

ANGUS COUNCIL

4 JULY 2002

STRUCTURAL TESTING OF STREET LIGHTING COLUMNS
RESULTS AND CONSEQUENTIAL EFFECTS OF 2002/03
TESTING PROGRAMME

REPORT BY THE DIRECTOR OF ROADS

ABSTRACT

This Report outlines the findings of an independent non-destructive structural testing programme of 604 street lighting columns and details the arrangements for dealing with the resultant column failures.

1 RECOMMENDATIONS

It is recommended that the Council agree:-

- i) to note that it is incumbent on the Council to carry out detailed and routine inspection procedures for the street lighting infrastructure in Angus as a matter of good practice and in order to guard against Public Liability claims resulting from "catastrophic failure" of lighting columns.
- ii) to note the results of the recent detailed inspections completed via an independent non-destructive structural testing programme.
- iii) to note the arrangements for dealing with the resultant column failures.
- iv) to note the additional financial burden which will fall on the Council as a result of replacing the column failures.
- v) to note that the Director of Roads will present a further report to a future Roads Committee recommending a policy and procedure consistent with Health and Safety requirements for the purposes of determining future requests for attachments to street lighting columns.

2. INTRODUCTION

2.1 2001/02 Testing Programme

Last year the Council carried out non-destructive structural testing of street lighting columns utilising a specialist company Roch Services. The results of these tests were reported to the Roads Committee on 11th October 2001, (Report No. 1163/01: Structural Testing of Street Lighting Columns).

This Report advised the Committee that there are various methods available to test a street lighting column's structural integrity i.e., visual, aural, ultrasonic, potential measurement and static load testing. It was decided that static load testing was the preferred methodology for testing columns as it provided definitive test results whereas the other testing systems required subjective interpretation of test results.

It was also accepted that there was insufficient funding to test all the street lighting columns in Angus in one financial year therefore, due to the increased potential for injury if a larger column collapsed due to structural failure, it was decided that the tests would be focused on columns of 8 metre mounting height and above.

The static load testing procedure was detailed comprehensively in Report No.1163/01 however, for ease of reference, each column test results in a test score ranging from 1-5 and these scores are explained below:-

1. The column is structurally sound

A plastic deformation, which indicates loads exceeding the yield point (elastic limit), was not detected.

It is recommended that the column is then tested again in 5 years.

2. The column reached the wind load, but ground movement was detected

The column achieved the wind load + 10% margin of safety without exceeding the yield point (elastic limit).

Measures to re-design and reconstruct the foundation, with respect to the ground conditions are necessary. After that the column should be tested again within 2 years.

3. The column did not reach the wind load, due to ground movement

Short-term measures to redesign and reconstruct the foundation, with respect to the soil conditions have to be carried out, because the overall stability of the column cannot be guaranteed. After the reconstruction measures, the column should be tested again, to assess material defects.

4. The test load was not reached due to material defects

The column does not comply with the structural soundness testing requirements. The column withstood the wind load, but plastic deformation was detected (exceeding the material's yield point). The column has to be removed as soon as possible.

5. **The wind load was not reached due to material defects**

The column does not comply with the structural soundness requirements. The column did not withstand the wind load. Plastic deformation was detected (exceeding the material's yield point). The column has to be removed immediately.

The results of the 2001/02 test where 150 columns were tested in Arbroath are shown in the table below.

Result Category (Angus Council)	Number of Columns	% of Columns
1	115	76.7
2	27	18.0
3	4	2.7
4	3	2.0
5	1	0.6

2.2 **The Way Ahead**

The tests carried out during 2001/02 provided Angus Council with precise data from an impartial and professional source and it was proposed therefore that this testing methodology be utilised in future years to check the structural integrity of other street lighting columns installed in Angus on a 5 year rolling programme basis.

Specifically it was agreed that during 2002/03 street lighting columns which carry attachments (e.g. hanging baskets, road signs, Christmas features etc) would be targeted as Roch Services can calculate precisely if these street lighting columns can safely accommodate these additional loads.

3. **DETAILS**

3.1 **2002/03 Testing Programme**

During January 2002 lighting columns in the Kirkton Road Area of Arbroath were damaged by severe storm weather. The high winds caused 3 column brackets to dislodge from the column shaft and subsequent visual inspections of similar bracket types in this area resulted in a further 3 column brackets being removed.

It was decided that the columns in this area should be included in the static load testing programme for 2002/03 to determine if the columns were still structurally sound as this would allow the Council to replace only the faulty column brackets and therefore minimise the costs involved in providing a solution to this problem.

In addition to testing these columns a list of columns with hanging baskets attached to them was collated through dialogue with the Director of Leisure

Services and this combined information provided the testing programme for 2002/03.

The results of the 2002/03 tests on 604 columns were are detailed in Appendix 1 and are also shown in summary in the table below

Result Category (Angus Council)	Number of Columns	% of Columns
1	468	77.5
2	8	1.3
3	19	3.1
4	36	6.0
5	73	12.1

The above information clearly shows that there has been a far greater number of column failures in comparison with last year 18.1% of category 4/5 failures for 2002/03 as against 2.6% category 4/5 failures for 2001/02.

However, it should be appreciated that the 2002/03 testing programme included two potential problem type of columns, which have directly resulted in the increase in column failures.

3.2 **Arbroath Columns**

The columns installed in the Kirkton Road area of Arbroath had a poor insert bracket design which relied on a rubber gasket to provide protection against the ingress of moisture. The visual inspections carried out during January 2002 indicated that the rubber gasket had perished on most of the columns in this area allowing moisture access to the bracket insert which resulted in the bracket failures.

In addition to this problem the moisture was also able to penetrate the column shaft and lie on the inside of the column at the point where the column base and shaft meet and as a consequence the column was deteriorating from the inside out at this point.

Although these columns were approximately 25 years old and were approaching the end of their design life this poor column/bracket design directly contributed to the column failing the static load test.

3.3 **Columns with Attachments**

It was appreciated that columns with attachments would have to be tested early during the 5 year testing programme to confirm if these columns could safely accommodate the additional loads. Although these columns had been subjected to a visual inspection prior to fixing attachments to them the static load test provides a more robust checking procedure.

In effect columns with the greater potential for failure were targeted for testing in year 2 of the testing programme. It is therefore perhaps not surprising that a high failure rate has been produced. The Director of Roads is however confident that as the column type installed in the Kirkton Road area is not prevalent throughout Angus, and that now all the columns with hanging baskets attached have been tested, that in the remaining 3 years of the intended 5 year programme the results should be similar to year 1 which in turn mirrored quite closely with UK wide trend.

3.4 **Carnoustie Columns**

Although the columns in High Street, Carnoustie were not included in the testing programme for 2002/03, these columns are of a similar age, type and slightly lighter design than those which failed the tests for additional loading in Tannage Brae, Kirriemuir. It was therefore necessary to terminate the use of these columns for hanging baskets. The Carnoustie columns are however still perfectly capable of withstanding their normal design loads and will not therefore have to be removed.

3.5 **Immediate Action**

In order to remove the risk of the 109 failed columns an immediate programme of column removal was commenced on Monday 24th June 2002.

In order to allow for the prompt removal of the columns without negatively impacting on the operation of adjacent columns which passed the test, it was decided that the column shaft would be cut approximately 5 feet from ground level and removed from site. This leaves the cabling safely housed in the base unit of the column and maintains the electricity supply to adjacent columns.

All the sites affected are now being considered for replacement lighting and in the course of the next few months new street lighting schemes will be installed taking cognisance of the condition of all the columns adjacent to the failed columns to ensure that the best value long term solution to this problem is found rather than a short term “quick fix” replacement of individual columns.

4. **FINANCIAL IMPLICATIONS**

A total of 604 columns were tested at an agreed rate of £39.00 per column resulting in a charge of £23,556 which has been allowed for within the street lighting revenue budget for 2002/03.

The costs involved in removing the failed columns and providing replacement street lighting schemes has not been quantified yet as the scheme evaluation is still ongoing. However, as a rough guide, on a one-for-one basis, the replacement schemes will cost approximately £110,000 i.e. roughly £1,000 per column.

All the costs involved in the replacement of failed columns will be funded from the Roads and Transport Renewal and Repair Fund.

5. HUMAN RIGHTS IMPLICATIONS

There are no Human Rights Implications arising from this Report.

6. CONSULTATION

The Chief Executive, the Director of Law and Administration, the Director of Finance and the Director of Leisure Services have been consulted in the preparation of this report.

7. CONCLUSION

The static load testing programme of 604 columns during 2002/03 has resulted in a higher percentage of column failures than the tests carried out during 2001/02 however it is accepted that this was primarily due to the types of column tested. The 2003/04 testing programme should provide results similar to 2001/02 which in turn reflected quite closely the UK wide trend.

Careful consideration will now have to be given with regard to column design, strength and condition in response to future requests for attachments to street lighting columns (hanging baskets, Christmas decorations, traffic signs, etc) and the Director of Roads will present a further report to a future Roads Committee recommending a policy and procedure consistent with Health and Safety requirements for this purpose.

Ronnie McNeil
DIRECTOR OF ROADS

NOTE

The following background papers, as defined by Section 50D of the Local Government (Scotland) Act 1973 (and not containing confidential or exempt information) were relied on to a material extent in preparing the above Report.

Report No. 1163/01 – Structural Testing of Street Lighting Columns – Roads Committee 11 October 2001.

JMcF/AS
REPORTS/light.cols.test
28 June 2002

APPENDIX 1

Location	No. of Columns Tested	No. of Failed Columns	Location	No of Columns Tested	No. of Failed Columns
Arbroath			Forfar		
Baden - Powell Road	25	0	Academy Street	10	5
East Kirkton Road	18	3	Arbroath Road	15	0
James Chalmers Road	4	0	Brechin Road	13	0
Kirkton Road	100	31	Carseview Road	11	3
Peasiehill Road	39	7	Castle Street	2	0
Sir William Smith Road	17	6	Craig O' Loch Road	8	0
Sub-Total	203	47	Don Street	3	1
Brechin			Dundee Loan	11	0
Bridge Street	1	1	Dundee Road	38	0
Church Lane	7	1	East Greens Car Park	5	0
Clerk Street	2	0	East High Street	9	0
High Street	2	0	Glamis Road	31	0
Montrose Street	6	2	Kirriemuir Road	9	0
Newington Gardens	1	0	Market Street	8	6
Panmure Street	6	1	Montrose Road	7	0
River Street	14	1	North Street	12	8
Southesk Street	1	1	Old Halkerton Road	3	1
St. Mary Street	3	0	Prior Road	4	1
Swan Street	2	1	Queenswell Road	11	0
Union Street	2	0	Restenneth Drive	15	4
Sub-Total	47	8	Robert Street	8	0
Edzell			St. James Road	18	6
Adam Place	1	0	Strang Street	3	0
Church Street	2	0	Suttieside Road	7	4
High Pen Lane	1	0	Victoria Street	9	3
High Street	14	0	West High Street	8	2
Manse Road	1	0	William Street	2	0
Sub -Total	19	0	Sub-Total	280	44
Kirkton of Auchterhouse			Kirriemuir		
Auchterhouse Road	13	0	Bank Street	3	0
Bonnyton Road	2	0	Bellies Brae	7	2
Kirktonbank	2	0	Glamis Road	6	0
Leoch Road	5	0	Glengate	1	1
Sub Total	22	0	Knowehead	6	2
Total	291	55	Reform Street	4	3
			School Wynd	3	0
			Tannage Brae	3	2
			Sub-Total	33	10
			Total	313	54
			GRAND TOTAL	604	109