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MODEL CLAUSES FOR CIVIL ENGINEERING WORKS

SECTION 23

STRUCTURAL REPAIR SURVEY

NOTES TO SPECIFIER:

These notes do not form part of the Specification.

Use of this Section and interface with other Sections

23.1

This Section covers the requirements of surveys for structural repairs, including the determination of the cause of damage or deterioration, assessment of the condition of the structure, reporting of results and conclusions, and the development of proposals for repairs. It may be necessary to use this Section in conjunction with Section 25 (Presentation of Survey Data and Information).

This Section provides general requirements that are applicable to most types of structure. Specific requirements for particular materials are given in other Sections - such as Section 83 (Structural Concrete Repairs), Section 93 (Structural Steelwork Repairs), Section 153 (Brickwork and Masonry Repairs) and Section 163 (Maintenance and Repair of Structural Timber).

Diagnostic investigations

23.2

Before repairs, other than emergency repairs, are carried out, it is essential to identify the root cause of the deterioration. In commissioning diagnostic investigations it is important that the specifier does not jump to conclusions regarding the cause of deterioration and thereby unduly limit the type of testing that is commissioned. It is far better to keep an open mind and use the diagnostic investigation to eliminate causes of deterioration. In this way, causes of deterioration not readily apparent are less likely to be overlooked.

Assumptions inherent in the use of this Section

23.3

This Section has been written assuming that the structure to be surveyed has previously been inspected, examined and assessed, and that information from these activities has given rise to the need for the survey. Thus the broad nature of deterioration should be known, and the survey is intended to investigate its cause and thereby the most appropriate remedial action, and/or to enable the design and detailing of the repair to be defined.

A structural repair survey is not a substitute for an inspection, examination or assessment and so this Section does not cover such activities.

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Design of repairs 23.4 - general

Design and construction work shall be carried out in accordance with the requirements of RT/CE/P/044 and other relevant Network Rail standards.

The specifier has to define the structural capacity, life expectancy and durability requirements of the proposed repair, but it can be beneficial to give guidance on the detail and/or extent of repair envisaged. In some cases it may only be possible to satisfy the specified requirements by expensive means, and the Contractor may not include options which fall just short of these requirements but would be economically more advantageous to Network Rail. Thus the Contractor could be allowed to propose 'non-compliant' solutions in line with the guidance on the 'degree of repair'.

Design of repairs 23.5 - concrete

The 'degree of repair' may be specified in detail or drawn from the following generic list (see Building Research Establishment Report Number 254).

Repairs for carbonated concrete can comprise:

- *repairs to visible damage only,*
- *repairs to visible and potential spalls,*
- *repairs to visible spalls and coating,*
- *repairs to visible and potential spalls and coating.*

Repairs for cast-in chloride contamination can comprise:

- *patch repair and coating (visible/potential),*
- *cathodic protection,*
- *replacement of a structural member - see Section 80 (Structural Concrete).*

Repairs for ingressed chloride contamination can comprise:

- *patch repairs, removing all chloride-contaminated concrete,*
- *patch repairs and coating,*
- *cathodic protection,*
- *replacement of a structural member - see Section 80 (Structural Concrete).*

Note that patch repairs can be appropriate for repairing carbonated concrete but, by themselves, would be inadequate for treating chloride-contaminated concrete.

Although listed above, cathodic protection is a specialised activity and so details of this are not included in this Section.

Design of repairs 23.6 - metalwork

The 'degree of repair' may be specified in detail or drawn from the following generic list:

- *replacement of structural members,*
- *replacement and/or additional plating of elements which are no longer structurally adequate,*

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- replacement and/or additional plating of elements which are required to meet loading requirements over and above the original design loading,
- replacement and/or additional plating of elements which, due to further corrosion, would not be structurally adequate in the short, medium or long term,
- replacement and/or additional plating of elements which have been damaged,
- replacement and/or additional plating of elements which no longer function as intended (for example, rocking or 'bouncing' bearings).

Design of repairs 23.7
- brickwork,
blockwork and
masonry

The degree of repair may be specified in detail or drawn from the following generic list:

- isolated patch replacement of bricks, blocks or masonry,
- construction of new brick, block or masonry skins,
- re-pointing,
- cleaning off,
- stitching of cracks,
- grouting of cracks,
- stitching of arch separation,
- installation of additional rings.

Limitations on applicability of this Section 23.8

This Section does not cover the following:

- repairs to buildings,
- foundation works,
- underwater examination or underwater repair works,
- specialised access techniques - such as abseiling and diving.

REFERENCES

This is a list of publications referred to only within the Notes to Specifier.

Model Clauses	Title	Issue date
25	Presentation of Survey Data and Information	Dec 1996
80	Structural Concrete	
Other publications	Title	Issue date
Building Research Establishment	Report Number 254: Repair and maintenance of reinforced concrete. (ISBN 0 85125 623 6)	1994

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Objective of the structural repair survey

23/1

- Outline proposal for repair works, up to feasibility stage.
- Single option proposal for repair works for Approval in Principle.
- Fully detailed design of the repair works.

Note to specifier

Select one of the above options to specify the level of detail to which the Contractor is to develop the proposal.

Or

- Confirm that the proposed repair works shown on the Contract Drawings are suitable and adequate.
- Confirm that the repair scheme shown on the Contract Drawings is suitable and adequate.
- Confirm that the conclusions of the reports appended to the Contract are suitable and adequate.

(23.001)

Note to specifier

One of the above options should be included where a design, scheme or outline proposal etc. has been developed, and the Contractor is to verify that this proposal is suitable for further development and/or implementation.

23/2

- The objective of the proposal specified above is to provide the required structural capacity and performance of the structure.
- The objective of the proposal specified above is to remedy the cause of the damage or deterioration, and minimise further damage or deterioration of the structure.
- The objective of the proposal specified above is to provide the required structural capacity and performance of the structure, to remedy the cause of the damage or deterioration, and minimise further damage to and/or deterioration of the structure.

(23.001)

Note to specifier

Select one of the above options to specify whether the proposal is required to provide a specific structural capacity or to reinstate or improve the durability of the structure.

Extent of the structural repair survey

23/3

The extent of the survey and recommendations it shall cover are ...

(23.001)

Note to specifier

Define the structural elements to be included or excluded.