

141_York Rise

Proposed refurbishment works Stage E report - May 2010

The options for comfort improvement and reducing heatloss were examined and the results listed in this report.

Statutory requirements ,cost and buildability issues were-considered and a contractor approached about implementation.



rozeman architects

t: +44 0-20 72500526

f: +44 0-20 76895612

Studio 5

49-59 Old Street

London EC1V 9HX

United Kingdom

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141_York Rise

Measures

01 - Upgrade the external envelope

02 - Upgrade ventilation and tackle condensation

03 - Upgrade heating [Phase II works]

04 - Reduce fossil fuel consumption [Phase II works]

05 - Reduce electricity and energy consumption

06 - Use good materials [Cradle to Cradle]

07 - Biodiversity

Options

- Renew roofing and facade slates
- Upgrade or renew roof glazing
- Refurbish/renew Velux roof windows
- Improve solar control
- Improve draft proofing
- Improve thermal insulation

- Mechanical ventilation with Heat Recovery [MVHR]
- Low energy constant volume extract fan

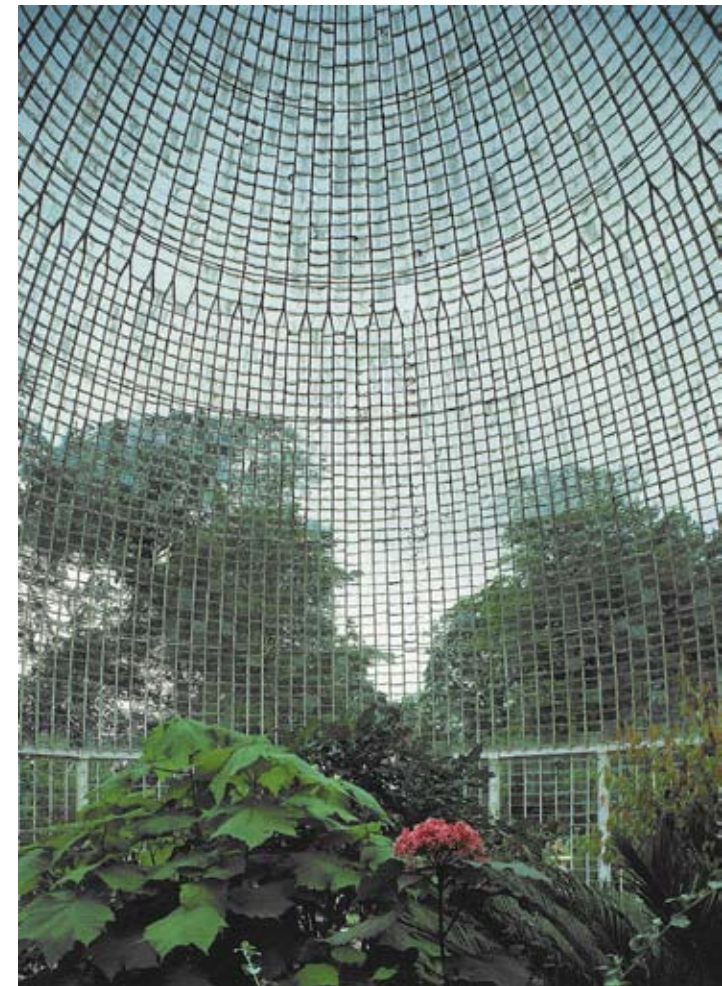
- High efficiency condensing gas fired boiler
- Retrofit UFH Under Floor Heating

- Air source heat pump
- Solar PV - Photo Voltaic

- Low energy lighting
- Upgrade controls

- Use recyclable products
- Use non-toxic (synthetic) products

- bird and bat boxes
- Glass house
- External trellis



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Solutions

01 - Upgrade the external envelope

- Renew roofing and facade slates
- Upgrade or renew roofglazing
- Improve solar control
- Improve draft proofing & thermal insulation



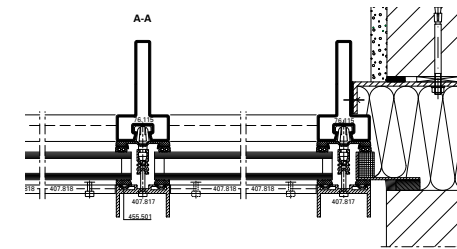
Vitral glazing system

- Cembrit Blunn Jutland slates [blue-black] or Marley Tru-tone blue-black [Samples now available for review]
- Replace glazing with high performance thermally broken glazing system. From a number of enquires we have two remaining suppliers willing to undertake the work:
 - Schuco, FW50+5 Aluminium glazing system for roofs and facades [Contractor: L2i Ltd]
 - Vitral, VRS Stainless steel panel system for roofs and facades [Contractor: Solar Vision Ltd]
- Clear high performance solar control glass [See below]
- High performance glass for solar control, self-cleaning and safety performance. The main suppliers are Pilkington and Saint Goban:
 - Pilkington, Activ-Suncool 70/40
 - Saint Goban, Solaglass Bioclean Cooklite STAll double glazed units with laminated inner panes and toughened outer panes.
- Pavarooof system, taped and sealed Pavatex woodfibre insulation over existing joists.
- The NBT PAVAROOOF system provides a vapour permeable insulation and sarking layer that offers thermal and acoustic performance without the need for a waterproof membrane. The system is suitable for over rafter insulation and adaptable to all kind of roofing materials: Tiles, slates, zinc, green roof etc. Made from over 95 % waste softwood and under 5 % inert water-proofing additives, PAVATEX woodfibre boards are a genuinely sustainable non-toxic building material.

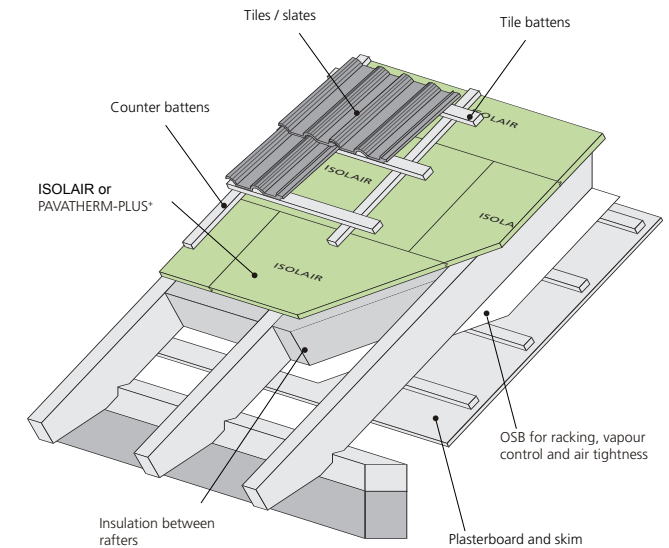
- The proposed roof build up:
 - 60mm Pavatherm and sarking board
 - Pavatex LDB 0.02 breathable airtightness membrane
 - 150mm Pavaflex insulation between raftersProposed build up gives a U-value of 0.27 w/sqmK compared to the existing U-value of 0.45 w/sqmK



Cembrit Blunn Jutland slates [Blue-Black]



Schuco FW50+S Aluminium Glazing



NBT Pavarooof system

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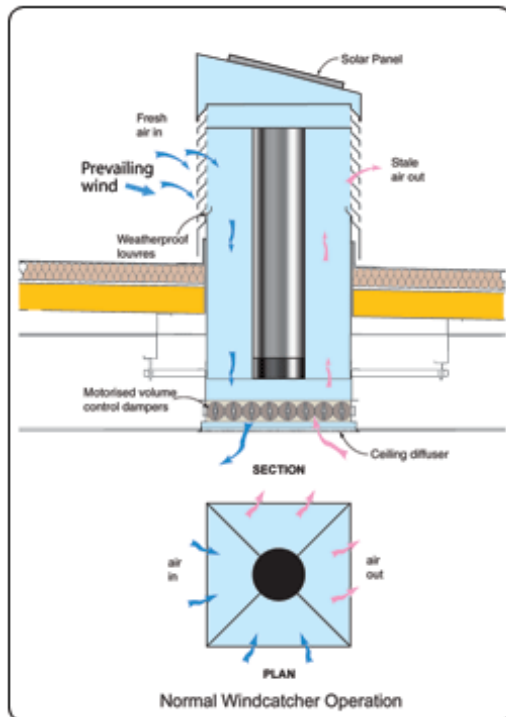
Solutions

01 - Upgrade the external envelope [Cont.]

- Tackle condensation
- Improve ventilation and extraction



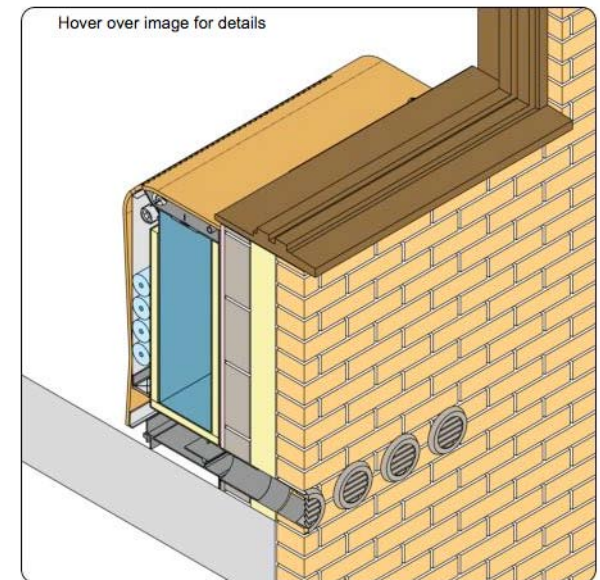
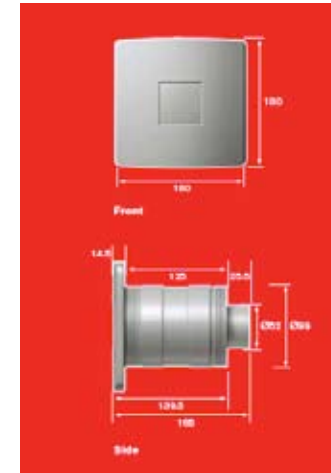
Hunter 'Osprey' ceiling: 142cm dia.



Monodraught SolaBoost Windcatcher

- Ceiling fans move the air around in homes, which not only keeps residents cool, but also helps distribute hot and cold air evenly. This, in turn, reduces condensation on windows, ceilings and walls.
- SELV [Safety extra low voltage] constant volume, continuously running extract fan. Extract fan runs on 12V and therefore is safe for bathroom use. The fan has very low energy consumption at 2W. Silent ventilation, volume sensor regulates speed with alternating pressures.
- Monodraught SolaBoost Windcatcher: A high efficiency polycrystalline solar panel is optimised for sunny weather and will provide approximately 100l/s of extra ventilation, driving a high efficiency DC fan that carries an air stream into the room through the central duct in the windcatcher unit. The fan features a unique feathered edge T blade so as to be ultra-quiet. It runs on ball bearings and has a brushless motor for zero maintenance and a very long life. By utilising four chambers the unit always maintains a leeward and windward side causing natural cross-ventilation. The windcatcher will always operate within its own design parameters but the SolaBoost adds a further dimension to the capabilities of natural ventilation. The control panel is normally mounted on an internal wall, allowing the end user complete control of the system.

- Monodraught Cool-phase Unit: This wall fitted unit provides powered fresh air ventilation, with the capability of storing and discharging large amounts of latent thermal energy. At present the unit is still powered by mains electricity, but a solar powered supply source is under development, with the aim of creating a true carbon zero product.



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Solutions

02 - Upgrade heating

- High efficiency condensing gas fired boiler

• Vaillant ecoTEC 937 high efficiency storage combination boiler provides a high level of hot water comfort. ecoTEC plus 937 key features:

- High efficiency SEDBUK band 'A' rating
- Fully modulating low NOx burner & fan (Class 5)
- Separate 15 litre "actoSTOR" provides exceptional

hot

water delivery and comfort and fully recharges in just 2 minutes with up to 200 litres of blended hot water ($\Delta T=35^{\circ}\text{C}$) in 10 minutes

- 15.2l/min flow rate @ 65°C
- DHW output up to 37.0 kW

ecoTEC plus 937 combination boiler

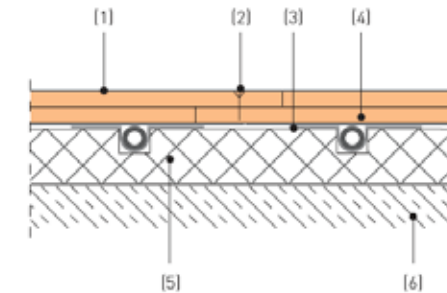
- Boiler case dims 720 mm x 440 mm x 598 mm
- "actoSTOR" dims 720mm x 440mm x 195mm
- All major components built-in
- Operation on low water pressure (1.3 bar)

- Retrofit UFH Under Floor Heating

• When contemplating non fossil fuel heating systems underfloor heating is the preferred form of space heating. Retrofits are common, but need to be carefully considered. Fermacell UFH overlay 2E22 combines the heat transfer benefits of a wet screed system with the speed of installation and flexibility of wooden board systems such as chipboard. Because Fermacell has a much lower thermal mass than concrete, the response time of the heating system is much quicker, and when you turn the heating down there is no delay. Unlike chipboard, Fermacell is not an insulator, and so can make UFH systems more efficient. The system can be used with warm water UFH systems that use tracked insulation (i.e. the board is fully supported across the whole floor area)



Example of FERMACELL 2 E 22 flooring elements laid in conjunction with UFH system



- (1) FERMACELL 2 E 22 25 mm Flooring element
- (2) FERMACELL Floorglue and 22 mm screw
- (3) Diffuser plates
- (4) Under Floor Heating pipes
- (5) Tracked Insulation
- (6) Structural Floor

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Solutions

03 - Reduce fossil fuel consumption

- Air Source Heat Pumps

- It all starts with the sun. The sun warms up our atmosphere and the outer layer of the earth's crust. In one year the energy sent to the earth by the sun is 50 times higher than the total consumption of energy on our planet... actually, there is always lots of thermal energy in the air, even on cold winter days or even at night. And not only in Florida or the south of Spain, but also in countries like Sweden or Norway where thousands of houses already have heat pumps.

- How do heat pumps work?

A heat pump only needs a heat source (the outside air), two heat exchangers (one to absorb and another one to release heat) and a relatively small amount of drive energy to keep the system going. A heat pump extracts thermal energy from the environment. In the case of ASHPs the source is the outside air. The pump extracts the energy at a certain temperature, increases that temperature and then releases it into a medium which in the Daikin Altherma system is the water running to your low temperature radiators or under floor heating system. Between those two media the heat is moved by means of a working fluid.

- Compressor - the essence of heat pumps

As the working fluid passes through the evaporator and extracts heat from the air, it turns into a gas. This is where the compressor comes in. When you compress a gas the temperature rises. (for example if you inflate the tyre of your bicycle, you can feel the air inside warming up through the rubber). Inside your house the second heat exchange takes place when the compressed gas enters the condenser, a surface which is colder than the gas itself. Finally, the gas condenses and releases its heat - this heat then warms up your house.



SPLIT SYSTEM

Outdoor unit (ERHQ006-016)

- Compact, weather resistant
- Contains inverter controlled compressor for maximum energy efficiency and precise temperature regulation
- Heat pump operation range: down to -20°C outside temperature
- Heat exchanger anti corrosion treatment as standard - this treatment increases resistance against acid rain and salt corrosion

Hydrobox (EKHBH(X)008-016)

- Compact and easy to install. All components are preassembled and the parts are easy to reach for maintenance
- Wall mounting comparable to traditional gas heater
- Built in electric back up heater as additional heating for back up purposes only
- 2 shut off valves to assemble the water outlet and inlet

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Solutions

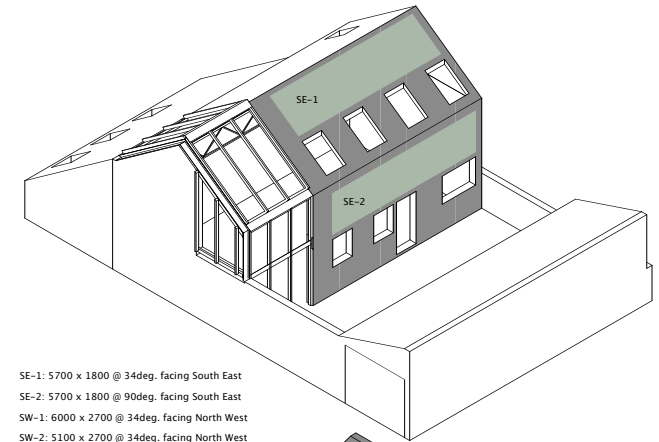
04 - Reduce fossil fuel consumption

- Solar PV - Photo Voltaic

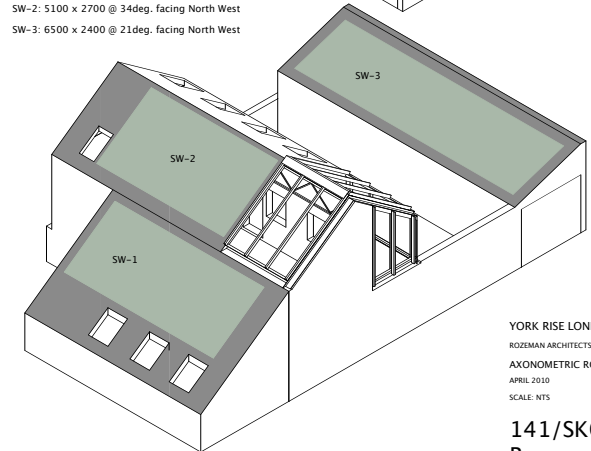
- Solar Century Photo Voltaic Slates

Chelsfield Solar, a local installer for Solar Century, was approached to test the viability of a solar PV installation on any of the available roofs. They advised against installing a PV system on the following grounds:

- Roof areas facing further north than due west or east are inefficient, the largest three roofs are all facing north-west.
- The minimum viable installation of requires 18 units to be installed which may just be possible on the SE facing roof, however overshadowing by the large tree reduces the annual output drastically.



SE-1: 5700 x 1800 @ 34deg. facing South East
SE-2: 5700 x 1800 @ 90deg. facing South East
SW-1: 6000 x 2700 @ 34deg. facing North West
SW-2: 5100 x 2700 @ 34deg. facing North West
SW-3: 6500 x 2400 @ 21deg. facing North West



YORK RISE LONDON NWS
ROZEMAN ARCHITECTS
AXONOMETRIC ROOF VIEWS
APRIL 2010
SCALE: NTS

141/SK03
Rev: -

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Solutions

05 - Reduce electricity and energy consumption

- Low energy lighting

- The economics of low-energy bulbs Osram's 20W low-energy bulb claims the same light output as a 100W incandescent bulb. Moreover, its lifetime is said to be 15 000 hours (or "12 years," at 3 hours per day). In contrast a typical incandescent bulb might last 1000 hours. So during a 12-year period, you have this choice: buy 15 incandescent bulbs and 1500 kWh of electricity (which costs roughly £150); or buy one low-energy bulb and 300 kWh of electricity (which costs roughly £30).

- Are LED bulbs better than fluorescents?

Researchers say that LED (light-emitting diode) bulbs will soon be even more energy-efficient than compact fluorescent lights. The efficiency of a light is measured in lumens per watt. The Philips Genie 11W compact fluorescent bulb has a brightness of 600 lumens, which is an efficiency of 55 lumens per watt; regular incandescent bulbs deliver 10 lumens per watt; the Omicron 1.3W lamp, which has 20 white LEDs hiding inside it, has a brightness of 46 lumens, which is an efficiency of 35 lumens per watt. The LED bulb has a life of 50 000 hours, eight times the life of the fluorescent bulb. It's projected that in the future, white LEDs will have an efficiency of over 150 lumens per watt. From the point of view of both energy efficiency and avoiding mercury pollution, it will be better to use LED bulbs.

- Upgrade controls

- Turning phone chargers off is a feeble gesture, like bailing the Titanic with a teaspoon. The widespread inclusion of "switching off phone chargers" in lists of "10 things you can do" is a bad thing, because it distracts attention from more-effective actions that people could be taking.

Good: Turning the thermostat down is the single most effective energysaving technology available to a typical person – every degree you turn it down will reduce your heating costs by 10%; and heating is likely to be the biggest form of energy consumption in most British buildings.



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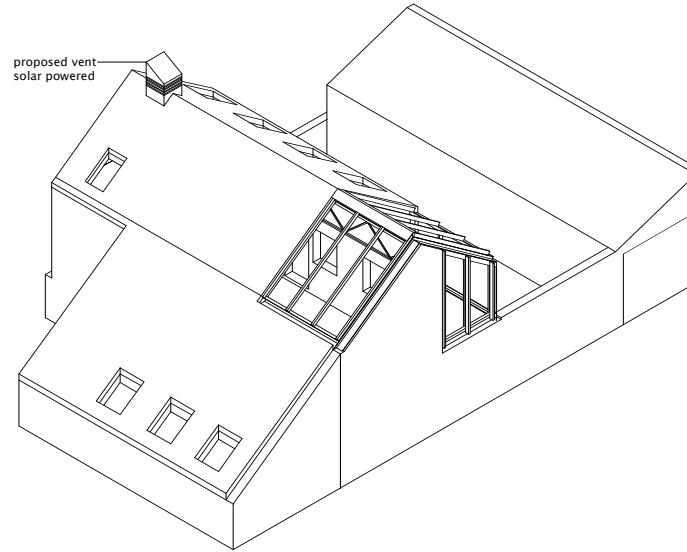
Proposed Measures

Phase I

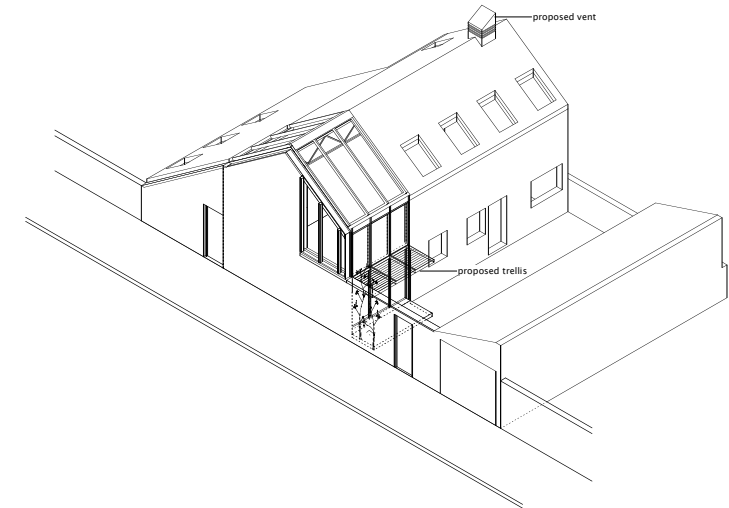
- Replace roof and wall slates and upgrade thermal performance of building envelope
- Replace roofglazing: thermally broken frames with high performance glass with a U-value 1.2 W/m²K; double glazing with solar control for roof, low E for vertical glazing
- Seal building envelope to omit draughts
- Overhaul or replace existing Velux roof windows and reset to suit thicker overall roof build-up
- Low energy light bulbs
- Solar power assisted passive stack ventilation [PSV system]
- Grow your own on outdoor trellis
- Reuse/ recycle before you buy
- Use recyclable products
- Use non-toxic [synthetic] products
- Install ventilation system: MVHR Cool-phase [or stage 2?]

Phase II

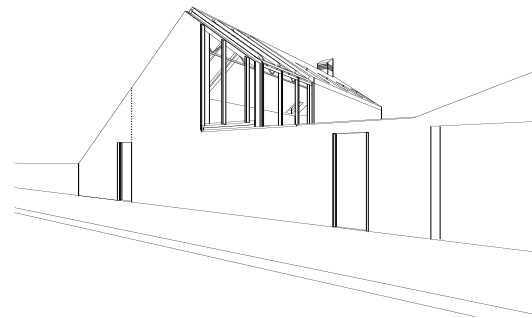
- Replace gas fired boiler with ASHP
- Install ventilation system: MVHR Cool-phase
- Reuse/ recycle before you buy
- Use recyclable products
- Use non-toxic [synthetic] products



Axonometric looking east



Axonometric looking west



Street view

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