



**Strathmore**  
UNIVERSITY

SCHOOL OF COMPUTING AND ENGINEERING SCIENCES  
BACHELOR OF SCIENCE IN ELECTRICAL AND ELECTRONICS ENGINEERING  
1<sup>ST</sup> SEMESTER 2022/2023 - UNIVERSITY EXAMINATION  
BEE 2301: ELECTRICAL INSTALLATION

DATE: 25<sup>th</sup> JULY, 2023

Time: 15:30Hrs – 17.30Hrs

**Instructions**

Answer **ALL QUESTIONS**.

Fig. 1 shows the lighting installation for a proposed building basement floor. Fig. 2 shows the electrical power installation for the same basement floor and Fig. 3 shows the description of the symbols used in Fig. 1 and Fig. 2 and copper cable ratings.

Assume that mains supply is provided at the following voltages.

- (i) Single phase supply at fixed 240V phase voltage
- (ii) Three phase supply at 415V line voltage

Assume a diversity factor of 0.4 for socket outlets.

Use the information contained in Fig. 1, Fig. 2 and Fig. 3 to answer the following questions.

**Question 1 (15 Marks)**

- (a) Prepare a table similar to Table Q1 shown below and use it calculate the mains supply fuse rating for the basement floor lighting and power.

Table Q1

| Type of Outlet       | Unit | Rating | Quantity | Maximum Load (Amps) | Diversity Factor | Actual Rating (Amps) |
|----------------------|------|--------|----------|---------------------|------------------|----------------------|
| Eg B3 Light Fittings |      |        |          |                     |                  |                      |
| .                    |      |        |          |                     |                  |                      |
| .                    |      |        |          |                     |                  |                      |
| .                    |      |        |          |                     |                  |                      |

**10 Marks**

- (b) Draw a block diagram showing the basement flow power flow.

**5 Marks**

**Question 2 (35 Marks)**

- (a) Use the basement floor wiring diagram for lighting and sockets shown in Fig. 1 and Fig. 2 to split the lighting and socket supply into separate circuits and propose suitable cable sizes to supply the lighting points or sockets for the proposed circuits. Prepare a table similar to Table Q2 shown below and use it to calculate the fuse/circuit breaker ratings for the basement floor lighting and power circuits.

Table Q2

| Name of Circuit               | Circuit_1 | Circuit_2 | ..... | Circuit_n |
|-------------------------------|-----------|-----------|-------|-----------|
| Lighting points               |           |           |       |           |
| Sockets                       |           |           |       |           |
| Cable Size (mm <sup>2</sup> ) |           |           |       |           |
| Cable Rating (A)              |           |           |       |           |
| Circuit Breaker Rating(A)     |           |           |       |           |

**15 Marks**

- (b) Draw a basement floor Schematic Drawing showing the circuits based on Table Q2.  
 For each circuit, show the complete wiring (line, neutral, earth) for fuses/circuit breakers and the ratings of for fuses/circuit breakers and cables.

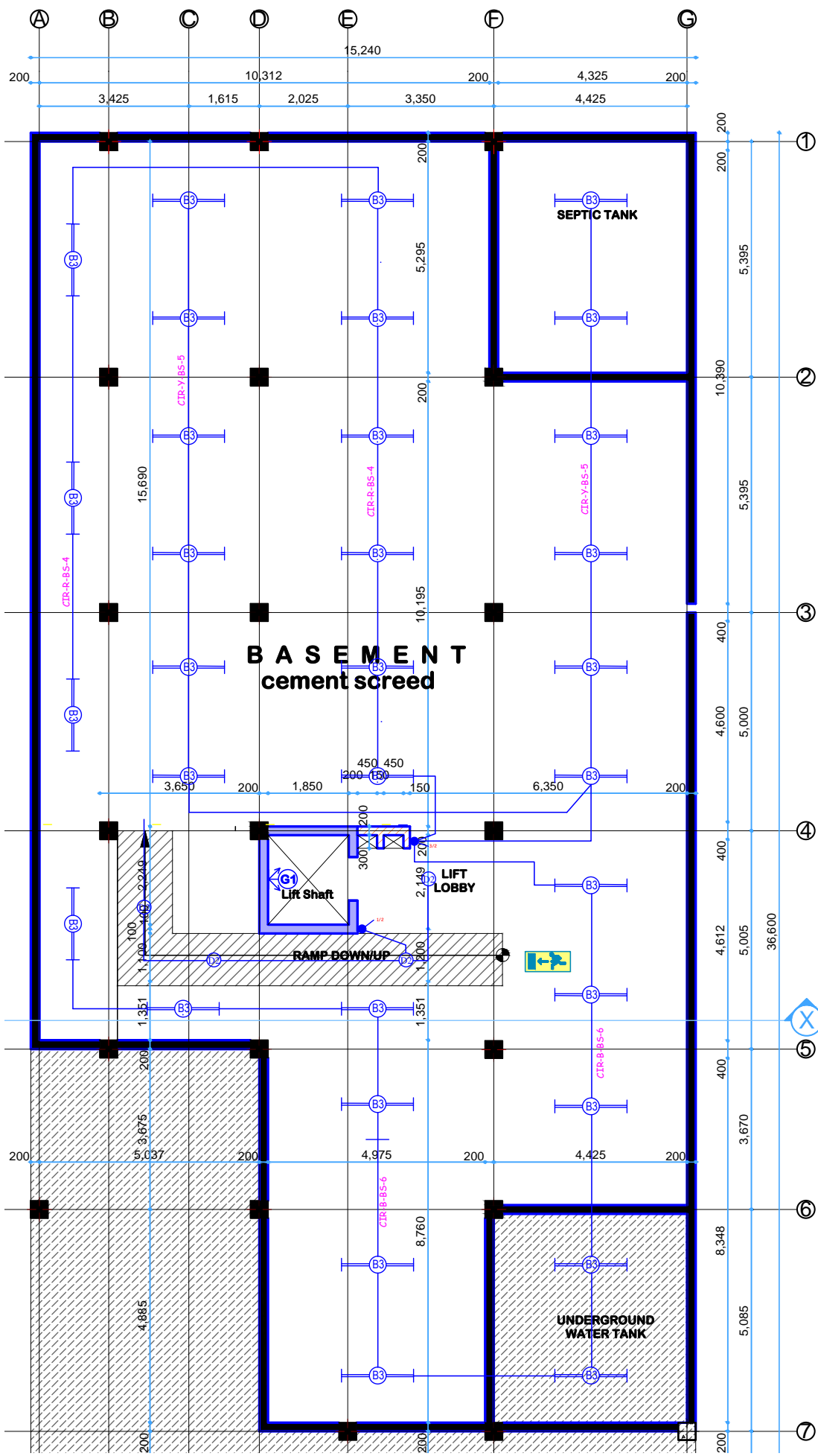


Fig. 1 Lighting

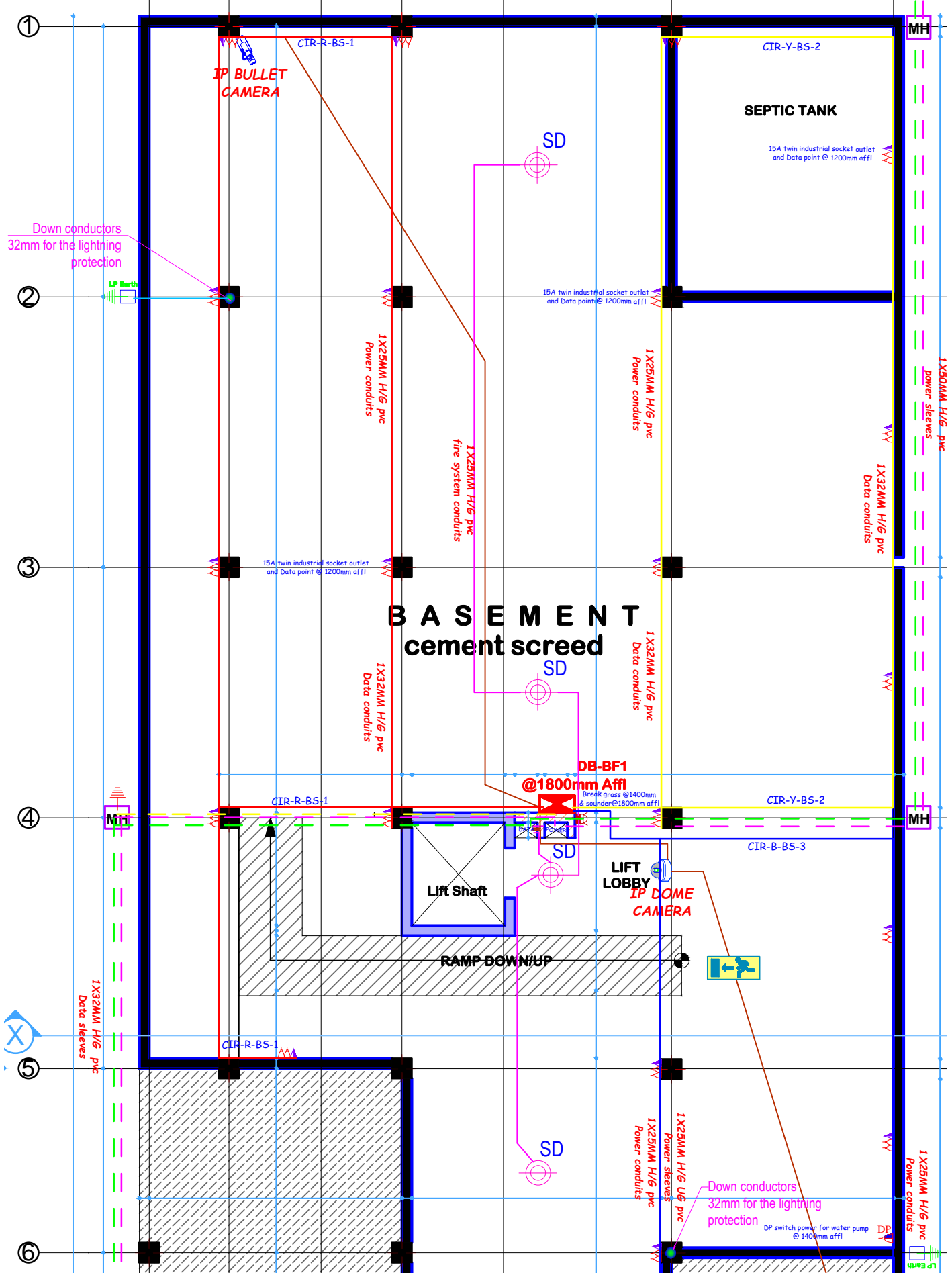


Fig. 2 Power

| Symbol | Description  | Mounting Height                |
|--------|--|--------------------------------|
|        | 1200mm, 1x36W high performance fluorescent fitting | Ceiling                        |
|        | 1200mm, 2x36W high performance fluorescent fitting | Ceiling                        |
|        | 28W circular standard luminaire                    | Ceiling                        |
|        | Chandelier   | Ceiling                        |
|        | 28W shallow circular luminaire                     | Ceiling                        |
|        | 40W Outdoor wall lantern                           | Ring Beam                      |
|        | 40W Wall fitting                                   |                                |
|        | TPN/SPN Isolator                                   |                                |
|        | 25A DP   | 1400mm above floor level (afl) |
|        | 13W wall mounted bathroom light fitting            | Mounted above bathroom mirror  |
|        | Single or double sided emergency exit lighting     | Ceiling                        |
|        | 10A one/two/three way gang switch                  | 1400mm afl                     |
|        | Intermediate switch                                | 1400mm afl                     |
|        | 15A single/twin switched industrial socket         | 300mm afl                      |
|        | Telephone/Data outlet                              | 300mm afl                      |
|        | Smoke/Heat detectors                               | Ceiling                        |
|        | Dome CCTV Camera                                   | Ceiling                        |
|        | Earthing   |                                |

| Nominal Cross Section (mm <sup>2</sup> ) | Current Carrying Capacity (A) Single Core Copper | Protective Fuse (A) |
|--|--|---------------------|
| 0.75                                     | 15   | 10                  |
| 1  | 19   | 16                  |
| 1.5                                      | 24   | 20                  |
| 2.5                                      | 32   | 25                  |
| 4  | 42   | 32                  |
| 6  | 54   | 50                  |
| 10                                       | 73   | 63                  |
| 16                                       | 98   | 80                  |
| 25                                       | 129  | 100                 |
| 35                                       | 158  | 125                 |
| 50                                       | 198  | 160                 |

Fig. 3 Symbols and Copper (Single Core) Cable Ratings