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### Crafts Street Elder Housing with Services Sustainability Narrative Update

Subsequent to our original submission, the project team has met several times with Green Newton to refine and improve upon the project's commitment to sustainability. More specifically, the project team has spent considerable time studying the possibility of certifying the project to Passive House Standards. Due to the nature of the use, it is considerably more difficult to understand what exact performance targets are required for certification of this project. This is due to the necessary inclusion of a commercial kitchen and indoor swimming pool (typically high energy end-uses) in what is otherwise a residential building. With a typical residential project, the process for passive house certification is straightforward and easily understood by the design team and the ownership group.

Unfortunately, our sustainability team as originally constituted was only familiar with the Passive House Institute US (PHIUS) standard and our initial discussions with PHIUS about the prospects for certification were not promising. For this reason, we began discussions with other consultant teams, and this led us to bring on a new consultant, RDH Building Science, to join the team. RDH is familiar with both Passive House standards, PHIUS and PHI, which we felt give us the best chance of ultimately achieving Passive House certification.

For the last 45 days, RDH has spent considerable time studying the project and applying its experience with other similar projects, including college residence halls, to see what it would take to achieve certification. This process has led us to the conclusion that while there may be a path to certification through PHI. Due to the commercial kitchen and swimming pool not being a common Passive House typology, certification requirements are not simple. This is not a commitment which we could yet make until we are much deeper into design and potentially not until certain technologies become more proven. Therefore, we are proposing a commitment to designing the project in a manner which offers us the best path towards certification, with appropriate documentation, even it turns out that certification is not feasible. To

best explain this commitment, we are segmenting the project into four areas of design and study: residential, kitchen, pool, and central hot water system.

### **Residential Design**

The residential portions of the building will be designed to a prescriptive standard that would achieve Passive House certification. This includes designing the building envelope and HVAC systems as if the building were to be certified. This will include all necessary higher-performance insulation, windows, and thermal bridge elimination upgrades. The envelope will be designed to meet Passive House airtightness standards and will be verified through testing. The HVAC systems will be designed for maximum efficiency and to provide necessary fresh air to the living areas. Our team feels this is the most important part of our commitment because if these measures are not included and verified during initial construction, they are difficult if not impossible to retrofit in the future.

### **Kitchen Design**

The commercial kitchen is the heart of the project and the services it provides. The design will not include any gas, moving to an all-electric appliance approach, including induction cooktops. Best practices will be implemented to create a best-in-class design (equipment, cooking station design, kitchen hoods) and reduce the kitchen's energy consumption while ensuring that it does not detract from the level of service provided to the residents.

Some other potential design elements that may be necessary to achieve Passive House certification will be considered during design, but these elements would be unconventional and our team has reservations making commitments to these elements such as grease exhaust heat recovery.

### **Pool Design**

The indoor swimming pool is an important component to the health and enjoyment of the residents of the project. It is also an element that uses significant energy. Similar to the kitchen, the design of the pool will include the best-in-class design practices (equipment, water heating, ventilation) to provide maximum operational efficiency, while ensuring that the level of service provided to residents is maintained. Design approaches departing from standard practices aiming to further reduce energy consumption will be evaluated on their impact on occupants' experience, as the design progresses.

### **Hot Water Heater Design**

A significant element of the project design is a centralized hot water production system. This system will be all-electric, significantly reducing the building's operation carbon footprint, and will serve all of three segments of the building. Hot water will be used not only within the residences as well as the commercial kitchen and pool. To

achieve Passive House certification, it is likely the hot water heating equipment would need to be a commercial-scale heat pump. There are no comparable systems installed locally that we can inspect, understand and price yet. These are exceptionally expensive and maintenance intensive systems that are relatively unproven in the US market and nonexistent in the northeast. This option will be investigated as the design progresses, but without confidence in the implications of including a heat pump system the project will include a standard electric hot water heater as the basis of design. This will set the project up for an easy future upgrade to a heat-pump system.

### **Verification**

The project team intends to work with the City and Green Newton to establish proposed Council Order conditions to verify that the design and execution of the project meets the following standards:

- Passive House Certifiability of the Residential portion of the project
  - Space Heating Demand: less than 4.8 kBtu/ft<sup>2</sup>.yr
  - Space Cooling Demand: less than 5.1 kBtu/ft<sup>2</sup>.yr
  - EUI: 16 kBtu/ft<sup>2</sup>.yr
  - Primary Energy Renewable (PER): less than 19 kBtu/ft<sup>2</sup>.yr (the PER metric considers the EUI metric, while adding the carbon impact of the choice of energy source)
  - Airtightness: 0.6ACH @50Pa
- Best-in-class kitchen design including induction appliances
- Best-in-class pool equipment design
- Central electric hot water heating for future heat pump implementation