

# Topic 4 Section 9

# Measurement: Contract Payments

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# Construction Progress Payments

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**Note!**

*The following discussion includes references to various clauses in the Australian Standard. These references were correct at the time of compilation of this manual. Trainees are advised to check the current version of the standard for correct clause numbers.*

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Provisions of the contract related to progress payments are of major importance to the contractor. The contractor delivers to the superintendent, at the times stated in the Annexure, a payment claim for works undertaken in accordance with Clause 42 of AS 2124.

Within 14 days of receiving the claim, the superintendent issues the principal and the contractor with a certificate which states the amount that, in the opinion of the superintendent, should be paid.

Contractors usually make a weekly or monthly claim for payment. The normal procedure is:

- The contractor submits a claim for payment, stating the amount of work completed and the estimated value.
- The resident engineer undertakes a measurement check, verifies that the claim is correct, and advises the superintendent. The resident engineer may carry out the measurement check with the contractor, or independently (as discussed in an earlier section).
- The superintendent issues a payment certificate to the principal (with a copy to the contractor) stating the amount which, in the opinion of the superintendent, should be paid.
- The principal pays the stated amount to the contractor.



The important point is that the superintendent is acting independently; his or her main role is to ensure fair outcomes for the two parties to the contract. It is the superintendent, not the principal, who issues the payment certificate. Once it has been issued, the principal is obliged to pay an amount not less than that shown on the certificate.

Payments of amounts owed by contractors to subcontractors are subject to negotiations between the two parties to the subcontract. There is no certification by a third party. However, in Queensland, legislation now covers the process of making subcontract payments (Subcontractors' Charges Act 1974; Subcontractors' Charges Amendment Act 2002); it provides the subcontractor with avenues of redress for claims of non-payment or under payment.

## Approval of Progress Payments

The inspector is normally responsible for checking and verifying the payment claim. However, the inspector's duties are limited to checking quantities and extending the costs.

Validating the contractor's payment request normally involves the following tasks:

- Quantity take-off and check, up to the date of the request.
- Field measurements of quantities of work completed and claimed.
- Construction cost estimate of all completed work, using the unit rates from the schedule of rates submitted at the time of the tender.
- Review of any claims for extra work.
- Completion of a checked schedule of rates, to identify any errors and discrepancies.

The inspector may carry out these either in co-operation with the contractor, or independently. Where the resident engineer has undertaken an independent check, he or she must advise the contractor of any changes and the reasons for the changes.

Clause 42.1, second paragraph, of AS 2124 is quite clear on this point, where it states:

Within 14 days after receipt of a claim for payment, the Superintendent shall issue to the Principal and to the Contractor a payment certificate stating the amount of the payment which, in the opinion of the Superintendent, is to be made by the Principal to the Contractor or by the Contractor to the Principal.

The Superintendent shall set out in the certificate the calculations employed to arrive at the amount and, if the amount is more or less than the amount claimed by the Contractor, the reasons for the difference.

## Progress Payments

If the work is being carried out using a schedule of rates contract, the unit rate is used as the basis for calculating all progress payment amounts. However, because a unit-rate contract does not have a fixed ceiling price, the final cost to the principal will be determined by the quantities actually completed, and their determination must be precise.

Clause 42.1 of AS 2124 sets out the requirements for the calculation of payment. The main requirement of this clause is that the contractor is paid an amount determined by the superintendent; it includes, amongst other items, the value of the work undertaken up to the time of the claim.

The clause also states the types of deductions that shall be made. These include:

- amounts already paid under the contract
- amounts the principal is entitled to deduct, including retention monies and other monies that are due under the terms of the contract
- the estimated cost of rectifying defective or omitted work.

The contractor is therefore entitled to be paid an amount of money equal to the unit rate multiplied by the actual quantity constructed, less any deductions. If the quantity of work actually completed exceeds the original tender amount, then the contractor will receive more money than originally tendered.

However, the opposite can apply; the contractor may receive less than the tender price.

Amounts above or below the original tender amount are known as over-runs and under-runs, respectively. Most contracts limit the amount of over-run or under-run to 20% of the tender amount. In such cases, the contractor is entitled to renegotiate the unit rate. Although 20% has been stated as the normal level, the percentage of over-run and under-run can vary from 10 to 25%, according to the type of contract.

However, these provisions are true only for a schedule of rates contract.

With lump-sum contracts, the contractor cannot receive more money than the tendered lump sum, even if the quantities differ from those scheduled. However, the contractor may receive more if the principal orders variations to the work, or the quantities form part of the contract.



## Variations and Extra Work

It is standard practice in construction contracts to give the principal the right to make changes to the work after the contract has been signed, and during the construction period.

Depending on the contract and its specific terms, such changes might involve:

- additions to and omissions from the work
- changes in the method of construction, or manner of work performance
- changes in materials
- changes in the contract time or order of work.

The principal issues a site instruction or a letter to the contractor to modify, or change by addition/subtraction, or otherwise alter the original contract documents. However, the alterations must be considered to be within the scope of the contract; otherwise, the contractor is not bound to execute the variation.

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### Note!

*Variations are the only legal means available to change the contract provisions after a contract has been awarded. When errors are found in the documents, the site instruction or letter fulfils, after the award of the tender, the same function that the notice to tenderers accomplishes during the tendering stage.*

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The variations may change the costs involved in the contract, and the change is not always in the contractor's favour. However we will discuss this issue when we consider the relevant clauses in AS 2124.

Variations and extras are used to:

- revise contract plans, and specify the method and amount of payment and changes in contract time resulting from the revision.
- revise contract specifications, including changes in payment and contract time that may result from such revisions.
- effect agreements concerning the work, including any payment or changes in the contract that may result.
- establish (for administrative purposes) the method of extra work payment and funds for work already stipulated in the contract (i.e. provisional sums).
- authorise (for administrative purposes) an increase in extra work payments necessary to complete a previously authorised change.
- cover adjustments to the contract unit rates for over-runs or under-runs, when stipulated in the contract documents (i.e. new unit rates are negotiated if the quantity varies by a specified percentage, e.g. 20%).
- effect payment after the settlement of claims.

When a variation is approved, the written documentation becomes part of the contract documents and is therefore binding on both parties.

## Payment for Extra Work

Payment for extras or variations is in accordance with the conditions set out in Clause 40, Variations, of AS 2124.

In a schedule of rates contract, a pre-arranged value has been established for each schedule item to facilitate the calculation of the amount to be paid to the contractor. However, the cost of extra work that not included in the original contract must be negotiated separately, or the parties to the contract must agree on a fair method of determining the value.

If no such procedures had been set out in the contract documents, this could lead to serious disputation between the contractor and the principal. A clause covering variations is therefore (in most cases) included in the general conditions of contract. Clause 40 covers both variations to the work and changed valuation.

Under Clause 40.1, the superintendent may direct the contractor to:

- increase, decrease or omit any part of the work under the contract.
- change the character or quality of any material or work.
- change the lines, levels, positions or dimensions of any part of the work under the contract.
- execute additional work.
- demolish or remove material or work no longer required by the principal.

The contractor is only bound to undertake work that is within the general scope of the contract. The contractor is not bound to carry out extra work after practical completion, unless it is rectification. Unless the superintendent and the contractor can agree on a price for the work, valuation of extra work is in accordance with clause 40.5.

There are a number of specific instances, as listed below, in which AS 2124 provides that a valuation shall be made under Clause 40.5:

- clause 3.3: Adjustment for actual quantities in a schedule of rates contract
- clause 8.1: Discrepancies in documents
- clause 11: Provisional sums
- clause 12.3: Extension of time and cost (latent conditions)
- clause 14.2: Payment where there is no variation (statutory requirements)
- clause 14.3: Notices and fees
- clause 27.5: Finding of minerals, fossils and relics
- clause 28.2: Care of survey marks
- clause 28.3: Errors in setting out
- clause 30.4: Variations due to defective materials on work
- clause 30.5: Acceptance of defective material on work
- clause 31.7: Costs of testing
- clause 33.1: Rate of progress
- clause 34.4: Cost of suspension
- clause 40.3: Pricing the variation.

Clause 40.5 sets out eight ways in which a valuation can be undertaken.

- If the contract prescribes specific rates or prices to be applied in determining the value, those rates shall be used. Therefore, if the schedule of rates includes specific rates that are to be used in the determination of variations or claims, those rates shall be used.
- If the above does not apply, the rates or prices in a priced bill of quantities or schedule of rates shall be used to the extent that it is reasonable to use them. Therefore if the schedule of rates contains appropriate unit rates, these are to be used if no specific rates have been included.
- To the extent that neither of the above applies, reasonable rates or prices shall be used. This clause can cause a certain amount of discussion, because what is considered reasonable by the superintendent may not be considered reasonable by the contractor.
- In determining the deduction to be made for work which is taken out of the contract, the deduction shall include a reasonable amount for profit and overheads. The amount of the deduction takes into account how the contractor priced the work, and also whether the contractor is able to redeploy resources to other tasks. If not, they may have to meet commitments such as severance pay.

- If the valuation is of an increase or decrease in a fee under clause 14.3, the value shall be the actual increase or decrease without regard to overheads or profit. The contractor would only be able to claim the difference if the payment was greater than the original fee, otherwise it will be a deduction.
- If the valuation relates to additional costs incurred by the contractor for delay or disruption, the valuation shall include a reasonable amount for overheads but shall not include profit, or loss of profit. The contractor in this case can only claim for actual costs incurred due to the delay or disruption.
- If Clause 11 (b) applies, the percentage referred to in Clause 11(b) shall be used for valuing the contractor's profit and attendance. Clause 11 (b) refers to work undertaken in respect to provisional sums included in the contract.
- Day work shall be valued in accordance with clause 41. If the parties cannot agree about the cost of undertaking additional work, or if the work was of a complex nature and difficult to value, the superintendent will often order that it be undertaken by day labour. In this case the contractor must submit all time sheets, wages sheets, invoices, receipts and other documents in support of the claim for the work undertaken.

Accurate record-keeping becomes important when extra work is being undertaken for any of these reasons, or if changes to the contract could result in a claim.

Inspectors are required to keep a daily record of all additional work performed and materials supplied, for use in checking the contractor's payment claims. Such records will also be of considerable value in the final settlement of the claim.

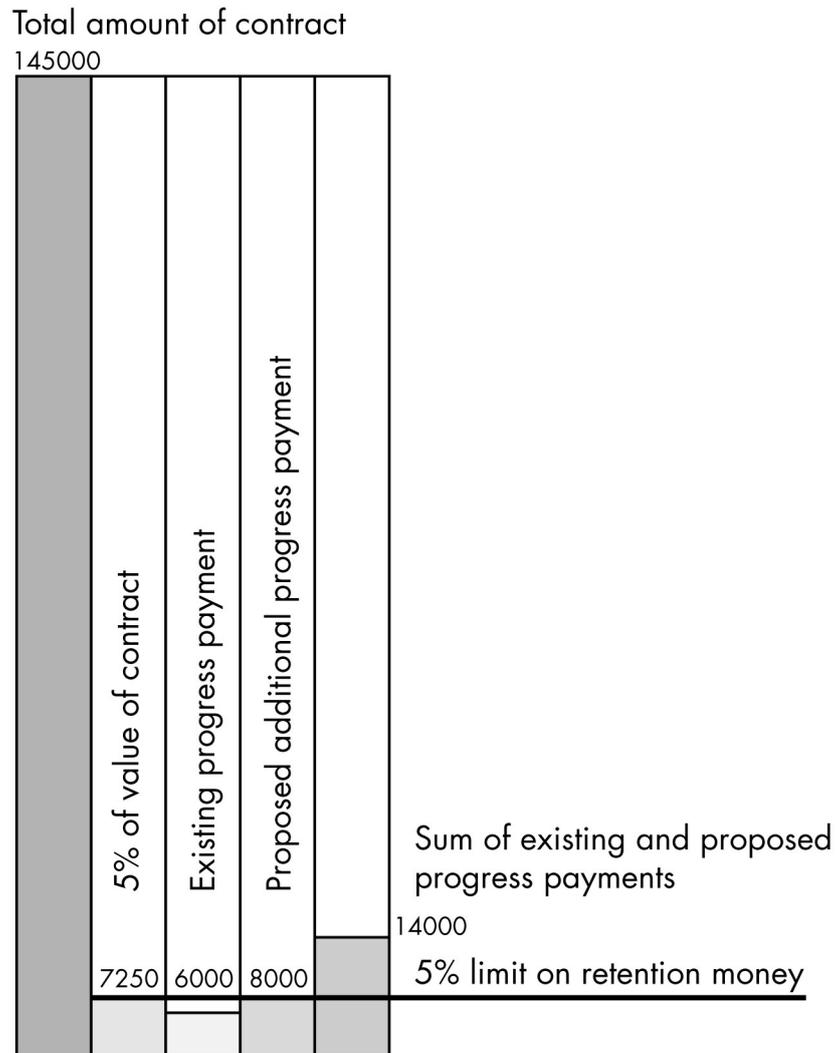
## Retention Money

Most construction projects, particularly public works projects, involve some form of retention money. This is money otherwise due to the contractor, but withheld until some condition has been satisfied. Typically, the percentage of retention money varies from about 5 to 10% of the progress payment. In some cases, the retained funds are held for the duration of the work. In others, there is a sliding scale where the amount may be reduced or actually eliminated at some point, after a specific period of time has elapsed.

Clause 42.3 of AS 2124 states that the principal may deduct from amounts due to the contractor, and retain, an amount up to the limits of the percentages stated in the Annexure. Most public organisations do this to provide money that will allow the principal, if necessary, to pay out lien claims if the major contractor fails to pay sub-contractors or suppliers. If a contractor defaults, these funds may be utilised by the surety to complete or rectify work.

As discussed, there are various ways of calculating the amount to be deducted. One of the most common methods is to deduct 10% of the progress claim, until this sum reaches 5% of the contract sum.

For example, if the contract sum is \$145 000, 5% of the contract sum is \$7250. If progress payments total \$60 000, the principal would hold retention money of \$6000. However, if the next claim was for \$80 000, 10% of this value would be \$8000, which would give a total in excess of 5% of the contract sum, \$7250. Thus the amount of retention money held would be reduced to \$7250 for the remainder of the contract. This calculation is shown in the following diagram.



## Liquidated Damages

Liquidated damages are another amount the principal is entitled to deduct if the contractor has failed to meet the contractual date.

Normally the amount of liquidated damages is based on loss of facility, because the principal is unable to use it for its intended purpose. The amount that can be claimed is stated in the contract documents. Clause 35.6 of AS 2124 stipulates that, if the contractor fails to reach practical completion by the date for practical completion, the contractor is indebted to the principal for liquidated damages at a specified daily rate. An amount accrues to the principal for every day after the date for completion, up to and including the date of practical completion.

Another reason for including liquidated damages clauses is to cover the costs of delays associated with managed contracts, where more than one contractor can be employed on the project.

If one contractor failed to meet the specified key date for a portion of the work, it could affect the ability of other contractors to deliver their portion of the work on time. The delay could result in added charges and make the other contractors' completion dates unenforceable.

## Progress Payment Certificate

The principal makes a progress payment within a specified period of time (usually 14 days) after receiving a payment certificate from the superintendent. The superintendent is responsible for issuing the certificate in accordance with established procedures, and on time. The amount shown on the certificate will be the gross value of the following:

- any progress payment claim in respect of work completed to a specified time.
- any other amount the principal is allowed to deduct, as a result of any correction to the contract
- any amount due to the principal from the contractor otherwise than under the contract (Clause 42.10).

### Note!

A progress payment is not evidence:

- that any work item has been constructed or executed
- of the value of any of the work constructed under the contract.

Instead, a progress payment is simply a payment on account. Even though the principal has paid for the work, the contractor is still responsible for rectification at his or her own cost if it is found to be defective.

## Final Payment

When the contractor considers that the work is nearing practical completion, he or she must inform the resident engineer 14 days before the anticipated date of practical completion.

When the contractor is of the opinion that practical completion has been reached, the superintendent shall be requested to issue the certificate of practical completion.

No later than 14 days after the receiving this notice, the resident engineer must issue to the contractor:

- the dated certificate of practical completion, or
- the reasons why the resident engineer is not prepared to issue the certificate.  
(This must be in writing).

The certificate does not constitute approval of the work or affect any other outstanding issue. When the certificate is issued, the contractor is advised that the defects liability period

has commenced and that any rectification work should be completed during this period.

It is normal practice for both the contractor's representative (e.g. a senior supervisor) and the inspector to inspect the work and note all outstanding work that has to be completed during the defects liability period. This will include minor omissions and defects not affecting practical completion. These details are recorded and submitted in writing to the contractor.

After the defects liability period has expired, and within a specified time, the contractor may submit the claim for final payment. If the work has been completed to the full satisfaction of the principal, the contractor is paid all monies that may be outstanding.

## Date of Practical Completion

The terms practical completion and date for practical completion, as detailed in AS 2124, are critical terms of the contract. Problems may arise if they are not correctly determined.

AS 2124, Clause 2, provides definitions of the terms date for practical completion, and date of practical completion.

### 2 INTERPRETATION

In the Contract, except where the context otherwise requires...

'Date for Practical Completion' means

- (a) where the Annexure provides a date for Practical Completion, the date;
- (b) where the Annexure provides a period of time for Practical Completion, the last day of the period,

but if any extension of time for Practical Completion is granted by the Superintendent or allowed in any arbitration or litigation, it means the date resulting therefrom;

'Date of Practical Completion' means-

- (a) the date certified by the Superintendent in a Certificate of Practical Completion issued, pursuant to Clause 42.5, to be the date upon which Practical Completion was reached; or
- (b) where another date is determined in any arbitration or litigation as the date upon which

Practical Completion was reached, that other date;

'day' means calendar day;...

'Practical Completion' is that stage in the execution of the work under the Contract when –

- (a) the Works are complete except for minor omissions and minor defects -
  - (i) which do not prevent the Works from being reasonably capable of being used for their intended purpose; and
  - (ii) which the Superintendent determines the Contractor has reasonable grounds for not promptly rectifying; and
  - (iii) rectification of which will not prejudice the convenient use of the Works; and
- (b) those tests which are required by the Contract to be carried out and passed before the Works reach Practical Completion have been carried out and passed; and
- (c) documents and other information required under the Contract which, in the opinion of the Superintendent, are essential for the use, operation and maintenance of the Works have been supplied;

The general conditions of tender include these terms under Clause 35, Times for Commencement and Practical Completion.

The contract commences when the successful tenderer's offer is formally accepted. This is normally taken to be the date of the letter of acceptance. Where the post is used to communicate acceptance, acceptance and (therefore the contract itself) will be effective from the time the letter is posted. Principals would normally ensure that such time occurs no later than the date on the letter.

The date for practical completion is normally determined by adding the time for practical completion to the commencement date of the contract. AS 2124 uses this approach, but also allows the principal the alternative of nominating an actual date for practical completion in the tender documents.

At the commencement of a contract, the contractor is required to commence work on the site within 14 days after being given possession of the site. If he or she is unable to do this, he or she must advise the superintendent who may approve an alternative date. If the contractor does not commence work, they will be held in breach of the contract.

The period of contract (and, consequently the time of completion) can only be changed with the approval of the superintendent, using reasons set out in the 'extension of time' clauses. We can only determine whether a contractor has reached practical completion by the date for practical completion by considering the following time periods:

- Original contract period
- Delays due to variations to the contract
- Delays resulting from inclement weather
- Delays caused by the principal and/or superintendent
- Other events listed in Clause 35.5
- Extensions of time actually granted.

If the resultant period is less than the time taken by the contractor to complete the work, the contractor shall be indebted to the principal for liquidated damages at the rate stated in the Annexure for that period.

On most work undertaken by contract, the defects liability period commences from the date of practical completion. During this period the contractor is expected to maintain and rectify the completed work.

Once the date of practical completion has been reached, the contractor is only liable to rectify any defects or omissions existing at practical completion or that subsequently become discovered during the defects liability period. If the superintendent requests a variation to the work after this date, the contractor is not bound to execute it.

## Measurement Issues

The techniques used to make field measurements, and the accuracy of the measurements, rarely cause problems with payment. However, certain types of measurements may not be representative of the true pay quantities set out in the contract documents. The important requirement is to measure the quantities detailed in the contract documents.

An example of such a measurement is shown in Case Study 4 at the end of this manual.

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### **Note!**

*All staff engaged in measuring up for payments must read the contract documents very carefully before undertaking the measurements.*

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## Measurement Guidelines

The following is not intended to be an exhaustive listing of all special areas of concern, but rather a sampling of some of the more common measurement problems encountered under a unit-price or schedule of rates contract.

The inspector must always check the contract documents before commencing a measure.

## Area Measurement

Special care is required when measuring areas of pavements and retaining walls.

### *Pavements*

The measurement of areas for payment usually presents no problem, but the contractor must achieve the proper pavement thicknesses. However, under-runs may occur where the contractor is being paid both for excavation of the roadbed (on a volume basis) and pavement surfacing on an area basis.

In some cases, there may be separate payments for pavements over small areas, such as trench resurfacing, and for larger paved areas that can be done with a paving machine. An example of the problems involved is shown in Case Study 5.

## *Retaining Walls*

If a retaining wall is constructed around a property, the inspector should be exceptionally careful about measuring the area of the wall. If all measurements are around the outside of the wall, the cost to the owner will be excessive. However, if all measurements are made on the inside face, the cost to the contractor would be unfair. Each wall surface should be taken as a prism, and any space occupied by the previously measured prism should not be included in other measurement of adjoining surfaces.

## Volume Measurements

The method of measuring becomes important when earth, rock and hot materials are involved.

In many cases, a survey crew measures the volume, taking cross sections of the affected area. If a volume of material is to be placed in accordance with the lines shown on the drawings, make sure that a survey crew is on the site before the work commences, to measure the exact profile of the ground before the work begins. Otherwise, there may be disputes about quantities.

## *Determination of Paving Quantities*

On asphalt–concrete pavement jobs, where the asphalt concrete material is to be paid for by the tonne, the inspector should watch closely for over-excavation. Even an additional 10 mm of depth can mean a large cost difference on a large roadway project.

Similarly, take care when the price of asphalt concrete is priced by the square metre of material placed to a specific depth. If the contractor reduces the thickness of pavement, he or she can obtain a payment for the full depth, while pocketing the difference for material not placed. (This is the difference between the estimated amount of material and the amount actually placed).

Many materials are subject to special conditions for the determination of pay quantities.

For example, asphaltic prime coat is usually measured in litres. However, the inspector should be certain that the volumes being paid for are based upon the volume that the material occupied at the particular temperature specified (e.g. 15°C).

However, if the material is placed hot and the inspector measures the volume at that time, an overpayment could result.

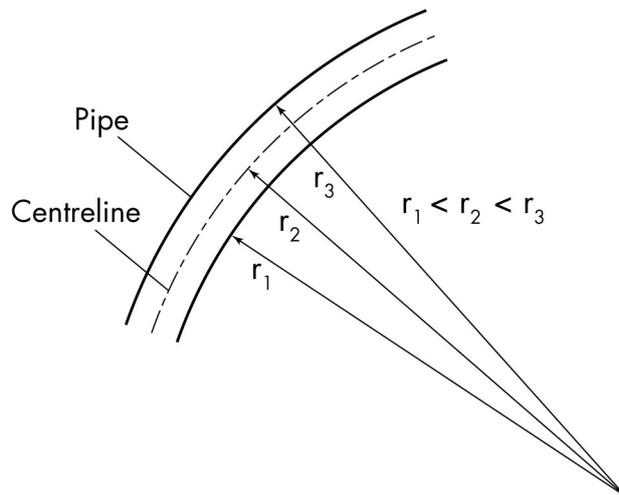
## Weight

At the beginning of the job, always establish what the basis of weight measurement will be.

## Linear Measurement

### Pipelines

Pipeline construction is often paid for in terms of length in stations (horizontal measure), as determined from the plans. Alternatively, measurement for payment could involve field measurements by a survey crew (which will also be horizontal measurements).



Pipelines may also be paid for by measurement along the top of the pipe in place. This method will yield the actual length of lay. Two important “don’ts” of measuring pipelines are:

- Do not accept lengths of pipe for measurement prior to laying.
- Do not allow measurement along the side of the pipe on the outside of curves.

Sometimes pipelines are paid for by measurement in the field, horizontally along the centre line of the pipe in place. This should result in the same quantity as that indicated on the plans.

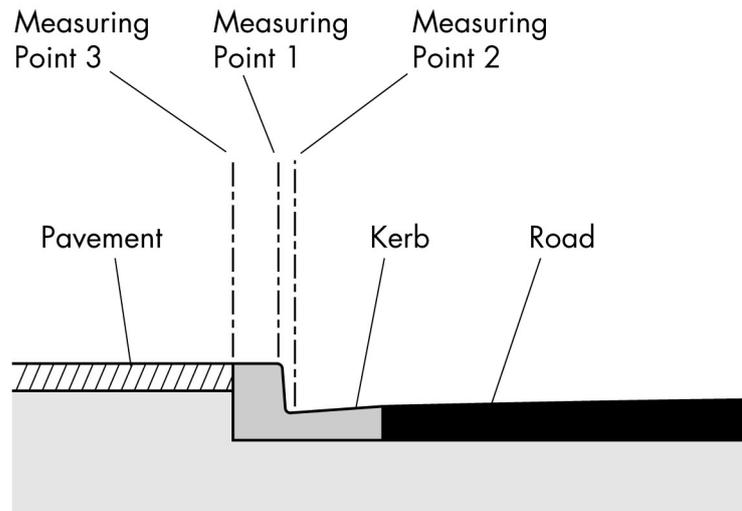
### Kerbs

Kerbs are generally measured in the field along the top edge, facing the street (1).

However, it is possible to measure the length of a kerb at a number of points:

- at the flow line (2, the slope of the kerb face may yield a slightly greater quantity this way, under certain conditions).
- at the footpath side of the top edge of the kerbing (3, in some cases, this may also cause errors).

The important thing is not so much where the measurements have been taken, but that all measurements are taken at the same place for the duration of the job.



### *Channels*

Where flood-control channels or similar structures are to be lined, always measure them at the same location each time. If the point of reference is the toe of a slope, do not permit the measurements to be made on opposite sides, as this will alter the indicated length.

### *Sewer Lines*

Measure RCP sewer pipe lines when they are in place. However, do not allow measurements to be made through sewer manholes, as the separate price paid for manhole construction already covers this cost.

### *Fencing*

Chain link fencing is measured either horizontally, or along the top rail of the fence in place, depending on the specified method. As with pipelines, the indicated length will be less when measured horizontally.

## Section 9 – Assessment Activities

For information on how these assessment activities may be used as part of the learning process, see the section on ‘Assessment’ in the ‘Topic Descriptor’ section at the front of this topic.

### Theory Questions

The following questions allow you to assess your progress in understanding the material presented in Section 9. The questions may be of any of the following types:

- multiple choice (identify correct answer or answers)
- multiple choice (identify incorrect answer or answers)
- fill in the gaps in a sentence or statement
- identify a sentence or statement as TRUE or FALSE
- write a few sentences or a short paragraph.

Answers to the question are shown in the separate ‘Answer’ section.

#### Question 1

It is standard practice to give the principal the right to make changes to the work after the contract has been signed and during the construction phase.

Describe three reasons why variations to the contract may be made.

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#### Question 2

If the resident engineer requests the contractor to undertake extra work, when is the contractor obliged to comply?

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**Question 3**

Which of the following descriptions accurately describes the meaning of the legal term ‘liquidated damages’.

The amount of money that is principal is entitled to if the contractor becomes bankrupt.

The amount that the principal is entitled to if the contractor fails to meet the contractual date.

The maximum amount of damages that the contractor must pay to cover the cost of flooding or other water damage.

**Question 4**

When the contractor considers that the work is nearing practical completion, how long before the anticipated date of completion must the contractor inform the resident engineer?

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**Question 5**

Once a certificate of practical completion is issued by the superintendent, does this mean that the contractor has no further liability for faults or defects?

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**Question 6**

List four tasks involved in approving progress payments.

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*Question 7*

List four of the processes required to claim final payment.

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