

BUREAU OF INDIAN STANDARDS

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भारतीय मानक मसौदा

**खुले उत्खनन के लिए विस्फोटन सहित यांत्रिक साधनों द्वारा चट्टान उत्खनन की
इकाई दर विश्लेषण के लिए प्रोफार्मा**

(IS 10777 का दूसरा पुनरीक्षण)

Draft Indian Standard

PROFORMA FOR ANALYSIS OF UNIT RATE OF ROCK EXCAVATION BY MECHANICAL MEANS INCLUDING BLASTING FOR OPEN EXCAVATION

(*Second Revision of IS 10777*)

**Measurement And Cost Analysis of Works for River
Valley Projects Sectional Committee, WRD 23**

**Last Date for Comments:
15 May 2022**

FOREWORD (*Formal clauses of the foreword will be added later*)

Excavation of foundation of various structures such as canals, dams, power houses, etc. in rock are done generally by mechanical means. The excavated rock may or may not be used in aggregate processing, depending on its quality. The mode of excavation depends on the site conditions, type and use of machinery and equipment and the use of ordinary or controlled blasting. Where controlled blasting is resorted to, separate analysis is required for the same. Underground and tunnel excavation requires to be considered separately and where dewatering is involved, the excavation needs to be dealt separately as well.

This standard was first published in 1983. The first revision of the standard was brought out in 1994 to cover the excavation by blasting means and update the standard based on experiences gained from field over time. The second revision of this standard has been brought out to bring the standard in sync with the latest field practices observed while using the standard and to bring it in the latest style and format of the Indian Standards. The major changes incorporated in this second revision of the standard are:

- a) Relevant taxes and duties, wherever applicable, have been added in calculation of unit rates.
- b) Provisions for contractor's overheads and profits have been indicated.

- c) Provisions to account for swell factor and bulk volume in case of earthwork by machinery has been indicated.

For the purpose of deciding whether a particular requirement of this standard is complied with, the final value, observed or calculated, expressing the result of a test or analysis, shall be rounded off in accordance with IS 2 : 1960 'Rules for rounding off numerical values (*revised*)'. The number of significant places retained in the rounded off value should be the same as that of the specified value in this standard.

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1 SCOPE

This standard lays down proforma for analysis of unit rate of rock excavation by mechanical means inclusive of blasting for open excavation.

NOTE —The unit cost of dewatering has not been accounted for in this standard and should be dealt separately. The proforma for unit rate analysis of dewatering is covered in IS 14590.

2 REFERENCES

The standards listed below contain provisions, which through reference in this text constitute provisions of this standard. At the time of publication, the editions indicated were valid. All standards are subject to revision, and parties to agreements based on this standard are encouraged to investigate the possibility of applying the most recent editions of the standards indicated below:

<i>IS</i>	<i>Title</i>
11590: 1995	Guidelines for working out unit rate cost of the construction equipment used for river valley projects (first revision)
14590: 1998	Proforma for analysis of unit rate of dewatering

3 CLASSIFICATION

3.1 The excavation may be classified into the following two classes:

- a) Excavation in rock requiring blasting, and
- b) Excavation in rock without blasting.

3.2 The proforma recommended for use, in analysis of unit rate of rock excavation by mechanical means including blasting for open excavation, is given in Table 1. Where controlled blasting is resorted to, separate analysis should be made for the same. Tunnels and underground excavation should also be considered separately and where dewatering is involved, should be covered separately as well.

TABLE 1 PROFORMA FOR ANALYSIS OF UNIT RATE OF ROCK EXCAVATION
(Clause 3.2)

Sl. No.	Item	Unit	Quantity	Rate	Amount	Remarks
(1)	(2)	(3)	(4)	(5)	(6)	(7)
i)	<i>Drilling</i>					
	a) Drilling machinery and equipment	h				
	b) Drill rod	m				
ii)	<i>Blasting</i>					
	a) Gelatine and/or gunpowder	kg				
	b) Detonators	numbers				
	c) Lead wire	m				
	d) Stemming including exploder charges	40% of detonators cost				
iii)	<i>Ripping and Dozing</i>					
	a) Machinery	h				
iv)	<i>Mucking, Haulage and Disposal</i>					
	a) <i>Machinery and equipment</i>	h				
	i. Loading equipment					
	ii. Haulage equipment					
	iii. Disposal equipment					
	b) Labour	Man days				

v)	<i>Scaling</i>		
	a)	Machinery and equipment	numbers
	b)	Labour	Man days
vi)	<i>Ancillaries and Incidentals¹⁾</i>		
	a)	Proportional cost of the following job facilities:	
		i. Labor and staff quarters	}
		ii. Service roads	
		iii. Electric power supply system	
		iv. Water supply system	
		v. Sanitation system	
		vi. Drainage system	
		vii. Surveying	
		viii. Other amenities including first aid and medical facilities	
		ix. Safety operation charge	
		x. Explosive magazine	
		xi. Stores	
	b)	Maintenance and operation of items mentioned at vi (a)	Percentage
	c)	Supervisory works establishment	
vii)	<i>Contingencies</i>		Percentage
viii)	<i>Overheads and profits²⁾</i>		Percentage
ix)	<i>Taxes and duties:</i>		
	a)	Tax on works	

	b)	Services tax	
	c)	Labour Cess	
	d)	VAT	
x)		<i>Total Rate, C_E</i>	,
xi)		<i>Total quantity of Excavation (Q)</i>	m^3
xii)		<i>Cost $\frac{C_E}{Q}$</i>	per m^3

NOTE —

- a) ¹⁾Care should be taken that items under this clause should not be included in analysis of unit cost of construction equipment (see IS 11590: 1995)
- b) ²⁾Contractors overheads and profit may be decided suitably in the project. The overheads shall include establishment, office stationery, general tools and plant, staff cars and their running and maintenance, insurance, workman's compensation, telephones and telecommunication facilities, security arrangements, etc.
- c) In case of earthwork by machines, swell factor and bulk volume shall be accounted.

