

**CHAPTER FIVE : INSPECTION, TESTING AND APPROVAL****CONTENTS****5.01 Introduction****INSPECTION****5.02 The various Inspection Duties****5.03 Technical Inspection****5.04 Survey Checks****5.05 Dimensional Checks****5.06 Non-Routine Measurement****5.07 Reporting****TESTING****5.08 The Role of Testing****5.09 Observance of Departmental " Guidelines"****5.10 Management of Testing Activities****5.11 Monitoring Role of Testing Engineer****5.12 Dealing with the Test Results****5.13 Testing by Supervision Staff Essential****APPROVAL****5.14 General Considerations****5.15 Approval Chit System****5.01 Introduction.**

The subjects of this chapter encompass what must be regarded as the most essential element of all supervision by the Engineer's staff.

The Conditions of Contract charge the Engineer with the "...overall supervision and direction of the Works.." and his Representative's duties are defined as "...to watch and supervise the Works and test and examine materials and workmanship.."

The work of the Resident Engineer therefore, in his role as Engineer's Representative and as assisted by his site staff, involves presence on site, watching the contractor's operations in progress, the visual inspection of completed items of work, checking for correct positioning, alignment and dimensional compliance of the works, arranging and conducting appropriate physical tests and appraising their results.

These activities carry over logically into approval measures which enable the contractor to proceed with progressive or sequential operations with reasonable confidence that his work will meet with ultimate acceptance. Similarly, the Employer can then expect that acceptable standards have been achieved throughout the progress of the works provided of course that the whole process has been tackled in a systematic and conscientious way.

**INSPECTION****5.02 The Various Inspection Duties.**

Inspection duties can be regarded as falling into the five categories indicated below.

Technical Inspection	Survey Checks
Dimensional Checks	Non-Routine Measurement Reporting.

**5.03 Technical Inspection**

Comprehensive information on the details of Technical Inspection activities is given in Part I of the Department's "Guidelines for Inspection and Testing of Roadworks". This sets out the nature of inspection duties for the various constructional operations encountered in roadworks and makes recommendations for the level of surveillance in terms of proportional time and the class of supervision staff to be assigned to the particular duties.

It is not intended to reproduce these technical recommendations here, but it is appropriate to comment on one or two staff management matters in connection with them.

First, it is important that the operations and area

boundaries (denoted by drainage, etc.) subject to supervision by each individual inspector are carefully defined and that both the contractor and the inspectors themselves are clearly aware of the detailed arrangements. Declarations on this subject should be made in writing to the contractor and can additionally form the basis for Duty Lists prepared for each member of the staff as recommended in Chapter 2.06. The scheduling of inspection duties and their allocation on the basis of staff classes detailed in the "Guidelines" should provide useful guidance to the Resident Engineer when assigning duties to staff and in preparing the Duty Lists.

Second is the question of superior officer's responsibility. A high proportion of inspection duties fall to the most junior staff on the supervision team. However, as in all staffing relationships where superiors delegate work to subordinates, the senior officer carries the ultimate responsibility and in construction contracts there is a strong element of technical and financial accountability. In order to cover their own position and safeguard that of the departmental chief officer for whom they work, Resident Engineers should themselves make regular and frequent visits to the works and ensure that their inspector force is devoting sufficient time to on-site activities and is complying with the requirements set out in this Manual and the "Guidelines". Resident Engineers based on site offices should attempt to visit the major operations every day and for "travelling Resident Engineers" based in regional offices the gaps between site visits should not exceed one working day unless a low level of contractor activity on site clearly warrants a relaxation of the rule.

#### **5.04 Survey Checks**

The setting out of the works is a contractor's responsibility but errors can result in serious embarrassment to all involved in the contract, including the supervision team. It is therefore important for the site staff to ensure that the contractor's setting out is correct and accurate.

No Departmental manual on site survey practice exists but Appendix A of Arahan Teknik 14/17 "Model Terms of Reference, Detailed Ground Survey and Engineering Design of Roads" gives some guidance as to what to expect from pre-

contract survey.

Inception period survey procedures are noted in Chapter 4.04 of this Manual but the following points are worth noting here.

The first inspection survey task is to check that the primary control of main intersection and curve points has been correctly established from the provided coordinated data, together with temporary bench marks for which the elevation values have been determined. The work of setting out the more detailed road alignment with drainage intervals and major structure and side road intersections should follow.

The site inspectors who carry out most of the Technical Inspection will, generally speaking, not be competent to deal with this basic survey work. It should therefore be undertaken by Surveyors or Survey Technicians. If the establishment of the supervision team does not include such specialists, it will be necessary to arrange for the checking of the basic setting out to be done by Surveyors from JKR regional or other offices. Failing this Resident Engineers should seek departmental approval to engage the services of a Licensed Surveyor from a commercial firm. Even if Surveyors are included in the team, the aim should be to provide a basic setting out system of pegs, pins and profile boards, etc., from which individuals responsible for the Technical Inspection (who may be unskilled in survey) can apply simple measurement, sighting or "boning" checks.

For example, road centre-line pegs should be established at say 25 metre intervals; profiles and slope stakes should be set up for earthworks, together with profiles for drainage run levels. At major structures, pegs should be provided for the end points of offset string lines for foundations, walls, piers, etc.

As a matter of general principle, checking of the contractor's survey and setting out should be done by supervision staff acting independently. Although a common peg system has to be used, separate chainmen, instruments, instrument set-ups, readings, recordings and calculations should be the rule in order to avoid the danger of duplicated errors.

As a practical precaution against the need for excessive repetition of survey work, it is sound practice to reference, with triangulated or bear-

ing ties, all major control points and the more important local marks likely to be damaged or demolished by construction plant.

### 5.05 Dimensional Checks

These checks should be made by the individual responsible for the Technical Inspection of the particular work item. They are important to ensure that design requirements are being met, and that what is being paid for is actually being provided by the contractor.

Inspector staff must therefore be fully versed in the dimensional requirements of the Drawings and Specification, together with specified tolerances. (The tolerances or permitted relaxations of dimensional requirements may have payment implications which require inspector's action - see Chapter 7.04.)

Most of the dimensional checks which have to be made will be obvious to most inspection staff but the more common ones are noted under the various operational headings in Table 5/1 for Approval Chat requirements on pages 5/19 - 21.

### 5.06 Non-Routine Measurement

The whole subject of measurement for payment is dealt with in Chapter Seven of this Manual and includes the involvement of inspection staff which arises to a lesser or greater extent depending on whether separate QS or engineer measurement staff are engaged. However, it is to be noted here that even where special measurement staff are employed, the inspector corps should watch for the following.

1. Special items which may otherwise slip through the routine measurement net, e.g. the removal and replacement of unsuitable material, the use of non standard pavement course thicknesses, etc.
2. The use of Daywork which requires the recording of plant, labour and materials employed.

### 5.07 Reporting

In addition to the duties described in the foregoing four sections, staff engaged on inspection duties are also required to record not only their own activities, but also information in connection with those construction operations they are

supervising. Further details on this subject are given in Chapter 9.06 of this Manual.

## TESTING

### 5.08 The Role of Testing.

The conducting of physical tests on materials and workmanship is a most essential part of the quality control regime required to be applied by the supervision team and from a management point of view needs to be regarded as integral with the Inspection and Approval site procedures.

### 5.09 Observance of Departmental "Guidelines"

The subject of Quality Control testing forms Part II of "Guidelines for Inspection and Testing of Roadworks" which must be read in conjunction with this Manual. The "Guidelines" define the tests which should be carried out for the various constructional elements and operations and also establishes suitable levels or frequencies of testing. It notes the discretion which can be exercised in this latter respect dependent upon the degree of inspection applied and the consistency of results achieved.

It is important that all staff engaged on inspection and testing duties and those officers responsible for approvals are fully conversant with the technical requirements and recommendations of the "Guidelines".

### 5.10 Management of Testing Activities.

Turning to the management aspects of testing activities, it is difficult to be categorical about the assignment of such duties to staff, because staffing establishments vary so widely from site to site. On the smallest jobs staffed with only one Technician or Technical Assistant, that person will have to undertake the required tests - probably assisted by contractor's labour - he carefully supervises. On larger projects there is likely to be a Testing Technician or a Testing Engineer in charge of the site laboratory and other testing staff. Even here, however, it is necessary to establish clearly who decides what testing is to be done for approval purposes - a fur-

ther item for the drafting of Duty Lists mentioned in Chapter 2.06.

Inspection staff are, of course, closest to the problem, but on larger contracts staffed with Section Engineers, or full time Resident Engineers it is preferable that these more senior staff (prompted by the inspectors and the raising of Approval Chits under the system described in Chapter 5.14, etc.) should requisition the testing services from the laboratory. If the laboratory has a substantial work load and is testing for a sectionalised site it is wise to keep a Testing Book in the laboratory in which requisitioning staff note the tests and anticipated times in advance, so that the Testing Engineer or Technician can organise his working day and allocate equipment and ovens, etc.

The results obtained from the requisitioned tests will be assessed for approval of the work item concerned, and failure will be noted on the Approval Chit and result in rejection. However, as soon as failure of any test is identified, it should be notified immediately (and in the first instance verbally) to both the contractor's agent and the Resident Engineer and any other supervision inspection staff concerned.

### 5.11 Monitoring Role of Testing Engineer.

In addition to the testing requirements raised by the Approval Chit system, engineers or technicians appointed exclusively to testing positions should regard themselves as having a wider brief. The Section Engineer or Inspector will require an answer to the "does it comply?" question for each particular part of the works, as it comes up for approval. The Testing Engineer is concerned with the overall and continuing requirement for quality control of the works, all the materials supplied and incorporated in them and the end result achieved. Accordingly, he should regularly examine stockpiles of materials, e.g. aggregates, cement, bitumen and manufactured items, and select samples for test under his own independent programme and also patrol the site in order to determine whether tests additional to those requisitioned by the site inspection team are desirable. The Testing Engineer will also be involved in the testing of trial and job mixes submitted for approval by the

contractor for concrete and asphaltic pre-mix etc.

### 5.12 Dealing with the Test Results

The results of all tests undertaken in the site laboratory must be carefully and systematically recorded and filed in the laboratory for easy retrieval and reference. The sectional headings quoted in the Testing "Guidelines" provide a useful basis for the filing system. Testing Engineers in charge of site laboratories have an obligation to review the results, assess the consistency being achieved, inform their Resident Engineers of requirements for improved control in contractor's constructional or manufacturing processes and to contribute a summary of all results to the Two Monthly Progress Report (see Chapter 9.07).

### 5.13 Testing by Supervision Staff Essential.

As a final and important comment on the subject of site testing, it is worth reiterating and stressing a point which is made in "Guidelines for Inspection and Testing of Roadworks" To quote from the first paragraph of Part II on page 11, "As far as practicable, all quality control testing ... should be directed and carried out by the staff of the ... Engineer..."

It is completely inappropriate to the whole concept of Engineer supervision to establish a control regime and then leave it to the contractor to organise and conduct the individual tests himself.

## APPROVAL

### 5.14 General Considerations.

What is under consideration here is approval for the contractor to proceed with the next operation. Contractually speaking, final acceptance of 'the Works' or any part of it is not given until the Certificate of Making Good Defects or the Maintenance Certificate is issued. However, in order to meet the practical need for stage by stage control, a system of "approvals" tied closely to the inspection and testing regime must be established. Verbal approvals are not adequate because they can give rise to confusion or dis-

pute as to what has been approved and because they leave no record which ensures that all sections and stages of the works have been systematically included in the checking process. Further, whilst approvals noted and countersigned by the contractor's agent are appropriate entries in the Daily Site Diary, they do not provide a suitably convenient or complete record.

### 5.15 Approval Chit System.

The method to be adopted for approval is the use of Approval Chits. Copies of typical blank forms and examples of completed forms are given in Figures 5A/12 and 5B/1-4 respectively on pages 5/21 to 5/16.

The Approval Chit is to originate with the contractor as a request for inspection and permission to proceed with the subsequent operation. It is to be submitted in duplicate and dated and timed at the time it is handed to the supervision team member who will initial receipt. Boxes are provided for initialling by supervision staff responsible for survey, technical inspection/dimensional checks and testing, with, in the latter case, appropriate test reference numbers. The particular work item and chainage limits or other defining data should be carefully recorded on the form and checked. When the boxes have been completed indicating compliance, signature for approval must be added, preferably by the Resident Engineer who dates and times the form and returns one copy to the contractor. (Completion of the boxes need not necessarily involve signature by the technician or engineer making the check. The box can be ticked by another member of the site staff informed verbally that the check has been made earlier e.g. an Inspector can tick for a Surveyor's check on setting out made earlier.)

If the work is found after inspection or test not to comply with requirements, the Approval Chits must be completed and returned in the same way but indicating non approval and the reasons for rejection.

The copy retained by the Resident Engineer is to be carefully filed. It is suggested that the serial number should be prefixed by the Bill of Quantities section number of the completed item being approved (not the subsequent operation) and the chits filed accordingly by section and in

date or chainage order.

The work items and stages to which the Approval Chit system is to be applied are stipulated in Table 5/1. (Pages 5/19 - 21)

### 5.16 Notice Periods for Inspection and Approval.

It is necessary to establish periods of notice which the contractor must give to the supervision team to inspect and test the work and within which it is reasonable to expect the Resident Engineer or his delegate to return the form with approval or rejection. These periods in working hours are also noted in Table 5/1. Regardless of the notice periods quoted, the response period to the Chit (that is the time taken to start checking or other appropriate action) should not normally exceed 2 working hours.

The notice periods quoted in Table 5/1 do not include time that may be necessary for the completion of developed strength tests. Examples are cube results for structural and pavement concrete and soil cement and soaked CBR's. In such cases it will normally be necessary to add further time to the quoted notice periods to obtain test results before the Approval Chit is returned.

However, in special circumstances, permission to proceed can be given before test results are available, provided all other checks are satisfactorily completed and provided the contractor accepts the risk of demolition of the work together with any subsequently built-on layers or parts if the tests eventually fail. Resident Engineers or any member of their staff should only make such a concession with the express permission of the Engineer or other superior officer. Permission will not be granted in cases which risk the demolition of cement or bitumen-bound pavement courses or important elements of structures.

If permission to proceed is given pending test results and on the basis of the contractor's risk of demolition, the Approval Chit should carry a suitable acknowledgement from the contractor and the test results that are outstanding should be noted. Figure 5B/3 gives an example of an Approval Chit completed in this way.

### 5.17 Contractor's compliance with the System.

Although most Conditions of Contract give the Engineer the right to inspect work for approval before it is covered up and to reject work which in his opinion does not comply, and although in general terms the contractor is required "...to execute, complete and maintain the Works to the satisfaction of the Engineer..." there is no specific contractual basis for the application of the Approval Chit system. It is therefore necessary to come to a mutual arrangement with the contractor for the use of the system and its detailed provisions. Most contractors will readily agree because the arrangement helps them to ensure ultimate acceptance, but if the Resident Engineer or his site staff experience difficulties in obtaining agreement or practical compliance with it, the matter should be referred to the Engineer, Co-ordinator or departmental Chief officer.

### 5.18 Signing of Chits.

Because of the mutual and non contractual nature of the agreement, the signing of the Approval Chits for either rejection or acceptance is not strictly restricted to the Engineer or his delegated Representative, but as previously noted, it is preferable that the Chits should be endorsed by the Resident Engineer. If rejections of a major nature are issued by subordinate staff they should be followed by confirmation by letter, or the issuing of a further Chit, in both cases signed by a delegated officer and marked "Confirmation of Approval Chit No.... (Rejection)"

Whatever arrangement is adopted for the signing of the Approval Chits, all cases of non compliance with the technical requirements of the contract must be brought to the attention of the Resident Engineer.

It is a wise precaution when coming to a general agreement for the use of Approval Chits to make a disclaimer in writing to the contractor that the issuing of such a chit does not constitute final approval for the completed work item involved. The model forms also carry a printed note to this effect.

### 5.19 Contractor's Abuse of System.

It sometimes happens that contractors abuse the

Approval Chit system, applying little superintendence to their own labour engaged in the preparatory work themselves, in the hope that the supervision team will pick up any deficiencies or errors during the latter's checking process. If the contractor persistently adopts this approach the thing to do is to issue a rejection as soon as the first fault is discovered and then repeat the process for each single defect as the Chits are successively presented for approval.

Otherwise, however, the supervision team should cooperate with the contractor's foremen and tradesmen, drawing their attention to faults as the work proceeds so that by the time the Approval Chit is presented the item is acceptable and the subsequent operation can go ahead without undue delay.

### 5.20 Mandatory Nature of the System.

The use of the Approval Chit system in so far as it is defined in Table 5/1 and described in this chapter is mandatory for the Resident Engineer subject to the contractor's agreement as discussed in Chapter 5.17

### 5.21 Culvert Approval Forms

These are standard forms in general use on many roadwork contracts. Their content categorises them as record forms rather than approvals, although they are used for acceptance of founding conditions before the concreting of bases etc. proceeds. They should be used in addition to, not as a substitute for, the normal Approval Chits advocated in the earlier sections of this chapter. A copy of a Culvert Form blank is given in Figure 5C.

FIGURE 5A/1

JABATAN KERJA RAYA, CAWANGAN JALAN CONTRACT : JKR/PERS/IP/39/91 Construction of Bandar Baru to Kampong Lama Rd.	APPROVAL CHIT ROADWORKS NO.     /	
<p>From :    Site Agent, Syarikat Bina Suprim</p> <p>To    :    Resident Engineer</p> <p>We request permission to proceed with the following work:</p> <p>.....</p> <p>From CH                      To CH</p> <p style="text-align: center;">Signed .....</p> <p style="text-align: center;">Received ..... Time .....Date....//</p>		
Survey:	Inspection:	Testing:
		Ref.
<p>From :    Resident Engineer JKR</p> <p>To    :    Site Agent, Syarikat Bina Suprim</p> <p>Your request to proceed with the above mentioned work</p> <p style="padding-left: 40px;">IS APPROVED</p> <p style="padding-left: 40px;">IS NOT APPROVED for the following reasons:</p> <p style="padding-left: 40px;">.....</p> <p style="padding-left: 40px;">.....</p> <p style="text-align: center;">Signed .....</p> <p style="text-align: center;">Resident Engineer JKR</p> <p style="text-align: center;">Time .....Date....//</p> <p>Received for Contractor .....</p> <p style="padding-left: 100px;">Neither the endorsement of this Form nor anything written on it is intended to convey final approval for any part of the Works.</p>		

FIGURE 5A/2

JABATAN KERJA RAYA, CAWANGAN JALAN CONTRACT : JKR/PERS/IP/39/91 Construction of Bandar Baru to Kampong Lama Rd.		A P P R O V A L   C H I T STRUCTURE/CHIT NO. S     /	
<p>From :    Site Agent, Syarikat Bina Suprim</p> <p>To    :    Resident Engineer</p> <p>We request permission to proceed with the following work:</p> <p>.....</p> <p style="text-align: right;">Signed .....</p> <p style="text-align: right;">Received ..... Time .....Date....../..</p>			
Survey:	Inspection:	Testing:	
		Ref.	
<p>From :    Resident Engineer JKR</p> <p>To    :    Site Agent, Syarikat Bina Suprim</p> <p>Your request to proceed with the above mentioned work</p> <p style="padding-left: 40px;">IS APPROVED</p> <p style="padding-left: 40px;">IS NOT APPROVED for the following reasons:</p> <p style="padding-left: 40px;">.....</p> <p style="padding-left: 40px;">.....</p> <p style="text-align: right;">Signed .....</p> <p style="text-align: right;">Resident Engineer JKR</p> <p style="text-align: right;">Time .....Date....../..</p> <p>Received for Contractor .....</p> <p style="padding-left: 40px;">Neither the endorsement of this Form nor anything written on it is intended to convey final approval for any part of the Works.</p>			

FIGURE 5B/1

JABATAN KERJA RAYA, CAWANGAN JALAN CONTRACT : JKR/PERS/IP/39/91 Construction of Bandar Baru to Kampong Lama Rd.	APPROVAL CHIT ROADWORKS NO. 6/15	
<p>From : Site Agent, Syarikat Bina Suprim</p> <p>To : Resident Engineer</p> <p>We request permission to proceed with the following work:</p> <p style="text-align: center;"><u>AGGREGATE ROAD BASE</u></p> <p>From CH 8+150 To CH 8+40 / Right Side.</p> <p style="text-align: right;">Signed <u>[Signature]</u></p> <p style="text-align: right;">Received <u>[Signature]</u> Time 13.45 Date 10/10/91</p>		
Survey: <u>OK.</u> <u>T.S. Chin</u>	Inspection: <u>NOT OK.</u> <u>(Sub base thickness)</u> <u>Wong Kai</u>	Testing: <u>Sub base -</u> <u>grading, CBE</u> <u>OK.</u> <u>Y.S. Low.</u> Ref. 6/23, 24 6/208, 209.
<p>From : Resident Engineer JKR</p> <p>To : Site Agent, Syarikat Bina Suprim</p> <p>Your request to proceed with the above mentioned work</p> <p style="text-align: center;"><del>IS APPROVED</del></p> <p>IS NOT APPROVED for the following reasons:</p> <p style="text-align: center;"><u>SUB BASE THICKNESS DEFICIENT CH 8+250.</u></p> <p style="text-align: center;"><u>2 8+325</u></p> <p style="text-align: right;">Signed <u>[Signature]</u> Resident Engineer JKR</p> <p style="text-align: right;">Time 10.30 Date 11/10/91.</p> <p>Received for Contractor <u>[Signature]</u> 11.02 11/10/91</p> <p>Neither the endorsement of this Form nor anything written on it is intended to convey final approval for any part of the Works.</p>		

FIGURE 5B/2

JABATAN KERJA RAYA, CAWANGAN JALAN CONTRACT : JKR/PERS/IP/39/91 Construction of Bandar Baru to Kampong Lama Rd.	APPROVAL CHIT ROADWORKS NO. 6/28	
<p>From : Site Agent, Syarikat Bina Suprim</p> <p>To : Resident Engineer</p> <p>We request permission to proceed with the following work:</p> <p style="text-align: center;">..... LAYING OF BINDER COURSE .....</p> <p>From CH 6+25 To CH 7+50 / Leftside.</p> <p style="text-align: right;">Signed <u>St Haniam</u></p> <p style="text-align: right;">Received <u>Rashidus</u> Time 6.20 Date 14/12/91</p>		
Survey: OK. <u>TS Chin</u>	Inspection: OK. <u>Wang Kar.</u>	Testing: Stone Base - D.O's & Gradients OK. <u>1/5 low</u> Ref. 6/51, 56 6/28, 132
<p>From : Resident Engineer JKR</p> <p>To : Site Agent, Syarikat Bina Suprim</p> <p>Your request to proceed with the above mentioned work</p> <p style="text-align: center;">IS APPROVED ✓</p> <p style="text-align: center;"><del>IS NOT APPROVED for the following reasons:</del></p> <p style="text-align: center;">.....</p> <p style="text-align: center;">.....</p> <p style="text-align: right;">Signed <u>Murad Bark</u></p> <p style="text-align: right;">Resident Engineer JKR</p> <p style="text-align: right;">Time 10.30 Date 16/12/91</p> <p>Received for Contractor</p> <p style="text-align: left;"><u>St Haniam</u> 16.15 16.12.91</p>		
<p>Neither the endorsement of this Form nor anything written on it is intended to convey final approval for any part of the Works.</p>		

5/14

JABATAN KERJA RAYA, CAWANGAN JALAN CONTRACT : JKR/PERS/IP/39/91 Construction of Bandar Baru to Kampong Lama Rd.	APPROVAL CHIT STRUCTURE/CHIT NO. S 3 / 15 <i>Sungei Putih Bridge</i>	
From : Site Agent, Syarikat Bina Suprim To : Resident Engineer		
We request permission to proceed with the following work: <div style="border: 1px solid black; padding: 5px; margin: 10px 0;"> <i>CONCRETING OF WEST ABUTMENT WALL</i>  <i>Second Lift (4-8 m) Panel 2.</i> </div>		
<div style="text-align: right;">           Signed <i>St Mariani</i>            Received <i>Mohd Din</i> Time <i>14:20</i> Date <i>06/05/91</i> </div>		
Survey: <i>OK</i> <i>T.S. Chui</i>	Inspection: <i>OK</i> <i>Rogah</i>	Testing: <i>7 day cubes</i> <i>for first lift</i> <i>due 08/05/91</i> <i>Y. S. Low</i> Ref. <i>—</i>
From : Resident Engineer JKR To : Site Agent, Syarikat Bina Suprim		
Your request to proceed with the above mentioned work <div style="display: flex; justify-content: space-between; align-items: center;"> <div>           IS APPROVED <input checked="" type="checkbox"/> <i>Subject to your risk on 7 day results on 1st Lift.</i>  <del>IS NOT APPROVED for the following reasons:</del> </div> <div style="text-align: right;"> <i>Agree</i>  <i>St Mariani</i> </div> </div> <div style="border-top: 1px dotted black; height: 20px; margin-top: 10px;"></div>		
Signed <i>Minda D. Shah</i> Resident Engineer JKR Time <i>10:00</i> Date <i>07/05/91</i>		
Received for Contractor <i>St Mariani</i>		
Neither the endorsement of this Form nor anything written on it is intended to convey final approval for any part of the Works.		

FIGURE 5B/4

JABATAN KERJA RAYA, CAWANGAN JALAN CONTRACT : JKR/PERS/IP/39/91 Construction of Bandar Baru to Kampong Lama Rd.	APPROVAL CHIT STRUCTURE/CHIT NO. S 3 / 21 <i>Sungei Putih Bridge</i>	
From : Site Agent, Syarikat Bina Suprim To : Resident Engineer  We request permission to proceed with the following work: ..... <i>DECK SLAB SPAN 2 (NORTH SIDE)</i> .....  <div style="text-align: right; margin-right: 100px;">           Signed <i>St Haniam</i>            Received <i>Mohd Din</i> Time <i>16.10</i> Date <i>13.11/91</i> </div>		
Survey:  <i>Rajin</i>	Inspection: <i>NOT OK</i>  <i>Rajin</i>	Testing: <i>7 day main beam - OK</i>  <i>1/3 Low</i> Ref. <i>2/107</i> <i>2/109</i>
From : Resident Engineer JKR To : Site Agent, Syarikat Bina Suprim  Your request to proceed with the above mentioned work  <del>IS APPROVED</del>  IS NOT APPROVED for the following reasons: <div style="margin-left: 40px;"> <i>① Cover to bottom steel</i>  <i>② Scaffolding to soffit insecure</i>  <i>③ Rubbish in shutters.</i> </div> <div style="text-align: right; margin-right: 100px;">           Signed <i>Musab Ibrahim</i>            Resident Engineer JKR            Time <i>11.15</i> Date <i>14.11/91</i> </div>		
Received for Contractor <i>St Haniam</i> <i>12.10 19.11.91</i>	Neither the endorsement of this Form nor anything written on it is intended to convey final approval for any part of the Works.	

FIGURE 5C

THE CONSTRUCTION AND COMPLETION OF JALAN MASUK DAN JAMBATAN- JAMBATAN  
KE PERKAMPUNGAN FELDA SG. ARING PERINGKAT II DAN JALAN PERKAMPUNGAN  
SG. ARING 2

CULVERT VERIFICATION

Contract No: JKR/PERS/IP/JR/76/86

Contractor : Wan Sam Constructions Sdn Bhd

Culvert Details

At Main/Village\* road

Date: \_ \_ \_ \_ \_

Culvert No: \_ \_ \_ \_ \_

Chainage: \_ \_ \_ \_ \_

Proposed

Actual

Type: _ _ _ _ _	_ _ _ _ _
Size: _ _ _ _ _	_ _ _ _ _
Length: _ _ _ _ _	_ _ _ _ _
U/S I.L. : _ _ _ _ _	_ _ _ _ _
Slope: _ _ _ _ _	_ _ _ _ _
Skew: _ _ _ _ _	_ _ _ _ _

Site Details

Foundation Condition: \_ \_ \_ \_ \_

Necessity of Probing: \_ \_ \_ \_ \_

Flow Condition: \_ \_ \_ \_ \_

Upstream Development: \_ \_ \_ \_ \_

Roadside Development: \_ \_ \_ \_ \_

Remark: \_ \_ \_ \_ \_  
\_ \_ \_ \_ \_  
\_ \_ \_ \_ \_  
\_ \_ \_ \_ \_

\*Delete as necessary

SKETCH

ITEMS TO BE COVERED BY APPROVAL CHITS;  
NOTICE PERIODS & DIMENSIONAL CHECKS

TABLE 5/1  
ITEMS TO BE COVERED BY APPROVAL CHITS;  
NOTICE PERIODS & DIMENSIONAL CHECKS

COMPLETED ITEM	SUBSEQUENT ITEM FOR APPROVAL TO PROCEED	NOTICE (WORKING HRS)	DIMENSIONAL CHECKS ON COMPLETED ITEMS	COMMENT
A. DRAINAGE DRAINS AND PIPES:				
1. Trench excavation for piped or filter draina	Pipe laying or filter placing	4	Invert depth/grade. Trench width for filter	Additional stage between jointing and surround may be introduced.
2. Pipe laying jointing & surround or placing filter material and/or fabric	Drain backfill	4	Filter material level	
3. Excavate unlined ditch	None	-		No Approval Chit issued but section min. depth or grade checked.
4. Excavate precast or masonry lined ditch	Bed and lay precast sections or masonry	4	Invert depth & grade	No Approval Chit issued on ditch completion but final check invert depth & grade.
5. Excavate insitu lined ditch and fix shutters	Concrete lined ditch	4	Invert depth & grade; Wall thickness.	
CULVERT, HEADWALLS, WINGWALLS, APRONS: (For box culverts see 'Structures')				
6. Base slab: excavate, blind, place steel	Concrete slab	4	Invert level, steel, spacing, cover	
7. Walls: shutter and fix steel	Concrete wall	4-6	Plan etc, steel spacing cover	
8. Concrete wall & strike shutter	Place fill	3		
CHAMBERS:				
9. Base slab: excavate & blind	Concrete base slab	4	Invert level, plan etc	No Approval Chit - verbal approval.
10. Construct wall shutter & steel, top slab	Concrete top slab	4	Steel, spacing, cover	
11. Concrete top slab & strike shutter	Place, fill or backfill			No Approval Chits for inter- mediate stages but check width progressively.
B. EARTHWORKS				
1. Site clearance, soil strip	Roadway excavation or embankment	4	E/w alignment & width strip depth	No Approval Chit for inter- mediate stages but check width progressively.
2. Remove unsuitable below embankment or above or below formation in cutting	Cart to tip or cart to tip and backfill as appropriate	-	Width/level	
3. Bulk excavation	Bulk excavation	-	Width/level, layer thickness.	No Approval Chits for inter- mediate stages but inspector identifies layers related to profiles etc for density tests, checks width pro- gressively & layer thickness.
4. Embankment below subgrade	Subsequent intermediate layers	-		

TABLE 5/1  
continuedITEMS TO BE COVERED BY APPROVAL CHITS;  
NOTICE PERIODS & DIMENSIONAL CHECKSTABLE 5/1 (cont'd)  
ITEMS TO BE COVERED BY APPROVAL CHITS;  
NOTICE PERIODS & DIMENSIONAL CHECKS

COMPLETED ITEM	SUBSEQUENT ITEM FOR APPROVAL TO PROCEED	NOTICE (WORKING HRS)	DIMENSIONAL CHECKS ON COMPLETED ITEMS	COMMENT
<b>B. EARTHWORKS (cont'd)</b>				
5. Embankment - first or intermediate sub-grade layer	Intermediate or last subgrade layer	3	Width/level, layer thickness	Approval Chits issued for each layer.
6. Subgrade replacement in cutting first or intermediate layer	Intermediate or last subgrade layer	3	Layer thickness	Approval Chits issued for each layer.
7. Benching	Embankment	-	Horizontal, vertical, steps	No Approval Chits - verbal approval.
<b>C. PAVEMENT</b>				
1. Trim, scarify & compact formation in cutting	Subbase or shoulder material	3	Level, regularity & width	
2. Place, compact & trim last layer embankment subgrade or subgrade replacement in cutting	Subbase or shoulder material	3	Level, regularity & width	
3. Shoulder first or intermediate layers	Shoulder intermediate or final layers	3	Thickness, width	No Approval Chits- verbal approval
4. Subbase	First layer unbound, stabilised or bituminous roadbase	8	Thickness, regularity & width	
5. First or intermediate layer unbound, stabilised or bituminous roadbase	Intermediate or final layer unbound, stabilised or bituminous roadbase	8	Thickness, regularity & width	
6. Final layer roadbase	Prime coat or tack coat	8	Thickness regularity & width	)Separate Approval Chits for )proceeding after prime or )tack can be omitted with )verbal approval given for )spread and curing.
7. Prime coat or tack coat	Binder course, single course (wearing) or surface dressing	8	Thickness regularity & width	
8. Binder course surfacing	Wearing course	8	Thickness regularity & width	
9. Wearing course			Thickness regularity & width	No Approval Chit Issued but indicated checks made & non compliance noted by letter.
10. Subbase or base; concrete bed to kerb or channel block	Lay, bed and joint kerb or channel block	8	Concrete bed thickness, alignment and level	No Approval Chit - verbal approval after checks.
<b>D. ROAD FURNITURE</b>				
1. Wearing course, surfacings	Markings	8	Guidelines	No Approval Chits - verbal approval
2. Guardrail and signs; erect posts and rails or signs	Backfill posts	3	Horizontal, vertical position	No Approval Chits - verbal approval