IT463

Business Case & Project Charter

GradBird Consultants

Contents

Project Name: IT Strategic Plan, City of Mequon

Project Team: GradBird consultants

Project Leader: [redacted]

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Mentor: [redacted]

Project Description:

The City of Mequon, WI, is the largest city in Ozaukee County, and the third largest city in land area in the state of Wisconsin. The City of Mequon provides public and information services to the citizens that enhance the quality of life in the community (City of Mequon, n.d.). The city has 4 primary facilities, namely City Hall, Public Safety Building, East Side Fire Station, and Public Works Safety. These facilities have various departments which include City Administrator's Office, City Clerk's Office, Finance, Public Works, Community Development, Police Department, and Fire Department. This project is started in request to the City of Mequon seeking assistance in developing the IT strategic plan. The proposed plan focuses on developing an Informational Technology Strategic Plan that guides the organization in planning, designing, implementing, maintaining the present and future technology requirements, and by spending the resources over the next 3-5 years in a cost-effective way.

Measurable Organizational Value (MOV):

The City of Mequon is striving to improve and maintain the current IT technologies used by the city. The project will focus upon creating a cost-effective plan with the highest benefits. A cost-effective plan will efficiently use the city resources to improve and maintain the existing IT technologies during the next 3-5 years. Our plan will focus upon improving the IT technologies to assist departments with better communications by replacing the Mitel VoIP phone system. With incremental changes to the buildings Wi-Fi routers and network switches, the wireless and wired networks will be upgraded resulting in higher wireless network speeds and maintaining wired network stability. To ensure reliability, the servers, workstations, and laptops will be upgraded. All

backup data will be relocated to the cloud to ensure that it is always available and free of viruses and threats. The plan will also include shifting all software, computation, and storage to a third-party provider. The purpose of these cost-effective upgrades is to provide a highly beneficial system so that the city can continue to provide cost-effective services to the citizens of Mequon.

Desired Areas of Impact:

The following table describes potential areas of impact:

Organizational Impact	Value	Metric	Time Frame
Strategic	Maintain and improve the current IT System	Within Budget $334,767	Annual Budget 12 months Project 3-5 years
Customer	Provide a better IT System to the city so the citizens can continue having low-cost services	Fewer complaints from citizens. 10% reduction Safe city – maintain low crime rate 5% reduction Safe city - faster emergency response times 5% faster response rate	Annual Survey 12 months Annual Survey 12 months Annual Survey 12 months Project 3-5 years
Financial	Effectively spending the city resources to improve or maintain the current IT system	Within Budget $334,767 And possible savings of 10%	Annual Budget Project 3-5 years

Organizational	A more reliable system that will reduce the number of IT issues and complaints	Fewer IT helpdesk tickets 10% reduction	Biannual Survey
Social	Increase city employees and citizens satisfaction	More positive employee satisfaction surveys 10% increase in satisfaction score More positive citizen satisfaction surveys 10% increase in satisfaction score	Biannual Survey

The City of Mequon serves more than 24,000 citizens. The city strives to provide quality services to the citizens while maintaining low tax rates (City of Mequon, n.d.). This strategic plan will provide the necessary information for the city to continue to provide those services with better and upgraded IT systems in a cost-effective manner. The plan will focus upon implementing improvements during the next 3-5 years. The plan will also include alternatives so the sponsor can choose the plan that meets the needs of the city. The plan includes considerations for anticipated city growth and unanticipated changes.

Desired value of Impact:

The planned IT system changes will decrease the number of IT help desk complaints because the upgraded and improved systems will be easier to use and more stable. The upgraded system will be more secure, which will reduce security threats and improve reliability. The project team anticipates the improved IT system will reduce departmental IT issues because the newer system is being tailored to meet current and future department needs. The success of the plan will be validated by annual and biannual surveys of citizens and city employees verifying satisfaction with the IT system changes.

Alternatives:

Based upon our project team's research, our team has outlined 3 alternatives:

Alternative 1:

Alternative 1 comprises the system's most cost-effective upgrades. Workstations, laptops, and servers, as well as the wired and wireless networks, will be modernized. During the five-year timeframe, the adjustments will be incremental. Four weeks per year, the project team will provide project management and consulting services, and three weeks per year, technology installations and training**.**

Essential changes to the current IT system:

1. Wired Network upgrades – Replacing the network switches with newer switches - 2 every year
    a. CISCO Catalyst Digital Building Series Switch PoE
    b. Low cost $442.00
2. Wireless Network upgrades - Installing newer wireless routers - one facility per year (no replacement the first year)
    a. NETGEAR AX3600 Wi-Fi 6 Access Point (WAX218PA)
    b. Low Cost $180
3. Workstation upgrades – Replacing the 10 workstations per year (5 workstations & 5 laptops)
    a. HP Z2 Tower Z5 workstations
        i. Lowest cost - $1274.00
        ii. Windows 10 Pro 64 operating system
        iii. Intel Core i7 processor
        iv. 512 GB HP Z Turbo Drive PCIe® NVMe™ TLC SSD
    b. Dell Precision 5550 Workstation Laptops
        i. Lowest Price $1309.00
        ii. Windows 10 Pro
        iii. Intel Core i7 processor
        iv. M.2 256GB PCLe NVMe Class 35m Solid State Drive
4. Replacing Server - Replacing the three current servers (one every 20 months)
    a. UHP ProLiant ML350 Gen10 Server

b. Low Cost $1780.00

5. Storage – Hard disc storage will be upgraded for backup workstations
    a. SSD 4 terabit, $700 per SSD, 7 SSDs

Alternative 2:

Alternative 2 comprises the following recommended changes to the current IT system. There will be upgrades for both wired and wireless systems. The workstations and laptops will be upgraded to support the current software with better and faster processing. All the backup data will be stored in cloud eliminating the backup work stations in AWS Glacier storage service. To provide a better and secure in-house surveillance system, the Hikvision cameras will be replaced with Montavue. To improve the communication system, we will be replacing Mitel VoIP phone system with Cisco phone services.

Recommended upgrades:

1. Wired Network upgrades - Replacing network switches with newer switches to 2 per year
    a. CISCO Catalyst Digital Building Series Switch PoE
    b. Low cost $442.00
2. Wireless Network upgrades - Installing newer wireless routers - one facility per year (no replacement for the first year) with
    a. NETGEAR AX3600 Wi-Fi 6 Access Point (WAX218PA)
    b. Low Cost $180.00
3. Workstation upgrades – replacing the ten workstations per year (5 workstations & 5 laptops) with
    c. HP Z2 Tower Z5 workstations
        i. Lowest cost - $1274.00
        ii. Windows 10 Pro 64 operating system
        iii. Intel Core i7 processor
        iv. 512 GB HP Z Turbo Drive PCIe® NVMe™ TLC SSD
    d. Dell Precision 5550 Workstation Laptops
        i. Lowest Price $1309.00
        ii. Windows 10 Pro
        iii. Intel Core i7 processor

iv. M.2 256GB PCLe NVMe Class 35m Solid State Drive

4. Replacing Servers – Replacing the three current servers (one every 20 months) with
    e. HP ProLiant ML350 Gen10 Server
    f. Low Cost $1780.00
5. Moving backup storage data to cloud storage to
    g. Change to hybrid system on-premises and AWS
    h. Estimate 500GB – 1TB
    i. Low Cost $0.004 per GB
6. Phone System replacement
    a. Cisco call manager and phone service
    b. Low Cost $120 per phone - 4 facilities, 25 phones per facility.
7. Security Hardware upgrades - replacing in-House Surveillance Monitoring system (Hike Vision)
    a. Montavue
    b. Low Cost $200.00 per camera – 16 cameras

Alternative 3:

Alternative 3 comprises outsourcing out a large portion of the project to a third-party provider. Two full-time technology professionals will be recruited by the third-party vendor to take charge of the current IT Department. Any software and hardware updates will be recommended and implemented by them. As the job is outsourced the IT professionals will be connecting to the city system using the Secure VPN Client. One week per year, the project team will meet with the third-party vendor to provide training and project support.

Details:

1. Outsource Technology Department to 3rd Party Vendor
    a. 2 Full-Time off-site tech professionals
    b. Connecting through VPN into the City system
    c. 3rd Party Vendor responsible for software, hardware change, support, and training.

Current System and Alternative 2 Integration Comparison

The following table compares the current system with Alternative 2:

Current System	Alternative 2
Servers 6 Dell Servers, I Windows Server, 1 IBM Server	**Servers** Replacing 3 servers (1 server every 20 months) HP ProLiant ML350 Gen10 Server
Workstations (Desktops & Laptops) 132 Lenovo, HP, Dell	**Workstations (Desktops & Laptops)** Replacing 50 workstations (5 desktops & 5 laptops each year) Desktops - HP Z2 Tower Z5 workstations Laptops - Dell Precision 5550
Wired Network 12 Cisco, Juniper, Trendnet, Asus Nighthawk, Netgear, Linksys switches	**Wired Network** Replacing 10 switches (2 per year) CISCO Catalyst Digital Building Series Switch PoE
Wireless Network Ubiquity and Asus base routers and access points	**Wireless Network** Replacing all Wi-Fi routers (1 facility per year, no replacements first year) NETGEAR AX3600 Wi-Fi 6 Access Point (WAX218PA)
Communication Mitel VoIP phone system	**Communication** Replacing the entire communication system (1 facility per year, no replacements first year) CISCO Call Manager
In-House surveillance monitoring system Hikvision	**In-House surveillance monitoring system** Replace entire camera system 16 Montavue cameras
Backup Storage ComVault	**Backup Storage** Moving ComVault to AWS Glacier
Business Systems Software, Broadcasting, CAD, Body-camera system, etc..	**Business Systems** No changes

System Integration Strategy:

Alternative 2 proposes moderate changes to ensure the current system continues to function within the city's expectations and needs, as well as maintaining the stability of the system by implementing incremental upgrades to system hardware components. Approximately half the servers will be replaced with newer HP servers. The backup storage will be moved from servers to the cloud in

AWS Glacier. All facility Wi-Fi routers will be replaced by the end of 5 years with newer and much faster NETGEAR routers. 10 of the wired network switches will be replaced with newer CISCO switches which will maintain wired network reliability. 50 new workstations will be incrementally installed into the system. By the end of the project the phone system will be upgraded to Cisco Call Manager which will provide a clearer communication system with more features. The in-house surveillance camera system will be upgraded to Montavue cameras with color 360 view. The plan includes no changes to the current business systems.

Total Cost of Ownership (TCO):

The following table lists the Total Cost of Ownership for 3 alternatives:

TOTAL COST OF OWNERSHIP				
Resource	**Description**	**Alt1**	**Alt2**	**Alt3**
Personnel Time	**Alt1:** 3 Weeks per year (consulting, project management) 2 people * $63.00 * 120 hours	$15,120		
	2 Weeks per year (installation, training) 2 people * $36.00 * 80 hours	$5,760		
		$20,880		
	City IT Department salaries	$62,400 $18,000 $61,440		
		$141,840		
	Alt 2: 4 Weeks per year (consulting, project management) 2 people * $63.00 * 160 hours		$20,160	
	3 Weeks per year (installation, training) 2 people * $36.00 * 120 hours		$8,640	
			$28,800	
	City IT Department salaries		$62,400 $18,000 $61,440	
			$141,840	

	Alt 3: Outsourcing (2 people @ $75 per hour per person), 40 hours per week 2 Weeks per year (project management) 1 people * $63.00 * 80 hours			$288,000 $5,040 _____ **$293,040**
Communication	**Alt1:** Maintaining the current communication system **Alt 2:** Replacing the Facilities phones, 1 Office per year (25 phones) for 4 years – no replacements first year, $120 per phone **Alt 3:** Maintaining the current communication system		**$3,000**	
Server	**Alt1:** Replacing 3 Servers, 1 Server per 20 Months, Cost $1780.00 per server **Alt 2:** Replacing 3 Servers, 1 Server per 20 Months, Cost $1780.00 per server **Alt 3:** Maintaining the current servers	**$5,340**	**$5, 340**	
Workstation	**Alt1:** Replacing 10 workstations per year Cost $1274.00 per workstation **Alt 2:** Replacing 10 workstations per year Cost $1274.00 per workstation **Alt 3:** Maintaining current workstations	**$12,740**	**$12,740**	

Workstation laptops	**Alt1:** Replacing 10 workstation laptops per year Cost $1309.00 Per workstation laptop **Alt 2:** Replacing 10 workstation laptops per year Cost $1309.00 Per workstation laptop **Alt 3:** Maintain current workstations laptops	**$13,090**	**$13,090**	
Wireless Network	**Alt1:** Replacing Facilities Wireless Routers, 1 Office per year (5 routers) for 4 years – no replacements first year **Alt 2:** Replacing Facilities Wireless Routers, 1 Office per year (5 routers) for 4 years – no replacements first year **Alt 3:** Connecting through the Cisco AnyConnect VPN client license - $150 per year	**$3,600**	**$3,600**	**$150**
Wired Network	**Alt1:** Replacing 2 switches per year, Cost $442.00 **Alt 2:** Replacing 2 switches per year, Cost $442.00 **Alt 3:** Maintaining current wired network system	**$884**	**$884**	

Camera	**Alt1:** Maintaining current system cameras **Alt 2:** Replacing Hike Vision cameras with Montavue, 16 cameras, $ 200 per camera. Installation cost $ 1,000 for all **Alt 3:** Maintaining current system cameras		**$4,200**	
Storage	**Alt1:** Hard disc storage upgrade for backup workstations, SSD 4 terabit, 700 per SSD, 7 SSDs **Alt 2:** Replacing the backup servers to store the data into cloud, 1TB Per month, @ $4 per TB and 12 TB per year. **Alt 3:** Maintaining current system data storage	**$4,900**	**$48**	
Software	Maintaining current software licensing	**$12,000**	**$12,000**	**$12,000**
Training	5 days onsite training, $ 500 per day	**$2,500**	**$2,500**	**$2,500**
Maintenance and support	$30 per hour, 8 hours per day for 1 week	**$1,200**	**$1,200**	
Lodging and Meals	**Alt 1:** $100 per room, 2 rooms (3 weeks) $100 per room, 2 rooms (2 weeks) $50 per day, 2 persons (3 weeks) $50 per day, 2 persons (2 weeks) **Alt 2:** $100 per room, 2 rooms (4 weeks)	$4,200 $2,800 $2,100 $1,400 _____ **$10,500**	$5,600 $4,200	

	$100 per room, 2 rooms (3 weeks) $50 per day, 2 persons (4 weeks) $50 per day, 2 persons (3 weeks) **Alt 3:** $100 per room, 1 room (1 week) $50 per day, 1 person (1 week)		$2,800 $2,100 _____ **$14,700**	 $700 $350 _____ **$1050**
TOTAL		**$229,474**	**$243,942**	**$308,740**

From the TCO table above, alternative 1, 2, and 3 are each under budget. Alternative 1 has the lowest TCO. Alternative 2 is 6.0% higher than alternative 1. Alternative 3 has the highest TCO. The table below shows the 5-year projection of outflows.

Project Out Flow for 5 Years

The following table lists the costs outflows at the end of each year for 5 years for each alternative.

Project Outflow for 5 Years						
	Year 0	**Year 1**	**Year 2**	**Year 3**	**Year 4**	**Total**
Alt 1	$229,474	$225,874	$229,474	$229,474	$229,474	$1,143,770
Alt 2	$243,942	$233,142	$243,942	$243,942	$243,942	$1,208,910
Alt 3	$308,740	$308,740	$308,740	$308,740	$308,740	$1,543,700

The Project Outflows for 5 years indicates Alternative 3 has the highest 5-year total. Alternative 1 and Alternative 2 have relatively comparable cost-effect 5-year totals.

Below is the table that summarizes the total costs for each of the three alternatives for the years ended 0, 3, and 5.

Total Cost at End of Years

The following table lists the costs at the end of Year 0, Year3, and Year 5, for each alternative.

Total Cost at End of Years			
	Year 0	**Year 3**	**Year 5**
Alt 1	$229,474	$684,822	$1,143,770
Alt 2	$243,942	$721,026	$1,208,910
Alt 3	$308,740	$926,220	$1,543,700

In the above table, it can be found that at the startup year, Alt 1 has the lowest cost and at the end of year 5 also has the lowest total cost. Alt 3 has the highest startup cost and at the end of year 5 also has the highest total cost. Comparatively, in the long run, Alt 1, and Alt 2 each provide significant savings than Alt 3.

Total Benefits of Ownership (TBO):

Below is the table that summarizes the Total Benefit of Ownership for the three alternatives.

TOTAL BENEFITS OF OWNERSHIP							
Benefits	**Weights**	**Alt1**	**Weight 1**	**Alt 2**	**Weight 2**	**Alt 3**	**Weight 3**
Functional							
Personnel Time Professional management of project implementation	2.5	6	0.15	8	0.2	4	0.1
Communication Clearer communication and better-quality phone system	3.75	6	0.225	8	0.3	4	0.15
Server Improved Server performance and reliability with warranty	5	7	0.35	7	0.35	2	0.1

Workstation Replacements include better and faster workstations (desktops & Laptops)	5	7	0.35	7	0.35	4	0.2
Wireless Network Newer Wi-Fi routers provide increased mobility and efficiency	5	9	0.45	9	0.45	4	0.2
Wired Network Replaced switches with faster and more secure switches which will provide a faster and more reliable network	5	8	0.4	8	0.4	4	0.2
Cameras New camera system is a higher quality system with better coverage and features	5	0	0	7	0.35	4	0.2
Storage Backup storage moved to the cloud will provide a more cost-effective secure backup system	5	0	0	10	0.5	4	0.2
Training Increased productivity and performance	3.75	7	0.2625	9	0.3375	6	0.225
Maintenance and Support Time saving, better analysis, cost saving	3.75	7	0.2625	9	0.3375	8	0.3
Usability							
User Friendly	10	8	0.8	10	1	7	.7
Availability	2.5	8	0.2	9	0.225	6	0.15

Performance	10	7	0.7	9	0.9	7	0.7
Reliability	2.5	7	0.175	8	0.2	6	0.15
Security	3.75	8	0.3	10	0.375	6	0.225
Efficiency	2.5	8	0.2	8	0.2	7	0.175
Economical	20	10	2	7	1.4	4	0.8
Maintainability	2.5	7	0.175	9	0.225	5	0.125
Scalability	2.5	5	0.125	5	0.125	5	0.125
TOTAL	**100**		**7.125**		**8.225**		**4.175**

From the TBO table, it is found that Alternative 2 has the highest benefit which is 15.0% higher than Alternative 1. Alternative 3 has the lowest TBO. To identify the most effective alternative amongst the three alternatives, the TBO scores and the TCO are compared. The figures below compare the TBO and TCO at the end of year 5, year 3, and the startup year 0 respectively.

Weighted Benefits

The following table lists the Total Weighted Benefits from the TBO for the 3 alternatives. These were used to compare with the TCO values for years 0, 3 and 5 which aids in the choice of the most effective alternative for this project.

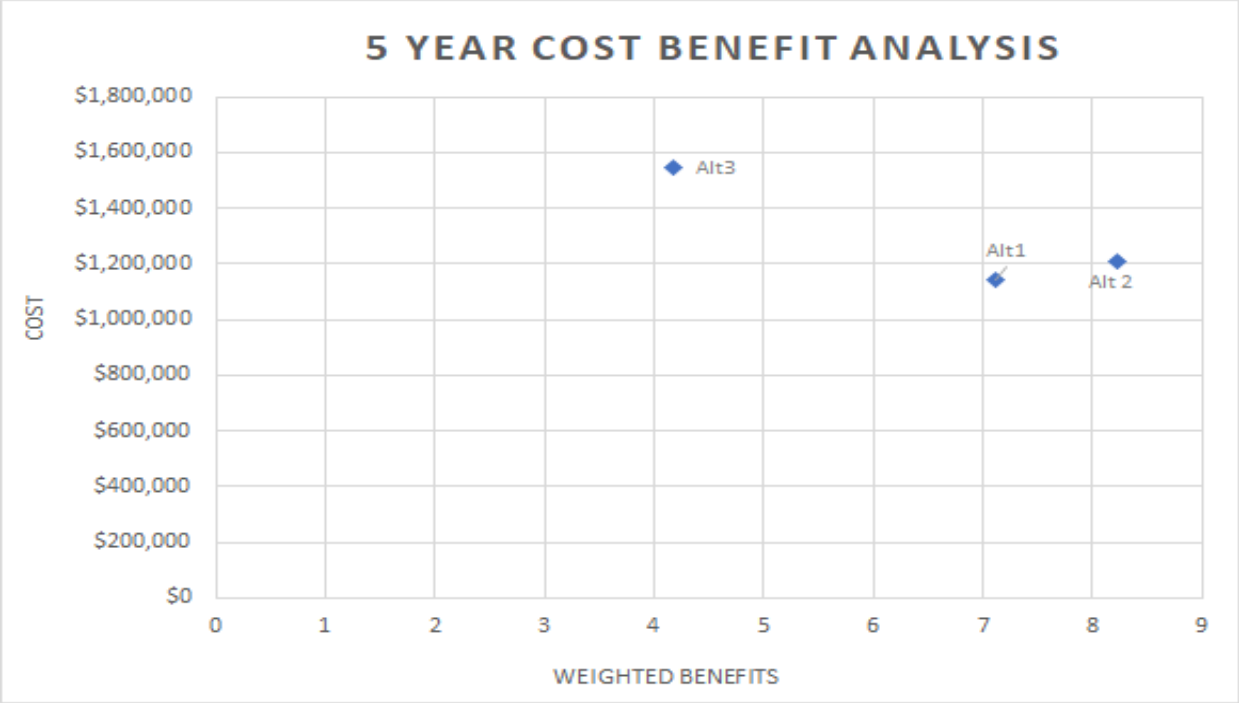
Weighted Benefits	
Alt 1	7.125
Alt 2	8.225
Alt 3	4.175

Cost Benefit Analysis (CBA):

The cost and benefits of the three alternatives are analyzed using their TCO and TBO from the startup year to the fifth year. First, a scatterplot of the weighted benefits and TCO's are used to compare the three alternatives at the startup year, end of year 3, and the end of year 5. Second, the Net Present Value (NPV) of the three alternatives are compared to determine which alternative is most profitable in the long run. Lastly, the payback period is determined for each alternative from startup year to year 5 and compared. These would aid the team to make the choice of the alternative that provides the most cost-effective upgrades and a high beneficial system so that the city can continue to provide cost-effective and high beneficial services to the citizens of Mequon.

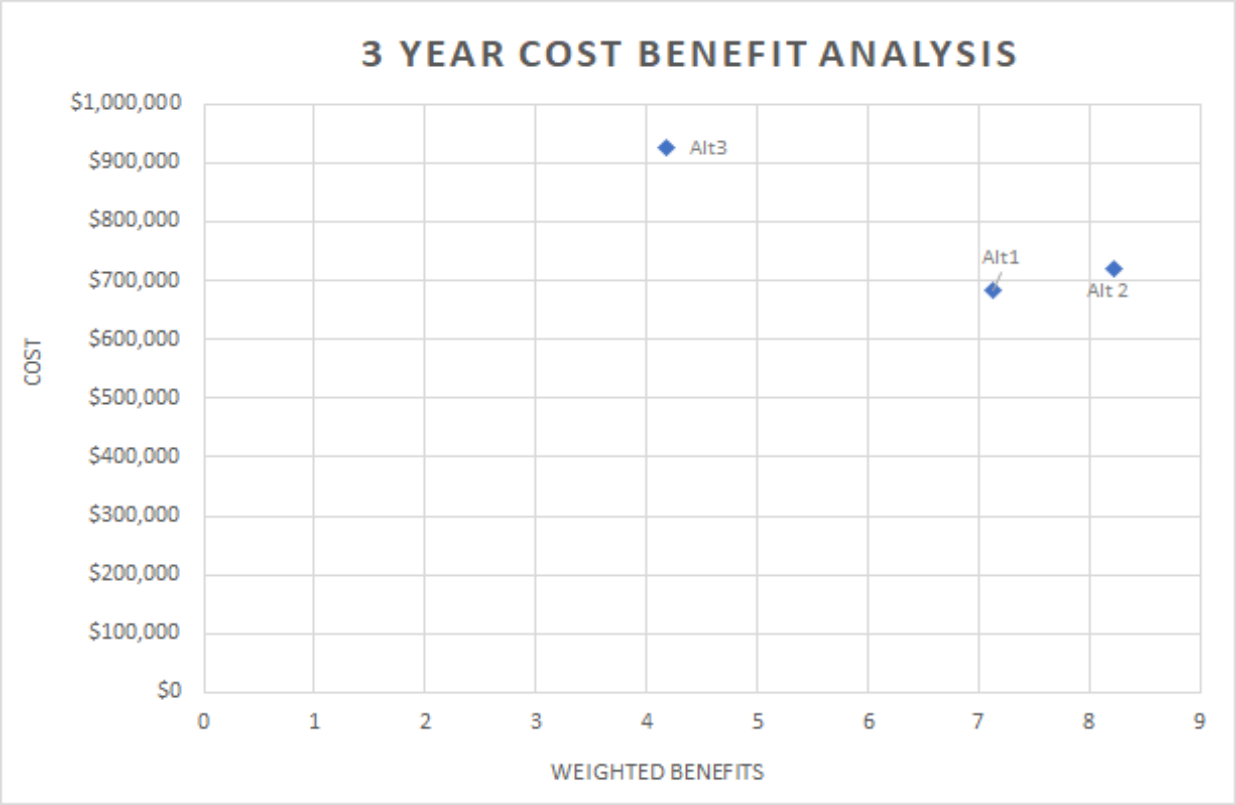
The figures below are the scatter plot used for the Cost Benefit Analysis of the three alternatives.

5 Year Cost Benefit Analysis:



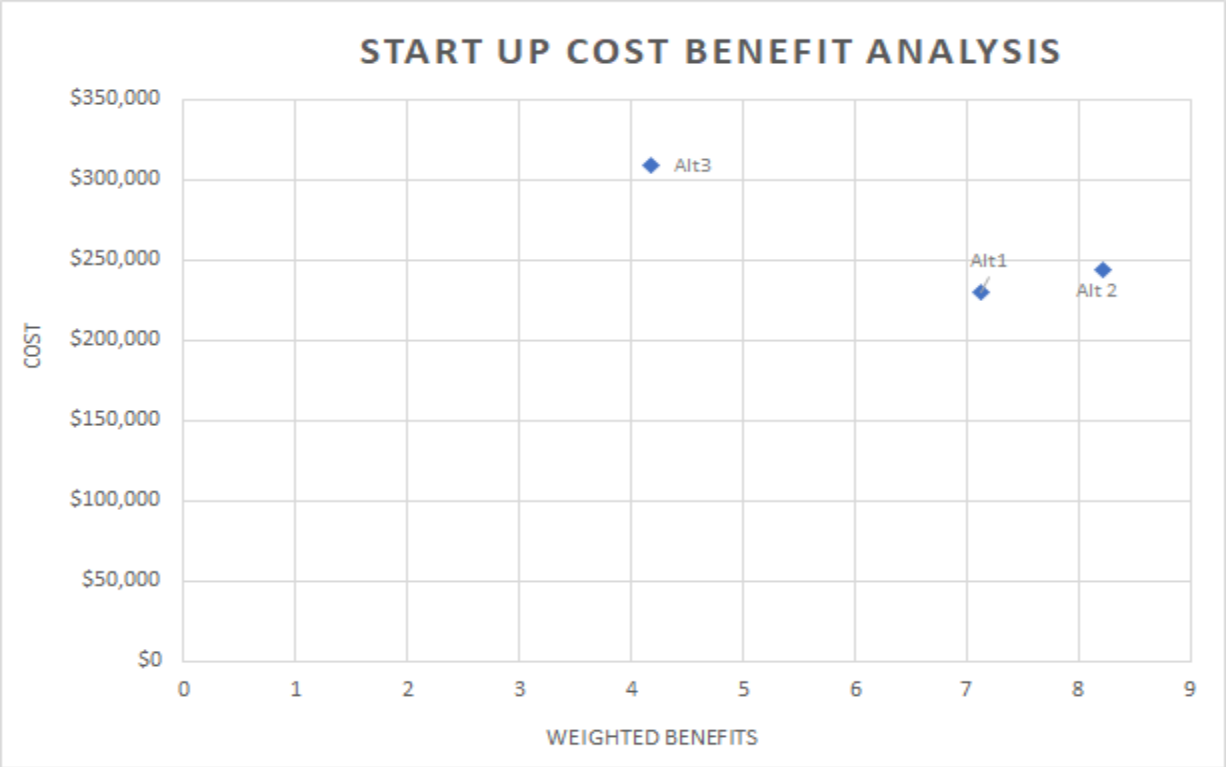
From this figure it can be found that at the end of year 5, Alt 2 has the highest benefit score followed by Alt 1, followed by Alt 3. Although Alt 2 has the highest benefit score, it does not have the lowest total cost. Rather, Alt 1 has the lowest total cost which shows how competitive Alt 1 and Alt 2 are in this project at the end of year 5. All three alternatives have a total cost at the end of year 5 within the city of Mequon's Information Services Division operating budget of $334,767.

3 Year Cost Benefit Analysis:



From this figure, it can be found that at the end of year 3 the comparison of the TBO and TCO results is like the results obtained at the end of year 5 as seen from the above. While Alt 2 has the highest benefit score followed by Alt 1, and Alt 3, Alt 1 has the lowest total cost followed by Alt 2, and Alt 3. This shows how competitive Alt 1 and Alt 2 are in this project at the end of year 3. All three alternatives have a total cost at the end of year 3 within the city of Mequon's Information Services Division operating budget of $334,767.

Start Up Cost Benefit Analysis:



From this figure, it can be found that at the startup year, the comparison result obtained is like that at the end of year 3 and year 5. While Alt 2 has the highest benefit score followed by Alt 1, and Alt 3, Alt 1 has the lowest total cost followed by Alt 2, and Alt 3. This also evidences how competitive Alt 1 and Alt 2 are in this project at the startup year. All three alternatives have a total cost at the startup year within the city of Mequon's Information Services Division operating budget of $334,767.

The entire cost benefit analysis shows that all three alternatives have total costs that are within the city budget of $334,767 which are cost-effective. Alt 2 has the highest benefit score at the startup year through the end of year 5, hence Alt 2 is cost-effective with the maximum benefit.

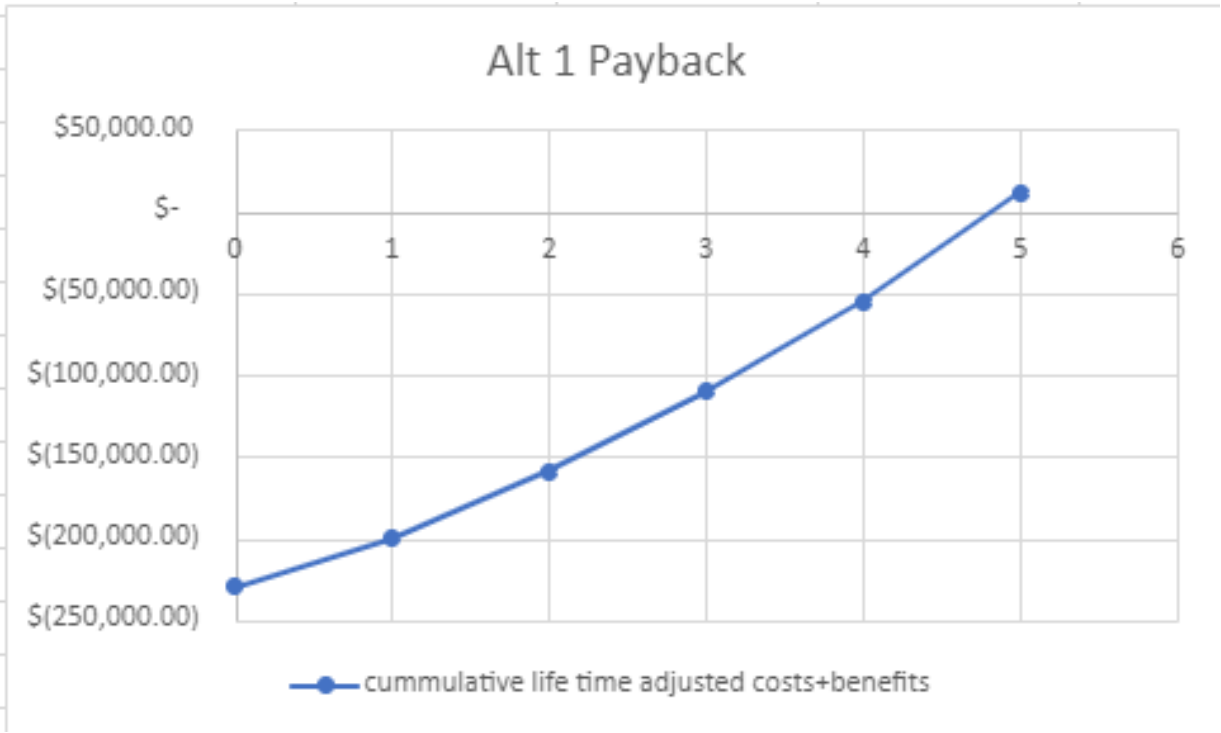
Net Present Value (NPV): The tables and figures below describe the computation of the NPV's and Payback periods of each alternative.

Below is the NPV analysis of Alternative 1.

NET PRESENT VALUE ANALYSIS OF ALTERNATIVE 1 Values converted to the nearest $1						
Cash flow description	**Year 0**	**Year1**	**Year2**	**Year 3**	**Year 4**	**Year5**
Development cost	(229,474)					
Operation & maintenance cost		(102,102)	(104,000)	(106,000)	(108,000)	(110,000)
Discount factors for 12%	1	0.893	0.797	0.712	0.636	0.636
Time adjusted costs (adjusted to present value)	(229,474)	(91,177)	(82,888)	(75,472)	(68,688)	(69,960)
Cumulative time-adjusted costs over lifetime	(229,474)	(320,651)	(403,539)	(479,011)	(547,699)	(617,659)
Benefits derived from operation of new system	0	135,000	155,000	175,000	195,000	215,000
Discount factor for 12%	1	0.893	0.797	0.712	0.636	0.636
Time adjusted benefits(current of present value)	0	120,555	123,535	124,600	124,020	136,740
Cumulative time-adjusted benefits over time	0	120,555	244,090	368,690	492,710	629,450
Cumulative lifetime adjusted costs + benefits	(229,474)	(200,096)	(159,449)	(110,321)	(54,989)	11,791

In this table an interest rate of 12% is used to calculate the discount factor used to compute the NPV of Alternative 1. Here, the total present value of lifetime cost obtained is 617,659 and is deducted from the total present value of lifetime benefits of 629,450 to obtain an NPV of 11, 791 which is worthwhile.

Payback Analysis of Alternative 1:



From this figure, Alternative 1 has a negative payback from startup year until the fourth year and ten months which experiences a breakeven point. Afterwards, a positive payback is ascertained.

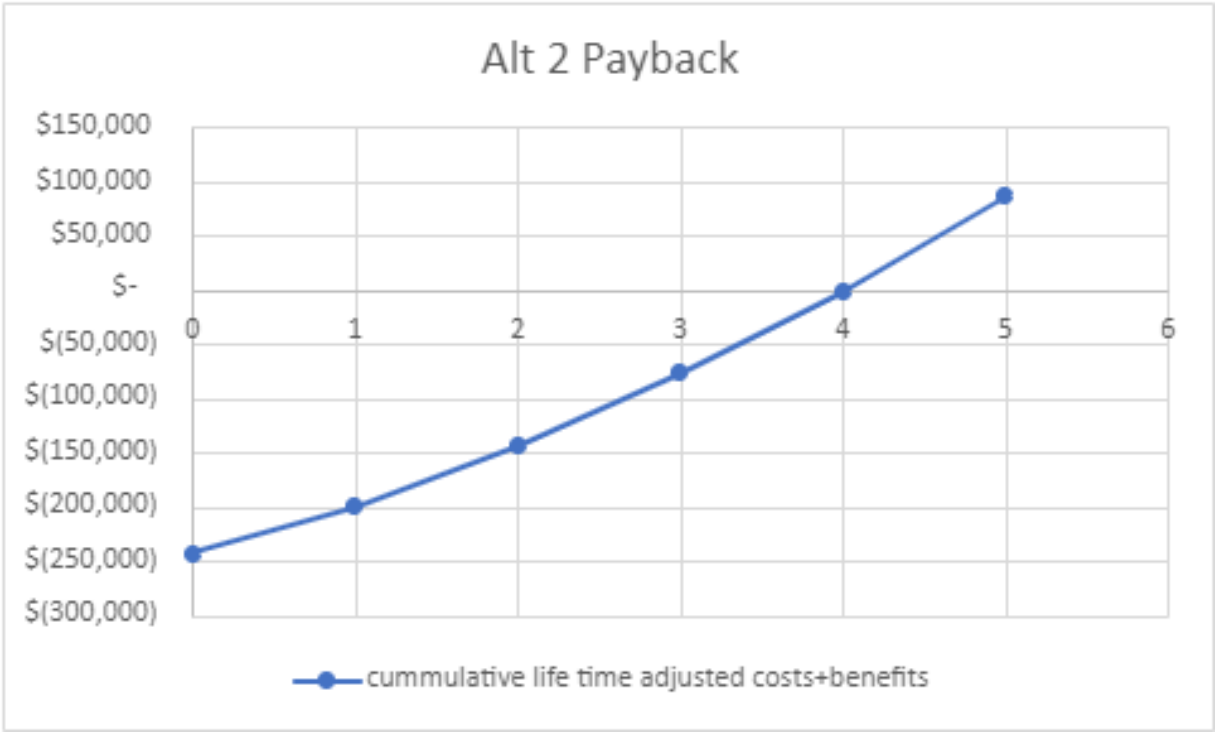
Below is the NPV analysis of Alternative 2.

NET PRESENT VALUE ANALYSIS OF ALTERNATIVE 2 Values converted to the nearest $1						
Cash flow description	**Year 0**	**Year1**	**Year2**	**Year 3**	**Year 4**	**Year5**
Development cost	(242,742)					
Operation & maintenance cost		(102,102)	(104,000)	(106,000)	(108,000)	(110,000)
Discount factors for 12%	1	0.893	0.797	0.712	0.636	0.636
Time adjusted costs(adjusted to present value)	(242,742)	(91,177)	(82,888)	(75,472)	(68,688)	(69,960)
Cumulative time-adjusted costs over lifetime	(242,742)	(333,919)	(416,807)	(492,279)	(560,967)	(630,927)

Benefits derived from operation of new system	0	150,000	175,000	200,000	225,000	250,000
Discount factor for 12%	1	0.893	0.797	0.712	0.636	0.636
Time adjusted benefits(current of present value)	0	133,950	139,475	142,400	143,100	159,000
Cumulative time-adjusted benefits over time	0	133,950	273,425	415,825	558,925	717,925
Cumulative lifetime adjusted costs + benefits	(242,742)	(199,969)	(143,382)	(76,454)	(2,042)	86,998

In this table an interest rate of 12% is used to calculate the discount factor used to compute the NPV of Alternative 2. Here, the total present value of lifetime cost obtained is 630,927 and is deducted from the total present value of lifetime benefits of 717,925 to obtain an NPV of 86,998 which is worthwhile.

Payback Analysis of Alternative 2:



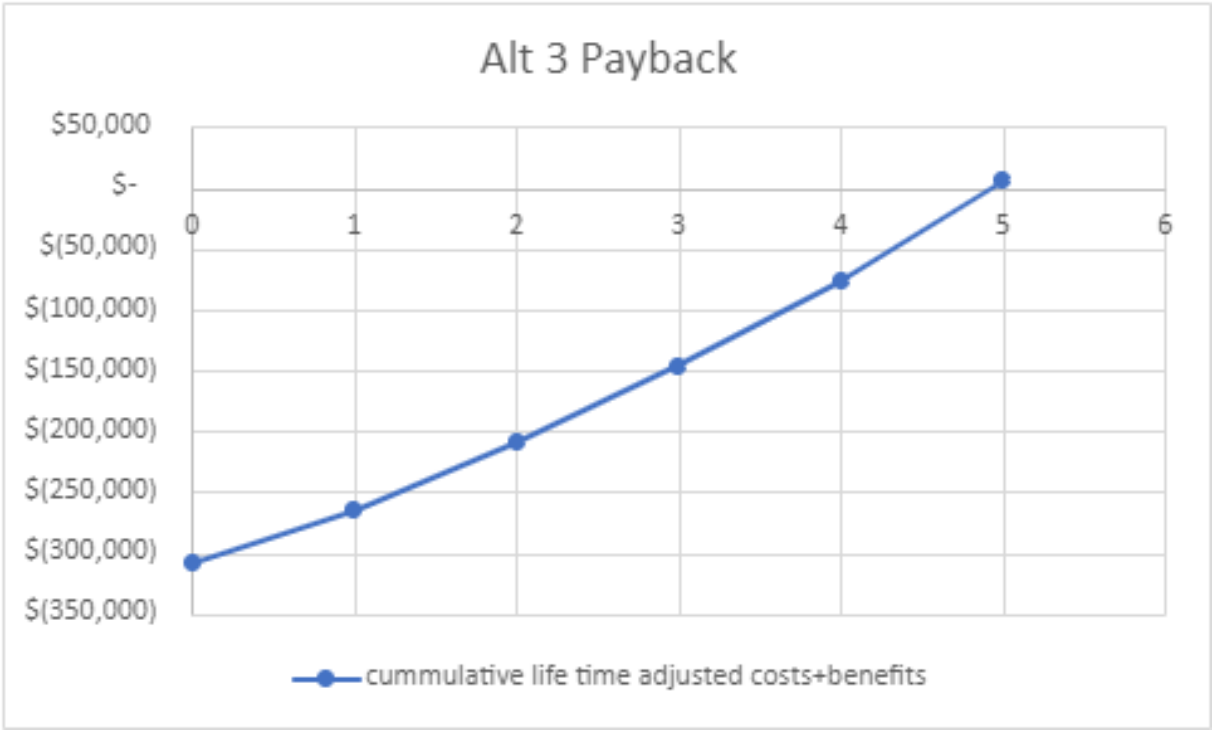
From this figure, Alternative 2 has a negative payback from startup year until the fourth year and one month which experiences a breakeven point. Afterwards, a positive payback is ascertained.

Below is the NPV analysis of Alternative 3.

NET PRESENT VALUE ANALYSIS OF ALTERNATIVE 3 Values converted to the nearest $1						
Cash flow description	**Year 0**	**Year1**	**Year2**	**Year 3**	**Year 4**	**Year5**
Development cost	(308,740)					
Operation & maintenance cost		(15,700)	(15,700)	(15,700)	(15,700)	(15,700)
Discount factors for 12%	1	0.893	0.797	0.712	0.636	0.636
Time adjusted costs (adjusted to present value)	(308,740)	(14,020)	(12,513)	(11,178)	(9,985)	(9,985)
Cumulative time-adjusted costs over lifetime	(308,740)	(322,760)	(335,273)	(346,451)	(356,437)	(366,422)
Benefits derived from operation of new system	0	65,000	85,000	105,000	125,000	145,000
Discount factor for 12%	1	0.893	0.797	0.712	0.636	0.636
Time adjusted benefits(current of present value)	0	58,045	67,745	74,760	79,500	92,220
Cumulative time-adjusted benefits over time	0	58,045	125,790	200,550	280,050	372,270
Cumulative lifetime adjusted costs + benefits	(308,740)	(264,715)	(209,483)	(145,901)	(76,387)	5,848

In this table an interest rate of 12% is used to calculate the discount factor used to compute the NPV of Alternative 3. Here, the total present value of lifetime cost obtained is 366,422 and is deducted from the total present value of lifetime benefits of 372,270 to obtain an NPV of 5,848 which is worthwhile.

Payback Analysis of Alternative 3:



From this figure, Alternative 3 has a negative payback from startup year until the fourth year and eleven months which experiences a breakeven point. Afterwards, a positive payback is ascertained.

The analysis of the three NPV's indicates that Alternative 2 has the highest NPV and the earliest break-even point. The NPV analysis supports cost benefit analysis, hence Alternative 2 is chosen as the recommended alternative.

Resources:

People and Roles:

1. **Project Sponsor**: The person who owns the project and provides the resources and has the authority to make major project decisions and supports the project by working with the project manager.

2. **Project Manager**: The project manager will be examining all the planning, ideas, monitoring the progress and execution of the project. He will be evaluating the team performance and makes sure all the main aspects of the project such as schedules, budget and scope are going as planned.

3. **Technology Team / Tech team:** This team consists of consultants hired by the third-party vendor, who will replace the current IT department personnel and will be responsible for implementing the plan.

4. **Financial Advisor**: This person will act as the financial analyst and take effective budget-related decisions by consulting with the Finance department. He can also introduce a few cost-effective strategies and work on executing them. He will be checking the integrity of the data and reviewing the budgets, helping the business in its investments and other financial dealings.

Technology:

1. Replacing department wireless routers.
2. Workstation upgrades:
   HP Z2 Tower Z5 workstations.
   Dell Precision 5550 Workstation Laptops
3. Server replacements: Replacing 3 current servers (1 per 20 months)
   HP ProLiant ML350 Gen10 Server
4. Moving the backup data into cloud storage
5. Replacing the phone system with Cisco Call Manager system.
6. Replacing the whole in-house surveillance system with better camera service.

Facilities:

1. The project team will be working at the four facilities provided by the City of Mequon depending on their necessities.

2. The team will be communicating by email, Microsoft teams and in person meetings regarding the crucial parts of the project if necessary.

Other:

1. Trainings: The team members will be given required trainings for the betterment of their performance, for them to work more productively and provide excellent results.

2. Maintenance and support: This covers hardware and software maintenance, as well as providing administrative support when necessary.

3. Lodging and Meals: The plan includes all the necessary professional and personal needs of the staff to perform their duties.

Cost of resources:

Human resources

Resource	Cost	Source
Project Manager	$63 per hour	Hourly wage for Project Management Manager | Salary.com
Technology Team (Small class vendor)	$75per hour	https://www.fullstacklabs.co/blog/software-development-price-guide-hourly-rate-comparison
Financial Analyst	$45 per hour	https://www.ziprecruiter.com/Salaries/Financial-Advisor-Salary--in-Wisconsin

Technology

Resource	Cost	Source
WIRELESS NETWORK AX3600 Wi-Fi 6 Access Point (WAX218PA)	$180 per Router	https://www.netgear.com/business/wifi/access-points/listing-filter/multigig-2/under-275/ax3600/
WIRED NETWORK Cisco® Catalyst® Digital Building Series Switch PoE	$442 per device	https://networkdevicesinc.com/products/cdb-8p?variant=32781089570919 https://www.cisco.com/c/en/us/products/collateral/switches/catalyst-digital-building-series-switches/datasheet-c78-738206.html
WORKSTATIONS -HP Z2 Tower Z5 Workstation **-Dell Precision 5 550 Workstation Laptops**	$1274.00 per workstation $1309.00 per laptop	HPE ProLiant ML30 Gen10 server | HPE Store US Precision 5550 15 Inch AI-optimized Mobile Workstation Laptop | Dell USA
SERVER HP ProLiant ML350 Gen10 Server	$1780.00 per server	Specs HPE ProLiant ML350 Gen10 Server (Quick Specs/a00021852enw.pdf) Cost HPE ProLiant ML350 Gen10 server | HPE Store US

BACKUP STORAGE Cloud(AWS- Glacier)	Glacier $0.004/ GB Per month	https://aws.amazon.com/s3/pricing/
COMMUNICATION Cisco Call Manager (Cisco VoIP phones)	$120 per phone	https://www.router-switch.com/cp-7821-k9-p-5637.html
Surveillance Monitoring System: Monatvue Cameras	$200 per camera	https://montavue.com/collections/16-channel-packages
SOFTWARE: Microsoft Office 365	$580 per year	https://www.mychoicesoftware.com/products/microsoft-office-professional-plus-2019-open-government
Municode	$350 per year	https://www.municode.com/documents
MS Windows Server (OS)	$1500 per year	https://www.microsoft.com/en-ie/windows-server/pricing
MS Windows 10 pro	$199 per year	https://www.cnet.com/tech/services-and-software/microsoft-prices-single-windows-10-licenses-at-119-for-home-199-for-pro/
Arc GIS	$2600 per year	https://www.esri.com/en-us/arcgis/products/arcgis-desktop-subscription
AutoCAD Civil 3D	$2315 per year	https://www.autodesk.ae/products/civil-3d/overview#:~:text=The%20price%20of%20an%20annual,3D%20subscription%20is%20US%246%2C250%20
AutoCAD LT	$440 per year	https://www.autodesk.com/products/autocad-lt/overview
Watchguard	$500 per year	https://www.cdw.com/product/watchguard-total-security-suite-subscription-license-renewal-upgrade-li/4242815
Others (Accela, Black Bear, Prophoenix, Hypercaster, Infoview)	$3500	Estimation based on existing software prices

Others

Resource	Cost	Source
Training	$40 per hour, 8 hours per day = $320 $120 food and lodging Total $500 per day	Hourly wage for Technical Trainer | Salary.com
Maintenance and Support Costs	$30 per hour. 8 hours per day for 1 week	Hourly wage for Technical Support Analyst I | Salary.com
Lodging	$100 per room, 4 rooms, 4 weeks	Holiday Inn Express® | Book Affordable Hotels Worldwide | Official Site (hiexpress.com)

Start and End Time:

Alt 1:

START AND END DATES					
Alt 1	Year 1	Year 2	Year 3	Year 4	Year 5
Project begins	1-Oct-2021	1-Oct-2022	1-Oct-2023	1-Oct-2024	1-Oct-2025
Final Acceptance	1-Dec-2021	-	-	-	-
3 Weeks per year Project Team (research, planning, etc.)	1-Jun-2022	1-Jun-2023	1-Jun-2024	1- Jun-2025	1-Jun-2026
3 Weeks per year (consulting, project management)	21-Jun-2022	21-Jun-2023	21-Jun-2024	21-Jun-2025	21-Jun-2026
2 Weeks per year (installation, training)	12-July-2022	12-July-2023	12-July-2024	12-July-2025	12-July-2026

1 Week per year (maintenance and support)	26-July-2022	26-July-2023	26-July-2024	26-July-2025	26-July-2026
1 Week per year (training)	5-Aug-2022	5-Aug-2023	5-Aug- 2024	5-Aug- 2025	5-Aug- 026

Alt 2:

START AND END DATES					
Alt 2	Year 1	Year 2	Year 3	Year 4	Year 5
Project Begins	1-Oct-2021	1-Oct-2022	1-Oct-2023	1-Oct-2024	1-Oct-2025
Final Acceptance	1-Dec-2021	--	--	--	--
4 Weeks per year Project Team (research, planning, etc.)	1-Jun-2022	1-Jun-2023	1-Jun-2024	1-Jun-2025	1-Jun-2026
4 Weeks per year (consulting, project management)	1-July-2022	1-July-2023	21-July-2024	21-July-2025	21-July-2026
3 Weeks per year (installation, training)	1-Aug-2022	1-Aug- 2023	1-Aug- 2024	1-Aug- 2025	1-Aug- 2026
1 Week per year (maintenance and support)	21-Aug-2022	21-Aug-2023	21-Aug-2024	21-Aug-2025	21-Aug- -2026

1 Week per year (training)	28-Aug-2022	28-Aug-2023	28-Aug-2024	28-Aug-2025	28-Aug-2026

Alt 3:

START AND END DATES					
Alt 3	Year 1	Year 2	Year 3	Year 4	Year 5
Project Begins	1-Oct-2021	1-Oct-2022	1-Oct-2023	1-Oct-2024	1-Oct-2025
Final Acceptance	1-Dec-2021	--	--	--	--
2 Weeks per year Project Team (research, planning, etc.)	1-Jun-2022	1-Jun-2023	1-Jun-2024	1-Jun-2025	1-Jun-2026
2 Weeks per year (consulting, project management)	14-Jun-2022	14-Jun- 2023	14-Jun- 2024	14-Jun- 2025	14-Jun- 2026
1 Week per year (training)	28-Jun-2022	28-Jun -2023	28-Jun -2024	28-Jun -2025	28-Jun -2026

Budget:

Alt 1, 5-Year Budget:

Budget					
	Year 1	**Year 2**	**Year 3**	**Year 4**	**Year 5**
Funds	$334,767	$334,767	$334,767.	$334,767	$334,767
IT Dept Salaries	$(141,840)	$(141,840)	$(141,840)	$(141,840)	$(141,840)
Software	$(12,000)	$(12,000)	$(12,000)	$(12,000)	$(12,000)
Office etc..	$(3,000)	$(3,000)	$(3,000)	$(3,000)	$(3,000)
Projects	$(20,000)	$(20,000)	$(20,000)	$(20,000)	$(20,000)
Alt 1	$(72,034)	$(75,634)	$(75,634)	$(75,634)	$(75,634)
TOTAL Surplus	**$85,893**	**$82,293**	**$82,293**	**$82,293**	**$82,293**

Alt 2, 5 Year Budget:

Budget					
	Year 1	**Year 2**	**Year 3**	**Year 4**	**Year 5**
Funds	$334,767	$334,767	$334,767	$334,767	$334,767
IT Dept Salaries	$(141,840)	$(141,840)	$(141,840)	$(141,840)	$(141,840)
Software	$(12,000)	$(12,000)	$(12,000)	$(12,000)	$(12,000)
Office etc..	$(3,000)	$(3,000)	$(3,000)	$(3,000)	$(3,000)
Projects	$(20,000)	$(20,000)	$(20,000)	$(20,000)	$(20,000)
Alt 2	$(79,302)	$(90,102)	$(90,102)	$(90,102)	$(90,102)
Total Surplus	**$78,625**	**$67,825**	**$67,825**	**$67,825**	**$67,825**

Alt 3, 5 Year Budget:

Budget					
	Year 1	**Year 2**	**Year 3**	**Year 4**	**Year 5**
Funds	$334,767	$334,767	$334,767	$334,767	$334,767.00
3rd Party Vendor	$(293,040)	$(293,040)	$(293,040)	$(293,040)	$(293,040)
Software	$(12,000)	$(12,000)	$(12,000)	$(12,000)	$(12,000)
Office etc..	$(3,000)	$(3,000)	$(3,000)	$(3,000)	$(3,000)
Projects	$(20,000)	$(20,000)	$(20,000)	$(20,000)	$(20,000)
Alt 3	$(3,700)	$(3,700)	$(3,700)	$(3,700)	$(3,700)
Total Surplus	**$3,027**	**$3,027**	**$3,027**	**$3,027**	**$3,027**

Recommendations:

Based upon the above analysis, our project team recommends Alternative 2 because Alternative 2 has the highest TBO, is cost-effective, has the highest NPV, and earliest beak-even point or payback period. Alternative 2 focuses upon integrating system upgrades during the next 5 years which will maintain and improve the current IT system. These improvements include network upgrades which will improve network speed, workstation replacements which will provide more powerful and reliable desktop and laptop workstations, server upgrades, moving the backup server storage to the cloud, replacing the current phone system, and replacing the current security camera system with better quality surveillance cameras. The Alternative 2 also includes maintaining the current IT dept staff and software licenses.

The Project Team will provide project management, consulting, technology installation, training, and support. Those services will provide professional management and installation of the plan, as well as facilitating a seamless transition during annual upgrades. The Alternative 2 annual upgrades will provide high benefits and a cost-effective solution.

References

City of Mequon. (n.d.). Retrieved from https://www.ci.mequon.wi.us/community