

PRECAST COLUMN | EDGE PROTECTION SOLUTION | COLUMN HOPPER

Here at Two Fifty One in Elephant and Castle we are building a 40 storey residential tower entirely out of precast concrete units provide by Explore Manufacturing. All precast units will be connected using a combination of bolts and rebar joints which can then be in filled with grout and in situ. Upon the completion of the structure, Explore will deliver precast cladding panels with a white concrete finish to make up the envelope of Two Fifty One. The project uses three tower cranes to be able to deliver the project, all three of which are heavily relied upon during day to day operations.

One of the precast units that we use is a variation of columns 350mm deep, with widths including 1200, 1050 and 700. These structural columns are the unit which sits closest to edge of the tower, excluding the cladding panels of course and this proved to induce a risk of both falling materials and tools whilst carrying out the installation of columns.

When installing columns the tops contain four threaded bars which connect to an E6 plank above. In order to install, tops of columns need to be topped with thixotropic grout, top nuts also need to be tightened when installing the column above.

This gave us a potential risk of dropping the following off of the leading edge:

- Grout
- Top Nuts
- Tools including wrenches, boat levels and trowels.

The Column Hopper is designed to ensure that during install at any point during construction, if any of the above were to fall, the items would be caught and unable to fall further than the column face itself.



Structure

The hopper consists of 1.5mm thick perforated steel sheets that have been formed using a press break method. Sections of bent steel is then bolted together to create a "half box shape," a recess is included which should be equal in depth and width to the column face. All bolts are reinforced with steel plates of 1mm thick in order to reduce the movement in the joints when encountering the wear and tear when storing/maneuvering on site. Supporting brackets and plates are also included in the system to stop the steel from buckling under any strains when fixed to the column.

Fixing to column

The hopper is fixed to a column using a ratchet strap and a rubber contact face to increase the friction force under stress. With the hopper weighing at 32kg it's easily maneuverable with a two man lift and can be lifted to the top of a column if it is hoisted to a 45 degree angle. The ratchet can then be fastened at the front face and the hopper will form a tight hold around the column holding it in place. The column is then ready to lift to the relevant floor for landing.

A safety chain is also included in the system which will be fixed once the column has been installed. A safety chain allows the system to have a second line of defence if the hopper was to buckle and become unattached from the column.

Removing from Column

The hopper can then be removed from the column once it is no longer required, this commences by lowering the crane. With the use of a MEWP or podium an operative can access the inside of the hopper and attach the crane to the lifting eyes. Both the safety chain and the ratchet strap can then be released allowing the hopper to be lifted to either a place of storage or another column.

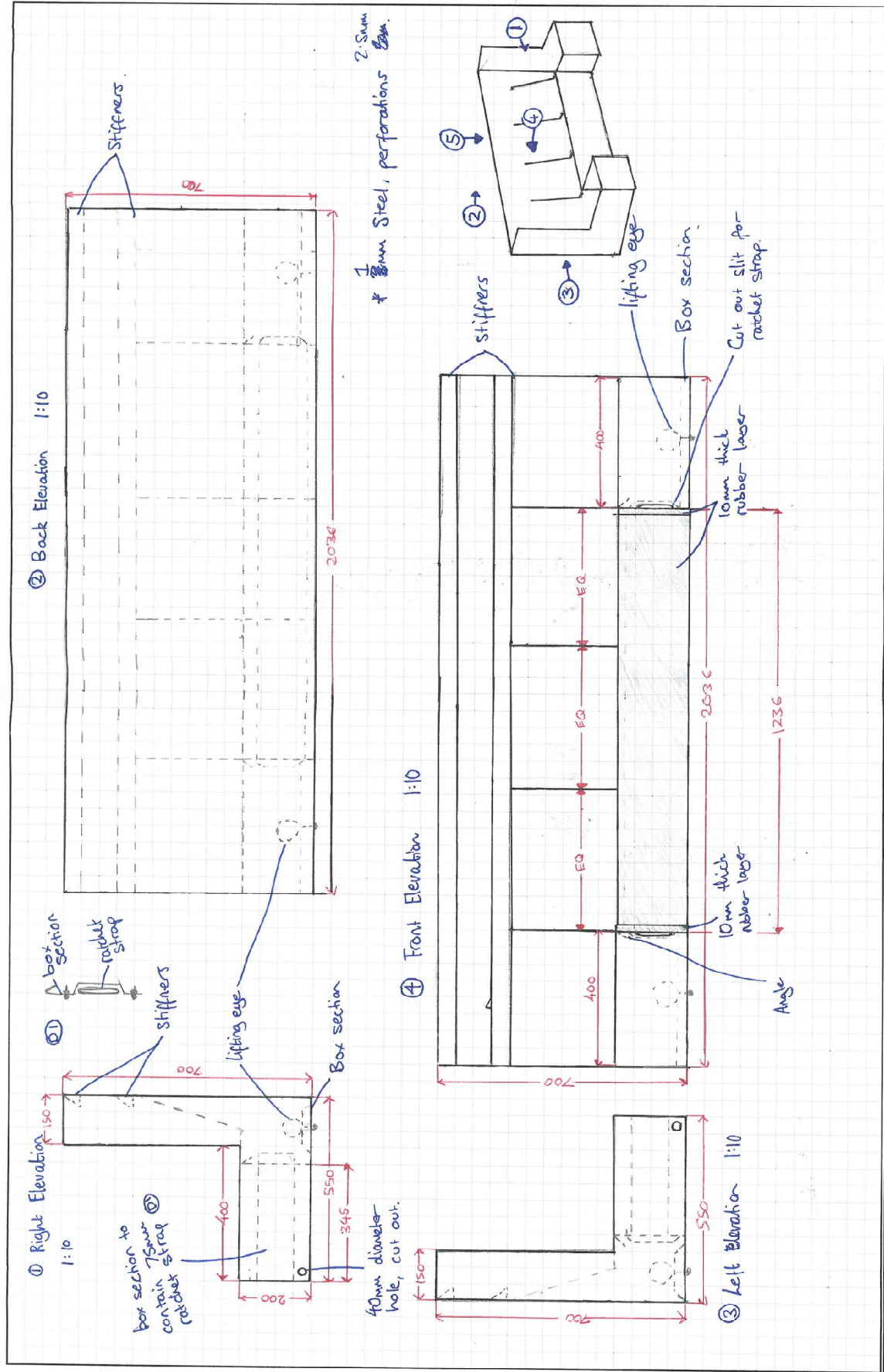
Advantages

- **Mitigates risk of falling objects including top nuts and tools**
- **Prevents grout from falling, ensuring safety and preventing cladding beneath from being covered in grout**
- **Easily manoeuvrable on site**
- **Can be lifted with the crane or two operatives**
- **Fixing and removing the hopper does not require work at a leading edge**
- **Can be reused**
- **Hopper sizes can be modified easily at manufacture to fit different columns**
- **Cheap**

Disadvantages

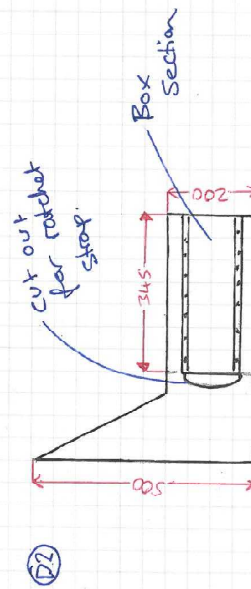
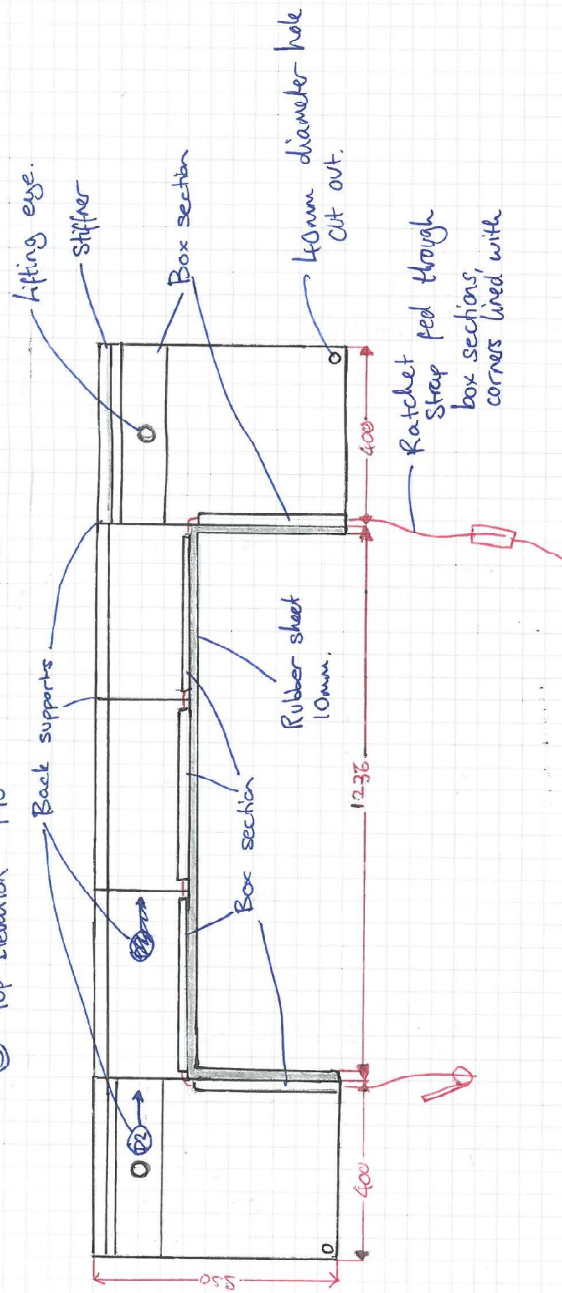
- Can be damaged easily on site if not stored correctly
- Can sometimes clash with propping
- Slightly increases the crane time when landing columns and removing the hoppers

In conclusion the hopper is a cheap and effective solution for ensuring safe operations of work are controlled when the top faces of columns come into play. The manufacture of the hoppers is carried out by Deck Joint who specialise in formwork solutions, however they were extremely cooperative when producing a bespoke item such as this.




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Prepared by:				Client:		Rev:	
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⑤ Top Elevation 1:10



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