Four samples with varying transparent concrete rates with optical fibre sheets were created in order to investigate the axial compression performances of short columns constructed of WHA transport concrete. After that, monotonic loading was used to evaluate the axial compression parameters' variation trends. The compression performances were also established using the Python programme. For the many parameters under consideration, there has been good agreement between the computational and experimental results. The results demonstrate that using of transparent concrete. Water hyacinth ash on transparent concrete can be utilised to make up for specimen failures brought on by pre-damage, enhancing columns' axial bearing capacity and resistance to deformation.

**Keywords:** WHA, Transparent Concrete, Python, Column.

### I. INTRODUCTION

Numerous building codes include Egyptian code1, and ACI2, limit the ratio of longitudinal steel in columns with axial load. It is advised to impose this limitation for financial reasons. Because of that, it is citing the 1 to 2% steel ratio column section as the most cost-effective column section. However, on lower levels of tall structures, where the size of the columns must be restricted for Higher steel ratios must be used for architectural objectives. Utilising greater steel ratios might further offer financial advantages by enabling fewer column sections and more rentable ground level. The strength and deformation of RC short columns with high steel ratios were examined in the current study. The experimental programme outlined in this research included fifteen square RC short columns that were cast horizontally and loaded axially in two groups. The RC short columns, measuring 190 cm in height and 10 by 10 cm in square section, were the test specimens. The work's objectives are: To demonstrate the advantages of transparent concrete 2) to assess the strength of extensively reinforced columns made of rolled steel parts; and 3) to assess the behaviour of heavily reinforced columns with varying proportions.

### II. TEST PROCEDURE

Tests were conducted at the universal testing machine. Each specimen was restrained by two steel end caps at the top and bottom prior to testing. These caps were made with high tension steel rivets with a diameter of 12 mm. These column is measured 600 mm in height. To avoid any eccentricities, two head bearing plates were positioned to both ends. Additionally, every specimen was positioned and centred using the machine axis with great care.

### III. TEST RESULTS

Every test specimen initially exhibited the same behaviour. It was noted that the surface fractures appeared initially. Large chunks of concrete cover spilled out of the gaps at the same time that they finally caused the concrete to spall. In general, the observation demonstrated that hair fractures appeared initially, then noticeable fissures and spalling of the concrete layer. Subsequently, there was a breakage of the links, a crushing of the concrete core, and ultimately, the longitudinal bars buckled. As seen in the photo, every short column specimen was tested on a UTM (600kN). The load was maintained until total failure occurred. Using a dial gauge, the column's axial deformation was measured and recorded at equal intervals. Next, the ultimate load and related deformation were recorded. A visualisation of the load deformation curve was made.
Fig 1. Transparent Concrete With Loading Set Up

Table 1

<table>
<thead>
<tr>
<th>Identification</th>
<th>Load (Kn)</th>
<th>Axial Deformation (mm)</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>T1 (100+ 0%)</td>
<td>100</td>
<td>3.80</td>
<td>Initial Crack</td>
</tr>
<tr>
<td></td>
<td>260</td>
<td>6.25</td>
<td>Ultimate Crack</td>
</tr>
<tr>
<td>T2 (90+ 10%)</td>
<td>120</td>
<td>3.60</td>
<td>Initial Crack</td>
</tr>
<tr>
<td></td>
<td>270</td>
<td>5.4</td>
<td>Ultimate Crack</td>
</tr>
</tbody>
</table>

IV. ANALYTICAL RESULTS

if __name__ == "__main__":
    # Input values (replace these with your actual values)
    applied_load = 270000 # in Newtons
    modulus_of_elasticity = 210e7 # Young's modulus for steel in Pascals
    cross_sectional_area = 0.01 # in square meters
    column_length = 600 # in millimeters
    # Calculate deformation
    result_deformation = (applied_load* column_length)/(modulus_of_elasticity*cross_sectional_area)
    # Display the result
    print(f"Deformation in the column: {result_deformation} millimeters")

Deformation in the column: 7.714285714285714 millimeters

Table 2

<table>
<thead>
<tr>
<th>Identification</th>
<th>Load (Kn)</th>
<th>Axial Deformation (mm)</th>
<th>Analytical (mm)</th>
</tr>
</thead>
<tbody>
<tr>
<td>T1 (100+ 0%)</td>
<td>100</td>
<td>3.80</td>
<td>2.85</td>
</tr>
<tr>
<td></td>
<td>260</td>
<td>6.25</td>
<td>7.43</td>
</tr>
<tr>
<td>T2 (90+ 10%)</td>
<td>120</td>
<td>3.60</td>
<td>3.43</td>
</tr>
<tr>
<td></td>
<td>270</td>
<td>5.4</td>
<td>7.72</td>
</tr>
</tbody>
</table>

There is a slight variation between experimental and Analytical.

V. CONCLUSION

1. Transparent concrete with WHA Shows good results than conventional concrete.
2. The first cracking load and ultimate cracking load have better results than conventional concrete
3. In addition of optical fibres, the strength will be enhanced in the transparent concrete than conventional concrete.
4. The experimental value is slightly varied than the analytical value of transparent concrete

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VI. REFERENCES


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