

# **EFFECT OF PRICE ESCALATION CLAUSE IN HIGHWAY CONSTRUCTION** PROJECT

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**Abstract** - In highway Construction industry to save contractors form price fluctuations of material, Fuel, Labour etc. the price escalation clause is added but in different type project and Different type of Government entities are using differential formulae. Contractor/Concessionaire at the time of biding the project and at the time of the project execution i.e from appointed dated its takes about 3-4 years; the project duration above 1 year is taken in to account of price escalation. The price escalation cost will calculate differently with different formulae due to same there is variation of amount. In this paper we will identify the differential cost of price escalation by using one project with different government formulae and we will conclude which type of formulae is adequate. Also, this paper gives us how these prices are calculated, for same which data is to be required. Using different entity price escalation clause, the most efficient and accurate method of price escalation will conclude in this dissertation.

Keywords: Price Escalation, Price Index, Clause, WPI, CPI, Preceding Quarter, CPWD, HAM, etc.

## 1. INTRODUCTION

## 1.1 AIM

In the construction industry, the contractor Highway works in an surroundings of chance and uncertainty resulting from the financial elements including fluctuations inside the expenses of materials, labour and equipment. Contractors and providers operating in nowadays volatile materials market discover that estimating, bidding and financing the development tasks are demanding situations. Many faces tremendous losses or erosion of expected earnings due to the fact lots of them are locked into fixed price creation contracts wherein contractors undergo the risk of material rate and provider value will increase. without the price escalation clause that permits for an adjustment to the agreement rate, if there may be a surprising rise inside the marketplace costs of key production substances, a contractor will have no respite from such will increase. it's miles vital to have an escalation clause within the contract to shield towards an unexpected spurt in the value of materials. To reduce this degree of hazard, it's miles vital for the contractor to consist of huge contingencies in preliminary estimates of the agreement while he tenders the settlement. If the contingencies are puffed up, the probability of the agreement being provided to any other contractor is accelerated.

## History

In India, Central Public Works department (CPWD) deals with public works of important authorities works. CPWD is above a hundred and fifty years old and contract sorts of the CPWD form the basis of many other agreement paperwork accompanied by other Central and state authorities Departments. For the primary time in Mar-1963, a subclause 10C becomes added in CPWD agreement paperwork (Gupta, 1992). inside the modern CPWD contract settlement, the ones summarized below.

Year/ Index	2013	2014	2015	2016	2017	2018	2019	2020	2021
All Commodi ties	111.1	114.8	110.3	110.3	114.1	118.9	121.2	121.8	135
Cement	103.9	108.7	108.6	107.5	109.9	111.8	118.9	120.2	123.8
Steel	98.8	101.7	90.2	84.2	91.3	109	106.5	107.2	131.9

## Table# -1- Historical Index Data

## **1.1 Price Escalation**

Escalation is the change in value or rate of specific items, products, materials & services in a given economy over duration or a period. Inflationary developments in economic system get contemplated through escalation in costs of units. It is the increase in price of any construction factors of the original contract or base price of a project because of passage of time.

Escalation impacts the finances and causes intense monetary overrun by the contractor. It also adds to contingency within the contractor's bid and is the major contributor to the overall cost uncertainty of escalation inside the smooth charges from the company. Creation work is accomplished in keeping with the pre showed agreement settlement. to manage up with the unexpected rate escalation, regulated provision is essential in construction contract document.



An escalation clause is a clause in a contract that ensures a exchange within the contract price as soon as a specific aspect past the manipulate of both party outcomes in an growth or lower within the Contractor's expenses. it is also called "rise and Fall" which suggests that if the rate of positive prices falls then the agreement price could be adjusted within the customers prefer. What is going up may also cross down in any case. pretty often escalation clauses are little understood by using customers unexpected with the specifics of the dredging enterprise. regularly the question arises, "Why do tenderer qualify their gives particularly with admire to fuel escalation?", that is a main element of unit price - typically 20 to 30%. anticipating Contractors to absorb the escalation threat of this of their fees is not exactly the ideal begin for a professional contractual courting among customer and Contractor. furthermore, it is able to properly backfire for the customer with all Tenderers having no other alternative than to place a hefty threat premium into their costs to cowl for sharp increases of factor expenses. based on studies and experience, the advice is made that any dredging agreement of length of greater than 3 to 6 months ought to have an escalation clause covered. on this manner, speculation is eliminated from the obligations of the Contractor and those outcomes in a higher attention on the projected works themselves.

### **1.2 Price Fluctuations**

The volume and the information of the escalation clause and method can and do range in line with the scenario handy. Some examples are given following below such as. Fuel, Steel, Wages. Etc.

### 1.2.1 Fuel

The escalation clauses in dredging contracts goes returned to the early Nineteen Seventies while the oil crisis imposed a massive spike in oil costs. From September 1973 to March 1974 the oil fee elevated 260% in actual phrases paralyzing the arena economy. similarly spikes occurred in 1979 with the fall of the Shah in Iran and extra currently from 2001 onwards the oil rate has been driven up with the upward thrust of demand from the Developed and developing nations like China, India and Brazil competing with the nonstop call for oil inside the US economy. picture 1 indicates the world crude oil prices from 1970 to 2022.



Image # 01: World crude oil prices from 1970 to 2022

### 1.2.2 Steel

From 2004 onwards steel costs greater than doubled because of China's never-ending call for iron ore, with simplest a quick respite because of the global economic disaster. Now the demand for raw Products has resumed and steel prices have hit High stages. Image -2 shows the average month-to-month cost of Iron Ore in Metric Ton Unit from 2002 thru 2021. steel is a not an obvious – but however crucial – element in dredging costs as the dredging contractors use metal in new-construct vessels and for Current repairs to their current fleets.



Image # 02: Iron ore Historical Prices 2002-2021

### 1.2.3 Wages (Labour Index)

The wages of all employees employed by the employer are paid weekly within three days following the last payment period, otherwise not later than the seventh day after the end of the payment period. In the event that the Employee's employment contract is terminated by or on behalf of the Employer, the Employee's wage is paid until the last day of the day following the termination of the employment contract. Payments must be posted online at the office on the working day, unless the job is completed before the due date, the final price must be posted on the paint site within eight hours of the last working day and at any stage of normal business hours. The compilation and data collection of the factory worker's cost index started from the poor financial conditions of the workers as a result of rising costs after World War I. Due to the increase in cost and cost of living, some state governments have started their own research on household budget and consumer indexation for Indian businessmen.

However, none of them were the best. The collection and control of the CPI for commercial workers is taken over by the central government, in line with recommendations made with the assistance of the Ministry of Labour. However, under the direction of the Industrial Welfare Board, in 1958-59, the Ministry of Labor conducted a survey of household behavior in 50 major industrial centers in India and compiled the Consumer Price Index for Industrial Workers on the basis of 1960 (1960) = 100. In 1941, the compilation of the Uniform and Scientific Strain Index began the most successful work. Since then, the collection and maintenance of the consumer price index for workers in the industry has been maintained by the Labor Bureau.

This series (1982 = 100) is a modification of the old series (1960 = 100), only when the numerical index was published in October 1988, the current series based on 2001 (two thousand one) = 100 was corrected and completed in 2006 relative to the previous version (1982 = 100).

## 1.4.4 Centre selection under new series (2016=100):

The services of the new database in 2016 were extensively reviewed and provided information on employment for specific jobs provided by states/union districts, including a list of state centres focused on workers, and aggregated employment data for all states/union territories in India for these jobs from various state governments. The actual operation of the seven existing buildings was used to train all the centres to be included in the new series. Employment of commercial workers in these seven sectors increased by 15 percent, as research from 1999 to 2000 showed that 78 centres were protected. Therefore, the actual location selection depends on the business importance of the location, which is affected by the operation of the intelligent operation.

The 88 centres contain about 60 percent of all jobs in seven industries. There are 65 original stations in the old series (2001=100) and the new series (2016=2016), 23 new stations in the new series and 13 simultaneously cancelled stations.

# 1.3 Index Complication Methodology.1.3.1 Basic framework:

The main factor in the creation of the product price index is weight and price. Weight is the percentage of actual spend on each product at the time of inception, and the starting price is the average annual interest price of the stock held on the exchange in 2016. Firm concept, holding and living costs are aggregated throughout the week and used as a basis for capturing market price. The general steps involved in directory compilation are as follows: the primary components for constructing customer price index numbers are the weights and expenses. Weights are the proportion of real expenditure on every commodity for the duration of the base period and base prices are the once a year common of object degree charges throughout the 2016 in appreciate of objects retained within the index basket. The concept of fixity, the weights and base costs stays constant in the course of the life of the series and best modern period expenses are amassed on weekly, month-to-month and so on foundation to seize the charge motion at the marketplace stage. The extensive stages concerned within the index compilation are depicted as following below:



Image # 03: Steps Involved in Basic Index Compilation.

No. 5/	1/2021	-CPI	MINIST LABOU	GOVERNMENT RY OF LABOUR J R BUREAU, CHAN	OF INDIA E EMPLOYME2 NDIG ARIS- 160	VT 136	2016 - 100	Dated : 3	0.06.2023
State	Sr.	No. Centre	Apr,2023	May.2023	State	Sr.	No. Centre	Apr,2023	May.2023
4.0		Guntur	142.4		Lura			12022	
AP	2	Nellore	133.0	133.7	MEG	53	Shillong	145.5	148.3
	3	Visakhapatnam	148.8	148.8	00	04	Angui-Talchar	144.0	144.4
ASM	4	Biswanath-Chartali	136,1	136.9		60	Conace	143.2	143.2
	6	Doom-Dooma Tinsukia	146.2	147.0	Du uni	50	Keorpras	143.2	193.2
	6	Guwahati	146.6	147.8	PUD	07	Puducherry	140.7	142.6
	7	Labac-Silchar	132.4	133.4	PUN	50	Amousar	128.1	128.1
	8	Numaligarh-Golaghat	139.2	141.7		99	Junior Street	140.5	140.1
	9	Sibsagar	139.6	141.1		60	Luoniana	141.1	140.1
BIH	10	Munger-Jamatpur	135.2	137.1		61	Sangrur	131.8	132.0
	11	Patna	132.8	133.3	FEJN	05	Ahwär	126.9	127.1
CHD	12	Chandigarh	141.3	141.4		63	Bhilwara	132.0	132.2
CHS	13	Bhilai	124.9	126.1	1.	64	Jaipur	128.1	127.8
	14	Korba	139.5	138.9	TN	65	Chennai	131.7	133.1
	15	Raipur	129.1	129.3		66	Colmbatore	130.7	133.3
DNH	16	Dadra & Nagar Haveli	126.2	126.1		67	Coonoor	133.2	134.1
DLI	17	Delhi	128.9	129.0		68	Madural	136.6	137.7
GOA	18	Goa	128.5	128.4		69	Salem	127.8	131.6
CUD	19	Ahmedabad	129.8	129.6		70	Tirunelveli	141.6	143.5
	20	Bhavnagar	131.8	131.6		71	Virudhu Nagar	138.9	136.7
	21	Rajkot	134.9	135.7	TEL	72	Hyderabad	133.7	134.6
	22	Surat	129.0	129.1		73	Mancheriyal	146.5	146.7
	23	Vadodara	130.0	130.0		74	Warangal	137.4	138.2
HRY	24	Fandabad	134.1	133.7	TRP	75	Tripura	130.5	130.4
	20	Gurugram	137.6	137.0	UP	76	Agra	139.0	139.0
	20	Tamunanagar	130,1	136,1		77	Ghaziabad/G.B. Naga	r 137.0	137.9
HP	27	Plinachal Pradesh	131.7	131.6*		78	Kanpur	136.9	137.5
JAK	20	Jammu & Kashmir	138.2	137.7		79	Lucknow	142.0	142.8
JON	20	Bokaro	129.9	120.2		80	Varanasi	135.2	135.8
	30	Dhanbad-Jhana	138.1	130.1	UTK	81	Udham Singh Nagar	145.4	144.5*
	32	Remonth	147.0	147.4	WB	82	Dariesling	125.3	124.8
ware.	33	Relation	130.4	130.0	1.	83	Durganur	138.0	138.1
	34	Bengaluru	127.6	128.2		84	Haldia	124.5	124.6
	35	Chikmagalur	127.7	127.4		85	Howrah	139.3	138.9
	36	Davanagere	140.8	140.0		86	Jalpaiguri	132.1	131.6
	37	Hubli-Dharwed	131.6	132.4		87	Kolkata	138.0	137.6
	38	Mercare-Kodegu	130.8	131.8		88	Ranicani	140.0	140.7
	39	Mysore	134.8	136.1		30		140.0	
KRL	40	Emakulam/Alwaye	136.1	135.4		ALI	INDIA INDEX	134.2	134.7
and a large	41	Idukki	130.7	136.0					
	42	Kollam	134.9	134.0					
MP	43	Bhopal	129.6	130.1					
	44	Chhindwara	129.6	130.4					
	45	Indone	127.4	127.6					
	. 46	Jabalpur	134.5*	139.7			-		
MHR	47	Mumbai	126.1	125.2			C1.		
	48	Nagpur	133.6	135.4			Part	1201-3	
	49	Nasik	125.6	125.6		(5	HYAM SINGH NE	GD	
	60	Pune	124.0	125.0	4	DEPLT	Y DIRECTOR OF	NERAL	
		New York Control of Co		A 4 4 10		N/ B			

Image # 04: Consumer Price Index Region wise adopted in India.

## 1.4 Objective of Project Dissertation

- **1.4.1** To study about price escalation & Collect data for same.
- **1.4.2** To examine the escalation clauses currently used in construction contracts followed through diverse Government Authorities / departments/ organizations in India
- **1.4.3** The adequacy of reimbursement paid to the contractor primarily based on presently used escalation clauses in government Authority containing various contracts.
- **1.4.4** A Case Study of NHAI HAM Project to find out; cost escalation impact on the outcome of construction projects to conclude the efficient way of calculation and Economical Price escalation Formulae.

### 2. LITERATURE REVIEW

A research paper published by Mr. David Kinlan and Mr. Drik Roukema mentioned a clause in the contract that requires price adjustment when there is an increase or decrease in prices. Restructuring provisions are increasingly common in facility contracts as a way to cover unexpected costs arising from changes in raw materials, fuel, and Labour during construction. Contractors must include oil, steel and wage costs when preparing tender estimates and assess the adequacy of the increase to cover the risk of price changes during contract execution. According to the analysis presented here, it is recommended that all screening contracts lasting more than three to six months include an increment clause, as this will remove the guesswork from the contractor's job, which will lead to better results for the job itself. The Changes in the total cost of dredging are mainly due to oil, metal and labour costs.

Ms. Surabhi Kharbanda and Mr. Ketan Jain learned in 2018 that upgrades could account for a significant portion of construction costs. Therefore, the volume of upgrades must be estimated for budgeting and competition. This article explores the use of time-based survey methods to predict construction progress. The time series construction cost index is used as a proxy for construction cost increase. The use of time series methods, their limits and their effects on inflation are determined and analyzed. The analysis strategy is best used in reliable situations to quickly estimate construction projects. This is because no assets can be predicted to increase due to unforeseen events, including war strikes or some key government action. Construction cost increases are at risk to the contractor or owner, or both, under the terms of the contract; any reasonable method to reduce the value.

**Dr. N. B. Chaphalkar & Ms. Sayali S. Sandbhor** examines the calculation model of today's products, analyses the building materials in the product basket, the changes in

the wholesale prices of these products and their effect on the success of the promotion. To give an overview of the Indian financial system, the institutions that contributed to it i.e. Inventories and products marketed in the financial market are regulated by various government-established indicators that affect the market, sale or production costs of products. The Indian market follows the Stock Market Index, which is compiled across the country and is a measure of changes in retail prices in the market. Development is one of the most important and controversial issues in the construction sector. Best Indian Business Rules allow the use of stock market capitalization to calculate capital gains for supplies. The volume of change in the wholesale price over a given period of time affects the calculation of the product.

Ministry of Labor, Ministry of Labor and Labor Function, reported the amount of goods and services from the public index. The index is also important to government as it is used to determine and fix the minimum wage for planned work, as well as to control and determine the Expensive Allowance (DA) paid to all Central/State government employees in the industry/construction sector. The measures implemented by the Office are based on international/international best practices and ILO guidelines. The publication of the CPI (Consumer Price Index)-IW is also based on Special Data on Demand Statistics (SDDS).

The annual inflation rate based on All India Wholesale Price Index (WPI) data stood at 5.85% (temporary) in November 2022 (over November 2021), approaching the 8.39% recorded in October 2022. The last 3 (three) months index and inflation rates of all products and wholesale price contributions are as follows:

Index Numbers & Annual Rate of Inflation (Y-o-Y in %)*									
All Commodities/Major	Weight	Sep-22 (F)		Oct	-22 (P)	Nov-22 (P)			
Groups	(%)	Index	Inflation	Index	Inflation	Index	Inflation		
All Commodities	100.0	151.9	10.55	152.5	8.39	152.1	5.85		
I. Primary Articles	22.6	175.9	11.54	181.0	11.04	177.7	5.52		
II. Fuel & Power	13.2	158.4	33.11	155.2	23.17	159.6	17.35		
III. Manufactured Products	64.2	142.2	6.12	141.9	4.42	141.5	3.59		
Food Index	24.4	175.1	8.02	177.5	6.48	174.3	2.17		

Note: P: Provisional, F: Final, \*Annual rate of WPI inflation calculated over the corresponding month of previous year

### Table# -2 WPI Components

### 3. METHODOLOGY

# 3.1 Collect data for Price Escalation Index and Clause.

Inflation is the expected economic result from the inflation rate calculated from WPI data. Progress refers to the change in price or value of a product or commodity in a particular market over a period of time. Inflationary growth in an economic system is provided by an increase in house prices. John Hollmann and others argue that this is much more than just an increase in the value of the original contract or the initial cost of building the project due to the passage of time. and others defines the increase as the change in the interest rate caused by the main financing. Renovation costs can be prohibitive and cause financial overload for contractors. It also provides an account of the situation in contractor competition, and "inflation" in price competition is important for price uncertainty. The construction process is based on a pre-approved contract. Regulatory clauses should be included in contracts or tenders to avoid exorbitant prices.

# 3.2 Construction contract and claims against price escalation clause.

Contracts and conditions play an important role in carrying out the work correctly and on time, preventing and resolving conflicts that arise. The Terms of Reference of the Contract define the rights, responsibilities, obligations and procedures that the interested parties must comply with. Setting up a construction bid is nothing more than sharing the risks involved with the various parties in the contract. Despite all the provisions in the tender contract, a bid was submitted at the construction site. Claims are usually made when one of the parties to a settlement is harmed and that party wants to get the money back from the other party.

It can be defined as a valid additional payment request due to performance change. The possibility that the cost will increase during the completion of the project may result in additional funds being requested over the initial cost. Claims lead to conflict even if they are not resolved well.

## 3.3 Calculation of WPI (Wholesale price Index)

Each index has its own method of calculating and interpretin g the content and is expressed as the change of the main valu e. The shopping cart is the subject of WPI as it is said to repre sent the entire market. After the cart is placed, changes to th e items in the cart in a financial system are tracked and recor ded. The offer for the same product comes from many sellers . Generally based on this information, further calculations ar e made as follows.

- **3.3.1** Allocation of weights
- **3.3.2** Calculation of price relative
- 3.3.3 Calculation of Index
- 3.3.4 Materials in commodity basket
- **3.3.5** Variation in WPI for major construction materials
- **3.3.6** Case study NHAI NH-6 Hybrid Annuity Project of 641.6 Cr. Project cost.

	Price Escalation in Different Type of Project and Departments										
Item Compensated	Central Public Works Departments	Military Engineer Services	rvices Public Works department Maharashtra NHAI HAM Project		NHAI EPC Projects						
		V <sub>Mc</sub> ={(Kc*Vg)/100}+Vc			VRW=0.85 RW x [PL x(L1-L0)/L0 + PA x(A1-A0)/A0						
Cement	V <sub>E</sub> = W * (X <sub>0</sub> /100)* {(CI-CI <sub>0</sub> )/CI <sub>0</sub> }	$E_{Mk} = \{(V_{Mc2} - V_{Mc1})\} + \{(C_1 - C_0)/C_0\}$	$V_{C} = [C_0 \{C_{L1} - C_{L0}\} * T]/C_{L0}$	Price Index Multiple=	+PF x(FI-FO)/FO +PB x(BI - BO)/BO						
		$V_{Ms} = \{(K_s * V_g)/100\} + V_s$		{(70%*WPI)+(30%CPI)}/{(70%WPI_0)+	+ PM x(MI -						
Steel	Vs=W*(X_/100)*{(SI-SL_o)SL_o}	$E_{Ms} = \{(V_{MS2} - V_{MS1})\} + \{(S_1 - S_0)/S_0\}$	$V_{S}=[S_0[S_{L1}-S_{L0})^{+}T]/S_{L0}$	(30%CPI <sub>0</sub> )}	MO/MO + PC x(CI - CO)/CO+ PS x(SI						
Materials ,Plant and	V <sub>M</sub> =W * (Xm/100)*{(MI-MI <sub>o</sub> )/MI <sub>o</sub> }	$V_{M} = \{(K_{oM} * V_{g})/100\} + (V_{oM} - V_{B})$	Vm=0.85*Pm/100*R*{(Mr	Project Cost (with Escalation)=Project	- SU/SU] &						
Machinery	$V = P^*Q^* \{(CI-CI_0)/CI_0\}$	$E_{M} = \{(V_{M2} - V_{M1})\} = \{(W_1 - W_0)/W_0\}$	$M_0)M_0$	Cost (Including GST)*Price Index	PA x/A1 = A0/A0						
POL	V <sub>F</sub> =W*{Z/100}*{(FI-FI <sub>0</sub> )/FI <sub>0</sub> }	Nil	V <sub>f</sub> =0.85*P/100*R*{(F <sub>1</sub> -F <sub>0</sub> )/F <sub>0</sub> }	Multiple	+ PF x(FI_FO)/FO + PM x/MI_						
Labour	VL=W*{Y/100}*{(LI-LL <sub>0</sub> )/LL <sub>0</sub> }	$E_L = \{(K_L/100)^*V_{g1}\}^*\{(L_L-L_o)L_o\}$	$V_L = 0.85 P_1 / 100 R^{+} \{(L_I - L_o)/L_o\}$		MO)/MO+PC x(CI-						
Bitumen	NI	Nil	$V_{B} = (B_{C1} - B_{C0})^{\mu}T$		CO)/CO+PS x(SI-SO)/SO]						

Table# -3 Escalation Formulae used in Construction Contracts; various tender types adopted by different govt. Entities/ department/ agencies in India

Description	Centr I	al Public Departme	Works nt	Military Engineer Services	Tamil Nadu Public Works Department	Airports Authority of India	Bharat Sanchar Nigam Limited
Compensation shall be payable for works whose stipulated period of completion is	6 months or less	0 to 18 months	> 18 months	> 6 months	> 12 months	> 6 months	>12 months
Clause in the general conditions of contract	10C	10CA	10CC	Special conditions	Special conditions	10CC	10C
Components involved for escalation	Material and Labour	Material	Cement Steel Materials POL Labour	Material POL Labour	Cement, Steel, Material, POL Labour, Bitumen, Plant and Machinery Spares	Material POL Labour	Cement Steel Material POL Labour
Index used for materials		WPI	WPI	WPI	WPI	WPI	WPI
Index used for Labour		CPI	CPI	CPI	CPI	CPI	CPI

## Table# -4 Escalation Clause using Conditions and Criteria using period.

## 3.3.1 Allocation of weights-

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The release price refers to the transaction price obtained in the domestic market when the sales volume begins. Products are weighted according to their percentage of total production in the industry. The weight and impact of individual items. The history of WPI in India is representative of this phenomenon, and the series often goes through seven revisions to include good business practices. The meeting is to revise the series every ten years.

The revisions of the Indian WPI series to date are summarized in Table 1 below. Expressed as a percentage of the total price, their total reaches 100. These weights are used to calculate the index for all products. For new products, the weight of the existing product will be changed. Adjust the weight of the item to remove it from different groups.

Sr. No.	Base year	Year of Introducti on	No. of Commodities	Groups of Commodities	No of Quotations		
1	August, 1939	Jan, 1942	23	4	23		
2	End of August, 1939	1947	78	4	215		
3	1948-49	1952	112	5	555		
4	1961-62 July	July,1969	139	7	774		
5	1970-71 Jan	Jan, 1977	360	3	1295		
6	1981-82 July	July, 1989	9 447 3		2371		
7	1993-94 April	April, 2000	435	3	1918		
8	2004-05 Sept	Sept, 2010	676	3	5482		
9	2011-12	May, 2017	697	3	8331		
			1. PRIMARY	1. PRIMARY ARTICLES-			
			3.MANUFAC				
		_	ALL COMMO	DDITIES=100			

## Table# -5. Revisions in WPI series in India

## 3.3.1.1. Primary Articles-

More details in the main article, including new vegetables and radishes, carrots, cucumbers, pickles, Mozambique, pomegranate, jackfruit, pear, and more. Materials such as copper concentrate, lead concentrate and garnet were added to the rock organization and copper ore, gypsum, kaolin, dolomite and magnesite were removed. Natural gas was announced as the new product of the main product.

## 3.3.1.2. Fuel and Power-

In the gas and power industry, non-coking coal can also be classified according to the total cost of electricity (GCV) to meet the needs of many households.

• Non-Coking Coal G1 to G6 [GCV > 5500 Kcal/kg.]

- Non-Coking Coal G7 to G14 [GCV 3100 Kcal/kg to 5500 Kcal/kg]
- Non-Coking Coal G15 to G17 [GCV < 3100 Kcal/kg.]

Coke product dropped. The Energy Index in the new series will be measured as a separate product suitable for agriculture, industry, home, business and rail use, recorded in 2004-05. In the new series, the monthly average electricity sales of 49 power plants covering water and electricity are used to record electricity meters. While Light

Diesel was removed due to its decreasing importance in the Mineral Oils subgroup, Petrol Koku was introduced to the market as a new product due to its significant growth. There are some adjustments to the weight of the fossil fuel tank. The number of offers has increased significantly to provide a wide range of services.

## 3.3.1.3. Manufactured Products

Numerous products containing synthetic material have been produced. As a result, the double-digit number of industries in the new series increased from 12 to 22 according to the 2008 National Industry Classification (NIC). Around 173 new products were launched, such as conveyor belts, rubber belts, metal cables, tissue paper, wood plywood, composites, while Khandsari, Papad, video CD player, etc. 135 products were removed from the market.

## 3.3.2 Calculation of price relative-

The relative price is charged for the items in the WPI basket selected by the source identified for data collection. A proposal of at least five possible projects is required, although a smaller number is also recommended due to unavoidable circumstances. Relative price is the ratio of the daily price of the stock to the index price. A relative value is calculated for each calculation. The product offer allows the calculation of the relative price calculated by the formula below.

Price relative = (Current price/ Base price) \*100

# 3.3.3 Calculation of Index

Average of price relatives for all quotations for a given commodity offers the WPI for that specific item. Technique of compilation of index follows Lasperyre's formula primarily based on weighted mathematics imply that is as follows:

I =( $\Sigma$ (IiXWi)) / ( $\Sigma$ Wi) Where,

I = Index number of wholesale prices of a subgroup/group/major group/ all commodities

Ii = Index for ith commodity in the subgroup/group/major group

Wi = Weight assigned to the item/subgroup/group/major group within the subgroup/group/major group/basket.

## 3.3.4 Materials in commodity basket

Include all products considered for use in the WPI calculation. It is essentially a product designed to demonstrate the effectiveness of a generic business. The items in the shopping cart are often updated over time to accommodate changes in customer behavior or behavior. While there were 676 items in total in 2004-05, there were 435 items in 1993-94. 259 items in the collection are not

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uncommon. The 435 items in the 1993-94 collection, 176 were removed and a total of 417 new items from the 2004-05 collection were added to the basket. In the 2004-05 series the work is 3 main body ie. Primary products, POL and electrical, manufacturing products. Main substances are divided into three groups as food, non-food and food, and finished goods are divided into 12 groups as food, beverages, tobacco products, textiles, wood and wood products, paper and paper, leather and leather products, leather and leather products, rubber products and pharmaceutical products, nonmetal products and metal products.

# 3.3.5 Variation in WPI for major construction materials

Changes in wholesale prices during the year are the result of the economy. Changes in the market are affected by changes in wholesale prices. The construction industry has grown over the past few years. This is also reflected in the increase/change in wholesale prices of basic necessities. The table below shows the change in the Retail Price Index over the last eight fiscal years. Table 6 Monthly Changes in Market Value of Gray Cement and Rebar Products Between January-December 2021

Commoditor		WPI of commodities for Month of January										
Commodity	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021		
OPC cement	100	103.9	108.7	108.6	107.5	109.9	111.8	118.9	120.2	123.8		
White cement	100	110.1	115.3	117.1	118.8	119.1	123.6	126.4	122	123.3		
Bricks	100	106	100.6	96.4	98	94.7	94	94.5	91.6	91.8		
Stone	100	107.4	112.8	116.2	116.7	113.7	112.3	113.4	111.1	113.5		
Steel	100	98.8	101.7	90.2	84.2	91.3	109	106.5	107.2	131.9		
Bitumen	100	109.3	112.4	84.4	64.7	70.4	85	82.5	73.4	106.2		

# Table# -6. Yearly variation in WPI for major construction materials

# 3.3.6 Case study NHAI NH-6 Project.

The Case Study NHAI Project is Hybrid Annuity Mode of **641.6 Cr**. Bid Project cost **536.87 Cr** Estimated cost. In simplification of Price Escalation Calculation, we will consider Estimated project cost i.e., **□ 5,36,87,28,668** Project in Brief as follows in Image.

	Project in Brief						
Project Name	Balance work for 4 laning of Amravati-Chikhli section of NH-6 (Package-IV) from Km 315.000 (Near Nandura) to Km 360.000 (Near Chikhli) in the State of Maharashtra to be executed on Hybrid Annuity mode under Bharatmala Pariyojana.						
Client	National Highway Authority of India, RO Nagpur under PIU Amravati. Maharashtra						
Independent Engineer	M/s. L.N. Malvivya Infra Projects Pvt. Ltd.						
Concessionaire	M/s. Nandura Chikhli Highways Private Ltd. (SPV Kalayn Toll Infrastructure Ltd.)						
EPC Contractor	Kalayn Toll Infrastructure Ltd.						
NH No.(New /Old)	NH-53/ NH6						
Scheme/ Phase	NHDP-IV						
Mode of the Execution (BOT Toll/ BOT Annuity/ EPC/ HAM/ Item Rate /Others	Hybrid Annuity (HAM)						
No. of Lanes / Configuration	Four Lanning						
Length of Project( in Km)	45 km (Km 315+000 to Km 360+000)						
Project Cost (in Cr)	Bid Project Cost : INR 641.60 Cr & Estimated Project Cost - 536.87 Cr.						
No. of Bypasses ( Name of	1 No						
Town, Length)	Nandura Bypass –6 Km						
No. of Toll plazas (Number and	1No						
Location)	356.542 (Near Chikhli).						
Agreement Date	16.07.2020						
Appointed Date	19.05.2021						
Construction Period	730 days						
Operation Period	15 yrs (from COD)						

# Table# -7 Project of Brief

Scope of Work								
Sr. No.	Description	Unit	Scope					
1	Total Project Length	Km	45					
2	Bypass Length	Km	6.7					
3	Service Road/ Slip Road	Кт	23.06					
4	Toll Plaza	Nos.	1					
5	Truck Lay bays	Nos.	1					
6	Bus Bays/Passenger shelter	Nos.	20					
7	Rail Over Bridge	Nos.	1					
8	Vehicular Underpass	Nos.	3					
9	Cattle/Pedestrian Underpass	Nos.	4					
10	Major Bridge	Nos.	4					
11	Minor Bridge	Nos.	18					
12	Pipe Culvert	Nos.	25					
13	Slab and Box Culvert	Nos.	10					
14	RE Wall	Sq.M	56000					
15	RCC Drain	Km	8.99					
16	Boundary Wall	Km	60					

## Table# -8 Scope of Project

Case study NHAI NH-6 Project.

The Case Study NHAI Project is Hybrid Annuity Mode of **641.6 Cr**. Bid Project cost **536.87 Cr** Estimated cost. In simplification of Price Escalation Calculation we will consider Estimated project cost i.e., 2 **5,36,87,28,668** Project in Brief as follows in Image.



Sr. No. Description of Item

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# e-ISSN: 2395-0056 p-ISSN: 2395-0072

Amount

Rate

Unit Quantity

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Unit Quantity

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Description of Item RCC Retaining wall

,11,59,669 ,10,89,735 73,13,536	7.08	PCC M-15	CuM	14	6684	93 576
,10,89,735 73,13,536	7.08	Filter Media	CuM	81	1700	1,37,700
73,13,536	7.1	RCC M-30 Foundation	CuM	85	7349	6,24,665
74 114	7.11	HYSD Steel Foundation	MT	6	70810	4,24,860
+,114	7.11	RCC M-30 Sub-Structure	CuM	36	7349	2,64,564
,74,970	7.13	HYSD Steel Sub-Structure	MT	3	70810	2,12,430
41.090	/.14	Toe Wall	INOS	110	<u>∠80</u>	30,800
67,844	7.15	Excavation	CuM	280	61	17,080
0,26,697	7.16	PCC M-15	CuM	26	6684	1,73,784
60,95,812 68,71,500	7.17	PCC-M-20	CuM	350	7102	24,85,700
15,98,380	7.18	Filter Media	CuM	136	1700	2,31,200
07 268	8.01	Drainage and Protective Works	Lm	74205	62	46.00.722
12,432	8.02	RCC M-20	Lm	11535	7597	8.76.31 206
43,33,728	8.03	W-Beam	Lm	20211	3149	6,36,43,809
9,63,553	8.04	Grass Turfing	SqM	59726	30	17,91,780
4,62,207	8.05	Filter Media	CuM	41	1995	81,236
70,054	8.06	Toe Wall	Lm	140	3620	5,06,800
1,25,664	8.08	Stone Pitching	CuM	81	2317	1,88,696
53,764	8.09	Paver Block Sand	SqM CuM	261	1227	1,15,45,600
75,932	0.1	Toll Plaza and Misc. Item	Cuivi	501	1327	4,78,025
2.91.104						
36,662	9.01	Construction of Administration Building				
18,860	9.01 a	Admin Block	SqM	300	14000	42,00,000
	9.01b	POS	SqM	25	14000	3,50,000
32,803	9.01c	Service Block	Nos	1	500000	5,00,000
5,37,913	9.01d	Toilet Block Single Toll Booths	SqM	25	14000	3,50,000
1,360	9.016	Double Toll Booths	Nos	3	300000	9.00.000
2,804	9.02	Canopy	SqM	894	4500	40,23.000
1,309	9.03	Wire Frenching	Lm	990	503	4,97,970
.00	9.04	Drain Under Footpath	Lm	990	7597	75,21,040
8,854	9.05	Covered Drain	Lm	109	7597	8,31,113
,808	9.06	Electrical Item				
4,089	9.06a	Lighting Canopy	Set	1	200000	2,00,000
8,298	9.06b	Street Light	Km	1	2400000	23,76,000
75	9.06c	High Mass Lighting	Nos	2	/25800	14,51,600
	9.07	Sign Boards Cantilever Gantry T1 & T2	Nec	2	157260	3 14 519
25	9.07a 9.07 b	Cantilever Gantry 11 & 18 Cantilever Gantry T2	Nos	2	157260	3.14,519
2,399	9.07 c	Kerb Sign for Toll gate T3	Nos	2	157260	3,14,519
59	9.07 d	Kerb Sign for Toll gate T4	Nos	2	75000	1,50,000
~~	9.07 e	Kerb Sign T5	Nos	2	75000	1,50,000
	9.07 f	Kerb Sign T6	Nos	2	75000	1,50,000
4,880	9.07 g	Kerb Sign T7	Nos	2	75000	1,50,000
	9.08	Generator Room Providing Vahiala Providence	SqM	25	14000	3,50,000
,50,285	9.09	Providing Medical Aid Post	SqM SqM	25	14000	3,50,000
10,522	9.11	Providing Traffic Aid Post	SqM	25	14000	3,50,000
,75,535	9.12	Toll plaza Management System	LS	1	11704180	1,17,04,180
3,040	9.14	Bull Nose Safety barrier	CuM	15	10449	1,57,989
5,000	9.15	50mm Steel Pipe	Lm	360	3230	11,62,800
5,000	9.16	Interlocking Paving Block	SqM	770	640	4,92,480
,000	9.17	Weigh Bridge	NOS	- 77	40000	24,00,000
, <del>28,448</del> 4,81,020	9.18	Bore wells	Nes	2	100000	2.00.000
,484	9.19	Supply of Ambulance	Nos	~ 1	2000000	20.00 000
	9.21	Supply of Cranes	Nos	1	2500000	25,00.000
00.815	9.22	Supply of Vehicle	Nos	1	1000000	10,00,000
,30,419	9.23	Supply of Highway Petrol Unit	Nos	2	1500000	30,00,000
,714	9.24	Installation of Weigh in motion	Nos	10	900000	90,00,000
,87,319	9.27	ETC Installation	Nos	10	500000	50,00,000
,97,668	9.27	Installation & Commissioning of Hybrid	Nos	10	500000	50,00,000
,68,016	0.20	EIC Landscaping	Sake	1500	30	45.000
	9.28	Providing Vehicle Parking	SaM	102	1500	1.53.000
	9.29	Spherical Staircase	Nos	9	61206	5.50.854
95,577	9.31	Security Cabin	Nos	2	15000	30,000
32,629	9.32	Highway Nest	SqM	2	500000	10,00,000
.,032		Traffic Signs, Marking & Safety	<u> </u>			1
7,566		Devices				I
09,299	10.1	Km Stone Fixing				
33 792	10.1 a)	200m Stone	Nos	302	733	2,21,366
51,284	10.1 b)	Km Stone	Nos	58	2707	1,57,006
44,100	10.1 c)	BCC Boundary Stope	INOS No:	450	4450	71,200
.630	10.2	Delineators Fixing	NOS	107	477	51.039
3,340	10.5	Sign Boards 0.9SgM	Nos	40	20884	8.35.360
60.1	10.5	Sign Boards 0.9SqM	Nos	212	36535	1,14,35,455
7,594	• • • • • • • •			515		6 76 000
86,506 346	10.6	Fixing Road Studs	Nos	2000	338	0,70,000
,594 36,506 346 3	10.6 10.7	Fixing Road Studs Fixing Tabular gantry	Nos	2000	338	0,70,000
86,506 346 33 83,840	10.6 10.7 10.7 a)	Fixing Road Studs Fixing Tabular gantry Full Over Head Gantry	Nos	2000	338 400139	8,00,278
86,506 346 43 83,840 7,355	10.6 10.7 10.7 a) 10.7 b)	Fixing Road Studs Fixing Tabular gantry Full Over Head Gantry Cantilever Type	Nos Nos Nos	2000 2 10	338 400139 252993	8,00,278 25,29,930
9,594 86,506 ,346 43 .83,840 7,355 .00,000	10.6 10.7 10.7 a) 10.7 b) 10.8	Fixing Road Studs Fixing Tabular gantry Full Over Head Gantry Cantilever Type Traffic Signs Ocom Ecouptational Transmission	Nos Nos Nos	2000 2 10	338 400139 252993	8,00,278 25,29,930
0,394 86,506 346 43 83,840 7,355 00,000 50	10.6 10.7 10.7 a) 10.7 b) 10.8 10.8a 10.8b	Fixing Road Studs Fixing Tabular gantry Full Over Head Gantry Cantilever Type Traffic Signs 90cm Equilateral Triangle 60cm Circular	Nos Nos Nos Nos	2000 2 10 141 5	338 400139 252993 8692 7458	8,00,278 25,29,930 12,25,572 37,290
9,394 886,506 346 43 83,840 7,355 .00,000 60 52	10.6 10.7 10.7 a) 10.7 b) 10.8 10.8a 10.8b 10.8c	Fixing Road Studs Fixing Tabular gantry Full Over Head Gantry Cantilever Type Traffic Signs 90cm Equilateral Triangle 60cm Circular 90 Cm Octagon	Nos Nos Nos Nos Nos	2000 2 10 141 5 50	338 400139 252993 8692 7458 14621	8,00,278 25,29,930 12,25,572 37,290 7,31,050
9,394 9,394 9,306 346 43 83,840 7,355 .00,000 60 52 7,060	10.6 10.7 10.7 a) 10.7 b) 10.8 10.8a 10.8b 10.8c 10.8d	Fixing Road Studs Fixing Tabular gantry Full Over Head Gantry Canlikver Type Traffic Signs 90cm Equilateral Triangle 60cm Creular 90 Cm Octagon 60cm Equilateral Triangle	Nos Nos Nos Nos Nos Nos Nos	2000 2 10 141 5 50 270	338 400139 252993 8692 7458 14621 5120	8,00,278 25,29,930 12,25,572 37,290 7,31,050 13,82,400
9,394 9,394 ,346 43 ,346 43 ,355 ,00,000 60 52 7,060 7,199	10.6 10.7 a) 10.7 b) 10.8 10.8a 10.8b 10.8c 10.8c 10.8d 10.8e	Fixing Road Studs Fixing Tabular gantry Full Over Head Gantry Cantilever Type Traffic Signs 90cm Equilateral Triangle 60cm Circular 90 Cm Octagon 60cm Equilateral Triangle Facility Informatory Sign 0.8X0.6	Nos Nos Nos Nos Nos Nos Nos Nos	2000 2 10 141 5 50 270 91	338 400139 252993 8692 7458 14621 5120 11086	8,00,278 25,29,930 12,25,572 37,290 7,31,050 13,82,400 10,08,826
7,594 86,506 346 13 83,840 7,355 00,000 50 52 7,060 7,199 00 1,617	10.6 10.7 a) 10.7 b) 10.8 10.8a 10.8a 10.8b 10.8c 10.8d 10.8c 10.8d	Fixing Road Studs Fixing Tabular gantry Full Over Head Gantry Cantilever Type Traffic Sigurent Triangle 60cm Creular 90 Cm Octagon 60cm Equilateral Triangle 60cm Equilateral Triangle Facility Informatory Sign 0.8X0.6 Facility Informatory Sign 0.6X0.45	Nos Nos Nos Nos Nos Nos Nos Nos	22000 22100 10 141 5 50 270 91 4	338 400139 252993 8692 7458 14621 5120 11086 7219	8,00,278 25,29,930 12,25,572 37,290 7,31,050 13,82,400 10,08,826 28,876
7,394 86,506 346 13 83,840 7,355 00,000 50 52 7,060 7,199 10 00 7,617 5,921	10.6 10.7 10.7 a) 10.8 10.8 10.8 10.8b 10.8c 10.8d 10.8c 10.8d 10.8f 10.8g	Fixing Road Studs Fixing Road Studs Fixing Tabular gantry Full Over Head Gantry Cantilever Type Traffic Signs 90cm Equilateral Triangle 60cm Circular 90 Cm Octagon 60cm Equilateral Triangle Facility Informatory Sign 0.8X0.6 Facility Informatory Sign 0.6X0.45 Octagon 0.9m	Nos Nos Nos Nos Nos Nos Nos Nos Nos Nos	22000 22100 141 55 50 270 91 4 4	338 400139 252993 8692 7458 14621 5120 11086 7219 14621	8,00,278 25,29,930 12,25,572 37,290 7,31,050 13,82,400 10,08,826 28,876 58,484
3.394           \$86,506           346           3.3           \$3,840           ,355           \$0,000           \$0           \$0,060           \$1,199           \$0           \$6,17           \$,921           \$,723	10.6 10.7 10.7 a) 10.7 b) 10.8 10.8a 10.8b 10.8c 10.8d 10.8e 10.8f 10.8g 10.8h	Fising Road Studs Fising Tabular gantry Full Over Head Gantry Cantilever Type Traffic Signs 90cm Equilateral Triangle 60cm Equilateral Triangle 60cm Equilateral Triangle 60cm Equilateral Triangle Facility Informatory Sign 0.8X0.6 Facility Informatory Sign 0.6X0.45 Octagon 0.9m Rectangular 0.3C0.9	Nos Nos Nos Nos Nos Nos Nos Nos Nos Nos	22000 2 10 141 5 5 50 270 91 4 4 4	338 400139 252993 8692 7458 14621 5120 11086 7219 14621 4255	8,00,278 25,29,930 12,25,572 37,290 7,31,050 13,82,400 10,08,826 28,876 58,484 17,020
	10.6 10.7 10.7 a) 10.7 b) 10.8 10.8a 10.8a 10.8a 10.8c 10.8d 10.8e 10.8f 10.8g 10.8h 10.8i	Fixing Road Studs Fixing Tabular gantry Full Over Head Gantry Cantilever Type Traffic Signs 90cm Equilateral Triangle 60cm Equilateral Triangle 60cm Equilateral Triangle 60cm Equilateral Triangle 60cm Equilateral Triangle Facility Informatory Sign 0.8X0.6 Facility Informatory Sign 0.6X0.45 Octagon 0.9m Rectangular 0.3C0.9 Service Road Start & End	Nos Nos Nos Nos Nos Nos Nos Nos Nos Nos	22000 2 10 141 5 50 270 91 4 4 4 16	338 400139 252993 8692 7458 14621 5120 11086 7219 14621 4255 20884	8,00,278 25,29,930 12,25,572 37,290 7,31,050 13,82,400 10,08,826 28,876 58,484 17,020 3,34,144
2,394 86,506 346 13 83,840 7,355 00,000 50 52 7,060 7,199 00 7,617 5,921 8,723 8,723 1,214 2,214	10.6 10.7 a) 10.7 a) 10.8 10.8 10.8 10.8 10.8 10.8 10.8 10.8	Fising Road Studs Fising Tabular ganty Full Over Head Ganty Cantilever Type Traffic Signs 90cm Equilateral Triangle 60cm Circular 90 Cm Octugon 90 Cm Octugon 60cm Equilateral Triangle Facility Informatory Sign 0.6X0.6 Facility Informatory Sign 0.6X0.45 Octugon 0.9m Rectangular 0.3C0.9 Rectangular 0.3C0.9 Service Road Start & End Object Hazard 0.3X0.9	Nos Nos Nos Nos Nos Nos Nos Nos Nos Nos	2 2 10 141 5 5 5 270 91 4 4 4 16 2	338 400139 252993 8692 7458 14621 5120 11086 7219 14621 4255 20884 8692	8,00,278 8,00,278 25,29,930 12,25,572 37,290 7,31,050 13,82,400 10,08,826 28,876 58,484 17,020 3,34,144 17,384
(394) (394) (346) (346) (338) (338) (355) (300) (300) (300) (300) (300) (300) (310) (3	10.6 10.7 10.7 a) 10.7 b) 10.8 10.8a 10.8b 10.8c 10.8d 10.8g 10.8g 10.8h 10.8j 10.8k	Fixing Road Studs Fixing Tabular gantry Fall Over Head Gantry Cantilever Type Traffic Signs 90cm Equilateral Triangle 60cm Equilateral Triangle 60cm Equilateral Triangle 60cm Equilateral Triangle Facility Informatory Sign 0.8X0.6 Facility Informatory Sign 0.6X0.45 Octagon 0.9m Rectangular 0.3C0.9 Service Road Start & End October Hazard 0.3X0.9 Chevron	Nos Nos Nos Nos Nos Nos Nos Nos Nos Nos	2000 2 10 141 5 50 270 91 4 4 4 16 2 2 71 71	338 400139 252993 8692 7458 14621 11621 11686 7219 14621 4255 20884 8692 7458 6692	8,00,278 8,00,278 25,29,930 12,25,572 37,290 7,31,050 13,82,400 10,08,826 28,876 58,484 17,020 3,34,144 17,384 5,29,518
3.394           86,506           346           3           3.355           00,000           0           2           .060           .1199           0           .617           .921           .723           .214           .479           .213           8           .970	10.6 10.7 10.7 a) 10.7 b) 10.8 10.8b 10.8b 10.8c 10.8d 10.8c 10.8d 10.8c 10.8f 10.8g 10.8f 10.8j 10.8j 10.8j 10.8j 10.8j 10.8j 10.8j	Fising Road Studs Fising Tabular ganty Full Over Head Ganty Cantilever Type Traffic Signs 90cm Equilateral Triangle 60cm Circular 90 Cm 0 Cotagon 90 Cm 0 Cotagon 60cm Equilateral Triangle 60cm Equilateral Cotagon 60cm Equilateral Cotagon 60cm Equilateral Cotagon 60cm Equilateral Cotagon 60cm Circulateral Cotagon 60cm	Nos Nos Nos Nos Nos Nos Nos Nos Nos Nos	2 2 10 141 5 5 5 5 270 91 4 4 4 16 2 2 71 5 5 91 5 4 2 70 91 5 5 91 4 4 5 91 91 91 91 91 91 91 91 91 91 91 91 91	338 400139 252993 8692 7458 14621 5120 11086 7219 114621 14621 20884 8692 7458 7458 7458 7458	8,00,278 8,00,278 25,29,930 12,25,572 37,290 7,31,050 13,82,400 10,08,826 28,876 58,484 17,020 3,34,144 17,384 5,29,518 4,02,732 2,00,772
	10.6 10.7 10.7 a) 10.7 b) 10.8 10.8a 10.8b 10.8c 10.8d 10.8c 10.8f 10.8f 10.8f 10.8f 10.8f 10.8k 10.8j 10.8k	Fixing Road Studs Fixing Tabular gantry Full Over Head Gantry Cantilever Type Traffic Signs 90Cm Equilateral Triangle 60cm Creular 90 Cm Octagon 60cm Equilateral Triangle Facility Informatory Sign 0.8X0.6 Facility Informatory Sign 0.6X0.45 Octagon 0.9m Rectangular 0.3C0.9 Service Road Start & End Object Hazard 0.3X0.9 Chevron Compulsory Left/Right 0.6 Speed Limit Thesementaritie Balanter	Nos Nos Nos Nos Nos Nos Nos Nos Nos Nos	2 2 10 141 5 5 270 91 4 4 4 16 2 71 5 54 39 279 12 270 12 2	338 400139 252993 8692 7458 14621 5120 11086 7219 14621 4255 20884 8692 7458 8692 7458 7458	8,00,278 8,00,278 25,29,930 12,25,572 37,290 13,82,400 10,08,826 28,876 58,484 17,020 3,34,144 17,384 5,29,518 4,02,732 2,90,862
2,594 86,506 346 1346 1348 83,840 7,355 00,000 60 52 7,060 7,169 00 7,060 7,199 00 7,061 7,199 00 7,061 7,214 0,479 9,213 48 4,970 75 19	10.6 10.7 10.7 a) 10.7 b) 10.8 10.8 10.8 10.8 10.8 10.8 10.8 10.8	Fising Road Studs Fising Tabular ganty Full Over Head Ganty Cantilever Type Traffic Signs 90cm Equilateral Triangle 60cm Circular 90 Cm Octagon 90 Cm Octagon 90 Cm Octagon 60cm Equilateral Triangle Facility Informatory Sign 0.8X0.6 Facility Informatory Sign 0.8X0.6 Facility Informatory Sign 0.8X0.6 Catagon 0.9m Rectangular 0.3C0.9 Service Road Start & End Object Hazard 0.3X0.9 Chevron Compulsory Left/Right 0.6 Speed Limit Thermoplastic Painting Thermoplastic Painting	Nos Nos Nos Nos Nos Nos Nos Nos Nos Nos	2 2 10 2 11 14 5 5 5 5 5 7 7 9 1 4 4 4 4 16 2 7 1 5 3 9 1 3 16 16 16 17 17 17 18 18 19 19 19 19 19 19 19 19 19 19	338 400139 252993 8692 7458 14621 5120 11086 7219 14621 4255 20884 8692 7458 8692 7458 7458 556 324	8,00,278 25,29,930 12,25,572 37,290 7,31,050 13,82,400 10,08,826 28,876 38,484 17,020 3,34,144 17,384 5,29,518 4,02,732 2,90,862 2,10,24,028 3,30,09,444
32.3         4           38.3         50.6           43         3           43         3           43.8         3.4.40           7.355         3.5           5.000,000         60           52         7,060           7,199         90           5,921         3.4,214           0,4799         9,213           48         4,970           75         19           19         0.996	10.6 10.7 10.7 b) 10.8 10.8 10.8 10.8 10.8 10.8 10.8 10.8	Fising Road Studs Fising Tabular gantry Full Over Head Gantry Cantilever Type Traffic Signs 90cm Equilateral Triangle 60cm Catular 90 Cm Octagon 60cm Equilateral Triangle 60cm Equilateral Triangle 60cm Equilateral Triangle 60cm Equilateral Triangle Facility Informatory Sign 0.6X0.6 Facility Informatory Sign 0.6X0.45 Octagon 0.9m Rectangular 0.3C0.9 Service Road Start & End Object Hazard 0.3X0.9 Chevron Compulsory Left/Right 0.6 Speed Limit Thermoplestic Painting Kerb laying Kerb laying	Nos Nos Nos Nos Nos Nos Nos Nos Nos Nos	2 2 10 141 5 5 5 270 91 4 4 4 4 16 2 71 54 39 37813 101881 15843	338 400139 252993 7458 14621 5120 11086 7219 14621 4255 20884 8692 7458 8692 7458 7458 556 324 903	8,00,278 8,00,278 25,29,930 12,25,572 37,290 7,31,050 13,82,400 10,08,826 58,484 17,020 3,34,144 17,384 5,29,518 4,02,732 2,90,862 2,10,24,028 3,30,09,444 1,43,06,273
2,394 86,306 36,306 31 7,355 00,000 50 7,255 7,060 7,199 00 7,199 00 7,199 00 7,199 00 7,199 00 7,213 1,214 1,214 1,214 1,213 1,214 1,215	10.6 10.7 10.7 a) 10.7 b) 10.8 10.8a 10.8b 10.8c 10.8d 10.8d 10.8f 10.8f 10.8f 10.8f 10.8j 10.8j 10.8j 10.8k 10.8 m 10.9 10.1 10.11	Fixing Road Studs Fixing Tabular gantry Fail Over Head Gantry Cantilever Type Traffic Signs 90cm Equilateral Triangle 60cm Creular 90 Cm Octagon 60cm Equilateral Triangle 60cm Equilateral Triangle Facility Informatory Sign 0.8X0.6 Facility Informatory Sign 0.6X0.45 Octagon 0.9m Rectangular 0.3C0.9 Service Road Start & End Object Hazard 0.3X0.9 Chevron Compulsory Left/Right 0.6 Speed Limit Thermoplastic Painting Korb laying Foot path Separator Tabular Steel rnäing	Nos Nos Nos Nos Nos Nos Nos Nos Nos Nos	2 2 10 141 5 5 5 270 91 4 4 4 16 2 71 54 37813 101881 15843 400	338 400139 252993 8692 7458 14621 5120 11086 7219 14621 200884 8692 7458 7458 7458 7458 7458 556 324 903 22565	8,00,278 8,00,278 25,29,930 12,25,572 37,290 7,31,050 13,82,400 10,08,826 28,876 58,484 17,020 3,34,144 4,02,732 2,90,862 2,10,24,028 2,29,030 1,225,572 3,330,09,444 1,43,06,228 1,026 1,026 1,026 1,026 1,028 1,026 1,026 1,028 1,020 1,028 1,020 1,020 1,020 1,020 1,028 1,020 1,028 1,020 1
2020 2020	10.6 10.7 10.7 b) 10.8 10.8 10.8b 10.8b 10.8c 10.8d 10.8g 10.8f 10.8g 10.8f 10.9f 10.11 10.12	Fising Road Studs Fising Tabular ganty Full Over Head Ganty Cantilever Type Traffic Signs 90cm Equilateral Triangle 60cm Equilateral Triangle 70 Cm Octogon 60cm Equilateral Triangle 70 Cm Octogon 60cm Carbon 10 Cm Octogon 60cm Carbon 60cm Carbon 70 Cm Octogon 70 C	Nos Nos Nos Nos Nos Nos Nos Nos Nos Nos	2 2 10 141 50 50 270 91 4 4 4 4 16 2 71 54 37813 37813 101881 15843 400 4 4 4 4 4 4 5 5 5 5 5 5 5 5 5 5 5 5 5	338 400139 252993 7458 14621 5120 11086 7219 14621 4255 20884 8692 7458 7458 7458 7458 7458 556 324 903 2565	8.00.278 25,29,030 12,25,572 37,290 7,31,050 13,82,400 10,08,826 28,876 58,484 17,020 3,34,144 17,384 5,29,518 4,02,732 2,90,862 2,10,24,028 3,30,09,444 1,43,06,225 10,26,000
2023/06 2023/06 2023/2023/2023/2023/2023/2023/2023/2023	10.6 10.7 10.7 a) 10.7 b) 10.8 10.8a 10.8b 10.8c 10.8d 10.8d 10.8f 10.8f 10.8f 10.8f 10.8j 10.8j 10.8j 10.8j 10.8 l 10.8 l 10.8 l 10.2 m 10.1 10.12	Fixing Road Studs Fixing Tabular gantry Full Over Head Gantry Cantikever Type Traffic Signs 90cm Equilateral Triangle 60cm Creular 90 Cm Octagon 60cm Equilateral Triangle 60cm Equilateral Triangle 60cm Equilateral Triangle Facility Informatory Sign 0.8X0.6 Facility Informatory Sign 0.8X0.6 Facility Informatory Sign 0.6X0.45 Octagon 0.9m Rectangular 0.3C0.9 Service Road Start & End Object Hazard 0.3X0.9 Chevron Compulsory Left/Right 0.6 Speed Linat Thermoplastic Painting Kerb laying Foot path Separator Tabular Steel railing Miscellaneous Planting Trees	Nos Nos Nos Nos Nos Nos Nos Nos Nos Nos	2 2 10 2 141 5 5 5 270 91 4 4 4 4 16 2 711 54 39 37813 101881 15843 400 10000	338 400139 252993 7458 14621 5120 11086 7219 14621 4255 20884 8692 7458 7458 7458 7458 7458 7458 7458 7458	8,00,278 8,00,278 25,29,930 12,25,572 37,290 13,82,400 13,82,400 10,08,826 28,876 58,484 17,020 3,34,144 17,384 5,29,518 4,02,732 2,10,24,028 2,10,24,028 2,10,24,028 10,08,620 1,54,10,000 1,54,100
36,366           346           43           3360           43           83,840           60,000           30           30           30           30           30           30           30           30           30           30           30           31           32           7,060           30,017           5,017           5,021           5,723           4,214           3,479           2,213           18,970           75           19           096           8,84           605           7,798           2,135	10.6 10.7 10.7 b) 10.8 10.8 10.8 10.8 10.8 10.8 10.8 10.8	Fising Road Studs Fising Tabular ganty Full Over Head Ganty Cantilever Type Traffic Signs 90cm Equilateral Triangle 60cm Equilateral Triangle 60cm Equilateral Triangle 70 Cm Octagon 90 Cm Octagon 80 Cm Octagon 90 Cm Octagon 80 Cm Octagon 90 Cm Octagon 90 Cm Octagon 80 Cm Octagon 90 Cm Octa	Nos Nos Nos Nos Nos Nos Nos Nos Nos Nos	2 2 10 141 50 270 91 4 4 4 4 16 2 71 54 37813 37813 37813 101881 15843 400 10000 90 	338 400139 252993 8692 7458 14621 14221 14251 1206 14425 1208 14425 14425 14425 20884 8692 7458 7458 7458 7458 7458 2556 324 903 2565 1541 50366 1541 1551 1541 1551 15	8.00.278 8.00.278 8.00.278 8.00.278 7.290 7.31.050 13.82.400 10.08.826 28.876 58.484 17.020 3.34.144 17.384 17.020 3.34.144 17.384 4.02.732 2.90.862 2.90.842 3.30.94.44 1.43.06.229 10.26.000 1.54.10.000
2020,306 2020,206 2020,207 2020,200 2020,2	10.6 10.7 10.7 b) 10.7 b) 10.8 10.8a 10.8b 10.8c 10.8d 10.8d 10.8f 10.8f 10.8f 10.8f 10.8f 10.8f 10.8f 10.8f 10.8f 10.8f 10.8f 10.81 10.12 11.1 11.2	Fixing Road Studs Fixing Road Studs Full Over Head Gantry Full Over Head Gantry Cantilever Type Traffic Signs 90Cm Equilateral Triangle 60cm Equilateral Triangle 60cm Equilateral Triangle 60cm Equilateral Triangle Facility Informatory Sign 0.8X0.6 Facility Informatory Sign 0.6X0.45 Octagon 0.9m Rectangular 0.3C0.9 Service Road Start & End Object Hazard 0.3X0.9 Chevron Compulsory Left/Right 0.6 Speed Limit Thermoplastic Painting Kerb laying Foot path Separator Tabular Steel railing Miscellaneous Planting Trees Rain water Harvesting Street Lighting	Nos Nos Nos Nos Nos Nos Nos Nos Nos Nos	2 2 10 141 5 5 270 91 4 4 4 16 2 71 54 39 37813 101881 15883 101881 15843 400 90 90	338 400139 252993 8692 7458 14621 5120 11086 7219 14621 4255 20884 8692 7458 8692 7458 556 324 903 22565 1541 50366	8,00,278 8,00,278 25,29,930 12,25,572 37,290 13,82,400 13,82,400 10,08,826 28,876 58,484 17,020 28,876 58,484 17,020 28,876 58,484 17,020 28,876 58,484 17,020 28,876 58,484 17,020 28,876 58,484 17,020 28,976 21,024,028 3,029,440 1,43,06,225 10,26,000 1,54,1000 1,54,1000 1,54,1000 1,54,1000 1,54,1000 1,54,1000 1,54,1000 1,54,1000 1,54,1000 1,54,1000 1,54,1000 1,54,1000 1,54,1000 1,54,1000 1,55
202306 202606 2026 2026 2026 2026 2026 2	10.6 10.7 10.7 b) 10.8 10.8a 10.8b 10.8b 10.8c 10.8d 10.8d 10.8d 10.8f 10.11 10.12 10.11 11.2 11.3 a	Fising Road Studs Fising Tabular ganty Full Over Head Ganty Cantilever Type Traffic Signs 90cm Equilateral Triangle 60cm Circular 90 Cm Octagon 90 Cm Octagon 60cm Equilateral Triangle 60cm Equilateral Triangle 10 Cm Octagon 0.9m 10 Cm Octagon 0.9m 10 Cm Octagon 0.9 Cm 10 Cm Octagon 0.3C0.9 10 Cm Octa	Nos Nos Nos Nos Nos Nos Nos Nos Nos Nos	2 2 10 141 5 50 270 91 4 4 4 4 16 270 91 4 4 4 4 4 3 37813 101881 15843 10000 90 3 	338 400139 252993 7458 14621 5120 11086 7219 14621 11086 7219 14621 20884 8692 7458 7458 7458 7458 7458 7458 7458 7458	8.00.278 8.00.278 25.29,930 12.25,29,930 12.25,29,930 12.25,272 37,290 7,31,050 13.82,400 10.08,826 28,876 58,484 17,020 33,41,144 17,384 17,020 33,41,144 17,384 17,020 210,24,022 210,24,
2023/06 2023/06 2024/2025 2025	10.6 10.7 10.7 b) 10.8 10.8 10.8b 10.8c 10.8d 10.8c 10.8d 10.8g 10.8f 10.11 10.12 10.11 10.12 11.2 11.3 11.3 11.3 11.3 10.8f	Fixing Road Studs Fixing Road Studs Full Over Head Gantry Full Over Head Gantry Cantilever Type Traffic Signs 90cm Equilateral Triangle 60cm Cicular 90 Cm Octagon 60cm Equilateral Triangle 60cm Equilateral Triangle 60cm Equilateral Triangle 90 Cm Octagon 90 Cm Second Start Rectangular 0.3C0.9 Service Road Start & End Object Hazard 0.3X0.9 Chevron Compulsory Left/Right 0.6 Speed Limit Thermoplastic Painting Korb laying Foot path Separator Tabular Steel railing Miscellaneous Planting Trees Rain water Harvesting Singet Arm	Nos Nos Nos Nos Nos Nos Nos Nos Nos Nos	2 2 10 141 5 5 5 270 91 4 4 4 16 2 270 91 4 4 4 16 2 270 91 141 5 5 5 5 5 5 5 5 5 5 5 5 5	338 400139 252993 7458 14621 5120 11086 7219 14621 4255 20884 8692 7458 7458 7458 7458 556 324 903 2565 1541 50366 2400000 2800000	8,0,0,278 8,0,0,278 8,0,0,278 8,0,0,278 12,25,29,930 12,25,29,930 12,25,29,930 13,82,400 13,82,400 13,82,400 28,876 28,876 28,876 28,844 17,030 28,484 17,030 28,484 17,030 28,484 17,030 28,484 17,030 21,04,028 21,02,4,028 33,0,09,440 21,02,000 1,54,10,000 1,54,10,000 1,54,30,000 1,23,06,000 1,23,06,000 1,23,06,000 1,23,06,000 1,23,06,000 1,23,06,000 1,23,06,000 1,23,06,000 1,23,06,000 1,23,06,000 1,23,06,000 1,23,06,000 1,23,06,000 1,23,06,000 1,23,06,000 1,23,000 1,23,06,000 1,23,000 1,23,000 1,23,000 1,23,000 1,25,000 1,25,000 1,
3346           3           3460           3           3.355           30,000           0           2           .0600           199           0           0.0           2.2           .0600           .0921           .1723           .214           .479           .214           .479           .214           .479           .214           .350           .90           .728           .135           .827           .788           .242           .0000	$\begin{array}{c} 10.6\\ 10.7\\ 10.7 \text{ b} \\ 10.7 \text{ b} \\ 10.7 \text{ b} \\ 10.8 \text{ c} \\ 10.8 \text{ b} \\ 10.8 \text{ b} \\ 10.8 \text{ c} \\ 10.1 \text{ c} \\ 10.1 \text{ c} \\ 11.1 \text{ c} \\ 11.3 \text{ c} \\ 10.8 \text{ c} \\$	Fising Road Studs Fising Tabular ganty Full Over Head Ganty Cantilever Type Traffic Signs 90cm Equilateral Triangle 60cm Circular 90 Cm Octagon 90 Cm Octagon 90 Cm Octagon 60cm Equilateral Triangle Facility Informatory Sign 0.8X0.6 Facility Informatory Sign 0.8X0.6 Facility Informatory Sign 0.8X0.6 Getagon 0.9m Rectangular 0.3C0.9 Service Read Start & End Object Hazard 0.3X0.9 Chevron Compulsory Left/Right 0.6 Speed Limit Thermoplastic Painting Kerb hysing Foot path Separator Tabular Sized railing Miscelaneous Planting Trees Rain water Harvesting Sireet Lighting Sireet Lighting Sireet Lighting Sireet Lighting Sireet Lighting	Nos Nos Nos Nos Nos Nos Nos Nos Nos Nos	2 2 2 10 141 5 50 270 91 4 4 4 16 2 71 15 4 4 16 2 71 15 39 39 13 101881 10883 1	338 400139 252993 7458 8692 7458 14621 5120 11086 7219 14621 20884 8692 7458 7458 7458 7458 7458 7458 7458 7458	8.00.278 8.00.278 8.00.278 25.29.9.30 12.25.572 37.290 13.82,400 10.08,826 28.876 58.484 17.384 17.384 17.384 17.384 17.384 17.384 17.384 17.384 17.384 10.26,000 1.026,000 1.026,000 1.23,941 10.26,000 1.23,946,000 1.24,94
202,306 202,306 202,207 203	$\begin{array}{c} 10.6\\ 10.7\\ 10.7 \text{ b} \\ 10.7 \text{ b} \\ 10.8 \text{ c} \\ 10.8 \text{ b} \\ 10.8 \text{ c} \\$	Fising Road Studs Fising Tabular ganty Full Over Head Ganty Full Over Head Ganty Cantilever Type Traffic Signs 90 cm Eucular 90 cm Circular 90 Cm Octagon 60cm Equilateral Triangle 60cm Equilateral Triangle 80cm Equilateral Triangle 10 Cm Public Triangle	Nos Nos Nos Nos Nos Nos Nos Nos Nos Nos	2 2 10 141 5 5 5 270 91 4 4 4 4 16 2 71 54 39 37813 101881 15843 4000 900 90 12 25 20 25 26 27 27 28 28 28 28 28 28 28 28 28 28	338 400139 252993 7458 14621 5120 11086 7219 14621 1202 11086 7219 14621 4255 20884 8692 7458 7458 7458 7458 7458 7458 7458 7458	8.00.278 8.00.278 8.00.278 8.00.278 7.200 7.31.050 13.82.400 10.08.826 28.876 58.484 17.020 3.34.144 17.384 5.29.518 4.02.732 2.00.84.02 3.30.04.44 1.43.06.229 10.26.000 1.54.10.000 4.532.941 6.532.941 6.532.941
202406 2026 2026 2027 2027 2027 2027 2027 20	10.6 10.7 10.7 10.7 10.8 10.8 10.8 10.8 10.8 10.8 10.8 10.8	Fixing Road Studs Fixing Road Studs Full Over Head Gantry Cantilever Type Traffic Signs 90cm Equilateral Triangle 60cm Equilateral Triangle 60cm Equilateral Triangle 60cm Equilateral Triangle Facility Informatory Sign 0.8X0.6 Facility Informatory Sign 0.6X0.45 Octagon 0.9m Rectangular 0.3C0.9 Service Road Start & End Object Hazard 0.3X0.9 Chevron Compulsory Left/Right 0.6 Speed Limit Thermoplastic Painting Kerb laying Foot path Separator Tabular Steel railing Miscellaneous Planting Trees Rain water Harvesting Street Lighting Singk Arm Double Arm High Mast Bus Shelter Median Plantation Chequered Tikes in mediav	Nos Nos Nos Nos Nos Nos Nos Nos Nos Nos	2 2 10 2 11 141 5 5 5 270 91 4 4 4 4 16 2 71 5 54 39 37813 101881 101881 101883 101881 101883 10000 90 3 3 2 2 2 2 2 2 2 2 2 2 2 2 2	338 400139 252993 8692 7458 14621 5120 11086 7219 14621 200884 8692 7458 7458 7458 7458 7458 7458 7458 7458	8.00.278 8.00.278 5.25,29,930 12.25,572 37,290 13.82,400 10.08,826 28,876 58,484 17,020 3.34,144 17,384 17,020 3.34,144 17,384 17,020 10,08,226 2,10,24,028 3,02,44,028 10,26,000 1,54,10,000 1,54,500 1,50,100
20.506 20.506 21.60 21.60 21.60 22.00 20.000 21.00 21.00 21.10	$\begin{array}{c} 10.6\\ 10.7\\ 10.7 \ b)\\ 10.7 \ b)\\ 10.7 \ b)\\ 10.8 \ c)\\ 10.1 \ c)\\ 11.1 \ c)\\ 11.1 \ c)\\ 11.2 \ c)\\ 11.3 \ c)\\ 11.3 \ c)\\ 11.3 \ c)\\ 11.5 \ c)\\ 11.5 \ c)\\ 11.7 \ c)\\ 11.$	Fising Road Studs Fising Tabular ganty Full Over Head Ganty Full Over Head Ganty Cantilever Type Traffic Signs 90cm Equilateral Triangle 60cm Circular 90 Cm Octagon 60cm Equilateral Triangle Facility Informatory Sign 0.8X0.6 Facility Informatory Sign 0.8X0.6 Facility Informatory Sign 0.6X0.45 Octagon 0.9m Rectrangular 0.3C0.9 Service Road Start & End Object Hazard 0.3X0.9 Chevron Compulsory Left/Right 0.6 Speed Limit Thermoplastic Painting Korb laying Foot path Separator Tabular Steel railing Miscellaneous Planting Trees Rain water Harvesting Street Lighting Street Lighting Steret Lighting Steret Lighting Steret Lighting Steret Device Median Plantation Chequered Tiles in median Toiket Block	Nos Nos Nos Nos Nos Nos Nos Nos Nos Nos	2000 2000 2000 200 10 141 50 50 270 91 4 4 4 4 4 4 4 4 16 270 91 4 4 4 4 54 39 37813 37813 37813 101881 115843 400 25 20 20 20 20 20 20 20 20 20 20 20 20 20	338 400139 252993 7458 14621 5120 11086 7219 14621 14255 20884 8602 7458 7458 7458 7458 7458 7458 7458 7458 7458 7458 7458 2565 324 903 2565 1541 1541 250366 2400000 2800000 725800 350000 58676 191 20000	8.00.278 8.00.278 25.29.9.30 12.25.29.930 12.25.29.930 12.25.29.73 7.200 7.31.050 13.82.400 10.08.826 28.876 58.484 17.020 28.876 58.484 17.020 23.34.144 17.384 5.29.518 2.10.24.028 3.30.09.440 2.10.24.028 3.30.09.440 2.10.24.028 3.30.09.440 2.10.24.028 3.30.09.440 2.10.24.028 3.30.09.440 2.10.24.028 3.30.09.440 1.54.10.000 3.23.96.000 3.23.96.000 3.23.96.000 3.23.96.000 3.23.96.000
10.2506           10.2506           10.2506           3           3.355           10.0000           0           2           0.0600           0           2           0.0600           0           1199           0           0.233           214           4799           213           8           970           5           970           5           926           1337           2828           262           000           500           510           520           920	$\begin{array}{c} 10.6\\ 10.7\\ 10.7 \text{ b} \\ 10.7 \text{ b} \\ 10.8 \text{ c} \\ 10.8 \text{ b} \\ 10.8 \text{ c} \\$	Fixing Road Studs Fixing Road Studs Full Over Head Gantry Full Over Head Gantry Cantilever Type Traffic Signs 90cm Equilateral Triangle 60cm Cacular 90 Cm Octagon 60cm Equilateral Triangle 60cm Equilateral Triangle 60cm Equilateral Triangle 90 Cm Octagon 90 Cm Octagon 90 Cm Octagon 90 Cm Sector State Facility Informatory Sign 0.6X0.6 Facility Informatory Sign 0.6X0.6 Facility Informatory Sign 0.6X0.6 Facility Informatory Sign 0.6X0.6 Octagon 0.9m Service Road Start & End 0 Diject Hazard 0.3X0.9 Chevron Compulsory Left/Right 0.6 Speed Limit Thermoplastic Painting Kerb laying Foot path Separator Tabular Steel railing Miscellameous Planting Trees Rain water Harvesting Singet Arm High Mast Doubk Arm High Mast Bus Shelter Median Plantation Chequered Tikes in median Toilet Block	Nos Nos Nos Nos Nos Nos Nos Nos Nos Nos	2 2000 2 10 141 5 5 5 270 91 4 4 4 16 2 71 54 39 37813 101881 15843 4 400 10000 90 3 3 12 25 20 43 4082 400	338 400139 252993 7458 14621 5120 11086 7219 14621 4255 20884 8692 7458 8692 7458 7458 556 324 903 2565 1541 50366 50366 2400000 725800 350000 785800 350000 58676 191 200000	8.00.278 8.00.278 8.00.278 37.290 12.25,572 37.290 13.82,400 10.08,826 28,876 58,484 17.020 28,876 58,484 17.020 28,876 58,484 17.020 28,876 28,477 29,046 21,024,028 3.34,144 1,7.384 5.29,518 2,10,24,028 3.30,09,444 1,43,06,229 10,26,000 1,54,10,000 1,54,10,000 1,54,10,000 1,54,10,000 1,54,10,000 1,54,10,000 1,51,614 7,79,687 8,00,000 1,59,400 1,59,400 1,59,400 1,54,10,000 1,51,614 7,79,687 8,00,000 1,59,400 1,59,500 1,59,500 1

Sr. No.	Description of Item	Unit	Quantity	Rate	Amount	Sr. No.	Description of
1.01	Site Clearance CnG	Ha	130	24136	31.31.887		RCC Retaining
2.01	Earth Work	CuM	68800	66	45 41 204	7.07	Excavation PCC M-15
2.2	Embankment	CuM	1000339	471	47,11,59,669	7.09	Filter Media
2.04 2.05	Subgrade Earthen Shoulder	CuM	320785 72878	471 512	15,10,89,735 3,73,13,536	7.1	RCC M-30 Fou HYSD Steel For
2.06	Granular Shoulder Compaction OGL	CuM CuM	407 42641	1902 73	7,74,114 31,12,793	7.11	RCC M-30 Sul
2.08	Median/Island Filling Sub Base and Base Course	CuM	76605	514	3,93,74,970	7.13	Weep Holes 10
3.01	GSB	CuM	40295	1902	7,66,41,090	7.15	Toe Wall
3.04	CTSB	CuM	211279	2343	49,50,26,697	7.16	PCC M-15
3.06	200 Micron Polythene Sheet	SqM	722905	300	21,68,71,500	7.17	PCC-M-20 Filter Media
3.07	AGG Bituminous Courses	CuM	72810	2398	17,45,98,380	7.18	Drainage and Pr
4.01 4.02	Prime Coat Tack Coat	SqM SqM	816172 1017804	19 8	1,55,07,268 81,42,432	8.01	Earthen Drain RCC M-20
4.03 4.03	DBM VG-40 DBM VG-30	CuM	63504 3603	6682 6651	42,43,33,728 2,39,63,553	8.03	W-Beam
4.04	BC VG-40 BC VG-20	CuM	34436	8210	28,27,19,560	8.04	Grass Turfing Filter Media
4.01	DLC	CuM	2446	3749	91,70,054	8.06	Toe Wall
4.02 5.02	PQC Excavation for Structures	CuM CuM	4168 9235	6748 61	2,81,25,664 5,63,354	8.08	Stone Pitching Paver Block
5.03 5.04	PCC M-15 M-20	CuM CuM	502 489	6684 7102	33,53,764 34,75,932	8.1	Sand
5.05 5.05 a)	Concrete Pipe 900mm NP4 Pipe	Lm	2520	7655	1 92 91 104		Toll Plaza and M
5.05 b)	1000mm NP4 Pipe	Lm	223	9569	21,36,662	9.01	Construction of
5.06	RCC	Lin	344	11307	01,48,800	9.01 a 9.01b	Admin Block POS
5.06 a) 5.06 b)	M20 M25	CuM	0 417	6920	28,82,803	9.01c	Service Block
5.06 c) 5.07	M30 FE 500 TMT HYSD	CuM MT	1819 156	6947 70538	1,26,37,913 1,10,37,786	9.01a 9.01e	Single Toll Boot
5.08 5.09 a)	Weep Holes 100mm Backfilling by Granular Material	Nos CuM	3612 1649	280 1142	10,11,360 18,82,804	9.01d	Double Toll Boo
5.1	Filter Media Drainag Spout	CuM	1901	1700	32,31,309	9.02	Wire Frenching
5.2	Painting of Structure	Nos	54	200	10,800	9.04	Drain Under Foo
5.22 5.23	Filter Media	CuM	198	1995	3,95,808	9.06	Electrical Item
5.24 a) 5.25 a)	Concrete M-15 Concrete M-15	CuM CuM	578 179	6684 8979	38,64,689 16,06,164	9.06a	Lighting Canopy Street Light
5.26 2.28	Flexible Apron Compressible Fibre Board	CuM SqM	1305 135	2436 184	31,78,298 24,875	9.06c	High Mass Light
A 6.01	Dismantling Dismantling			-		9.07	Sign Boards
6.01 c)	PCC	CuM	131	644	84,525	9.07 b	Cantilever Gantr
6.01 d) 6.01 e)	RCC Wearing Course/Pavement	CuM	3983 63	1034	45,12,399 65,359	9.07 c	Kerb Sign for Te Kerb Sign for Te
6.01 f) B	Dismantling of Railing Foundation	CuM	321	251	80,669	9.07 e	Kerb Sign T5
6.02 6.02 a)	Excavation for Structures Soil	CuM	64070	70	44.84.880	9.07 f	Kerb Sign T6 Kerb Sign T7
6.02 b)	Rocks Open Foundation	CuM	903	328	2,96,184	9.08	Generator Roon
6.03a	Concrete M15	CuM	3090	6684	2,06,50,285	9.09	Providing Vehicl Providing Medic
6.04	RCC M35 Pile	Cuivi	12300	7063	8,83,10,522	9.11	Providing Traffic
6.04a 6.04b	0-10 m Depth 10-20m Depth	Lm	2245 618	14243 15280	3,19,75,535 94,43,040	9.12 9.14	Toll plaza Mana Bull Nose Safety
6.05 6.05a	Carryout Load Test on Pile Initial Load test	MT	4375	440	19,25,000	9.15	50mm Steel Pipe
6.05b 6.05c	Routine Load test Initial Horizontal Pile Load test	MT	2625 525	440 440	11,55,000 2,31,000	9.16	Weigh Bridge
6.06	RCC M35 for Pile Cap	CuM	2704	7137	1,92,98,448	9.18	Utility Duct
6.08	Filling Annular Filling	CuM	132	6087	8,03,484	9.19	Supply of Ambu
C 6.09	Sub-Structure Concrete for Sub-Structure					9.21	Supply of Crane
6.09 d-i 6.09 d-ii	RCC M-35 upto 5 m ht RCC M-35 upto 5-10 m ht	CuM	8177 5360	7656 7823	6,26,00,815 4,19,30,419	9.22	Supply of Venes
6.09 f-ii 6 1	RCC M-45 5-10m Ht Placing FF415 TMT HYSD Steel	CuM MT	74	8844 70810	6,51,714 8 91 87 319	9.24	Installation of W
6.11	Weep Holes 100mm Beals filling by Commiles Fill	Nos	11258	280	31,52,240	9.27	Installation & C
6.13	Filter Media	CuM	7216	1700	1,22,68,016	9.27	ETC
6.14	Prestressed RCC Concrete Slab					9.29	Providing Vehicl
6.14-i 6.14 c	Prestressed RCC Concrete Slab RCC M-35 Deck Slab	CuM	5788	8362	4,83,95,577	9.3	Spherical Stairca Security Cabin
6.14 d 6.14 e	RCC M-40 Deck Slab RCC M-45 Deck Slab	CuM CuM	1186 939	8795 8844	1,04,32,629 83,03,632	9.32	Highway Nest
6.14-ii 6.14 c	Prestressed RCC Concrete Girder RCC M=35 Deck Slab	CuM	233	8702	20 27 566	1 1	Traffic Signs, Devices
6.14 d	RCC M-40 Deck Slab	CuM	1700	9006	1,53,09,299	10.1	Km Stone Fixing
6.15	Placing FE415 TMT HYSD Steel	MT	1321	72700	9,60,33,792	10.1 a) 10.1 b)	200m Stone Km Stone
6.16	Structural Steel	MT	950	78678	7,47,44,100	10.1 c)	5th Km Stone
E 6.19	Miscellaneous BC 40mm	CuM	879	7741	68,01,630	10.2	Delineators Fixir
6.2 6.21	Mastic Asphalt 25mm PCC M-15 Approach Slab	SqM CuM	20730 845	758 6427	1,57,13,340 54,29,594	10.4	Sign Boards 0.9
6.22	RCC M-30 Approach Slab	CuM	1674 249	10449 2154	1,74,86,506	10.5	Fixing Road Stu
6.23 b	Down Take Pipe	Lm	64	300	19,143	10.7	Fixing Tabular g
6.25	RCC Railing M-30	Lm	3209	1950	62,57,355	10.7 b)	Cantilever Type
6.27 6.27 a	Bearings PTFE	мт	82800	250	2,07,00,000	10.8	Traffic Signs
6.27 c 6.28	Tar Paper Expansion Joint	SqM	250	49	12,160	10.8b	60cm Circular
6.28 a 6.28b	20 mm Thick Filler Strip Seal Expansion Joint	Lm	299 641	248 14660	74,152 93,97,060	10.8c	90 Cm Octagon 60cm Equilatera
6.28c	Asphaltic Plug Painting of Structure	Lm	1250	1310	16,37,199	10.8e	Facility Informat
6.3	Pitching of Slopes	CuM	1950	2317	45,17,617	10.8f	Facility Informat Octayon 0.9m
6.32	Toe Wall M-15	CuM	1019	6684	68,08,723	10.8h	Rectangular 0.30
6.33 6.34	Curtain Wall Flooring	CuM CuM	1435 607	6684 8079	95,94,214 49,00,479	10.8i 10.8j	Service Road St Object Hazard (
6.35 6.36	Flexible Apron Shelitex Board	SqM SqM	2873 83	2436 156	69,99,213 12,948	10.8k	Chevron
6.37 6.38	Footpath Green Fiber Sheet 15mm	SqM SaM	4745 121	903 500	42,84,970 60,375	10.8 l 10.8 m	Compulsory Lef Speed Limit
6.37 A	Angle Section for Fibre Sheet	MT	1	78678	88,119	10.9	Thermoplastic P
6.01 d)	RCC	CuM	512	1133	5,80,096	10.11	Foot path Separ
6.01 e) 6.01 f)	w earing Course/Pavement Dismantling kerb/Railing/Gutters	CuM Lm	400 855	251	4,81,844 2,14,605	10.12	Tabular Steel rai
B 6.02	Repair & Rehabilitation Mastic Asphalt 25mm	<u>Sq</u> M	5881	758	44,57,798	11.1	Planting Trees
6.03 6.04	BC PCC M-15	CuM CuM	235 201	7741 6427	18,19,135 12,91.827	11.2	Rain water Harv
6.05	RCC M-30	CuM	612	10449	63,94,788	11.3 11.3 a	Single Arm
6.07	RCC M-40 Crash barrier	Lm	426	4517	9,02,526 19,24,242	11.3 b	Double Arm
6.08 6.09	KCC Railing M-30 80mm NB Pipe	Lm Lm	431 426	3000 600	12,93,000 2,55,600	11.3 c 11.4	Bus Shelter
6.1 6.10a	Expansion Joint Strip Seal Expansion Joint	Lm Lm	431 163	248 248	1,06,888 40,424	11.5	Median Plantatio
6.10b	Asphaltic Plug Stone Pitching	Lm	725	9718 2317	70,45,550	11.0	Toilet Block
6.12	Filter Media	CuM	202	1995	4,02,990	12	Maintenance
6.15	Chipping Dammed Concrete	Nos SqM	80	1000	80,000	12	. or noies Filling
7.01	RE wall RE wall Excavation	CuM	11568	61	7,05,648	Total An	ount
7.02 7.03	PCC M-15 RE Wall Facia Pannel	CuM SaM	1735 53763	6684 5000	1,15,96,740 26,88,15.000	Total Est	imated Amount
7.04	Filter Media Crash barrier M-40	CuM	14906	1700	2,53,40,200	Bid Quot Total B:	ed Percentage
7.06	Back Fill RE wall	CuM	127874	685	8,75,93,690		- roject Cost

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4,79,35,07,740 57,52,20,929 5,36,87,28,668 19.51% 6,41,60,00,000

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		Estim	ated Qty	Consum	ption Rate	Con	sumption		
Sr. No.	Item in Brief.	Unit	QTY.	Unit	Consump tion Rate	Unit	Item wise Consump tion	Item Qty	Remark
1	M-15	CuM	5098	Kg/Cum	308	MT	1570		
2	M-20	CuM	12374	Kg/Cum	341	MT	4220		
3	M-20	CuM	7132	Kg/Cum	377	MT	2689		0.07Cum/M
4	M-25	CuM	0	Kg/Cum	380	MT	0		
5	M-30	CuM	6046	Kg/Cum	393	MT	2376		
6	M-35	CuM	19557	Kg/Cum	402	MT	7862		
7	M-40	CuM	19304	Kg/Cum	418	MT	8069		
8	M-45	CuM	3043	Kg/Cum	449	MT	1366		
9	DLC	CuM	2446	Kg/Cum	165	MT	404		
10	PQQ	CuM	4168	Kg/Cum	450	MT	1876		
11	CTSB	CuM	211279	Kg/Cum	51	MT	10835		
12	CTB	CuM	75058	Kg/Cum	103	MT	7698	48964	Cement
13	Tack Coat	SqM	1017804	Kg/SqM	0	MT	305		VG-30
14	BC VG- 30	CuM	5227	Kg/Cum	129	MT	676	1362	Bitumen
15	BC VG- 40	CuM	34436	Kg/Cum	129	CuM	4451		VG-40
16	DBM VG- 30	CuM	3603	Kg/Cum	106	CuM	381	11166	Bitumen
17	DBM VG- 40	CuM	63504	Kg/Cum	106	CuM	6716		
18	Steel	MT	4298	MT	1	MT	4298	4298	Steel
19	Structural Steel	MT	950	MT	1	MT	950	950	Stru.Steel

## **CONSUMPTION STATEMENT**

## **Table# -9 Consumption Summary**

As above details will be used for calculation of price escalation Cost. The Project Taken for case study is executing under HAM (Hybrid Annuity Mode) to calculate effect of price escalation clause in highway Construction industry we have to calculate price escalation cost of above project in using all types of departments adopted to calculate the price escalation to achieve conclusion. Also, this calculation also gives information about-

- **1.** Index Adaptation to calculate price escalation.
- 2. Website on which index available.
- **3.** For Calculation which quantity are to be taken.
- 4. Where, which and when index is to be calculated.
- 5. Constants and Star rate calculation using all types of Price escalation in different type departments.

#### 4. **RESULTS AND ANALYSIS**

#### 4.1 **Price Escalation Cost using Central Public works** (CPWD)Formulae.

As per central public works department Memorandum No.DGW/CON/237/ A Dated 31.12.2018 Amendment of Clause 10C. 10CA and 10CC of General Conditions of Contracts 2008 the formulae as follows.

#### Cement /Steel/Structural Steel Cost. 4.1.1

According to GCC 2008 Clause in CPWD 10 CA - Payment of changes in price of documents as Bids Received should extend the contract (equal) if, after submitting Bids, the price of documents listed in Schedule I/Chart B/Chart F is

increased/decreased by more than the price in effect at the last hour of the contract date. 2. However, performance within the extended reasonable period specified above will be limited to the current rate at the date of completion or the current rate for the anticipated period, whichever is shorter. The increase/decrease in the cost of cement, reinforcement and steel structure will be evaluated according to the price index announced by the CPWD Director (Works). For other items listed in Schedule "F",

This should be determined from the All-India Market Prices for Materials published by the Economic Advisor, Government of India, Ministry of Trade and Industry and Base Prices for Cement, Rebar and Structural Steel published by the Director General of CPWD (Works) for Delhi (including Noida, Director of Commerce) under the authority of the Director General of CPWD (Works). CPWD and other local rates for other documents issued by the Regional Marketing Officer specified in the Schedule 'F/G/B', including the extension in the evaluation period (if any), are valid on the date of receipt of the specified trailing offer. If the price index of a product has not been published by the Ministry of Trade and Industry, the closest product price index in the "F" Chart is taken as basis.

Therefore, the contract/tender price for all these materials will be different and calculated according to the following formula for the main materials used in construction: -

#### Cement Price Variation Calculated such as, P\*0 {((CI/SI/SCI)-Vc/Vs/Vsc= (CIo/SIo/SCIo)/(CIo/SIo/SCIo)}

Where-

Vc/Vs/Vsc =Variation in material cost i.e. Increase or decrease in the amount in rupees to be paid or recovered. P=Base Price of material For documents issued by the Company, CPWD or the Regional Affairs Manager, as shown in the "G/B/F" Schedule, at the starting price valid at the date of the last receipt of the bids, including any extensions, Star Rates as per SSR 2019-20 i.e Last Receipt of Tender. i.e 13 Jan 2020.

Sr. No.	Material	Basic rate for 2019-20(Excluding GST)
a)	Cement /PPC	Rs. 4,700/- Per M. T.
b)	PSC	Rs. 4,840/- Per M. T.
c)	GGBS (IS-16714)	Rs. 3990/- Per M. T.
d)	TMT-FE-500 reinforcement	Rs. 41,200/- Per M. T.
e)	HCRM/ CRS reinforcement	Rs. 44,000/- Per M. T.
f)	Structural Steel	Rs. 44,100/- Per M. T.
g)	Bitumen VG-30 (Packed)	Rs. 32,500/- Per M. T.Ex. Refinery Mumbai
h)	Bitumen VG-10 (Packed)	Rs. 31,700/- Per M. T. Ex. Refinery Mumbai
i)	Bitumen VG-40 (Bulk)	Rs. 30,180/- Per M. T. Ex. Refinery Mumbai
j)	Bitumen VG-30 (Bulk)	Rs. 29,200/- Per M. T. Ex. Refinery Mumbai
k)	Bitumen VG-10 (Bulk)	Rs. 28,400/- Per M. T. Ex. Refinery Mumbai
1)	Bitumen VG-40 (Packed)	Rs. 33,580/- Per M. T. Ex. Refinery Mumbai
m)	Bitumen Emulsion	Rs. 23,490/- Per M. T. Ex. Refinery Mumbai
n)	CRMB - 55	Rs. 30,555/- Per M. T.
p)	CRMB - 60	Rs. 30,735/- Per M. T.

## Table# -10 PWD SSR 2019-20 Star Rates

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Q =Quantity of material buy at site for confide use in the works since previous bill.

Clo/Slo/SClo = The price index is given by the Indian Ministry of Industry and Commerce, which is the Economic Advisor of the Government of India, such as Cement, Rebar and Structural Steel, valid on the last day of receiving bids for other items listed in the "G/B/F" Schedule with and with extensions if any.

CI/SI/SCI=Price index for Cement, Rebar and Structural Steel Price Indices published by the Economic Advisor to the Government of India Ministry of Industry and Trade as All India Commercial Price Indices for payment or payment period information

### Using above all the Price escalation cost as follows.

## 4.1.1.1 Cement Cost.

Vc= P\*Q \* {(CI-CIo)/CIo} P= Rs.4700 As per Table no-10 Sr. (a) Q= 48964 MT as per Table No.9 CI= 135 (18 May 2023) Quantity Billedas per Following Image.



Image # 05: WPI Cement May-2023. Clo=118.5 (13 Jan 2020) receipt of tender as per Following Image

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Month/Year	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
2019	112.7	116.1	116.4	119.6	123.2	122.5	120.6	118.5	120.7	118.6	119.6	118.5		
	OFFICE O DEPARTMENT INTERNAL TR/ Vholesale F Monthly Whol Name of Com Name of Com Name of Com Same of Com Name of	OFFICE OF TH DEPARTMENT FOR P INTERNAL TRADE Vholesale Price I Monthly Wilobesale P Hame of Commodity Type : Individual Commodity Base Year : 2011-12 = Monthl/Year Jan 2019 112.7	OFFICE OF THE ECC DEPARTMENT FOR PROMOT INTERNAL TRADE Vholesale Price Index Monthly Wholesale Price Indf Mane of Common Office I Collar Weight Versil 2011 Monthly Wholesale Price Indf Weight Versil 2011 Monthly Ward I and I and I and I and I Monthly Year I and I	OFFICE OF THE ECONON DEPARTMENT FOR PROMOTION OF INTERNAL TRADE Violesale Price Index (VVPI) Membry Weiseaar Price Index Types Lebadaction Department Editory Team Free American Bear Free 2011 - 2 - 10 Feb Merican 2019 - 112 - 116.4 Merican	OFFICE OF THE ECONOMICA A DEPARTMENT FOR PROMOTION OF NOUS INTERNAL TRADE Volcesale Price Index (WPI) Memory Walesade frie Index Type Index (WPI) Memory Walesade frie Index Type Index (WPI) Memory Walesade frie Index Type Index (WPI) Memory Walesade frie Index Memory Walesade (WPI)	Defice OF THE ECONOMIC ADVIS           DEPARTMENT FOR PROMOTION OF INDUSTRY AN INTERNAL TRADE           Wholesale Price Index (WPI)           Number of the state of	Defice OF THE ECONOMIC ADVISER DEPARTMENT FOR PROMOTION OF ADVISTIY AND MITCHINAL TRADE           Vholesale Price Index (WPI)           Name of the state of the sta	Description         Definition         Description         Description <thdescription< th=""> <thdescription< th=""></thdescription<></thdescription<>	DEFICE OF THE ECONOMIC ADVISER           DEPARTMENT FOR PROMOTION OF INDUSTRY AND INTERNAL TRADE           Volcesate Price Index (WPP)           Number of the internal state of the inte	DEFICE OF THE ECONOMIC ADVISER           DEPARTMENT FOR PROMOTION OF NOUSITY AND INTERNAL TRADE           Wholesale Price Index (WPI)           Modely Monesale Price Index (WPI) Base Terror 2011 22 - 102 Base Terror 2011 22 - 102 Base Terror 2011 22 - 102           MonoTerror Law For Mark Are Ring Jam Art Arag Sep 2019 112 T 116.1 116.4 119.8 122.2 122.2 122.5 128.6 116.5 120.7	OFFICE OF THE ECONOMIC ADVISER         A           DEPARTMENT FOR PROMOTION OF INDUSTRY AND INTERNAL TRADE         A           Wholesale Price Index (WPI)         B           Monthly Minkman Price Index Type Indextad Characterity Type Index Indextad Characterity Type Ind	OFFICE OF THE ECONOMIC ADVISER GERARMENT FOR PROMOTION OF INDUSTRY AND NITERNAL TRADE         A230 Annue 1, A230 Annue 1, A330 Annue 1, A3	OFFICE OF THE ECONOMIC ADVISER DEPARTMENT FOR PROMOTION OF INDUSTRY AND INTERNAL TRADE         Annet Mandback Mitternal Trade           Monthly Mitchesler Price Index (WPI)           Monthly Mitchesler Price In	OFFICE OF THE ECONOMIC ADVISER DEPARTMENT FOR PROMOTION OF INDUSTRY AND INTERNAL TRADE Volcesale Price Index (WPI) Multibulicasie Price Index (WPI)

Image # 06: WPI Cement Dec-2019.

So,

Vc= P\*Q \* {( CI-CIo)/CIo} Vc= 4700\*48964\*((135-118.5)/118.5) Vc = 4700\*48964\* (16.5/118.) Vc = 4700\*48964\*0.1392 Vc = 3,20,34,207/- Cement Escalation Amount

### 4.1.1.2 Steel Cost.

## Vs= P\*Q \* {( (SI)-(SIo)/(SIo/SIo)}

P= Rs. 41200 As per Table no-10 Sr. (d) Q= 4298MT as per Table No.9 SI= 144.5 (18 May 2023) Quantity Billed as per Following Image.

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	Month/Year	Jan	Feb	Mar	Apr	May	Jain	Jul Au	510	Oct Nov	Dec
	2023	148.3	148.4	147.6	145.7	144.5					
		y be trea	led as ind	lex for pa	articular i	tem not-	availab	le. onths are to	be reck	oned with rel	



SIo=102.4 (13 Jan 2020) receipt of tender as per Following Image

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DEPARTMENT FOR PROMOTION OF INDUSTRY AND INTERNAL TRADE Wholesale Price Index (WPI) Monthly Wholesale Price Index Tamer & Commonly 1: Mild Server Long Products Tamer & Commonly 1: Mild Server Long Products Tamer & Commonly 1: Mild Server Long Products Bere Yers : 2015-12 - 100 Monthlyrar Jam Feb Mar Age Mary Jam								_						
Month/Year	Jan	Feb	Mar	Apr	May	Jan	Jul	Aug	Sep	Oct	Nov	Dec		
2019	109.5	109.9	110.1	110.1	109.4	108.4	106.1	104.2	103.4	102.6	101.9	102.4		
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Image # 08: WPI Steel Dec-2019.

### So

Vs= P\*Q \* {((SI)-(SIo)/(SIo/SIo)} Vs= 41200\*4298\*((144.5-102.4)/102.4) Vs= 41200\*4298\*((42.1)/102.4) Vs= 41200\*4298\*0.4111 Vs=7,27,96,601/-

4.1.1.3 Structural Steel Cost.

Vsc= P\*Q \* {((SCI)-(SCIo)/(SCIo/SCIo)}

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P= Rs. 44100 As per Table no-10 Sr. (f) Q= 950MT as per Table No.9 SCI= 154.7 (18 May 2023) Quantity Billed as per Following Image

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	Month/Year	Jan I	Feb Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
	2023	153.5	159.1 159	157.9	154.7									
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Image # 09: WPI Structural Steel May-2023.

**SCIo=99.1** (13 Jan 2020) receipt of tender as per Following Image



Image # 10: WPI Structural Steel Dec-2019.

## So

**Vsc= P\*Q \* {( (SCI)-(SCIo)/(SCIo/SCIo)}** Vs= 44100\*950\*((154.7-99.1)/99.1) Vs= 44100\*950\* ((55.6)/99.1)

Vs= 44100\*950\* ((55.6)/99.1) Vs= 44100\*950\*0.5610 Vs=2,35,03,095/-

# 4.1.2 Material (Expect Cement/Steel/ Structural Steel) Cost

Payment to rate/increase/decrease account when bidding for employment in the Central Department of Public Works (excluding information paid under section 10CA). If there is an increase in the prices of 10 CC Materials (no materials or goods delivered by the Department at a fixed price by the Department under the contract provisions in CPWD 4 10) and the contract will be specified below, the contract will therefore be different. less No such payment will be made for works where the total time specified is equal to or less than the time specified in Schedule F. Such payments for material and labor costs will eventually be calculated according to the following rules: -

- i) The base period for working out such escalation shall be the last stipulated date of receipt of tenders/quote including extension, if any
- ii) The Price of work on which escalation will be payable shall is considered as below:
- a) The total cost of the work has been done in the agreed quarter: (A)

b) Total operating cost increased compared to the previous quarter.: (B)

c) Total amount of work done since last quarter (A-B) : (C)

d) Total Estimated Value of Advance Payment (excluding information paid by clause 10) (CA)fresh paid in this quarter: (D)e) Total value of security received for quarterly period

(excluding items used by Chapter 10 CA): (E)

f) The total value of the adjustment is confirmed before payment is made for the quarter. (D-E) :(F)

g) Advance payment for this quarter: (G)

- h) Advance payment recovered during quarter: (H)
- i) Advance payments received this quarter (G-H): (I)

j) Pay for additional items at quarterly market rates: (J) Then, M=C+ F+ I – J

N = 0.85 M

k) Deduct cost/Price of material supplied by the concerned department and recovered during the quarter in billing period: (K)

l) Reduce cost of service rendered at fixed costs and recovered for the duration of the quarter:(L)

Cost of work for which escalation is applicable:

W = N-(K+L)

- Materials (excluding cement, HSYD/TMT rebar, steel structures or other materials in CPWD 10 CA clauses), labor, diesel, etc. Each work will be pre-ordered and placed in the Contract Schedule together with the tender documents in Schedule "E". The decision of the Responsible Agent to calculate this percentage is binding on the contractor.
- iv) Installment payments for other materials i.e. construction materials/works/materials (excluding cement, HSYD/TMT rebar, steel structures or other materials from CPWD 10 CA provisions) and diesel shall include the following standards:

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v)

Adjustment for civil construction material/Works/Components (except cement, Structural steel, reinforcement HSYD/TMT bars and other materials covered under clause 10CA) / electrical component of construction

'Materials',

## V<sub>M</sub>=W \* (Xm/100)\*{( MI-MIo)/MIo}

Where-

Vm = Variation in material cost i.e. Increase or decrease in the amount in rupees to be paid or recovered.

W = Cost of work done worked out as indicated in sub-para (ii) of Clause in CPWD 10CC.

## i.e.W = N-(K+L)

Xm = Component of 'materials'(except cement, Structural steel, reinforcement HSYD/TMT bar sand other materials covered in CPWD clause 10CA) expressed as percent of the total value of work.

MI = All India Wholesale Price Index for civil component/electrical component\* of construction material as worked out on the basis of All India Wholesale Price Index for individual Commodities/Group items for the period under consideration as published by Economic Advisor to Govt. of India, Ministry of Industry & Commerce and applying weightages to the individual Commodities/ Group Items. (In respect of the justified period extended under the provisions of clause 5 of the contract without any action under clause 2, the index prevailing at the time of stipulated date of completion or the prevailing index of the period under consideration, whichever is less shall be considered).

MIo = All India Wholesale Price Index for civil component/electrical component of construction material as worked out on the basis of All India Wholesale Price Index for

individual Commodities/Group items valid on the last stipulated date of receipt of tender, including extension, if any, as published by the Economic Advisor to Govt. of India, Ministry of Industry & Commerce and applying weightages to the individual Commodities/Group items.

## Material Cost (Excluding Cement, Steel, Structural Steel) V<sub>M</sub>=W \* (Xm/100)\*{(MI-MIo)/MIo}

Vm = Variation in material cost i.e. increase or decrease in the amount in rupees to be paid or recovered.

W = Cost of work done worked out as indicated in sub-para (ii) of Clause 10CC.

i.e. W = N-(K+L)

N = 0.85 M

Where,

M= Total Cost executed during quarter Say its **Rs.5,36,87,28,668** N=0.85 M =0.85 x**5,36,87,28,668** W=N-(K-L)=X **5,36,87,28,668**  Xm = Component of 'materials' (except cement, Structural steel, reinforcement bars

and other materials covered under clause 10CA) expressed as percent of the total value of work.

Xm=5368728668- {(Cement Qty X Star Rate) + (Steel Qty X Star rate) + (Stru. Steel QtyX Star rate)

Xm =5368728668-{(4700\*48964)+(41200\*4298))+(44100\*950)} Xm =5368728668-(230130800+177077600+41895000) Xm =5368728668-449103400

## **Xm** = 4919625268

MI=Material Index all Commodities at Billing=149.6



Image # 11: WPI Material May-2023

MIo=Material Index all Commodities at Tender Receipt=123.



Image # 12: WPI Material Dec-2019

V<sub>M</sub>=W\*(Xm/100)\*{(MI-MIo)/MIo} V<sub>M</sub>=4919625268\*(149.6-123/123)\ V<sub>M</sub>=4919625268\*0.2162 V<sub>M</sub>=1,06,36,22,983/-Total Price Escalation Cost using central Public Works Department Formulae= 3,20,34,207+ 7,27,96,601+2,35,03,095+1,06,36,22,983= 1,19,19,56,886/-

Total Price Escalation Cost using CPWD Formulae=<u>1,19,19,56,886/-</u>

# 4.2 Price Escalation Cost using HAM Project Formulae-

The price of the bid will be adjusted from time to time in accordance with these provisions to reflect changes in the price evaluated after the date the evaluation was used prior to the bid date., the change in the value of the data showing the date before the tender date is adjusted according to the bid price and the date when the value is used before the specified date is accepted as the bid value at the start of the construction. The Company will calculate the change in the Price Index between the Previous Date Report and the Day Before Closing Date for each month after the specified date and will be expressed as a multiple of the Closing Date ("Price Index Multiplier"). All invoices sent by the Concessionaire to the Company for the construction period must be the product of the relevant portion of the tender price and the valid price on the invoice date.

In HAM Project the Price escalation is to be calculated on Milestone basis the milestone is 10%, 30%, 50%, 75%, and 90%. At each milestone the price escalation which is Positive or Negative side is decided on milestone payment and at the time of annuity this amount is revert back to Contractor by government on half annuity basis. To do simplicity of calculation the price escalation calculated for 90% i.e., after project completion is considered.

The increase in the form of is calculated as follows. **Price Index Multiple=** {(70%\*WPI)+(30%CPI)}/{(70%WPI0)+(30%CPI0)}

Project Cost (with Escalation) =Project Cost (Including GST) \*Price Index Multiple.

**WPIo-**The Wholesale Price Index on the Reference Index Date preceding the Bid Say Jan-21 i.e Dec-2020. Index Taken i.e.**123.00** 



Image # 13: WPI Material Dec-2019 for HAM.

**CPIo-** The Labour Price Index on the Reference Index Date preceding the Bid Date i.e Bid Date Jan-20i.e Dec-2019. Index Taken i.e. <u>405.00</u>

	Consumer Price Index Num	hers fr	or Indu	strial	worke	rs on	Rase	2001 -	100 fo	r Yea	2010		
State	Centre Desc	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
MHR	MUMBAI	300	302	305	307	308	309	312	313	321	322	322	322
	NAGPUR	383	387	386	386	389	393	403	403	403	405	407	405
	NASIK	353	357	357	358	360	360	362	364	369	375	377	380
	PUNE	330	329	331	336	341	344	351	353	353	355	358	357
	SHOLAPUR	320	324	324	327	332	331	335	341	341	347	350	347

Image # 14: CPI for Labour Dec-2019 for HAM.

**WPI-**The Wholesale Price Index Multiple applicable on the date of Invoice Jun-23 i.e May-2023. Index Taken i.e.**149.6** 

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Wholesale P Monthly Whole Name of Comm Type : Group It Weight : 100 Base Year : 20	rice Inc esale Price nodity : A em 11-12 = 10	dex (W e Index I commo	(PI)											 _
Month/Year	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Deo		
2023	150.7	150.9	151	150.9	149.6									
1. Figure 0 ma	y be treat	ed as ind	ex for p	articular	r item not	availa	ble.	are foi			ith cofe			

Image # 15: WPI for MaterialMay-2023 for HAM.

**CPI-**The Labour Price Index Multiple applicable on the date of Invoice (Preceding Quarter) i.e Jun-23 i.e Mar-2023. Index Taken i.e., **133.1 X 3.6 (Multiply Factor For 2016) = 479.16** 

Ŭ		Em	ploym	ient,(	Govern	nmen
S.No	Base Year	State	Centre	Year	Month	Index
1	2016	MAHARASHTRA	Nagpur	2023	Feb	132.7
2	2016	MAHARASHTRA	Nagpur	2023	Mar	133.1
3	2016	MAHARASHTRA	Nagpur	2023	Apr	133.5
4	2016	MAHARASHTRA	Nagpur	2023	May	135.4

Image # 16: CPI for Labour Mar-2023 for HAM.

## Price Index Multiple=

{(70%\*WPI)+(30%CPI)}/{(70%WPIo)+(30%CPIo)} Price Index Multiple= {(70%\* 149.6)+(30%\*479.16)}/{(70%\*123)+(30%\*405.0)} Price Index Multiple= 1.20 (Use Up to 2 Digit) Project Cost (with Escalation) =Project Cost (Including GST) \*Price Index Multiple.



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Project Cost (with Escalation) =5,36,87,28,668\* 1.2 Project Cost (with Escalation) = 6,44,24,74,402 Price Escalation Amount = Project Cost with escalation-Project Cost

**Price Escalation Amount (HAM) =** 6,44,24,74,402 - 5,36,87,28,668

Price Escalation Amount (HAM) = 107,37,45,734/-

# 4.3 Price Escalation Cost using PWD Maharashtra Formulae-

Government of Maharashtra Govt. Circular No. Sankirn-2017/C.R.121/Part II/Bldg.2 Dated 23-10-2017 Price Variation is to be calculated as.

It is obligatory to include this price correction clause for projects with a construction period of more than 1 year. According to MoRTH guidelines, there is no interest increase if the term is up to 1 year (12 months). For this reason, price adjustment provisions should be included in projects with a construction period of more than 1 year (12 months). It should also be clarified that works such as pit filling or 1-10km rehabilitation cannot continue beyond the completion of the year without the written approval of the relevant Project Manager. Price adjustment provisions included in the tender are also specified in Annex "A".

## 4.3.1 Price Adjustment

The contract price should be adjusted to increase or decrease the labor, material, oil and diesel (excluding asphalt, cement and steel) costs according to the following standards and the procedures and standards included in the contract. The amended provisions contained herein shall be as follows:

(a) The revised rate applies to work completed from the start date specified in the Contract Documents to the end of the initial completion period, or extended work as agreed by the Contractor, and failure of the work to be completed beyond the specified time due to the contractor. (b) The price adjustment shall be determined during each month from the formula given in the contract data.

(c) Following expressions and meanings are assigned to the work done during each month:

 $\mathbf{R}$  = Total cost of work per month. If any, the Guaranteed Advance amount given in that month will be deducted from the Guaranteed Advance amount returned within the month, if any. The cost of the work done as a variation will not be included, and the cost will be adjusted separately according to the offer.

To the extent that full compensation for any rise or fall in costs to the contractor is not covered by the provisions of this or other clauses in the contract, the unit rates and prices

included in the contract shall be deemed to include amounts to cover the contingency of such other rise or fall in costs. The formula for adjustment of prices are: R = Value of work done

## 4.3.2 Adjustment for labour component

 (i) Price adjustment for increase or decrease in the cost due to labour shall be paid in accordance with the following formula:

## VL= 0.85 x P1/100 x R x (LI- Lo )/Lo

- (ii) VL= increase or decrease in the labour Cost of work during the month under consideration due to changes in rates for local labour.
- (iii) Lo= the consumer price index for industrial workers for the State on 28 days preceding the date of opening of Bids as published by Labour Bureau, Ministry of Labour, Government of India.
- (iv) LI= The consumer price index for industrial workers for the State for the under consideration as published by Labour Bureau, Ministry of Labour, Government of India.
- (v) PI= Percentage of labour component mentioned in tender document.

# 4.3.3 Adjustment of POL (fuel and lubricant) component

Price adjustment for increase or decrease in cost of POL (fuel and lubricant) shall be paid in accordance with the following formula:

## Vf = 0.85 x Pf/100 x R x (Fl - Fo)/Fo

Vf = Increase or decrease in the Fuel influence of work during the month under consideration due to changes in rates for fuel and lubricants.

Fo = The official retail price of High-Speed Diesel (HSD) at the existing consumer pumps of lac at nearest center on the day 28 days prior to the date of opening of Bids.

Fl = The official retail price of HSD at the existing consumer pumps of IOC at nearest center for the 15th day of month of the under consideration.

Pf = Percentage of fuel and lubricants component of the work.

Note: For the application of this clause, the price of High-Speed Diesel oil has been chosen to represent fuel and lubricants group.

# 4.3.4 Adjustment of Other materials Component (Excluding bitumen, steel and cement)

Price adjustment for increase or decrease in cost of local materials other than cement, steel, bitumen and POL procured by the contractor shall be paid in accordance with the following formula:

## Vm = 0.85 x Pm /100 x R x (MI - M0 )/M0

Vm= Increase or decrease in the Material cost during the month under consideration due to changes in rates for local materials other than cement, steel, bitumen and POL.

M= The all-India wholesale price index (all commodities) on 28 days preceding the date of opening of Bids, as published by the Ministry of Industrial Development, Government of India, New Delhi.

MI= The all-India wholesale price index (all commodities) for the month under consideration as published by Ministry of Industrial Development, Government of India, New Delhi.

Pm= Percentage of local material component (other than cement, steel, bitumen and POL of the work.

## 4.3.5 Adjustment of bitumen, steel and cement-

**Cement Cost** - VC=[C0{CL1-CL0)\*T]/CL0 **Steel Cost**-VS=[S0{SL1-SL0)\*T]/SL0 **Structural Steel Cost**-VS=[S0{SL1-SL0)\*T]/SL0 **Bitumen Cost**-VB={BC1-BC0}\*T So, General Price Escalation using Constant P as Follows Pl -25% (Labour) Pm- 65%(Material) Pf -15% (POL) Physical State S

a) Cement Cost - Vc= P\*Q \* {(CI-CIo)/CIo} Vc= P= Rs.4700 As per Table no-10 Sr. (a) Q= 48964 MT as per Table No.9

**CI= Avg Preceding Quarter of Invoice Raised** (136.8+136.4+135)/3= **136.07.** (18 May 2023) Quantity Billed as per Following Image.



Image # 17: WPI for Cement Bill Invoice Period.

**Clo=Avg Preceding Quarter of Tender Receipt** (118.6+119.6+118.5)/3= **118.9** (13 Jan 2020) receipt of tender as per Following Image.

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Monthly Who Name of Com Type : Individ Weight : 0.85 Base Year : 21	Price I lesale Pi modity : al Comr 277 011-12 =	ndex rice Inde : Ordinar nodity 100	(WPI) ix y Portlar	nd ceme	nt								 
Month/Year	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
2019	112.7	116.1	116,4	119.6	123.2	122.5	120.6	118.5	120.7	118.6	119.6	118.5	



## **Cement Cost** - **Vc= P\*Q \* {( CI-CIo)/CIo} Vc=** 4700\*48964\*{ (136.07-118.9)/118.9} Vc= 4700\*48964\*0.1444

Vc= 3,32,30,888/-

b) Steel Cost.

Vs= P\*Q \* {((SI)-(SIo)/(SIo/SIo)} P= Rs. 41200 As per Table no- 10 Sr. (d) Q= 4298MT as per Table No.9 SI= Avg Preceding Quarter of Invoice Raised

(147.6+145.7+144.5)/3=**145.93**(18 May 2023) Quantity Billed as per Following Image

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	Monthly Whole Name of Comm Type : Group Ite Weight : 1.000 Base Year : 201	sale Price iodity : d. m 3 11-12 = 10	dex (WPI) e Index Mild Steel -Lo	ng Products									 	_
	Month/Year	Jan	Feb Ma	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
	2023	148.3	148.4 <mark>147</mark>	.6 145.7	144.5									
	1. Figure 0 may	be treat	ed as index fo	r particular	item not-	availabl	e.							

Image # 19: WPI for WPI for Steel Bill Invoice Period.

**SIo=Avg Preceding Quarter of Tender Receipt** (102.6+101.9+102.4)/3**= 102.3** 



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Image # 20: WPI for Steel at Tender Receipt.

## So

```
Vs= P*Q * {((SI)-(SIo)/(SIo/SIo)}
Vs= 41200*4298*((145.93-102.3)/102.3)
Vs= 41200*4298*((43.63)/102.3)
Vs= 41200*4298*0.4265
Vs=7,55,23,596/-
```

## c) Structural Steel Cost.

Vsc= P\*Q \* {( (SCI)-(SCIo)/(SCIo/SCIo)} P= Rs. 44100 As per Table no- 10 Sr. (f) Q= 950 MT as per Table No.9 SCI= Avg Preceding Quarter of Invoice Raised,(159+157.9+154.7)/3 = 157.2 (18 May 2023) Quantity Billed as per Following Image

ERNHEN	T OF INDIA MINISTRY	उद्योग मंत्र DF COMME	RCE & INDU	JSTRY								s	creen Reader Access	0	हिंदी संस्करण
	आर्थिक सला OFFICE OI DEPARTMENT INTERNAL TRA	हकार व F <b>THE</b> FOR PRO DE	рт фгय <b>ЕСОР</b> мотюм	লিয 10MI 1 OF IN	C AD	VISER Y AND	2				A	Azad mrit N	Ka Nahotsav		
	Wholesale P Monthly Whole Name of Comm Type : Individu Weight : 0.012 Base Year : 20	rice In esale Pric nodity : A al Commo 67 11-12 = 11	dex (W e Index ngles, Ch dty 10	(PI) annels, s	Sections,	, steel (co	ated/no	0							_
	Month/Year	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
	2023	153.5	159.1	159	157.9	154.7									

Image # 21: WPI for Structural Steel Bill Invoice Period.

**SCI0= Avg Preceding Quarter of Tender Receipt,**(100.5+98.8+99.1)/3=99.47 (13 Jan 2020) receipt of tender as per Following Image





### So

Vsc= P\*Q \* {((SCI)-(SCIo)/(SCIo/SCIo)}

Vsc= 44100\*950\*((157.2-99.47)/99.47) Vsc= 44100\*950\* ((57.73)/99.47)) Vsc= 44100\*950\*0.5804 Vsc=2,43,15,858/d) Bitumen Cost.

```
VB={BCI-BC0)*T
```

**VB**- Amount of price variation in Rupees to be allowed in the **Bitumen** component.

**T**= Quantity of Bitumen (Grade) in metric ton used in the permanent works and approved enabling works during the quarter under consideration.

**BCI=** Current average ex-refinery price per metric ton of Bitumen (Grade) under consideration including taxes (LBT, excise, sales tax) during the quarter under consideration for BPCL/HPCL/IOCL.

For VG-30

(55893.44+55893.44+57783.33+59377.92+57724.27+5 6968.31)/6 = <u>57,273.45</u> (18 May 2023) & VG-

40(59566.91+59566.91+61740.28+63571.11+61941.08 +61055.19)/6= <u>61,240.25</u>

Quantity Billed as per Following Image.



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	मलग	सी जी एर	ा री /CG <b>S</b> T	एस जी ए			
पदार्थ/PRODUCT	BÂSIC	दर RATE	राशि AMOUNT	दर RATE	राशि AMOUNT	কুল TOTAL	
दर प्रति किलोलीटर (RATE PER KL)							
एल डी ओ LDO	40580.00	9.0%	3652.20	9.0%	3652.20	47884.0	
फर्नेयस ओईल(रैक) FO	26770.00	9.0%	2409.30	9.0%	2409.30	31589.0	
एम टी ओ MTO	62800.00	9.0%	5652.00	9.0%	5652.00	74104.0	
एस बी पी SBP	64300.00	9.0%	5787.00	9.0%	5787.00	75874.0	
हेय्कज़ेन HEXANE	55300.00	9.0%	4977.00	9.0%	4977.00	65254.0	
एस के ओ SKO	56740.00	9.0%	5106.60	9.0%	5106.60	66953.0	
दर प्रति टन RATE PER MT							
फर्नेयस ओईल FO	27900.00	9.0%	2511.00	9.0%	2511.00	32922.0	
हेय्कज़ेन HEXANE	83290.00	9.0%	7496.10	9.0%	7496.10	98282.0	
एस एस एच एस LSHS	28750.00	9.0%	2587.50	9.0%	2587.50	33925.0	
नाफथा NAPTHA	41000.00	9.0%	3690.00	9.0%	3690.00	48380.0	
बेजजिन BENZENE	50520.00	9.0%	4546.80	9.0%	4546.80	59614.0	
एम टी ओ MTO	81766.00	9.0%	7358.94	9.0%	7358.94	96484.0	
टोलुईन TOLUENE	55000.00	9.0%	4950.00	9.0%	4950.00	64900.0	
बिटूमेन पैक (दर प्रति टन) BITUMEN- PA	ACK (RATE F	PER MT)					
वीजी40 (VG40)	40080.00	9.0%	3607.20	9.0%	3607.20	47294.0	
वीजी30 (VG30)	37710.00	9.0%	3393.90	9.0%	3393.90	44498.0	
वीजी10 (VG10)	36910.00	9.0%	3321.90	9.0%	3321.90	43554.0	
बिटूमेन बल्क (दर प्रति टन) BITUMEN- B	BULK (RATE	PER MT)					
वीजी40 (VG40)	34680.00	9.0%	3121.20	9.0%	3121.20	40922.0	
वीजी30 (VG30)	33210.00	9.0%	2988.90	9.0%	2988.90	39188.0	
वीजी10 (VG10)	32410.00	9.0%	2916.90	9.0%	2916.90	38244.0	

Image # 23: Bitumen Prices at Tender Receipt.

**BCo=** Basic rate of Bitumen in rupees per metric tonne as considered for working out value of

**P** or average ex-refinery price for BPCL/HPCL/IOCL in rupees per metric tonne including taxes (LBT, excise, sales tax) of Bitumen under consideration for prevailing quarter preceding the month in which the last date prescribed for receipt of tender, falls, whichever is higher,

**For VG-30 (**40321+41666+38188+38421+36438+35093)/6 = <u>38354.5 &</u>

**For VG-40 (**42150+43684+40922+40132+37854+36297)/6 = <u>40173.17(</u>13 Jan 2020) receipt of tender as per Following Image

VG-30 Cost VB={BCI-BC0)\*T VB(VG-30)=(61240.25-38354.5)\*1362 VB(VG-30) = 2,57,67,609.9 VG-40 Cost VB={BCI-BC0)\*T VB(VG-40)=(57273.45-40173.17)\*11166 VB(VG-40) = 19,09,41,726.5 Total Bitumen Escalation Cost= VB(30)+ (VB(40)= 2,57,67,609.9+19,09,41,726.5 Total Bitumen Escalation Cost VB=21,67,09,336.4

## e) General Price (Excluding Cement, Steel, Structural Steel)

VL= 0.85 x P1/100 x R x (LI- Lo )/Lo Vm = 0.85 x Pm /100 x R x (MI - M0 )/M0 Vf = 0.85 x Pf/100 x R x (F - F0)/Fo

# General Price Escalation= VG= VL+Vf+Vm

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**Impact Factor value: 8.226** 

**R**= Cost of work done during the Billing quarter under consideration of Work.

**Minus-**the cost of Cement, HYSD and mild Steel, Bitumen, calculated at the **basic star** 

rates as mentioned below.

**Note:** Above star rates are considered only for working out value of P as mention above

and the Price Variation will be paid on the basis of formulas mentioned in the respective clauses as mentioned below. **Sav.** 

**P1** = Percentage of Labour Component as indicated above. 25%

**Pm**= Percentage of Material Component as indicated above. 60%

**Pf**= Percentage of Petrol, Oil and Lubricant Component. 15% R = Cost of work

R= M-N

Where,

M= Total Cost executed during quarter Say its **Rs.5,36,87,28,668** 

N= Cost of All Components in Escalation multiplying with star rate mentioned in Table 10

## R= 5,36,87,28,668

**R** = Component of 'materials' (except cement, Structural steel, reinforcement bars and other materials covered)expressed as percent of the total value of work.

R=5368728668- {(Cement Qty X Star Rate) + (Steel Qty X Star rate) + (Stru. Steel Qty X Star rate)-(Bitumen Qty\*Star rate)}

## R=5368728668-

**{(**4700\*48964)+(41200\*4298)**)+(**44100\*950)+

(1362\*29200)(V30)+(11166\*30180)

## R=5368728668-

**(**230130800+177077600+41895000+39770400+33698988 0**)** 

**R =5368728668-** 825863680 **R=**4,54,28,64,988

## VL= 0.85 x P1/100 x R x (LI- Lo)/Lo L1= (Mar-23+Apr-23+May-23)/3 L1=(133.1+133.5+135.4)/3 L1=134.67\*3.6(Multiplying Factor) =484.81

G	General Index   Official website of Labour Bureau, Ministry of Labour a Employment,Government of India							
S.No	Base Year	State	Centre	Year	Month	Index		
1	2016	MAHARASHTRA	Nagpur	2023	Feb	132.7		
2	2016	MAHARASHTRA	Nagpur	2023	Mar	133.1		
3	2016	MAHARASHTRA	Nagpur	2023	Apr	133.5		
4	2016	MAHARASHTRA	Nagpur	2023	May	135.4		

Image # 24: CPI at Bill Invoice.

L0= (Oct-19+Nov-19+Dec-19)/3 L0=(405+407+405)/3 L0=405.67



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Consumer Price Index Numbers for Industrial workers on Base 2001 = 100 for Year 2019										2019			
State	Centre Desc	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
MHR	MUMBAI	300	302	305	307	308	309	312	313	321	322	322	322
	NAGPUR	383	387	386	386	389	393	403	403	403	405	<mark>407</mark>	<mark>405</mark>
	NASIK	353	357	357	358	360	360	362	364	369	375	377	380
	PUNE	330	329	331	336	341	344	351	353	353	355	358	357
	SHOLAPUR	320	324	324	327	332	331	335	341	341	347	350	347

Image # 25: CPI at Tender Receipt.

## $V_L = 0.85 \text{ x } P_L / 100 \text{ x } R \text{ x } ((LI-Lo)/Lo)$

VL=0.85\*15%\*4,54,28,64,988\*((484.81-405.67)/405.67) VL=0.85\*15%\*4,54,28,64,988\*0.1951

VL= 11,30,04,902/-

Vm = 0.85 x Pm / 100 x R x (MI - M0) / M0

M0=(122+122.3+123)/3= 122.43



Image # 26: WPI at Bill Invoice.

## MI=(151+150.9+149.6)/3 =150.5



Image # 27: WPI at Tender Receipt

## Vm = 0.85 x Pm /100 x R x (MI - M0 )/M0

Vm=0.85\*60%\*4,54,28,64,988\*((150.5-122.43)/122.43) Vm=0.85\*60%\*4,54,28,64,988\*0.2293

## <u>Vm= 53,12,56,260/-</u>

 $V_F = 0.85 \text{ x } P_F / 100 \text{ x } R \text{ x } (F - Fo) / Fo$ 

Where

F= (93.64+93.64+93.64+93.64+93.64+93.64)/6=93.64

Best Price in Amanati J Aman : x +		×	-	٥	×
← → C 🔒 mypetrolprice.com/366/Dissel-price-in-Amravati?FuelType=18LocationId=366	G	6 1	â		) 1
Amravati, we publish the updated BS6 diesel prices.					
Home » Diesel price in India » Diesel prices in Maharashtra » Diesel price in Amravati					
Historical Diesel Prices of Amravati (per Liter)					
₹ 93.64 00.00 ▼ 02 Mar					
₹ 93.64 00.00 ▼					
₹ 93.64 00.00 ▼					
₹ 93.64 00.00 ▼ 29 ∰					
< Page 20 0/310 ≥ > (4 →					
Diesel Prices of near by Locations					
Achalpur Amawadi Anjangaan Sary Bhalcul Chandur Kaliway Chandurdaara Olahaddaa Daryapur Dhamanga Dharm Honda Nandgana Hhandeshwar Tensa Warud	on Rai	way			
FAQ about Diesel Price in Amravati					
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📧 🔎 Type here to search 🛛 🏭 😰 📮 🔹 🛤 🔊 💶 📱 💋 🧰 🌰 24°C. Cloudy	^ «	E DNG	17-0	653 17-2023	¢

Image # 28: Diesel Rate at Bill Invoice.

F0=(72.08+70.34+70.22+70.2+70.29+72.55)/6=70.95

$\rightarrow$	mypetrolprice.com/366/Diesel-price-in-Amravati/Fuel/ype=18LocationId=366	G	8 1	t I	0
	Amravati, we publish the updated BS6 diesel prices.				
	Home » Diesel price in India » Diesel prices in Maharashtra » Diesel price in Amravati				
	Historical Diesel Prices of Amravati (per Litre)				
	₹ 70.39 +00.10 ▲ 08 Dec				
	₹ 70.29 +00.09 ▲				
	₹ 70.2 +00.05 ▲ 29 105				
	₹ 70.15 -00.12 ▼ 24 <sup>Nov</sup>				
	Diesel Prices of near by Locations				
	Achalpur Amravelt Angangaon Sury Bhalkal Chandor Raiwey Chandurbacer Chikhaidara Daryepur Dhamangae Dhare Hunde Nandgane shandeshwar Teas Wand	n Raih	изу		
	FAQ about Diesel Price in Amravati				
	Share Facebook Twitter Reddit LinkedIn Google+ Emai	1		<	

Image # 29: Diesel Rate at Tender Receipt.

 $V_F = 0.85 \text{ x } P_F / 100 \text{ x } R \text{ x } (F - Fo) / Fo$ **V**<sub>F</sub>=0.85\*15%\*4,54,28,64,988\*((93.64-70.95)/70.95) **V**<sub>F</sub>=0.85\*15%\*4,54,28,64,988\*0.3198 V<sub>F</sub>= 18,52,33,048/-Then, General Price Escalation= VG= VL+Vf+Vm VG=11,30,04,902+18,52,33,048+53,12,56,260 VG= 82,94,94,210/-**Total Price Escalation Amount using PWD Maharashtra** formulae is, Price Escalation =VC+VS+VSC+VB+VG Price Escalation (PWD-MH) = 3,32,30,888 +7,55,23,596+ 2,43,15,858+21,67,09,336+82,94,94,210. Price Escalation (PWD-MH) = 1,17,92,73,888/-In view of above all the price escalation from different type of Govt. firms & Projects is summarized below,



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Price Escalation Cost in Different Type of Project and Departments										
Sr.No.	Central Public Works Departments	NHAI HAM Project	Public Works department Maharashtra							
1	1 10 10 56 996	1 07 27 45 724	1 17 02 72 999							
1	1,19,19,50,880	1,07,57,45,754	1,17,92,73,888							

## Table# -11 Price Escalation Cost Summary.

## **5. CONCLUSION**

The dissertation gives detail study about Price Escalation. It offers us records about the escalation clauses presently used in construction contracts followed through numerous government departments/ agencies in India. The Dissertation gives the calculation of price escalation and collection of data and implementation of the data in formulae to calculate exact price variation cost. The Case Study which is included detail price and quantity calculation which all type formulae are to be used. After all this with reference to Table.11 Price Escalation Cost Summary different government entity calculate different cost due this it's impose financial loss to government firms and contractor also. As per Table.11 HAM project price escalation cost is economical with respect to other firms for Government sector but this impact on contractors and concessionaire. Also this method is much simpler that other PWD and CPWD formulae. The CPWD Cost is much higher and its loss making for government.

The PWD Maharashtra formulae are more suitable and detail calculation consisting in it. Also, the cost calculated in this type it is less that CPWD and Higher than HAM. HAM is Lum sum type of tender in which quantities are not to be considered but at the time of confirming schedule G the quantities have to be calculated. So, by using this paper it will suggest that the HAM project is also will be calculated by using PWD Maharashtra formulae. This dissertation gives the effect of price escalation clause in highway construction industry in which this helps contractors to save from price fluctuation also this increase financial burden on government entities. To do the same there will be uniform and only one formulae and calculation will be used to calculate adequate, efficient, accurate, uniform price escalation cost. After all, above the PWD Maharashtra Formulae is fulfil all the requirements.

## Future Scope.

This Dissertation concludes that PWD Maharashtra formulae is more suitable while calculating Price Escalation Cost there are some Limitation should consider such as; Labor, Material and POL Impact Percentage are to be calculated on or Before Tendering on basis of total items and Estimated quantities. This Paper also gives detail calculation, Collection of Index, Calculation of Consummation statement etc. for outcome of price escalation cost of each government entity and Type i.e. Hybrid Annuity Mode, Central Public works department and Public Works Department Maharashtra.

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## BIOGRAPHY



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