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RW/NH-24036/55/2021-BP&SP

Government of India
Ministry of Road Transport & Highways
(BP & SP Cell)
Transport Bhawan, 1, Parliament Street, New Delhi-110001.

Dated: 19th January 2022

CIRCULAR

To,

1. The Chairman, National Highways Authority of India (NHAI), G-5&6, Sector - 10, Dwarka, New Delhi - 110 075
2. The Managing Director, National Highway Infrastructure Development Corporation Ltd., 3rd Floor, PTI Building, Parliament Street, New Delhi - 110 001
3. The Principal Secretaries/ Secretaries of all State/ UTs Public Works Department dealing with National Highways, other Centrally Sponsored Schemes & State Schemes
4. Director General (Border Roads), Seema Sadak Bhawan, Ring Road, New Delhi - 110 010
5. The Engineers-in-Chief and Chief Engineers of all States/ UTs Public Works Department dealing with National Highways, other Centrally Sponsored Schemes & State Schemes

Subject: Revision of Normative Cost Norms for the National Highways in Plain and Rolling Terrain - Reg.

Reference: Circular No. RW/NH-24036/27/2010-PPP dated 25.04.2018.

Sir,

The issue of cost estimates of National Highways has been coming up at various forum. Historically, a reference is made to the costing norms as considered by the B. K. Chaturvedi Committee in the then Planning Commission which were mainly based on the data provided by the NHAI at that time. The same were updated by MoRTH from time to time. Subsequently, after deliberations in Ministry and with approval of Competent Authority, a Circular No. RW/NH-24036/27/2010-PPP dated 25.04.2018 has been issued by MoRTH for cost norms for the NHs all across India. The cost norms issued vide aforesaid circular is currently being used for cost comparison of the various project highways.

2. As most of IRC Specifications and Manual for design of highways/ pavements/ structures have been revised in recent past (2018 onwards), including the Standard Data Book for Analysis of Rates; it has been necessitated to revise the existing Normative Cost Norms. Moreover, the existing normative rates being used are as one cost for Pan India, while the same may vary from State to State. Hence, to incorporate all the necessary changes made in IRC specifications, considering the current construction practices and also to cater the issue of various project locations in different states, normative cost norms are required to be revised for the justification of current project costs.

3 The major factors having impact on the project cost are as below:-

1. Cost of the basic material i.e. bitumen, cement, steel and aggregates
2. Lead of Aggregates
3. Traffic Loading condition (MSA)
4. Embankment Height
5. Structural Features
    i. Type of Substructure Foundation
    ii. Span Type (Single/ Multiple)
    iii. Skew Angle of Major Structures

4. Keeping in view of the aforesaid considerations, an **Interactive Microsoft Excel based Project Cost Analysis Tool** has been developed to work out the normative cost of various components of Project Highway considering the variation of material rates for location (state), typical cross section, aggregate lead, traffic loading in MSA, different type of pavement configuration, embankment height and foundation of structures. **The project Cost Analysis tool is for Plain and Rolling terrain in various States and UTs.** The user has to submit various inputs like Type of Pavement, Lane Configuration, Lead of Aggregates, MSA, Embankment Height, Pavement Combination, Type of Foundation in Structure, Skew Angle etc. in the Project Cost Analysis Tool to derive the component wise normative cost for the project highway in the particular state.

5. Assumptions and considerations for Interactive Microsoft Excel based Project Cost Analysis Tool are as under:-

5.1 In order to develop the cost for each roadway classification, 21 categories of roads configuration have been considered based on the different Typical Cross sections (As per relevant IRC Codes) for arriving at the Normative Cost Norms as mentioned below:

Sl. No.	Description	Remarks
1	Widening to 2-lane + PS	Flexible Pavement
2	Widening the Existing 2 lane to 4 lane+ PS	Flexible Pavement
3	Widening the Existing 4 lane to 6 lane+ PS	Flexible Pavement
4	Widening the Existing 4 lane to 8 lane+ PS	Flexible Pavement
5	Widening the Existing 6 lane to 8 lane+ PS	Flexible Pavement
6	Greenfield Alignment - 2 Lane+ PS	Flexible Pavement
7	Greenfield Alignment - 4 Lane+ PS	Flexible Pavement
8	Greenfield Alignment - 6 Lane+ PS	Flexible Pavement
9	Greenfield Alignment Expressway - 4 lane+ PS	Flexible Pavement
10	Greenfield Alignment Expressway - 6 lane+ PS	Flexible Pavement
11	Greenfield Alignment Expressway - 8 lane+ PS	Flexible Pavement
12	Widening the Existing 2 lane to 4 lane + PS	Rigid Pavement
13	Widening the Existing 4 lane to 6 lane + PS	Rigid Pavement
14	Widening the Existing 4 lane to 8 lane + PS	Rigid Pavement
15	Widening the Existing 6 lane to 8 lane + PS	Rigid Pavement
16	Greenfield Alignment - 2 Lane + PS	Rigid Pavement
17	Greenfield Alignment - 4 Lane + PS	Rigid Pavement
18	Greenfield Alignment - 6 Lane + PS	Rigid Pavement
19	Greenfield Alignment Expressway - 4 lane + PS	Rigid Pavement
20	Greenfield Alignment Expressway - 6 lane + PS	Rigid Pavement
21	Greenfield Alignment Expressway - 8 lane + PS	Rigid Pavement

5.2 Various assumptions have been considered in order to calculate the proposed normative costs for the road projects which is as follows:

Sl.	Particular	Proposed Normative costs Norms	Remarks
1	**Road Portion** The road works has been classified as IRC		
(i)	**Average embankment height (Excluding Pavement Crust)**	1 m	Embankment height is variable. May vary form 0.5 meter to 8 meter.
(a)	Designed Traffic for 2 lane with Paved Shoulder	50 MSA	The base MSA has been considered 50 MSA for calculation of base cost, but it may vary from 20 MSA to 150 MSA in the proposed Project Cost Analysis Tool.
(b)	Designed Traffic for 4 lane+ PS	50 MSA	
(c)	Designed Traffic for 6 lane+ PS	50 MSA	
(d)	Designed Traffic for 8 lane+ PS	50 MSA	
(e)	Designed Traffic for Expressway	50 MSA	
(f)	Designed Traffic for Perpetual Pavement	Greater than 300 MSA	
(ii)	**CBR**	10%	CBR has been kept fixed at 10%
(iii)	**Crust composition with Flexible Pavement**		
A	Bituminous Concrete (BC)		
(a)	Up to 2 Lane + Pave Shoulder	40 mm	As per relevant IRC Manual for different MSA & Pavement Combination, the crust is variable and the same may be changed as per design criteria. Aggregate lead is variable and the same may vary in the proposed Project Cost Analysis Tool.
(b)	4-lane/6-lane + PS /Expressway	40 mm	
B	Dense Bituminous Concrete (DBM)		
(a)	Up to 2 Lane + Paved Shoulder	105 mm	
(b)	4-lane/6-lane + PS / Expressway	105 mm	
C	WMM	250 mm	
D	GSB	200 mm	
E	Sub-grade (10% Effective CBR)	500 mm	
F	Perpetual Pavement (Crust composition) for Expressway	SMA-50 mm, DBM-255 mm, WMM-150 mm and GSB-200 mm	Single Crust composition has considered for Perpetual Pavement.
(iv)	**Crust composition with Rigid Pavement**		
(a)	Pavement Quality Concrete (PQC)	300 mm	

Sl.	Particular	Proposed Normative costs Norms	Remarks
(b)	Dry Lean Concrete (DLC)	150 mm	Only one Crust composition has being considered for Rigid Pavement, Embankment height & aggregate lead may vary in the proposed Project Cost Analysis Tool.
(c)	Granular Sub-base (GSB)	150 mm	
(d)	Sub-grade (10% Effective CBR)	500 mm	CBR has been kept fixed at 10%
1.2	**Bridge Portion**		
	Type of Foundation	Open Foundation,	As per preliminary design.
		Pile Foundation with Steel Liner (Depth 20m)	As per preliminary design, Dia of Pile -1 m has considered
		Well Foundation (Depth 40 m)	As per preliminary design , Dia of well – Avg. of 5 to 7.5 m
	Super Structure	RCC / Solid Slab	
		Pre-Stressed	
		Box Girder type	
	Width of Carriageway	As per relevant IRC Manual	
1.3	**Pipe Culverts**		
	Minimum earth cushion	600 mm	
	Nos. of Row	One Row	
	Internal dia of Pipe	1200 & 1500 mm	
	Type of Hume Pipe	NP4	
	Width of carriageway	As per relevant IRC Manual	
1.4	**Box Culverts**		
	Earth cushion	300 mm	
	Size of Box	Mean value of 2.0 x 2.0 m to 5.0 x 5.0 m (Single Cell)	
	Width of Carriageway	As per relevant IRC Manual	
1.5	**ROB**		
	Type of Foundation	Open Foundation,	As per preliminary design.
		Pile Foundation with Steel Liner (Depth 20m)	As per preliminary design, Dia of Pile -1 m has considered
	Sub-structure	RCC type	
	Super-structure	Steel Girder	
	Width of Carriageway	As per relevant IRC Manual	

Sl.	Particular	Proposed Normative costs Norms	Remarks
1.6	ELEVATED STRUCTURE LIKE FLYOVERS / VUP/ LVUP/ SVUP		
1.6.1	Flyover/VUP (Standard)		
	Type of Foundation	Open Foundation,	As per preliminary design.
		Pile Foundation with Steel Liner (Depth 20m)	As per preliminary design, Dia of Pile -1 m has considered
	Type of Abutment/Pier	Circular (Single Pier Type)	
	Vertical Clearance	5.5 m	
	Span arrangement	Varies from 10m to 40m	
	Super-structure	RCC type/ Solid Slab	
		Pre-Stressed type	
		Box Girder type	
	Width of Carriageway	As per relevant IRC Manual	
1.6.2	LVUP		
	Type of Foundation	Open Foundation (Box type)	
	Vertical Clearance	4.00 m	
	Span arrangement	12 m	
	Super-structure	Solid Slab	
	Width of Carriageway	As per relevant IRC Manual	
1.6.3	SVUP		
	Type of Foundation	Open Foundation (Box type)	
	Vertical Clearance	4.00 m	
	Span arrangement	7.00 m	
	Super-structure	Solid Slab	
	Width of Carriageway	As per relevant IRC Manual	
1.7	Slope Protection Works		
(i)	Retaining Wall & Toe Wall		
	Type of Slope Protection	With RCC	
	Height	Upto 5 mtrs.	
(ii)	RE Wall		
	Type of Slope Protection	Precast panel	As per relevant IRC Code
1.8	Lined Covered Drain		
	Size	Height- 1 meter	

Sl.	Particular	Proposed Normative costs Norms	Remarks
		Width – 1.5 meter	
1.9	**Boundary Wall**		
(i)	RCC Precast panel	Total Height- 2.5 meter, Height Above GL - 1.5 meter	As per the Ministry Drawing for Boundary Wall.
(ii)	GI Barbed Wire Fencing	Height Above GL - 1.8meter	
1.10	**New Jersey Crash Barrier**		
	Size	With RCC	As per relevant IRC Code
1.11	**Metal Beam Crash Barrier (meter)**		
	Height	With RCC	As per relevant IRC Code
1.12	**Service/Slip Road**		
A	**With Flexible Pavement**		
(i)	Width of Carriageway	5.5/7.0/10.0 m	Designed Traffic as per relevant IRC Manual for different MSA
(ii)	Designed Traffic	10 MSA	The base MSA has considered 10 for base cost, but it may change from 10 MSA to 40 MSA in the proposed Project Cost Analysis Tool.
(iii)	Embankment Height	1.0 m	Embankment height is variable. May vary form 0.5 meter to 5 meter in the proposed Project Cost Analysis Tool.
(iv)	Effective CBR of Subgrade Soil	10%	CBR has been kept fixed at 10%
(v)	**Crust composition**		
(vi)	Bituminous Concrete (BC)	30 mm	As per relevant IRC Manual for different MSA & Pavement Combination. The crust is variable and the same may be changed as per design criteria. Aggregate lead is variable, and may vary in the proposed Project Cost Analysis Tool.
(vii)	Dense Bituminous Concrete (DBM)	50 mm	
(viii)	WMM	250 mm	
(ix)	GSB	200 mm	
(x)	Sub-grade	500 mm	
B	**With Rigid Pavement**		
(i)	Width of Carriageway	5.5/7.0/10.0 m	
(ii)	Embankment Height	1.0 m	
(iii)	Effective CBR of Subgrade Soil	10%	
(iv)	**Crust composition**		
	Pavement Quality Concrete (PQC)	300 mm	Only one Crust composition has considered for Rigid Pavement, Embankment height & aggregate lead may vary in the proposed Project Cost Analysis Tool.
(vi)	Dry Lean Concrete (DLC)	150 mm	
(vii)	Granular Sub-base (GSB)	150 mm	
(viii)	Sub-grade	500 mm	
1.13	**Basic Lead of Material**		

Sl.	Particular	Proposed Normative costs Norms	Remarks
(i)	Aggregate	50 Km.	Aggregate Lead has been considered 50 Km. for base Cost, it may vary in the proposed Project Cost Analysis Tool.
(ii)	Bitumen	0 to 300 Km.	
(iii)	Earth	5 Km.	Lead from borrow to site is considered 5 Km.
(iv)	Project Lead	13 Km.	Project Length has been considered 50 Km.

5.3 The Finishing Road Level (FRL) of the crossing road under the VUP/ PUP/ Flyover shall be atleast 150 mm above the FRL of the slip road/ crossing road.

5.4 The proposed Normative Cost Norms are excluding the provision of various miscellaneous items such as Toll Plaza, Rest Area, Bus bays, Truck lay-byes, ATMS, Foot over bridge, Road & Traffic signage, Wayside amenities, ambulance, crane and other project facilities. Cost of these items is to be worked out as per site requirement in each case or lump-sum provision @ 10% to 15% of Total Project Cost (excluding LA) may be considered to arrive at the normative cost for these additional items.

5.5 The centages involved depending on the mode of execution of the work i.e. EPC, BOT and Hybrid Annuity, are notified by the Ministry of Road Transport & Highways from time to time and the costs of these centages may be added to the normative civil costs to arrive at the Total Project Cost based on Normative Cost Norms.

5.6 The normative costs derived on the basis of above Project Cost Tool is only to be used for comparison during Appraisal and Approval of the projects and not be used for preparation of estimates for project highways.

6. This issues with concurrence of Finance Wing vide their U.O. No. vide note #11 dated 26.10.2021 and approval of Minister (RT&H).

7. Contents of this circular may be brought to the notice of all the concerned for immediate compliance.

Yours faithfully,

19.1.22

(Narender Sharma)
Superintending Engineer (BP &SP)

Encl :

1. Interactive Microsoft Excel based Project Cost Analysis Tool for Plain & Rolling Terrain.
2. User manual.

Copy to :

1. All Technical Officers at the Headquarters
2. Secretary General, Indian Roads Congress
3. Director, IAHE, NOIDA
4. All ROs, MoRT&H.
5. Sr. PPS to Secretary (RT&H), Sr. PPS to DG (RD) & SS, PS to AS&FA, PS to ADG-I/II/III.
6. NIC-with the request to upload on the Ministry's portal.

Copy for information to:

1. CEO, NITI Aayog, NITI Bhawan, Sansad Marg, New Delhi.
2. Secretary, Department of Expenditure, Ministry of Finance, North Block, New Delhi.
3. Secretary, Department of Economic Affairs, Ministry of Finance, North Block, New Delhi.
4. Secretary, Ministry of Environment and Forests, Paryavaran Bhawan, New Delhi.
5. Secretary, Ministry of Development of North Eastern Region, Vigyan Bhawan Annexe, Maulana Azad Road, New Delhi.

सत्यमेव जयते
सड़क परिवहन और राजमार्ग मंत्रालय
MINISTRY OF ROAD TRANSPORT & HIGHWAYS

Project Cost Analysis Tool for Normative Cost Plain/Rolling Terrain

NATIONAL HIGHWAYS AUTHORITY OF INDIA
The Government of India

USER MANUAL

Project Cost Analysis Tool for Normative Cost Plain/Rolling Terrain

The Project Cost Analysis Tool for Normative Cost Plain/Rolling Terrain has developed an Interactive Microsoft Excel based Project Cost Analysis Tool to work out the normative cost of various components of Project Highway considering the variation of material rates for location (state), typical cross section, aggregate lead, traffic loading in MSA, different type of pavement configuration, embankment height and foundation of structures. The project Cost Analysis tool is for Plain and Rolling terrain in 29 no. of States and UTs. The user has to submit various inputs like Type of Pavement, Lane Configuration, Lead of Aggregates, MSA, Embankment Height, Pavement Combination, Type of Foundation in Structure, Skew Angle etc. in the Project Cost Analysis Tool to derive the component wise normative cost for the project highway in the particular state

Users and their Role & RESPONSIBILITIES

Role & Responsibilities
✓ Open the Interactive Microsoft Excel
✓ Can change the Name of State from drop-down list
✓ Can change the lead of aggregate by manual entry
✓ Can Change pavement & Lane configuration from drop-down list
✓ Can Change length of road by manual entry
✓ Can Change height of embankment by manual entry
✓ Can Change traffic loading in MSA by manual entry
✓ Can Change Structure configuration from drop-down list
✓ Can Change skew angle in degree of structure by manual entry
✓ Can Change area of structure by manual entry
✓ Can Change barrel length of culvert by manual entry
✓ Can Change the other miscellaneous work by manual entry
✓ Can provide the amount of various miscellaneous items by manual entry
✓ Generate Normative Cost
✓ View Reports

Click on **Interactive Microsoft Excel Sheet,** Select the **Name of State** by drop-down list **&** Enter the value of **Aggregate Lead,** now you can see the screen as shown below:

Project Cost Analysis					
Sl. No.	Description	Input	Output		
			Total Cost (Cr.)	Total Cost (Rupees)	Cost Per Unit (Cr.)
1	Name of State	Delhi			
	Aggregate Lead in km	50			

Figure 1.1: Name of State & Aggregate Lead

Main Carriage way, Select the Configuration of Carriageway with Flexible Pavement combination by drop-down and enter the value for **Length in Kilometre, Average Height of Embankment (Excluding RE Wall Approach)** and **MSA .** The figures show parameters for **Flexible Pavement**

2	**Flexible Pavement**				
(a)	**Type-1**				
	Configuration of Road with Pavement Combination	Greenfield Alignment - 2 Lane+ PS_ (BC, DBM, WMM & GSB)	21.400	21,40,00,000	4.280
	Length in Km	5			
	Embankment Height in meter	1			
	MSA	50			
	Aggregate Lead in km	50			
(b)	**Type-2**				
	Configuration of Road with Pavement Combination	Greenfield Alignment Expressway - 4 lane+ PS_ (BC, DBM, CTB, CTSB & SAMI or BC, DBM, WMM, & CTSB)	40.975	40,97,50,000	8.195
	Length in Km	5			
	Embankment Height in meter	2			
	MSA	110			
	Aggregate Lead in km	50			
(c)	**Type-3**				
	Configuration of Road with Pavement Combination	Greenfield Alignment - 6 Lane+ PS_ (BC, DBM, AIL, CTB & CTSB or BC, DBM, AIL, CTB & GSB)	47.225	47,22,50,000	9.445
	Length in Km	5			
	Embankment Height in meter	1			
	MSA	120			
	Aggregate Lead in km	50			

Figure 1.2: Configuration of Main Carriageway Road with Flexible Pavement combination, Length of Road, Average Height of Embankment & MSA for Main Carriageway

Main Carriage way, Select the Configuration of Carriageway with Rigid Pavement by drop-down and enter the value for **Length in Kilometre, Average Height of Embankment (Excluding RE Wall Approach).** The figures show parameters for **Rigid Pavement**

3	Rigid Pavement				
(a)	Type-1				
	Configuration of Road	Greenfield Alignment - 2 Lane + PS	4.710	4,71,00,000	4.710
	Length in Km	1			
	Embankment Height in meter	1			
	Aggregate Lead in km	50			
(b)	Type-2				
	Configuration of Road	Greenfield Alignment - 4 Lane + PS	42.800	42,80,00,000	8.560
	Length in Km	5			
	Embankment Height in meter	1			
	Aggregate Lead in km	50			
(c)	Type-3				
	Configuration of Road	Greenfield Alignment - 6 Lane + PS	124.900	1,24,90,00,000	12.490
	Length in Km	10			
	Embankment Height in meter	2			
	Aggregate Lead in km	50			

Figure 1.3: Configuration of Main Carriageway Road with Rigid Pavement, Length of Road & Average Height of Embankment

Service Road, Select the Configuration of Carriageway with Type of Pavement by drop-down and enter the value for **Length in Kilometre, Average Height of Embankment (Excluding RE Wall Approach) & MSA.** The figures show parameters for **Service Road**

4	Service Roads				
(a)	Type-1				
	Configuration of Road with Pavement Combination	With flexible pavement-5.50 meter carriageway_(BC, DBM, WMM & GSB)	19.000	19,00,00,000	1.900
	Length in Km	10			
	Embankment Height in meter	1			
	MSA	20			
	Aggregate Lead in km	50			
(b)	Type-2				
	Configuration of Road with Pavement Combination	With flexible pavement-7 meter carriageway_(BC, DBM, WMM & GSB)	12.300	12,30,00,000	2.460
	Length in Km	5			
	Embankment Height in meter	1			
	MSA	30			
	Aggregate Lead in km	50			
(c)	Type-3				
	Configuration of Road with Pavement Combination	With flexible pavement-7 meter carriageway + PS_(BC, DBM, WMM & GSB)	29.200	29,20,00,000	2.920
	Length in Km	10			
	Embankment Height in meter	1			
	MSA	40			
	Aggregate Lead in km	50			

Figure 1.4: Configuration of Service Road with Pavement combination, Length of Road, Average Height of Embankment & MSA

Junctions ,Select the Type of Junction by drop-down and enter the value for **Number of Junctions.** The figures show parameters for **Junctions**

5	Junctions				
(i)	**Major Junction**				
(a)	**Type-1**				
	Type of Junction	X Type	0.962	96,21,879	0.962
	No	1			
	Aggregate Lead in km	50			
(b)	**Type-2**				
	Type of Junction	T Type	1.222	1,22,21,845	0.611
	No	2			
	Aggregate Lead in km	50			
(c)	**Type-3**				
	Type of Junction	Y Type	5.089	5,08,92,708	0.509
	No	10			
	Aggregate Lead	50			
(ii)	**Minor Junction**				
(a)	**Type-1**				
	Type of Junction	X Type	9.054	9,05,40,764	0.604
	No	15			
	Aggregate Lead in km	50			
(b)	**Type-2**				
	Type of Junction	T Type	6.537	6,53,66,760	0.327
	No	20			
	Aggregate Lead in km	50			
(c)	**Type-3**				
	Type of Junction	Y Type	6.151	6,15,07,948	0.246
	No	25			
	Aggregate Lead in km	50			

Figure 1.5: Type, Nos. & Area of Junction

RE Wall Approach, Select the Configuration of Carriageway with Type of Pavement by drop-down and enter the value for **Area of RE Wall in Sqm. & MSA.** The cost of RE Wall will be reflect including cost of road . The figures show parameters for **RE Wall Approach**

6	RE Wall Structure Approach (Flyovers/VUP/LVUP/SVUP/ROB)				
(i)	**Flexible Pavement**				
	Type-1				
	Configuration of Road with Pavement Combination	For 4-lane Greenfield Alignment _(BC, DBM, WMM & GSB)	0.0019	18,575	0.002
	Area in Sqm	1.00			
	MSA	50.00			
	Aggregate Lead in km	50			
	Type-2				
	Configuration of Road with Pavement Combination	For 4-lane Greenfield Alignment _(BC, DBM, WMM & GSB)	0.0019	18,575	0.002
	Area in Sqm	1.00			
	MSA	50.00			
	Aggregate Lead in km	50			
(ii)	**Rigid Pavement**				
	Type-1				
	Configuration of Road	For 6-lane Greenfield Alignment	0.0023	22,874	0.002
	Area in Sqm	1.00			
	Aggregate Lead in km	50			
	Type-2				
	Configuration of Road	For 6-lane Greenfield Alignment Expressway	0.0026	26,454	0.003
	Area in Sqm	1.00			
	Aggregate Lead in km	50			

Figure 1.6: Configuration of Road with Pavement combination for RE Wall Structure Approach , Area of RE wall & MSA

Flyover/VUP, Select the Type of Structure confirmation with type of Foundation by drop-down and enter the value for **Skew angle in degree & Area of Slab in sqm.** . The figures show parameters for **Flyover/VUP**

7	**Flyover/ VUP**				
	Structure No-1				
	Structure Configuration	Single Span With Open Foundation	3.558	3,55,82,689	0.003
	Skew Angle in degree	25.00			
	Aggregate Lead in km.	50			
	Area in Sqm.	1050.00			
	Structure No-2				
	Structure Configuration	Single Span With Pile Foundation	4.184	4,18,36,373	0.004
	Skew Angle in degree	0.00			
	Aggregate Lead in km.	50			
	Area in Sqm.	1050.00			
	Structure No-3				
	Structure Configuration	Multiple Span With Open Foundation	14.129	14,12,93,398	0.003
	Skew Angle in degree	0.00			
	Aggregate Lead in km.	50			
	Area in Sqm.	5010.00			
	Structure No-4				
	Structure Configuration	Multiple Span With Pile Foundation	18.282	18,28,15,727	0.004
	Skew Angle in degree	0.00			
	Aggregate Lead in km.	50			
	Area in Sqm.	5010.00			

Figure 1.7: Configuration of Structure for Flyover/VUP with type of foundation , Skew angle & Area of Slab

Bridge, Select the Type of Structure confirmation with type of Foundation by drop-down and enter the value for **Skew angle in degree & Area of Slab in sqm.** . The figures show parameters for **Bridge**

8	**Bridge**				
	Structure No-1				
	Structure Configuration	Single Span With Open Foundation	4.866	4,86,60,481	0.004
	Skew Angle in degree	0.00			
	Aggregate Lead in km.	50			
	Area in Sqm.	1250.00			
	Structure No-2				
	Structure Configuration	Single Span With Pile Foundation	7.144	7,14,40,344	0.006
	Skew Angle in degree	0.00			
	Aggregate Lead in km.	50			
	Area in Sqm.	1250.00			
	Structure No-3				
	Structure Configuration	Single Span With Well Foundation	7.552	7,55,19,300	0.006
	Skew Angle in degree	18.00			
	Aggregate Lead in km.	50			
	Area in Sqm.	1250.00			
	Structure No-4				
	Structure Configuration	Multiple Span With Open Foundation	15.204	15,20,40,024	0.003
	Skew Angle in degree	0.00			
	Aggregate Lead in km.	50			
	Area in Sqm.	5620.00			
	Structure No-5				
	Structure Configuration	Multiple Span With Pile Foundation	22.921	22,92,07,626	0.004
	Skew Angle in degree	0.00			
	Aggregate Lead in km.	50			
	Area in Sqm.	5620.00			
	Structure No-6				
	Structure Configuration	Multiple Span With Well Foundation	24.249	24,24,88,613	0.004
	Skew Angle in degree	0.00			
	Aggregate Lead in km.	50			
	Area in Sqm.	5620.00			

Figure 1.8: Configuration of Structure for Bridge with type of foundation , Skew angle & Area of Slab

ROB, Select the Type of type of Foundation by drop-down and enter the value for **Skew angle in degree & Area of Slab in sqm.** . The figures show parameters for **ROB**

9	**ROB**				
	Structure No-1				
	Structure Configuration	With Open Foundation	10.625	10,62,52,344	0.008
	Skew Angle in degree	0.00			
	Aggregate Lead in km	50			
	Area in Sqm	1350.00			
	Structure No-2				
	Structure Configuration	With Pile Foundation	10.970	10,97,01,446	0.008
	Skew Angle in degree	0.00			
	Aggregate Lead in km	50			
	Area in Sqm	1350.00			

Figure 1.9: Type of foundation for ROB , Skew angle & Area of Slab

LVUP, Enter the value for **Skew angle in degree & Area of Slab in sqm.** . The figures show parameters for **LVUP**

10	**LVUP**		6.494	6,49,40,854	0.004
	Aggregate Lead in km	50			
	Skew Angle in degree	0.00			
	Area in Sqm	1740.00			

Figure 1.10: Area of Slab & Skew angle (LVUP)

SVUP, Enter the value for **Skew angle in degree & Area of Slab in sqm.** . The figures show parameters for **SVUP**

11	**SVUP**		2.491	2,49,06,405	0.003
	Aggregate Lead in km	50			
	Skew Angle in degree	25.00			
	Area in Sqm	824.00			

Figure 1.11: Area of Slab & Skew angle (SVUP)

Culverts, Enter the value for **Barrel length of culverts in meter**. The figures show parameters for **Culverts**

12	**Culvert**				
	Length of Hume Pipe Culvert in meter	600.00	1.451	1,45,10,400	0.002
	Length of Box Culvert in meter	720.00	8.967	8,96,70,240	0.012

Figure 1.12: Barrel length of Culverts

Other Miscellaneous Items, Enter the value for **Other Miscellaneous Items as per Unit**. The figures show parameters for **Other Miscellaneous Items**

13	New Jersey Crash Barrier		0.614	61,42,500	0.0002
	Length in meter	2500.00			
	Aggregate Lead in km	50			
14	Metal Beam Crash Barrier (meter)	18500.00	7.126	7,12,62,000	0.0004
15	Lined Covered Drain		8.020	8,02,01,633	0.0007
	Length in meter	11500.00			
	Aggregate Lead in km	50			
16	Retaining Wall		25.872	25,87,18,702	0.0047
	Length in meter	5520.00			
	Aggregate Lead in km	50			
17	Toe Wall		8.481	8,48,11,461	0.0024
	Length in meter	3520.00			
	Aggregate Lead in km	50			
18	Boundary Wall				
	(i) 1.8 meter High GI Barbed Wire Fencing in meter	1580.00	0.124	12,38,720	0.0001
	(ii) RCC type in meter	2560.00	1.353	1,35,27,040	0.0005

Figure 1.13: Other Miscellaneous Items

Provision of various Miscellaneous Items, Enter the Amount in Crore for various Miscellaneous Items **which are lump sum provision in Normative Cost Norms** . The figures show parameters for **various Miscellaneous Items**

19	The provision of various miscellaneous items such as Toll Plaza, Rest Area, Bus bays, Truck lay-byes, ATMS, Foot over bridge, Road & Traffic signage, Wayside amenities, ambulance, crane and other project facilities. Cost of these items may be worked out as per site requirement in each case or lump-sum provision @ 10% to 15% of Total Project Cost. (Amount in Crore)	48.00	48.000	48,00,00,000	7.6%

Figure 1.14: Provision of various Miscellaneous Items

Sample of Project Cost Analysis Tool for Normative Cost Plain/Rolling Terrain

सड़क परिवहन और राजमार्ग मंत्रालय
MINISTRY OF ROAD TRANSPORT & HIGHWAYS
भारत सरकार
Government of India

Project Cost Analysis

Sl. No.	Description	Input	Output		
			Total Cost (Cr.)	Total Cost (Rupees)	Cost Per Unit (Cr.)
1	**Name of State**	**Delhi**			
	Aggregate Lead in km	50			
2	**Flexible Pavement**				
(a)	**Type-1**				
	Configuration of Road with Pavement Combination	Greenfield Alignment - 2 Lane+ PS_ (BC, DBM, WMM & GSB)	**21.400**	**21,40,00,000**	**4.280**
	Length in Km	5			
	Embankment Height in meter	1			
	MSA	50			
	Aggregate Lead in km	**50**			
(b)	**Type-2**				
	Configuration of Road with Pavement Combination	Greenfield Alignment Expressway - 4 lane+ PS_ (BC, DBM, CTB, CTSB & SAMI or BC, DBM, WMM, & CTSB)	**40.975**	**40,97,50,000**	**8.195**
	Length in Km	5			
	Embankment Height in meter	2			
	MSA	110			
	Aggregate Lead in km	**50**			
(c)	**Type-3**				
	Configuration of Road with Pavement Combination	Greenfield Alignment - 6 Lane+ PS_ (BC, DBM, AIL, CTB & CTSB or BC, DBM, AIL, CTB & GSB)	**47.225**	**47,22,50,000**	**9.445**
	Length in Km	5			
	Embankment Height in meter	1			
	MSA	120			
	Aggregate Lead in km	50			
3	**Rigid Pavement**				
(a)	**Type-1**				
	Configuration of Road	Greenfield Alignment - 2 Lane + PS	**4.710**	**4,71,00,000**	**4.710**
	Length in Km	1			
	Embankment Height in meter	1			
	Aggregate Lead in km	**50**			
(b)	**Type-2**				
	Configuration of Road	Greenfield Alignment - 4 Lane + PS	**42.800**	**42,80,00,000**	**8.560**
	Length in Km	5			
	Embankment Height in meter	1			
	Aggregate Lead in km	**50**			
(c)	**Type-3**				
	Configuration of Road	Greenfield Alignment - 6 Lane + PS	**124.900**	**1,24,90,00,000**	**12.490**
	Length in Km	10			
	Embankment Height in meter	2			
	Aggregate Lead in km	**50**			
4	**Service Roads**				

Project Cost Analysis

Sl. No.	Description	Input	Output		
			Total Cost (Cr.)	Total Cost (Rupees)	Cost Per Unit (Cr.)
(a)	**Type-1**				
	Configuration of Road with Pavement Combination	With flexible pavement-5.50 meter carriageway_(BC, DBM, WMM & GSB)	19.000	19,00,00,000	1.900
	Length in Km	10			
	Embankment Height in meter	1			
	MSA	20			
	Aggregate Lead in km	50			
(b)	**Type-2**				
	Configuration of Road with Pavement Combination	With flexible pavement-7 meter carriageway_(BC, DBM, WMM & GSB)	12.300	12,30,00,000	2.460
	Length in Km	5			
	Embankment Height in meter	1			
	MSA	30			
	Aggregate Lead in km	50			
(c)	**Type-3**				
	Configuration of Road with Pavement Combination	With flexible pavement-7 meter carriageway + PS_(BC, DBM, WMM & GSB)	29.200	29,20,00,000	2.920
	Length in Km	10			
	Embankment Height in meter	1			
	MSA	40			
	Aggregate Lead in km	50			
5	**Junctions**				
(i)	**Major Junction**				
(a)	**Type-1**				
	Type of Junction	X Type	0.962	96,21,879	0.962
	No	1			
	Aggregate Lead in km	50			
(b)	**Type-2**				
	Type of Junction	T Type	1.222	1,22,21,845	0.611
	No	2			
	Aggregate Lead in km	50			
(c)	**Type-3**				
	Type of Junction	Y Type	5.089	5,08,92,708	0.509
	No	10			
	Aggregate Lead	50			
(ii)	**Minor Junction**				
(a)	**Type-1**				
	Type of Junction	X Type	9.054	9,05,40,764	0.604
	No	15			
	Aggregate Lead in km	50			
(b)	**Type-2**				
	Type of Junction	T Type	6.537	6,53,66,760	0.327
	No	20			
	Aggregate Lead in km	50			
(c)	**Type-3**				

Project Cost Analysis

Sl. No.	Description	Input	Output		
			Total Cost (Cr.)	Total Cost (Rupees)	Cost Per Unit (Cr.)
	Type of Junction	Y Type	6.151	6,15,07,948	0.246
	No	25			
	Aggregate Lead in km	50			
6	**RE Wall Structure Approach (Flyovers/VUP/LVUP/SVUP/ROB)**				
(i)	**Flexible Pavement**				
	Type-1				
	Configuration of Road with Pavement Combination	For 4-lane Greenfield Alignment _(BC, DBM, WMM & GSB)	0.0019	18,575	0.002
	Area in Sqm	1.00			
	MSA	50.00			
	Aggregate Lead in km	50			
	Type-2				
	Configuration of Road with Pavement Combination	For 4-lane Greenfield Alignment _(BC, DBM, WMM & GSB)	0.0019	18,575	0.002
	Area in Sqm	1.00			
	MSA	50.00			
	Aggregate Lead in km	50			
	Type-3				
	Configuration of Road with Pavement Combination	For 6-lane Greenfield Alignment _(BC, DBM, WMM & GSB)	0.0023	22,949	0.002
	Area in Sqm	1.00			
	MSA	50.00			
	Aggregate Lead in km	50			
(ii)	**Rigid Pavement**				
	Type-1				
	Configuration of Road	For 6-lane Greenfield Alignment	0.0023	22,874	0.002
	Area in Sqm	1.00			
	Aggregate Lead in km	50			
	Type-2				
	Configuration of Road	For 6-lane Greenfield Alignment Expressway	0.0026	26,454	0.003
	Area in Sqm	1.00			
	Aggregate Lead in km	50			
	Type-3				
	Configuration of Road	For 8-lane Greenfield Alignment Expressway	0.0030	29,741	0.003
	Area in Sqm	1.00			
	Aggregate Lead in km	50			
7	**Flyover/ VUP**				
	Structure No-1				
	Structure Configuration	Single Span With Open Foundation	3.558	3,55,82,689	0.003
	Skew Angle in degree	25.00			
	Aggregate Lead in km.	50			

Project Cost Analysis

Sl. No.	Description	Input	Output		
			Total Cost (Cr.)	Total Cost (Rupees)	Cost Per Unit (Cr.)
	Area in Sqm.	1050.00			
	Structure No-2				
	Structure Configuration	Single Span With Pile Foundation	4.184	4,18,36,373	0.004
	Skew Angle in degree	0.00			
	Aggregate Lead in km.	50			
	Area in Sqm.	1050.00			
	Structure No-3				
	Structure Configuration	Multiple Span With Open Foundation	14.129	14,12,93,398	0.003
	Skew Angle in degree	0.00			
	Aggregate Lead in km.	50			
	Area in Sqm.	5010.00			
	Structure No-4				
	Structure Configuration	Multiple Span With Pile Foundation	18.282	18,28,15,727	0.004
	Skew Angle in degree	0.00			
	Aggregate Lead in km.	50			
	Area in Sqm.	5010.00			
8	**Bridge**				
	Structure No-1				
	Structure Configuration	Single Span With Open Foundation	4.866	4,86,60,481	0.004
	Skew Angle in degree	0.00			
	Aggregate Lead in km.	50			
	Area in Sqm.	1250.00			
	Structure No-2				
	Structure Configuration	Single Span With Pile Foundation	7.144	7,14,40,344	0.006
	Skew Angle in degree	0.00			
	Aggregate Lead in km.	50			
	Area in Sqm.	1250.00			
	Structure No-3				
	Structure Configuration	Single Span With Well Foundation	7.552	7,55,19,300	0.006
	Skew Angle in degree	18.00			
	Aggregate Lead in km.	50			
	Area in Sqm.	1250.00			
	Structure No-4				
	Structure Configuration	Multiple Span With Open Foundation	15.204	15,20,40,024	0.003
	Skew Angle in degree	0.00			
	Aggregate Lead in km.	50			
	Area in Sqm.	5620.00			
	Structure No-5				
	Structure Configuration	Multiple Span With Pile Foundation	22.921	22,92,07,626	0.004
	Skew Angle in degree	0.00			
	Aggregate Lead in km.	50			
	Area in Sqm.	5620.00			
	Structure No-6				
	Structure Configuration	Multiple Span With Well Foundation	24.249	24,24,88,613	0.004
	Skew Angle in degree	0.00			
	Aggregate Lead in km.	50			

Project Cost Analysis

Sl. No.	Description	Input	Output		
			Total Cost (Cr.)	Total Cost (Rupees)	Cost Per Unit (Cr.)
	Area in Sqm.	5620.00			
9	**ROB**				
	Structure No-1				
	Structure Configuration	With Pile Foundation	**10.970**	**10,97,01,446**	**0.008**
	Skew Angle in degree	0.00			
	Aggregate Lead in km	50			
	Area in Sqm	1350.00			
	Structure No-2				
	Structure Configuration	With Pile Foundation	**10.970**	**10,97,01,446**	**0.008**
	Skew Angle in degree	0.00			
	Aggregate Lead in km	50			
	Area in Sqm	1350.00			
10	**LVUP**		**6.494**	**6,49,40,854**	**0.004**
	Aggregate Lead in km	50			
	Skew Angle in degree	0.00			
	Area in Sqm	1740.00			
11	**SVUP**		**2.491**	**2,49,06,405**	**0.003**
	Aggregate Lead in km	50			
	Skew Angle in degree	25.00			
	Area in Sqm	824.00			
12	**Culvert**				
	Length of Hume Pipe Culvert in meter	600.00	**1.451**	**1,45,10,400**	**0.002**
	Length of Box Culvert in meter	720.00	**8.967**	**8,96,70,240**	**0.012**
13	**New Jersey Crash Barrier**		**0.614**	**61,42,500**	**0.0002**
	Length in meter	2500.00			
	Aggregate Lead in km	50			
14	**Metal Beam Crash Barrier (meter)**	18500.00	**7.126**	**7,12,62,000**	**0.0004**
15	**Lined Covered Drain**		**8.020**	**8,02,01,633**	**0.0007**
	Length in meter	11500.00			
	Aggregate Lead in km	50			
16	**Retaining Wall**		**25.872**	**25,87,18,702**	**0.0047**
	Length in meter	5520.00			
	Aggregate Lead in km	50			
17	**Toe Wall**		**8.481**	**8,48,11,461**	**0.0024**
	Length in meter	3520.00			
	Aggregate Lead in km	50			
18	**Boundary Wall**				
	(i) 1.8 meter High GI Barbed Wire Fencing in meter	1580.00	**0.124**	**12,38,720**	**0.0001**
	(ii) RCC type in meter	2560.00	**1.353**	**1,35,27,040**	**0.0005**

Project Cost Analysis

Sl. No.	Description	Input	Output		
			Total Cost (Cr.)	Total Cost (Rupees)	Cost Per Unit (Cr.)
19	**The provision of various miscellaneous items such as Toll Plaza, Rest Area, Bus bays, Truck lay-byes, ATMS, Foot over bridge, Road & Traffic signage, Wayside amenities, ambulance, crane and other project facilities. Cost of these items may be worked out as per site requirement in each case or lump-sum provision @ 10% to 15% of Total Project Cost. (Amount in Crore)**	**6.25**	**6.250**	**6,25,00,000**	**1.1%**
	Total Project Cost		**592.811**	**5,92,81,08,490**	

Note:-

1 Length of main carriageway will be excluding RE Wall Approach length.

2 Average Height of Embankment for main carriageway will be excluding RE Wall Approach.

3 RE Wall Cost is inclusive of Pavement Crust DBM/BC etc.

4 Barrel length of Hume Pipe Culvert & Box Culvert.

5 Drop-down seletion & Manual entry are required from Input (D column) as below :

(a) Select from drop-down list — X Type

(b) Manual entry — 0.00

6 Abbreviations :

BC, DBM, WMM & GSB - Surface course, Base/Binder course, WMM & GSB

BC, DBM, AIL, CTB & CTSB - Surface course, Base/Binder course, AIL, CTB & CTSB

BC, DBM, CTB, CTSB & SAMI - Surface course, Base/Binder course, CTB, CTSB & SAMI

BC, DBM, AIL, CTB & GSB - Surface course, Base/Binder course, AIL, CTB & GSB

BC, DBM, WMM, & CTSB - Surface course, Base/Binder course, WMM, & CTSB)

PS - Paved Shoulder