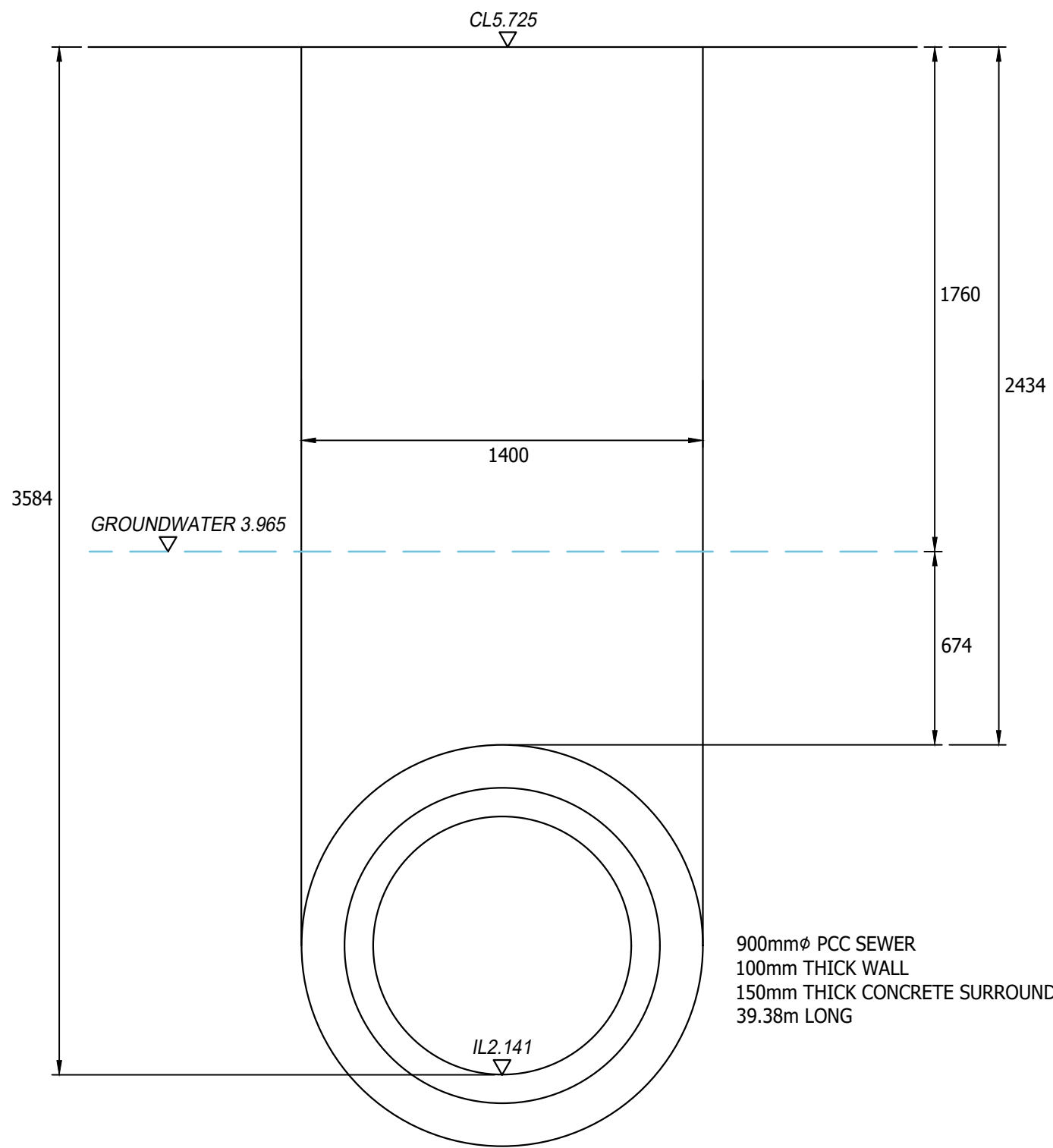




900mmø SEWER (PN1.016)

FLOTATION CALCULATIONS

WATER DISPLACED BY SEWER:

$$O/D = 0.90 + 0.2 + 0.3 = 1.4m$$

$$\begin{aligned} \text{CROSS SECTIONAL AREA} &= \pi r^2 \\ &= \pi \times 0.70^2 \\ &= 1.539m^3 \end{aligned}$$

$$\begin{aligned} \text{DENSITY OF WATER} &= 1000 \text{ kg/m}^3 \\ \text{LENGTH OF SEWER} &= 39.38m \\ \text{i.e VOLUME OF WATER DISPLACED BY SEWER} &= 1.539 \times 39.38m \\ &= 60.62m^3 \end{aligned}$$

$$\begin{aligned} \text{UPWARDS (BUOYANCY) FORCE} &= 60.62 \times 1000 \\ &= 60620 \text{ kg} \\ \text{x g (9.8 m/s}^2\text{)} &= 594076 \text{ N} \\ \text{FACTOR OF SAFETY} &= 1.2 \end{aligned}$$

$$\text{i.e } 594.076 \times 1.2 = \mathbf{712.89 \text{ kN}} \text{ (BUOYANCY FORCE)}$$

BACKFILL + SEWER SELF-WEIGHT:

$$\begin{aligned} \text{SEWER PIPE (area)} &= \pi r_{(o)}^2 - \pi r_{(i)}^2 \\ &= (\pi \times 0.55^2) - (\pi \times 0.45^2) \\ &= 0.950 - 0.636 \\ &= 0.314m^2 \end{aligned}$$

$$\begin{aligned} \text{CONC. SURROUND (area)} &= \pi r_{(o)}^2 - \pi r_{(i)}^2 \\ &= (\pi \times 0.70^2) - (\pi \times 0.55^2) \\ &= 1.539 - 0.950 \\ &= 0.589m^2 \end{aligned}$$

$$\begin{aligned} \text{SEWER PIPE (volume)} &= 0.314 \times 39.38 = 12.365m^3 \\ \text{MASS} &= 12.365m^3 \times 2140 \text{ kg/m}^3 \\ &= 26461.1 \text{ kg} \end{aligned}$$

$$\begin{aligned} \text{CONC. SURROUND (vol)} &= 0.589 \times 39.38 = 23.195m^3 \\ \text{MASS} &= 23.195 \times 2500 \text{ kg/m}^3 \\ &= 57987.5 \text{ kg} \end{aligned}$$

$$\begin{aligned} \text{TOTAL MASS} &= 26461.1 + 57987.5 \\ &= 84448.6 \text{ kg} \\ \text{x g (9.8 m/s}^2\text{)} &= 827596.28 \text{ N} \\ &= \mathbf{827.6 \text{ kN}} \end{aligned}$$

$$\begin{aligned} \text{SATURATED BACKFILL DEPTH} &= 0.674m \\ \text{DENSITY OF SATURATED BACKFILL} &= 2000 \text{ kg/m}^3 \\ \text{i.e. } 2000 \times 0.674 &= 1348 \text{ kg/m}^2 \end{aligned}$$

$$\begin{aligned} \text{UNSATURATED BACKFILL DEPTH} &= 1.760m \\ \text{DENSITY OF UNSATURATED BACKFILL} &= 1020 \text{ kg/m}^3 \\ \text{i.e. } 1020 \times 1.760 &= 1795.2 \text{ kg/m}^2 \end{aligned}$$

$$\begin{aligned} \text{TOTAL} &= 1348 + 1795.2 = 3143.2 \text{ kg/m}^2 \text{ ACTING OVER TOP AREA OF THE SEWER, } 1.40 \times \text{LENGTH} \\ &= 1.74 \times 39.38 \\ &= 68.52 \text{ m}^2 \end{aligned}$$

$$\begin{aligned} \text{i.e. FORCE OF BACKFILL} &= 3143.2 \text{ kg/m}^2 \times 68.52 \text{ m}^2 \\ &= 215372 \text{ kg} \\ \text{x g (9.8 m/s}^2\text{)} &= 2110646 \text{ N} \\ &= \mathbf{2110.6 \text{ kN}} \end{aligned}$$

$$\begin{aligned} \text{i.e. SEWER \& BACKFILL SELF-WEIGHT TOTAL} &= 827.6 + 2110.6 \\ &= \mathbf{2938.2 \text{ kN}} \end{aligned}$$

$$\mathbf{2938.2 > 712.89 \text{ kN} \therefore \text{OK (NO FLOTATION)}}$$

Notes

1. The location, size, depth and identification of existing services that may be shown or referred to on this drawing have been assessed from non intrusive observations , record drawings or the like. The contractor shall safely carry out intrusive investigations, trial holes or soundings prior to commencing work to satisfy himself that it is safe to proceed and that the assessments are accurate. Any discrepancies shall be notified to gta prior to works commencing.

2. Prior to commencement of works the contractor shall provide co-ordinated and dimensioned installation drawings and calculations and allow 10 working days for gta`s checking procedure prior to proceeding with those works or the ordering of materials.

3. Tender or billing drawings shall not be used for construction or the ordering of materials.

4. Do not scale. All dimensions and levels to be site confirmed.

5. This drawing shall be read in conjunction with all relevant architects, consultants drawings and specifications, together with H&S plan requirements

6. Copyright : This drawing must not be copied, amended nor reproduced without the prior written agreement of gta.

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Status				
INFORMATION				
Client				
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Project				
PEBBLE WALK, SINAH LANE HAYLING ISLAND, HANTS				
Title				
FLOTATION CALCULATIONS 900mmØ SEWER				
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