



DATA CENTRE *partnership*



APPROACH & *partnership*

Over the past 10 years Govan Brown has enjoyed a strong working partnership with Structure Tone Inc. Structure Tone is a global construction leader and are experts in mission critical facilities construction having constructed over 25 million SF of mission critical space. This outstanding partnership affords our clients the opportunity to leverage the strength of the Govan Brown covenant in the Canadian market place as one of its leading construction management firms combined with the global technical acumen of Structure Tone, industry leaders in the data centre and mission critical construction sector.

Together we have successfully executed over 20 projects in Canada including technical projects for clients like MMC, Hewlett Packard and Softlayer. Our shared experience completing these highly technical and data centre projects enables our clients to benefit from Govan Brown's understanding of the market place in Canada including key trade relationships and local knowledge. Client's will also benefit from Structure Tone's understanding of the mechanical and electrical infrastructure associated with critical facilities and methods of procedures that will be implemented on these projects to ensure their success.

VALUE PROPOSITION

The Govan Brown and Structure Tone combined approach to data centre construction blends the strengths and relationships of our collective teams to drive value for our clients in any construction mandate. Clients will benefit from our unique approach in the following ways:

- Receive local market advocacy from Govan Brown on each project through the assignment of Project Managers and Site Superintendents who know Canadian markets;
- Leverage trusted Govan Brown relationships with key trades in all construction divisions while satisfying the legislated requirements of municipalities across Canada;
- Supplementing local teams with Structure Tone global leaders in project planning, mechanical, electrical and data centre construction procedures;
- Sharing of global best practices by assigning Structure Tone key resources to projects including Mechanical, Electrical, and Plumbing, Project Managers and Coordinators;
- Direct oversight of Govan Brown and Structure Tone executives to ensure diligent governance on every project;
- Utilize our combined experience in pre-construction to identify the potential risks associated with projects and appropriate mitigation efforts to minimize or eliminate these threats;
- Drive a consistent outcome on all technical projects to achieve budget and schedule requirements.

OUR EXPERIENCE

Both Govan Brown and Structure Tone have combined to build several Data Centres and spaces with heavy mechanical and electrical components over the last 10 years of our partnership. This includes installing uninterruptable power systems, generators, HVAC systems, environmental controls, fire suppression systems, and sophisticated building automation and security systems. Together we have been integral to helping our client's reduce budget, accelerate schedule, and resolve field challenges while never compromising the overall design and/or operational/capacity goals of the facility. We possess the ability to consistently deliver increased efficiency, and cost savings and process improvement to our clients rooted in lessons learned that we have amassed over the combined 35+ years of building mission critical facilities. The following are examples of a range of mission critical projects completed by our team members.

MISSION CRITICAL PROJECTS COMPLETED

Govan Brown and Structure Tone have partnered together on several projects. Their expertise in building Data Centres and projects with heavy mechanical and electrical components combined with our expertise in construction management provides our clients with complementary skill sets, project experience, and seamless product delivery. Projects completed by STI are identified with an asterix.

CONFIDENTIAL FINANCIAL SERVICES CLIENT *

New Jersey
370,000 square feet

370,000 sf state-of-the-art mission critical facility that required work on two adjacent easements to create additional storm water control and to accommodate point of entry (POE) conduits (phone, fiber, etc. to support the technical space) and utility power feeds. Security concerns required construction of berms with boulders and ballards to provide force protection. We also constructed a perimeter fencing system, heavy duty lift gates and privacy landscaping. Interior security measures include card reader and fingerprint scan access to the white space. The building foundation is spread footings with piers and perimeter grade beams. The building structure is a robust structural steel frame designed for high floor loadings and seismic concerns. Slabs are reinforced concrete on metal deck with shear studs to provide composite action. The

building skin is a pretensioned, precast panel system with integral insulation and the roof system is a concrete slab with a fully adhered torch applied membrane over insulation. The building structure is rated to withstand winds up to 110mph. The base building infrastructure includes new 26kV service. It is a dual feed system rated 2N. Each service transformer is rated 40mVA. In the data centre, we installed the cable plant infrastructure to support all information systems. This included racks, cabinets, RPPs and data cabling. The data centre achieved LEED Gold certification.

CONFIDENTIAL TECHNOLOGY CLIENT *

New York
125,000 square feet

Construction of a new 125,000 data centre and includes 75,000 sf of white space day-one expandable to 150,000 sf. Our team built the first high density data centre for under \$5M/MW and a PUE of 1.08. The structure is pre-engineered insulated metal panels. There is a single-story office/administration center and five (three constructed in Phase I and two constructed in Phase II) data center pods. All buildings are connected via halls. A long narrow complex of structures often referred to as a 'chicken coop' accommodates the 100% outside air-cooling. Prior to beginning construction of the buildings, our team performed extensive site work, including grading, drainage, retention ponds, parking lot, ring road and site utilities (sewer, water, telecoms) to support the pods. Site work also included construction of a utility yard (foundations for generators and outdoor switchgear) and foundations (poured concrete footings) for all buildings. For the data pods, the generator system is N+1 (EPS). The 100% air-cooled system includes hot/cold aisle separation facilitated by air economizer and extensive use of louvers for air intake and heat rejection. Server fans are the primary medium for moving air. There is no raised floor. Security measures included perimeter fencing, CCTV, intrusion controls, and card access within the buildings.

CONFIDENTIAL FINANCIAL SERVICES CLIENT *

New Jersey
398,000 square feet

Structure Tone managed construction of a new data centre that also includes administrative/office, separate security building, maintenance and general support areas. The two-story building is 398,000 sf with over 150,000 sf of white space with 36 inch raised flooring. The project also included construction of a new 3,000 sf security control and visitor access center. In addition to construction of the facilities, our scope included extensive hardscape (access roads, parking, sidewalks, security barriers, etc.) and landscape (pine trees, berms, drainage, etc.). The main function of the new facility is to support the mission critical operations of over 150,000 sf of white space. The space is planned to allow the installation of a network operations centre (NOC) installed in the future and we have built the room, raised floor and power requirements in preparation for this. The facility is concurrently maintainable with fully redundant systems equivalent to a Tier III rating. Systems redundancy includes:

- Generator and chiller plant-N+2 (seven auxiliary generators)
- UPS-N+1
- Substation-2N

Underground fuel storage tanks and a water storage tank will maintain the facility for 72 hours. In addition there is more than 20 minutes of thermal water stored without the use of thermal storage tanks. All raised floor includes grounding and the building has lightning protection. The facility is designed and constructed to achieve power density of 28MW (enough power to 10,000 residential homes). To achieve this, we built two 138kV substations/switchyards on site. The new substations interrupt an underground transmission line and are the only service on the line. The new substations fully mimic those of the local utility to which they connect.

Overall, the electrical and mechanical infrastructure includes all new:

ELECTRICAL	MECHANICAL
UPS	Chiller plant
Power distribution units	Cooling tower
Generators	Pumps
Paralleling gear	Computer room air handlers
Automatic static transfer switches	Air handling units
Transformers	Piping and ductwork
Remote power panels	
Batteries	

Structure Tone installed an electric power monitoring systems (EPMS), including building management system (BMS) and pre-action fire protection and detection system. We coordinated the integration and connection sewer and water service utilities to the building. Our team installed the cable plant infrastructure to support all information systems within the data centres, which was a complete fiber solution. We assisted with the placement of cabinets and rack layout, including cabling and power to cabinets. Schedule challenges required creative solutions in order to meet project milestones. With such a short time frame for the construction, our team had two 28MW, 138kV unit substations built off-site. This allowed for work to continue onsite.

AIG

120 Bremner Blvd., Toronto, ON
48,000 square feet

Completed in less than 6 months, this 48,000 square foot office space was built over 2.5 floors and consists entirely of raised access flooring. The raised floors sit roughly 18" off the cement floor plate which allows all the tech and computer cabling from the workstations to flow under the floor to hub rooms and the Intermediate and Main Distribution Frames (IDF/MDF). These IT rooms are supported by CRAC units and UPS systems to guarantee the steady operation of the equipment within the room. Mura Flex wall systems were tailored into the raised flooring plan, as were AV equipped conference rooms and a 22 person table with built in AV features and teleconferencing capabilities.

CIBC TECHNOLOGY RELOCATION

483 Bay Street, Toronto, ON
240,000 square feet

This relocation project for CIBC required the construction of all new corporate interior space along with a server room and office with raised flooring as part of the first phase of the project. The second phase included an interior fit up of 5 floors. Each of the five floor plates was made up of 40,000 square feet, totalling 200,000 square feet. They were to act as a technology resource and network centre for the bank. The floors were made up of multi use office and technology labs along with twin LAN rooms for each floor. To accommodate the influx of electrical equipment, a liquid cooling system made up of twin cooling towers was installed. The cooling towers service over 40 heat pumps that provide cooling for the 10 LAN rooms and technology labs located in the space. The mechanical cooling systems were installed on the roof and the cooling loop descended to the fifth floor.

CI DATA CENTER & RECOVERY DATA CENTRE

25,630 square feet

This project functioned as CI Financial's prime Data Centre and balance of space was fit out to operate as a fully ready and functional Disaster Recovery Centre. It was tied into the existing base building generator system but added supplemental 1000 litre diesel tank and duplex redundant pump systems. Major equipment included:

Full redundant UPS system complete with PDUs and batteries; Fully auto transfer switch and back up remote generator feed; Stand alone glycol dry cooler system with two dry cooler units at roof; Fully redundant pump system; 2 CRAC units in the UPS room; 11 CRAC units in the Data Centre and Fire Suppression System.

CIBC PROJECT LASER

55 Yonge Street, Toronto, ON
20,000 square feet

Interior fit out of back of house technical support centre over two floors (6 & 7) plus dedicated UPS room which housed:

100 KVA/80 kW UPS; 600 Amp, 120/208V 3 phase 4 wire Transfer Switch; Distribution panels; 2 – 2.5 ton glycol AC units c/w humidification capacity at 5 lbs/ hour - 25% - 100%; LAN Room (+/- 300 SF); backed up by UPS and Generator systems; 2 – 3.5 ton glycol AC units c/w humidification capacity at 10 lbs/hr – 25% - 100%; stand alone dry cooler and glycol pump system to support above AC units.

Second phase of project was to add Generator to roof of building;

250/200 kW diesel Gen Set; fully redundant, duplex pump package with complete automatic control panel with alarms and 250 gal diesel tank in basement.

CYRUSONE *

7100 Metropolis Drive, Austin, TX
80,000 square feet

The CyrusOne project was a large facility repurposing effort that required the team to quickly work in a design assist scenario to reuse an existing tilt-up structures and add an expansion. This facility was completely converted from a standard tilt-up facility to be a dedicated resilient data center. One of the challenging aspects of this project was the 16 week schedule from ground breaking to commissioning to completion. This facility utilized a first of its kind modular UPS room that was first utilized on this project by the client. Utilizing this approach allowed for minimizing interior utilization of non-Data Center equipment and thus maximizing the data processing spaces. This project was one of the fastest new facilities that CyrusOne had ever created in their history and was turned over to active use on time to meet their IT user needs.

DIGITAL REALTY TRUST *

12234 & 12235 N Freeway, Houston, TX
120,000 square feet

Structure Tone Southwest was the Construction Manager for new tilt wall data centers as well as an entire campus high voltage electrical distribution upgrade for Digital Realty Trust. The project consisted of a 90,000 sf shell containing 4 data centers and a second 60,000 sf shell containing 3 data centers. At the same time, Structure Tone Southwest managed the installation of a campus wide 35kV electrical upgrade, bringing in eight new circuits from the public utility company to a central electrical mall, and then distributing out to the buildings on the campus. The project was completed in less than 6 months and was the fastest delivery ever for Digital Realty in their history.

HEWLETT PACKARD DATA CENTRE RENOVATION

115 Clegg Road, Markham, ON
40,000 square feet

This complex data centre project required the replacement of several electrical and mechanical systems while daily operations resumed in the HP office. All new Computer Room Air Conditioning (CRAC) units had to be replaced as well as other Air Handling Units (AHU). These newly installed features required the appropriate piping and wiring that was related to their functions. New plumbing and waterlines were also installed as well as new electrical systems that controlled the majority of the data centre's equipment. The most challenging aspect of the project was the process of reinforcing the roof trusses above the equipment without halting their operation. It was crucial that we maintained the safety of our workers while also preventing dust from penetrating the systems and ensuring that the equipment had appropriate cooling. Major equipment included:

Replacement of 6 rooftop condenser units and associated indoor CRAC units; supply & install 2 new rooftop condenser units and associated indoor CRAC units; upgrade to existing electrical service including new high voltage switchgear; provide concrete ductbanks and pads to two new utility switchgears; coordinate installation and commissioning of two new utility switchgears with electrical utility company; structural steel reinforcement of roof above active server banks; various mechanical, electrical, security & architectural improvements in an active data centre.

SOFTLAYER TECHNOLOGIES

371 Gough Road, Markham, ON
10,000 square feet

The 10,000 square foot data center was aggressively scheduled to be completed in a short two month period. Divided into 2 phases, the project pace was dictated by the progress of base building construction which was occurring concurrently. Each phase took roughly 4 weeks to complete as construction could only be done in the evenings as to not disrupt the progress of base building construction. During this phase, we installed 100 electronic equipment casings or racks and 10 remote power panels (RPPs). The second phase was completed during the day as base building construction had been completed. During this portion of work, another 98 racks were installed as were another 10 RPPs, totalling over 198 racks and 20 RPPs for the facility.

MID RANGE

85 Idema Road, Markham, ON
10,000 square feet

Conversion of a 10,000 square foot warehouse into a computer solutions facility for Mid Range. The space was transformed into a fully functioning office with a data centre. From the outset, the project required an abundant amount of mechanical and electrical work. For the office to be functional, it was necessary to include fire and smoke detection and suppression; electrical distribution, including receptacle placement and electrical feed for rooftop air handling unit; security and monitoring systems; and basic heating, plumbing and ventilation. The 5,500 square foot data centre was comprised of a large generator, 4 CRAC units, a large remote terminal unit for data collection and 2 uninterruptable power sources to ensure the function of all data related technology in case of an emergency power failure. It is also supported by a raised floor that conceals the glycol loop running from the 4 CRAC units which condition the room.

CONFIDENTIAL FINANCIAL SERVICES CLIENT *

New Jersey
6,000 square feet

In keeping with its worldwide environmental strategy, the client engaged Structure Tone to provide construction management services for its prototype "extreme efficiency data centre." The data center is 100% outside air-cooled and was added to an existing, occupied, functional data center of older design. With scalability in mind, it is the first of five (planned) modules (or pods). The data center includes:

- Rack loading of over 20kW of blades
- All air-cooled design
- No room-based CRAC units or water

- No perforated tile or underfloor cooling
- Temp and humidity tolerances of modern IT equipment pushed to new limits
- 60°F-90°F and 30%-80% relative humidity (RH) for cold aisle
- AC/compressors with DX cooling in excess of 95°F
- PUE 1.17 on free cooling (to 1.23 annual average PUE)

Pressurized air from roof-mounted AHUs flows to supply ducts where humidification is used for evaporative cooling. Cold aisle air circulates through the racks where it is exhausted through the hot aisle up to return ducts and recirculation dampers. On very cold days, hot aisle air is used to maintain temperature and, as noted above, DX cooling coils activate on extremely hot days. To accommodate the new system we had to perform structural modifications to the building. This included installing dunnage steel on the roof (of the eight floor building), opening roof slabs to install duct work and connecting the duct work to the new pod. Knowing that future scalability was one of the client's goals, 95% of all the dunnage steel required for five pods was installed, including visual screens and sound attenuators.

CLIENTS

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|-----------------|---------------------|-------------------------|--------------------|
| ■ AIG | ■ Deutsche Bank | ■ McGraw-Hill | ■ Qualcomm |
| ■ Barclays | ■ eBay | ■ MD Anderson | ■ RBC |
| ■ Bloomberg LP | ■ Frost Bank | ■ Merrill Lynch | ■ ROBTV |
| ■ Cephalon | ■ Interxion | ■ Microsoft | ■ Standard & Poors |
| ■ Cisco Systems | ■ JPMorgan Chase | ■ Morgan Stanley | ■ Time Warner |
| ■ Citigroup | ■ Knight Securities | ■ Nortel | ■ TIAA-CREF |
| ■ Credit Suisse | ■ Level 3 | ■ NYSE Euronext | ■ Unisys |
| ■ CyrusOne | ■ Lowe's | ■ Princeton University | ■ Yale University |
| ■ Dell | ■ Mayo Clinic | ■ Progressive Insurance | ■ Yahoo! |