

Town of Montague  
Department of Public Works

Cost / Benefit Analysis Summary

4/20/16

Item	Description	Cost Over the Life of the Building (50 Years)	Net Present Value
1	Construction Cost of a New 15,085 SF Storage Garage + 4,710 SF Canopy	\$ 4,872,778	\$ 4,517,765
2	Building Maintenance Costs	\$ 1,150,487	\$ 927,617
3	Heating, Ventilation, and Electrical Costs	\$ 1,391,138	\$ 1,109,371
	<b>Total Costs Associated with Building and Maintaining a Storage Garage:</b>	<b>\$ 7,414,402</b>	<b>\$ 6,554,753</b>
4	Additional Vehicle Maintenance Costs Associated with Exterior Storage	\$ 5,185,328	\$ 4,093,144
5	Additional Costs Associated with Vehicle Life Expectancy Reduction	\$ 6,340,840	\$ 5,200,133
6	Site Development Costs for Exterior Storage	\$ 419,769	\$ 389,186
7	Exterior Storage Area Maintenance Costs	\$ 1,037,685	\$ 814,034
8	Cold Weather Costs for Vehicles Stored Outdoors (non-productive labor)	\$ 2,344,048	\$ 1,850,322
9	Storm Event Costs for Vehicles Stored Outdoors (non-productive labor)	\$ 264,280	\$ 208,615
10	Engine Block Heater Usage Costs	\$ 507,383	\$ 400,513
11	Security Loading & Unloading of Vehicles (non-productive labor)	\$ 990,684	\$ 820,388
12	Vehicle Staging Non-Productive Labor Costs	\$ 52,297	\$ 41,282
13	Reduced Employee Safety Costs	\$ 178,794	\$ 141,134
14	Environmental Impacts	\$ 490,415	\$ 374,112
15	Increase in Vehicle Maintenance Costs Due to Delays in Preventative Maint.	\$ 861,220	\$ 679,822
	<b>Costs Associated with Storing Vehicles Outdoors:</b>	<b>\$ 18,672,743</b>	<b>\$ 15,012,686</b>
	<b>Additional Costs Incurred By the Town if Vehicles and Equipment are Stored Outdoors:</b>	<b>\$ 11,258,341</b>	<b>\$ 8,457,933</b>

**Note: Costs associated with reduced public safety due to delays associated with outdoor storage have not been included in this analysis**

Net Present Value (NPV) Discount Rate: 0.80%

Town of Montague  
 Department of Public Works  
 Cost / Benefit Analysis - Item 1 - Vehicle Storage Garage Cost  
 2016

AMOUNT FINANCED	DEBT SERV. YEARS	ESTIMATED INT. RATE
3,522,702	20	3.65%

Vehicle Storage Garage & Canopy Construction Cost with Soft Costs

	15,085	SF Garage
\$	169	Cost / SF
	4,710	SF Canopy
\$	82	Cost / SF
\$	2,935,585	Subtotal
\$	587,117	Gen. Condit. / Contingency (20%)
SAY: \$	3,522,702	TOTAL

Total Cost: \$ 4,872,778

NPV Total: \$ 4,517,765

				Total	Net Present Value
Year 1	Principal	\$	176,135		
	Interest	\$	128,579	\$ 304,714	\$ 302,295
Year 2	Principal	\$	176,135		
	Interest	\$	122,150	\$ 298,285	\$ 293,569
Year 3	Principal	\$	176,135		
	Interest	\$	115,721	\$ 291,856	\$ 284,962
Year 4	Principal	\$	176,135		
	Interest	\$	109,292	\$ 285,427	\$ 276,473
Year 5	Principal	\$	176,135		
	Interest	\$	102,863	\$ 278,998	\$ 268,101
Year 6	Principal	\$	176,135		
	Interest	\$	96,434	\$ 272,569	\$ 259,844
Year 7	Principal	\$	176,135		
	Interest	\$	90,005	\$ 266,140	\$ 251,702
Year 8	Principal	\$	176,135		
	Interest	\$	83,576	\$ 259,711	\$ 243,672
Year 9	Principal	\$	176,135		
	Interest	\$	77,147	\$ 253,282	\$ 235,755
Year 10	Principal	\$	176,135		
	Interest	\$	70,718	\$ 246,853	\$ 227,947

Town of Montague  
 Department of Public Works  
 Cost / Benefit Analysis - Item 1 - Vehicle Storage Garage Cost  
 2016

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\$	169	Cost / SF
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\$	2,935,585	Subtotal
\$	587,117	Gen. Condit. / Contingency (20%)
SAY: \$	3,522,702	TOTAL

Total Cost: \$ 4,872,778

NPV Total: \$ 4,517,765

			Total	Net Present Value
Year 11	Principal	\$ 176,135		
	Interest	\$ 64,289	\$ 240,424	\$ 220,248
Year 12	Principal	\$ 176,135		
	Interest	\$ 57,860	\$ 233,995	\$ 212,658
Year 13	Principal	\$ 176,135		
	Interest	\$ 51,431	\$ 227,567	\$ 205,174
Year 14	Principal	\$ 176,135		
	Interest	\$ 45,003	\$ 221,138	\$ 197,795
Year 15	Principal	\$ 176,135		
	Interest	\$ 38,574	\$ 214,709	\$ 190,520
Year 16	Principal	\$ 176,135		
	Interest	\$ 32,145	\$ 208,280	\$ 183,349
Year 17	Principal	\$ 176,135		
	Interest	\$ 25,716	\$ 201,851	\$ 176,279
Year 18	Principal	\$ 176,135		
	Interest	\$ 19,287	\$ 195,422	\$ 169,310
Year 19	Principal	\$ 176,135		
	Interest	\$ 12,858	\$ 188,993	\$ 162,441
Year 20	Principal	\$ 176,135		
	Interest	\$ 6,429	\$ 182,564	\$ 155,670

Town of Montague  
 Department of Public Works  
 Cost / Benefit Analysis - Item 1 - Vehicle Storage Garage Cost  
 2016

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3,522,702	20	3.65%

Vehicle Storage Garage & Canopy Construction Cost with Soft Costs

	15,085	SF Garage
\$	169	Cost / SF
	4,710	SF Canopy
\$	82	Cost / SF
\$	2,935,585	Subtotal
\$	587,117	Gen. Condit. / Contingency (20%)
SAY: \$	3,522,702	TOTAL

Total Cost: \$ 4,872,778

NPV Total: \$ 4,517,765

	Total	Net Present Value
Total: \$	4,872,778	\$ 4,517,765

**Town of Montague  
Department of Public Works  
Cost / Benefit Analysis - Item 2 - Building Maintenance Costs**

Average Employee Rate \$ 28.00  
Avg Annual Inflation Rate 3.0%  
Benefits Adjustment 1.5694  
2016

Building Maintenance Activity	A Frequency per year	B Average Maintenance Manhours per Occurrence	LABOR			PARTS		H Total Labor & Parts Cost per Year (1st Year) (E + G)	TOTAL		J Total Cost Over Life of Bldg (50 Years)	Net Present Value
			C Total Manhours per Year (A x B)	D Loaded Rate	E Total Labor Cost per Year (C x D)	F Parts Cost per Occurrence	G Total Parts Cost per Year (A x F)		I Total Cost Over 20 Year Period			
Yearly Preventative Maintenance Service	1	8	8	\$ 43.94	\$ 352	\$ 250	\$ 250	\$ 602	\$ 16,164	\$ 67,852	\$ 53,561	
Change Light Bulbs	2	8	16	\$ 43.94	\$ 703	\$ 100	\$ 200	\$ 903	\$ 24,266	\$ 101,866	\$ 80,410	
Unscheduled Repairs	2	16	32	\$ 43.94	\$ 1,406	\$ 500	\$ 1,000	\$ 2,406	\$ 64,655	\$ 271,410	\$ 214,243	
Replace Roof	One Occurrence @ year 25		--	--	--	--	--	--	--	\$ 207,345	\$ 171,254	
Repaint Exterior Items	0.20	80	16	\$ 43.94	\$ 703	\$ 100	\$ 20	\$ 723	\$ 19,430	\$ 81,562	\$ 64,383	
Repair / Replace Heating Elements after useful life of equipment	One Occurrence @ year 25		--	--	--	--	--	--	--	\$ 248,814	\$ 205,505	
Replace overhead doors after useful life	Four Occurrences - @ years 10, 20, 30 and y		--	--	--	--	--	--	--	\$ 171,637	\$ 138,261	
<b>TOTALS:</b>								\$ 4,634	\$ 124,515	\$ 1,150,487	\$ 927,617	

**Town of Montague  
 Department of Public Works  
 Cost / Benefit Analysis - Item 3 - Heating, Ventilation, & Electrical Costs  
 2016**

Energy Cost Estimate for a 10200 SF Vehicle Storage Garage

**January 2007 Energy Model Results for a 40,000 SF Vehicle Storage Garage**

Energy Model indicates total energy cost for heating a 40,000 SF garage @	10,000 \$ / Year	0.25 per SF
Adjust for 15,085 SF Vehicle Storage Garage	3,771 \$ / Year	
Adjust for Escalation to 2016 (20%)	4,526 \$ / Year	

**January 2007 Energy Model Results for a 40,000 SF Vehicle Storage Garage**

Energy Model Indicates total yearly electricity consumption @	157,000 kWh	3.925 kWh per SF
Adjust for 15,085 SF Vehicle Storage Garage	59,209 kWh	
Annual Electricity Consumption:	59,209 kWh	
Electricity Cost:	0.134 \$ / kWh	(per Bureau of Labor Statistics)
Annual Electricity Cost:	7,934 \$ / Year	

**Energy Cost Estimate for a 15,085 SF Vehicle Storage Garage:**

Annual Fuel Cost @	\$ 4,526 per year
Annual Elec Cost @	\$ 7,934 per year
Total	\$ 12,459 1st Year

Over life of bldg with 3% / yr inflation:	\$ 1,391,138
Net Present Value:	\$ 1,109,371

**Town of Montague  
Department of Public Works  
Cost / Benefit Analysis - Item 4 - Increased Vehicle Maintenance Costs**

Avg Annual Inflation Rate 3.0%  
Benefits Adjustment 1.5694  
Number of Large Vehicles 11  
Number of Small Vehicles 15  
Number of Pieces of Construction Equipment 4  
Average Employee Rate (loaded) \$ 39.63  
2016

Vehicle Type	Sheet	Maintenance Activity	FREQUENCY			D Average Maintenance Manhours per Occurrence	E Number of Vehicles or Equipment	LABOR			PARTS		TOTAL		M Total Cost Over Life of Bldg (50 Years)	Net Present Value
			A Estimated Occurrences per Year - Interior Storage  (per veh.)	B Estimated Occurrences per Year - Exterior Storage  (per veh.)	C Additional Occurrences per Year per Vehicle  (B - A)			F Total Manhours per Year  (C x D x E)	G Loaded Rate	H Total Labor Cost per Year  (F x G)	I Parts Cost per Occurrence per Vehicle	J Total Parts Cost per Year  (C x E x I)	K Total Labor & Parts Cost per Year (1st Year)  (H + J)	L Total Cost Over 20 Year Period		
Large Vehicles	1	Diagnose no start condition - remove, rebuild or replace starter motor	0.014	0.070	0.056	3	11	1.848	39.63	\$ 73	\$ 250	\$ 154	\$ 227	\$ 6,106	\$ 25,631	\$ 20,232
	2	Diagnose no start condition (diesel) - gelled fuel, start vehicles with either	0	0.43	0.43	2.5	11	11.825	39.63	\$ 469	\$ 15	\$ 71	\$ 540	\$ 14,498	\$ 60,859	\$ 48,040
	8	Repair windshield wiper system - replace wiper motors, repair or replace wiper linkage, replace wiper blades	0.06	0.39	0.33	2	11	7.26	39.63	\$ 288	\$ 100	\$ 363	\$ 651	\$ 17,484	\$ 73,396	\$ 57,937
	9	Repair hydraulic pumps, motors, gear boxes - change oil viscosity (summer/winter)	0	1	1	2.5	11	27.5	39.63	\$ 1,090	\$ 100	\$ 1,100	\$ 2,190	\$ 58,839	\$ 246,997	\$ 194,972
	10	Prepare vehicles for plow winter use - repair corroded electrical connections, clean rust from hydraulic pistons, replace frozen quick disconnects	2	3	1	2.5	11	27.5	39.63	\$ 1,090	\$ 100	\$ 1,100	\$ 2,190	\$ 58,839	\$ 246,997	\$ 194,972
	12	Repair brakes (air & hydraulic) on vehicles stored outdoors - brake shoes frozen to drums, calipers frozen to caliper frames	0	1	1	3.5	11	38.5	\$ 39.63	\$ 1,526	\$ 300	\$ 3,300	\$ 4,826	\$ 129,667	\$ 544,319	\$ 429,669
	13	Diagnose / repair frozen air systems	0	0.4	0	2	11	8.8	39.63	\$ 349	\$ 20	\$ 88	\$ 437	\$ 11,735	\$ 49,261	\$ 38,885
	14	Repair or replace tires other than normal wear and tear - dry rot, rusted rims	0.05	0.16	0.11	1	11	1.21	\$ 39.63	\$ 48	\$ 150	\$ 182	\$ 229	\$ 6,165	\$ 25,881	\$ 20,430
	15	Repair rust / rot - coat rust with special primers/paint, weld patches/panels	0.1	0.26	0	6.5	11	11.44	\$ 39.63	\$ 453	\$ 525	\$ 924	\$ 1,377	\$ 37,010	\$ 155,359	\$ 122,636
	16	Diagnose water in fuel in vehicles stored outdoors	0	0.26	0.26	1	11	2.86	\$ 39.63	\$ 113	\$ 15	\$ 43	\$ 156	\$ 4,198	\$ 17,623	\$ 13,911
	17	Replace hydraulic lines - fittings rusted, hoses dry rotted	0.05	1	0.95	2	11	20.9	\$ 39.63	\$ 828	\$ 100	\$ 1,045	\$ 1,873	\$ 50,334	\$ 211,292	\$ 166,788
	18	Check battery condition - recharge or replace	0.16	0.32	0.16	1	11	1.76	\$ 39.63	\$ 70	\$ 200	\$ 352	\$ 422	\$ 11,332	\$ 47,571	\$ 37,551
	19	Check alternator output	0.05	0.1	0.05	1.5	11	0.825	\$ 39.63	\$ 33	\$ 225	\$ 124	\$ 156	\$ 4,204	\$ 17,646	\$ 13,929

**Town of Montague  
Department of Public Works  
Cost / Benefit Analysis - Item 4 - Increased Vehicle Maintenance Costs**

Avg Annual Inflation Rate 3.0%  
Benefits Adjustment 1.5694  
Number of Large Vehicles 11  
Number of Small Vehicles 15  
Number of Pieces of Construction Equipment 4  
Average Employee Rate (loaded) \$ 39.63  
2016

Vehicle Type	Sheet	Maintenance Activity	FREQUENCY			D Average Maintenance Manhours per Occurrence	E Number of Vehicles or Equipment	LABOR			PARTS		K Total Labor & Parts Cost per Year (1st Year)	L Total Cost Over 20 Year Period	M Total Cost Over Life of Bldg (50 Years)	Net Present Value
			A Estimated Occurrences per Year - Interior Storage  (per veh.)	B Estimated Occurrences per Year - Exterior Storage  (per veh.)	C Additional Occurrences per Year per Vehicle  (B - A)			F Total Manhours per Year  (C x D x E)	G Loaded Rate	H Total Labor Cost per Year  (F x G)	I Parts Cost per Occurrence per Vehicle	J Total Parts Cost per Year  (C x E x I)				
Small Vehicles	8	Repair windshield wiper system - replace wiper motors, repair or replace wiper linkage, replace wiper blades	0.6	1.2	0.6	2	n/a	1.2	\$ 39.63	\$ 48	\$ 100	\$ 60	\$ 108	\$ 2,890	\$ 12,132	\$ 9,576
	9	Repair hydraulic pumps, motors, gear boxes - change oil viscosity (summer/winter)	0	1	1	2.5	15	37.5	39.63	\$ 1,486	\$ 100	\$ 1,500	\$ 2,986	\$ 80,236	\$ 336,814	\$ 265,871
	10	Prepare vehicles for plow winter use - repair corroded electrical connections, clean rust from hydraulic pistons, replace frozen quick disconnects	2	3	1	2.5	15	37.5	39.63	\$ 1,486	\$ 100	\$ 1,500	\$ 2,986	\$ 80,236	\$ 336,814	\$ 265,871
	11	Tune up vehicle stored outdoors - remove spark plugs frozen in engine, remove fuel filters frozen to fuel lines, replace ignition coils	0	0.21	0.21	10	15	31.5	\$ 39.63	\$ 1,248	\$ 500	\$ 1,575	\$ 2,823	\$ 75,862	\$ 318,455	\$ 251,379
	12	Repair brakes (air & hydraulic) on vehicles stored outdoors - brake shoes frozen to drums, calipers frozen to caliper frames	0	1	1	3.5	15	52.5	\$ 39.63	\$ 2,080	\$ 300	\$ 4,500	\$ 6,580	\$ 176,819	\$ 742,253	\$ 585,912
	14	Repair or replace tires other than normal wear and tear - dry rot, rusted rims	0.05	0.16	0.11	1	15	1.65	\$ 39.63	\$ 65	\$ 150	\$ 248	\$ 313	\$ 8,407	\$ 35,292	\$ 27,859
	15	Repair rust / rot - coat rust with special primers/paint, weld patches/panels	0.1	0.26	0.16	6.5	15	15.6	\$ 39.63	\$ 618	\$ 525	\$ 1,260	\$ 1,878	\$ 50,468	\$ 211,854	\$ 167,231
	16	Diagnose water in fuel in vehicles stored outdoors	0	0.26	0.26	1	15	3.9	\$ 39.63	\$ 155	\$ 15	\$ 59	\$ 213	\$ 5,725	\$ 24,031	\$ 18,969
	17	Replace hydraulic lines - fittings rusted, hoses dry rotted	0.05	1.00	0.95	2	15	28.5	\$ 39.63	\$ 1,129	\$ 100	\$ 1,425	\$ 2,554	\$ 68,637	\$ 288,126	\$ 227,438
	18	Check battery condition - recharge or replace	0.16	0.32	0.16	1	15	2.4	\$ 39.63	\$ 95	\$ 200	\$ 480	\$ 575	\$ 15,453	\$ 64,870	\$ 51,207
	19	Check alternator output	0.05	0.1	0.05	1.5	15	1.125	\$ 39.63	\$ 45	\$ 225	\$ 169	\$ 213	\$ 5,732	\$ 24,063	\$ 18,995
	20	Replace leaking brake / fuel lines	0	0.24	0.24	5	15	18	\$ 39.63	\$ 713	\$ 100	\$ 360	\$ 1,073	\$ 28,840	\$ 121,064	\$ 95,564



**Town of Montague  
Department of Public Works  
Cost / Benefit Analysis - Item 4 - Increased Vehicle Maintenance Costs**

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Benefits Adjustment 1.5694  
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Number of Small Vehicles 15  
Number of Pieces of Construction Equipment 4  
Average Employee Rate (loaded) \$ 39.63  
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Vehicle Type	Sheet	Maintenance Activity	FREQUENCY			D Average Maintenance Manhours per Occurrence	E Number of Vehicles or Equipment	LABOR			PARTS		TOTAL		M Total Cost Over Life of Bldg (50 Years)	Net Present Value
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Construction Equipment	3	Repair or replace trailer electrical connectors	0	1	1	1	1	1	\$ 39.63	\$ 40	\$ 35	\$ 35	\$ 75	\$ 2,005	\$ 8,418	\$ 6,645
	4	Prepare small equipment - engine seized due to water, engine oil contaminated with water, repair electronic ignition system	0	1	1	4	1	4	\$ 39.63	\$ 159	\$ 275	\$ 275	\$ 434	\$ 11,649	\$ 48,899	\$ 38,599
	--	Not Used			0			0	\$ 39.63	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -
	6	Prepare sweepers for spring use - repair/replace frozen water pumps, replace damaged water lines	0	1	1	8	0	0	\$ 39.63	\$ -	\$ 200	\$ -	\$ -	\$ -	\$ -	\$ -
	7	Prepare sanders stored outdoors for winter use. Free up frozen conveyors and replace hydraulic quick disconnects	0	2	2	8	2	32	\$ 39.63	\$ 1,268	\$ 300	\$ 1,200	\$ 2,468	\$ 66,318	\$ 278,391	\$ 219,754
	9	Repair hydraulic pumps, motors, gear boxes - change oil viscosity (summer/winter)	0	1	1	2.5	4	10	39.63	\$ 396	\$ 100	\$ 400	\$ 796	\$ 21,396	\$ 89,817	\$ 70,899
	11	Tune up equipment stored outdoors - remove spark plugs frozen in engine, remove fuel filters frozen to fuel lines, replace ford ignition coils	0	0.21	0.21	10	4	8.4	\$ 39.63	\$ 333	\$ 500	\$ 420	\$ 753	\$ 20,230	\$ 84,921	\$ 67,034
	12	Repair brakes (air & hydraulic) on vehicles stored outdoors - brake shoes frozen to drums, calipers frozen to caliper frames	0	1	1	3.5	4	14	\$ 39.63	\$ 555	\$ 300	\$ 1,200	\$ 1,755	\$ 47,152	\$ 197,934	\$ 156,243
	13	Diagnose / repair frozen air systems	0	0.4	0	2	4	3.2	\$ 39.63	\$ 127	\$ 20	\$ 32	\$ 159	\$ 4,267	\$ 17,913	\$ 14,140
	14	Repair or replace tires other than normal wear and tear - dry rot, rusted rims	0.05	0.16	0	1	4	0.44	\$ 39.63	\$ 17	\$ 150	\$ 66	\$ 83	\$ 2,242	\$ 9,411	\$ 7,429
	15	Repair rust / rot - coat rust with special primers/paint, weld patches/panels	0.1	0.26	0.2	6.5	4	4.16	\$ 39.63	\$ 165	\$ 525	\$ 336	\$ 501	\$ 13,458	\$ 56,494	\$ 44,595
	16	Diagnose water in fuel in vehicles stored outdoors	0	0.26	0.26	1	4	1.04	\$ 39.63	\$ 41	\$ 15	\$ 16	\$ 57	\$ 1,527	\$ 6,408	\$ 5,058
	17	Replace hydraulic lines - fittings rusted, hoses dry rotted	0.05	1.00	0.95	2	4	7.6	\$ 39.63	\$ 301	\$ 100	\$ 380	\$ 681	\$ 18,303	\$ 76,834	\$ 60,650
	18	Check battery condition - recharge or replace	0.16	0.32	0.16	1	15	2.4	\$ 39.63	\$ 95	\$ 200	\$ 480	\$ 575	\$ 15,453	\$ 64,870	\$ 51,207
	19	Check alternator output	0.05	0.1	0.05	1.5	4	0.3	\$ 39.63	\$ 12	\$ 225	\$ 45	\$ 57	\$ 1,529	\$ 6,417	\$ 5,065
	<b>TOTALS:</b>											\$ 45,970	\$ 1,235,245	\$ 5,185,328	\$ 4,093,144	

Town of Montague  
 Department of Public Works  
 Item 5 - Cost/Benefit Analysis

Baseline Vehicle/Equipment Replacement Costs  
 (Based on a Fleet of 34 Vehicles)

Recommended Average DPW Vehicle Life Expectancy (years) 11  
 3.0%

2016

Vehicle #	Description	Purchase Date	Purchase Price	Replacement Date	Estimated Replacement Cost	Estimated Replacement			Estimated Replacement			Estimated Replacement			Estimated Replacement																			
						year	NPV	Cost	year	NPV	Cost	year	NPV	Cost	year	NPV	Cost																	
A3	Ford Sedan	1997	\$ 24,000	2008	\$ 33,222	2	\$ 32,696	2019	\$ 45,986	13	\$ 41,461	2030	\$ 63,656	24	\$ 52,576	2041	\$ 88,115	35	\$ 66,670	2052	\$ 121,972	46	\$ 84,542											
A4	F150 Pick-up	1998	\$ 17,000	2009	\$ 23,532	3	\$ 22,976	2020	\$ 32,574	14	\$ 29,135	2031	\$ 45,090	25	\$ 36,946	2042	\$ 62,415	36	\$ 46,850	2053	\$ 86,397	47	\$ 59,409											
H1	F350 Pick-up	2003	\$ 39,686	2014	\$ 54,935	8	\$ 51,542	2025	\$ 76,042	19	\$ 65,359	2036	\$ 105,261	30	\$ 82,880	2047	\$ 145,705	41	\$ 105,098	2058	n/a	-	-											
H2	F350 Pick-up	1998	\$ 32,625	2009	\$ 45,161	3	\$ 44,094	2020	\$ 62,513	14	\$ 55,914	2031	\$ 86,532	25	\$ 70,903	2042	\$ 119,781	26	\$ 97,368	2053	\$ 165,805	47	\$ 114,013											
H3	F150 Pick-up	1993	\$ 18,500	2006	\$ 27,168	-	\$ 27,168	2017	\$ 37,607	11	\$ 34,451	2028	\$ 52,056	22	\$ 43,686	2039	\$ 72,058	33	\$ 55,397	2050	\$ 99,746	44	\$ 70,247											
H4	International Dump Truck 4700	2000	\$ 63,810	2011	\$ 88,328	5	\$ 84,878	2022	\$ 122,267	16	\$ 107,631	2033	\$ 169,246	27	\$ 136,484	2044	\$ 234,275	38	\$ 173,072	2055	\$ 324,292	49	\$ 219,467											
H5	F350 Pick-up	1996	\$ 19,187	2007	\$ 29,022	1	\$ 28,792	2018	\$ 40,173	12	\$ 36,510	2029	\$ 55,609	23	\$ 46,297	2040	\$ 76,976	34	\$ 58,708	2051	\$ 106,553	45	\$ 74,446											
H10	Mack Sander	1978	\$ 18,000	2006	\$ 110,000	-	\$ 110,000	2017	\$ 152,266	11	\$ 139,488	2028	\$ 210,771	22	\$ 176,880	2039	\$ 291,757	33	\$ 224,297	2050	\$ 403,860	44	\$ 284,425											
H11	L8000 Dump/Sander	1997	\$ 93,500	2008	\$ 129,426	2	\$ 127,380	2019	\$ 179,156	13	\$ 161,526	2030	\$ 247,993	24	\$ 204,827	2041	\$ 343,281	35	\$ 259,735	2052	\$ 475,181	46	\$ 329,363											
H12	Sterling L9500 Dump/Sander	2001	\$ 94,400	2012	\$ 130,672	6	\$ 124,571	2023	\$ 180,880	17	\$ 157,965	2034	\$ 250,380	28	\$ 200,311	2045	\$ 346,585	39	\$ 254,009	2056	\$ 479,755	50	\$ 322,102											
H14	Mack R487 Dump/Sander	1985	\$ 20,000	2006	\$ 110,000	-	\$ 110,000	2017	\$ 152,266	11	\$ 139,488	2028	\$ 210,771	22	\$ 176,880	2039	\$ 291,757	33	\$ 224,297	2050	\$ 403,860	44	\$ 284,425											
H20	John Deere Loader	2006	\$ 119,953	2017	\$ 166,043	11	\$ 152,109	2028	\$ 229,842	22	\$ 192,885	2039	\$ 318,156	33	\$ 244,592	2050	\$ 440,402	44	\$ 310,160	2061	n/a	-	-											
H21	John Deere Loader	2006	\$ 127,825	2017	\$ 176,940	11	\$ 162,091	2028	\$ 244,926	22	\$ 205,543	2039	\$ 339,035	33	\$ 260,643	2050	\$ 469,303	44	\$ 330,514	2061	n/a	-	-											
H22	Bombardier Sidewalk Tractor	1994	\$ 50,000	2006	\$ 71,288	-	\$ 71,288	2017	\$ 98,679	11	\$ 90,398	2028	\$ 136,595	22	\$ 114,631	2039	\$ 189,080	33	\$ 145,361	2050	\$ 261,731	44	\$ 184,328											
H23	Trackless Sidewalk Tractor	2000	\$ 82,548	2011	\$ 114,266	5	\$ 109,803	2022	\$ 158,171	16	\$ 139,238	2033	\$ 212,945	27	\$ 176,563	2044	\$ 303,071	38	\$ 223,895	2055	\$ 419,521	49	\$ 283,915											
C1	F250 Pick-up	2001	\$ 35,000	2012	\$ 48,448	6	\$ 46,186	2023	\$ 67,064	17	\$ 58,568	2034	\$ 92,832	28	\$ 74,268	2045	\$ 128,501	39	\$ 94,177	2056	\$ 177,875	50	\$ 119,423											
C2	F350 Diesel Pick-up	1997	\$ 41,000	2008	\$ 56,754	2	\$ 55,856	2019	\$ 78,560	13	\$ 70,830	2030	\$ 108,746	24	\$ 89,817	2041	\$ 150,530	35	\$ 113,895	2052	\$ 208,368	46	\$ 144,426											
C3	F350 Dump	2003	\$ 46,500	2014	\$ 64,367	8	\$ 60,392	2025	\$ 89,099	19	\$ 76,581	2036	\$ 123,334	30	\$ 97,110	2047	\$ 170,723	41	\$ 123,143	2058	n/a	-	-											
C20	John Deere 210C Backhoe	1988	\$ 25,000	2006	\$ 42,561	-	\$ 42,561	2017	\$ 58,914	11	\$ 53,970	2028	\$ 81,551	22	\$ 68,438	2039	\$ 112,886	33	\$ 86,784	2050	\$ 156,260	44	\$ 110,049											
S2	F250 Pick-up	1996	\$ 29,000	2007	\$ 40,143	1	\$ 39,824	2018	\$ 55,567	12	\$ 50,500	2029	\$ 76,918	23	\$ 64,037	2040	\$ 106,472	34	\$ 81,204	2051	\$ 147,382	45	\$ 102,973											
S3	F350 Dump	1990	\$ 14,000	2006	\$ 30,000	-	\$ 30,000	2017	\$ 41,527	11	\$ 38,042	2028	\$ 57,483	22	\$ 48,240	2039	\$ 79,570	33	\$ 61,172	2050	\$ 110,144	44	\$ 77,570											
S4	F550 Dump	2003	\$ 30,326	2014	\$ 41,978	8	\$ 39,386	2025	\$ 58,108	19	\$ 49,944	2036	\$ 80,435	30	\$ 63,333	2047	\$ 111,340	41	\$ 80,310	2058	n/a	-	-											
S10	Mack Dump/Sander	1999	\$ 97,120	2010	\$ 134,437	4	\$ 130,219	2021	\$ 186,092	15	\$ 165,128	2032	\$ 257,595	26	\$ 209,394	2043	\$ 356,571	37	\$ 265,526	2054	\$ 493,578	48	\$ 336,706											
S11	Mack Dump/CB Cleaner	1999	\$ 95,900	2010	\$ 131,502	4	\$ 127,377	2021	\$ 182,030	15	\$ 161,523	2032	\$ 251,972	26	\$ 204,823	2043	\$ 348,788	37	\$ 259,730	2054	\$ 482,804	48	\$ 329,356											
S12	Dump/Sander L8501	1998	\$ 103,914	2009	\$ 143,841	3	\$ 140,444	2020	\$ 199,110	14	\$ 178,092	2031	\$ 275,615	25	\$ 225,834	2042	\$ 381,515	36	\$ 286,373	2053	\$ 528,106	47	\$ 363,142											
S13	Mack Sander	1983	\$ 20,000	2006	\$ 110,000	-	\$ 110,000	2017	\$ 152,266	11	\$ 139,488	2028	\$ 210,771	22	\$ 176,880	2039	\$ 291,757	33	\$ 224,297	2050	\$ 403,860	44	\$ 284,425											
S20	Backhoe	2000	\$ 71,739	2011	\$ 99,304	5	\$ 95,425	2022	\$ 137,459	16	\$ 121,006	2033	\$ 190,276	27	\$ 153,444	2044	\$ 263,386	38	\$ 194,578	2055	\$ 364,588	49	\$ 246,738											
S21	Sweeper	1995	\$ 90,300	2006	\$ 124,996	-	\$ 124,996	2017	\$ 173,024	11	\$ 158,504	2028	\$ 239,506	22	\$ 200,995	2039	\$ 331,532	33	\$ 254,875	2050	\$ 458,918	44	\$ 323,200											
S22	Sweeper	2001	\$ 100,000	2012	\$ 138,423	6	\$ 131,961	2023	\$ 191,610	17	\$ 167,336	2034	\$ 265,234	28	\$ 212,194	2045	\$ 367,145	39	\$ 269,077	2056	\$ 508,215	50	\$ 341,209											
S30	Sewer Jet / Water Jet	1997	\$ 26,215	2008	\$ 36,288	2	\$ 35,714	2019	\$ 50,231	13	\$ 45,288	2030	\$ 69,531	24	\$ 57,428	2041	\$ 96,247	35	\$ 72,823	2052	\$ 133,229	46	\$ 92,345											
VM1	F450 Pick-up	2001	\$ 40,000	2012	\$ 55,369	6	\$ 52,784	2023	\$ 76,644	17	\$ 66,934	2034	\$ 106,093	28	\$ 84,878	2045	\$ 146,858	39	\$ 107,631	2056	\$ 203,286	50	\$ 136,484											
W1	F150 Pick-up	2000	\$ 21,000	2011	\$ 29,069	5	\$ 27,934	2022	\$ 40,238	16	\$ 35,422	2033	\$ 55,699	27	\$ 44,917	2044	\$ 77,100	38	\$ 56,958	2055	\$ 106,725	49	\$ 72,227											
W2	F350 Pick-up	1995	\$ 24,000	2006	\$ 33,222	-	\$ 33,222	2017	\$ 45,986	11	\$ 42,127	2028	\$ 63,656	22	\$ 53,421	2039	\$ 88,115	33	\$ 67,741	2050	\$ 121,972	44	\$ 85,900											
W3	F350 Utility Vehicle	2003	\$ 39,716	2014	\$ 54,976	8	\$ 51,581	2025	\$ 76,100	19	\$ 65,409	2036	\$ 105,340	30	\$ 82,943	2047	\$ 145,815	41	\$ 105,177	2058	n/a	-	-											
Subtotals:					\$ 2,725,679	NPV \$ 2,635,251	Subtotals:					\$ 3,772,977	NPV \$ 3,341,686	Subtotals:					\$ 5,222,682	NPV \$ 4,237,495	Subtotals:					\$ 7,229,414	NPV \$ 5,380,903	Subtotals:					\$ 7,953,981	NPV #####

\$ 2,243,906

Total Replacement Costs Based on 11 Year Vehicle Life Expectancy:	\$ 26,904,732	(50 yr period)	\$ 1,816,067	1469803	1202566	813910
NPV:	\$ 21,072,189					

**Town of Montague**  
**Department of Public Works**  
**Item 5 - Cost/Benefit Analysis**

**2 Year Reduction in Vehicle & Equipment Life**

Recommended Average DPW Vehicle Life Expectancy (years) 11  
 Reduced Average DPW Vehicle Life Expectancy (years) 9

3.0%

Discount Rate 0.8%

2016

Vehicle #	Description	Purchase Date	Purchase Price	Replacement Date	Estimated Replacement Cost	Estimated Replacement Cost		Replacement Date	Estimated Replacement Cost	Estimated Replacement Cost		Replacement Date	Estimated Replacement Cost	Estimated Replacement Cost		Replacement Date	Estimated Replacement Cost	Estimated Replacement Cost		Replacement Date	Estimated Replacement Cost																																
						year	NPV			year	NPV			year	NPV			year	NPV			year	NPV																														
A3	Ford Sedan	1997	\$ 24,000	2006	\$ 31,315	-	\$ 31,315	2015	\$ 40,858	9	\$ 38,031	2024	\$ 53,311	18	\$ 46,188	2033	\$ 69,559	27	\$ 56,094	2042	\$ 90,758	36	\$ 68,125	2051	\$ 118,419	45	\$ 82,737																										
A4	F150 Pick-up	1998	\$ 17,000	2007	\$ 22,181	1	\$ 22,005	2016	\$ 28,941	10	\$ 26,725	2025	\$ 37,762	19	\$ 32,457	2034	\$ 49,271	28	\$ 39,418	2043	\$ 64,287	37	\$ 47,872	2052	\$ 83,880	46	\$ 58,140																										
H1	F350 Pick-up	2003	\$ 39,686	2012	\$ 51,781	6	\$ 49,364	2021	\$ 67,563	15	\$ 59,951	2030	\$ 88,154	24	\$ 72,810	2039	\$ 115,021	33	\$ 88,423	2048	\$ 150,076	42	\$ 107,392	2057	n/a	-	-																										
H2	F350 Pick-up	1998	\$ 32,625	2007	\$ 42,568	1	\$ 42,230	2016	\$ 55,542	10	\$ 51,288	2025	\$ 72,470	19	\$ 62,288	2034	\$ 94,556	28	\$ 75,648	2043	\$ 123,375	37	\$ 91,873	2052	\$ 160,976	46	\$ 111,577																										
H3	F150 Pick-up	1993	\$ 18,500	2006	\$ 27,168	-	\$ 27,168	2015	\$ 35,448	9	\$ 32,995	2024	\$ 46,251	18	\$ 40,072	2033	\$ 60,348	27	\$ 48,666	2042	\$ 78,740	36	\$ 59,104	2051	\$ 102,738	45	\$ 71,781																										
H4	International Dump Truck 4700	2000	\$ 63,810	2009	\$ 83,258	3	\$ 81,291	2018	\$ 108,632	12	\$ 98,726	2027	\$ 141,740	21	\$ 119,901	2036	\$ 184,939	30	\$ 145,617	2045	\$ 241,304	39	\$ 176,849	2054	\$ 314,847	48	\$ 214,780																										
H5	F350 Pick-up	1992	\$ 19,187	2006	\$ 29,022	-	\$ 29,022	2015	\$ 37,867	9	\$ 35,247	2024	\$ 49,408	18	\$ 42,806	2033	\$ 64,466	27	\$ 51,987	2042	\$ 84,114	36	\$ 63,138	2051	\$ 109,750	45	\$ 76,680																										
H10	Mack Sander	1978	\$ 18,000	2006	\$ 110,000	-	\$ 110,000	2015	\$ 143,525	9	\$ 133,593	2024	\$ 187,268	18	\$ 162,246	2033	\$ 244,342	27	\$ 197,044	2042	\$ 318,811	36	\$ 239,306	2051	\$ 415,976	45	\$ 290,632																										
H11	L800 Dump/Sander	1997	\$ 93,500	2006	\$ 121,996	-	\$ 121,996	2015	\$ 159,177	9	\$ 148,162	2024	\$ 207,691	18	\$ 179,940	2033	\$ 270,989	27	\$ 218,533	2042	\$ 353,579	36	\$ 265,404	2051	\$ 461,341	45	\$ 322,338																										
H12	Sterling L5500 Dump/Sander	2001	\$ 94,400	2010	\$ 123,171	4	\$ 119,307	2019	\$ 160,710	13	\$ 144,896	2028	\$ 209,690	22	\$ 175,973	2037	\$ 273,597	31	\$ 213,715	2046	\$ 356,983	40	\$ 259,553	2055	\$ 465,781	49	\$ 315,222																										
H14	Mack R487 Dump/Sander	1985	\$ 20,000	2006	\$ 110,000	-	\$ 110,000	2015	\$ 143,525	9	\$ 133,593	2024	\$ 187,268	18	\$ 162,246	2033	\$ 244,342	27	\$ 197,044	2042	\$ 318,811	36	\$ 239,306	2051	\$ 415,976	45	\$ 290,632																										
H20	John Deere Loader	2006	\$ 119,953	2015	\$ 156,511	9	\$ 145,680	2024	\$ 204,212	18	\$ 176,926	2033	\$ 266,450	27	\$ 214,873	2042	\$ 347,657	36	\$ 260,959	2051	\$ 453,614	45	\$ 316,929	2060	n/a	-	-																										
H21	John Deere Loader	2006	\$ 127,825	2015	\$ 166,783	9	\$ 155,241	2024	\$ 217,614	18	\$ 188,537	2033	\$ 283,936	27	\$ 228,974	2042	\$ 370,472	36	\$ 278,084	2051	\$ 483,382	45	\$ 337,728	2060	n/a	-	-																										
H22	Bombardier Sidewalk Tractor	1994	\$ 50,000	2006	\$ 71,288	-	\$ 71,288	2015	\$ 93,015	9	\$ 86,578	2024	\$ 121,363	18	\$ 105,147	2033	\$ 158,351	27	\$ 127,690	2042	\$ 206,813	36	\$ 155,088	2051	\$ 269,583	45	\$ 188,351																										
H23	Trackless Sidewalk Tractor	2000	\$ 82,548	2009	\$ 107,706	3	\$ 105,162	2018	\$ 140,532	12	\$ 127,717	2027	\$ 183,963	21	\$ 155,110	2036	\$ 239,247	30	\$ 188,378	2045	\$ 312,163	39	\$ 228,782	2054	\$ 407,302	48	\$ 277,850																										
C1	F250 Pick-up	2001	\$ 35,000	2010	\$ 45,667	4	\$ 44,234	2019	\$ 59,585	13	\$ 53,722	2028	\$ 77,745	22	\$ 65,244	2037	\$ 101,440	31	\$ 79,238	2046	\$ 132,356	40	\$ 96,233	2055	\$ 172,694	49	\$ 116,872																										
C2	F350 Diesel Pick-up	1997	\$ 41,000	2006	\$ 53,496	-	\$ 53,496	2015	\$ 69,800	9	\$ 64,969	2024	\$ 91,073	18	\$ 78,904	2033	\$ 118,829	27	\$ 95,827	2042	\$ 155,045	36	\$ 116,380	2051	\$ 202,299	45	\$ 141,342																										
C3	F350 Dump	2003	\$ 46,500	2012	\$ 60,672	6	\$ 57,840	2021	\$ 79,163	15	\$ 70,245	2030	\$ 103,290	24	\$ 85,311	2039	\$ 134,770	33	\$ 103,609	2048	\$ 175,844	42	\$ 125,830	2057	n/a	-	-																										
C20	John Deere 210C Backhoe	1988	\$ 25,000	2006	\$ 42,561	-	\$ 42,561	2015	\$ 55,532	9	\$ 51,689	2024	\$ 72,457	18	\$ 62,776	2033	\$ 94,540	27	\$ 76,240	2042	\$ 123,353	36	\$ 92,591	2051	\$ 160,948	45	\$ 112,450																										
S2	F250 Pick-up	1996	\$ 29,000	2006	\$ 38,974	-	\$ 38,974	2015	\$ 50,852	9	\$ 47,333	2024	\$ 66,350	18	\$ 57,484	2033	\$ 86,572	27	\$ 69,814	2042	\$ 112,956	36	\$ 84,787	2051	\$ 147,392	45	\$ 102,973																										
S3	F350 Dump	1990	\$ 14,000	2006	\$ 30,000	-	\$ 30,000	2015	\$ 39,143	9	\$ 36,434	2024	\$ 51,073	18	\$ 44,249	2033	\$ 66,639	27	\$ 53,739	2042	\$ 86,948	36	\$ 65,265	2051	\$ 113,448	45	\$ 79,283																										
S4	F550 Dump	2003	\$ 30,326	2012	\$ 39,569	6	\$ 37,721	2021	\$ 51,628	15	\$ 45,812	2030	\$ 67,363	24	\$ 55,637	2039	\$ 87,893	33	\$ 67,571	2048	\$ 114,681	42	\$ 82,063	2057	n/a	-	-																										
S10	Mack Dump/Sander	1999	\$ 97,120	2008	\$ 126,720	2	\$ 124,716	2017	\$ 165,340	11	\$ 151,465	2026	\$ 215,732	20	\$ 183,951	2035	\$ 281,481	29	\$ 223,405	2044	\$ 367,269	38	\$ 271,321	2053	\$ 479,202	47	\$ 329,514																										
S11	Mack Dump/CB Cleaner	1999	\$ 95,000	2008	\$ 123,953	2	\$ 121,994	2017	\$ 161,731	11	\$ 148,159	2026	\$ 211,022	20	\$ 179,936	2035	\$ 275,336	29	\$ 218,529	2044	\$ 359,252	38	\$ 265,399	2053	\$ 468,742	47	\$ 322,321																										
S12	Dump/Sander L8501	1998	\$ 103,914	2007	\$ 135,584	1	\$ 134,508	2016	\$ 176,907	10	\$ 163,357	2025	\$ 230,823	19	\$ 198,394	2034	\$ 301,172	28	\$ 240,948	2043	\$ 392,961	37	\$ 292,624	2052	\$ 512,725	46	\$ 355,386																										
S13	Mack Sander	1983	\$ 20,000	2006	\$ 110,000	-	\$ 110,000	2015	\$ 143,525	9	\$ 133,593	2024	\$ 187,268	18	\$ 162,246	2033	\$ 244,342	27	\$ 197,044	2042	\$ 318,811	36	\$ 239,306	2051	\$ 415,976	45	\$ 290,632																										
S20	Backhoe	2000	\$ 71,739	2009	\$ 93,603	3	\$ 91,392	2018	\$ 122,131	12	\$ 110,994	2027	\$ 159,353	21	\$ 134,800	2036	\$ 207,920	30	\$ 163,712	2045	\$ 271,288	39	\$ 198,824	2054	\$ 353,969	48	\$ 241,468																										
S21	Sweeper	1995	\$ 90,300	2006	\$ 124,996	-	\$ 124,996	2015	\$ 163,092	3	\$ 159,239	2024	\$ 212,798	18	\$ 184,365	2033	\$ 277,653	27	\$ 223,907	2042	\$ 362,274	36	\$ 271,931	2051	\$ 472,686	45	\$ 330,254																										
S22	Sweeper	2001	\$ 100,000	2010	\$ 130,477	4	\$ 126,384	2019	\$ 170,243	13	\$ 153,491	2028	\$ 222,129	22	\$ 186,412	2037	\$ 289,828	31	\$ 226,393	2046	\$ 378,160	40	\$ 274,950	2055	\$ 493,412	49	\$ 333,921																										
S30	Sewer Jet / Water Jet	1997	\$ 26,215	2006	\$ 34,205	-	\$ 34,205	2015	\$ 44,629	9	\$ 41,541	2024	\$ 58,231	18	\$ 50,450	2033	\$ 76,978	27	\$ 61,271	2042	\$ 99,135	36	\$ 74,412	2051	\$ 129,348	45	\$ 90,372																										
VM1	F450 Pick-up	2001	\$ 40,000	2010	\$ 52,191	4	\$ 50,554	2019	\$ 68,097	13	\$ 61,396	2028	\$ 88,852	22	\$ 74,565	2037	\$ 115,931	31	\$ 90,557	2046	\$ 151,284	40	\$ 109,980	2055	\$ 197,365	49	\$ 133,569																										
W1	F150 Pick-up	2000	\$ 21,000	2009	\$ 27,400	3	\$ 26,753	2018	\$ 35,751	12	\$ 32,491	2027	\$ 46,647	21	\$ 39,460	2036	\$ 60,864	30	\$ 47,923	2045	\$ 79,414	39	\$ 58,201	2054	\$ 103,617	48	\$ 70,684																										
W2	F350 Pick-up	1995	\$ 24,000	2006	\$ 33,222	-	\$ 33,222	2015	\$ 43,347	9	\$ 40,347	2024	\$ 56,558	18	\$ 49,001	2033	\$ 73,795	27	\$ 59,510	2042	\$ 96,285	36	\$ 72,274	2051	\$ 125,631	45	\$ 87,775																										
W3	F350 Utility Vehicle	2003	\$ 39,716	2012	\$ 51,820	6	\$ 49,401	2021	\$ 67,614	15	\$ 59,997	2030	\$ 88,221	24	\$ 72,865	2039	\$ 115,108	33	\$ 88,493	2048	\$ 150,190	42	\$ 107,473	2057	n/a	-	-																										
Subtotals:						\$ 2,609,858	NPV \$ 2,554,020	\$ 2,305,585	Subtotals:						\$ 3,405,272	NPV \$ 3,109,238	\$ 1,974,910	Subtotals:						\$ 4,443,108	NPV \$ 3,767,079	\$ 1,630,982	Subtotals:						\$ 5,797,248	NPV \$ 4,575,041	\$ 1,371,751	Subtotals:						\$ 7,564,094	NPV \$ 5,556,293	\$ 1,153,736	Subtotals:						\$ 7,876,010	NPV #####	\$ 818,641

Total Replacement Costs Based on 9 Year Vehicle Life Expectancy (50 yr Period):	\$ 31,695,589
DIFF (2 years):	\$ 4,790,857
Cost for 1 year:	\$ 2,395,428
Additional Cost per Vehicle Each Year:	\$ 70,454
Additional Cost For Fleet of 30 Per Year:	\$ 2,113,613
Additional Cost for Fleet of 30 for 3 Years:	\$ 6,340,840
Total Replacement Costs Based on 11 Year Vehicle Life Expectancy (50 yr Period):	\$ 26,904,732

Total Replacement Costs for 9 Year Vehicle Life Expectancy:	\$ 25,001,178
DIFF:	\$ 3,928,989
Cost for 1 year:	\$ 1,964,495
Additional Cost per Vehicle Each Year:	\$ 57,779
Additional Cost For Fleet of 30 Per Year:	\$ 1,733,378
Additional Cost for Fleet of 30 for 3 Years:	\$ 5,200,133
Total Replacement Costs for 11 Year Vehicle Life Expectancy:	\$ 21,072,189

**Town of Montague  
Department of Public Works  
Cost/Benefit Analysis - Item 6 - Site Development Costs for Exterior Vehicle Storage Area**

Note: Cost to construct and maintain and exterior parking area over the life of the building

2016

Description	Quantity	Unit	Unit Cost	TOTAL (No OH&P)	TOTAL (Incl. OH&P)
DIVISION 2 - SITE WORK					
<u>GENERAL SITE WORK</u>					
Earth Excavation Site	733	CY	\$11.50	\$8,431.20	\$9,442.95
Formation of Subgrade	2199	SY	\$3.45	\$7,588.08	\$8,498.65
Finish Grading	2199	SY	\$1.15	\$2,529.36	\$2,832.88
Concrete Curb	870	LF	\$34.50	\$30,015.00	\$33,616.80
Processed Aggregate Base	1188	TN	\$40.25	\$47,804.93	\$53,541.52
Bituminous Concrete (4" pavement) Yard Area	493	TN	\$103.50	\$50,991.92	\$57,110.95
Underground Drainage System	1	LS	\$46,000.00	\$46,000.00	\$51,520.00
Site Lighting	1	LS	\$11,500.00	\$11,500.00	\$12,880.00
				<b>Subtotal:</b>	<b>\$229,444</b>
<b>Area/Dimensions to be adjusted for formulas above</b>					
Area	19795	SF			
Dim Garage	95	155	<b>General Condit. (8.5%)</b>		
Dim Canopy	30	155	<b>\$19,503</b>		
				<b>Subtotal</b>	<b>\$248,946</b>
				<b>Contingency (15%)</b>	
				<b>\$37,342</b>	
				<b>Escalation (6%):</b>	
				<b>\$17,177</b>	
				<b>Total:</b>	<b>\$303,466</b>

			Total	Net Present Value
Year 1	Principal	\$ 15,173		
	Interest	\$ 11,076	\$ 26,250	\$ 26,041
Year 2	Principal	\$ 15,173		
	Interest	\$ 10,523	\$ 25,696	\$ 25,290
Year 3	Principal	\$ 15,173		
	Interest	\$ 9,969	\$ 25,142	\$ 24,548
Year 4	Principal	\$ 15,173		
	Interest	\$ 9,415	\$ 24,588	\$ 23,817
Year 5	Principal	\$ 15,173		
	Interest	\$ 8,861	\$ 24,034	\$ 23,096
Year 6	Principal	\$ 15,173		
	Interest	\$ 8,307	\$ 23,481	\$ 22,384
Year 7	Principal	\$ 15,173		
	Interest	\$ 7,754	\$ 22,927	\$ 21,683
Year 8	Principal	\$ 15,173		
	Interest	\$ 7,200	\$ 22,373	\$ 20,991
Year 9	Principal	\$ 15,173		
	Interest	\$ 6,646	\$ 21,819	\$ 20,309
Year 10	Principal	\$ 15,173		

**Town of Montague  
Department of Public Works  
Cost/Benefit Analysis - Item 6 - Site Development Costs for Exterior Vehicle Storage Area**

Note: Cost to construct and maintain and exterior parking area over the life of the building

	Interest	\$	6,092	\$	21,265	\$	19,637
Year 11	Principal	\$	15,173				
	Interest	\$	5,538	\$	20,712	\$	18,973
Year 12	Principal	\$	15,173				
	Interest	\$	4,984	\$	20,158	\$	18,320
Year 13	Principal	\$	15,173				
	Interest	\$	4,431	\$	19,604	\$	17,675
Year 14	Principal	\$	15,173				
	Interest	\$	3,877	\$	19,050	\$	17,039
Year 15	Principal	\$	15,173				
	Interest	\$	3,323	\$	18,496	\$	16,413
Year 16	Principal	\$	15,173				
	Interest	\$	2,769	\$	17,942	\$	15,795
Year 17	Principal	\$	15,173				
	Interest	\$	2,215	\$	17,389	\$	15,186
Year 18	Principal	\$	15,173				
	Interest	\$	1,661	\$	16,835	\$	14,585
Year 19	Principal	\$	15,173				
	Interest	\$	1,108	\$	16,281	\$	13,994
Year 20	Principal	\$	15,173				
	Interest	\$	554	\$	15,727	\$	13,410
	<b>Total:</b>	<b>\$</b>	<b>419,769</b>	<b>\$</b>	<b>389,186</b>		

**Town of Montague  
Department of Public Works  
Cost/Benefit Analysis - Item 7 - Exterior Storage Area Site Maintenance Costs**

2016

<b>Replace Pavement @ Year 20 and Year 40</b>			NPV	
	Yr 1	Reclaim Pvmnt:	\$21,994	
	Yr 1	New Pavement:	\$57,111	
	Yr 1	Contingency	\$11,866	
		Cost @ Year 20 based on 3% escalation	\$159,519	\$137,107
		Cost @ Year 40 based on 3% escalation	\$288,108	\$211,152
		Total:	<b>\$447,627</b>	<b>\$348,259</b>
<b>Yearly Striping</b>				
		Labor per Year (hours):	32	
		Labor Rate (loaded):	\$39.63	
	Yr 1	Total Labor:	\$1,268	
		Total cost over 50 years:	<b>\$143,044</b>	<b>\$112,915</b>
<b>Snow Removal</b>				
		Labor per event (hours):	8	
		Labor Rate (loaded):	\$39.63	
		Number of Snow Events per Year:	6	
	Yr 1	Total Labor	\$1,902	
		Total cost over 50 years:	<b>\$214,567</b>	<b>\$169,373</b>
<b>General Maintenance</b>				
		Labor per week (hours):	1	
		Weeks:	52	
		Labor Rate (Loaded):	\$39.63	
	Yr 1	Total Labor	\$2,061	
		Total cost over 50 years:	<b>\$232,447</b>	<b>\$183,487</b>
<b>TOTAL COST OF SITE MAINTENANCE:</b>			<b>\$1,037,685</b>	<b>\$814,034</b>



**Town of Montague  
Department of Public Works  
Cost / Benefit Analysis - Item 9 - Storm Event Costs**

Avg Annual Inflation Rate      3.0%  
Benefits Adjustment            1.5694  
Average rate with out benefits    25.25

Vehicles with Plows:    11  
Sanders:                    7

Average Workforce Rate (loaded) \$    39.63  
2016

	FREQUENCY		LABOR				FUEL CONSUMPTION				TOTAL		Net Present Value	
	A	B	C	D	E	F	G	H	I	J	K	L		M
Maintenance Activity	Average Number of Plow Events	Average Number of Sand Events	Average Vehicle/Plow Preparation Time per Vehicle (minutes)	Average Sander Preparation Time per Sander (minutes)	Total Preparation Time (hours)	Loaded Labor Rate	Total Labor Cost per Year (F x E)	Fuel Consumption Rate During Warm-up (gallons/hr)	Total Fuel Consumption During Warm-up (gallons)	Fuel Cost per Gallon	Total Fuel Consumption Cost During Warm-up per Year (I x J)	Total Labor & Fuel Cost per Year (1st Year) (G + K)	Total Cost Over Life of Bldg (50 Years)	
Vehicle Preparation & Plow Connection	6	7	30	30	58	39.63	\$ 2,279	\$ 0.32	\$ 18	\$ 3.50	\$ 64	\$ 2,343	\$ 264,280	\$ 208,615
<b>TOTALS:</b>												\$ 2,343	<b>\$ 264,280</b>	<b>\$ 208,615</b>



**Town of Montague**  
**Department of Public Works**  
**Cost / Benefit Analysis - Item 10 - Engine Block Heaters**

Avg Annual Inflation Rate      3.0%  
 Number of Large Vehicles      11  
 Number of Small Vehicles      15  
 Number of Pieces of Construction Equipment      4

2016

Maintenance Activity	FREQUENCY			LABOR				TOTAL		Net Present Value
	A Vehicles & Equipment	B Cold Weather Days	C Average Block Heater Usage per Vehicle per Day (hours)	D Total Block Heater Hours of Operation per Year (hours)	E Engine Block Electrical Consumption (Kw)	F Total Electrical Usage	G Electrical Unit Cost (\$/Kwh)	H Total Electrical Cost per Year (1st Year) (F * G)	I Total Cost Over Life of Bldg (50 Years)	
Emergency Vehicles (continuous operation)	15	119	16	28,560	0.7	19,992	\$ 0.18	\$ 3,599	\$ 405,906	
Non-Emergency Vehicles (4 hours operation)	15	119	4	7,140	0.7	4,998	\$ 0.18	\$ 900	\$ 101,477	
Cold Weather Days:      Assume November 15 thru March 15th								\$ 4,498	<b>\$ 507,383</b>	<b>\$ 400,513</b>
17 weeks										
7 days per week										
119 days per year										

**Assumptions:**

1. It is assumed that all emergency response vehicles will be required to be plugged in overnight to ensure adequate equipment is available for the DPW use.

**Town of Montague**  
**Department of Public Works**  
**Cost / Benefit Analysis - Item 11 - Loading & Unloading Costs**

Avg Annual Inflation Rate      3.0%  
Benefits Adjustment            1.5694  
Number of Large Vehicles        11  
Number of Small Vehicles        15  
Number of Pieces of Construction Equipment    4  
Average Workforce Rate (loaded) \$    39.63  
2016

	FREQUENCY			LABOR				TOTAL		Net Present Value
	A Number of Vehicles Impacted by Operations	B Number of Employees Impacted by Operations	C Average Loading & Unloading Time per Vehicle per Day (minutes)	D Total Downtime Per Year (minutes)	E Total Downtime Per Year (hours)	F Loaded Labor Rate	G Total Labor Cost per Year (F x E)	H Total Labor Cost per Year (1st Year) (G)	I Total Cost Over Life of Bldg (50 Years)	
Maintenance Activity										
Vehicle Loading & Unloading	2	4	30	30,000	500	\$ 39.63	\$ 19,814	\$ 19,814	\$ 990,684	\$ 820,388
Work Days	250							\$ 19,814	\$ 990,684	\$ 820,388

Assumptions:

1. It is assumed that there is an average of 2 employees per vehicle



**Town of Montague**  
**Department of Public Works**  
**Cost / Benefit Analysis - Item 13 - Employee Safety Costs**

Avg Annual Inflation Rate	3.0%
Benefits Adjustment	1.5694
Number of Large Vehicles	11
Number of Small Vehicles	15
Number of Pieces of Construction Equipment	4
Average Workforce Rate (loaded) \$	39.63
	2016

Description	FREQUENCY			TOTAL		Net Present Value
	A Average Hours of Lost Labor per Year	B Loaded Labor Rate	C Total Labor Cost per Year (A x B)	D Total Labor Cost per Year (1st Year) (C)	E Total Cost Over Life of Bldg (50 Years)	
Loss of labor due to injury	40.0	\$ 39.63	\$ 1,585	\$ 1,585	\$ 178,794	\$ 141,134
Average hours of lost labor / year:	120			\$ 1,585	\$ 178,794	\$ 141,134

Assumptions:

1. It is assumed that the Town will incur an average of 40 hours per year of lost labor due to injuries resulting from exposure of employees to fall hazards or other hazards associated with exterior storage of equipment & materials

**Town of Montague  
Department of Public Works  
Cost / Benefit Analysis - Item 14 - Environmental Impact Costs**

Avg Annual Inflation Rate 3.0%  
Benefits Adjustment 1.5694  
Average rate no benefits 25.25

Average Workforce Rate (loaded) \$ 39.63  
2016

Description	A Consultant Hours	B Consultant Fee	C Consultant Expenses / Contractors	D Total Consultant Costs	E Regulatory Fees	F Clean-up Costs	TOTAL	
							K 1st Year Occurrence Costs	Total Costs
Immediate Response Actions (containment)	8	\$ 150.00	\$ 1,000	\$ 2,200	\$ -	\$ -	\$ 2,200	
DEP Notification & Remediation Submittals	24	\$ 150.00	\$ 1,000	\$ 4,600	\$ 6,000	\$ -	\$ 10,600	
Limited Soil and Surface Disposal	16	\$ 150.00	\$ 1,000	\$ 3,400	\$ -	\$ 15,000.00	\$ 18,400	
Close-out (response action outcome)	40	\$ 150.00	\$ 1,000	\$ 7,000	\$ -	\$ -	\$ 7,000	

Year 1 Cost

\$ 38,200

NPV

Year 10	\$ 49,842	\$ 46,393
Year 20	\$ 66,984	\$ 57,573
Year 30	\$ 90,021	\$ 71,448
Year 40	\$ 120,980	\$ 88,665
Year 50	\$ 162,588	\$ 110,033

<b>Total Cost:</b>	<b>\$ 490,415</b>	<b>\$ 374,112</b>
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**Assumptions:**

- It is assumed that there will be one reportable hazardous materials release associated with storing equipment outdoors every +/- 10 years (year 10, 20, 30, 40, and 50) associated with leaks/spills from vehicles & equipment stored outdoors

**Town of Montague  
Department of Public Works  
Cost / Benefit Analysis - Item 15 -Preventative Maintenance Delay Costs**

Avg Annual Inflation Rate      3.0%  
Benefits Adjustment            1.5694  
Number of Large Vehicles       11  
Number of Small Vehicles       15  
Number of Pieces of Construction Equipment    4  
Average Mechanics Overtime Rate (loaded) \$    52.25  
2016

Vehicle Type	Maintenance Activity	LABOR					PARTS		TOTAL				Net Present Value
		A Average Maintenance Manhours per Vehicle	B Number of Vehicles or Equipment	C Total Manhours per Year	D Loaded Rate	E Total Labor Cost per Year	F Parts Cost per Occurrence per Vehicle	G Total Parts Cost per Year	H Total Labor & Parts Cost per Year (1st Year) (H + J)	I Total Cost Over 20 Year Period	J Total Cost Over Life of Bldg (50 Years)		
<b>Large Vehicles</b>	Additional Maintenance Hours	2	11	22	\$ 52.25	\$ 1,150	\$ 200	\$ 2,200	\$ 3,350	\$ 90,004	\$ 377,819	\$ 298,239	
<b>Small Vehicles</b>	Additional Maintenance Hours	2	15	30	\$ 52.25	\$ 1,568	\$ 100	\$ 1,500	\$ 3,068	\$ 82,427	\$ 346,012	\$ 273,132	
<b>Construction Equipment</b>	Additional Maintenance Hours	2	4	8	\$ 52.25	\$ 418	\$ 200	\$ 800	\$ 1,218	\$ 32,729	\$ 137,389	\$ 108,451	
<b>TOTALS:</b>								\$ 7,635	\$ 205,159	\$ 861,220	\$ 679,822		

Note:

1. These costs are based on additional maintenance tasks due to delayed preventative maintenance resulting from the additional services required by Item 4.