

CHAPTER TEN : DRAWINGS

CONTENTS

10.01	Departmental Guidelines for Drawings
10.02	Site Facilities for Drawings
10.03	Assignment of Drawing Staff
10.04	Drawing Register
10.05	Categories of Drawings
10.06	Original Contract Drawings and Master Set of Prints
10.07	Amended Contract Drawings
10.08	Supplementary Drawings
10.09	Contractor's Works Drawings
10.10	Contractor's Temporary Works Drawings
10.11	Programming Drawings
10.12	Progress / Measurement Drawings
10.13	As Built Drawings

10.01 Departmental Guidelines for Drawings.

Arahan Teknik 6/85 "Guidelines for Presentation of Engineering Drawings" regulates the preparation of drawings for roadworks in the Department and site staff will find that the Drawings which form part of their contract documents comply with it. The "Guidelines" are also generally applicable to the additional site drawings which inevitably become necessary as construction proceeds and all officers responsible for the preparation and keeping of such drawings should be conversant with the provisions of the "Guidelines".

10.02 Site Facilities for Drawings.

The preparation of hard and fast rules for the

management of drawings and drafting activities is complicated by the fact that staffing, equipment and office resources devoted to them vary so much according to the size of the project. However, for the purpose of this Manual the following assumptions have been made.

1. Dye-line printing facilities are not available on site nor are they sufficiently accessible to make day to day use practicable. Dye-line plan printing therefore, has to be undertaken on an irregular basis in regional or other JKR offices or at commercial outlets.
2. Photocopying is available on site or is sufficiently accessible for practical day to day use elsewhere.
3. Plan filing chests or racks for approximately 150 A1 sheets (in five compartments or divisions) are available on site.

10.03 Assignment of Drawing Staff.

If a draftsman or suitably qualified technician is included in the team, he should be made responsible for the safeguarding and management of all drawings, the drafting of additional drawings, receiving and issuing drawings and maintaining a Drawing Register. If no such individual is included in the team the RE must assign the most suitable member of his staff to undertake these duties, except of course, the actual drafting of drawings for which he must make arrangements in his regional JKR office, JKR H.Q. or other nearest JKR facility.

10.04 Drawing Register.

A Drawing Register sectionalised under the categories indicated in Chapter 10.05 is to be maintained on every contract site, recording the number and title of every drawing held, issued and received. Further, the Register should record, for issued drawings, the following information.

- a) Date of issue.
 - b) Number of copies.
 - c) Whether in paper print or negative form.
- The keeping of a Drawings Register as

described in this section and as detailed in the subsequent sections of this chapter is a mandatory requirement.

10.05 Categories of Drawings.

The drawings prepared and used in connection with the contract include the following.

A WORKING DRAWINGS

1. Original contract drawings.
2. Amended contract drawings.
3. Supplementary Engineer's drawings.
4. Contractor's works drawings.
5. Contractor's temporary works drawings.
6. Programming drawings.

B RECORD DRAWINGS

1. Progress/Measurement drawings.
2. As Built Drawings.

10.06 Original Contract Drawings and Master

Set of Prints. The original negatives of these drawings are retained in JKR HQ or regional offices and remain unaltered.

One set of copy negatives is to be obtained by the Resident Engineer at the start of the job and held, together with a full set of paper prints, in the Site Office. The paper prints form the basis of a Master Set. Both the copy negatives and the Master Set of prints become subject to amendment as described in Chapter 10.07.

A further two sets of paper prints are to be obtained from the original drawing negatives and issued to the contractor free of charge. If requested, copy negatives may also be supplied to the contractor and charged to him.

Books of half-size reductions of the Contract Drawings are useful and convenient for site work but it should be remembered during reference to them that they may be subject to unnoted amendment for which staff must refer to the Master Set of prints. The reduction process also renders the half size drawings inaccurate for scaling purposes.

10.07 Amended Contract Drawings

The copy negatives held in the Site Office must be progressively amended to show changes in

design or extra or omitted work authorised on the various instruction forms described in Chapter Six. (copies of the instruction forms are to be circulated to the drafting staff for this purpose). The changes to the negative are to be recorded in the amendment box on the negative and progressive alphabetic suffixes added to the drawing numbers to indicate amendment, all in accordance with Arahan Teknik 6/86.

The Master Set of prints is also to be progressively updated to ensure that site staff have current construction details readily available.

As far as the actual drafting work for the amendments is concerned the contractor should be required to make the alterations to the negatives as part of his contract responsibilities for the preparation of As Built Drawings. However, the member of the site staff responsible for Drawings should attend to alteration (or annotation) of the Master Set print as soon as the works instruction is issued. He should replace the old print with a new one after revision of the negative by the contractor.

The amendment and its suffixed number is to be recorded in the amended drawing section of the Drawing Register. Two prints of the amended drawing are to be supplied free of charge to the contractor and the date of issue recorded in the Register.

Minor amendments do not need to raise an amended negative immediately - they can be incorporated with a subsequent major amendment or a collection- of minor items. However, in this case, the minor amendment must first be noted promptly on the Master Set print as previously described and the contractor must, of course, be informed of the change without delay in one way or another-Site Instruction Form, APP or A3 Supplementary Drawing (see Chapter 10.08)

If the negative becomes so heavily amended as to prevent legible reproduction it will be necessary to prepare a retraced negative incorporating all previous, and the current amendments, but the previous amendment box details must appear on the new negative.

10.08 Supplementary Drawings

As far as possible design changes, additions and omissions should be dealt with by amending the

original contract drawings as described in the previous section of this chapter. However, if there is no suitable drawing in the original set or if it is otherwise impracticable to amend existing drawings it will be necessary to produce a supplementary drawing under signature of the Engineer.

Arrangements for drafting, printing and registering Supplementary Drawings and issuing them to the supervision site office and the contractor should be as described for Amended Contract Drawings in Chapter 1.0.07 but a separate section of the Drawing Register should be opened for them. The numbering system should be the same as that adopted for the original contract drawing and be in accordance with Arahan Teknik 6/85.

The "Guidelines" stipulate that all road works drawings are to be prepared in A1 format but an exception to the rule can be made as follows. For supplementary site drawings which do not rely on accurate scaling in use and which fit conveniently on to the smaller size frame, A3 format can be used. No other size variations are permitted. Prints may be produced from the A3 negative by photocopy process but in this case must be immediately and prominently over-stamped "Do not scale". (For the "As Built" set, A3 size drawings must be converted to A1 format)

The original negative of the supplementary drawing (whether A1 or A3 size) should be sent to the JKR Regional Office or JKR HQ to be held with the original negative of the Contract Drawings. A site copy negative is to be filed in number order with those of the original contract drawings. Two prints are to be issued to the contractor and one is to be placed with the Master Set or, if of A3 size, kept (single fold) in box or lever arch files.

10.09 Contractor's Works Drawings

Contractors, for one reason or another, sometimes produce working drawings for permanent work. The prints or negatives should be separately filed and recorded in the appropriate section of the Drawing Register under the contractor's numbering reference. Contractor's Works Drawings which vary the content or detail of works shown on the Contract Drawings should

not be accepted unless they relate to contractor's alternative proposals that have been approved by the Engineer.

10.10 Contractor's Temporary Works Drawings

Drawings are more often raised by the contractor for temporary works such as structural formwork and temporary traffic diversion layouts and details. Acceptance or rejection of the drawing's proposals must be confirmed to the contractor in writing and, if accepted, the negatives or prints are to be filed separately from the other categories of drawings and recorded in the appropriate section of the Register under the contractor's number reference. If the drawings are reproduced from original contract drawing negatives or drawn on prints of original drawings the contractor must be required to strike out the original number and substitute his own.

10.11 Programming Drawings

Prints of original layout drawings are frequently used by both contractor and the supervision team for the indication of construction sequences with the help of colour coding. They are to be numbered, registered and filed separately from the other categories. The numbers used are to be those of the negative of the base drawings but with the alphabetic references in spaces 9 and 10* substituted with PG and serials starting at 01 in space 11.

** See Appendix 1 of Arahan Teknik 6/85.*

10.12 Progress/Measurement Drawings

These are drawings prepared by the supervision team for its own record purposes (see Chapter 7.09). They are drawn on prints of road layout and structure general arrangement drawings and are to be numbered, registered and filed separately from other categories. The drawing numbers are to be formulated as indicated for Programming Drawings in Chapter 10.11 except that the alphabetic references are to be "P M."

10.13 As Built Drawings

These provide a most important record for the

Department and other government agencies and, although the actual preparation of the drawings is required to be undertaken by the contractor, the responsibility for ensuring that an accurate and comprehensive set of As Built Drawings is produced, rests firmly with the supervision team. As their name implies, the As Built Drawings are intended to show details of the actually constructed works in the form that they exist on completion. As a result, there is often a tendency to leave their preparation until the end of the construction period. This is not an acceptable approach. By the time this stage is reached many of the staff involved in construction on both sides have dispersed, and those who remain may have difficulty in recalling details from one or two years earlier and have little incentive, or interest, in completing the task at the tail-end of the job.

The approach that must be adopted is to deal with the preparation progressively throughout the construction period. If the procedures outlined in Chapter 10.07 for amending original contract drawings and for circulating works instructions to the drafting staff for recording on the drawings as proposed in Chapters 6.10 and 6.11 (j) are observed, together with the further procedures set out in this chapter, it should not be a difficult task to make the few final additions and amendments to the As Built Drawings at the time of completion.

The As Built Drawings are to comprise the final editions of the following.

1. The Original Contract Drawings or, where amended, the Amended Contract Drawings
2. Supplementary Drawings
3. Contractors Working Drawings that have been approved for use in construction
4. Final Land Plans
5. Special Drawings.

The last category is required because some important record data is not raised automatically by drawings contained in the first three sets named, or cannot be conveniently presented on them. Examples of such items are:

- a) removal and replacement of unsuitable material below formation,
- b) variation in pavement course thickness or

layering and

- c) permanent diversion of services.

It has already been noted that the contractor is responsible for preparing and presenting the full set of As Built Drawings. However, in order to ensure that he meets this obligation in an adequate way, it is essential for the supervision team to monitor the progress of drawing preparation and to carefully note all the amendments that need to be shown.

The contractor should be required to present the As Built Drawing for any particular sheet as and when the constructional work detailed on that sheet is completed. He must be required to present for approval any such completed "As Built" at the Monthly Progress Meetings together with a list of amendments made to those that are in the course of preparation. In order to ensure that no items are omitted the contractor's list should be checked against a record of amendments and additional items kept for the purpose in a special section of the Drawings Register.

Negatives for the major proportion of the As Built Drawings (those in categories 1, 2 and 3 above) can be supplied (and charged) to the contractor by the Resident Engineer as copy negatives of the original or Amended Contract Drawings and Supplementary Drawings.

The drawing numbers of the base negatives are to be retained but the copy negatives produced for the purpose are to be prominently stamped "AS BUILT DRAWINGS" in the bottom right hand corner above the title box and any previous overprinting.

Copy negatives may also be similarly provided for the Special Drawings (category 5 above) if suitable negatives are available. If not, the contractor is to prepare negatives himself. If appropriate, the base negative numbers are to be used or new numbers are to be provided in accordance with Arahan Teknik 6/85. Again, the negatives are to be stamped "AS BUILT DRAWINGS" in the bottom right hand corner.

In addition to the preparation of full size negatives the contractor must be required to present a microfilm of every As Built Drawing. All full size negatives of the As Built Drawings (including Supplementary Drawings originally of A3 size) must be presented in A1 format.

On acquisition of the negatives for the As Built Drawings from the contractor, the Resident Engineer is to prepare one complete set of paper prints and then submit all the negatives (including microfilms) to the Documentation Unit, Roads Section, JKR H.Q. through the Engineer or Project Co-ordinator.

The requirements set out in this chapter for ensuring that the contractor properly prepares and presents the As Built Drawings are mandatory on the Resident Engineer.

Finally, in meeting these mandatory requirements the Resident Engineer should carefully bear in mind that apart from the general recording of the final form and detail of the project, the As Built Drawings are required for the following practical purposes.

- (i) To assist with the measurement for the preparation of an accurate final account.
- (ii) To provide details for the instruction and supervision of defects maintenance work by the contractor and for the organisation of subsequent routine and special maintenance by the Department.
- (iii) To record details of underground features which may be encountered in any subsequent excavation or load application operations within the Right-of-Way.
- (iv) To provide details of both above-and-belowground features for statutory and commercial authorities when planning and installing their services.
- (v) To provide information which helps the Department to assess pavement performance and to decide what remedial action to take in the event of failure.
- (vi) To record land-take and ownership.