

2.4 "Subsidence" damage.

2.4.1 At the time of ACA's initial inspection in July 2001 a council employee on site commented that access to the Southern garage areas had been closed to the residents due to local subsidence affecting the basement level wall to the rear of the flats on Sandstone Place. The subsidence had apparently caused the garden walls adjacent to "The Green" to lean over.

2.4.2 A small path from the garage under Sandstone Place leads across "The Green" towards Retcar Close. The ground is higher behind the walls but they do not act as retaining walls since the ground is landscaped down behind the wall. There is no indication to suggest that the lean is due to soil instability or foundation failure. An inspection inside the sealed-off garages under Sandstone Place did not reveal any defects suggesting soil instability or failure of foundations.

2.4.3 It was noted that the narrow walkway from The Green into Sandstone Place has been closed to the public for health and safety reasons. No further details were available.

2.4.4 Subsequent discussions with a member of the on-site maintenance staff indicated that children have applied lateral pressure to the wall (eg by jumping across) causing the wall to lean over.

2.4.5 The "retaining wall" is located in a sheltered area and would not be subject to large lateral loads due to wind. It is approximately 900mm high and there is no balustrade fixed to the wall.

2.4.6 The lateral load caused by jumping may have caused the wall to lean-over, cracking the mortar bed joints. If further lateral load is applied, a section of wall may collapse but in its undisturbed state, this is unlikely.

## 2.5 Fire damage in garages

2.5.1 There is evidence of several fires in the garage units which in some areas have caused significant but local damage to the concrete. The structural capacity of the slab is not in question but its durability has been severely compromised. The areas affected by fire were mainly garage slab soffit and wall elevations. Fire damaged areas where concrete had begun to spall, were noted to the following areas:

- Retcar Close
- Sandstone Place
- Stoneleigh Terrace

2.5.2 Tests were conducted in two areas to assess the extent of the fire damage to the reinforced concrete slabs above, (Retcar Close and Stoneleigh Terrace). Fire damaged concrete can result in a significant loss of strength, dependant on the intensity of heat generated by the fire, the proximity of the fire-damaged area to the fire and the composition of the concrete. A pink discolouration of the concrete can occur above 300 °C when the heat affects the ferrous salts in the aggregates.

2.5.3 Concrete exposed to the effects of a fire are likely to have a rise in temperature, undergo heat transfer to interior concrete and embedded reinforcement. The probable consequences of this are surface crazing, loss of concrete strength through cracking and spalling and a reduction in yield strength of the reinforcement. The concrete member in badly damaged areas may also deflect or buckle. Upon cooling, buckled reinforcement bars will remain buckled; the cracks will close up but there will be a reduction in strength. Further deformations and cracking may ensue as the concrete reabsorbs moisture from the atmosphere and in cases of severe fire damage, recovery of deflection of the concrete member may not be 100%.

2.5.4 Therefore the greatest consequence of fire-damaged concrete is a significant loss in strength through cracking and loss in section through spalled concrete.

- 2.5.5 The two areas tested both had areas of discoloured (pink) spalled concrete but did not show signs of (excessive) structural deformation.
- 2.5.6 The core test results indicated that the concrete tested had suffered a deterioration due to fire. The extent of this deterioration was considered limited and localised.
- 2.5.7 The pink colouration noted to a number of the cores indicated that the temperature reached by the two fires was at least 300°C but less than 600 °C. Concrete affected by temperature may be apparently sound but be significantly reduced in strength.
- 2.5.8 The compressive strength test results indicated that the cores taken from the middle and 1m from the fire were reduced in strength when compared to the control samples.
- 2.5.9 The maximum depth of 10mm of pink colouration at both areas indicated that the fires were less than ½ hour duration.

## 2.6 Drainage

2.6.1 A drainage report had been commissioned by AFH Shaw Sprunt in November 2001 in order to report and advise on general condition of the drainage systems following preliminary CCTV drainage reports for the Whittington Estate.

2.6.2 The report details the findings of the CCTV survey videos and comments on the general condition of the drainage system and suggests remedial works required in order to bring the drainage system into a fully operational condition.

### Surface water drainage

2.6.3 The existing surface water drainage channels are badly maintained and require maintenance measures to be implemented. Missing lengths of drainage gutters, silting-up and leachate residue collection have compromised the efficiency of the existing drainage system.

2.6.4 Slip drains have been used throughout the estate as a method of draining walkways and individual patios. The drains appear to have been poorly maintained in recent years with visible blockages to the drains in the public areas. The residents report pooling of rainwater after medium to heavy downpours in the walkway areas. Where slip drains are present in front of flat entrance doors within Stoneleigh Terrace, several residents have reported that water drains from staircases in front of their property through the binstore area beneath the staircase and then runs towards their flat door and the slip drain leaving a residue of dirty water. Consideration could be given to installing a slip type drain immediately in front of the binstore door to minimise this occurrence.

2.6.5 Plastic gutters, located behind the line of the garage doors, collect the water after it has passed through the slip drains and transport the water to down pipes, which discharge into cast insitu channels.

2.6.6 It was noted that many of the plastic gutters were silted up, and it is difficult to maintain these systems. Leachate residue has also formed around downstand pipes, making discharge difficult or impossible.

- 2.6.7 One rainwater pipe discharging into a planter on Raydon Road was half blocked by leachate residue. This will severely restrict the flow and provide an inefficient system.
- 2.6.8 Where there had been fires in garage units, the plastic gutters had melted but had not all been replaced.
- 2.6.9 The passage of rainwater throughout the estate needs to be reorganised and managed so that there is a clear identified path of all rainwater goods to the below ground drainage.
- 2.6.10 All downpipes should be recorded and traced with an aim to ensure that the rainwater passes directly down into the drainage system without flowing onto pavements and balconies and then back into rainwater outlets. This process has been completed at those properties already inspected.
- 2.6.11 There have been a number of attempts to alleviate rainwater drainage problems on the Estate, which have had varying degrees of success. This has particularly been the case to the balconies, which extend over habitable rooms and to glazed canopies over external staircases. Lulot Gardens appears to have had additional downpipes fitted to balconies to improve the drainage. These downpipes have been fitted externally and are more visible than the original downpipes, which were tucked behind balcony walls. Lulot Gardens did not report any problems with balconies leaking and had a low response rate for survey requests.
- 2.6.12 Each downpipe must be provided with a clearly identified path into the below ground drainage. This may involve core drilling through the concrete substrate to allow for new downpipes to pass down through the structures. Where new downpipes are recommended these will need to be fitted to the front of the elevation. As existing downpipes are hidden from view and as there may be a significant number of new downpipes required, agreement would need to be reached with the Planning Department before any change in the appearance of the building is made.

- 2.6.13 All outlets must be checked to ensure they drain freely and that they are adequately sized. Where remedial work has been carried out to balconies the outlet must be checked to ensure that any new coverings do not restrict the gulleys to render them too small to drain freely.

#### **Underground Drainage**

- 2.6.14 All of the systems inspected would benefit from specialist scale cutting. This is mainly due to the age of the system. Approximately 25% of the system is in a poor state of repair requiring some sort of remedial work. It should be noted that in areas where the pipework requires descaling works to be carried out, the camera could not proceed along that stretch of pipe. As such further degrading of the pipe may have occurred along that length beyond the restriction.

- 2.6.15 There are four main means by which the pipework has degraded and these are:

- Cracked pipe
- Displaced joint
- Build up of scale and debris
- Total collapse of pipe

In order to make good these failures there are 3 options dependant upon the cause

- Descale (for build up of scale and debris)
- Reline with a resin liner to strengthen & seal the pipe (for cracked pipes)
- Excavate & replace the pipe (for displaced joints and total collapse of pipe)

- 2.6.16 The underground pipework is mainly of a cast iron type. Listed below is a breakdown of the work required based on the areas available by the survey undertaken to date.

Description	Remedial Work	No of Occurrences	Approx. length of run
Displaced Bend	Excavate & replace 3m section	0	
Jetting	High pressure spinning jet	14	As required

The figures given for the length of run are approximate and may only be determined once excavation has commenced. Access for all excavation works will need to be clarified as the drainage contractor has indicated that the drain runs appear to pass through some private property.

#### Car Park Drainage

- 2.6.17 The existing surface water is drained from above (walkway level) via a suspended PVC channel which discharges via a downpipe direct onto the car park surface from where it runs in a slot type drainage channel cut into the car park floor slab. It is assumed that from these channels the surface water is then drained into the general surface water drainage system.
- 2.6.18 In some areas these PVC channels have been melted or damaged by fire and have not been reinstated. The PVC channels require replacing or reinstating in cast iron.
- 2.6.19 Rodding points were noted on the garage floors.
- 2.6.20 It was not possible to establish if interceptors were considered for the garage areas in the construction stage. With a sustained maintenance programme, they can assist in reducing the amount of build-up, blockages and oil contamination being discharged from the estate.

- 2.6.21 All drainage outlets should be flushed through and cleaned out including the main soil stacks to all blocks.