



ICPC Recommendation

Recommendation No. 2

Recommended Routing and Reporting Criteria for Cables in Proximity to Others

Note: The presence of a Suffix letter after the Issue number indicates inclusion of updated peripheral information that does not change the wording of this Recommendation.

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PREAMBLE

The purpose of this recommendation is to assist cable owners and those planning submarine cable systems that cross or are in close proximity to existing in-service cables. Owners of existing cables which may be crossed by a planned cable should also find assistance from this recommendation in reaching agreement on the manner of any proposed crossing or close approach by a new cable system.

The recommendations are based on best practice/worst case scenarios and, given the proliferation of modern cables, it is unlikely that many proposed crossings will meet all, or even most of the criteria.

Nonetheless, the recommendation should be used as a guideline to enable the two cables' owners to reach a compromise over the planned crossing, acceptable to both parties. Ultimately, the objective is to allow each cable to share the seabed without significant impact to future maintenance of either cable.

1. INTRODUCTION

This Recommendation provides generalised cable routing and notification criteria that the ICPC recommends be used when undertaking cable route planning activities where the cable to be installed crosses, approaches close to or parallels an existing or planned system.

The criteria set out in the following paragraphs are designed to specifically apply to submarine telecommunication cables. For information on crossing power cables and pipelines, see ICPC Recommendation No. 3.

2. CABLE ROUTE SELECTION DATA

2.1 General

The minimum requirements for cable routing are embodied in the United Nations Convention on the Law of the Sea (UNCLOS) Articles 51, 58, 79, and 114. It is necessary to give due regard to cables or pipelines already in position. In particular, possibilities of repairing existing cables or pipelines shall not be prejudiced.

The routing of a cable depends on a number of factors, including the end points to be connected, seabed characteristics, risks of cable damage, water depths, the routes and characteristics of cables already in place. Cable routing guidelines to strive for under ideal conditions are suggested below. It must be noted that in practice, a number of factors particular to any given cable installation may prevent adherence to certain of these guidelines. In areas of dense cable congestion, it will not be possible to meet these guidelines; therefore a compromise must be agreed between each cable owner.

The routes of new cables should be selected so as to avoid crossings of other cables, in particular existing in service cables, whenever feasible. Crossings of two or more cables, which would create a close spaced triangle or matrix, or other situation which prejudices the repair of existing cables should be avoided if possible. Where this is not possible, then consideration should be given to Section 2.12 of this recommendation.

Optimised cable crossing and parallel criteria would ideally consider such factors as water depth, cable maintenance and repair, accuracy of the navigational control methods used to identify the locations of existing cables, and local legal and permitting requirements.

These factors, coupled with natural and cultural submarine obstructions, will all influence crossing angles and spacing. It is recommended that each crossing and parallel situation be examined on its own particular merits, with consideration for the prevailing environment and conditions.

2.2 Planning

When new systems are conceived, it is important that potential cable crossings are considered as early as possible in the planning process. Approaches should be made to other cable owners whose cables may be affected and information, including the positions of their submerged plant, sought from them. In cases where two or more new systems are being planned and installed in the same time frame, it may be appropriate to also approach the system supplier responsible for the routing and installation. The protocol in such cases should be agreed between the purchaser and supply contractor. Communication between the two supply contractors during installation is critical so the installation timing and location is known.

In areas where cables must through necessity closely approach others, for example at existing cable landing points, it is recommended that Maintenance Authorities of cables in close proximity are consulted in order to ascertain the most up to date Cable Route Position Lists (RPLs) including any adjustments for cable maintenance operations. An exchange of route information from both the existing and planned cable should confirm if indeed no crossings are required and help prevent unforeseen interaction between cables.

Those planning a new cable should consider providing ICPC with basic cable routing and landing details for dissemination to its members. This action will raise awareness and allow other members to alert the presence of in service cables in the same vicinity.

NB: Failure to relate the positions of repeaters in other systems to the positions of repeaters in the system being planned may result in problems with recovery of repeaters during repairs later in the lives of either system.

2.3 Crossing Agreements

The early stages of the Route Engineering process will identify existing and planned cables that the new system will closely approach or cross. Early consultation should take place with the Maintenance Authorities of these other cables in order to reach an agreement on the position and manner of the crossing or close approach.

In most cases the cable owners should be able to come to an accord without a formal signed Crossing Agreement (which would contain liability and insurance provisions), this being effected by a simple exchange of correspondence covering the technical aspects of the proposed crossing, an 'agreement to cross'.

For such a simple 'agreement to cross', (which should not require a signature from either party), the Maintenance Authority for the crossing cable should forward to the Maintenance Authority for the crossed cable the following information:

- i) A Route Position List (RPL) covering the route of the cable for at least three times depth of water on both sides of the proposed crossing point

- ii) The information source for the crossed cable route (Admiralty Chart, 3rd party database name or RPL provenance)
- iii) Depth of water
- iv) Angle of cables crossing
- v) Cable armour type
- vi) Positions of any submarine plant within 3 x depth of water on both sides of the proposed crossing point.
- vii) Derivation of navigational data, including datums
- viii) Type of seabed in area of crossing
- ix) Burial information, if applicable, including the procedures to be followed by the Installer, when crossing the cable.

It is helpful to include the above information in a chartlet of the crossing area or close approach, showing both cables and any other points of interest. Consideration should be given to supplying a copy of the RPL for the whole of the particular segment of the system involved as this may serve to highlight areas where the cables are in close proximity away from the crossing point.

To aid this process ICPC have produced an agreement to cross notification template for the exchange of technical information (Attachment 1). The Maintenance Authority for the crossed cable should then review the information and respond on a timely basis to ensure that the crossing falls within the guidelines laid down by this procedure, or if that is not possible, that a compromise is reached which is acceptable to both parties.

Ultimately an 'agreement to cross' may not be achieved if both parties cannot reach an agreed compromise.

NB: The need for both parties to provide the fullest possible information to each other, as early as possible in the project timetable cannot be overstressed. Delay in forwarding the initial request will have a knock on effect, as will the failure to supply sufficient information for the other party to make an informed decision. Project timescales are becoming foreshortened and the fullest possible information, sent as early as possible, will help to ensure that crossing agreements can be concluded well in advance of the cable installation.

2.4 Cable Crossings

When crossings are unavoidable, they shall be made as near to a right angle (90 degrees) as possible. If a 90-degree crossing is not technically feasible then angles down to 45 degrees may be considered depending on the particular circumstances. It is highly recommended that crossing angles shallower than 45 degrees not be implemented in order to ensure operational and maintenance activities related to either cable are not compromised.

2.5 Cable Types

Cable types shall be chosen to avoid situations where armoured cables cross lightweight (LW) cables and vice versa due to the risk of abrasion.

Where it is proposed to install an armoured cable over an existing LW cable, special coverings shall be applied to armoured cables or special crossing methods implemented where this situation is deemed unavoidable.

Where it is proposed to install a LW cable over an existing armoured cable, a short length of armoured cable shall be inserted into the LW cable at the crossing point or special crossing methods implemented where this situation is deemed unavoidable.

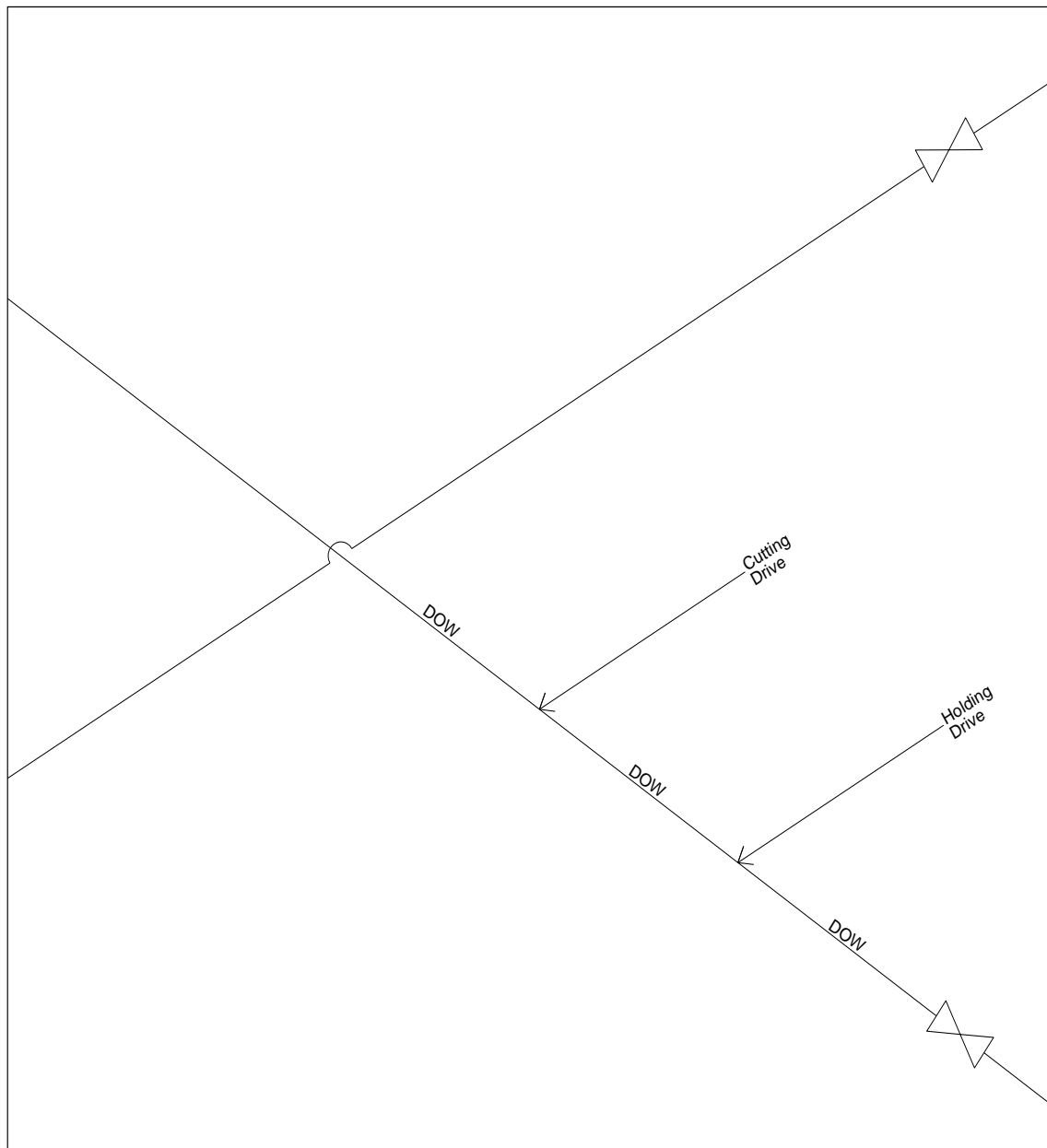
2.6 Repeaters

It is recommended that a clearance of at least three times the depth of water should be allowed between a crossing point and a repeater in the crossed system. The applicable depth of water being the crossing point or the repeater, whichever is the greater. This will ensure that the repeater can be recovered, without endangering the crossing cable, should the cable have been cut so close to the other end of the repeater that recovery from that end is not possible.

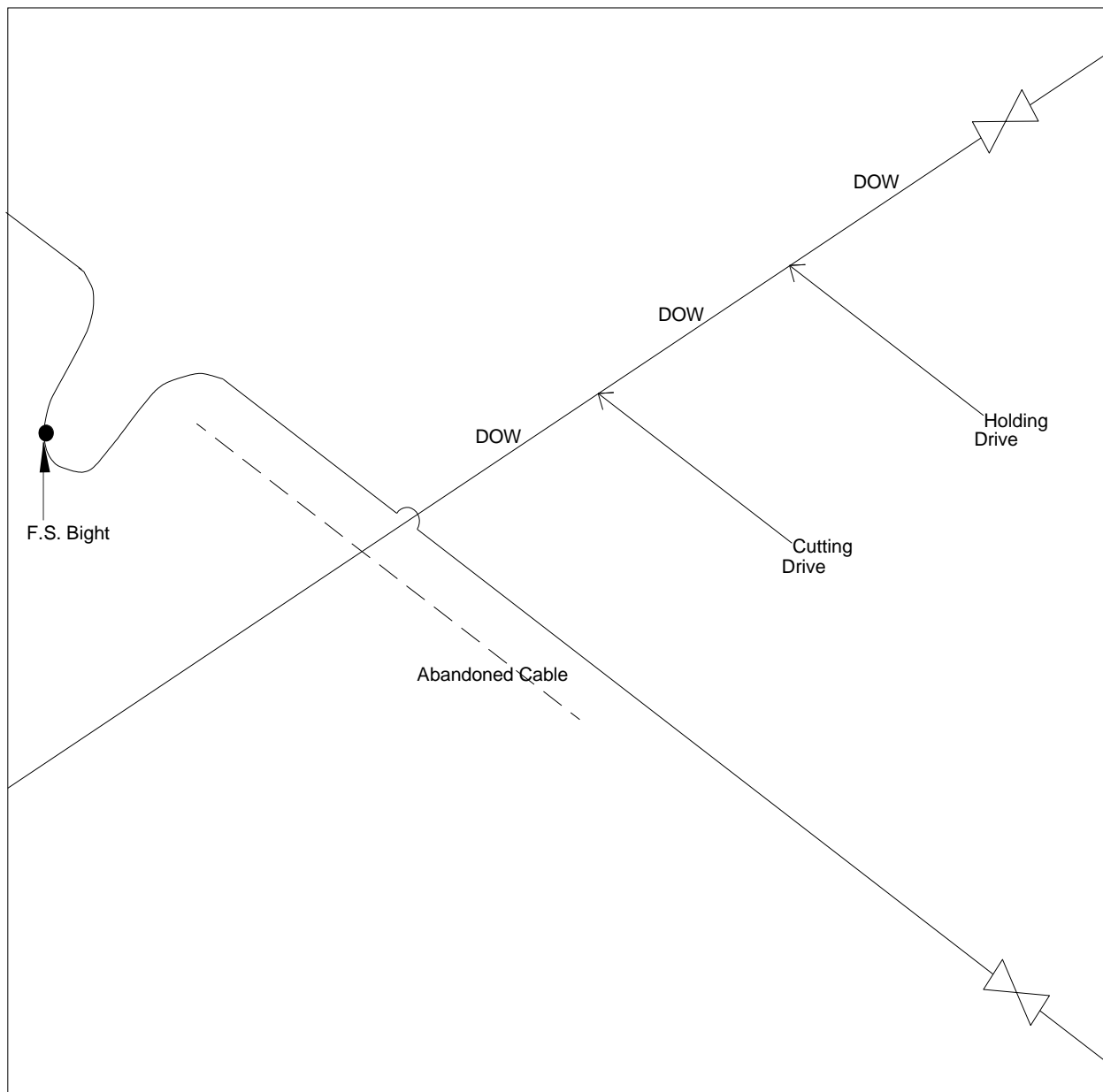
However, with the use of modern navigational equipment and lay/repair practices, these distances could be reduced to 2 times depth of water providing that two such crossings do not exist on either side of the repeater.

If a minimum of 2 times water depth cannot be maintained, then an alternative maintenance solution should be agreed between cable owners.

(See Diagram 1 on the following page)

Diagram 1

Similarly, a clearance of at least three times depth of water should be allowed between the crossing point and a repeater in the crossing system. This will ensure that, in the event of a repair to the crossed cable which results in that cable becoming the crossing cable, the repeater can be recovered should the cable have been cut close to the other end. (See diagram 2)

Diagram 2

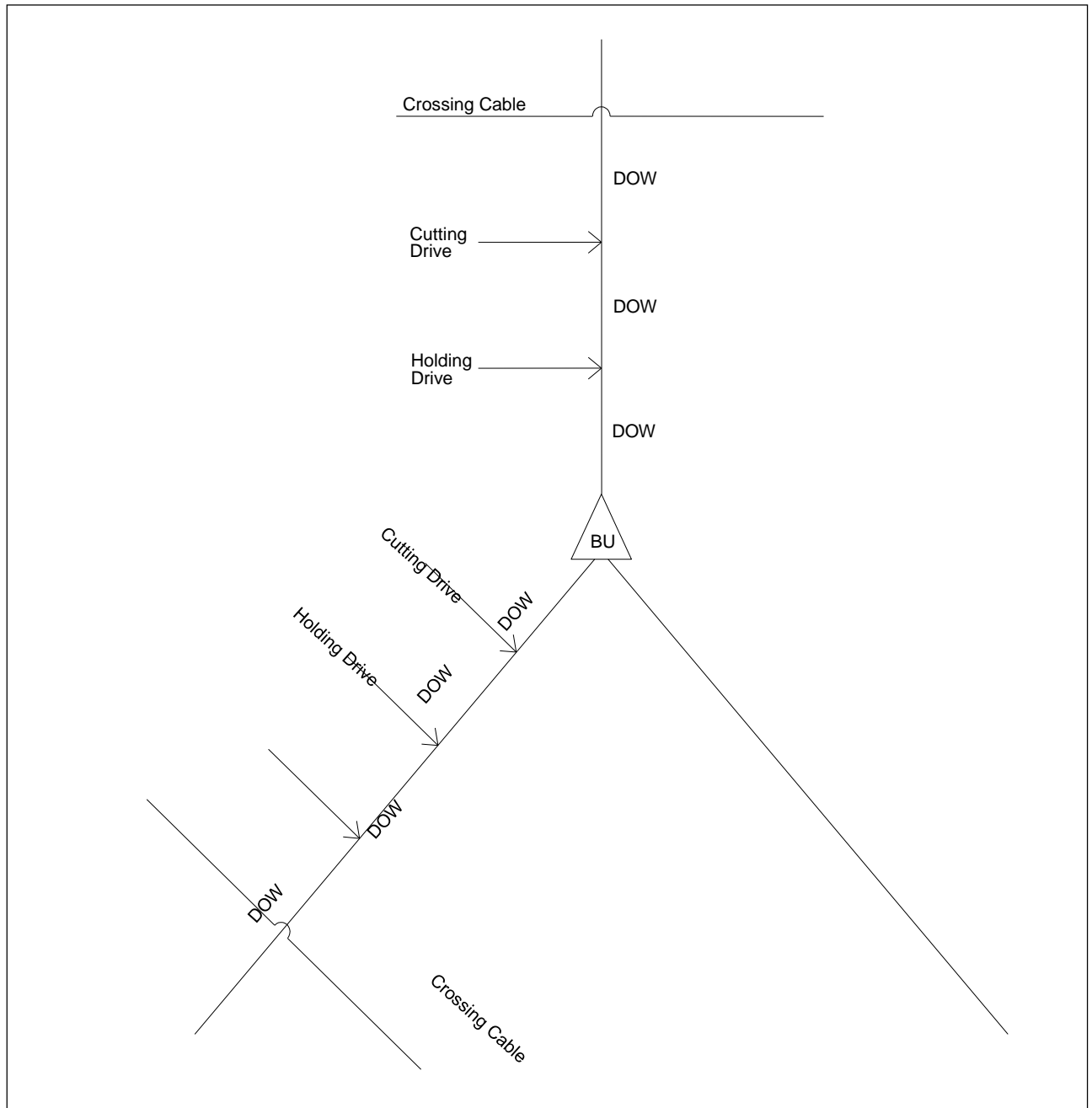
It should be noted that when repairs are carried out close to cable crossings, the planning process should ensure that the final splice is deployed well away from the crossing point and preferably in a direction away from the adjacent repeater, so that it least compromises future repairs in the same area. It should be recognised that practical operational considerations on the repair ground may mean the repair bight direction cannot always be laid away from the adjacent repeater.

It should also be noted that, whilst the clearance criteria of at least three times depth of water should be adequate in most circumstances, in very shallow water this may not be sufficient. For example, in 20m water depth grappling for the crossed cable only 60m from the crossing cable could result in that cable being disturbed: in this situation a clearance of at least 100m should be allowed.

2.7 Branching Units

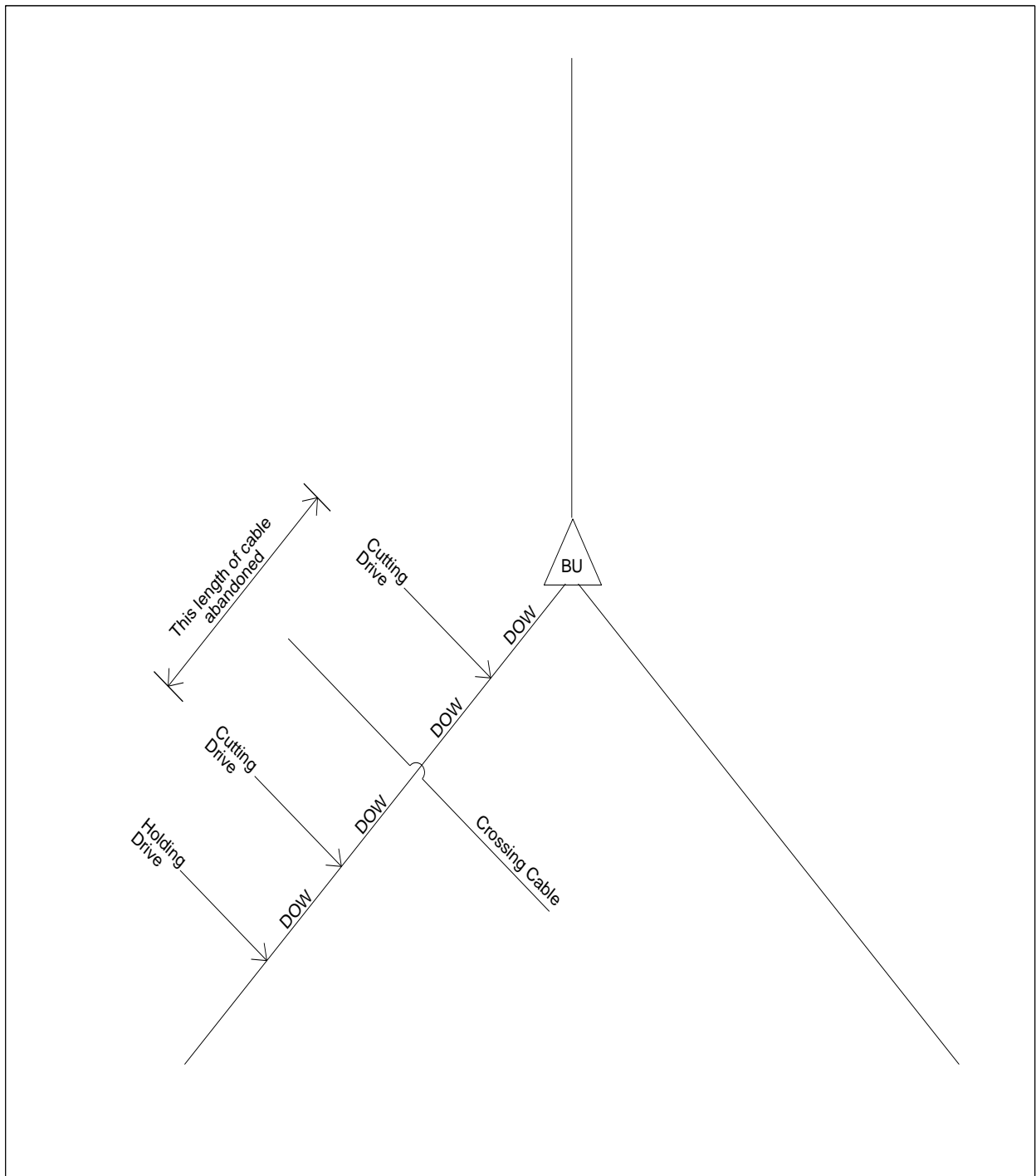
As with repeaters, a clearance of at least 3 times depth of water should be allowed along the main trunk of a branching unit to allow it to be recovered without endangering the crossing cable. The applicable depth of water being the crossing point or the branching unit, whichever is the greater. On the legs of a branching unit, the clearance recommended is 4 times depth of water. This is to allow room for a cutting drive followed by a holding drive to enable the legs to be buoyed off, whilst still keeping operations well clear of the crossing cable. (See diagram 3)

Diagram 3



Where other considerations are paramount, it is possible to cut down the clearance along the legs to twice depth of water, but if this is done then the cutting and buoying operation has to be undertaken outside the crossing point and in that case a length of cable equal to twice depth of water would have to be abandoned on each leg that was crossed. (See diagram 4)

Diagram 4



2.8 Burial Procedures

When it is necessary to cross a buried cable, then the following should apply.

The Maintenance Authority of the crossing cable should supply a copy of the procedures to be followed by its contractor during the crossing operation. This should include at least the following:

(i) Plough up/plough down positions.

These are conventionally 500m before and after the closest point of approach to the cable being crossed. In some circumstances it may be acceptable to reduce this clearance, following discussions with the Maintenance Authority of the crossed cable and the agreement of all parties involved in the installation process. For example the distance from plough up/plough down might be reduced for cables on the continental shelf where the route of the cable to be crossed has been positively identified and located during marine survey.

(ii) Plough position during the crossing.

The plough will normally be flown between the plough up and down positions, though the Maintenance Authority of the crossed cable may ask that the plough be on the deck of the installation ship at this time.

(iii) Post Lay Inspection

An ROV should inspect the crossing point to verify the position and ensure that the cable has been properly laid prior to any burial operations.

(iv) Post Lay Burial.

The cable between the plough up and plough down position will be buried by an ROV, either tracked or free-swimming. The procedure should detail how this will be done and how close the ROV will approach the cable.

If the crossed cable is not buried, permission may be sought to bury a short section at the crossing point, prior to burying the crossing cable.

If the crossed cable is buried, permission may be sought to bury the crossing cable to a shallower depth, leaving an agreed safety margin between the two cables so that there is no risk of the ROV fouling the lower cable.

Should burial not be possible at the crossing point, then cable protection by other methods, such as mattressing or rock dumping may be required.

After completion of the crossing operations, as-laid data should be provided to the owner of the crossed cable in the format and time frame agreed.

2.9 Cable Parallels

Where in service cables parallel one another, the distance between them shall be maintained at 3 times depth of water where possible. However, it is recognised that these separation distances may not be achievable in all circumstances when planning a cable and so the distances may be reduced. With the use of modern navigational equipment and lay/repair practices, these distances could be reduced to 2 times depth of water after consultation and agreement by all affected parties. In areas of high cable congestion, even a separation of 2 times water depth may not be achievable. In these cases, the

maintenance options for each cable should be assessed and agreed with each affected party.

In the case of multiple coastal or festoon type systems, the distance between parallel cables and the number of crossings shall not be ignored in order to reduce the system length. When close parallels are unavoidable because of routing constraints, the minimum spacing between parallel cables shall be determined after consultation with and agreement by all affected parties.

2.10 Shore-end Cables

Every endeavour shall be made to avoid unnecessary alter courses in the routing of shore-end cables. This approach will allow:

- a) The earliest possible launching of a cable plough, where the cable is to be buried into the seabed.
- b) Easier subsequent cable installations to be achieved without unnecessary cable crossings close to shore.
- c) Easier removal of the shore-end cable, should this be required for either permitting reasons or to allow a subsequent cable system to be installed, or for any other reason, after the cable system is withdrawn from service at the end of its service life.

2.11 Choke Points or Narrows

Where there is a feature, or series of features, which restricts the width of the corridor in which a cable must run, careful consideration shall be given to the positioning of the first and subsequent cables in order to maximise the utilisation of the available space.

The route chosen for the first and subsequent cables shall ensure that:

- a) A minimum number of cable crossings occur in the approach to, and departure from, a chokepoint or narrows.
- b) That the cables lie parallel to the maximum extent possible and the distance between cables is chosen with due regard to the installation of further cables through the same feature at some time in the future.
- c) The number of altercourse points shall be kept to a minimum.

2.12 Multiple Crossings

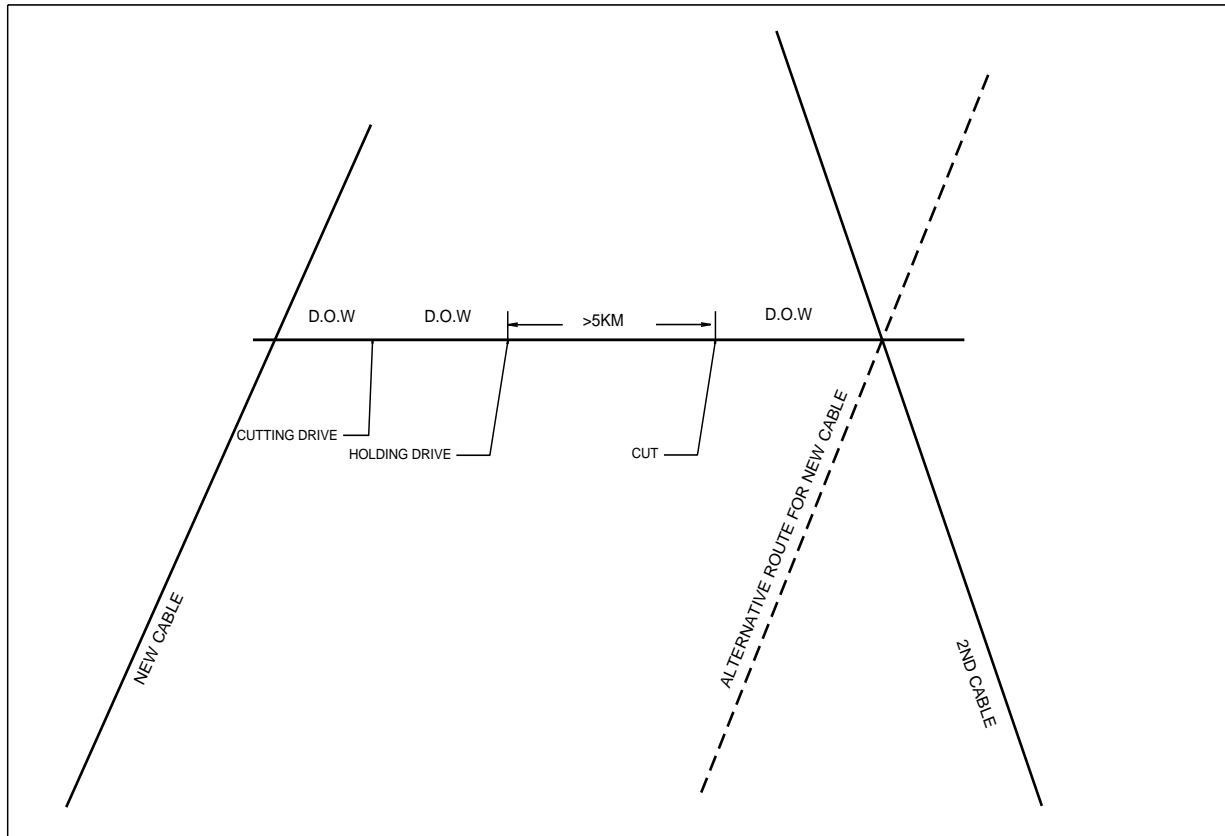
In deep water, crossings should be planned so that they are well away from existing cable crossings. However, where it is not possible to provide a sufficiently large separation, then it may be preferable to install the new cable over the existing crossing.

In the example below (see Diagram 5), a new cable is to be installed close to the crossing point of existing cables. If we assume 4,000m water depth throughout, and that generally in deep water the minimum cable length that can economically be recovered is 5 kms, it can be seen that the minimum clearance between the two cable-crossing points is 17kms. Anything less will effectively sterilise the cable between the two crossing points and render it unrecoverable.

In this case it would be preferable to install the new cable over the original crossing point.

Care should be taken when the original two cables cross at a relatively shallow angle as a third cable may make cable recovery close to the crossing point, during repairs, difficult: however even in this case, the cable unrecoverable at a multiple crossing may be less than would be so if the two crossings were separated.

Diagram 5



3. NOTIFICATIONS IN CONNECTION WITH NEW CABLE CONSTRUCTION OR REPAIRS

3.1. General

Advance notification of planned new cable routes, or repair operations, which will result in close parallels and/or crossings of existing cable routes, shall be made to the responsible Maintenance Authority for the existing cable system or to the Purchaser or Supply Contractor for cables in the process of being installed.

3.2. Contact List

A list, identifying maintenance or engineering contacts for every working cable system in the same general area as the new cable system, shall be established by the Maintenance Authorities of each of the cable systems. This list shall be periodically updated to reflect

current status and shall include telephone, facsimile and e-mail details of the nominated contacts. This list will be used to facilitate required notifications and to obtain existing cable positional data for use in new route planning.

3.3. Conflicts with Military and Government Cables

The organisation that has responsibility for planning the new cable system shall make all reasonable efforts to ensure the planned cable route does not conflict with military, government or any other submarine facilities. Additionally, consultation with other ICPC members that have cables in the area of planned installation could assist in locating appropriate military and government contacts.

3.4. Operational Notifications

The cable owner or Maintenance Authority will ensure that it is a requirement of the cable installation vessel or company to inform all relevant parties of the intention to cross 48 and 24 hours before the crossing and again 24 hours after the crossing.

4. REFERENCES

Document	Title
Submarine Cables: The Handbook of Law and Policy – Publishers: Martinus Hijoff (2014)	Chapter 11, Protecting Submarine Cables from Competing Uses

5. DEFINITIONS

The following words acronyms and abbreviations are referred to in this document.

Term	Definition
DoW	Depth of Water
FS	Final Splice
Maintenance Authority	The organisation responsible for the operation and maintenance of a particular submarine cable system
RPL	Route Position List
LW	Lightweight cable (unarmoured)
ROV	Remotely Operated Vehicle, an unmanned submersible robot

6. ATTACHMENTS

Document Number	Title
Recommendation No.2 Attachment No. 1.	ICPC Agreement to Cross Notification Template

ICPC Agreement to Cross Notification



Planned Cable System Name: *(Name of new cable)*

Planned cable Owner: *(Company name and contact)*

Agreement to Cross Contact: *(cable owner or their agent, name contact details)*

ICPC Recommendation No2 Recommended Information Exchange

- | | |
|-------|---|
| i) | Route Position List (RPL) for consideration: (either co-ordinate listing below or the name of a separate file attached) |
| ii) | Information Source for the crossed cable (Admiralty Chart, 3rd party database name or RPL provenance) |
| iii) | Depth of water at the crossing |
| iv) | Angle of cables crossing |
| v) | Cable armour type |
| vi) | Positions of any submarine plant within 3 x depth of water on both sides of the proposed crossing point. |
| vii) | Derivation of navigational data, including datums |
| viii) | Type of seabed in area of crossing |

- ix) Burial information, if applicable, including the procedures to be followed by the Installer, when crossing the cable.

Crossing Chart

