



Written Submission for the Pre-Budget Consultations in Advance of the Upcoming Federal Budget

By: TRIODETIC Ltd

TRIODETIC LTD.

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Recommendation 1: That the government implement increased spending in relation to affordable and aboriginal housing.

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We thank the Honorable Members of the Standing Committee on Finance for the opportunity to talk before the Committee on June 18, 2020 and to submit our recommendations for the 2021 Federal Budget.

COMPANY BACKGROUND

Triodetic is a structural engineering company based outside of Ottawa in Arnprior Ontario, where we design, engineer and manufacture everything.

Since the mid-1960's, Triodetic has been an internationally recognized leader in space-frames, domes, shells, and free-form structures, and holds numerous patents and trademarks for its technology. All products are supplied in compliance with Sustainable Building Initiatives.

Founded over 60 years ago as a spaceframe architecture company, with projects throughout the world: (Ontario Place Dome, the John F Kennedy Library Glass Wall, and the Melbourne Arts Center Spire).

Triodetic is credited with numerous industry awards and many landmark projects throughout North America, Caribbean, South America, Europe, Africa, Australia and the Pacific, China, and Middle East.

All Triodetic activities are performed in compliance with OSHA Safety requirements and ISO Quality Management principles. All manufacturing takes place at the factory in Arnprior, Ontario.

MULTIPOINT FOUNDATION DIVISION

Triodetic was invited 40 years ago by the Canada Mortgage & Housing (CMHC) to develop a foundation solution for permafrost soil for aboriginal housing needs. We designed and manufactured a steel spaceframe foundation system, called Multipoint Foundations, to support buildings on unstable soils: permafrost, floodplains, and brownfields. Since then we have been supporting housing & commercial projects throughout Canada, the US, Norway and Russia.

The Multipoint Foundations (MPF) works like a floating raft slab, protecting the structural integrity of the building despite the differential settlement of the soil.

After making inroads into the permafrost foundation needs, in the past 5 years MPF have been used for urban brownfield location sites, being involved in the development of over twenty (20), three to four story affordable housing projects with Vancouver Affordable Housing and BC Housing.

Our foundations are preferred for brownfield location sites because no remediation of the soil is required—no digging or excavation. The Multipoint Foundations are placed directly on top of the soil, and they assemble and disassemble very quickly (our system is relocatable) without leaving a footprint. Premanufactured modular units then can be easily installed onto our foundation system.

In conjunction with modular building manufacturers, Triodetic has been developing emergency medical, relief and shelter unit options that could be useful for the Canadian Federal and Provincial Governments in dealing with the Covid-19 crisis across the country

Triodetic designs, engineers and manufactures everything at our plant in Arnprior ON using Canadian aluminum and steel. We have won the Canada Mortgage & Housing Innovation Award and this past February 2020, the First Nation's Community of Fort Severn—the northernmost community in Ontario on the Hudson Bay—received an innovation award for their use of our MPF system during the First Nations Housing Conference in Thunder Bay, ON.

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RECOMMENDATIONS

With our direct experience of 40 years working with all stakeholders involved in affordable and aboriginal housing, we propose that the Canadian Federal Government continue and increase funding towards these housing needs in Canada. Currently the Federal Government is involved with the Federal Community Housing Initiative with a \$500 million investment over 10 years from 2018-2028. Also the Federal Government spends annually approximately \$300 million to address First Nations Housing needs. While we believe this is a good first step towards tackling the problem, we believe this still falls short of the total demand for housing, which will only increase after the economic fallout of Covid-19. Therefore, we recommend that the Federal Government duplicate spending in affordable and aboriginal housing to \$1 billion and \$600 million respectively, to bring us closer to a more permanent solution to the housing problem and shortage that we are currently facing.

BENEFITS TO CANADA

The cost savings for each project was tremendous, not to mention the added bonus of quicker unit occupancy – weeks, instead of months or years if site remediation is involved. With the potential rise in the need to build temporary facilities for increasing bed capacity Triodetic has a structure that can be deployed relatively quickly in remote locations where the infrastructure is lacking for a staging area. First unit can be delivered within a 2 week period, second one would require 3-4 weeks. Complete set up would take between 10-15 days.

This structure can be considered as a multi-use facility. After the use as a crisis/medical/isolation center this facilities can be reused for affordable housing foundation and for indigenous communities therefore it will make this cost efficient to the government. This would turn into a long term investment 30 - 40 years. This product can be promoted beyond Canada's borders to assist countries in need of urgent infrastructure capacity to support urgent medical situations or long term economic development. The benefits to Canada will be more international recognition by developing countries and higher employment levels locally due to increasing demand for this Canadian engineered and manufactured product

MARKET EXPERTISE

Residential

Multipoint Foundations has been developed for any structures situated on weak, unstable, variable soils or in flood prone regions. By providing a rigid platform, to build on, the foundation acts as a floating slab eliminating damage to the building

This effectively

- extends building life
- maximizes the value of material used,
- reduces maintenance and insurance costs
- Is economical in term of both initial and life cycle costs.

Commercial

MultiPoint is a galvanized steel and aluminum, 3 dimensional, reinforced space frame that provides uniform support to the building above, regardless of the soil conditions below. A galvanized finish gives long life corrosion protection to tubing, base plates, saddle brackets and washers. Hotels, Maintenance Garages, Hospitals and Power generating equipment are just a few of the structures that have been built with our system. With a capacity of 33,000 lbs. per base plate MULTIPOINT Foundation can support heavy commercial multi story buildings.

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Modular

A flat and level platform is the key to setting up modular units, MULTIPOINT provides a perfect base to rest modular buildings on and with our quick assembly the crews can build the foundation at the same period as the home is being delivered, a typical modular house foundation of 1500 sqft to 2000 sqft can be assembled by 3 workers in 1 day, using simple hand tools. The frame is delivered to site as a compact kit for hand assembly by local labor. Avoid the issue of the foundation not costs and preside installation.

Floodplains

Our foundation can be used to elevate your structure above the flood plain is a regulation using a cost effective solution to obtain your desired height. In addition to our custom designed frame hight, our foundations also add the rigidity of the system to the home and adds a sense of comfort for owners knowing they will be protected if or when a flood occurs.

Multipoint Foundations can be used in new construction, existing retrofits to reinstate deteriorated conventional concrete foundations or where piles have been used and elevate.

Frames height can be custom designed to the require flood level but also add the rigidity of the system to the home and add comfort to the owner that they will be protected if or when a flood occurs.

Retrofit

MultiPoint avoids the need for site excavation, ground leveling, piling and/or concrete and masonry construction.

The system can be used to replace deteriorated conventional concrete foundations or where piles have been used with minimal disruption. Jacking or elevating the existing structure, then fast assembly of MULTIPOINT below can turn a deteriorating home back into a valuable structure.

Other benefits include lower foundation cost and faster construction in many cases, no delay in waiting for special equipment in remote areas, and no damage to the surrounding environment by heavy equipment or alterations to the natural topography.

ENVIRONMENTAL BENEFITS

Triodetic recognizes the value and importance of sustainable building design. Our commitment to the community where we operate and those where our structures are built and used is demonstrated in our design, fabrication rocesses, products supplied and installation techniques employed.

The following summary identifies the environmental advantages offered by Triodetic technology:

- 60-90% Re-cycled raw materials used
- Up to 60% less material consumption through advanced structural design
- Reduced energy consumption in fabrication
- Non-polluting fabrication
- 100% recycling of scrap & waste
- Up to 50% reduction in freight
- Reduced project duration
- Minimal disruption to building site
- Work provided for local unemployed
- Reduced site hazards
- No site painting
- 100% product re-use

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STRUCTURE GEOMETRY

Every Triodetic frame is custom-designed. Frame modules can be any size.

In many instances cost savings can be achieved through the intelligent use of curvature in building elements and we take advantage of this.

The Triodetic joint is ideal for accommodating complex geometry, curvature, uneven support spacing and non-uniform loads, without price premium.

We develop the most efficient frame geometry for each application so that the resulting structure has the least mass. Many structure shapes are now available in single layer lattices, longer clear-spans are possible with double curved shells or a combination of shell and 3D trusses.

Triodetic strives to ensure every structure meets the design intent both aesthetically and structurally and reference to our project history will attest how well these designs stand the test of time.

Round steel or aluminum tubes are the most common sections used in the Triodetic system. Other sections and materials can be used and Triodetic has developed methods to do this for special applications. In either case, the Triodetic joint offers a streamlined joint that is simple to construct and is readily re-configured to implement future modifications or alternate use.

Longer spans and heavier loads are more efficiently achieved with steel members.

Aluminum is well suited to applications where light-weight is critical (e.g. building retrofits & temporary structures), and is often preferred in marine locations.

In pool/spa environments painted galvanized steel or anodized aluminum are preferred.

Industrial applications generally only require galvanized steel or mill finish aluminum.

Highly corrosive conditions may necessitate the use of stainless steel.

Architectural applications generally require paint finish.

ENGINEERING AND DESIGN

The structural capabilities of the Triodetic framing system have been established over a number of decades by extensive research and testing. As new materials and technologies evolve, independent full-scale testing continues to be the basis of the design limits adhered to when we design for each application and location.

Triodetic expends a substantial portion of its income yearly to perform research and development of building products and manufacturing processes. Landmark achievements include a number of world-firsts in architectural and industrial applications that accommodate abnormal loads, unusual geometry, and extreme corrosive environments.

All designs are performed and reviewed by Triodetic's experienced professional engineers in accordance with all building codes and standards appropriate to each project. Triodetic uses a suite of analysis programs, refined in-house for every conceivable structure geometry and loading condition. As experts in geometric and structural design of metal frame structures and cladding, we can provide rapid response to enquiries and the benefit of decades of experience in which solutions and details work best for each application.

We provide an engineer's stamp from professionals registered in each region for every project. Design reviews are available for Building Department officials as necessary.

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Triodetic Design and Manufacture comply with ISO Quality Management Principles and Practices. All materials are sourced from approved suppliers, all production is completed and checked by trained operators, and all welding is performed and reviewed by certified welding engineers and inspectors.

When required, Triodetic engineers are available to meet with clients at any stage of design or construction to address technical questions or project co-ordination.



Multipoint Foundations for aboriginal housing in Nunavut Canada

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Multipoint Foundations for aboriginal housing in Northwest Territories Canada

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Multipoint Foundations for affordable housing in British Columbia Canada

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