

Draft Letter to Designers and Maintaining Agents

INTERIM ADVICE NOTE 47/02

DMRB VOLUME 2: SECTION 3: SPECIAL STRUCTURES POST TENSIONED GROUTED DUCT CONCRETE BRIDGES

I attach Interim Advice Note IAN 47/02 in relation to post-tensioned grouted duct concrete bridges.

CHE Memorandum 40/96, lifted the moratorium on post-tensioned grouted duct concrete bridges, except those bridges constructed from precast concrete segments, for which the restriction remains in place. It made reference to the Concrete Society Technical Report TR47 'Durable Bonded Post-tensioned Concrete Bridges'. In addition the UK Certification Authority for Reinforcing Steels (CARES) Certification Scheme for the supply and installation of post-tensioning systems in concrete structures, was implemented for Highways Agency bridges, to be managed by CARES. Allowance was made for this scheme to be phased in over a limited period.

Interim Advice Note 16 updated the advice given in the Memorandum, but retained the moratorium for precast concrete segmental construction using internal grouted tendon systems.

A second edition of TR47 (2002) has now been published – this updates the guidance given in the first edition and reflects the current state of knowledge on post-tensioning.

This Interim Advice Note supersedes the advice given in IA16, by making reference to the second edition of TR47, and sets out specific requirements to be used for post-tensioned grouted duct concrete bridges. Although the moratorium for precast concrete segmental construction using internal grouted tendon systems still remains in force, the intention is to review this over the next two years, based on evidence from the performance of such structures in service and developments in material technology, to provide added safeguards to structures, particularly at joints.

The second edition of TR47 also makes reference to remedial grouting operations, and this is also covered in the IAN. A CARES certification scheme has also been developed for remedial work.

QUERIES

If you have any technical questions on the use of this document please get in touch with your local Highways Agency SSR TAG contact (**enter name /tel no. of local TAG contacts**).

OD Project Sponsor

INTERIM ADVICE NOTE IAN 47/02

POST TENSIONED GROUTED DUCT CONCRETE BRIDGES

SUMMARY

This Interim Advice Note provides information for the design, construction and repair of post-tensioned concrete structures.

INSTRUCTIONS FOR USE

This IAN supersedes IAN 16/99.

INTERIM ADVICE NOTE 47/02

DMRB VOLUME 2: SECTION 2: SPECIAL STRUCTURES POST TENSIONED GROUTED DUCT CONCRETE BRIDGE

1. INTRODUCTION

General

- 1.1 CHE Memorandum 40/96, lifted the moratorium on post-tensioned grouted duct concrete bridges, except those bridges constructed from precast concrete segments, for which the restriction remains in place. It made reference to the Concrete Society Technical Report TR47 'Durable Bonded Post-tensioned Concrete Bridges'. In addition the UK Certification Authority for Reinforcing Steels (CARES) Certification Scheme for the supply and installation of post-tensioning systems in concrete structures, was implemented for Highways Agency bridges, to be managed by CARES. Allowance was made for this scheme to be phased in over a limited period.
- 1.2 Interim Advice Note 16 updated the advice given in the Memorandum, but retained the moratorium for precast concrete segmental construction using internal grouted tendon systems.
- 1.3 A second edition of TR47 (2002) has now been published – this updates the guidance given in the first edition and reflects the current state of knowledge on post-tensioning.

Scope

- 1.4 This Interim Advice Note supersedes the advice given in IA16, by making reference to the second edition of TR47, and sets out specific requirements to be used for post-tensioned grouted duct concrete bridges. Although the moratorium for precast concrete segmental construction using internal grouted tendon systems still remains in force, the intention is to review this over the next two years, based on evidence from the performance of such structures in service and developments in material technology, to provide added safeguards to structures, particularly at joints.

2. QUALITY ASSURANCE

- 2.1 As advised in IA16 the requirement to comply with the UK Certifying Authority for Reinforcing Steels (CARES) Certification Scheme, or fully equivalent schemes, has now been further tightened. All firms supplying and installing post-tensioned systems in concrete bridges shall now be appropriately fully certificated to comply with the CARES scheme, Appendix 2a(i), covering office practice and site procedures.
- 2.2 The following words shall be used in contract documents, for schemes managed by the Highways Agency:

"Firms shall be fully certified in accordance with the UK Certification Authority for Reinforcing Steels (CARES) Certification Scheme for the Supply and Installation of Post-tensioning Systems in Concrete Structures, in accordance with Appendix 2a(i) or equivalent."

3. EXTERNALLY POST-TENSIONED SYSTEMS

- 3.1 The first edition of Concrete Society Technical Report TR47 and the CARES scheme are primarily directed at internally post-tensioned grouted duct concrete bridges, however the second edition now makes reference to externally post-tensioned systems, with and without grout in ducts as part of the corrosion protection system. The guidelines and specification in TR47 and the CARES scheme or equivalent, shall henceforth also generally apply for such external systems using grouted duct systems.

4. TECHNICAL APPROVAL

- 4.1 Designers are reminded that all new construction, strengthening and maintenance operations involving post-tensioned grouted duct construction techniques will be subject to technical approval procedures in accordance with BD2 'Technical Approval of Highway Structures on Motorways and other Trunk Roads'. The design of the post-tensioning system will be classed as an aspect not covered by standards, and subject to departure procedures. They should also be considered as Category III and require a full independent check.

5. SPECIFICATION

- 5.1 The specification in the second edition of TR47 shall be used for all Highways Agency schemes, where internally post-tensioned grouted duct concrete bridges are proposed. Since the Specification sets down much 'good practice', it is also recommended for use with external post-tensioned systems, where grout is utilised as part of the corrosion protection system. The May 2002 edition of the Specification for Highway Works is compatible with the first edition of TR47, but requires updating to be compatible with the second edition – hence the use of the updated TR47 specification will be considered as a departure until such time as the published Specification for Highway Works is updated.

6. GROUT

- 6.1 There has been some debate in the construction industry regarding the use of different grout materials. Attention is drawn to the second edition of TR47 which refers to both prebagged proprietary materials and site batched grout. The former is generally preferred, and especially for small projects, but the latter is often adopted for large-scale works. If site batched grout is used then the report highlights the variations that can occur in the characteristics and weight of bagged cement. Consequently, tight site controls and accurate batching are required to ensure the uniformity and consistency of the resultant grout.
- 6.2 Whichever grout is adopted, the Specification in TR47 sets out the need for grout suitability trials, compliance with specified grout properties and performance, and testing requirements.

7. DUCTS

- 7.1 Ducts are to be made from non-metallic material which can be jointed in such a way that there is an effective seal, which can be pressure tested, to prevent the ingress of contaminants. No published specification exists for non-metallic ducts, but reference should be made to Fédération Internationale du Béton *fib* Bulletin No.7 'Corrugated plastic ducts for internal bonded post-tensioning'.

8. ANCHORAGES

- 8.1 No anchorages are to be placed in pockets formed in the top surface of bridge decks; however anchorages may be formed in blisters on the under surface of bridge deck slabs. In all cases the detailing recommended for a particular anchorage location should be followed.
- 8.2 Prestressing anchorages for post-tensioning systems shall comply with the UK Certification Authority for Reinforcing Steels (CARES) Certification Scheme for the Production and Supply of Prestressing Anchorages for Post-tensioning Systems in accordance with CARES Appendix PT2 (a) iii and be supplied by firms holding a valid CARES certificate of approval or fully equivalent.

9. GROUTING TRIALS

- 9.1 All Highways Agency post-tensioning schemes involving the use of grout shall include a grouting trial. Although a number of contractors have initially expressed opposition to such trials, it has proved a valuable aid to material selection, to assist detailed design considerations, and to resolve construction issues. It also has been beneficial in ensuring that there is a good interaction between operatives and supervisors involved in grouting operations.

10. VOID GROUTING

- 10.1 The second edition of TR47 also includes information on remedial regrouting or void grouting. This is stated as best practice guidance, and should be followed on Highways Agency contracts. Many of the matters in relation to grouting in new construction also apply to regrouting. Again there are considerable benefits in undertaking a full scale trial. A recent contract recreated typical voids in the trial, and then used a different colour grout for the void filling operation. Non-destructive and intrusive examination of the regouted ducts proved confidence in the methods, materials and operatives, before embarking on the operations on the structure itself.
- 10.2 The use of regrouting methods constitutes a departure from standard. The specification of materials and methods may be based on that for grouting contained in the second edition of TR47 for initial grouting, until such time as a regrouting specification is available – further information and advice can be provided, and where proposals are being assessed which include regrouting operations, early contact should be made with the local Highways Agency Technical Approval Authority engineers.
- 10.3 The following words shall be used in contract documents, for schemes managed by the Highways Agency:
- "Firms shall be fully certified in accordance with the UK Certification Authority for Reinforcing Steels (CARES) Certification Scheme for Void Grouting of Post-tensioning Systems in Concrete Structures in accordance with CARES Appendix PT2 (a) v or equivalent.
- 10.4 However, in exceptional circumstances, where through the lack of a suitable contract, full certification cannot be obtained, a firm will be required to have obtained the letter of pre-

certification, in accordance with Section 4, paragraph 4.7, and Appendix PT 1 of the CARES Certification Scheme."

Information Systems