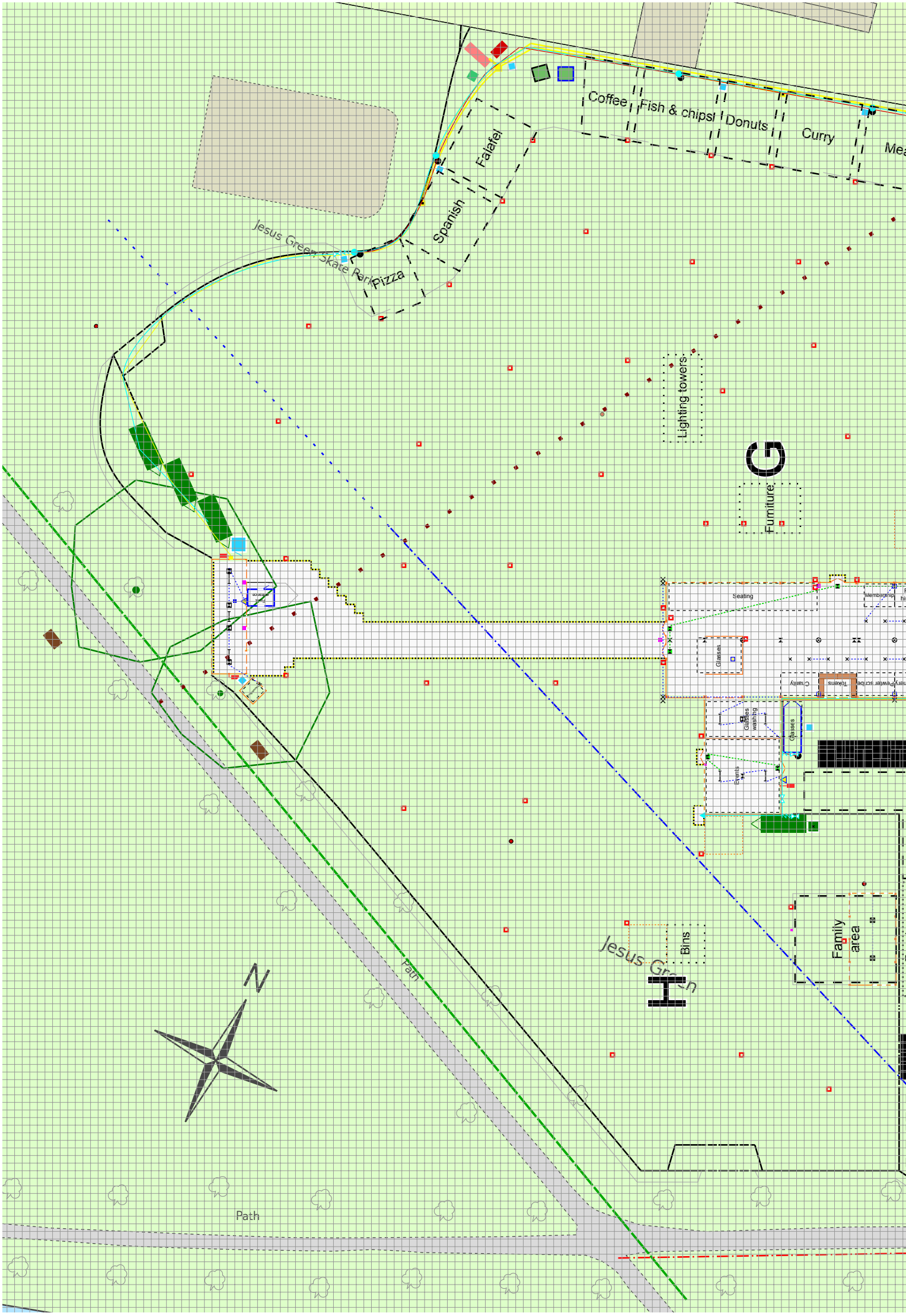
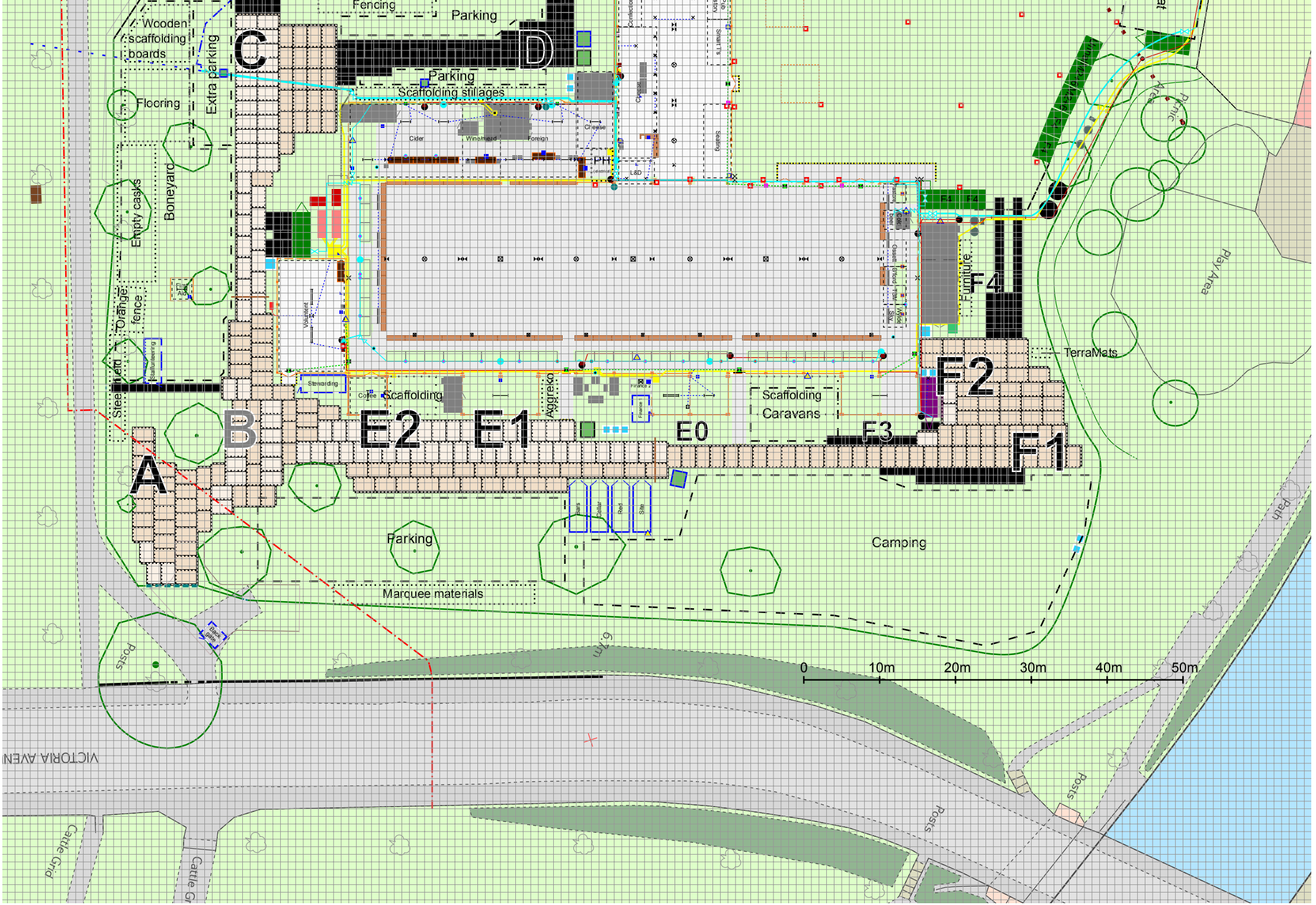
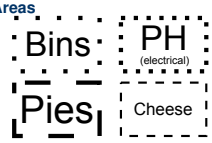
The Book of Shite


Coffee
Fish & chips!
Donuts
Curry
Falafel
Spanish
Pizza
Jesus Green Skate Park
Lighting towers
Furniture
Seating
Membership
Glasses
Glasses washing
Tokens
Charity
Events
Bins
Jesus Green
Family area
Path
Path
N


Fencing
Parking
Wooden scaffolding boards
Extra parking
C
D
Parking
Scaffolding stillages
Flooring
Cheese
Cider
Wine/mead
Foreign
PH
L&D
Sealing
Boneyard
Empty casks
Orange fence
Steel fence
First Aid
Volunteers
Stewarding
Coffee
Scaffolding
Aggregates
Finance
Scaffolding
Caravans
F4
Furniture
TerraMats
F2
F3
F1
B
A
E2
E1
E0
Bars
Cellar
Red
Site
Parking
Camping
Marquee materials
Exact gate
Posts
6.7m
0
10m
20m
30m
40m
50m
VICTORIA AVEN
Cattle Grid
Posts
Posts
Play Area
Picnic Area
Path

Legend

Areas



Named equipment loading / storage area

Large / small area for named purpose

Loading zone label, general use / restricted / smaller vehicles only

Lighting

Wiring (connectivity, not route), 16 A / 10 A

Low-bay, 400 W / 250 W

LED UFO

500 W HID

Five foot double fluorescent

Five foot single fluorescent

Four foot single fluorescent

LED flood, 100 W / 50 W / <50 W

Emergency exit sign, large / small

Emergency twin-head

Maintained emergency bulkhead

Non-maintained emergency bulkhead, large / small

Water

MDPE pipe, ⌀ 32 mm / ⌀ 25 mm / ⌀ 20 mm

Drain hose; rainwater pipe

Hose tap

Drinking tap

Glass rinser

Double check valve

Isolation valve

Access to sewer or drain

Sink (has hot water)

Hand-wash station

Drainage sump

Electric power

Three-phase cable, 250 A / 125 A / 63 A / 32 A

Generator

Fuel tank

Power tent

125 A distribution board

63 A rubber box

32 A 3-phase board

32 A → 4 × 16 A single-phase board

32 A → 4 × 13 A socket board

32 A → 6 × 13 A socket strip

16 A → 4 × 13 A splashproof box

13 A outlet, 4 sockets / 2 sockets

Product dispense

Scaffolding stillage

Racking stillage

Bar

Waste

Dry mixed recyclable waste skip; general waste skip; wheelie-bin; electrocutor trap

Vacuum tank; vacuum pump; wastewater holding tank

Welfare facilities

Toilet trailer; pod toilet (4 × female); shower trailer; hand sanitizer

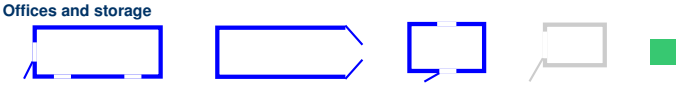
Baby change; turdis; disabled turdis; urinal turdis

Refrigeration

Cold-room / chiller plant of shown size

5 m markers along cooling circuit, outlet; no outlet (use 10 m hose); position-critical outlet

Offices and storage



20 ft office with end door; 20 ft container; 12 ft office; Forma-Stor; gas cage

Structures

5 m bays of marquee wall, hard / flappy / window / opaque with door

Unwalled structure

Marquee heater

Gatehouse

Fence

Steelshield fence, with vehicle, hatch and pedestrian gates

GS7 fence, with double panel and pedestrian gates

Crowd-control barrier

Cable management

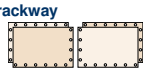
Trench

AH Midi ramp

AH Mini ramp

AH Compact ramp

Trackway



SignaRoad, regular / flipped

TerraMat

Supa-Trac, edged on three sides

TerraGuard

In-situ

Bench

Tree, with location and shape / with location and estimated shape / estimated location and shape

Kerb, raised and level

Road fence, with gate

Swimming pool fence

Play-area fence, with gate

Services

11 kV cable

33 kV cable

Water main, known and presumed course

Sewer

The Book of Site

2024

CAMBRIDGE BEER FESTIVAL

First edition May 2016
Second edition May 2017
Third edition May 2018
Fourth edition May 2019
Fifth edition May 2023
Sixth edition May 2024

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Revision 17b3f3e8af6527f8460e91b6be3dc8131722a46c-clean

Cambridge Beer Festival
http://www.cambridgebeerfestival.com/

Loading zones (2024)

Supplier	Loading zone (in order of preference)
Advanced Portable Roadway	E, A
Aggreko	E1
Arena	F1, E, C
BE Event Hire	G, F, C
Breweries	F, E
Cap Trac	C, E, F1
Certas Energy	C
Cider	C
Food (cheese etc.)	D
Foreign beer	D
Fortis Hire	G, F2, C, H
Greater Cambridge Shared Waste	C
GL Events	E, G, C (as they prefer)
Glasses	G, F
Latta Hire	F, G, D
Pearce Hire	F2, E
Rentafridge	F (large cold-room) or C (others)
Stuart Power	C (generators) or G, F, C (lighting towers)
Sunbelt Rentals	F2, F1, C, A
Thalia	E1, G, D (skips); H, C (bins)
Welch's (HQ)	F1, E
Wine/mead	C, D

Artics should preferably reverse park in **A**. **E** can take two lorries.

B should not be used when large lorries may need to turn around.

Busy days

Monday 12

Supplier	Preferred loading zone
Arena	F1
Cap Trac	C
GL Events	E, G (as they prefer)
Sunbelt Rentals	F2
Thalia	E1

Tuesday 13

Supplier	Preferred loading zone
BE Event Hire	G
Cap Trac	C
GL Events	E, G (as they prefer)
Pearce Hire	F
Rentafridge	F (large cold-room) or C (others)
Stuart Power	C
Welch's (HQ)	F1

Tuesday 27

Supplier	Preferred loading zone
Cap Trac	C
Latta Hire	G
Rentafridge	F (large cold-room) or C (others)
Sunbelt Rentals	G
Thalia	G and H
Welch's (HQ)	F1

Wednesday 28

Supplier	Preferred loading zone
Arena (scaffolding)	F1
BE Event Hire	G
Cap Trac	C
GL Events	E, G (as they prefer)
Pearce Hire	F
Stuart Power	C

Schedule (2024)

This schedule mainly lists task-completion deadlines. Doing things early means less to do later and reduced stress[1]. *Italic* items are supplier-caused distractions.

Thursday

PM	Mark-out roadway and roadway trenches *see 2.1.1, 'Marking-out: Roadway'*
PM	Collect SWA cables, turdis locks, three 32 A plug tails, 13→32 A adaptor, plastic barrier fence, barrier tape, trenching tools, brew kit, petrol, generator, gazebo and chairs from containers

Friday

AM	Arrange access to site *see 9.1, 'Access to Jesus Green'*
AM	Dig trenches and install SWA cables *see* **??**, '**??**'
??	*Take delivery of three turdi and some fire extinguishers* *see 8.1, 'Turdi'* *9.2, 'Fire extinguishers'*
All day	Secure and monitor roadway installation *see 3.1, 'Plastic barrier fence'*
PM	*Site gatehouse, stage 12 ft offices, install 32 A plug tails* *see* **??**, '**??**'

[1] Normally. Losing pumps by putting them out before marquees are walled is a counterexample.

Saturday (early set-up)

PM	Label containers for Monday / Wednesday collection
PM	Tape-over water-heaters' plugs to avoid plugging-in before wet *see 6.12, 'Sump pumps and water heaters'*
PM	Put a bar-base in the site container for floor-gap measurement

Sunday

AM	Mark-out later-stage roadway, rear fence, main marquees, Staffunteering and containers; barrier-tape stillage delivery area *see 2.1, 'Marking-out'*
AM	Secure construction area *see 3.1, 'Plastic barrier fence'*
All day	Monitor rear fence build *see 3.2, 'Rear fence installation'*

Monday

AM	*Four fork-trucks, extension forks, lighting tower, and bowser delivered*
AM	*Take delivery of stillage and GS7 fence* *see 2.4.2, 'Back-stage areas: Equipment storage and staging'*
All day	Monitor roadway and structures builds *see 2.1.3, 'Marking-out: Marquees'*
All day	*Locate red, site, and cellar containers, and Staffunteering* *see 4.1, 'Office preferences'*
PM	*One DMR and two general waste FELs delivered* *see 9.11, 'Skip layout, transport and set-up'*
PM	Deploy front fence; use plastic fence behind Victoria Avenue gate *see 2.3.1, 'GS7 fence layout: First pass'* *3.1, 'Plastic barrier fence'* *3.3, 'GS7 fence construction'*
PM	Mark-out marquee flooring *see 9.3, 'Flooring'*
PM	Mark-out main generators and igloo *see 2.1.4, 'Marking-out: Other'*
PM	Site and set-up compound lighting-tower *see 9.9, 'Lighting tower set-up'*

Tuesday

AM	Mark-out stillage positions
	see 9.12, 'Stillage construction'
??	*Site and assemble Forma-Stors, stage gas cages*
	see **??**, '**??**'
??	*950 l diesel into bowser*
	see 9.4, 'Fuel and the Beer Festival'
??	*MEWPs delivered*
	see 2.4.1, 'Back-stage areas: Loading zones'
??	*Site generators and fuel tanks, padlock the tanks' filler caps*
	see 6.1, 'Generator transport and siting'
??	*Furniture delivered*
	see 2.4.2, 'Back-stage areas: Equipment storage and staging'
All day	Monitor structures and flooring builds
	see 2.1.3, 'Marking-out: Marquees'
	9.3, 'Flooring'
All day	*Assist cold-room construction*
	see 5.1, 'Cold-rooms'
PM	*Unload Pearce Hire delivery*
	see 2.4.1, 'Back-stage areas: Loading zones'
PM	Monitor stillage construction and install fall-guard tape
	see 9.12, 'Stillage construction'
PM	*HQ delivery*
PM	Deploy ramps and three-phase distribution
	see 1.8.3, 'Management of pipes and cables: Ramps'
	6.2, 'Generator set-up'
	6.3, 'Main breaker'
	6.4, 'Introduction to IEC 60309'
	6.5, 'Main generator distribution network'
	6.6, 'Security through obscurity'
	6.7, 'Earthing the Moon'
PM	Main generator turn on
	see 6.8, 'Energizing the site'
PM	Refresh the water supply pipeline
	see 1.8.2, 'Management of pipes and cables: Conduit'
	7.1.1, 'Fresh-water connection: Supply flushing'

Wednesday (set-up)

??	*Fourteen turdi delivered* *see 8.1, 'Turdi'*
??	*Conveyor, hand-trucks, tippy skips, and fuel kaddi delivered* *see 2.4.1, 'Back-stage areas: Loading zones'*
??	*Supervise delivery of volunteer toilets and showers* *see 8.2, 'Siting toilet units'*
All day	*Locate Finance, Stewarding, glasses and bars containers* *see 4.1, 'Office preferences'*
All day	Monitor structures, flooring and cold-room builds; snagging *see 2.1.3, 'Marking-out: Marquees'* *5.1, 'Cold-rooms'* *9.3, 'Flooring'*
All day	Fresh-water plumbing, and wiring *see 1.6, 'Keep it 'tidy''* *6, 'Electrical'* *7, 'Plumbing'*
PM	Connect and disinfect fresh water pipework *see 7.1, 'Fresh-water connection'*
PM	Enable showers *see 7.7, 'Showers'*
PM	Cordon-off camping area *see 2.4.3, 'Back-stage areas: Camping area'*
PM	Power-up festoon and gatehouse *see 6.10.5, 'Festoon'*
PM	Mark-out entrance tent

Thursday

??	*Site cooling plant; install two inch pipework* *see 5.3, 'Beer-cooling plant'*
Midday	*Water-sampling and compliance visit* *see 7.1.3, 'Fresh-water connection: Samples'* *7.1.4, 'Fresh-water connection: Compliance'*
All day	*Supervise Fortis Hire deliveries* *see 8.2, 'Siting toilet units'*
All day	Snagging of structures

Friday

AM	Mark-out extended fenceline *see 2.3.2, 'GS7 fence layout: Final form'*
AM	*Cooling plant commissioning* *see 5.3.2, 'Beer-cooling plant: Commissioning'*
AM	Site gas cages and tippy skips *see 9.6, 'Gas prison'* *9.13, 'Tippy skips'*
??	*Fire extinguishers delivered / positioned* *see 9.2, 'Fire extinguishers'*
??	*Concessions generator, lighting towers, bins, and heaters delivered* *see 2.4.2, 'Back-stage areas: Equipment storage and staging'*
??	*Fridge delivery and step assembly* *see 5.2, 'Serve-overs and upright fridges'*
??	*PA installation* *see 10.6, 'Public Address (PA) system'*
All day	*Two DMR and one general waste FELs delivered* *see 9.11, 'Skip layout, transport and set-up'*
All day	*Supervise Fortis Hire installation* *see 8.2, 'Siting toilet units'*
All day	Wiring and grey water plumbing *see 1.6, 'Keep it 'tidy''* **??**, '**??**' *6, 'Electrical'* **??**, '**??**' *7.9, 'Setting up a drain sump'*
PM	Extend fenceline *see 3.3, 'GS7 fence construction'*
PM	Mark-out entrance path *see 9.3.2, 'Flooring: Supa-Trac self-installation'*

Saturday (set-up)

AM Mark-out concession pitches

AM Install concessions generator, part-used fuel tank, and distribution

see 6.1, 'Generator transport and siting'
6.2, 'Generator set-up'
6.7, 'Earthing the Moon'
6.21, 'Power distribution and use at Concessions'

AM Position skips

see 9.11, 'Skip layout, transport and set-up'

?? Plumb gutter drainage

see 9.7, 'Gutter drainage'

?? Deploy concessions plumbing

see 7.12, 'Plumbing for Concessions'

?? Self-install entrance flooring

see 9.3.2, 'Flooring: Supa-Trac self-installation'

?? Site entrance toilet units

see 1.7, 'Introduction to trailers'
8.2, 'Siting toilet units'

?? Erect first aid and programmes gazebos

see **??**, '**??**'

All day Wiring

see 1.6, 'Keep it 'tidy''
6, 'Electrical'

All day Site turdi

see 8.1, 'Turdi'

PM Site and set-up all lighting towers

see 9.9, 'Lighting tower set-up'

Sunday

?? Site office and container at entrance

see 4.2, 'Moving 10 ft containers'

?? Deploy crowd-control barrier

see 3.4, 'Cycle parking and other barriers'

?? Deploy furniture

see 9.5, 'Furniture'

All day Tidy site up

see 2.4.2, 'Back-stage areas: Equipment storage and staging'

Monday

?? *Entrance turdis and urinal delivered*

see 8.1, 'Turdi'

?? *Conveyors collected*

?? Erect entrance lane frame and emergency exit banners

see 9.10, 'Signage'

?? Install public hand sanitizers

see 9.8, 'Hand sanitizer dispensers'

?? Fence gaps around toilet trailers

see 8.5, 'Security'

?? Toilet commissioning

see 8.6, 'Toilets: Final commissioning'

PM Attach generator failure guides to cables at entrance and concessions generator

Open week

??	Door rolling (**??**)
PM	Evening lighting (*11.1*)
??	Improve the entrance if slippery (*11.2*)
??	Load balancing
	see 6.20, 'Load balancing'
??	Marquee-heater management (*11.3*)
??	Monitor coolant levels (*11.4*)
??	Plan for next year (*11.5*)
??	Power management (**??**)
??	Refuelling (*11.6*)
??	Skip management (*11.7*)
??	Tent ventilation (**??**)
??	Toilet management (*11.8*)
??	Self-created flooding (*11.9*)
??	When The Lights Go Out (*11.10*)

Sunday (tear-down)

??	De-plumb, and recover cables for, toilet units
PM	Fill and gather wheelie-bins for emptying
PM	Gather and refuel four lighting towers and concessions generator
	see 9.4, 'Fuel and the Beer Festival'

Monday

AM	Clear extended garden
	see 4.2, 'Moving 10 ft containers'
	7.13, 'Plumbing: Packing-up'
??	*Four lighting towers and concessions generator collected*
All day	Repack majority of furniture (trestle tables in stacks of 20)
All day	Gather and refuel marquee heaters
	see 9.4, 'Fuel and the Beer Festival'
PM	Reduce fenceline, gather crowd-control barrier
	see 2.3.1, 'GS7 fence layout: First pass'
	3.3, 'GS7 fence construction'
PM	Drain and repack all Aggreko kit
	see 5.3.3, 'Beer-cooling plant: Decommissioning'
PM	Empty cold-rooms, disassemble Forma-Stors
PM	Empty tippy skips
	see 10.9, 'Tippy skips'
PM	Complete all MEWP tasks
PM	Prepare wheelie-bins for collection

Tuesday

AM	Stillage must be clear for dismantling
	see 7.13, 'Plumbing: Packing-up'
AM	Flooring other than main marquee must be clear for dismantling
AM	Refill plant fuel tanks and fuel kaddi; mostly empty bowser
	see 9.4, 'Fuel and the Beer Festival'
??	*Aggreko, HQ, and Rentafridge collections*
??	*MEWPs, marquee heaters, Forma-Stors, gas cages, wheelie-bins, two DMR and one general waste FELs, and sixteen Latta toilets collected*
All day	Empty and decommission site drainage before power goes
	see 7.13, 'Plumbing: Packing-up'
PM	*Refill generator fuel tanks (5000 l)*
	see 9.4, 'Fuel and the Beer Festival'
PM	Re-coil gutter pipe
PM	Gather Pearce Hire equipment

see 6.22, 'The Pearce Checklist'

Wednesday

AM	Gather any outstanding, and count all, furniture
??	*Load stillage collection*
??	*Load Pearce Hire collection*
??	*Fortis Hire, Cap Trac (flooring), furniture, and Stuart Power collections*
??	*4 m telehandler, fuel kaddi, hand-trucks, and tippy skips collected*
All day	*One 20 ft office, bars and cellar containers collected*
All day	Pack site container

Thursday

AM	Fences dismantled; replace with plastic fence *see 3.1, 'Plastic barrier fence'*
All day	*20 ft office, glasses, red and site containers collected*
All day	*TerraMats extracted and collected*
PM	*9 m telehandler and Sunbelt tower light collected*
PM	*Load GS7 collection*
PM	Secure all remaining plant *see 1.7, 'Introduction to trailers'* *2.2, 'Early and late site layout'* *4.2, 'Moving 10 ft containers'*

Friday

All day	Recover the office power connectors, then stand around and place bets on what goes last *see 9.1, 'Access to Jesus Green'*

What this book is

This book is neither meant to be read end-to-end, nor is it authoritative. Much like a Haynes manual. The general information in Chapter 1 is worth a read, and some familiarity with the 'how to use things' Chapter 10 and the last two sections of Chapter 11 (dealing with things going wrong) is handy, but the rest of it is for reference in relation to specific tasks/topics.

By all means have a flick through, but it's a lot to take in and remember: seeing what's coming up on the schedule and reading that will be far more digestible.

The advice, instructions, emphasis, and views reflect my own experience and knowledge. Some of it will be poorly worded; some of it others may disagree with, and have better ways of achieving. The book is primarily meant to be *useful*, so *please* point out mistakes, things that are unclear, or missed entirely. At the same time, please have a bit of patience with the bits that are teaching you to suck eggs — the intention is to be helpful to people from a range of backgrounds.

Contents

Not bad, if you like that sort of thing

1

General

This chapter discusses a few topics which apply widely; certainly to more than one of the more-specific later chapters.

1.1 Health and Safety

This section is a reminder, rather than a full-blown coverage of H&S[1].

The festival site is little different to a construction site, and Health and Safety legislation applies as much as anywhere else. Statistically, construction sites are some of the most dangerous workplaces. Inspectors have the right to come on site at any time, and if serious problems are found can shut the site down.

Bear in mind there are many people on site; the site is highly visible, even before it opens; and many of the public carry a camera. Other people may have very different evaluations of risk and invite an assessment on the festival.

Regularly ask yourself 'is what I am doing safe?'. If in doubt of the safety of any operation or task, stop, and confirm the procedure with others — there may be ways to avoid a potential danger.

Personal protective equipment (PPE) is provided by the festival, and must be used where appropriate.

1.2 Noise

Not before 7 a.m. Preferably not after 9 p.m. Go home and sleep.

[1] documentation for volunteers is available in the Staffunteering office, and you will have received extra information, as part of the training, for any machinery you may use

1.3 Contractors

The festival pays a lot of money to contractors so we don't have to do everything. Site's job, in a way, is to make it easy for the contractors do as much of the work for us as possible. Don't waste your time and the festival's money: if there's something that's reasonably part of a contractor's job, and either hasn't been done, or isn't done correctly, *ask them to sort it out* (politely). At the same time, they're not mind-readers: preparing a useful diagram goes a long way.

1.4 Electronic control panels

Equipment that we hire is increasingly supplied with electronic control panels. This normally adds more useful abilities to the plant, but also means things are not as simple as "press the 'on' button": sometimes it's not even clear which *is* the 'on' button. This book doesn't aim to cover every detail, and in fact, it *can't* predict the exact control panel some hired lighting tower will be supplied with.

Often the controls are clear enough, but access to some settings may not be. The answer is to search online for the *control panel* model, and find a manual.

1.5 Fork-lift signals

There will be times when you can see more clearly than a fork-truck operator what needs to be done, however *do not distract an operator who does not want your guidance*. The following signals are in use at CBF.

Raise the tines[2]

Raise the tines: with forearm vertical, forefinger pointing up, move hand in a small horizontal circle.

Lower the tines: as for *raise*, but pointing downwards.

[2] images from https://www.forkliftsafety.com/

Tilt mast back ('tilt on'): with forearm vertical, thumb extended, jerk thumb over shoulder.

Tilt mast forward ('tilt off'): as for *tilt on*, but with forearm horizontal and moving downwards.

Tilt mast back

Move tines

Move tines: with arm extended, palm down, point forefinger in direction of movement.

Quick: gesture faster.

Slow: gesture slowly.

Stop: with arm upwards, palm facing forwards.

Emergency stop: as for *stop*, but with both hands.

To approach an active fork-truck, always first signal the operator and *wait* for a positive response before approaching.

1.6 Keep it 'tidy'

While the heading is about 'tidiness', really it means to aim for a high quality of construction. This isn't just pointless obsessive behaviour; it gives a better

impression of the standard of construction to customers, other volunteers, and any official inspectors who visit, and it also generally leads to a safer site.

Examples for wiring and plumbing are easy to provide:

Distribution board upright near stillage, remaining accessible and free of a beery-bath

Pipes and cables pushed to side, leaving walkway clutter-free

Pipe regularly secured to ledger, raised from ground contaminants

Springy water pipe tied to heavy cable, reducing trip hazard

Tap raised and secured away from contamination, pipes and cables away from vehicle crush risk and (most) people's feet

Taking some pride in site-work applies elsewhere too. Some (non-exhaustive) examples follow.

- Uniform and straight/level lights — fixtures on the piss above people's heads is not a good look.
- Properly adjusting toilet stairs — reduces risk of slips and trips.
- Levelling the showers — improves drainage.
- Joining up cellar flooring to main flooring — lowers risk of twisted ankles.
- Installing of flooring edge-ramps — much better for all customers.
- Non-bodged drainage — less likely to break and need redoing.
- Obstructing access to trailer 'A' frames — avoids curious children and tired & inquisitive punters hurting themselves.

Cable-tie style guide: they look better with the ends trimmed (don't leave a sharp cut end though!) or tucked away.

A masterwork of lantern rigging

Continuous flooring from outside through the stillage

Ramp recessed with closely surrounding floor, minimizing trip-hazard; bug-zapper at a good height (2 m) on entry to food area

In short, if you're doing a job, do it well (don't pretend you'll patch it up later).

1.7 Improvised marquee leg attachment points

Marquee legs give conveniently sturdy uprights to attach things to, but often don't have obvious holes or other fixing points. What they do have are keder grooves, for holding wall and roof panels, which can provide fixing points. The below method is particularly well-suited to securing poles against legs.

1. Thread a medium (7.6 mm-wide) cable tie through itself to form a loop 5 cm long when folded flat, and cut the tail off. Do this twice.
2. Slide the cable-tie heads up two adjacent grooves of the marquee leg.
3. Secure the pole against the leg with a third cable tie linking the two cable-tie loops. The tension around the pole stops the loops sliding down the channels.

Other versions include linking the loops directly, then hanging something from the linking cable tie.

1.8 Introduction to trailers

We have to deal with various trailers: the toilet units, the showers, the lighting towers, the diesel bowser, and possibly refrigerated trailers used by concessions.

A brief introduction to important trailer parts follows.

1.8.1 Hitches

Pin hitch

Ball hitch

Fork-truck towing accessory

Pin hitch trailers (some lighting towers, and the bowser) can, after bringing the trailer to the right level with the jockey wheel, be coupled to the rear of a fork-truck, using the truck's pin (*don't lose it!*); or a fork-truck's tine, using the pictured accessory (*don't lose this pin either*). Using either option, the trailer must be supported by the jockey wheel *before* uncoupling too.

Ball hitch trailers (everything else) can be coupled to a vehicle with a ball hitch, or the fork-truck towing accessory. Similar jockey wheel considerations apply as for pin hitches, but the trailer must be lowered on to the ball to couple, and lifted off to uncouple, while pulling up on the locking handle.

For both hitch types, it's possible to instead play games using towing/lifting straps attached to a sturdy part of the towing frame to drag the trailer. This is a worse option, as bending the jockey-wheel stem is possible, and control is limited. In particular, a trailer may run on when being dragged — it will stop when it hits the forks, but perhaps not before they've gone through the thing on the trailer. Often best to drop the forks off first, if using a telehandler.

1.8.2 Jockey wheels

Clockwise for up, counter-clockwise for down. Yes, this is surprising.

Lift the jockey wheel well clear of the ground before towing, to avoid it getting bent or knocked off. Most of the jockey wheel stems are ribbed, allowing you to unlock the stem (having transferred the weight to the towing-point) and lift the wheel rapidly. Do re-lock it before towing...

1.8.3 Brakes

Nearly all the trailers have a handbrake. *Ensure this is off before towing*, and on when you want the trailer to stay put. The toilet trailer handbrakes are a) very stiff, b) highly sprung, and c) possibly go 'the wrong way' to apply the brakes, so watch out.

1.8.4 Legs

As the trailers all have wheels in the centre, a weight at the back will cause the trailer to tip, lifting the jockey wheel off the floor. This is not ideal. The trailers have rear legs to avoid this, and sometimes front ones too, for levelling[3]. *Do not tow a trailer with its legs down.*

Fridge trailer rear leg

Extended lighting tower legs

[3] or *slightly off*-levelling, for fridge trailers, where you want condensate puddles to drain out

1.9 Management of pipes and cables

1.9.1 Trenches

Getting power to the camping area and to Staffunteering requires running cables under the roadway. There are no slots in the underside of the roadway, so trenches must be cut. An additional trench takes a drain hose under the stillage walkway. These are all shown on the site plan as brown lines.

A key aim of trenching is to remove no more material than required — it both weakens the surrounding ground supporting the trench covers, and creates more work to restore the green. All trenches need only be around an inch deep and wide, which plastic trackway will easily span.

The bad old days, when we trenched under the 15 m-wide marquee (2023)

Road lifting

If a trench needs revealing by lifting a constructed trackway using a fork-truck, the operator must angle the tines to go under the road, lower them to the ground, and push them forward from a starting point some way back from the road, digging through the ground, before lifting the surface.

Roadway cannot generally be lifted very high (restricted by attached panels), and it may not be well-supported by the lifting tine(s). *Unless absolutely certain of the security of the lifted surface, DO NOT reach under it*. A falling roadway will easily crush an arm. Use a pole/board/whatever to push the cable/pipe beneath the roadway if necessary.

1.9.2 Conduit

Trenching for the water supply pipe is avoided by installing it in the buried conduit running from the in-situ tap to the field drain access used by the gutter pipe, at the corner of the cider/foreign marquee.

1.9.3 Ramps

Rather than trench, we hire cable management ramps to cross the join between Cheese and Foreign, the join between the bar area and the voluntent, the rear marquee accesses, and the TerraMats towards the sewer manhole. Cables and pipes can be easily inserted (and removed) inside/under these, which have a high visibility non-slip surface.

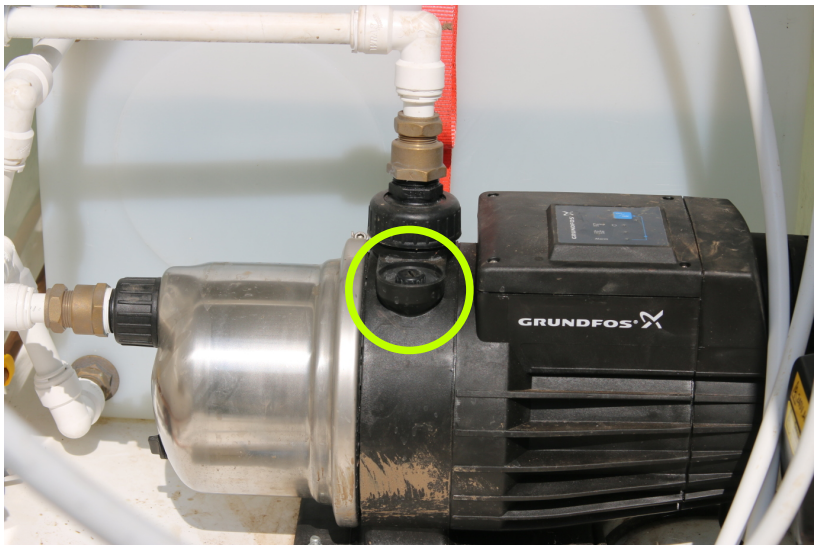
Water, drainage and power taken towards Concessions. The ramps are *between* TerraMat sheets to avoid them sliding.

The small black ramps are used to cross the marquee exit leading to the camping area, and for unplanned use. The large ramps are used on the roadway. The in-between 'Mini' model is used for the other cases listed above. The voluntent and cheese ramps should be installed early, so the flooring can be made to butt up to them. Appropriately sized black-edged yellow rectangles give the ramps' positions on the site plan.

1.10 Pump priming

Several pumps on site are not self-priming (i.e. if initially dry, they will sit and spin, but not draw any liquid in, and so not push any out), notably the one in some shower trailers. The recirculation pumps on the toilet trailers can also suffer from this.

These pumps have a waterproof plug at the top of the pump chamber, like that circled on the below picture.



Shower pump, priming plug circled

To prime such a pump:

1. turn the pump off;
2. wearing appropriate PPE[4], carefully unscrew the plug;
3. pour liquid (water) into the chamber until it is full to the brim; and
4. replace the plug, and retry the pump.

If you have to do this more than twice it is likely the pump is failing or the system is losing pressure elsewhere.

[4] a churning pump will boil the liquid inside, so the pump may contain pressurized steam — if the liquid is recirculation fluid and it is released into your eye you'll regret it

2

Site layout

2.1 Marking-out

Marking-out is done shortly before the thing the contractor is going to install arrives; typically the day before. You will need a plan, spray paint, at least one 100 m measuring tape, strings (130 and 60 m are handy) and pins; a laser can also be useful for getting straight lines.

2.1.1 Roadway

The important one: get it wrong and nothing else fits. Mildly skewing the long straight heading toward the play area has major consequences at the far end. A line from the centre of the circular seating area in the play area which misses the trunk of the tree facing the Victoria Avenue gate by 1.1 m towards the road will be parallel with the roadway, and 0.2 m from giving the tent-side edge of the roadway by the camping area. Of course, for installation we start near the gate (first panels 12.6 m away and almost aligned with the path), so the above is more of a sanity check, than a layout method.

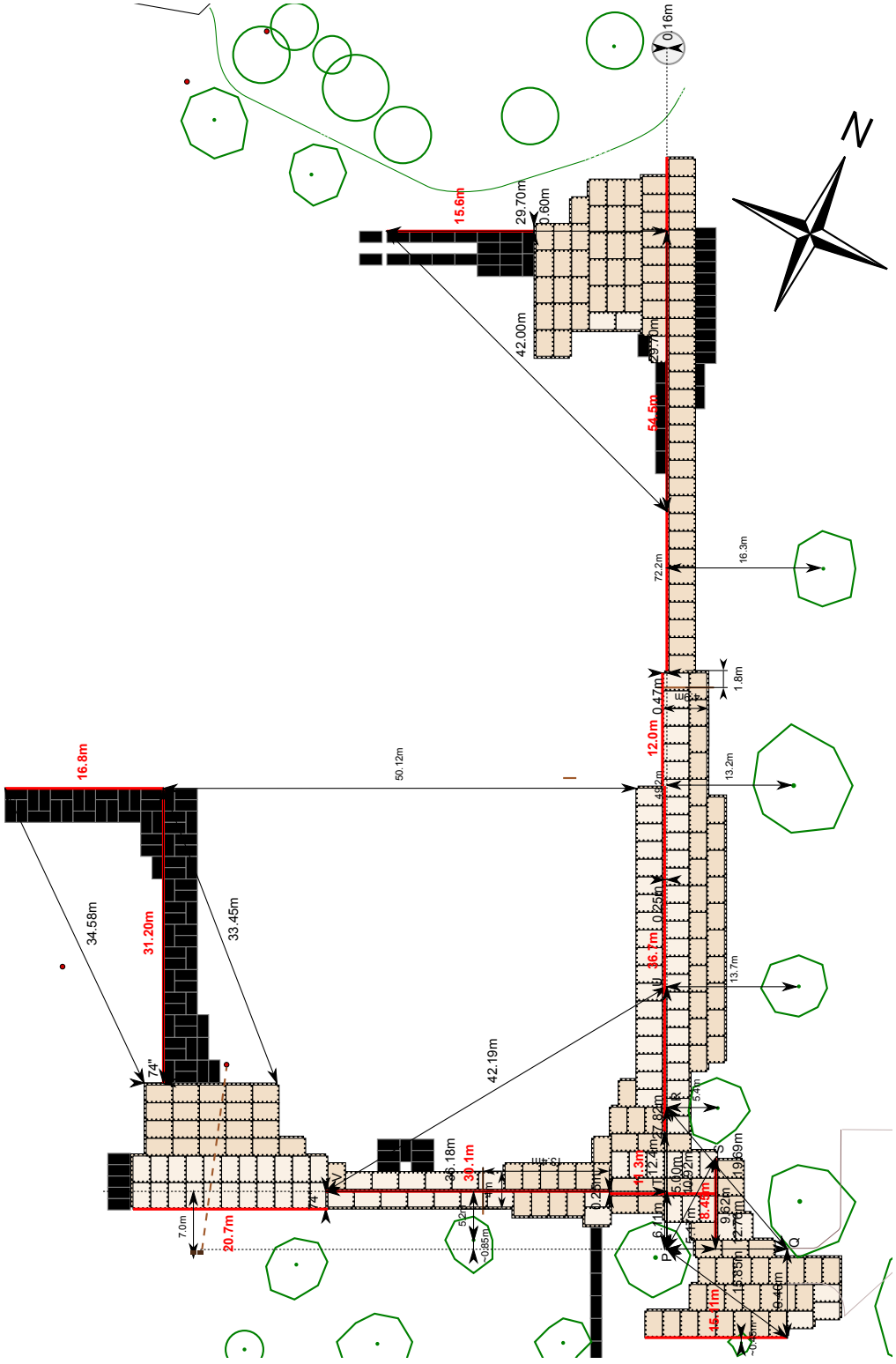
SignaRoad is a robust and versatile product which gives a trip-hazard-free surface. The panels can be used either way up, with flipping affecting how other panels connect. The two options are shown as light and dark shades of beige on the site plan, with the darker version being the 'as delivered' preference. The lightweight TerraMat panels are shown individually in black. Each SignaRoad panel's surface covers 2.82 m × 1.88 m, TerraMats are 2.4 m × 1.2 m.

The procedure for 2024's SignaRoad layout is overleaf. For all measurements keep the tape or string taut, and compensate for any deflection caused by wind.

1. Pin a tape and long string on the grasscrete corner inside of the two kerbstones at the north corner of the west hammerhead exit: point Q.
2. From Q, run the string to the north edge of the iron access covers near the tap, and find point P, 12.76 m along the string.
3. Re-pin the string and tape at P, and run the string so the centre of the play-area's circular seating area is 16 cm away to the east at its closest. Or equivalently, go to the left side of the eleventh green fence hoop to the right of the yellow gate, viewed from inside the play area.

Here

4. Check that the distances from the string to nearby trees are 16.3 m at 72.2 m along the string (total 88.5 m), 13.2 m at 49.2 m (total 62.4 m), 13.7 m at 27.8 m (total 41.5 m), and 5.4 m at 15.0 m (total 20.4 m).
5. Re-pinning the tape at Q, find point R on the string, 19.69 m *from Q*, then adjust P along the line of the string so that it's 15.00 m from R.
6. Attach the tape at the new P, then, starting 12.4 m along the string, paint a 36.7 m line offset by 0.25 m towards Park Street, a further 12.0 m line offset by 0.47 m towards Park Street, and a final 54.5 m line with no offset.
7. Hold the tape's 16.09 m mark on the string at 9.62 m from P, and form an angle eastward to find point S 10.92 m from P. Run the other string from S between P and Q, 5.17 m from P, then paint along it for 8.45 m from S.
8. Moving this string, set out a line offset from P to Q by 9.40 m towards the path (diagonal using P and Q of 15.85 m, for a total of 25.25 m), then from the point nearest Q paint for 15.11 m away from the gate.
9. Identify points T and U, 6.11 m and 27.82 m from P along the long string, then re-pin the tape at T. Find point V by holding the tape at U on 78.37 m and forming an angle towards Park Street at the tape's 36.18 m mark.
10. Deploy a string from T, through V and beyond, for 60 m. Check that the nearest tree is 5.2 m from the string, and, farther on, the tap is 7.0 m away.
11. Paint 30.1 m from V towards T, then a line offset by 0.25 m towards the path, ending on the line from step 7, 3.75 m from S. In the opposite direction from V, paint a 20.7 m long line offset towards the path by 74 in.



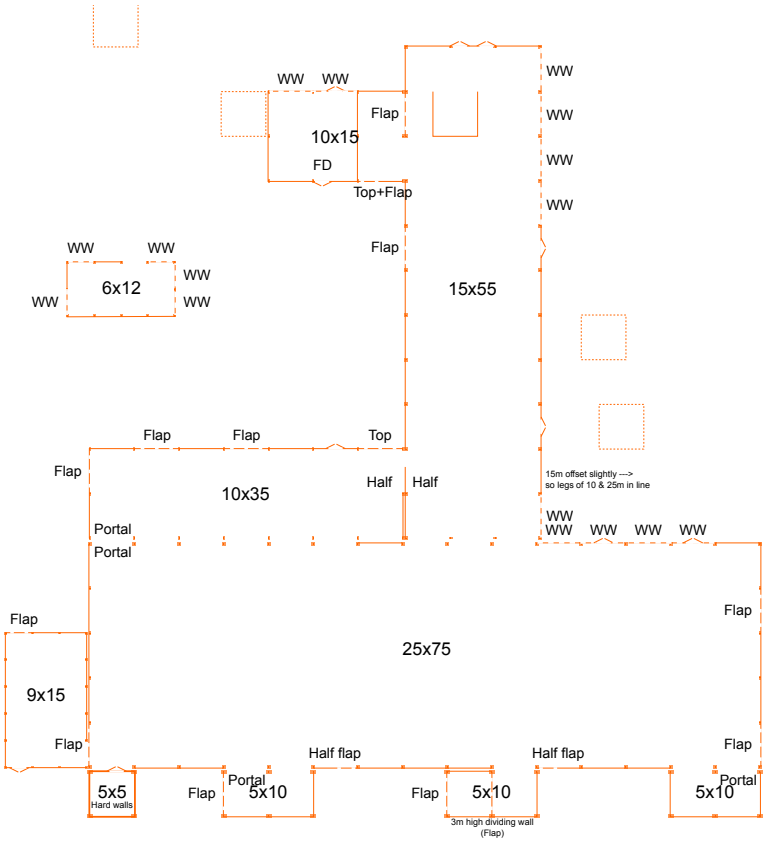
Suggested paint lines are shown in red, brown lines are trenches

2.1.2 Rear fence

For the rear fence the vehicle entrance gateposts are most important: 7 m apart, just in front of the roadway panels, with 1.5 m of clear ground behind for the stays to be anchored. A 1 m pedestrian gate is provided near Staffunteering, and a hatch gate in view of the gatehouse allows the site to be locked externally. Route the fence away from having easy jump-points (trees) near the fence's outer face and include the path-side wiggle to please the Chief Steward.

The play-area's fence (curvy green line on the site plan) is notable: if our fence is close to it, it becomes called a step. While taking the park fence inside ours would avoid this, it's a bit anti-social. Therefore we must leave a 2 m-wide gap from our fence to the potential 'step'. This also means the swimming pool's rear access remains usable.

2.1.3 Marquees



Annotated marquee plan. 'FD' — Fire Door, 'Top' — wall only attached on eave rail, 'WW' — Window Wall. All other doors glazed.

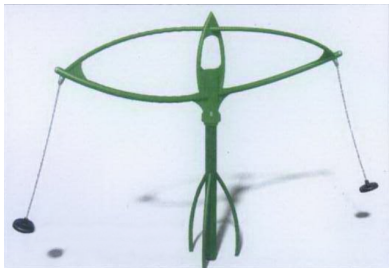
Easier than the roadway, but getting the 25 m-wide marquee right is also a good idea. Its footprint will be constrained by the roadway, so presuming this was correctly installed, it can be used as a frame for measurements.

The rear of the 25 m-wide marquee should be parallel to the long straight of the roadway, 6.22 m away at first, and 9.5 m away later, while its gable nearest the site gate should be 10.0 m from the roadway spur, allowing room for the 9 m-wide voluntent. The diagram provided to the marquee contractor notes that our marked lines are for plate centres, not edges.

The 15 m-wide marquee must be offset by around 0.4 m relative to the 25 m marquee, so that the legs of the cider/foreign and 25 m-wide marquees line up.

Should things not have gone entirely to plan, some guidelines: the front of the 25 m marquee lies on the line from the west side of the wooden bench on the path, to the 'Hurricane' swing in the play area. If this is to be modified, consider the effects of the slight rise to the foreign bar: how repositioning will impact on bar and stillage stability, and marquee rainwater drainage.

Marquee base-plates towards bench



'Hurricane' swing

2.1.4 Other

Everything else should be a simple scaling of the site plan into paint on the ground — if it's not, the plan needs revising for next year! Marking out things that we can't easily move (the 20 ft containers, the cold-rooms, and the flooring / stillage) are the most useful, so that our contractors can be shown where an item goes then be left to get on with it. In particular, painting *DO NOT CROSS* lines for the flooring, as described in 9.3.1, 'Flooring: Aims', is highly advisable.

2.2 Early and late site layout

At either end of the festival there are nights when plant is on site, and there is no substantial fence. While turdi are potential targets for mischief, there's an amount of (rather more tempting) equipment from Sunbelt. Mobile plant should be kept close to the night hut, so it is more easily guarded. It may be possible to barricade plant in, interlocking the fork-truck tines to make plant removal more challenging.

If using the reinforced ground (grasscrete) to the right of the road gate as an early staging area, try not to block where the rear fence needs to go!

2.3 GS7 fence layout

The GS7 ('Heras') fence goes through two stages of installation during set-up, which are reversed during tear-down. Notes on the installation procedure are in 3.3, 'GS7 fence construction'.

2.3.1 First pass

The minimal form is just large enough to allow the main marquees to be erected and most of the toilet units to be installed, without taking over the whole green.

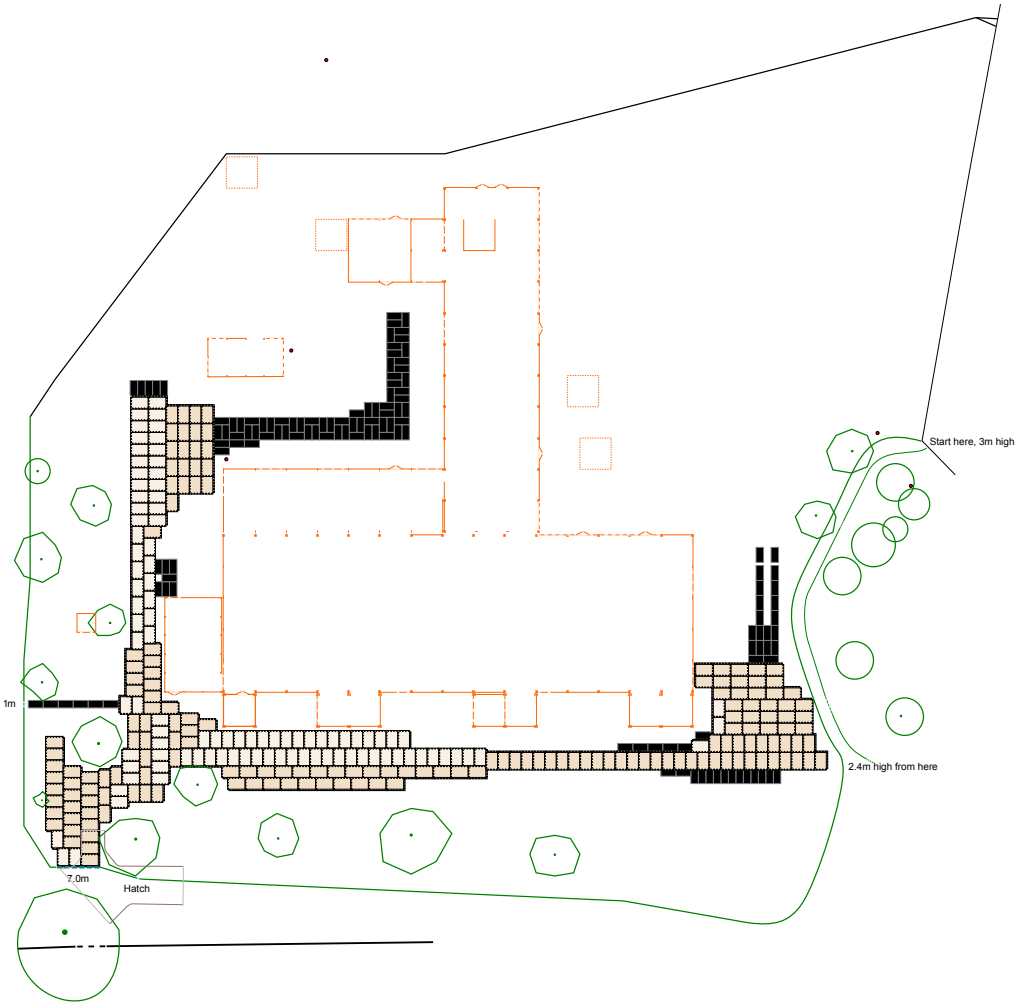
Below are the basic steps to create it from nothing.

1. Start from about *six metres beyond* the spray-painted bars (blue and white marks) of the green swimming-pool fence, towards the skate-park. Create a narrow and well-secured triangle, attaching two fence panels to the in-situ fence, using as many clips as necessary.

2. Take the fence directly toward the far corner of the front of the 15 m-wide marquee, allowing a 5.5 m gap for access inside the fence.

3. Head towards the path crossing for 10 panels.

4. Turn to meet the end of the rear fence, somewhere beyond the standpipe, near the path.



Early fencing plan, with the thicker green line for the rear Steelshield fence, the thicker black line for GS7 fence, and thin green and black lines for in-situ fence

2.3.2 Final form

The later stage is as shown by the black lines on the main site plan, with seven castor-equipped double panel gates (dashed line) and a pedestrian gate near the family area (dotted line). The initial triangle can be kept, all else must be dismantled and moved. The section near the back of Foreign should extend past the family tent for three panels before turning to the corner of the events tent. The garden evacuation gates have two layers to restrict passing-out of CAMRA cards, like the crowd-control barrier (3.4) does elsewhere. Fewer than ten panels are used for other purposes on the site.

2.4 Back-stage areas

See the large dashed outlines on the site plan for areas with a particular purpose.

2.4.1 Loading zones

The large letters on the site plan indicate loading zones: places to send lorries to. The similar but smaller letters are suitable for accommodating vans. See the loading plan at the front for who should go where, when. The idea is to be able to have multiple lorries on site at the same time, and have them close to where their loads are delivered or collected. **B** should not be used.

2.4.2 Equipment storage and staging

Tightly dotted outlines on the site plan show where the named equipment should be kept. These locations are convenient for the kit to be used with minimal movement, and provide a clear location for volunteers to find, and later return, things. Some metal items are deliberately stored near marquees to block (combustible) cars parking there. Any materials not specifically named and pallets (particularly anything that might fuel a fire) ought to be stored neatly in the boneyard.

During most of set-up and tear-down the 'Parking' and 'Camping'[1] areas may be used to stage deliveries. Because they have other uses as more people come on site, the designated staging locations (sparsely dotted boxes) are preferable. In particular, the 'Scaffolding' area should be protected with barrier tape to avoid marquee bits being placed there on the first Monday.

2.4.3 Camping area

Volunteers will start wanting somewhere to camp from the first Wednesday night onwards. Use the orange plastic barrier fence (3.1) to section the area off and avoid it being used for parking and deliveries.

[1] the camping area may be of more use kept clear for turning vehicles than staging

3

Fencing

3.1 Plastic barrier fence

The barrier fence's main use is to block members of the public from entering areas in which either contractors and machinery are working, or trip-hazards exist, while there is no solid fence installed.

1. During roadway installation, and until Steelshield arrives (restricted area: roadway).

2. After Steelshield erection, before GS7 fencing arrives (restricted area: roadway + marquee footprints).

3. While the main fencing is up (restricted area: between the Steelshield gate and the Victoria Avenue gate).

4. After the GS7 fencing is dismantled, but before Steelshield removal (restricted area: between the ends of the Steelshield).

5. Once the Steelshield is removed, and until the roadway has been recovered (restricted area: roadway).

One pin every five metres, driven in with a club hammer. Weave a pin between the ends of two sections of fence to form a join.

During the festival the fence is useful for setting out the camping area boundary (2.4.3) and creating a storage and collection area for empty casks.

3.2 Rear fence installation

Danger! Danger! Medium voltage!

As the site plan shows, the rear fence crosses a red dashed line. The red dashed line is a (disconnected?) 11 kV underground cable, not more than 600 mm buried. Ensure the contractor doesn't use long pegs.

3.3 GS7 fence construction

One foot and two clips per panel (on average). One anti-lift strap per foot for the extended outer fenceline. The clips to be roughly a foot up and a foot down from the bottom/top of the panel. Mesh face of panel to outside. The castor accessories are for the double panel gates, used by vehicles and for site evacuation.

Fencing runs are most easily done with a gang of three (or more): a fork-truck operator reversing with a stillage of panels, which the other two unload/load as the truck progresses along the fenceline. A second pass with the truck moving feet follows, and the result is very little carrying. A cordless impact driver makes installing or removing the clips very quick. Doing the extended fence with the crowd-control barrier already in place gives some separation from the public.

The GS7 fenceline is described in the previous chapter (section 2.3), and drawn on the site plan in black.

3.4 Crowd-control barriers

The main use of the crowd-control/pedestrian barrier ('GT') we hire is to provide cycle parking along the outside of the GS7 fence. There is enough that it can be zig-zagged to allow even more bicycles to fit. A further use is to make it harder for those already inside to pass CAMRA cards to others outside.

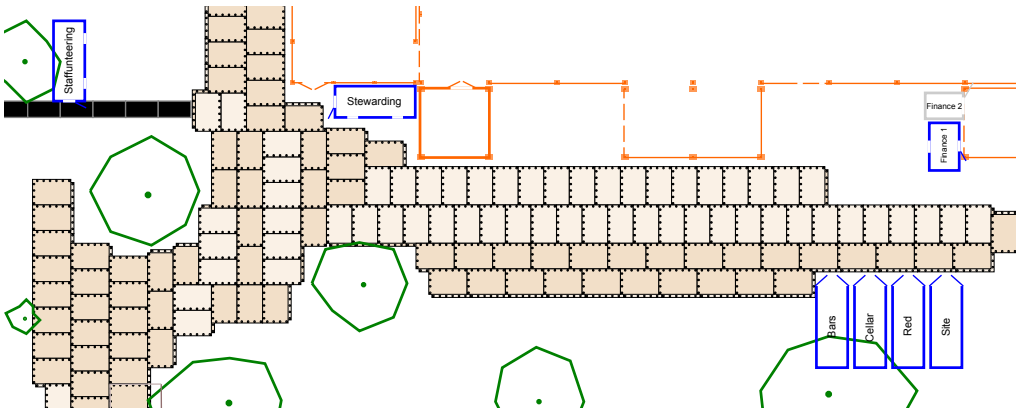
Inside the fenceline, the barrier is mostly used to form the family area, to restrict public access behind the food concessions, and for use in cheese-counter queue-control (around 60 pieces in total).

These uses are all shown in a grey line on the site plan.

Tensabarrier is hired through the furniture order for use at the entrance and cheese-counter, but installation is dealt with by the relevant volunteers.

4

Containers and offices



Site plan excerpt, offices and containers with blue outlines, Forma-Stors with grey outlines

4.1 Office preferences

Staffunteering: end door, windows to right on entry, looking towards the voluntent.

Stewarding: end door, windows to right on entry.

4.2 Moving small ($\leq$12 ft) containers

For containers with usable fork-pockets (it may be useful to note that a mast-fork-truck's forks often go wider than a telehandler's), movement is easy, so long as you're in reverse. Get a banksman for forward manoeuvres, and mind tree branches.

If there's no usable fork-pockets, you'll have to use the crane points. Secure a strap to each corner of the top of the container using a lark's-foot hitch, then place two straps per tine on a telehandler's forks, the inner one overlapping the outer to avoid it escaping. Again, use reverse and/or a banksman.

Lark's foot hitch[1], the knot of champions

4.3 Forma-Stors

Forma-Stors are bolt-together (19 mm socket) containers, used for storing ambient wine/mead stock and card machines.

1. Use a fork-truck to place the base in position. For the wine store, the back wall of the container should be 17.2 m from the inside edge of the marquee gable plate (11 m of floor, 6 m of fridge, and 0.2m for worst-case Supa-Trac alignment as it runs from the 15 m-wide marquee end).
2. Bolt each wall panel to the base, using the longer bolts for the sides, and the clips to hold the panel corners together. Attach the door panel last.
3. Lift and bolt on the roof.

20 mm holes in the top corners of the side panels allow cables to enter for power and lighting. Use or improvise a grommet to avoid damaging the cables.

[1] author: 'Malta', source: Wikipedia

5

Refrigeration

Powering the equipment is covered separately in 6.11, 'Electrical: Refrigeration units'

5.1 Cold-rooms

These are built on-site by the contractor, we just have to make sure they are in the right place, and have the expected door arrangements. They are shown as large grey rectangles with doors on the site plan; the lumps are suggested locations for the chiller blocks. If the blocks are positioned elsewhere consider:

- how to best get an even temperature inside the unit,
- where the heat from the radiator will end up,
- allowance of sufficient space around the radiator for air circulation, and
- allowance of sufficient space (1 m away from the room) to remove and exchange the chiller, should it fail.

See also 10.7.1, 'Equipment use — Refrigeration: Temperature adjustment'.

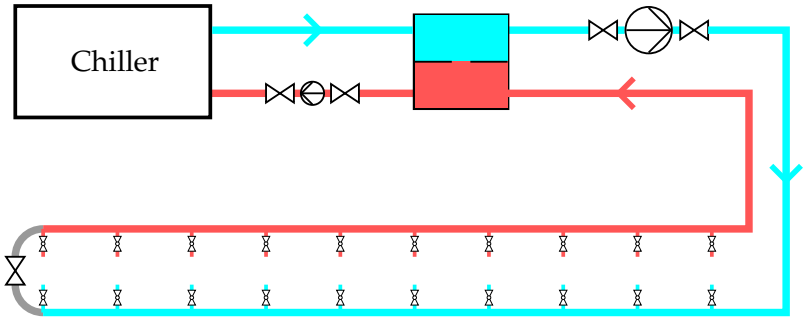
5.2 Serve-overs and upright fridges

Plug 'n' play. Allow time for the compressor oil to drain down, if a fridge has not been transported upright, before turning it on.

The serve-overs are quite high. Eight metal stillage boards, arranged $2 \times 2 \times 2$, held together by passing stout cable ties through the holes, create a safe and useful booster step for access.

5.3 Beer-cooling plant

The system is made up of two chillers circulating cooled water to a buffer tank, which is then pumped to CAMRA kit connected in parallel between 2 in flow and return pipes. The chillers are centrally positioned, so there are two flow and return pairs serving opposite directions.



One half of the cooling system, CBF and CAMRA equipment omitted, distribution connections (mostly) at 5 m spacing

The 2 in pipes are joined by reducing tees which spur to 1 in ball valves, terminating in camlock connectors (male for flow, female for return). CBF maintains a stock of 44 adaptors to mate with these connectors, each converting camlock into two 22 mm plumbing connectors, equivalent to two in/out connections of a CAMRA chiller unit, on to which the standard manifold/saddle equipment is connected. Six pairs of special wide-bore adaptors are held for use at the end of the 2 in pipe run, where pressure will be at its lowest.

The flow/return pipes are joined by a bypass gate valve, normally closed, which is opened to allow the system to run when little cooling load is connected.

5.3.1 Installation

The main plant is positioned by the delivering lorry's crane (site plan: grey outlines by Finance), but after that the installation is down to volunteer labour. This does not necessarily mean Site: co-opt Cellar if at all possible. In preparation, scaffolding tubes should be attached over gaps in the stillage to provide a structure to attach the hired pipework to, to avoid the pipes blocking walkways. Some stillage verticals need extending to make the pipes sufficiently elevated.

Much of the installation work is cable-tie-ing the 2 in pipes to the stillage, most easily done a section at a time, rather than by connecting the pipes first. This allows lifting less weight, and more control of the orientation of

the tee outlets. The positioning of the outlets is important, so they do not end up over gaps in the stillage. The run going to Cider should have its first outlets immediately after reaching the 'Gay Bar' stillage; the other should have its fourth and fifth outlets equally spaced either side of the first stillage gap reached. The site plan shows a symbol every 5 m along the distribution pipes:

Outlet

No outlet (use 10 m hose)

Position-critical outlet

Pipes entering the marquee and crossing the stillage gap on a 6 m tube

Tee/valve assembly with CBF adaptor and CAMRA pipework

Vertical scaff. pole used to reach Cider

The chiller, pump and tank pipework are connected as in the schematic.

5.3.2 Commissioning

This is undertaken by the contractor's installer.

1. Fill the buffer tank.
2. Ensure all pipe connections are good.
3. Open *all* 2 in valves (including tank ports).
4. Ensure power cabling is correct (6.11, 'Electrical: Refrigeration units').
5. Turn on the pump connected to the chiller, verify fluid circulation to the tank and correct flow direction.
6. Turn on the chiller, check no faults are flagged and the set point is 5 °C.
7. Turn on the main pump, verify fluid circulation and flow direction.
8. Maintain the tank level at the top of the baffle plate (half-full).

Do not run the chillers without their circulation pump operating — the chiller may freeze and burst.

Water may be rapidly added to the tank by connecting a 30 m 32 mm diameter pipe to the isolation valve between the walls separating Cheese and Foreign.

As CAMRA equipment is connected, more fluid will be required in the buffer tank. The bypass valves should only be closed when enough equipment is connected to avoid generating damagingly high pressures in the system.

5.3.3 Decommissioning

As CAMRA equipment is removed the bypass valves should be reopened.

The main pipework can be partially drained by modifying connections at the tank to use the main pump to suck fluid back into the tank (pulling against a pipe-end open to atmosphere).

1. Shut all 2 in valves (including tank ports).
2. Remove the short hose between the pump and the tank, disconnect and elevate the other hose attached to the pump.
3. *Without great loss of fluid* move the third hose from the tank to the pump.
4. Connect the pump to the tank with the short hose.
5. Open *all connected* valves, then start the pump, stopping it when the tank level stops rising.

All equipment should be gathered, drained, ready for collection.

6

Electrical

6.1 Generator transport and siting

In short, it's preferable to use the delivery lorry's crane, if ground conditions permit. It gives better control, and the large generators are on the limit of a big telehandler's capacity when fuelled (delivered three-quarters full — note it on the delivery paperwork if not).

If the wagon can't get close enough to site the generators, then the generators should all have fork-pockets. The biggest size of generator may *only just* be liftable: the jib-lift may not raise it fully, and then tilt will be needed to clear it from the lorry-bed. In such a case, it's advisable to only have to lower it once, as you may not pick it up again; i.e. site it directly from the lorry. The exception to this is if the generator output will be at the wrong end...

When siting the generators, ensure there is sufficient room on all sides to open all access panels, no vents are obstructed, and the ground is (roughly) flat and level. Also, as mentioned above, bear in mind which end the electrical connections will be made. In the case of the concessions generator, ideally position it away from casual vandalism by objects thrown over the fence. Following the site plan (generators shown in pink, fuel tanks in red) should take care of many of these concerns however.

Once a generator is off the lorry it is wise to check it works. See 10.3, 'Equipment use: Generators' on connecting the battery and generator starting. Check also that the phase–neutral voltage is or can be configured to 250 V.

Site the external fuel tanks so that the supply and return hoses reach the generator's connection points. *Padlock the tanks' filler caps to avoid diesel loss.*

6.2 Generator set-up

The primary 150 kVA main generator and the 100 kVA concessions generator should both have supply and return lines to their external fuel tanks fitted (push-fit) and the fuel-line connections inside the generator housings should be set to use the external tanks. The spare 150 kVA's configuration will vary depending on why it is being used, so it's easiest to not set its fuel source up at first. 10.3, 'Equipment use: Generators' discusses fuel-line connections and source-selection in more detail.

All generators must have the supplied (somewhere in the housing) ground rod attached securely to the proper earthing point (most likely next to the bolt-on output terminals), and inserted solidly (at least a foot) into the ground.

For both the primary and spare main site generators, firmly attach the five-wire generator-tails supplied by Pearce Hire to the bolt terminals. Obviously don't do this with the generator on, and use the right coloured cables for each terminal — green for ground, blue for neutral, brown for L1, black for L2, grey for L3 (if, *bizarrely*, the terminals are described in the old colours, black is N, red is L1, yellow is L2, and blue is L3, and the cables are connected *according to a terminal's name*, i.e. the blue cable still goes to N (black), *not L3*).

If possible, use the control panel to configure the phase–neutral voltage to 250 V — this increases efficiency, and allows the use of longer cables.

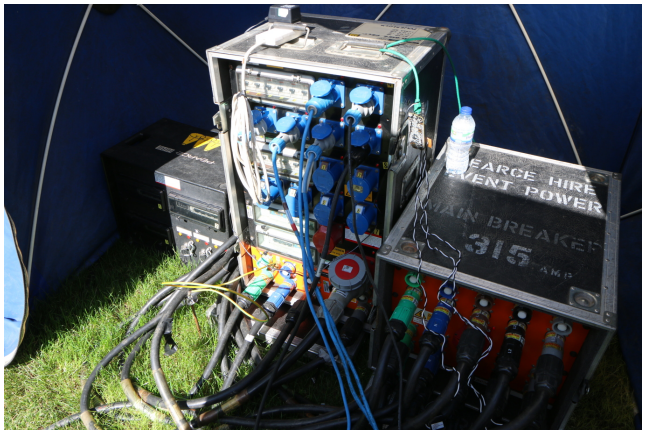
6.3 Main breaker

Erect (and peg/weight down) the blue pop-up tent, shown on the site plan as a large yellow square. Inside the tent, place the 315 A main breaker, the Powerlock to 3×125 A splitter and a modular distro rack, removing all flight-case covers.

Plug the Powerlock connector ends of the generator tails from the primary generator into the main breaker, using a push and twist action. If you are certain both generators have *four* pole output circuit breakers[1] (and at least one generator's breaker is 'off'), you may connect the spare generator's tails to the main breaker too. *If doing this both generators must* never *have their breakers 'on' at the same time, even if one generator is not running*.

Using one five-wire set of short double-ended Powerlock cables, connect the output of the main breaker to the splitter, and using the second set connect the splitter's Powerlock outputs to the modular distro.

[1] disconnecting L1, L2, L3, *and N*



From left: 125A splitter, modular distro, and main breaker

6.4 Introduction to IEC 60309

IEC 60309, sometimes called 'CEEform', connectors connect the majority of appliances on the site, and much of the distribution network. The plugs have a cylindrical casing, which both makes the connector splash-proof (making them suitable for outdoor use), and blocks easy use of equipment with common BS 1363 13 A plugs. Note that we do not use much of the fully immersion-proof version, so no connectors in puddles please.

The connectors are coloured by their voltage rating. Since we have a three-phase supply, with a nominally 230 V phase-neutral voltage, two colours are most common on site: blue (200 – 250 V) for single-phase connections (3 conductors), and red (380 – 480 V) for three-phase (4 or 5 conductors). There's also yellow (100 – 130 V) in use, obtained via a transformer, to power the conveyor belt used as a cask-lifter and recharge the cherry-picker.

Two types of blue single-phase connector are used: the smaller (⌀ 43.5 mm[23]) 16 A ones, and the larger (⌀ 57.3 mm) 32 A ones. Three types of red three-phase connector are in use: the smallest (⌀ 63.4 mm) are rated to carry 32 A, the middle ones (⌀ 69.5 mm) 63 A, and the largest (⌀ 81.5 mm) 125 A.

The lower-current connectors are generally just push to plug-in and pull to unplug; higher-current ones tend to have a locking screw-collar, which must be correctly aligned to fully plug-in or before unplugging, to avoid accidental disconnection, and provide much greater water-resistance.

[2] this measurement, and those following it, refer to the outer diameter of a plug's shroud
[3] the [2] used here is a footnote, not 'squared'
[23] Why are you looking at footnote 23? It's a [2] and a [3] next to each other, duh.

6.5 Main generator distribution network

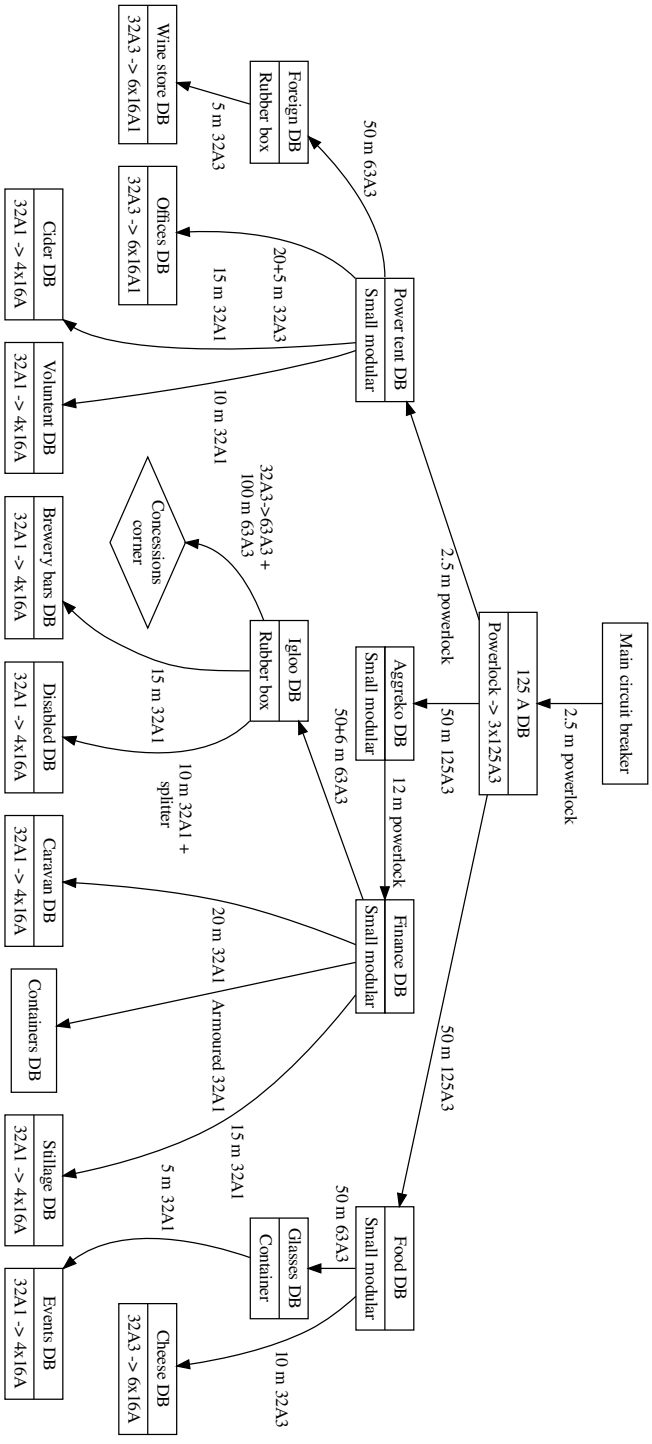


Diagram of the core electrical system

6.5.1 Three phase

The three-phase network is shown schematically in the preceding diagram, and in yellow on the site plan (line width corresponding to cable capacity), with the following symbols:

125 A distro

63 A rubber box

32 A 3-phase board

6.5.2 RCD tuning

Tuned VRCD

The generators, main breaker, and 32, 63 and 125 A three-phase outlets on Pearce Hire distribution boards have VRCDs — RCDs where the permitted amount of current flowing to earth can be changed, as can the length of time a too-high burst of earth-leakage will be ignored. This configurability allows the use of *discrimination*, where a well-set-up system will trip near to a faulty appliance or cable, but the trip will not cascade higher up the chain, knocking out the main breaker or generator.

The approach is to increase the tolerance (decrease the sensitivity) at each level as the distribution 'tree' gets nearer the generator. The VRCDs *should* be supplied at a sensitive setting, so tuning is generally only worthwhile on outlets supplying another VRCD, i.e. the Finance rack's 63 A outlet, and those in the power tent. Any downstream outlet not one of the mentioned VRCDs is

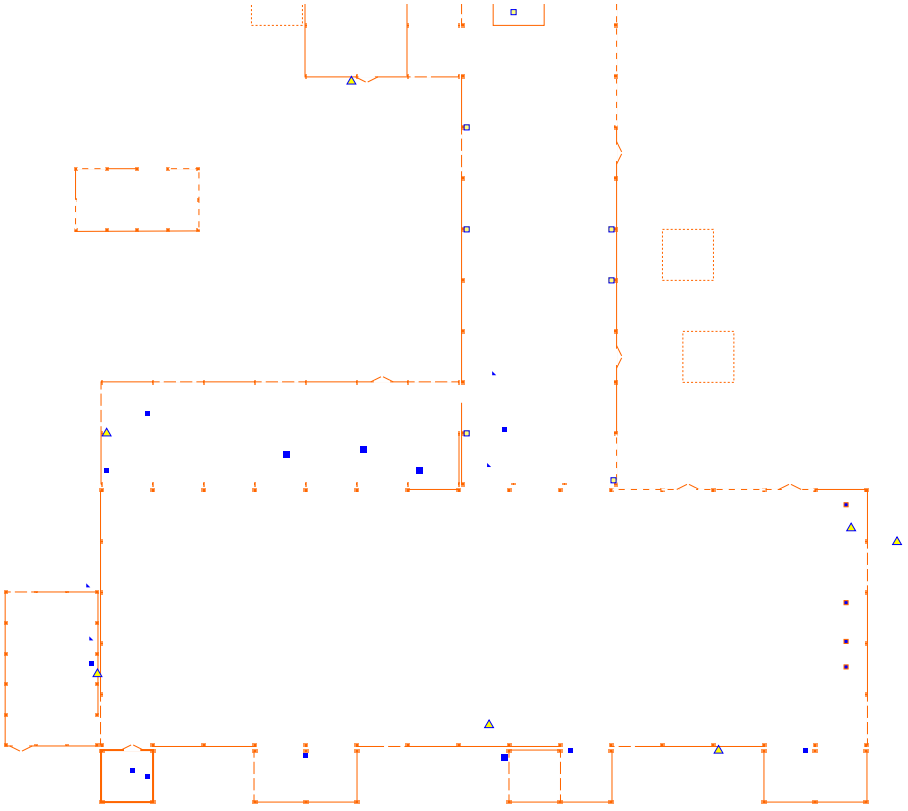
protected by an instantaneous 30 mA RCBO[4], so use a trip current one or two steps higher, and a delay around 300 ms, on each output. Set the main breaker and generator one notch higher still on both measures, unless the steps are such that the limits are getting silly. 'Silly' is defined as (Bang!) Oh no! (Dies.)

6.5.3 Single phase

Most of the festival's wiring is single-phase. Instead of having pages of diagrams here, per-distribution-board plans are available as a separate document, and should be stuck to the relevant boards at the festival.

Use CBF cables before the hired ones: things plugged in later are unplugged earlier, so this policy means that hired cables can be gathered for return more easily. Our cables have purple length tags for 16 A and pink tags for 32 A.

Cables to single-phase distribution boards are not drawn on the site plan, but the boards' rough locations are, with most of them repeated below for clarity.



Selected locations of 4 × 16 A single-phase distribution boards (△) and 13 A outlets (32 A supply: ▫ and ■; 16 or 13 A supply: ▪, ◣ and ▪)

[4] except for the glasses container, where all outlets are protected by a 100 mA inlet RCD

6.6 Security through obscurity

There are many people on site (even excluding the public), some of whom are curious (which is fine), and some who are prone to meddle (which is not fine). There will nearly always be very good reasons why a member of Site has put a circuit on or off, and others attempting to 'fix' things may well create us more work. For these reasons, people who are not Site should not be touching any circuit breakers or distribution equipment unless specifically told they may.

We can encourage good behaviour by removing temptation: don't put a load of pretty lights and panels of switches near to idiots. For the main distribution boards we put physical access restrictions in place: the power tent is generally closed, the finance compound has limited access, and the PA rack and distro for the 15 m-wide marquee are surrounded by Pearce Hire boxes. Of course, these have other purposes: the tent keeps the equipment (and us!) dry, while the other barriers hide the monstrous rats' nests of cables.

6.7 Earthing the Moon

What is this hideous pile of arse? — Ed.

Generators, the main breaker, the modular distribution racks, and powered offices *must* be earthed, by attaching an earth rod to their earthing point (often located on one of an office's corners), and whacking the rod a foot or more in the ground.

Earth lighting-towers too, if using their auxiliary power outlet.

6.8 Energizing the site

1. Turn off the main breaker, and the breakers on the generator, the Powerlock splitter and power tent distribution rack.

2. Ensure the RCD key-switches are set to 'on' on the main breaker and the Powerlock splitter.

3. Start the generator (see 10.3, 'Equipment use: Generators').

4. Turn on the generator breaker, check the RCD using its test button (then reset it).

5. Check the phase lamps on the rear of the main breaker: all lit if incoming phases are wired and working correctly.

6. Turn on the main breaker, check the RCD using its test button (then reset it), check the RCD and socket 'on' lamps are lit.

7. For each three-phase output of the Powerlock splitter and modular distribution rack: turn on the breaker, check the RCD using its test button (then reset it), check the RCD and socket 'on' lamps are lit.

There's no reason to routinely test the RCDs after the first time, but turning the Powerlock splitter's breakers on one at a time is always good practice to avoid suddenly loading the generator with everything at once. The cooling plant supply, as the biggest single load, should be turned on first.

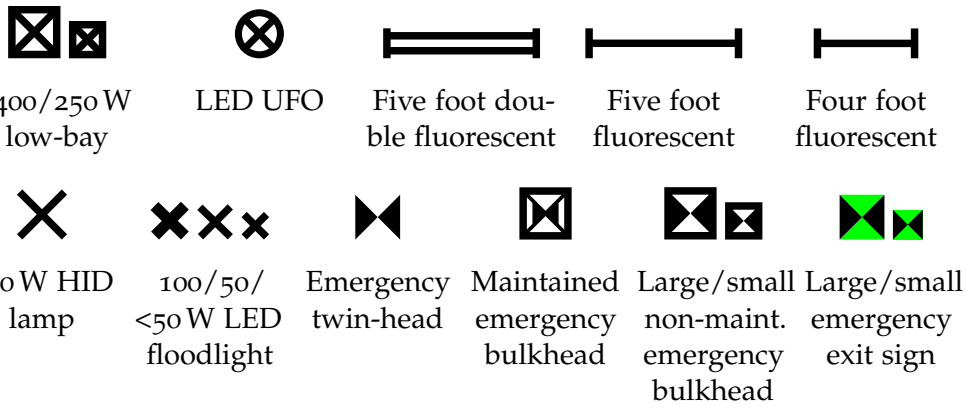
6.9 Office wiring

The 20 ft offices have in and out 32 A single-phase connectors, mounted high up at one end. The smaller offices need a 32 A plug on a short lead wiring in (and removing before collection!), next to the door. Other things (including more offices) may be daisy-chained with a 20 ft office, but consider the likely power consumption: the whole circuit must not pull more than 32 A.

6.10 Lighting

Nowhere does the idea of tidiness (1.6) apply more than lamp rigging — a lack of neatness proudly displayed where everyone can see it makes the whole place look second-rate.

Symbols used on the site plan:



'Maintained' emergency lights are lit with and without mains power, 'non-maintained' only come on when the supply goes off.

Suggestions for how to connect things (rather than actual cable routes) are shown using ------- for normal 16 A lighting circuits, and ------- for 10 A (emergency exit sign) wiring.

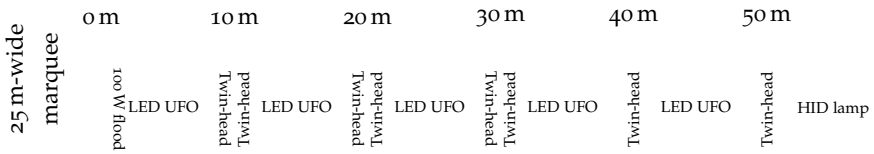
6.10.1 Secondary bonding

To achieve ideal fixture positions, non-robust attachments, such as hook-clamps, are often used. It is standard practice that anything rigged in such a temporary manner 'at height' should have some convincing[5] secondary measure in place to stop it falling if its main attachment fails. In the festival's case, this mostly applies to lighting, and needn't be difficult: depending on the fixture's weight and situation, use a safety strop, robust cable tie, or even a chain (most are not load rated however). For light (i.e. not heavy) fixtures, with good cable strain relief, securely attaching the unit's flex may also be an option.

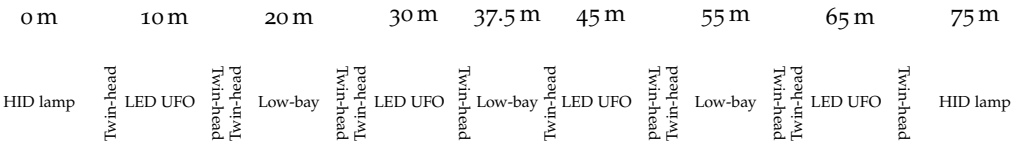
Do consider whether your proposed secondary will work as expected: will it, or its attachment point, stand the jerk of stopping the falling light? Will the rotation of the light, following the first failure, dislodge the secondary? Will loading the secondary cause other fixtures' attachments to fail?

[5] easily verified, of good manufacture, adequately load rated, and in good condition

6.10.2 15 m- and 25 m-wide marquees



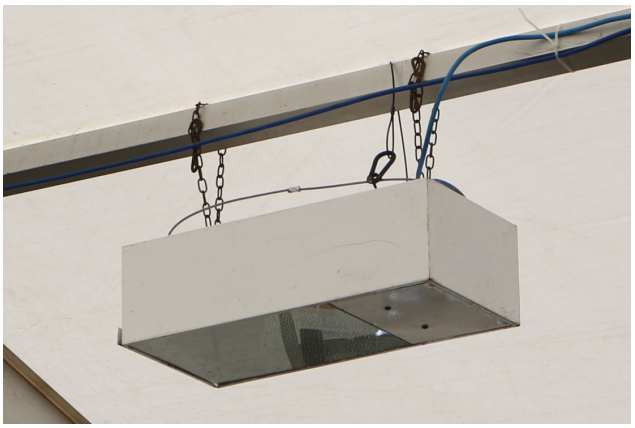
15 m-wide marquee's layout of UFOs, twin-heads, 100 W LED floodlight and HID lamp



25 m-wide marquee's layout of UFOs, low-bays, twin-heads and HID lamps

Low-bays and UFOs

These are the indoor-lighting workhorses. We have 150 W LED 'UFOs', and two flavours of low-bay: 400 W and 250 W. UFOs and 400s (which have '400' written on the casing) have similar brightness and are used in preference for the main lighting, with the shortfall for the illumination of the stillage being made up with the 250s. The 'main lighting' units are generally rigged every 10 m, alternating with twin-head emergency lights: seven in the 25 m-wide marquee, on the first purlin down from the apex (the spacing shrinks to 7.5 m in the middle); five in the 15 m, along the apex. The stillage low-bays go on the second from bottom purlin, with each light covering three bays of stillage: in the middle of the second, fifth, eighth, etc. bays.



'Long-ways' low-bay mounting

A low-bay is hung along a purlin or similar, with the hooks suspending it from two chain or cable-tie loops around the purlin. The safety bond is also looped over the purlin. Additional cable ties are used for cable management. The UFOs, being symmetrical, hang from any mounting point, held by a chain or cable tie going through the lamp's eyebolt, and have a safety bond to guard against chain or cable-tie failure.

A hovering UFO

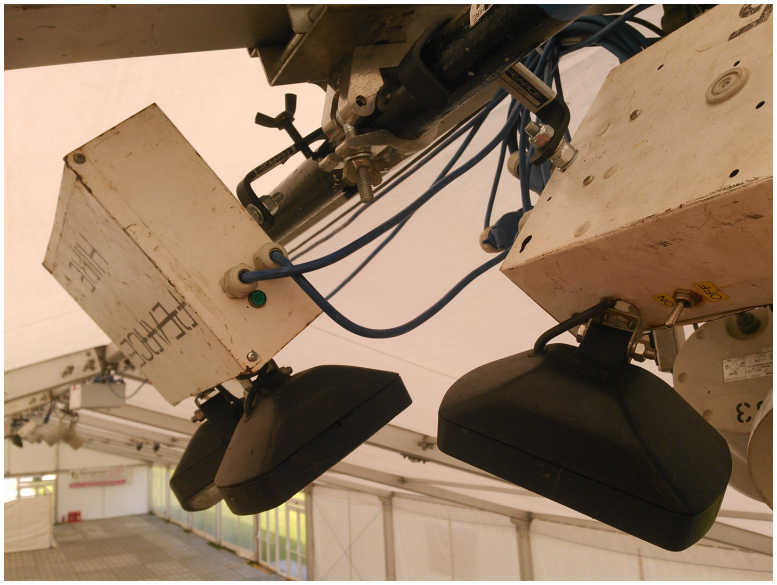
In the 25 m marquee, power for these lights is provided by one of the pre-made 16 A looms. Two double-cable assemblies cover the main lighting (use the untaped sockets), while two single strand assemblies cover the main stillage, all fed from the Finance distribution rack. The UFOs have pass-through connectors, so in the 15 m-wide marquee they just need linking up with normal 16 A cables.

Note that low-bays will not light-up ('strike'), if recently turned off and still warm, for maybe 10 minutes: this is worth bearing in mind When The Lights Go Out (11.10).

Twin-heads

The twin-head lights have battery-backup power, and are used for emergency lighting. Two runs of them are positioned to alternate with the main lights; eight in the 15 m, twelve in the 25 m. Note that most are mounted in pairs, but there are some singles; the diagrams at the start of this subsection show the placements clearly.

The lights are equipped with hook clamps, which attach to short aluminium scaffolding bars clamped to the marquee's keder grooves via a half-coupler. Assemble the bar, coupler and clamp in advance. Where one light is used, hang a hook either side of the marquee clamp; where two lights are to be hung, install the one that will act to tighten the half-coupler *first*. Use a (supplied) chain to provide a secondary attachment.



Two twin-head units mounted using a keder clamp

After mounting, the heads need splaying out and pointing downwards, with the intention of lighting the marquee, particularly escape routes (i.e. towards the emergency exits). Switch the units to 'on' before leaving them, using the toggle switch between the light-heads (check the charge indicator lights-up when the units are powered).

Power is provided by one of the pre-made 16 A looms. A single strand, with red-taped sockets, covers the 15 m-wide marquee (fed from the distribution rack), and the red-taped sockets on the two double-cable looms are used to cover the main installation in the 25 m marquee (fed from the Finance distribution rack). Identify the breaker powering the emergency units with tape clearly, so, if it's dark and the low-bays will not strike, the emergency feed can be turned off, bringing the lights on (see 11.10, 'When The Lights Go Out').

The emergency lighting will need testing, once charged, for adequate light levels (at night!) and lasting long enough without power for an evacuation to be decided upon and completed. We aim for a 10 lx average and a 1 lx minimum.

HID lamps

Three big black boxy floodlights are attached at the gable apexes of the 15 m- and 25 m-wide marquees, arranged to point straight down. As well as lighting the floor, the bounce off of the gable wall helps make the ends appear less dingy. Use keder clamps, or some very big cable ties (on parts where they won't melt), for mounting. Power them from the main lighting feed.

Exit signs

Emergency exit signs suspended over and wired along the inside eave-rails, over the roll-up wall

Battery-backed emergency exit signs, pictured above, are installed using chains or cable ties, with one over every marquee door and the four behind-stillage exits from the 25 m-wide marquee. The signs are connected via 10 A Bulgin connectors, and we only hire a few 16 A IEC 60309 to 10 A Bulgin adaptors; the assumption is that nearby signs will be linked. Therefore do the majority of wiring using 10 A Bulgin-connector cable along the marquee eave-rails (inside). The signs in the 15 m-wide marquee can all be daisy-chained, and linked to the signs above the 25 m-wide marquee's doors.

The signs need testing for working without power, once charged (check the charge indicator lights-up when the units are powered).

Tensioned catenaries

Across the ends of the 25 m-wide marquee, at around 4 m in from the gables, wire rope is hung between the lowest purlins on either side, and held as a tight catenary using a wire rope grip. Additional support is given by vertical ropes attached to the second purlins down from the apex. The (broadly) horizontal rope then has four equally spaced double-tube fluorescent fixtures hung from it, using the units' built-in clips, to light the gable bars. Stop the lights sliding by securing one clip of each unit on the rope with a small cable tie.

The cables on our fluorescent units are long enough to just daisy-chain them directly. The connectors are 16 A, but each string of lights uses under 3 A.

Brewery bar with four double fluorescents

The thing's hollow — it goes on forever — and — oh my God! — it's full of lights-onna-sticks!

LED floodlights

The small black LED floodlights, nearly all pre-mounted/wired on wooden battens, provide extra light for the stalls in the 15 m-wide marquee. The lights have 16 A plugs and sockets, and use so little power that they all could be supplied by one power outlet. The cable lengths of the 'lights-onna-stick's allow them to be connected directly in a row. These are generally mounted in the middle of the first purlin down from the apex[6], on the side to be lit up, and are secured with a strong cable tie through each lamp bracket. Use two smaller 50 W lights per marquee bay for most stalls (not the t-shirt vendor — they have their own lighting), and the larger 100 W units for the cheese stall.

Rig a single additional 100 W LED floodlight, powered by the main lighting circuit, on the apex beam to light up the sponsored banner above the big

[6] exception: Learning & Discovery — mounted above the gutter

marquee gutter, cable-tied by the bracket to the purlin, with a safety chain secondary. Similarly, *when the desired position is known*, install a 50 W LED light on the lowest purlin above the cheese/bread cutting area as a work light.

Supply cables run up the side of the marquee. Pass them between the purlins and roof 'canvas' to minimize droop.

Remote control

CBF has inline 16 A switches (some with built-in splitters) which can be used to control both normal and emergency lighting circuits by Wi-Fi, allowing easy power saving and continued illumination if the low-bays are failing to re-strike. Labels on the devices indicate which circuit they should control, in order that the interface page at `http://lights/`[7], or, failing that, `http://172.19.0.80/`, (accessible via the 'cbf-site' Wi-Fi network) works as expected.

Under-bar lighting

Supplied via an inline mains switch, the under-bar light power supplies get powered from a board under the middle stillage. Using cable ties, mount the switch so that the bar manager can control the lighting, and secure the cable that crosses the end of the serving area with anti-slip hazard tape or the small black cable ramps. *The anti-slip tape is coated with very sharp particles that will cut skin — use gloves when applying it.*

Installed under-bar lighting supply cables

[7] in many browsers simply '`lights/`' will also work, but '`lights`' will take you shopping

6.10.3 All other marquees

Fluorescents

The four foot units hired from Pearce Hire go all over the place: sixteen in the cider and foreign beer marquee; three at the entrance; two each in the events tent, glass returns area, and family tent; and one each in the first aid tent (via an inline light switch), coffee tent, and middle conservatory. Two of CBF's single five foot tube units are used in the other two conservatories, while one double tube unit goes over Finance's extended office and two more light up the voluntent.

The lights come with two small wire loops, which can be easily clipped over a purlin, and 16 A inlets and outlets (one of each), permitting daisy-chaining. In the cider/foreign marquee twelve units light the bar and stillage — use a 2 m cable between marquee bays, but link units in the same bay directly — and both hand-wash and marquee entry/exit areas get a pair each.

Two double tube lights and a twin-head in the voluntent

The power consumption is very low, so feel free to split a supply from something else and link many fluorescent lights together.

Twin-heads

Two are installed in the cider/foreign marquee, one in the events tent, and another in the voluntent, all using 0.5 m bars. See the twin-head section of 6.10.2, 'Lighting: 15 m- and 25 m-wide marquees' for general installation details.

Cider and foreign bar lighting. Note the twin-head units.

Emergency bulkheads

We have several different battery-backed bulkhead lights, each with a 16 A inlet and outlet. In most cases the lights are cable-tied to a purlin.

LED 'maintained' units two go in the family tent, with a third in the card-machine store (powered from a 13 A socket).

Smaller 'non-maintained' units one lights the area outside the finance office, the other two are described as 'exit signs', in the next subsection.

Other 'non-maintained' units four are used in the entrance, a fifth goes in glass returns.

Entrance lighting, with three fluorescents and ~~four~~two bulkhead lights. Those responsible for this oversight have been shot.

The lights need testing for working without power, once charged (check the charge indicator lights-up when the units are powered).

Exit signs

Of the large hired signs, one goes over each door of the events tent, and another is used over the doors of the voluntent (connected via the one over the join with the 25 m-wide marquee). Again, see the corresponding section of 6.10.2, 'Lighting: 15 m- and 25 m-wide marquees' for general installation details.

Events tent lighting

Two small CBF bulkhead lights, more generally described in the previous subsection, have had exit stickers applied, and these units are cable-tied over the exits from the cider/foreign marquee.

Under-counter lighting

Similar to the 25 m-wide marquee's under-bar lighting, lights are installed under the glass returns counter. A 16 A supply can be easily provided from the end of the area's overhead lighting circuit.

6.10.4 External light poles

The plan in 9.9, 'Lighting tower set-up', has some smaller yellow segments, whose pointy ends are around the edge of the 15 m-wide marquee, with another pair at a corner of the 25 m-wide marquee. These show the locations of the external light poles, and the aims of the lights mounted on them.

A pole is made of two pieces of aluminium pole, joined in a T shape at the top by a rigid scaffolding clamp. This is easiest to assemble before erecting the

pole. Mount the cross-bar a little distance in from the end (say, six inches) to leave a short stub at the top. The pole is held vertical by one or two ratchet straps: one at the top of a marquee leg, and optionally another at ground level.

By thy great mercy defend us from all perils and dangers of this night

Upper ratchet strap

To erect a pole, plant one end on the floor (perhaps even lightly strapping it), before pushing and holding the pole vertical *against the marquee leg* while an assistant threads and tightens the upper ratchet. Apply the lower ratchet, or hammer the base of the pole firmly into the ground, and get the strap(s) *very* tight. Note that the pole *must* be held tightly against something solid (i.e. the leg) for this to work — tightening against something that it can later ping off (the edge of a marquee leg-plate, for instance) is not secure.

The large flattish floodlight can then be hung off the horizontal top bar, making sure the thumb-screw is tight before adjusting the lamp's angle/aim to be as shown in the external lighting diagram (take an adjustable spanner for this). All poles take two lamps, except the one behind the family tent, which takes one. The stub of the vertical pole at the top provides a post to retain a safety loop.

Secure the cables down the pole well, and unify the two lights with a 16 A splitter. We have four Lewden 'Splitline' splitters for this, which both can be easily cable-tied down, and have been modified to have the outputs switchable by radio. This makes turning the lights off (during daytime) and on (in the evening) more straight-forward than playing 'hunt-the-breaker', which is worthwhile, as each pair of lamps uses around 5 A continuously. The two poles at the front of the 15 m-wide marquee, both fed from the glasses container, share a splitter.

'Splitline' splitter

6.10.5 Festoon

We hire two sections of 100 m festoon, which are combined to run along the top of the rear fence, powered from the board near the sewer manhole (see 6.21, 'Power distribution and use at Concessions', later in this chapter). 'S' hooks and a window-latch pole are used to reduce cable tie and ladder use. The lights are automated by feeding them through a daylight sensor. Before the concessions generator is set-up, power the festoon by using the 'night time' concessions supply from the main generators.

Note that you can typically *delegate* installation of the bulbs and cages, and the hanging up of the festoon itself.

6.10.6 Other lights

A few lone low-power floodlights are used around the site.

- A 50 W LED floodlight, equipped with a bracket suited to weighting with a fence block, goes on top of the showers to light the marquee and igloo entrances, with its power split from the shower's supply.
- A CFL light is installed in the opening of the programmes tent (described in **??**, '**??**') is powered via the entrance tent's lights.
- A 10 or 20 W LED lamp lights up the pedestrian gate. Since the fixture has a 16 A connector, and the Staffunteering office's convenient outlet is 32 A, you'll need a naughty (32 to 16 A) cable. Fortunately, since the office is powered via a 16 A circuit breaker, this isn't that naughty.
- A similar lamp goes on top of the baby changing booth, supplied by the cable heading to the family tent. *Make sure the cables are secure and out of the way so children can't pull the lamp off.*

6.11 Refrigeration units

Refrigeration units are mostly covered in Chapter 5; this section just deals with power.

The cold-rooms all have 16 A connectors, one per chiller. The igloo has five chillers, the mid-sized cold-rooms have two each, and the others just one.

The beer-cooling plant takes two 63 A feeds (one 10 m cable per chiller), which then in turn power the smaller chiller pumps using 32 A three-phase power (5 m cables). The two main circulation pumps must also be powered with 32 A three-phase power (5 m cables).

Display fridges are powered from 13 A outlets, typically via multi-socket extension leads, which are discussed in 6.14, '13 A sockets'.

Refrigerated trailers generally take a 16 A feed, connected to the chiller unit.

6.12 Sump pumps and water heaters

Sump pumps and water heaters are mostly covered in 7.9, 'Plumbing: Setting up a drain sump' and 7.5, 'Plumbing: Hand-washes and sinks' respectively; this section just deals with power.

Sump pumps and water heaters both have 16 A plugs, but the pumps draw less than 3 A (the water heaters up to 13 A). The pumps can safely be put on the same 16 A circuit as many other things, such as nearby water heaters or toilet units, so have pass-through power connectors. Bear in mind electrical *diversity* too: since water heaters spend most of the time off, they can generally be ignored when sharing a 32 A feed.

Water heaters should not be powered when not connected to water, otherwise their thermal fuse may melt and need replacing (some spares held).

6.13 Water boiler and dishwasher

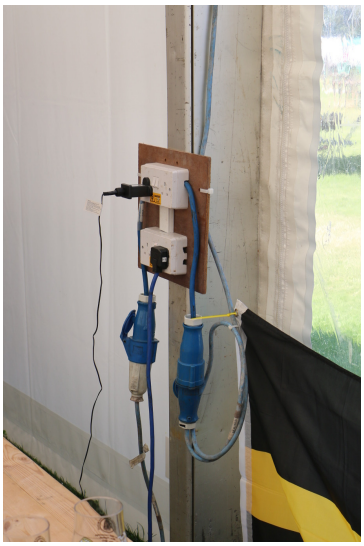
The water boiler and dishwasher are mostly covered in 7.11, 'Plumbing: Water boiler' and 7.10, 'Plumbing: Dishwasher'; this section just deals with power.

Both units need 16 A supplies, and from time to time use most of them.

6.14 13 A sockets

13 A socket boards are installed down the sides of the 15 m-wide marquee to supply the various stalls, as shown in the earlier 6.5.3, 'Single phase' diagram.

Each board has a 32 A single-phase plug and socket, allowing several boards to be daisy-chained — it depends on what gets plugged in, but one 32 A feed for each side of the marquee should give enough power. The 13 A sockets have no water resistance, don't leave them on the ground (the one at the start of the long gutter is in a public area, and should be up at eave level).



Suspended, not-even-slightly-water-resistant, socket board

Orange splash-proof socket box

Strips with six 13 A sockets, fed by 32 A circuits, are provided on three stillages in the 10 m-wide marquee, and in the card-machine store. Other multi-socket strips, generally 16 A to 4 × 13 A, go in the voluntent (one 4 × 13 A for general use, one 2 × 13 A for fridges), by the cheese-counter (13 A feed), at the entrance, and to various 'desks'. Their use *must* be avoided in potentially wet areas. For this reason a further set of four-way strips, for use by brewery bars, have splash-proof housings.

6.15 Bug zappers

Hung around 2 m from the ground, *not* above food or visible from outside, but near places where flies might enter the food area. One should therefore go in the doorway between Cheese and Foreign, the other probably farther down the wall of the 15 m-wide marquee. 16 A plugs, very low power, site plan symbol:

6.16 Camping area power

Because the camping area is on the other side of the roadway, a cable must be passed under the roadway (see **??**, '**??**'). A special armoured cable is kept for this, but won't reach by itself — use the armoured cable to cross the road, starting at the Finance distribution rack, then extend it as required with a normal 32 A cable (this keeps the join from being at risk of getting run over).

6.17 Showers and toilets

Showers and toilets are mostly covered in 7.7, 'Plumbing: Showers' and Chapter 8 respectively; this section just deals with power.

16 A connectors, except for the female vacuum pods which are 32 A (two hand-dryers, luxury!), which are hidden in the trailer service bays, and on the rear of the vacuum pods. Power needs vary, but you can often power two units *without hand-dryers* from one 16 A outlet, especially if one is a disabled or urinal unit. Special CBF cables exist with multiple outlets for this purpose. The vacuum pumps are rated at 1.5 kW.

Watch for the toilet supplier taking our cables when they pack-up.

6.18 LED lighting towers

Lighting tower set-up is mostly covered in 9.9; this section just deals with power.

All towers have a 16 A mains feed, to reduce diesel consumption/refuelling and noise. A tower consumes around 5 A with the lights on, less without. Ensure a plugged-in tower has the mains selected as its power source, usually indicated by a picture of a pylon.

6.19 Marquee heaters

Need a 16 A supply (but use less than 4 A).

6.20 Load balancing

The majority of festival appliances draw power on only one phase. For the generator to be most efficient, all three phases should be equally used. During

wiring an attempt to assist this can be made, by alternating heavy loads across the phases (the three-phase distribution boards have brown, black, or grey tape on the outlet caps to indicate phase).

The at-time-of-plugging-in technique rarely works that well, not least owing to multiple people doing the wiring. The only real answer is to wait for everything to be connected and check the loading measured by the generator.

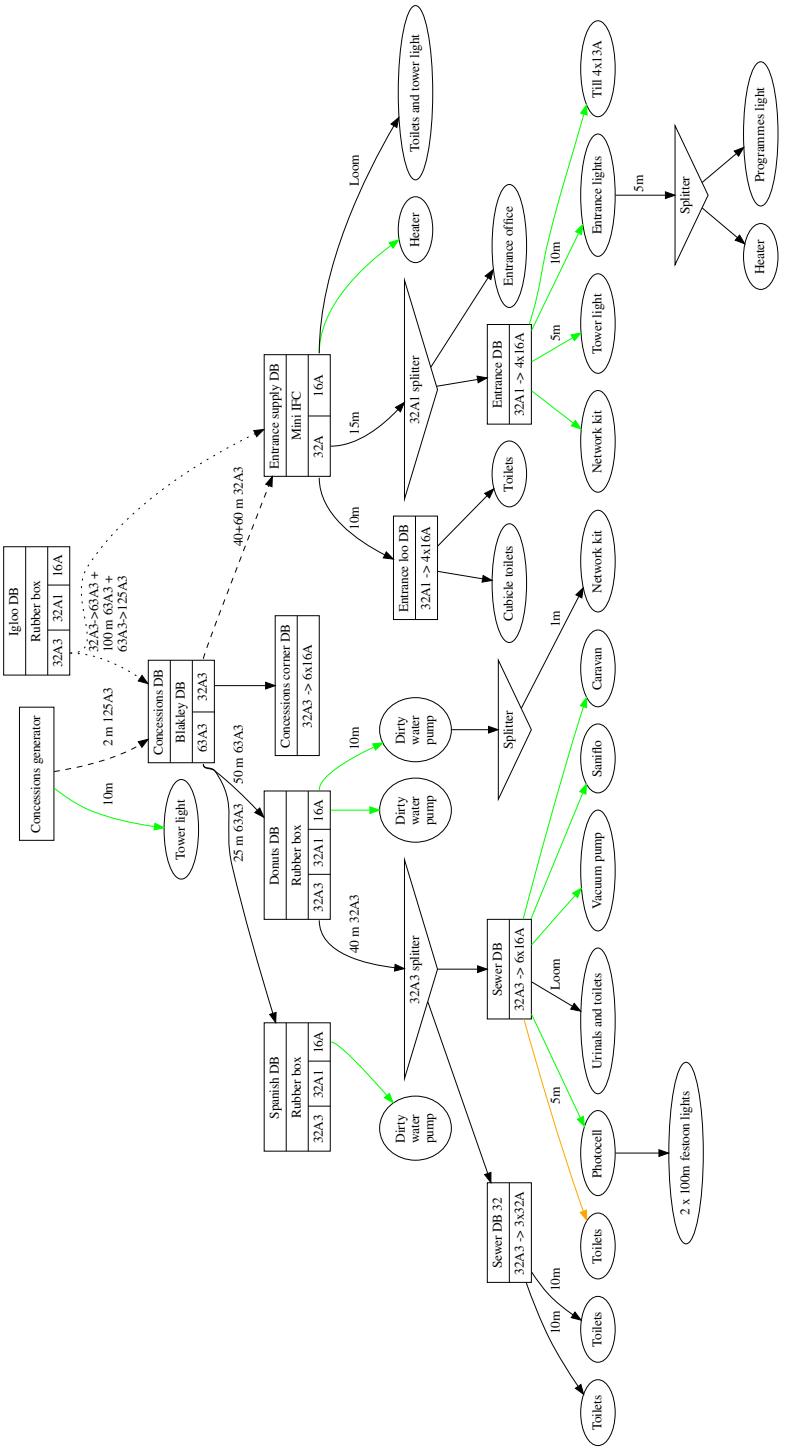
Not too bad, actually

With some numbers, progress can be made — if you know that L3 has 70% of the load, while L1 has 10%, you can go round and swap power-hungry things on L3 for light-users on L1 (check nobody will be that upset by their equipment's power disappearing first).

If there's still a dramatic imbalance, with lots of oscillation, a two-person approach may be appropriate: using a private radio channel, have one person call out phase loadings while another moves around the site swapping plugs. Note however that loading is a dynamic thing: in particular much power is used by cooling, which switches itself on and off. Things will never be in perfect balance for long.

The load balance should be reviewed periodically: your guesses of what uses a lot of power may be wrong, more things get plugged in over time, and if it's hot *all* the cooling may be on.

6.21 Power distribution and use at Concessions



Concessions electrics. Green circuits are most lightly loaded.

Concessions electrics need some explanation, so the diagram is included. The dashed lines indicate the normal connections; the generator powers 'Concessions DB' and that powers 'Entrance supply DB'. The dotted lines are an optional alternative, allowing the main site to power either the entrance if the concessions generator is overloaded, or the concessions when demand is low (at night). It also gives us a partial backup for failure of the concessions generator (discussed in 11.10, 'When The Lights Go Out').

It is not unknown for concessions to generate electrical faults. With the entrance being powered from the same generator it is critical that the RCDs are set such that entrance power has a good chance of surviving. Set a low sensitivity and long delay on the concessions generator and Blakley board: the rubber boxes and mini IFC boards will all handle earth faults locally.

Apart from the entrance, our responsibilities for appliance connections are only the festoon lights, toilet units, sump pumps and lighting towers, all dealt with previously in this chapter.

At the time of setting up the concessions generator, move the part-used fuel tank from the main generators to Concessions, leaving them two full ones for the rest of the festival; this matches fuel consumption well.

6×16 A distribution board, supporting the photocell controlling the festoon lights. It's a pun.

6.22 The Pearce Checklist

Pearce Hire give a detailed quotation, which can, and should, be used as a checklist when packing the equipment for return.

In advance of this, it is as well to recruit volunteers to gather all disconnected electrical equipment, with Pearce kit going in one area of the 25 m-wide marquee, and CBF gear going by the site container, ready for packing.

7

Plumbing

7.1 Fresh-water connection

The water supply connection is found under an inspection chamber cover next to the stainless-steel standpipe cover near the path. A capped vertical pipe is left in the chamber, while the stop valve to it is right at the bottom. Typically the chamber is half-full of murky water and life. Taking a pump, a long cable, and a long hose, to pump out the chamber will make the search for the tap-head far more pleasant. Note the ground water will slowly[1] return when pumping stops. The in-situ pipe's cap should not be removed until well-clear of the murk, for hygiene reasons. Before connecting the onward pipe ensure the top of the in-situ pipe is free of contamination — ants-on-tap is undesirable.

Immediately following the right-angle elbow we install on the vertical pipe is our main double check valve. This protects Cambridge Water's network from the CBF site. Make sure it's the correct way round!

The onward large-bore pipe should first pass through an underground conduit to reach the corner of the cider/foreign marquee, then proceed along the marquee wall. Exercise caution in deploying the surface section too early, such as during marquee construction: the pipe is vulnerable to heavy things crossing/falling on it, especially before it's filled and when the ground is hard.

7.1.1 Supply flushing

The water supply comes from near the swimming pool, and spends months at a time unused. During this time it is likely that the residual chlorine in the

[1] or rapidly, if the weather gods hate you

pipeline gets used up, and the water first coming out of the pipe is pretty stale. To make the disinfection process more effective, first run the water supply straight down the field drain for some time — both to ensure the water is fresh, and to give the supply pipeline chance to be treated with new residual chlorine.

Following flushing, drain the conduit pipe so it can be disinfected at the same time as the rest of the festival's pipework.

The Resurgence of the Polypipe River

7.1.2 Disinfection

To make the site's water drinkable the pipework must be disinfected. We use Fernox Sterox tablets, which work best on an initially drained system. Since you don't want to drain the system until tear-down, this means building most of the fresh water plumbing in one hit (see later sections) — typically everything, with the possible exclusion of the pipework going beyond the igloo to the food concessions (though in reality, this is quick to lay out). There is also a time-pressure; not only will demand for water start appearing, but samples of the fresh water must be with Cambridge Water by *2pm* on Thursday afternoon — by which time the pipework must have been disinfected *and had time to recover from being chlorine tonic-water*.

It's likely there will be some leaks, having hastily plumbed the whole site in one go. Before inserting the tablets and then turning the supply on, shut all isolation valves (*and outlets — they were probably left open for draining-down during last year's tear-down*): this allows each section to be filled separately and problems dealt with over a smaller area.

Warn everyone on site not to use any water outlet until advised otherwise.

Read the Sterox instructions. Insert 1.5–2 tablets, broken up to fit in the pipe,

on the supply-side of the big check valve: do not inhale the powder, and try to avoid all contact with it. Make all connections and turn on the supply.

Fill each section in turn, fix any leaks, and run off a *small* amount of water at each outlet (not water heaters, leave these isolated until later, their tanks use up too much chlorinated water) until the new water displaces any water remaining from the previous year. The water should smell noticeably of chlorine. Take the opportunity to rinse any chlorine-tablet dust off yourself.

Use a test-tablet to verify a good level (ideally over 50 mg/l) of chlorine at the run-ends (the events tent tap, the end-of-stillage tap, and either the other public tap or the furthest Concessions tap), if it's not obvious from the smell.

Leave the system to pickle for an hour or two.

After this time, flush every outlet, running a good amount of water through all branches, so that chlorine levels are no higher than at the connection point.

Permit use of water, *on the basis of it not being for drinking without boiling*.

If not now, do similar disinfection when filling the run to the entrance (7.12).

7.1.3 Samples

In most years since 2017, a representative of Cambridge Water has taken the samples, and checked compliance (7.1.4) on the same visit. The visit should be booked with Sean Calvey of Gasco Cambridge, for 12pm on Thursday, with at least four weeks notice.

The sample locations should have been connected during disinfection, be near the end of each major branch, and preferably are places where drinking water might reasonably be expected. Some suggestions:

- the end-of-stillage tap, near the showers;
- the drinking tap next to the brewery bars;
- the drinking tap by the events tent; and
- the end of the food concessions' branch or the cheese-counter sink tap.

To do the sampling ourselves, fill Cambridge Water's sample bottles[2] around Thursday lunchtime, after other users have had time to draw off even more water. Chlorine levels should not be below 0.08 ppm. For metal taps, first remove any spout filter and sterilize the spout with a blow-torch, then run water for a minute or more before taking the sample. Note on the bottle labels where the samples were taken.

[2] ensure these are available *before* you need them

The samples must be with Cambridge Water by 2pm on Thursday afternoon. The samples will be processed overnight. If there is a problem Cambridge Water will let us know. If nothing has been heard by the end of office hours on Friday the water may be viewed as potable, but a phone call to Sean, or any contact made at Cambridge Water, for 'the bacterials' should provide earlier certainty. Do not display 'Drinking water' signs before this.

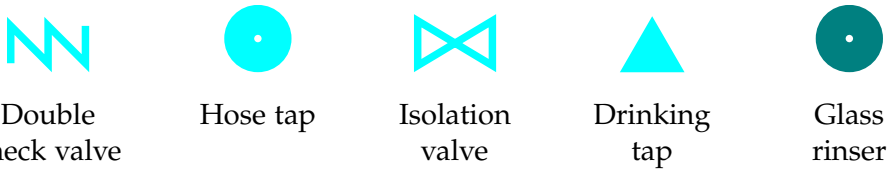
7.1.4 Compliance

Speaking of Cambridge Water... Apart from having a strong interest in protecting the rest of Cambridge from our site, Cambridge Water are legally responsible for enforcing the water regulations on our installation. The key idea is preventing contamination of drinking water, and a particular risk is backflow, where less pristine water enters through an outlet. The measures specified (largely, but not entirely, more double check valves) in the later Taps, Glasses container, Hand-washes and sinks, and Toilets sections are to avoid these problems and are therefore important.

Another necessary step is being clear when, against the usual expectation, the water supply is *not* suitable for drinking. Signs *must* be present at such outlets: those in the glasses container, those in the toilet units, and, if unsampled, those along the Concessions branch.

7.2 Plumbing layout

See the site plan. Light blue lines are fresh-water pipes, with line width corresponding to pipe diameter; dark red lines are drain hoses. Symbols used:



All pipes are pre-labelled at one (drain hoses) or both (water pipe) ends, so just have to be installed, rather than playing the 'guess where this connector

goes' game. *Check that connectors for the fresh-water supply have the sealing O ring (behind the pipe-grip) in them before you create a leaking joint.* If pipes need lengthening, try to replace the too-short section, rather than add a joint. Don't cut pipes if a shorter substitute is available. Update labels if necessary.

Drain hoses mostly go on the floor and must always be *unrolled* from the reel to avoid kinks. The hoses are stored crudely joined together: as you unroll, a Jubilee Clip indicates a break point. Attempt to prevent hoses being a trip-hazard, and do not kink/crush them if you want fluid to pass along them.

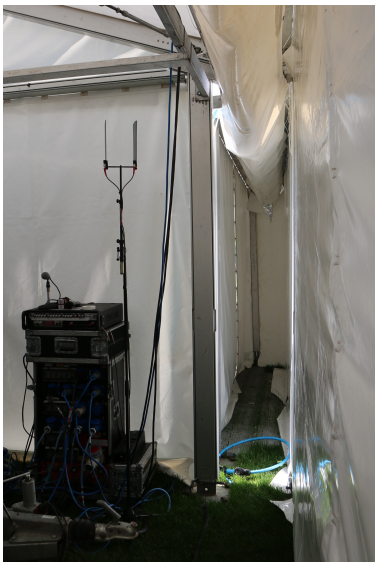
Some details mentioned neither in Chapter 1 nor elsewhere in this chapter:

The junction between Foreign and Cheese, and crossing the 15 m

There's an important fresh-water tee and isolation valve here, between the two marquee walls. The incoming main splits into two:

1. to a ⌀ 32 mm valve, permitting connection of the glass rinser or a large diameter 'hose' to fill the cooling system buffer tank, and
2. to the showers, toilets and concessions.

The supply to the showers, and the drainage from cheese, get past the walk-through join of the 15 m- and 25 m-wide marquees by going over it, in the gutter. They then proceed along the 25 m-wide's eave-rail, inside the roof-tensioning-bar pockets, before dropping down by the side of the disabled toilet.



Isolation valve located beneath gutter in the corner of Foreign

Pipe going up into the marquee gutter

Stillage arches

When spanning gaps in the stillage, the pipe arches must be as high as possible, and tightly cable-tied to avoid sagging when filled, especially over longer spans. The stillage is the only other place drain hoses are elevated, with the outflows of two hand-wash sumps crossing walkways overhead.

Planet Fletch Arch

Arch, middle of main stillage

Sewer manhole

The lid is astonishingly heavy, and hungry for fingers. Until the urinal soil pipes are installed, close it on to a board, both to avoid the drain hose getting crushed, and to avoid having an open pit.

CBF has got its hole

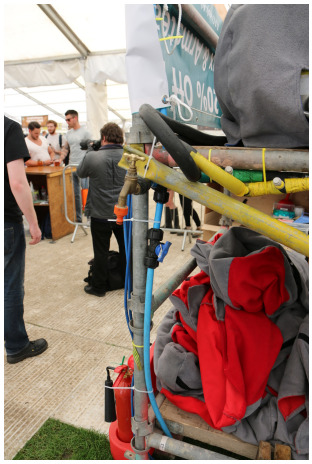
7.3 Taps

Sink taps are discussed on the next page. The push-taps for public water are dealt with separately later in this chapter. This section is about 'hose'-style taps.

The tap locations are shown on the plan, and are part of the roll-out pipework. Turn them off as they are installed, and open them to help drain the pipework during tear-down.

Taps must be secure; no one wants a tap that spins off away when trying to operate the handle. Scaffolding, fencing, and cable ties are your friends. While more of a concern for the concession taps, they must also not be capable of being contaminated. Typically this means you must ensure they're not on the floor or in a sump. As a secondary measure each tap must have a double check valve. Ours have them built-in, shown by the presence of a screw near the inlet.

If the concessions branch has not been sampled, the taps must have 'Not drinking water' signs.



A secure tap

Above the concessions midden, a proud tap

7.4 Glasses container

The glasses container needs a water feed, connected by a standard MDPE coupler once you've removed the protective hamster-cage. As the container has water heaters and softeners plumbed-in, its taps do not provide drinking water, and the supply pipe has a double check valve to stop backflow of treated water.

A sump bin must also be provided to take water away, and should fit neatly under the outflow — this may have a cap on it, which you should remove...

7.5 Hand-washes and sinks

Hand-wash electrical installation is covered in 6.12, 'Sump pumps and water heaters'.

Heating water causes a change in fluid category, so all water heaters must be isolated from drinking water. The push-fit connectors for the water heaters are double check valves, which have a handy shut-off valve allowing heater installation *after* pipework disinfection. Therefore, when speed-plumbing to first get the water on, the priority out of hand-washes and sinks is the sinks, specifically their cold water taps.

A sink is made up of a top and a base. All sink tops and bases have paint stripes; match the number to get a compatible pair. One sink (single blue stripe) goes to the cheese-counter, while the other (triple blue stripe) goes in the voluntent. The taps on these two sinks need connecting, bending the supply pipe through the slot in the rear of the sink base. Don't waste time on sink assembly at this stage!

When time permits, the sink bases have screws you should use to attach the tops, found either on the wings, at the back corners, or in the middle. The cheese-counter sink's water heater needs mounting, by hanging it on the back-board attached to the sink base. A sump-bin (see 7.9, 'Setting up a drain sump') goes under the sink. Both sink water heaters are plumbed-in by pushing the check valve on to the heater inlet *and opening the valve*.

A marquee-mounted hand-wash station

The slightly more complex voluntent set-up

Hand-wash facilities are provided by pre-fabricated stations ('HWoS') combining a water-heater and a paper-towel dispenser. Most have no sink, just a sump-bin directly underneath the outlet. This is on purpose, so hand-wash facilities are not confused with sinks or taps used for cleaning food equipment

(i.e. jugs, measuring glasses etc.). Two have brackets to hold a small sink, and are installed beside the bigger sinks. For the beer bars, the stations just require cable-tie-ing to the stillage. The others are a little more complicated: unless there's some convenient attachment point already, secure the stick to a marquee leg using the **??**, '**??**' method. Water connection is as for the sink water heaters. For the HWoS with sink brackets, undoing the bolts allows a small sink to be inserted, and the done-up bolts clamp it in place. A hose should be attached to each such sink to drain it into a nearby sump.

7.6 Public water taps

An ASA complaint waiting to happen. Have you ever tried drinking Cambridge water?

Installed outside; one near the brewery bars, and one near the family area:

1. remove any core of soil remaining in the stem from previous use;
2. do-up the tap against the stem by hand to find its assembled alignment;
3. push (by hand) the stem into the ground, with the tap forward;
4. remove the tap, push the stem to 0.5 m depth using the carriage of a fork-truck (it's a 1.5 m pipe, 1 m should be visible);

5. insert the tap, flicking the tail of the plastic water pipe out through the side of the stem;

6. do-up the tap against the stem by hand;

7. attach the blue supply pipe to the ⌀ 15 mm tap pipe; and

8. *once water quality is confirmed*, fix a large 'Drinking water' sign on the stem to make the purpose clear.

To remove, disconnect the tap supply, remove the tap, loop a rope through the hole in the stem and pull the rope up using a fork-truck.

7.7 Showers

Mark-out the showers from the plan (purple rectangle), leaving room for boiler ventilation at the back, and doors at the front. The supplier will do the trailer set-up. If smelly people demand to have a means to become clean before then: see the levelling subsection of 8.2, 'Siting toilet units', then before hanging the cubicle steps on, slide the supporting bar out (see photograph).

Retractable step support bar

For drainage use the 'bath' as a sump, to avoid needing to dig a pit to squeeze a bin under the no-doors-side outflow (see the subsequent section on sumps).

Nobody has yet chosen to use the bath instead of a shower

Apart from that, it's ridiculously easy: supply water (25 mm MDPE, inside the service bay)[3], turn gas on, and supply power (16 A single-phase, also inside the service bay, see 6.17, 'Electrical: Showers and toilets'). Unlock all cubicles, check the water is hot, and lock the service bay door.

If the showers do not produce water, it's probable they were drained before delivery to site, and a pump may need priming; see 1.9, 'Pump priming'.

Should the gas bottle need changing, remember it's a left-handed thread.

Decommissioning is simply removing water, power, and the sump, and turning the gas tap off.

7.8 Toilets

Toilets are mostly covered in the next chapter; this section just deals with the water supply.

The toilets need fresh water connections for the hand-wash basins. The 15 mm connection points are inside the service bay for the trailers, and low on the back side of the vacuum pods. Our pre-built pipework's connections to toilets all have double check and isolation valves, which avoids us needing to disinfect the units' pipework and protects our drinking water from the units' plumbing. The connecting pipework from our MDPE fittings to the pods is provided and installed by the toilet supplier.

The basins inside the units will need 'Not drinking water' signs mounting, if not already present.

[3] no check valve needed *if* there's an on-board cistern with an air-gap inlet

7.9 Setting up a drain sump

Sump pump electrical installation is covered in 6.12, 'Sump pumps and water heaters'.

The principle is simple. The container receives liquid, either directly or by hose from another sump, and, on the liquid reaching a certain level, the submersible pump activates and pumps the container out to the next bucket down the chain, and so on, until it gets to the drain.

The rest of this section is about why the reality of that design can fail.

For the pump to activate, its float switch must change position sufficiently for the circuit to be made. With an external float switch on a decent length of cable, the float may not rise enough for the contact to be made before the bucket overtops. Restricting the float, in effect shortening its cable, *can* help, but often just restricts its movement so it still doesn't activate the pump.

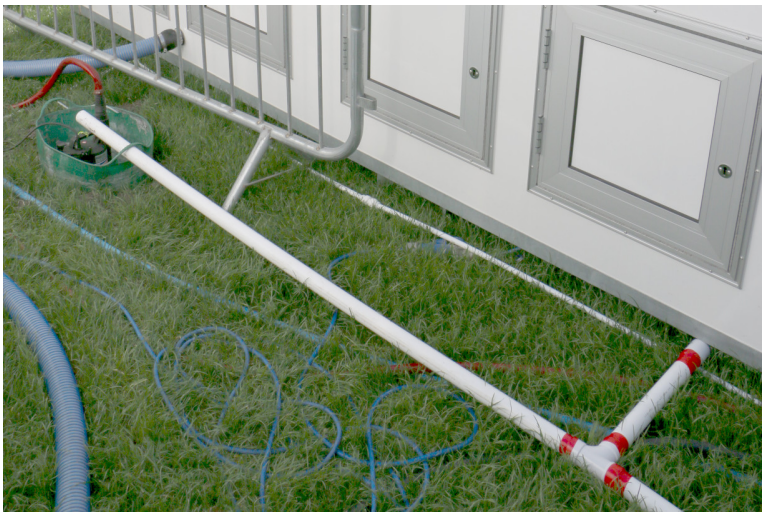
When activated the pumps are good at moving water, but poor at moving air. If a pump gets air-locked, and can't prime itself, it just whizzes away impotently, and burns out, while the bucket overflows. The pumps tend to prime better in a greater depth of water.

A non-ghastly sump

The solution both these issue is unrestricted floats in deeper sump containers, hence the large black bins. Use these wherever possible, they're far better than the alternative.

Unfortunately, in some places the large black bins are too tall, relative to the outflow you want to capture. Digging pits to recess the bins is a pain, so

for toilet grey water shallower containers are used, in which the newer pumps with built-in floats work well.



A typical toilet grey-water arrangement, prone to failure with free-float pumps. Oh no!

The hoses we use: first don't want to fit on the pump outlets, and then just want to always fall off — a major cause of 11.9, 'Self-created flooding''s existence. Cable ties to secure wet greasy hoses to pumps are crap, don't even bother. Use a Jubilee Clip: these *should* be left on the hose year to year. The CBF toolbag has some perfectly sized M7 nutspinners for the clips.

At the other end, where a hose is pointing into a sump, cable ties *do* have a use however: holding the hose to the bin or other hoses to stop it jetting itself out of the sump on to the floor. Advisable unless you fancy a week of regularly reinserting escaped hoses.

The sumps get things other than water put in them, some things not very liquid at all. Especially by concessions. For this reason we have special 'dirty-water' pumps for use (only) on the concession drainage run, which reduces this major cause of premature pump death. The pumps can chew through solid 'matter' over a centimetre in size. The downside is that the pumps have lower throughput and are hopeless at self-priming (laying them on their side can help). They are recognized by their large intake holes. Using the mesh sump-covers (cable-tied to the bin handles to avoid mischief) should avoid so much rubbish going into the sumps in the first place, while allowing hoses to sneak between the bin edge and the mesh.