



6/30/2024

Proposal: Servers & Storage




Presented to: **City of Whitewater**

Presented by: **Digicorp, Inc.**





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City of Whitewater – New Servers & Storage Project Summary

We propose 3 new VM hosts running Hyper-V or VMware. 2 hosts at City Hall, using shared storage provided by StorMagic SVSAN; one host at Wastewater to house VM replicas from City Hall. VMware has been considered the gold standard for virtualization, is well known, and very well supported; however, it is an extra cost. Using shared storage is also beneficial as it allows for on-demand rapid migration of VMs from one host to another at City Hall for maintenance purposes. We recommend the third host at Wastewater for DR purposes – in the event of a complete loss at City Hall, the VMs will already be present at Wastewater, and can simply be turned on, leading to a much faster recovery time.

This quote includes an option for both VMware hosts and Hyper-V. Our recommendation is to utilize VMware; however, we are comfortable supporting Hyper-V as well, if it leads to ongoing cost savings for the city.

Phase 2 of the project will include migrating the data on many of these VMs to Server 2022 VMs. Server 2016 is still supported through 2027, but due to poor update behavior we recommend any VMs with 2016 or older be upgraded to 2022.

Note: This assumes the current Wastewater SCADA VMs will be migrated to PCs prior to this project beginning. If they are not migrated, we can migrate the existing VMs to VMware for an additional 3 hours per VM. They would reside at Wastewater for the time being.

Server Hardware Summary (Two hosts at City Hall)

HPE Proliant DL360 Gen11 (x2)
1 x Intel 4514Y 2.0GHz 16-core w/ HT
8 SFF x4 24G U.3 backplane
256G memory per host
NS204i Boot Controller
4 x 7.68TB NVMe Read-intensive drives per server (RAID10 usable capacity of ~13.9TB)
2 x 800W Platinum power supply
1 x 2-port 10/25G SFP28 OCP3 NIC (SVSAN iSCSI)
1 x 2-port 10/25G SFP28 PCIe NIC (future 10G LAN connection/vMotion)
1 x 4-port 1G PCIe NIC
iLO Advanced
3 x 1M 25G DACs (iSCSI & vMotion connectivity)

Shared Storage at City Hall

2 x SVSAN Standard 12TB license (no caching)
1 x Witness PC (Raspberry Pi 4B, or small Intel-based PC)

Server Hardware Summary (One host at Wastewater)

HPE Proliant DL360 Gen11 (x2)
1 x Intel 4514Y 2.0GHz 16-core w/ HT
8SFF x1 24G U.3 backplane

- 4 x 7.68TB NVMe Read-intensive drives per server (RAID5 usable capacity of ~20.9TB)
- HPE MR408i RAID controller
- 256G memory



- 2 x 800W Platinum power supply
- 1 x 2-port 10/25G SFP28 OCP3 NIC (future 10G)
- 1 x 4-port 1G PCIe NIC
- iLO Advanced

Server Software Licensing

We are planning on setting up 8 new VMs at City Hall. In total, we believe there are 10 Server 2022 VMs at City Hall, and one at Wastewater.

To run everything on one host at City Hall for maintenance, we recommend fully licensing each host to comply with Microsoft's licensing guidelines.

Recommended licensing

- 3 x VMware vSphere Standard 16-core packs (if Phase 1 – Option 1 is chosen)
- Server 2022 or 2025 - 11 sets of 16-core packs
 - 1 pack for Wastewater to run the tertiary DC
 - 5 packs for one host at City Hall
 - 5 packs for the second host at City Hall
- Server 2022 or 2025 User CALs – Total number of employees that potentially touch a Windows server. Recommend FTE count at least, potentially including part-time employees. Estimate 150, need to verify with customer / HR before purchase.
- SQL 2022
 - We recommend core-based licensing for SQL in these instances. It is simpler to administer and can be more cost effective. If Whitewater knows the number of named users that access each SQL-based application, we can provide a cost comparison to server/CAL based vs core-based licensing.
 - 2 x 2-core packs for PD SQL server (4 core minimum purchase)
 - 2 x 2-core packs for City Hall SQL server (4 core minimum purchase)

Phase 1 – New Distribution/core switch

The city's current network consists mostly of Aruba 2530 switches, which are end of sale and will be end of support in 2026. In addition, they are all 1G, with no options for additional bandwidth. Digicorp recommends implementing a 10G core switch, with all switches at City Hall uplinked directly to it where possible.

Hardware

- 1 x Aruba 6300 24SFP+ switch
- 6 x 10M OM3 LC-LC fiber patch cables (server & FortiGate uplinks)
- 10 x 10G SR J9150D-compatible transceivers (six for core switch, four for servers)
- 2 x 10G SR transceivers for the FortiGate (compatible is fine)
- 4 x 1G LR transceivers for the core switch (remote departments) (compatible is fine)
- 12 x 1G Base-T transceivers for switch uplinks at City Hall (compatible is fine)

Planned connections

- 2 x 10G FortiGate



- 4 x 25G Server uplinks
- 16 (for 8) switches at City Hall (five in switch closet, dispatch, and two server switches)
- 3-4 x remote departments (Library, Streets, and Aquatic center)

In the future (perhaps with the access switch replacement project in 2026) we would recommend a second core switch for redundancy along with a second FortiGate in HA.

Once the server project has finished, we recommend removing the older of the server switches. That labor is included at the end of phase 2.

We would recommend moving the wireless bridge uplinks to the core as well long-term, but that may require moving those ethernet terminations to the switch closet. That labor is not included here.

Labor estimates

- Program switch remotely based on anticipated design – up to 4 hours
- Onsite installation (afterhours) – 8-12 hours (2 engineers, 4-6 hours)
 - We will adjust the FortiGate uplinks during this time as well.

Phase 2 – New hosts and storage installation

Option 1 – VMware hosts

All three hosts will be provisioned with VMware vSphere Hypervisor, and VMware vCenter will manage them. The two hosts at City Hall will be provisioned as a cluster.

Labor Estimates

Build and install 3 hosts

- Build 3 hosts remotely (assemble hardware, install OS, install all applicable updates including driver and firmware) – 12 hours
- Install at City Hall, configure IP addresses, add to network – 6 hours
- Install at Wastewater, configure IP addresses, add to network – 3 hours
- Setup vCenter – 2 hours
- Migrate & convert City Hall VMs to VMware hosts – 30 hours (afterhours)
 - Duffman (Shoretel 2012 R2) – 6 hours
 - Patty (DC 2022) – 3 hours
 - Jimbo (SQL 2016) – 3 hours
 - Moleman (Laserfische 2016) – 3 hours
 - HVAC (Win 10) – 3 hours
 - Key System (Win 10) – 3 hours
 - Maude (Win 10) – 3 hours
 - Santos L Halper (Win 10) – 3 hours
 - Homer (Win 10) – 3 hours
- Migrate Wastewater VMs to VMware hosts – 18 hours (if needed) (afterhours)
 - 6 VMs
 - 3 hours per VM (bill only actual work)



- Update backup jobs as appropriate – 4 hours
- Setup Veeam replication (both from City Hall to Wastewater, and from Wastewater to City Hall) – 4 hours
- Remove 2910a switch from server room – 2 hours onsite
- Optional – decommission 4 existing R710 hosts (only after phase 3 is complete) – 12 hours (3 per)
 - Remove RAID arrays, recreate for purpose of wiping drives.
 - Initiate 3-pass wipe using NWipe (or 7-pass if customer desires).
 - Remove from rack & recycle through Digicorp if desired.

Option 2 – Hyper-V hosts

All three hosts will be provisioned with Server 2022 (or 2025 if it is available at the time of purchase). A Hyper-V cluster will be configured between the two hosts at City Hall. VMs are migrated from the existing Hyper-V hosts, and only the virtual hardware is upgraded during a reboot cycle.

Labor Estimates

- Build 3 hosts remotely (assemble hardware, install OS, install all applicable updates including driver and firmware) – 12 hours
- Install at City Hall, configure IP addresses, add to network – 6 hours
- Install at Wastewater, configure IP addresses, add to network – 3 hours
- Build Hyper-V cluster and validate functionality – 8 hours
- Live migrate City Hall VMs to new hosts – 4-8 hours (performed over several evenings to minimize impact to users)
 - Duffman (Shoretel 2012 R2)
 - Patty (DC 2022)
 - Jimbo (SQL 2016)
 - Moleman (Laserfische 2016)
 - HVAC (Win 10)
 - Key System (Win 10)
 - Maude (Win 10)
 - Santos L Halper (Win 10)
 - Homer (Win 10)
- Migrate Wastewater VMs to new host – up to 4 hours (if needed) (afterhours)
 - 6 VMs
- Update backup jobs as appropriate – 4 hours
- Setup Veeam replication (both from City Hall to Wastewater, and from Wastewater to City Hall) – 4 hours
- Optional – decommission 4 existing R710 hosts (only after phase 3 is complete – 12 hours (3 per)
 - Remove RAID arrays, recreate for purpose of wiping drives.
 - Initiate 3-pass wipe using NWipe (or 7-pass if customer desires).
 - Remove from rack & recycle through Digicorp if desired.
- Remove 2910a switch from server room – 2 hours onsite



Phase 3 – OS Upgrades

Because of the potential for CJJ present in the PD files, and obvious CJJ present in TiPSS and TraCS, we recommend separating those resources to their own servers – one PD file & print server, and separate PD DB & application servers. The data drives on those servers will need to be encrypted with BitLocker as well.

All Windows 10 VMs need to be properly licensed or removed. We recommend moving applications to Server 2022 VMs and have proposed that below. The jump box will be removed. Alternatively, a new Server 2022 VM with RDS can be created for IT staff to use simultaneously. Lastly, we recommend the WSUS server be decommissioned, and simple group policies be used to push updates from Microsoft.

- Duffman – leave as-is due to impending demise in 2025
- Kodos (file server) 20-24 hours
 - ~8TB of file data.
 - Create 2 new 2022 VMs (PD and City) – 4 hours.
 - Robocopy data from current VM to new VMs – 4 hours.
 - This robocopy may take a few weeks, based on a previous project.
 - Cutover night/weekend – 4-8 hours.
 - Disable shares on existing server.
 - Final robocopy sync.
 - Update all drive mappings, including home dirs. in AD.
 - Update LaserFische mapping for scanning if used.
 - Update copiers for scan-to-folder if used.
 - Onsite follow-up day after cutover (one engineer) – 8 hours.
- Frink (print server) 15-19 hours
 - Printers will be moved to either the City Hall or PD file servers – there really isn't a huge need to have a separate print server, and we can save on some licensing costs.
 - Review current printer definitions on Frink, determine which do not need to be recreated – 2 hours.
 - Configure printers on new servers – 4-8 hours.
 - Recommend using universal drivers where possible to minimize the number of drivers needed.
 - Push new printer definitions via group policy – 4 hours.
 - Remove printer shares on old Frink server – 1 hour.
 - Remote follow-up after cutover (one engineer) – 4 hours.
- (new) PD DB server & application servers – 14-20 hours.
 - Create 2 new 2022 VMs – 4 hours.
 - Install SQL Server 2022 – 2 hours.
 - Migrate TraCS – 4-8 hours.
 - Web services will reside on the application server, potentially the installation as well.
 - Provide cutover assistance to update end-user workstations with Whitewater IT.
 - Migrate TiPSS – 4-6 hours.
 - Web services will reside on the application server.
 - Provide cutover assistance to update end-user workstations with Whitewater IT.
- Jimbo (SQL, Caselle, TiPSS) – 22-54 hours.



- SQL Standard 2016 - Databases - Caselle, CTI, Firehouse, LaserFische, Netwrix, SCADA ReadCenter (RCD_ databases), TIPSS, Tracs DBs, old Veeam
- Create new 2022 VM – 2 hours.
- Install SQL 2022 – 2 hours.
- Migrate Netwrix databases – 2 hours.
- Work with Civic to migrate Caselle installation & databases – 4-8 hours
 - Provide cutover assistance to update end-user workstations with Whitewater IT.
- Work with Water SCADA vendor to move Read Center application – 4-8 hours.
 - Provide cutover assistance to update end-user workstations with Whitewater IT.
- Work with ESO to migrate Firehouse application & databases or obtain directions to do so ourselves – 4-8 hours.
 - Provide cutover assistance to update end-user workstations with Whitewater IT.
- Obtain directions for moving LaserFische databases; migrate databases – 4-8 hours.
 - Provide cutover assistance to update end-user workstations with Whitewater IT.
- Migrate any remaining databases, or decommission as appropriate – up to 16 hours, likely less.
- Moleman (LaserFische) – 16-26 hours.
 - Create new 2022 VM – 2 hours.
 - Work with vendor to move LaserFische to new server – 4-8 hours.
 - Provide cutover assistance to update end-user workstations with Whitewater IT – 4 hours.
 - Migrate Netwrix to this VM – 4-8 hours.
 - Migrate Spiceworks to this VM – 2-4 hours.
- Maintenance VM – 14-22 hours.
 - This VM will house more public-facing apps that users may need to login to, like the key system or the HVAC system.
 - Create new 2022 VM – 2 hours.
 - Work with vendor to move HVAC applications to new server – 4-6 hours.
 - Work with vendor to move key system application to new server – 4-6 hours.
 - Migrate vehicle management application to this VM – 4-8 hours.
- Optional – IT jump box VM – 6 hours
 - Create new 2022 VM – 2 hours.
 - Configure RDS services – 2 hours.
 - Install apps as appropriate – 2 hours.



Pricing Summary

Core Switch

<u>QTY</u>	<u>DESCRIPTION</u>	<u>Unit Price</u>	<u>Extended Price</u>
1	HPE Renew Aruba 6300M 24-port SFP+ and 4-port SFP56 Switch Modular, 1U High - Rack-mountable - Lifetime Limited Warranty	\$ 7,495.00	\$ 7,495.00
2	HPE Aruba X371 250W 100-240V AC Power Supply	\$ 425.00	\$ 850.00
8	Aruba Compatible 25GB SR Transceiver (Server uplinks)	\$ 150.00	\$ 1,200.00
2	Aruba Compatible 10GB SR Transceivers (Aruba uplinks)	\$ 250.00	\$ 500.00
2	10GB SR Transceiver (Fortigate uplinks)	\$ 95.00	\$ 190.00
4	Aruba Compatible 1GB LR Transceiver (Remote Department uplinks)	\$ 195.00	\$ 780.00
16	Aruba Compatible 1GB Base-T Transceivers (City Hall switch uplinks)	\$ 60.00	\$ 960.00
3	Aruba Compatible 25GB 1M DAC	\$ 150.00	\$ 450.00
1	Proposed 24 Strand OM4 Fiber between Switch closet and Server Room (Estimated)	\$ 6,000.00	\$ 6,000.00
	Total		\$ 18,425.00

City Hall Hosts

<u>QTY</u>	<u>DESCRIPTION</u>	<u>Extended Price</u>
2	HPE DL 360 G11 1U 8SFF x4 Server including:	\$ 35,950.00
1	Intel Xeon-Silver 4514Y 2.0GHz 16-core 150W Processor for HPE	
1	HPE 256GB (8x32GB) Dual Rank Registered Smart Memory Kit	
1	HPE NS204i-p x2 Lanes NVMe PCIe3 x8 OS Boot Device -Includes (2) 480 GB M.2 SSD drives in RAID 1	
4	Micron 7500 Pro 7.68TB NVMe Read-intensive SSD per server (RAID10 usable capacity of ~13.9TB)	
1	BCM Ethernet 1Gb 4-port BASE-T PCIe Adapter for HPE	
1	BCM Ethernet 10/25Gb 2-port SFP28 PCIe Adapter for HPE	
1	BCM Ethernet 10/25Gb 2-port SFP28 OCP3 Adapter for HPE	
2	HPE 800W Platinum Hot-plug Power Supplies	
1	HPE iLO Advanced LIC	
1	HPE Tech Care Essentials w/DMR for DL360 for 5 Years	
	Total	\$ 35,950.00



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Storage Software

<u>QTY</u>	<u>DESCRIPTION</u>	<u>Extended Price</u>
2	SvSAN 12TB Single Node Base LIC	\$ 6,500.00
2	SvSAN 12TB Single Node Platinum Support for 3 Years	\$ 5,600.00
1	Witness Server (Raspberry Pi)	\$ 190.00
	Total	\$ 12,290.00

Wastewater Replication Server

<u>QTY</u>	<u>DESCRIPTION</u>	<u>Extended Price</u>
1	HPE Proliant DL360 G11 8SFF x1 including:	\$ 18,475.00
1	Intel Xeon-Silver 4514Y 2.0GHz 16-core 150W Processor for HPE	
1	HPE 256GB (8x32GB) Dual Rank Registered Smart Memory Kit	
1	HPE NS204i-p x2 Lanes NVMe PCIe3 x8 OS Boot Device -Includes (2) 480 GB M.2 SSD drives in RAID 1	
4	Micron 7500 Pro 7.68TB NVMe Read-intensive SSD per server (RAID 5 usable capacity of ~20.9TB)	
1	HPE MR408i-o Gen11 SPDM Storage Controller	
1	BCM Ethernet 1Gb 4-port BASE-T PCIe Adapter for HPE	
1	BCM Ethernet 10/25Gb 2-port SFP28 OCP3 Adapter for HPE	
2	HPE 800W Platinum Hot-plug Low Power Supply	
1	HPE iLO Advanced Management Engine	
1	HPE Tech Care Essentials w/DMR for DL360 for 5 Years	
	Total	\$ 18,475.00

Server Software

<u>QTY</u>	<u>DESCRIPTION</u>	<u>Unit Price</u>	<u>Extended Price</u>
11	Microsoft Windows Server 2022 Standard 16 Core License Pack	\$ 1,069.00	\$ 11,759.00
4	Microsoft SQL Server 2022 Standard Core - 2 Core License Pack	\$ 1,577.00	\$ 6,308.00
150	Windows Server 2022 User CAL	\$ 46.00	\$ 6,900.00
	Total		\$ 24,967.00

Virtualization Software (Optional)

<u>QTY</u>	<u>DESCRIPTION</u>	<u>Unit Price</u>	<u>Extended Price</u>
48	VMware vSphere 8 Standard LIC per-core for 3 YRS	\$ 150.00	\$ 7,200.00
	Total		\$ 7,200.00



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Professional Services to Complete Phase 1

<u>QTY</u>	<u>DESCRIPTION</u>	<u>Unit Price</u>	<u>Extended Price</u>
16	Digicorp Professional Services to complete the detailed Scope of Work for Phase 1	\$ 135.00	\$ 2,160.00
	Estimated Total (will bill actual)		\$ 2,160.00

Professional Services to Complete Phase 2

Option 1: VMware

<u>QTY</u>	<u>DESCRIPTION</u>	<u>Unit Price</u>	<u>Extended Price</u>
45	Digicorp Professional Services to complete the detailed Scope of Work for Phase 2	\$ 135.00	\$ 6,075.00
48	Digicorp Professional Services to complete the detailed Scope of Work for Phase 2	\$ 202.50	\$ 9,720.00
	Estimated Total (will bill actual)		\$ 15,795.00

Option 2: Hyper-V

<u>QTY</u>	<u>DESCRIPTION</u>	<u>Unit Price</u>	<u>Extended Price</u>
59	Digicorp Professional Services to complete the detailed Scope of Work for Phase 2	\$ 135.00	\$ 7,965.00
4	Digicorp Professional Services to complete the detailed Scope of Work for Phase 2	\$ 202.50	\$ 810.00
	Estimated Total (will bill actual)		\$ 8,775.00

Professional Services to Complete Phase 3


<u>QTY</u>	<u>DESCRIPTION</u>	<u>Unit Price</u>	<u>Extended Price</u>
171	Digicorp Professional Services to complete the detailed Scope of Work for Phase 3	\$ 135.00	\$ 23,085.00
	Estimated Total (will bill actual)		\$ 23,085.00

Additional Professional Services

<u>QTY</u>	<u>DESCRIPTION</u>	<u>Unit Price</u>	<u>Extended Price</u>
16	Digicorp Professional Services to provide System Training and documentation	\$ 135.00	\$ 2,160.00
1	Digicorp Professional Services to provide ongoing annual support (T&M from Block Support Agreement)		T&M
	Estimated Total (will bill actual)		\$ 2,160.00



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Notes: Pricing includes promotions and is valid until 7/31/2024. Applicable taxes, trip and freight charges are not included.

