

BUTTERFLY PARK, RANCHI

Detailed Project Report

COMMISSIONED BY: JHARKHAND ZOO AUTHORITY, RANCHI CONSULTANT: M/s STREET-HOUSE First edition of Report: 2nd December, 2019 Second edition of Report: 4th October, 2021

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Declaration

I Gaurav Chaurasia, Principal Architect, M/s STREET-HOUSE, Kota, Rajasthan hereby declare that the Detailed Project Report (DPR) for the Project: Butterfly Park in Bhagwan Birsa Biological Park, Ormanjhi, Ranchi is our own work and, any information and drawings for landscaping and structures we have incorporated has been duly acknowledged.

Gaurav Chaurasia (B.Arch. NIT Jaipur)

Principal Architect M/s STREET-HOUSE

1. Introduction

Bhagwan Birsa Biological Park is a zoo recognized by the Central Zoo Authority of India under Wildlife (Protection) Act, 1972 of India. It is situated at village Chakla, block Ormnajhi about 20 kms from district Ranchi, on National Highway no. 33, segment Ranchi – Ramgarh. This Highway passes through the zoo. The area of the zoo on the left-hand side of this NH – section is called Botanical Section (23 hectares) and that on its right-hand side is called the Zoological Section (81 hectares).

Total Area of Bhagwan Birsa Biological Park ~ 104 hectares Botanical Section (23 hectares) Zoological Section (81 hectares)

The Bhagwan Birsa Biological park has been established with the objective of conserving endangered and threatened flora and fauna; developing among visitors an empathy for wild animals; and motivating people to support the cause of wildlife conservation.

Similarly, keeping the same aim in mind the Butterfly Park has to be established in the botanical section of the park.

Total Area for Butterfly Park~ 7.6 hectares (19.57 acres)

2. Project Feasibility Study

Need of the Butterfly Park in Jharkhand

Jharkhand- the land of forests is rich in bio-diversity as a part of Chhotanagpur Plateau province of the Deccan Peninsula Bio-geographic Zone. The recorded forest area is 2.36 million hectares which constitutes 29.61% of the geographical area of the state. The Chhotanagpur Plateau is especially rich in forest resources.

So, this region provides a suitable tropical habitat for butterflies of different sizes, shapes, colours and patterns, and they are so developed to survive in such natural forest habitat. Presence of butterfly in good number is an indicator of a perfect natural environment.

Urban areas of Ranchi, Jamshedpur, Bokaro, Dhanbad and others have lots of small and big industries which are polluting the environment (as per Jharkhand Biodiversity Board).

Butterflies have an important role to perform in promoting awareness o the increasingly urgent need for biodiversity of the terrestrial ecosystem:

- 1. The appearance of butterfly is of an aesthetic and ecological value.
- 2. The existence of butterfly in the environment are mentioned to be pollinators of plants, food sources for other animals and also has an important role in scientific discoveries.
- 3. Unfortunately, environment disturbance overcome decrease of the butterfly population. Environment disturbance is a change in environmental components forming the habitat thereby affecting the ecosystem imbalance and biotic communities inside.
- 4. In order to reduce the impacts of disturbance, the thematic garden is needed, such as the ecological park (eco-park), or butterfly park.

Site Study:

On 19th November 2019, *Mr. Parag Rangnekar*, eminent Butterfly expert from Goa and author of the book, *Butterflies of Goa* was invited by *M/s STREET-HOUSE*, architecture firm appointed for the project, for the site inspection. At site, he had addressed an issue after a comparative analysis of the Master Plan prepared by the Architect from landscape point of view and of the actual botanical garden site, which more or less resembles a forest, here he recommended that instead of a cad drawing, the approach of just marking up the site along the pathway that we were walking can be made as a walkway because there were already certain host and nectar plants that can be retained to be a habitat for butterflies and that day 15 butterflies were cited in a span of 2 hours of walk in winter morning.

Conclusion: This site visit gave us a hope that it won't be difficult to set up a butterfly park in the Botanical garden of the Bhagwan Birsa Biological Park, Ormanjhi, Ranchi. Following is the list of butterflies found on site, before execution of the habitat:

- 1. Tawny Coaster
- 2. Sergeant
- 3. Bush Brown
- 4. Baronet
- 5. Plain Tiger
- 6. Lemon Pansy
- 7. Common Sailor
- 8. Peacock Pansy
- 9. Oak Blue
- 10.Common Evening Brown
- 11.Lesser Grass Blue
- 12.Common Jezebel
- 13.Common Cerulean
- 14.Grass Yellows
- 15.Common Crow

Trees of the Park:

Following is the list of flora found on site:

S.no.	Tree	S. no.	Tree
1	Acacia (Acacia auriculaeformis)	24	Jamun (Zyzygium cuminii)
2	Amaltash (Cassia fistula)	25	Jirhur (Indigofera pulchella)
3	Amla (Emblica officinalis)	26	Kachnar (Bauhinia variegata)
4	Arjun (Terminalia arjuna)	27	Kadamb (Anthocephalus cadamba)
5	Asan (Terminalia bellerica)	28	Karanj (Pongamia glabra)
6	Ach (Morinda tinctoria)	29	Kathber (Zizyphus xylocarpa)
7	Bakain (Melia azadirech)	30	Kend (Diospyros melanoxylon)
8	Banyan (Ficus bengalensis)	31	Kusum (Scliechera oleosa)
9	Bel (Aegle marmelos)	32	Male bamboo (Dendrocalamus strictus)
10	Bhelwa (Semicarpus anacardium)	34	Mango (Mangifera indica)
11	Harra (Terminalia chebula)	35	Maulan (Bauhinia vahlii)
12	Bistendu (Diospyro montana)	36	Moraba (Agave sps.)
13	Black Siris (Albizzia lebbeck)	37	Neem (Azadiracta indica)
14	Bottle Brush (Bridelia retusa)	38	Palash (Butea monosperma)
15	Chakundi (Cassia siamea)	39	Piar (Buchanania latifolia)
16	Chiretta (Swertia pulchella)	40	Pipal (Ficus religiosa)
17	Chorantha (Heteropogan contortus)	41	Putranjeeva (Putranjiva roxburghii)
18	Copper pod (Peltophorum ferrugineum)	42	Sal (Shorea robusta)
19	Dhawain (Woodfordia fruiticosa)		
20	Gamhar (Gmelina arborea)		
21	Guava (Psidium guava)		
22	Gulmohar (Delonix regia)		
23	Haldu (Adina cordifolia)		

General climatic conditions of Ranchi: -

Wind direction: West – East

Temperature Summer Season: Mid-March to June Mean Minimum Temp: 240 C Mean Maximum Temp: 370 C

Monsoon Season: July to Mid-September(Pre monsoon showers in 2nd half of June)Average rainfall: 141 cm[Max. of rainfall is received during monsoon season].

Winter Season: October to Mid-March Mean Minimum Temp: 100 C Mean Maximum Temp: 220 C

The climatic conditions were quite favorable for butterfly habitat.

Case Study:

Butterfly Parks in the State of Jharkhand

Butterfly Park in Tata Steel Zoological Park, Jamshedpur



For now, there is only one Butterfly park identified in the state of Jharkhand, the butterfly park in Tata Steel Zoological Park which is an abode of butterflies.

Area covered – 3500 sq. ft.

Number of species found- 13 different butterflies of 5 different species

It is a closed butterfly park, with an aim to preserve rare varieties of butterflies and increase their numbers.

Butterfly Park nationwide: Bannerghatta Butterfly Park, Bangalore (Karnataka)



The Zoo Authority of Karnataka together with Department of Biotechnology (DoBT), Govt. of India have jointly initiated the project during the year 2003 under special master plan. The project got completed in 2007, it is the unique project of its time serving as a role model in the nation, and most of the Zoos and parks interested to establish Butterfly Park are using this as knowledge hub and plan to replicate.

Area Covered: 7.5 acres

Number of species found- 48 different butterflies of 5 different species i.e. Papilionidae, Pieridae, Nympalidae, Lycaenide and Hespiridae were breeding in different seasons under captive conditions and released into the conservatory dome.

Butterfly Park in Statue of Unity, Kevadia (Gujarat)





The Butterfly Garden along the banks of Narmada River, makes it an attractive spot to appreciate the assortment of these flying jewels. It is an open butterfly park. *Area Covered: 10 acres*

Number of species found- 70 different butterflies of 5 different species

The garden is covering **150 species** of nectar plants and larval host plants. Special care has been taken in the landscaping of the park to support the diversity of butterfly species.

The Butterfly Garden has been developed in a way to create an environment that attracts butterflies and gives them a habitat to proliferate. Since butterflies feed on the nectar of flowers, there are hundreds of flowering plants that will provide them with food. There are also suitable places for them to lay eggs and host plants for caterpillars to thrive.

<u>3. Project: Concept, Components and Scope</u>

BUTTERFLY PARK, Ranchi

Area ~ 19.57 acres Location: Ormanjhi, Ranchi. Biological Parks ecological function could enhance to be a habitat for butterflies.

Concept: Design and Development

Topographical Propagation of Landscapemerging of architecture and landscape

This project has a unique challenge of engaging humans with butterflies!

In sprawling green land in Ranchi, a butterfly park is proposed, a conservatory for butterflies has been created from facets which are emerging from the ground, and slope and materiality of the facets changes according to the programme underneath.

Facets signify a fragment of land is lifted to create a shelter for butterflies without reducing the ground footprint because of architecture.

The <u>USP of this butterfly park</u>, it's an open to sky butterfly park in the tropical climatic zone with specifically designed interactive signages of butterflies and their host and nectar plants providing information to visitors about butterflies on the spot without making them walk to an interpretation centre.

So, there will be an interpretation centre within the butterfly park around 900m long and dense flower beds with about 200 different host and nectar plants for 65 species of butterflies.

Components:

S. no.	Component of a Butterfly Park	Sub-Component
1.	Entrance Gate	Plaza with a gazebo
		Ticket Kiosk
		Preservation Room
		Entrance Gate Rest House side
2.	Butterfly Conservatory	Vestibule
		Butterfly Sculpture
3.	Pond	Mud Puddle
4.	Children's Park	
5.	Nursery	Equipment room with a Gazebo
6.	Miscellaneous Landscape Elements	Signages
		Sculptures
		Street-furniture
		Swings for Children's Park
		Water Fountain
		Garden bridge
		Stone Pots for flowers

The Components of the Butterfly Park:

- 1. Host and Nectar flower beds with signages of butterfly with their host/ nectar plants
- 2. Interactive Sculptures of Butterflies/ selfie points.
- 3. Interactive Signages for information about butterflies
- 4. Washrooms for Gents and Ladies
- 5. Parking for 120 Cars and 150 for two-wheelers

Note: *No trees will be disturbed in design and development of the project. If any tree is overcoming on any of the program footprint, will be retained and used as a feature.*

For e.g.: Trees overcoming the conservatory footprint will become part of it. Similarly, trees in the flower bed will become a part of the defined planter bed area.

Scope:

- 1. A habitat for butterfly to be developed in the sprawling lawns at Bhagwan Birsa biological park.
- 2. An open butterfly park is to be designed, including a Conservatory cum interpretation center.
- 3. Proposing a retention pond and mud puddles in the mid of the site.
- 4. Establishment of Host and Nectar plant gardens.
- 5. Establishment of Nursery.
- 6. Developing plantation pattern and design.
- 7. Supervision of all aspects of the project till the completion

4. Design Methodology

HABITAT: Open Butterfly Park vs Closed Butterfly Park

Closed Butterfly Park is an artificially intact environment which restricts the movement of butterflies. Such units are meant for locations where climatic or weather conditions are unfavorable for survival of butterflies. Butterfly Aviary in Sharjah, UAE is a good example of Closed Unit system.

Open to Sky Butterfly Park is meant for places away from the hustle bustle of the city life in the outskirts of city where butterflies naturally flourish because of abundance of nectar and host plants. But a small aviary or conservatory is needed for some rare butterflies to protect them from predators.

For Bhagwan Birsa Biological Park-Ranchi, Open to sky kind of habitat is more suited with a Conservatory with natural climatic conditions as the climate of Ranchi permits, the intention of building Conservatory: for easier siting of butterflies during adverse climatic situations.

About Butterflies

Butterfly Lifecycle

Butterflies are known for their unusual lifecycle, with a *larval caterpillar stage*, an inactive *pupa stage*, and a spectacular colourful winged fully formed *butterfly*.

- 1. The *eggs* are laid on a plant that *larva* uses for food. Most *caterpillars* eat leaves.
- 2. After several molts' larva is transformed into *pupa* which ultimately transformed into an adult *butterfly*.



Diagram: Butterfly Lifecycle

Butterflies are sensitive creatures and has an ephemeral lifespan of few days or weeks.

A habitat should be designed taking care of their:

- 1. basking and roosting spots,
- 2. feeding spots with fruit trees, and other spots where they look for nutrients,
- 3. Stepped foliage: host and nectar plants planting pattern
- 4. Varied flight heights



Diagram: Butterfly Lifestyle

Basking and Roosting Spots for Butterflies

Basking: Butterflies are cold blooded creatures, which means they do not generate enough heat from their own metabolism, to provide them with the heat and energy they need to fly. Therefore, butterflies rely on heat absorbed from the sun. They need spots where there is abundant of sunlight for basking.

Roosting: There should be inaccessible zones for visitors in the Butterfly Park, which becomes spots for butterflies to roost.

NUTRIENTS FOR BUTTERFLIES:

Butterflies usually get nutrients from *mud puddles*, as they are the source of minerals to them.

Mud puddle have been created around Conservatory

Sugar rich fruit trees like bananas for proteins.

Fruit trees zone should be allocated in an area inaccessible to the visitors.

Moistened *pollen* in flowers for sugar.



Diagram: Nutrients for Butterfly

PLANTING PATTERN:

Host and Nectar plants planting pattern must be organized in such a way that butterflies which prefer to take a flight higher level should be facilitated with *mid storey high* plants and similarly for butterflies which prefer to fly *Under storey level* and *ground level*, plants according to their needs should be planted.



Diagram: Planting Pattern for Butterfly Park

Plinth and step formula:

Plants should be staggered in Stepped foliage manner that they facilitate visitors to interact with butterflies, to view and watch them.

Plinth and Staircase formula of contemporary architecture can be efficiently utilized in the landscape.

Host and Nectar plants for Butterflies

Specific plant is grown to attract particular butterfly.

A mix of host and nectar plants is preferable because it is a good way to attract butterflies to the biological park.

Host Plants: Butterflies lay eggs on host plants. Host plants helps and facilitates caterpillar and then pupa. Then matured butterflies are released in an aviary to prevent them from their enemies of butterfly like birds, garden lizard, spiders etc.

Nectar Plants: The choice of nectar varies with different species of butterfly. So, variety of nectar plants should be staggered in groups to attract butterflies, single species of plants remain unnoticed, colour and nectar act as a source of attraction.

(List of Host and Nectar Plants attached)

Points that have been kept in consideration during design process:

- 1. To determine butterfly behavior in some habitats in urban areas, identifying the type of preferred plants (food-plants for adult butterflies and host plants for caterpillars) and adding the preferred plants in urban park concept.
- 2. Microhabitat components are consisting of, namely (a) shrub; b) *hedges;* c) nectar plants, and d) unmanaged areas. The diversity of microhabitat components determines the diversity of butterflies in the urban parks.

3. Abiotic factors that affect the characteristics of the fourth urban forests are sunlight intensity, temperature, and humidity. Leaf area index was calculated to determine the flatness of canopy crown and the characteristics of canopy closure. The humidity required for the butterfly ranges between 50 to 75%, and the temperature ranges in 20 to 40°C. While tolerance limit of light intensity ranges from 500 to 7500 lux.

Factors to be considered in developing a suitable habitat:

1. Cover Plants

Tall trees that have wide canopy will protect butterflies from strong gusts of wind and rain. Butterflies will choose areas with less compact canopy, because less dense areas will allow sunlight to enter and create warmer micro-climate that can maximize the growth of caterpillar. Butterflies also favor these areas because the sunlight maintains their temperature and metabolism.

2. Water

In the life cycle of butterflies, water requirements are fulfilled mostly in the caterpillar stage by its consumption of green vegetables. Whereas for the adult butterflies, the water requirements are fulfilled by nectars. Nevertheless, adult butterflies will gather in small mud puddles as well as wet sand areas to absorb minerals and salts contained in the puddles knowns as mud puddling. Puddling is more of nutrient source than water.

3. Food – butterflies (food plants)

Adult butterflies depend largely on the availability of nectar as food source. While other species take nutrition and minerals from rotting fruits, tree sap, animal feces and urine, and animal carcasses. Nectar plants are the main food for adult butterflies. The sufficient provision of light-colored nectar plants needs to be considered because butterflies can quickly recognize the plants. Planting in areas with an abundance of sun intensity is important for plants and butterflies. Nectar plants are flowering plants that require sun exposure. Butterflies also demand a high intensity of sunlight as butterflies use solar heat to increase metabolism and help them fly.

4. Food - Caterpillars (host plants)

Each species of butterflies laid their eggs on certain plants as host plants. Caterpillar's host plants can be shaped as leaves on trees, shrubs, vegetables, legumes, wild flowers, grasses, and weeds in. Female butterfly is quite selective in choosing host plant to lay their eggs to ensure the growth of caterpillars that fit the feed. The existence of host plants will also invite the female butterflies to lay their eggs. There are several important factors that affect the pattern of oviposition (egg-laying) on butterfly, namely microclimate, vegetation structure, the number of host plants available, and the availability of nectarproducing plants. When the number of plants that can be used by butterflies as oviposition sites increases, the abundance of caterpillar found will also increases.

5. Interspersion of habitat component

In ensuring the reproduction of butterflies goes well and their ability to survive, all the necessary habitat components must be available. The ideal butterfly habitat component consists of a complex of closely spaced vegetation, comprising with diverse sources of host plants and food plants (trees, shrubs, wildflowers, legume and grasses), open water, and puddling areas.

6. Minimum area for Habitat

Although butterflies can search for food in large areas, there is no minimum size for a butterfly habitat. Butterfly species has potential and can be found anywhere as long as the closure of plants required by caterpillars and adult butterflies are available. In general, minimum habitat size is not a limiting factor for each species, as the territory of each species varies.

Landscape Concept:

1. Butterfly habitat components

Six components of butterfly life requirements that have described previously are priority factors in preparing the concept of an urban park as a butterfly park. Furthermore, the next consideration is the abiotic factors and environmental disturbances that exist around the site. Urban Park area that has been qualified according to these criteria will determine the survival of the butterfly.

2. Butterfly Maintenance Area

This area was created with the aim of providing life support for the butterfly. The live support component may consist of a caterpillar conservation area, cocoon (chrysalis) space, and adaptation area for butterflies before being released into the wild.

3. Vegetation arrangement by function

In essence, there are four categories of vegetation areas based on their function, namely the shelter plants (canopy cover), the caterpillars' host plants, the butterfly's food plants, and the nursery plants. This vegetation placement is arranged in zones according to its function. Plants are arranged by the composition of plants' strata (ground cover, shrubs, trees) to look aesthetic.

4. Butterfly display and collection room

This is an enclosed area, which designed according to the life requirements of a butterfly. The sunlight should sufficiently penetrate through para net. Plants display in this area is only for food plants for butterfly due to the presence of caterpillars may cause inconvenience for visitors. Butterflies are supplied from the butterfly maintenance area.

5. Butterfly Collections Introduction

The determination of the butterfly species that will be displayed is related to food plants and abiotic factors that influence it. Butterflies that will be introduced are local butterfly species that already exist on the site. To maintain its existence, the plant feed should always be available and assisted with well treatment in the butterfly maintenance area.

6. Management and service area

The Park management requires an area that serves as management space, office, and visitor services. The management and office area are private, while the visitor service area is semiprivate.

7. Visitor management program

The urban park is a green open space that accessible and can be enjoy by visitors as part of recreation and tourism. The visitor management serves to provide visitors comfort, as in determining the visit time and also serving the group visits (school and community), route visits, and educational tourism program packages.

DESIGN 3D VIEWS- PROPOSED BUTTERFLY CONSERVATORY



DESIGN 3D VIEWS- INTERIOR BUTTERFLY CONSERVATORY



DESIGN 3D VIEWS- BIRDS EYE VIEW: BUTTERFLY PARK



PREVIOUS OPTIONS



PREVIOUS OPTIONS



5. PROJECT COST AND PROJECT PHASING

The initial budget for the project was decided to be Rs. 2 Crores. (Two Crores Only) in October 2019.

BUTTERFLY PARK- Initial Budget- October 2019		
S. No.	Particulars	Amount (INR)
1	Butterfly Conservatory	1 Crore
2	Landscape and Hardscape	50 Lakhs
3	Pond	35 Lakhs
4	Entrance Gates	15 Lakhs
	TOTAL	2 Crores

In a span of almost two years after some iterations and additions of the Jharkhand Zoo Authority, which have been mentioned as follows:

- 1. A **Bridge** should be installed in the sprawling lawns of the Butterfly Park.
- 2. Water Fountains should be made at different locations so that while walking one must hear the noise of waters.

After including both the elements the project cost gone up to Rs. 2.52 Crores (as per latest attached Bill of quantities; BOQ).

Also, the project has been split into two parts: Phase I and Phase II.

Phase I includes Landscape and Hardscape.

Landscape work means the Habitat development i.e. plantation of host and nectar plants and

Hardscape means the construction of walkway for the butterfly park.

The construction works of the Phase I were completed in December 2020 by the department of Jharkhand Zoo Authority.

So, the estimate for Phase I:

BUTTERFLY PARK- PHASE I: Estimate			
S. No.	Particulars	Amount (INR)	
1	Civil works and Miscellaneous	34.80 Lakhs	
2	Horticulture	15.17 Lakhs	
	TOTAL	49.97 Lakhs	
	Say	50 Lakhs	

Phase II includes construction of:

- 1. Butterfly Conservatory and its landscaping
- 2. Pond
- 3. Entrance Gates

So, the estimate for Phase II:

BUTTERFLY PARK- PHASE II: Estimate as on 13 th August, 2021			
S. No.	Particulars	Amount (INR)	
1	Civil works- Butterfly Conservatory	1,00,73,676.77	
2	Civil works- Pond	41,13,021.13	
3	Civil works and Electrical Works- Entrance Gates	37,59,499.43	
4	Miscellaneous Works	19,95,000.00	
5	Horticulture works- Butterfly Conservatory	2,72,293.72	
	TOTAL	2,02,13,491.05	
	Say	2.02 Crores	

Note: In Phase II, Horticulture works will be done departmentally, So the budget for the work executed by the external agency will be Rs. 2.00 Crores.

BUTTERFLY PARK- (Total Estimate = Phase I + Phase II) as on 13 th August, 2021			
S. No.	Particulars	Amount (INR)	
1	Civil works and Miscellaneous- Phase I	34,79,607.42	
2	Horticulture works- Habitat development- Phase I	15,17,676.46	
3	Civil works- Butterfly Conservatory	1,00,73,676.77	
4	Civil works- Pond- Phase	41,13,021.13	
5	Civil works and Electrical Works- Entrance Gates	37,59,499.43	
6	Miscellaneous Works	19,95,000.00	
7	Horticulture works- Butterfly Conservatory	2,72,293.72	
	TOTAL	2,52,10,774.93	
	Say	2.52 Crores	

<u>6. Time Duration for Construction</u>

BUTTERFLY PARK, RANCHI: TENTATIVE SCHEDULE as on October 2019.

S. No.	Particulars	Date
1	Habitat Completion- Plantation and pavement works	31 st March, 2020
2	Conservatory and Interpretation Center	1 st May, 2020
3	Signages and sculpture installation	10 th May,2020
4	Training staff for 'pupa preservation and how to culture pupa'	15 th -17 th May,2020

Note:

Due to Covid-19 novel Corona virus Pandemic, project tender process and its execution delayed, so the Jharkhand Zoo Authority executed the Phase I in-house and successfully completed the project in December, 2020.

Phase-II will take 6 months to complete after appointing the reputed Contractor for the execution.

BUTTERFLY PARK, RANCHI-Phase II: TENTATIVE SCHEDULE as on 13th August 2021

S. No.	Particulars	Date
1	Civil Works- Butterfly Conservatory, Pond and Entrance Gates	3 months
2	Steel Works- Butterfly Conservatory	1 month
3	Finishing Works- Stone Cladding, Paint works etc.	1 month
4	Horticulture works- Butterfly Conservatory and Nursery	1 month
	TOTAL TIME DURATION	6 months

7. Project Institution Framework (Construction)

Manner of undertaking Construction work

Phase I- In-house

Phase II- External agency for execution, selection by tender process.

The *Jharkhand Zoo Authority* will execute the **Phase I- Landscape and Hardscape works** in-house i.e. departmentally and will invite tender for the execution of the **Phase II- Construction of Butterfly Conservatory, Pond and Entrance Gates** from the reputed agencies and organisations nationwide, that will be denoted as 'Contractor'.

Contractor

The Contractor shall execute the whole and every part of the work in the most sound and substantial and workman-like manner, and in strict accordance with the specifications both as regard to materials and workmanship. The Contractor shall also conform exactly, fully and faithfully to the designs, drawings and instructions in writing relating to the work signed by the In Charge or other competent authority and lodged in his office, and to which the Contractor shall be entitled to have access, during office hours, at such office or on the site of the work, for the purpose of inspection. The Contractor shall, if he so requires, be entitled at his own expense to obtain copies of the specifications and of all such designs, drawings and instructions as aforesaid. The Contractor shall also be responsible for the delivery of assigned job as per complete satisfaction of the In Charge and the execution of the work strictly in accordance with the specifications of the work.

Contractor bound by In Charge instructions

The Contractor shall be bound to carry out the work in accordance with any instructions in this connection which may be given to him in writing signed by the In Charge, his authorized representative or other competent authority.

Any instructions given verbally shall be noted in the Instruction Book and got signed by the Architect/In Charge, or his
authorized representative, and deemed as instructions for the proper execution of the work and, when considered necessary by the Site-In- Charge / Architect, followed up in writing.

The whole of the work must be proceeded with in such sections and at such times as directed by the In Charge /Architect. If the Contractor or his workmen or servants knowingly or unknowingly break, damage, deface, injure or destroy any part of the fixed or part of unfixed development in which they may be working, or any building, road, fence, enclosure or grass land or cultivated ground contiguous to the premises on which the work or any part thereof is being executed, or if any damage shall be done to the work while it is in progress, from any cause whatever, or if any damage of any kind is done to the plant material incorporated in the work, or if any imperfections become apparent in it within twelve months of the grant of a Certificate of Completion, final or otherwise, by the In Charge or other competent authority, the Contractor shall make good the same at his own expense, or in default, the In Charge or other competent authority may cause the same to be made good by other workmen, and deduct the expenses (of which the certificate of the In Charge or other competent authority shall be final) from any sums that may be due or may thereafter become due to the Contractor, or from his security deposit or the proceeds of sale thereof, or of a sufficient portion thereof.

The Contractor shall provide maintenance for the work for the abovespecified period of twelve months, and shall ensure that all works are maintained in perfect condition.

Architect's Role: M/s STREET-HOUSE, Kota -Rajasthan

The Architect, in concurrence with the Employer, may from time to time issue further Drawings and/or written instructions, details, directions and explanations, which are hereafter collectively referred to as "instructions" in regard to:

- i) The variation or modification of the design, quality or quantity of works or the addition or omission or substitution of any work.
- ii) Any discrepancy in the Drawings or between the Schedule of quantities and/or drawings and/or specification.
- iii) The removal from the site of the materials brought thereon by the Contractor and the substitution of the other

material thereof.

- iv) The removal and/or re-execution of any works executed by the Contractor.
 v) The opening up for inspection of any work covered up.
- vi) The amending and making good of any work as executed.

The Contractor shall forthwith comply with and duly execute any work comprised in such Architect's instructions, directions and explanations, given to the Contractor or his representative upon the works by the Architect; which shall, if involving a variation, be confirmed in writing by the Contractor within seven days, and if not dissented from in writing within a further seven days by the Architect, such shall be deemed to be Architect's instructions within the scope of the Contract. If compliance with the Architect's instruction, as aforesaid, involves work and/or expense and loss beyond that contemplated by the Contract, then, unless the same were issued owing to some breach of this Contract by the Contractor, the Employer shall pay to the Contractor at the Site-In-Charge/ Architect's Certificate the price of the said work (as an extra to be valued as hereinafter and/ or expense and/ or loss).

Any alterations made to the work made based on technical;/aesthetic values as per the instructions of the In Charge/ Architect shall be considered as part of the work undertaken by the Contractor under this Contract, and shall be executed as such.

8. Project Operations and Management Planning (Construction to Completion)

Phase I: Landscape and Hardscape:

The list of butterflies from the book—'Butterflies of Jharkhand' by Mr. Prabhat Kumar. Retd. IFS Officer, have been taken into consideration and accordingly host and nectar plants were selected for butterflies.

The Phase I which included planting of host and nectar plants for butterflies have been done in-house, working drawings and planting pattern scheme were provided by the M/s STREET-HOUSE. The zoning of garden has been done for butterflies and specific host and nectar plants were planted accordingly. Planting pattern for seasonal flowering plants: host and nectar plants have been made to implement season wise.

Attached overleaf report:

- 1. List of Butterflies of Jharkhand (with specific Host and Nectar Plants)
- 2. List of Host plants
- 3. List of Nectar plants

Phase II: Construction of Butterfly Conservatory, Pond and Entrance Gates.

The Phase II mainly comprises of civil works:

Conservatory is a steel structure which rises on **pedestals of RCC** tied up by plinth beams, strong foundations have been taken into consideration to resist strong wind pressure.

The Steel Conservatory will be covered with **industrial mesh**, to avoid predators entering into the Conservatory.

There will be a **Vestibule** in Conservatory with double doors to arrest the escaped butterflies.

Area of Conservatory ~ 802.98 sqm

Pond will be an RCC structure, 1.2m (4') deep. **Volume of Pond ~ 917.88 cum**

It will be mainly a lily pond, which is a nectar plant for Butterflies, large pots filled with good earth and mud will be placed in water to grow lilies. Natural stone rocks will be placed inside the conservatory and around it to give it a natural pond look.

Entrance gates

There will be entrances on two sides, Main entrance towards Aquarium side and Side entrance towards Guest house side. At the Main Entrance, there will be a ticket window kiosk and a Preservation Room. <u>The annual maintenance of the Butterfly Park habitat will be around **25 Lakhs.**</u>

Total 12 full time gardeners are needed to maintain the park.

After successful implementation of the project components, i.e. plantation of host and nectar plants, construction of Pond, Butterfly Conservatory, Preservation Room. The pupa will be preserved after collection from Butterfly Park, which will be cultured in controlled climatic conditions, then butterflies will be released in the open butterfly park and some in the Butterfly Conservatory.

The Jharkhand Zoo Authority will maintain the habitat of Butterfly Park in-house under the supervision of Range Forest Officer, Forester and Forest guards with the help of 12 full-time gardeners (denoted as a *team*) who were involved in the execution of Phase-I of the Project.

The *team* will be trained for pupa preservation by the architecture firm M/s STREET-HOUSE after the completion of the project.

Note:

In case department face difficulty in maintaining the park especially Pupa preservation, then a private entity/ community entity/NGO can participate through a variety of models for performance-based O&M (even without participating in the

infrastructure construction; in this context, contract periods can be of shorter duration of 11 months since capital cost has not been borne by the private entities and to prevent service delivery complacency on the part of the contracted entities).

	Manpower required for Maintenance of Butterfly	y Park, Ranchi
S. No.	Areas for maintenance of Butterfly Park	No. of Gardeners/ Support staff
1	Conservatory and Pond	1
2	Central Garden – inside both walkway arches	4
3	Entrance Gate and Children's Park	1
4	Fruit and Ornamental trees Zone	2
5	Flower beds along Entrance Gate walkway	1
6	Nursery	1
7	Earth Mounds	1
8	Murum Walkway Maintenance	1
	TOTAL	12

This will be finalized as per the decision made by Member Secretary, Jharkhand Zoo Authority.

Water supply

Underground pipelines laying is the part of Phase I, which will be connected to the boring (to be provided by the department, boring cost not a part of estimate of the project).

Electricity supply

As per butterfly expert's recommendation, there should be no light fixtures in the Butterfly park, as it creates disturbance in their habitat.

For miscellaneous works, for connections like electric pump which is placed in the Rest-House can used easily.

For Entrance Gate which is in right in front of Aquarium, which is abundant with Solar panels for electricity, can be used

for providing electric-power in Preservation Room and Ticket-Kiosk.

Visitor Facilities

Every Butterfly Park needs to provide certain essential facilities to visitors to make their visit comfortable and meaningful. Some of the usual facilities provided by Jharkhand Zoo Authority include:

- 1. Parking
- 2. Drinking water facility
- 3. Cafeteria
- 4. Washrooms

Butterfly Parks are places to engage humans with nature:

Pond: Soothing calm of waters to relax from hustle bustle of city life.

Gazebos: Wrought iron gazebos for spending quality time with family and friends for long durations.

Designed for disabled: The landscape has been developed keeping handicapped visitors in mind.

Signages: Butterfly Park Etiquette

Don'ts

- Don't bring food or drinks into the exhibit.
- Don't wander off the pathways in the exhibit.
- Don't touch the plants or pluck <u>flowers</u>.
- Don't pick up or handle the butterflies, unless a staff member invites you to do so.
- Don't remove butterflies from the exhibit area, even if they are dead.

Dos

- Do take your time. Butterfly spotting takes patience!
- Do ask questions. Most butterfly houses have knowledgeable staff or volunteers posted in the exhibit area, able and willing to teach you about the species you are seeing.
- Do look for feeding stations and puddling areas, where you can get a closer view of the butterflies.
- Do visit the emerging area, where you can watch new butterflies and moths break out of their pupal cases. You might have to wait for a while to see one emerge, but it is well worth it.
- Do consider bringing a small pair of <u>binoculars</u> with you, to get a better view of butterflies perched high in the exhibit.
- Do take lots of pictures! Where else will you have that many butterflies within reach of your camera lens?
- Do check for hitchhikers before you exit the butterfly house. Ask a friend to make sure no butterflies have perched on your back.

Attached overleaf:

- 1. List of Butterflies of Jharkhand
- 2. List of Host Plants
- 3. List of Nectar Plants
- 4. Bill of Quantities (Estimate)
- 5. Tender drawings

	BUTTERFLY PARK (PHASE-II) , ORMANJHI, RANCHI (JH	HARKHAND)	
	BUTTERFLY PARK (PHASE-II) , ORMANJHI, RANCHI (JHARKHAND) Rates as per SOR Jharkhand: 2021/ DSR: 2021 BILL OF QUANTITIES: SUMMARY OF PRICES No. SECTIONS Rs. Amount A CIVIL WORKS - CONSERVATORY Rs. 1,00,73,676.77 B. CIVIL WORKS - POND Rs. 41,13,021.13 C. CIVIL WORKS and Electrical- ENTRANCE GATE Rs. 37,59,499.43 D. Miscellaneous Works Rs. 19,95,000.00 GRAND TOTAL Rs. 1,99,41,197.33		
	BILL OF QUANTITIES: SUMMARY OF PRICE	S	
S. No.	SECTIONS	Rs.	Amount
А	CIVIL WORKS - CONSERVATORY	Rs.	1,00,73,676.77
В.	CIVIL WORKS - POND	Rs.	41,13,021.13
C.	CIVIL WORKS and Electrical- ENTRANCE GATE	Rs.	37,59,499.43
D.	Miscellaneous Works	Rs.	19,95,000.00
	GRAND TOTAL	Rs.	1,99,41,197.33
		Say	1.99 Crores

MEMBER SECRETARY JHAKHAND ZOO AUTHORITY Architect: STREET-HOUSE

	BUTTERFLY PARK (PHASE-II) - ORMANJHI, RANC	HI (JHARKH	AND)
	CONSERVATORY		
	Rates as per SOR Jharkhand: 2021/ DSR:	2021	
	BILL OF QUANTITIES: SUMMARY OF P	RICES	
S. No.	SECTIONS	Rs.	Amount
1	CIVIL WORKS- CONSERVATORY	Rs.	88,17,994.37
	TOTAL	Rs.	88,17,994.37
	GST	12.00%	10,58,159.32
	TOTAL (adding GST)	Rs.	98,76,153.70
	Labour Cess	1.00%	98,761.54
	Contingency	1.00%	98,761.54
	TOTAL(Including GST, Labour Cess and Contingency)	Rs.	1,00,73,676.77
		Say	1.01 Crores

SOR No.	S.No.	Particulars	No.	Length	Width	Height	Qty.	Unit	Rate	Amour
5.1		EARTHWORK				0				
5.1.1	1	Earthwork in excavation in foundation								
		trenches in ordinary soil (vide								
		classification of soil item -A) and								
		disposal of excavated earth as obtained								
		to a distance upto 50 M. including all								
		lifts, levelling, ramming the foundation								
		trenches, removing roots of trees, shurbs								
		all complete as per approved design,								
		building specification and direction of								
		E/I.								
		For Foundation- Conservatory								
		F1	18.00	2.00	2.00	1.80	129.60			
		F2	7.00	1.20	1.20	1.80	18.14			
		For Plinth Beam- Conservatory								
		PB-1a to 1c	1	20.00	0.35	0.50	3.50			
		PB-2a to 2c	1	20.00	0.35	0.50	3.50			
		PB-3a to 3c	1	20.00	0.35	0.50	3.50			
		PB-4a to 4c	1	20.00	0.35	0.50	3.50			
		PB-5a to 5c	1	20.00	0.35	0.50	3.50			
		PB-6a to 6c	1	20.00	0.35	0.50	3.50			
		PB-7a to 7c	1	20.00	0.35	0.50	3.50			
		PB-8a to 8c	1	20.00	0.35	0.50	3.50			
		PB-12a to 12g	1	30.00	0.35	0.45	4.73			
		PB-13a to 13d	1	28.00	0.35	0.45	4.41			
		PB-14a to 14i	1	50.00	0.35	0.45	7.88			
								$ \downarrow \downarrow$		
		For Gazebo/ Café Pavilion						\downarrow		
		(Total 5 in no.)	20.00	3.00	0.30	0.90	16.20	+		
							208.95	cum	138.32	28,902.5

						1		<u>т т</u>		
5.1.2	2	Extra for earthwork in hard soil as per								
		specification and direction of E/I (Vide								
		classification of soil item-B)								
		For Foundation								
		For Foundation- Conservatory								
		F1	18.00	2.00	2.00	0.60	43.20			
		F2	7.00	1.20	1.20	0.60	6.05			
							49.25	cum	14.13	695.87
5.6.5	3									
		Providing average 150mm thick dry								
		rammed khoa beaten to 112mm								
		(a superstant sector) and the sector)								
		(compacted with water) made of well								
		burnt or jhama bricks including ramming								
		properly till compacted thickness is								
		achieved, curing and carriage of water								
		with all leads making proper slope and								
		blending the top with compart mortar								
		(1.10) all as a part has the first								
		(1:10) all complete as per building								
		specification and direction of E/I.								
		For Flooring					_			
		For Conservatory	1	25.00	6.00		150.00			
			1	12.00	3.00		36.00			
		For Gazebo Pavilion	5	3.00	3.00		45.00			
							231.00	sqm	174.25	40,251.75
5.3		CONCRETE WORKS								
		P.C.C.								
5.3.1	4	Providing and laying position cement								
		concrete of specified grade excluding the								
		cost of centering and shuttering- All								
		work upto plinth level:								
5.3.1.2		1:2:4 (1 cement: 2 sand coarse(Zone III):								
		4 graded stone aggregate 20mm nominal								
		size)								
		For Foundation- Conservatory								
		I OF FOUNDATION- CONSCIVATORY		1	1	1	1	1		

						1	-	-		
		F1	18.00	2.00	2.00	0.10	7.20			
		F2	7.00	1.20	1.20	0.10	1.01			
		For Plinth Beam- Conservatory								
		PB-1a to 1c	1	20.00	0.35	0.10	0.70			
		PB-2a to 2c	1	20.00	0.35	0.10	0.70			
		PB-3a to 3c	1	20.00	0.35	0.10	0.70			
		PB-4a to 4c	1	20.00	0.35	0.10	0.70			
		PB-5a to 5c	1	20.00	0.35	0.10	0.70			
		PB-6a to 6c	1	20.00	0.35	0.10	0.70			
		PB-7a to 7c	1	20.00	0.35	0.10	0.70			
		PB-8a to 8c	1	20.00	0.35	0.10	0.70			
		PB-12a to 12g	1	30.00	0.35	0.10	1.05			
		PB-13a to 13d	1	28.00	0.35	0.10	0.98			
		PB-14a to 14i	1	50.00	0.35	0.10	1.75			
		Stone Masonry for Gazebo/ Café								
		Pavilion								
		(Total 5 in no.)	20.00	3.00	0.30	0.10	1.80			
		For Flooring								
		For Conservatory	1	25.00	6.00	0.10	15.00			
			1	12.00	3.00	0.10	3 60			
		For Gazebo Pavilion	5	3.00	3.00	0.10	4 50			
				2.00	2.00	0.10	42.49	cum	4 492 36	1 90 871 39
								• • • • • • • • • •	.,	1,,, 0,0,, 110,
		R.C.C.								
5.3.9	5	Providing and laying position specified grade of reinforced cement concrete, excluding the cost of centering, shuttering, finishing and reinforcement- All work upto plinth level.								
5.3.9.2		1:2:4 (1 cement: 2 coarse sand: 4 graded stone aggregate 20mm nominal size)								
		Conservatory								

		Footing								
		F1	18.00	2.00	2.00	0.60	43.20			
		F2	7.00	1.20	1.20	0.30	3.02			
							46.22	cum	4,727.96	2,18,545.22
		Neck Column								
		(600*600)	18.00	0.60	0.60	2.00	12.96			
		(400*350)	7.00	0.40	0.35	2.00	1.96			
							14.92	cum	4,727.96	70,541.16
		Plinth Beam								
		PB-1a to 1c	1	20.00	0.35	0.50	3.50			
		PB-2a to 2c	1	20.00	0.35	0.50	3.50			
		PB-3a to 3c	1	20.00	0.35	0.50	3.50			
		PB-4a to 4c	1	20.00	0.35	0.50	3.50			
		PB-5a to 5c	1	20.00	0.35	0.50	3.50			
		PB-6a to 6c	1	20.00	0.35	0.50	3.50			
		PB-7a to 7c	1	20.00	0.35	0.50	3.50			
		PB-8a to 8c	1	20.00	0.35	0.50	3.50			
		PB-12a to 12g	1	30.00	0.35	0.45	4.73			
		PB-13a to 13d	1	28.00	0.35	0.45	4.41			
		PB-14a to 14i	1	50.00	0.35	0.45	7.88			
							45.01	cum	4,727.96	2,12,805.48
5.3.17	6	Centering and Shuttering including strutting, propping etc. and removal of form for:								
5.3.17.1		Foundations, footings, bases of columns, etc for mass concrete								
		For Footing								
		F1(total 18 footings- 18x4)	72	2.00		0.60	86.40			
		F2(total 7footings- 7x4)	28	1.20		0.30	10.08			
		Neck Column								
		(600*600)- total 18 footings- 18x4	72	0.60		2.00	86.40			

		(400*350)-total 7 footings- 7x4	14	0.40		2.00	11.20			
			14	0.35		2.00	9.80			
		Plinth Beam								
		PB-1a to 1c	2	20.00		0.50	20.00			
		PB-2a to 2c	2	20.00		0.50	20.00			
		PB-3a to 3c	2	20.00		0.50	20.00			
		PB-4a to 4c	2	20.00		0.50	20.00			
		PB-5a to 5c	2	20.00		0.50	20.00			
		PB-6a to 6c	2	20.00		0.50	20.00			
		PB-7a to 7c	2	20.00		0.50	20.00			
		PB-8a to 8c	2	20.00		0.50	20.00			
		PB-12a to 12g	2	30.00		0.45	27.00			
		PB-13a to 13d	2	28.00		0.45	25.20			
		PB-14a to 14i	2	50.00		0.45	45.00			
							461.08	sam	184.61	85,119,98
								~ 1		,
5.2		MASONRY								
		FLY ASH BRICKS								
5.2.46	7	Providing designation 100 A brick work								
		with fly ash lime brick (FLAG)								
		confirming to IS 12894-1990								
		(9"x4.5"x3") in C M (1:3) in								
		foundation and plinth with approved								
		quality of clean coarse sand of F.M. 2-								
		2.5 including providing 10 mm thick								
		mortar joints, cost of screening materials.								
		raking out joints to 15mm depth, curing.								
		taxes and royalty all complete as per								
		building specification and direction of								
		E/I								
		Plinth Beam- Conservatory								
		PB-1a to 1c	1	20.00	0.35	0.30	2.10			
		PB-2a to 2c	1	20.00	0.35	0.30	2.10			
		PB-3a to 3c	1	20.00	0.35	0.30	2.10			
		PB-/a to /c	- 1	20.00	0.35	0.30	2 10			
-			· 1	20.00	0.55	0.30	2.10			

		PB-6a to 6c	1	20.00	0.35	0.30	2.10			
		PB-7a to 7c	1	20.00	0.35	0.30	2.10			
		PB-8a to 8c	1	20.00	0.35	0.30	2.10			
		PB-12a to 12g	1	30.00	0.35	0.30	3.15			
		PB-13a to 13d	1	28.00	0.35	0.30	2.94			
		PB-14a to 14i	1	50.00	0.35	0.30	5.25			
			1	50.00	0.55	0.50	28 14	cum	4 597 84	1 29 383 22
							20.14	cum	4,577.04	1,27,303.22
5.2.28	8	Providing Random rubble stone masonry in C.M. (1:4) in foundation and plinth with hammer dressed stone of less than 0.03 M3 in volume and clean coarse sand of 2 to 2.5 including cost of screening, raking out joints to 20mm depth, curing, taxes and royalty all complete as per building specification and direction of E/I. For Gazebo Pavilion/ Café (Total 5 in no.)	5.00	3.00	0.30	0.75	3.38			
							3.38	cum	2,575.32	8,691.71
5.5		STEEL WORKS								
5.5.1	9	Providing reinforcement (Round bars conforming to I.S. 432 dia. in mm) (IS 2062 Gr A)of 6&8mm.dia.rods as per approved design and drawing with cutting,bending and binding with annealed wire with cost of wire ,removal of rust placing the rods in position(excluding carriage of bars to work site) all complete as per building specification and direction of E/ I.								
		8mm dia Gr. A	1.04	0.012	7.05		0.10			
		r or Peaestai(400*350)	1.90	0.013	1.85		0.19	МТ	71 704 80	13 700 63
						1	10.17	11/1	/1,/04.00	15,/90.05

							T		
555	10	Drouiding Tor staal rainforcement of							
5.5.5	10	10mm 12mm and 16mm dia have as non							
		Tomm, 12mm and Tomm, dia bars as per							
		approved design and drawing with							
		cutting, bending and binding with							
		annealed wire with cost of wire ,removal							
		of rust placing the rods in							
		position(excluding carriage of bars to							
(a)		10mm (TMT coil Fe 500) {Only valid							
		for TATA (Tiscon), SAIL, JSPL,							
		Electrosteel Steels Ltd Bokaro and							
		Vizag(RINL)}							
		For Footing-F1	43.20	0.01	7.85	2.54			
		For Pedestal	14.92	0.013	7.85	1.46			
						4.01	MT	77,259.94	3,09,613.42
(b)		12mm (TMT coil Fe 500) {Only valid							
		for TATA (Tiscon), SAIL, JSPL,							
		Electrosteel Steels Ltd Bokaro and							
		For Footing- F1	43.20	0.008	7.85	2.54			
		For Footing- F2	3.02	0.015	7.85	0.36			
						2.90	MT	76,041.94	2,20,481.78
(c)		16mm (TMT coil Fe 500) {Only valid							
		for TATA (Tiscon), SAIL, JSPL,							
		Electrosteel Steels Ltd Bokaro and							
		Vizag(RINL)}							
		Plinth Beam	45.01	0.008	7.85	2.65			
		For Pedestal(600*600)	12.96	0.013	7.85	1.27			
						3.92	MT	76,041.94	2,98,210.92

5.5.6	11	Providing Tor steel reinforcement of								
		20mm, 25mm,28mm and 32mm dia. bars								
		as per approved design and drawing with								
		cutting, bending and binding with								
		annealed wire with cost of wire ,removal								
		of rust placing the rods in								
		position(excluding carriage of bars to								
		work site) all complete as per								
		building specification and direction of E/								
		I.								
		20/ 25 mm dia TMT bar Fe 500 {Only								
		valid for TATA (Tiscon), SAIL, JSPL,								
		Electrosteel Steels Ltd Bokaro and								
		Vizag(RINL)}								
		Plinth Beam	45.01	0.013	7.85		4.42			
							4.42	MT	76,041.94	3,35,847.31
5.8		FINISHING WORK								
5.8.43	12	Providing two coats of painting with								
		ready mixed paint of approved shade and								
		make over steel surface including								
		cleaning the surface thoroughly,								
		scaffolding and taxes all complete as per								
		building specification								
		and direction of E/I.								
		Conservatory								
		For Steel columns	108.00		0.30	6.00	194.40			
		For Truss	60.00		0.30	25.00	450.00			
		(Considering total Area)					644.40	sqm	65.37	42,124.43
		Note: Colour should match the finish								
		of corten steel.								
									TOTAL	22,05,876.78

SOR No.	S.No.	Particulars	No.	Length	Width	Height	Qty.	Unit	Rate	Amount
		EXPOSED BRICK WALL				Ŭ	~ ~ ~			
DSR 6.26	1	Brick work with common burnt clay								
		selected F.P.S. (non modular) bricks of								
		class designation 7.5 in exposed brick								
		work including making horizontal and								
		vertical grooves 10 mm wide 12 mm								
		deep complete in								
		cement mortar 1:6 (1 cement : 6 coarse								
		sand)								
6.26.1		From ground level upto plinth level								
		Conservatory								
		Outer periphery	1.00	20.00	0.45	0.45	4.05			
			1.00	30.00	0.45	0.45	6.08			
			1.00	28.00	0.45	0.45	5.67			
			1.00	50.00	0.45	0.45	10.13			
							25.92	cum	6,849.50	1,77,539.04
		FLOORING WORKS								
DSR 11.29	2	40 mm thick fine dressed stone flooring								
		over 20 mm (average) thick base of								
		cement mortar 1:5 (1 cement : 5 coarse								
		sand), including pointing with cement								
		mortar 1:2 (1 cement : 2 stone dust) with								
		an admixture of								
		pigment to match the shade of stone.								
SR 11.29.1		Red sand stone		_						
		For Conservatory	1	25.00	6.00		150.00			
			1	12.00	3.00		36.00		+	
			3	10.00	3.00		90.00		+	
		For Gazebo Pavilion	5	3.00	3.00		45.00			
							321.00	sqm	1,193.30	3,83,049.30

DSR 16.68	3	Providing and laying 60mm thick factory made cement concrete interlocking paver block of M -30 grade made by block making machine with strong vibratory compaction, of approved size, design & shape, laid in required colour and pattern over and including 50mm thick compacted bed of coarse sand, filling the joints with line sand etc. all complete as per the direction of Engineer- in-charge.								
		For Linear walkway to link Gazebo and Walkway.	5.00	5.00	1.20		30.00			
		·					30.00	sqm	951.00	28,530.00
DSR 16.69	5	Providing and laying at or near ground level factory made kerb stone of M-25 grade cement concrete in position to the required line, level and curvature, jointed with cement mortar 1:3 (1 cement: 3 coarse sand), including making joints with or without grooves (thickness of joints except at sharp curve shall not to more than 5mm), including making drainage opening wherever required complete etc. as per direction of Engineer- in-charge (length of finished kerb edging shall be measured for payment). (Precast C.C. kerb stone shall be approved by Engineer- in-charge).								
		For Linear walkway to link Gazebo	150.00	0.20	0.10	0.25	1 1 2			
		anu waikway.	130.00	0.30	0.10	0.25	1.13	cum	8.613 55	9 690 24

DSR 8.7	6	Providing and fixing cramps of required size & shape in RCC/ CC / Brick masonry backing with cement mortar 1:2 (1 cement :2 coarse sand), including drilling necessary hole in stones and embedding the cramp in the hole (fastener to be paid separately).							
8.7.1		Gunmetal cramps	2.00			2.00	kg	639.05	1,278.10
DSR 10.2	7	Structural steel work riveted, bolted or welded in built up sections, trusses and framed work, including cutting, hoisting, fixing in position and applying a priming coat of approved steel primer all complete. Note: Premium quality Steel should be used, and left over should be used for angles or box sections as supporting vertical and horizontal members for Conservatory as per specifications.							
		Truss (1500 kg per truss)	10			15,000.00			
		Columns over Pedestals(42kg per m)	50	42	6	12,600.00			
		Note: Total weight of columns= 4725 kg; 378 kg considering in contingency. (20% wastage)	20%	(weight)		27,600.00 5,520.00	kg kg	78.20 78.20	21,58,320.00 4,31,664.00
DSR 10.25	8	Steel work welded in built up sections/							
10 25 2		framed work, including cutting, hoisting, fixing in position and applying a priming coat of approved steel primer using structural steel etc. as required.							
10.25.2		railings, brackets, gates and similar works.							

	For Supporting vertical and horizontal							
	members for Conservatory.				4000			
	For Conservatory Door	2		300.00	600			
	For gazebos	5			8000.00			
	Designer benches	20			1000.00			
	Signages	150			1000.00			
	Garden bridge				10000.00			
					24600	kg	142.30	35,00,580.00
	Note: It should be premium quality Steel.							
DSR	BASIC RATES (SH: 26.0 NEW TECHNOLOGIES AND MATERIALS)							
1021	Hard drawn steel wire fabric 75 x 25 mm mesh of weight not less than 7.75 kg/sqm							
	Roof- Facets				313.29			
					316.42			
	Slope- Facets				130.15			
					46.12			
	Side- Facets				239.61			
					200.00			
					100.00			
					1345.59	sqm	430.00	5,78,603.70
1000								
1223	Steel weld mesn				212.00			
	Kooi- Facets				313.29			
	Slava Essets				310.42			
	Stope- Facets				150.15			
	Sida Essats				40.12 220.61			
	Side- Facets		+ +	<u> </u>	239.01			
			+		200.00			
			+ +		1345 50	sam	150.00	2 01 838 50
			+ +	<u> </u>	1070.07	Squi	150.00	2,01,000.00

1023	Galvanised steel J or L hooks 8 mm dia	5				5 set	10 nos	120.00	600.00
								TOTAL	74,71,692.88
							GST	12.00%	7,93,454.11
						LABOU	IR CESS	1.00%	66,121.18
]	FOTAL (E	XCLUD	ING GST a	& LABO	UR CESS)	66,12,117.60

	BUTTERFLY PARK (PHASE-II) : ORMANJHI, RANCHI (JHARKHAND)											
	POND											
	Rates as per SOR Jharkhand: 2021/ DSR: 2021											
	BILL OF QUANTITIES: SUMMARY OF PRICE	S										
S. No.	S. No. SECTIONS Rs. Amount											
A.	CIVIL WORKS- POND	Rs.	36,00,333.62									
	TOTAL	Rs.	36,00,333.62									
	GST	12.00%	4,32,040.03									
	TOTAL (adding GST)	Rs.	40,32,373.65									
	Labour Cess	1.00%	40,323.74									
	Contingency	1.00%	40,323.74									
	TOTAL(Including GST, Labour Cess and Contingency)Rs.41,13,021.13											
	Say 41.13 Lakhs											

	PART-A : CIVIL WORKS - SOR- POND											
SOR No.	S.No.	Particulars	No.	Length	Width	Height	Qty.	Unit	Rate	Amount		
5.6.5	1	Providing average 150mm thick dry										
		rammed khoa beaten to 112mm.										
		(compacted with water) made of well burnt										
		or jhama bricks including ramming										
		properly till compacted thickness is										
		achieved, curing and carriage of water with										
		all leads, making proper slope and blending										
		the top with cement mortar (1:10)										
		allcomplete as per building specification										
		and direction of E/I.										
		For Pond	764.90					sqm	174.25	1,33,283.83		
		(Total Surface Area of Pond= 764.90										
5.3		CONCRETE WORKS										
		P.C.C.										
5.3.1	2	Providing and laying position cement										
		concrete of specified grade excluding the										
		cost of centering and shuttering- All work										
		upto plinth level:										
5.3.1.3		1.2.4 (1 cement: 2 sand coarse(Zone III): 4										
		graded stone aggregate 20mm nominal size)										
		graded stone aggregate 20mm nommar size)										
		For Pond surface	764.90			0.15	114.74					
		(Total Surface Area of Pond= 764.90					114.74	cum	4,492.36	5,15,430.92		
		R.C.C.										
5.3.9	3	Providing and laying position specified										
		grade of reinforced cement concrete,										
		excluding the cost of centering, shuttering,										
		finishing and reinforcement- All work upto										
		plinth level.										
		1:2:4 (1 cement: 2 coarse sand: 4 graded										
		stone aggregate 20mm nominal size)										

		Raft Slab	764.90			0.15	114.74			
		For edges		135.00	1.50	0.30	60.75			
		Retaining Wall		135.00	0.23	1.50	46.58			
							222.06	cum	4,727.96	10,49,890.80
5.3.17	4	Centering and Shuttering including								
		strutting, propping etc. and removal of form								
		for:								
5.3.17.1		Foundations, footings, bases of columns,								
		etc for mass concrete								
		Retaining Wall(below plinth)	2.00	135.00		1.50	405.00	sqm	184.61	74,767.05
5.5		STEEL WORKS								
5.5.1	5									
		Providing reinforcement (Round bars								
		conforming to I.S. 432 dia. in mm) (IS 2062								
		Gr A)of 6&8mm.dia.rods as per approved								
		design and drawing with cutting, bending								
		and binding with annealed wire with cost of								
		wire removal of rust placing the rods in								
		position(excluding carriage of bars to work								
		site) all complete as per								
		building specification and direction of E/I								
		summing specification and direction of L/1.								
		8mm dia Gr. A								
		Retaining Wall	46.58	0.010	7.85		3.66	MT	71,704.80	2,62,162.61
5.5.5	6	Providing Tor steel reinforcement of								
		10mm, 12mm and 16mm., dia bars as per								
		approved design and drawing with								
		cutting bending and binding with annealed								
		wire with cost of wire, removal of rust								
		placing the rods in position(evoluting								
		carriage of bars to work site) all complete								
		peaninge of bars to work site) an complete				1	1		1 /	

(b)		12mm (TMT coil Fe 500) {Only valid for TATA (Tiscon), SAIL, JSPL, Electrosteel Steels Ltd Bokaro and Vizag(RINL)}								
		Raft Slab	175.49	0.01	7.85		13.78			
		Retaining Wall	46.58	0.010	7.85		3.66			
							17.43	MT	76,041.94	13,25,541.05
5.12.7	7	Providing 25mm thick water proof cement plaster (1:3)with clean coarse sand of F M 1.5 with integral water proofing compound Liquid @125 ml per bag cement including screening, curing with all leads and lifts of water, scaffolding taxes and royalty all complete as per building specification and direction of E/I. Brand-Dr.fixit Pidiproof LW+,Sika- Plasrocrafe plus, MYK proof WP 10,Fosroc-Conplast X4211C or Equivalent.		125.00		1.50				
		Retaining Wall		135.00		1.50	202.50			
		Raft Slab	764.90			ļ	764.90			
							967.40	sqm	247.32	2,39,257.37
									TOTAL	36,00,333.62

	BUTTERFLY PARK (PHASE-II) : ORMANJHI, RANCHI (JHARKHAND)										
	ENTRANCE GATE										
	Rates as per SOR Jharkhand: 2021/ DSR: 2021										
	BILL OF QUANTITIES: SUMMARY OF PRICES										
S. No.	S. No. SECTIONS Rs. Amoun										
A.	CIVIL WORKS- ENTRANCE GATE	Rs.	32,62,490.69								
B.	ELECTRICAL WORKS	Rs.	28,387.66								
	TOTAL	Rs.	32,90,878.35								
	GST	12.00%	3,94,905.40								
	TOTAL (adding GST)	Rs.	36,85,783.76								
	Labour Cess	1.00%	36,857.84								
	Contingency	1.00%	36,857.84								
TOTAL(Including GST, Labour Cess and Contingency)Rs.37,59,											
	Say 37.59 Lakhs										

	PART-A : CIVIL WORKS - SOR- ENTRANCE GATE											
SOR No.	S.No.	Particulars	No.	Length	Width	Height	Qty.	Unit	Rate	Amount		
5.1		EARTHWORK										
5.1.1	1	Earthwork in excavation in foundation										
		trenches in ordinary soil (vide classification										
		of soil item -A) and disposal of excavated										
		earth as obtained to a distance upto 50 M.										
		including all lifts, levelling, ramming the										
		foundation trenches, removing roots of										
		trees, shurbs all complete as per approved										
		design, building specification and direction										
		of E/I.										
		For Entrance gate										
			4.00	1.8	1.8	1.80	23.33					
		For Equipment Room	4.00	2.4	0.45	1.20	5.18					
		For Security Cabin and Ticket Window	8.00	1.80	0.45	1.20	7.78					
							36.29	cum	138.32	5,019.36		
5.6.5	2	Providing average 150mm thick dry										
		rammed khoa beaten to 112mm.										
		(compacted with water) made of well burnt										
		or jhama bricks including ramming										
		properly till compacted thickness is										
		achieved, curing and carriage of water with										
		all leads, making proper slope and blending										
		the top with cement mortar (1:10)										
		allcomplete as per building specification										
		and direction of E/I.										
		For Flooring										
		For Equipment Room	1.00	2.40	2.40		5.76					
		For Security Cabin and Ticket Window	2.00	1.80	1.80		6.48					
		Miscellaneous	1.00	5.00	5.00		25.00					
							37.24	sqm	174.25	6,489.07		

5.3		CONCRETE WORKS								
		P.C.C.								
5.3.1	3	Providing and laying position cement concrete of specified grade excluding the cost of centering and shuttering- All work upto plinth level:								
5.3.1.2		1:2:4 (1 cement: 2 sand coarse(Zone III): 4 graded stone aggregate 20mm nominal size)								
		For Foundation- Entrance Gate								
		F10- For Entrance Gate	4.00	1.8	1.8	0.10	1.30			
		For Equipment Room	2.00	2.4	0.45	0.10	0.22			
		For Security Cabin and Ticket Window	8.00	1.80	0.45	0.10	0.65			
		For Picket fencing- Pole fixing	66.00	0.30	0.30	0.45	2.67			
		(Considering 200m length to be fenced								
		with poles at a distance of 3m)	 				4.02		1 400 26	01 711 50
			 '				4.83	cum	4,492.36	21,/11.58
		P C C	'							
5.3.9	4	Providing and laying position specified grade of reinforced cement concrete, excluding the cost of centering, shuttering, finishing and reinforcement- All work upto plinth level.								
5.3.9.2		1:2:4 (1 cement: 2 coarse sand: 4 graded stone aggregate 20mm nominal size)								
		For Entrance Gate Columns								
		Footing	4.00	1.80	1.80	0.35	4.54	cum	4,727.96	21,446.03
		Neck Column	 							
		column (750*750)	4.00	0.75	0.75	1.85	4.16	cum	4,727.96	19,680.13
		Plinth Beam	2.00	4.3	0.75	0.30	1.94			

							1.94	cum	4,727.96	9,148.60
										,
5.3.10	5	Reinforcement Cement Concrete work in								
		walls (any thickness), including attached								
		pilasters, buttresses, plinths and string								
		courses, fillets, columns, pillars, piers.								
		Abutments, posts and struts etc. above								
		plinth level upto floor five level excluding								
		cost of centering, shuttering, finishing and								
		reinforcement:								
		1:1.5:3 (1 cement: 1.5 coarse sand (Zone								
		III): 3 graded stone aggregate 20mm								
		nominal size)								
		COLUMNS								
		For Entrance Gate	4.00	0.75	0.75	2.50	5.63			
							5.63	cum	5,891.97	33,142.33
5.3.11	6	Reinforcement Cement Concrete work in								
		beams, suspended floors, roof having slope								
		upto 15 degrees, landings, balconies,								
		shelves, chajjas, lintels, bands, plain								
		window sills, staircases and spiral								
		staircases above plinth level upto floor five								
		level excluding cost of centering,								
		shuttering, finishing and reinforcement:								
		1:1.5:3 (1 cement: 1.5 coarse sand (Zone								
		III): 3 graded stone aggregate 20mm								
		nominal size)								
				1 70						
		Equipment Room	2.00	1.50	0.23	0.30	0.21			
							0.21	cum	6,092.63	1,261.17
		DEAM								
		BEAM	1.00	2.4	0.22	0.20	0.77			
		Eaupment Room	4.00	2.4	0.23	0.30	0.66			

			1		1	1				
		Security Cabin and Ticket Window Cabin	0.00	1.0	0.02	0.20	0.00			
		Security Cabin and Ticket window Cabin	8.00	1.8	0.23	0.30	0.99			10.000.10
							1.66	cum	6,092.63	10,089.40
		SLAB								
		Equipment Room	2.00	4.50	4.50	0.10	4.05			
		Security Cabin and Ticket Window Cabin	2.00	4	4	0.10	3.20			
		(Sloping Roof- form)					7.25	cum	6,092.63	44,171.57
5.3.17	7	Centering and Shuttering including strutting, propping etc. and removal of form for:								
5.3.17.1		Foundations, footings, bases of columns, etc for mass concrete								
		For Entrance Gate Columns (Two								
		entrance)								
		Footing	16.00	1.80		0.35	10.08	sqm	184.61	1,860.87
		Neck Column								
		column (750*750)	16.00	0.75		1.85	22.20	sam	184.61	4.098.34
								. 1		· · · · · ·
		Plinth Beam	4.00	4.3		0.30	5.16	sqm	184.61	952.59
		Columns	8.00	0.75		2 50	15.00	sam	184 61	2 760 15
		Cotumns	0.00	0.75		2.50	15.00	sqiii	101.01	2,707.15
		Ream	24.00	1.80		0.30	12.06			
		Deam	12 00	2.40		0.30	9.64			
			12.00	2.40		0.30	0.04		194.61	2 007 50
							21.60	sqm	104.01	3,987.58
		Slah	3.00		1		48 00	sam	184 61	8 861 28
		Sub	5.00		7		-0.00	sym	107.01	0,001.20
5.2		MASONRY								
5.2										
		ILT ASH BRIUNS								1

5.2.46	8	Providing designation 100 A brick work with fly ash lime brick (FLAG) confirming to IS 12894-1990 (9"x4.5"x3") in C M (1: 3) in foundation and plinth with approved quality of clean coarse sand of F.M. 2 to 2.5 including providing 10 mm thick mortar joints, cost of screening materials, raking, cut joints to 15mm depth, curing, taxes and royalty all complete as per buildrng specification and direction of E/I.								
		For Equipment Room- plinth	4.00	3.00	0.60	0.30	2.16			
		For Security Cabin and Ticket withdow	8.00	2.4	0.6	0.30	3.46			
							5.62	cum	4,597.84	25,821.47
5.2.50	9	Providing designation 100 A brick work with fly ash lime brick (FLAG) confirming to IS 12894-1990 (9"x4.5"x3") in C M (1: 8) in foundation and plinth with approved quality of clean coarse sand of F.M. 2 to 2.5 including providing 10 mm thick mortar joints, cost of screening materials, raking, cut joints to 15mm depth, curing, taxes and royalty all complete as per buildrng specification and direction of E/I.								
		For Equipment Room	4.00	2.40	0.23	3.00	6.62			
		1 or Securuy Cubin and Licket Willdow	8.00	1.80	0.23	2.40	7.95			
							14.57	cum	4,138.85	60,314.63

5.2.28	10	Providing Random rubble stone masonry in C.M. (1:4) in foundation and plinth with hammer dressed stone of less than 0.03 M3 in volume and clean coarse sand of 2 to 2.5 including cost of screening, raking out joints to 20mm depth, curing, taxes and royalty all complete as per building specification and direction of E/I.				0.10				
		For Entrance gate Signage Plinth	2.00	1.8	1.2	0.60	2.59			
			8.00	1.8	0.45	1.20	7.78			
		For Guest House side Gate Columns	2.00	0.6	0.75	3.50	3.15		2 575 22	24 912 19
							15.52	cum	2,575.52	34,813.18
5.5		STEEL WORKS								
5.5.1	11	Providing reinforcement (Round bars confirming t IS 432 dia in mm) (IS 2062 Gr A) of 6 & 8mm.dia.rods as per approved design and drawing with cutting, bending and binding with annealed wire with cost of wire removal of rust, placing rods in position (excluding carriage of bars to work site) all complete as per building specification and direction of E/I.								
		8mm dia Gr. A								
		Column	9.79	0.008	7.85		0.58			
		Beam	1.66	0.005	7.85		0.06			
		Slab	7.25	0.005	7.85		0.28			
		Lintel	0.21	0.005	7.85		0.01		71 704 00	
							0.93	MT	/1,/04.80	66,966.86

5.5.5	12	Providing Tor steel reinforcement of 10mm, 12mm and 16mm dia. bars as per approved design and drawing with cutting, bending and binding with annealed wire							
		with cost of wire removal of rust, placing rods in position (excluding carriage of bars to work site) all complete as per building specification and direction of E/I.							
(a)		10mm (TMT coil Fe 500){Only valid for Tata (Tiscon), SAIL, JSPL Electrosteel Steels Ltd. Bokaro and Vizag (RINL)}							
		Slab	7.25	0.005	7.85	0.28	MT	77,259.94	21,985.28
(b)		12mm (TMT coil Fe 500){Only valid for Tata (Tiscon), SAIL, JSPL Electrosteel Steels Ltd. Bokaro and Vizag (RINL)}							
		Column	9.79	0.008	7.85	0.58			
		Footing	4.54	0.015	7.85	0.53			
		Beam	1.66	0.020	7.85	0.26			
			0.21	0.015	7.85	0.02 1.39	MT	76,041.94	1,06,057.16
(c)		16mm (TMT coil Fe 500){Only valid for Tata (Tiscon), SAIL, JSPL Electrosteel Steels Ltd. Bokaro and Vizag (RINL)}							
		Column	9.79	0.010	7.85	0.77			
						0.77	MT	76,041.94	58,424.45
5.7		PLASTER WORKS							

5.7.1	13	Providing 12mm. cement plaster (1:3) with								
		clean coarse sand of F.M. 1.5 including								
		screening, curing with all leads and lifts of								
		water, scaffolding taxes and royalty all								
		complete as per building specification and								
		direction of E/I.								
		INTERIOR								
		Entrance Gate								
		For Security Cabin and Ticket Window								
		Cabin Walls	8.00	1.8		2.40	34.56			
		For Security Cabin and Ticket Window								
		Cabin Ceiling	2.00	4	4		32.00			
		For Equipment Room- Walls	4.00	2.4		3.00	28.80			
		For Equipment Room- Ceiling	2.00	4.5	4.5		40.50			
							135.86	sqm	169.18	22,984.79
5.7.12	14	Providing 25rnm. thick cement plaster (1:4)								
		with clean coarse sand of F.M.								
		1.5.including screening, curing with all								
		leads and lifts of water, scaffolding taxes								
		and royalty all complete as per building								
		specification and direction of E/l.								
		EXTERIOR								
		For Security Cabin and Ticket Window								
		Cabin Walls	8.00	1.8		2.40	34.56			
		Pardi	8.00	2.4		0.30	5.76			
		For Equipment Room	4.00	2.4		3.00	28.80			
		Pardi	4.00	2.4		0.30	2.88			
							72.00	sqm	242.19	17,437.68
5.8		FINISHING WORK								
5.8.21	15	Providing two coats of plastic emulsion								
--------	----	---	------	-----	-----	-------	--------	-----	--------	-----------
		paint of approved shade and make over a								
		coat of cement primer over new surface								
		including preparing plastered surface by								
		rubbing smooth with pumice stone or fine								
		sand paper, applying putty wherever								
		required, scaffolding, washing of floor and								
		taxes all complete as per building								
		specification and direction of E/I.								
		INTERIOR								
		Entrance Gate								
		For Security Cabin and Ticket Window								
		Cabin Walls	8.00	1.8		2.40	34.56			
		For Security Cabin and Ticket Window								
		Cabin Ceiling	2.00	4	4		32.00			
		For Equipment Room- Walls	4.00	2.4		3.00	28.80			
		For Equipment Room- Ceiling	2.00	4.5	4.5		40.50			
							135.86	sqm	229.34	31,158.13
		EXTERIOR								
		For Security Cabin and Ticket Window		1.0		• • •				
		Cabin Walls	8.00	1.8		2.40	34.56			
		Pardi	8.00	2.4		0.30	5.76			
		For Equipment Room	4.00	2.4		3.00	28.80			
		Pardi	4.00	2.4		0.30	2.88		220.24	
							72.00	sqm	229.34	16,512.48

5.8.41	16	Providing primer one coat of red lead paint							
0.00.11	10	of approved make over new steel surface							
		including propaging the surface ofter							
		including preparing the surface after							
		cleaning, removing dust, dirt, scales smokes							
		and grease and cleaning the surface							
		thoroughly including cost of scaffolding							
		and taxes all complete as per building							
		specification and direction of E/I.							
		(Mode of measurement Area shall be							
		multiplied by the co-efficient as indicated							
		in bullding specification).							
		For Picket fencing	2.00	200.00	0.90	360.00			
		-				360.00	sqm	53.49	19,256.40
									-
5.8.43	17	Providing two coats of painting with ready mixed paint of approved shade and make over steel surface including cleaning the surface thoroughly, scaffolding and taxes all complete as per building specification and direction of E/I.							
		For Picket fencing	2.00	200.00	0.90	360.00			
						360.00	sqm	65.37	23,533.20
								TOTAL	6,99,954.75

		PART-A1 : CIVIL WO	ORKS -	DSR- EN	TRANC	E GATE				
SOR No.	S.No.	Particulars	No.	Length	Width	Height	Qty.	Unit	Rate	Amount
DSR 8.17	1	Wall lining butch work upto 10m height with Dholpur stone 40 mm thick rough facing on the exposed surface with stone strips of minimum length 300 mm and required width, including embedding every tenth layer and bottom most layer in masonry or concrete after making necessary chases of size 75x75 mm and by providing layer of 75 mm thick strips i/c 12 mm thick bed of cement mortar 1:3 (1 Cement : 3 coarse sand) i/c ruled pointing in cement mortar 1:2 (1 white cement : 2 stone dust) with an admixture of pigment to match the shade of stone complete as per direction of Engineer-in-charge.								
		For Entrance Gate Columns (total 4	16		0.75	2.50	30.00			
		For Plinth Beam- Security Cabin and Ticket Window Cabin	8	1.80		2.40	34.56			
		Note : For Shingle Stone colour and shade should be as shown in Render (as specification).								
		For Guest House side columns	8		0.60	2.50	12.00			
		Miscellaneous	1	2.40	0.75	1.80	3.24			
							79.80	sqm	2,607.45	2,08,074.51
DSR 11.29	2	40 mm thick fine dressed stone flooring over 20 mm (average) thick base of cement mortar 1:5 (1 cement : 5 coarse sand), including pointing with cement mortar 1:2 (1 cement : 2 stone dust) with an admixture of pigment to match the shade of stone.								

DSR 11.29.1		Red sand stone						_		
		For Security Cabin and Ticket Window								
		Cabin- exterior								
		For Exterior Flooring	8	2.40	0.60		11.52			
		Miscellaneous	1	2.40	1.00		2.40			
							13.92	sqm	1,193.30	16,610.74
DSR 11.37	3	Providing and laying Ceramic glazed floor tiles of size 300x300 mm (thickness to be specified by the manufacturer) of 1st quality conforming to IS : 15622 of approved make in colours such as White, Ivory, Grey, Fume Red Brown, laid on 20 mm thick cement mortar 1:4 (1 Cement : 4 Coarse sand), Jointing with grey cement slurry @ 3.3 kg/sqm including pointing the joints with white cement and matching pigment etc., complete.								
		For Security Cabin and Ticket Window	2	1.8	1.8		6.48			
		For Equipment Room	1	2.4	2.4		5.76			
		For equipment Room exterior	1	2.4	2.4		5.76			
							18.00	sqm	935.60	16,840.80
DSR 16.68	4	Providing and laying 60mm thick factory made cement concrete interlocking paver block of M -30 grade made by block making machine with strong vibratory compaction, of approved size, design & shape, laid in required colour and pattern over and including 50mm thick compacted bed of coarse sand, filling the joints with line sand etc. all complete as per the direction of Engineer-in-charge.								
		For Entrance Enclave(Radius 10m)					314.00			
						1	314.00	sqm	951.00	2,98,614.00

DSR 16.69	5	Providing and laving at or near ground level								
		factory made kerb stone of M-25 grade								
		cement concrete in position to the required								
		line, level and curvature, jointed with								
		cement mortar 1:3 (1 cement: 3 coarse sand)								
		including making joints with or without								
		grooves (thickness of joints except at sharp								
		curve shall not to more than 5mm)								
		including making drainage opening								
		wherever required complete etc. as per								
		direction of Engineer in charge (length of								
		finished korb adging shall								
		ha massured for normant) (Procest C C								
		be measured for payment). (Freeast C.C.								
		kerb stone shan be approved by Engineer-in-								
		charge).								
			200.00	0.20	0.10	0.05	2.25			
		For Entrance Gate and Walkway Joints.	300.00	0.30	0.10	0.25	2.25		0 (12 55	10 200 40
							2.25	cum	8,613.55	19,380.49
DSR 8.2	6	Providing and fixing 18 mm thick gang saw								
		cut, mirror polished, premoulded and								
		prepolished, machine cut for kitchen								
		platforms, vanity counters, window sills,								
		facias and similar locations of required size,								
		approved shade, colour and texture laid over								
		20 mm thick base cement								
		mortar 1:4 (1 cement : 4 coarse sand), joints								
		treated with white cement, mixed with								
		matching pigment, epoxy touch ups,								
		including rubbing, curing, moulding and								
		polishing to edges to give high gloss finish								
		etc. complete at all levels.								
8.2.2		Granite stone slab colour black, Cherry/								
8222										
0.2.2.2		Area of slab over 0.50 sqm								

		For Security room Counter	1.00	1.20	0.60	0.72	2		
		Window/ Ventilator Sill	2.00	1.20	0.30	0.72	2		
						2.10	sqr	n 4,425.35	9,558.76
DSR 8.4	7	Extra for fixing marble /granite stone, over and above corresponding basic item, in facia and drops of width upto 150 mm with epoxy resin based adhesive, including cleaning etc. complete.	1.00	1 80	0.15	0.2	,		
		For Security room Counter	1.00	1.80	0.15	0.2	,		
		Vindow Sill	2.00	1.00	0.15	0.2	5		
			2.00	1.20	0.10	0.90	sqr	n 434.25	390.83
DSR 8.7	8	Providing and fixing cramps of required size & shape in RCC/ CC / Brick masonry backing with cement mortar 1:2 (1 cement :2 coarse sand), including drilling necessary hole in stones and embedding the cramp in the hole (fastener to be paid separately).							
8.7.1		Gunmetal cramps	10.00			10.0	0 kg	639.05	6,390.50
									- ,
DSR 10.25	9	Steel work welded in built up sections/ framed work, including cutting, hoisting, fixing in position and applying a priming coat of approved steel primer using structural steel etc. as required.							
10.25.2		In gratings, frames, guard bar, ladder, railings, brackets, gates and similar works.							
		For Picket Fencing				150	00		
		For Main Gate	1			500			
		For Guest House side gate	1			500			
						160	00 kg	142.30	22,76,800.00
		Note: Premium quality Steel should be used.							

DSR 21.1	10	Providing and fixing aluminium work for						
		doors, windows, ventilators and partitions						
		with extruded built up standard tubular						
		sections/ appropriate Z sections and other						
		sections of approved make conforming to IS:						
		733 and IS: 1285, fixing with dash fasteners						
		of required dia and size, including necessary						
		filling up the gaps at junctions, i.e. at top,						
		bottom and sides with required EPDM						
		rubber/ neoprene gasket etc. Aluminium						
		sections shall be smooth, rust free, straight,						
		mitred and jointed mechanically wherever						
		required including cleat angle, Aluminium						
		snap beading for glazing / paneling, C.P.						
		brass / stainless steel screws, all complete as						
		per architectural drawings and the directions						
		of Engineer-in-charge. (Glazing, paneling						
		and dash fasteners to be paid for separately)						
		:						
21.1.2		For shutters of doors, windows & ventilators						
		including						
		providing and fixing hinges/ pivots and						
		making provision for fixing of fittings						
		wherever required including the cost of						
		EPDM rubber / neoprene gasket required						
		(Fittings shall be paid for separately)						
21.1.2.3		Polyester powder coated aluminium						
		(minimum thickness of polyester powder						
		coating 50 micron)						
		For Doors and Windows			75.00	kg	573.40	43,005.00
						COT	TOTAL	28,95,665.61
				Ŧ		GST	12.00%	3,07,504.31
					ABOUR	CESS	1.00%	25,625.36
				T	UTAL (E	XCLU	JDING GST)	25,62,535.94

		PART- B: ELECTRICA	L WORK	S		
SOR No.	Item no.	Description of Item	Qty.	Unit	Rate	Amount
		INTERNAL WIRING				
1.3	1	Wiring for light point / fan point/ exhaust fan point/ cell bell point with 1.5sq.mm FR PVC insulated copper conductor single core cable in surface/ recessed PVC conduit, with modular type switch, modular plate, suitable size G.I box etc. as required.				
1.3.1		a) Group A	4	Point	508.00	2,032.00
1.4	2	Wiring for twin control light point with 1.5 sq.mm FR PVC insulated copper conductor single core cable in surface /recessed PVC conduit, 2 way modular type switch, modular plate,suitable size G.I box etc.as required.	4	Point	804.00	3,216.00
1.5	3	Wiring for light /power plug with 2x4 sq.mm FR PVC insulated copper conductor single core cable in surface /recessed PVC conduit along with 1 No 4 sq.mm FR PVC insulated copper conductor single core cable for loop earthing as required.	10	m	212.00	2,120.00
			_			
1.7	5	Wiring for circuit / submain wiring along with earth wire with the following sizes PVC insulated copper conductor, single core cable in surface/recessed PVC Conduit as required.				
1.7.2		$2 \times 2.5 \text{ sq.mm} + 1 \times 2.5 \text{ sq.mm}$ earth wire	10	m	173.00	1,730.00
	_		<u> </u>			
1.24	6	Supplying and fixing modular switch/ socket on the existing modular plate & switch box including connections but excluding modular plate etc as required.				

1 24 1		5/6 amps switch	2	Each	50.00	118.00
1.24.4			2	Each	39.00	118.00
1.24.4		3 pin 5/6 amps socket outlet	2	Each	75.00	150.00
1.27	7	Supplying and fixing of following size/				
		modules, GI box along with modular base &				
		cover plate for modular switches in recess etc as				
		required.				
1.27.2		4/5 Module	2	Each	157.00	314.00
1 31	8					
1.51	0	Supplying and fixing suitable size GI box with				
		modular plate and cover in front on surface or				
		in recess including providing and fixing 3 pin				
		5/6 amps modular socket outlet and 5/6 amps				
		modular type switch connection painting etc as				
		required (for light plugs to be used in non				
		residential buildings)	2	Fach	241.00	182.00
				Lach	241.00	402.00
1.22	0					
1.52	9	Supplying and fixing suitable size GI box with				
		modular plate cover in front on surface or in				
		recess including providing and fixing 6				
		pin.15/16 amps modular socket outlet and $15/16$				
		amps modular switch connection, painting etc				
		as required	2	Each	307.00	614 00
			-	Luch	201.00	
1.38	10	Sumplying and fining call hall / hurran suitchla				
		Supprying and fixing can beil / buzzer suitable				
		for D.C./A.C single phase,230 volts,complete as		F 1	0.00	50 6 00
		required.	2	Each	263.00	526.00
1.01	11					
1.21	11	Completing on 1 Circles of Collection since DVC				
		Supplying and fixing of following sizes PVC				
		conduit along with acessories in surface / recess				
		including cutting the wall and making good the				
		same in case of recessed conduit as required.				
1.21.3		32mm	10	m	115.00	1,150.00

			T			
1.26	12	Supplying and fixing modular blanking plate on				
		the existing modular plate & switch box				
		excluding modular plate as required.	2	Each	36.00	72.00
2.18	13					
		Supplying and fixing 20 amps 240 volts SPN				
		industrial type socket outlet, with 2 pole and				
		earth, metal enclosed plug top along with 20				
		amps 'C' series, SP MCCB, in sheet steel				
		enclosure, on surface or in recess with chained				
		metal cover for the socket outlet and complete				
		with connections, testing and commissioning				
		etc as required.	2	Each	985.00	1,970.00
		EARTHING				
3.5	14	Earthing with GL aarth plata 600 mm x 600 mm				
		Earthing with Of earth plate 000 min x 000 min				
		providing masonary anglosure with cover plate				
		having locking arrangement and watering nine				
		etc as required (but without charcoal or coke				
		and salt)	1	Set	3 109 00	3 109 00
			1		5,107.00	5,109.00
3.8	15	Extra for using salt and coke for GI or Copper				
010	10	plate earth electrode as required.	1	Set	3.263.00	3.263.00
						-,
3.11	16	Supplying and laying 25mm x 5mm GI Strip at				
		0.50 metre below ground as strin earth				
		electrode including soldering etc. as required	1	m	83.00	83.00
		cicenode, including soldering etc, as required.	1		05.00	05.00
3.18	17	Providing and fixing 25mm x 5mm GI Strip on				
5.10	1,	surface or in recess for connections etc as				
		required.	2	m	123.00	246.00
			1			

		LIGHTING CONDUCTOR				
4.1	18	Providing and fixing of lighting conductor finial, made of 25mm dia 300 mm long, copper tube, having single prong at top, with 85mm dia 3 mm thick copper base plate including holes etc. complete as required.	2	Each	1,110.00	2,220.00
4.4	19	Reverting, sweating and soldering of copper /				
		G.I tape (with another copper / G.I tape, base of the finial or any other metallic object) as required.	2	Each	114.00	228.00
47	20					
1.7	20	Providing and fixing G.I tape 20 mm X 3 mm on parapet or surface of wall for lighting conductor compete as required.(for horizontal run).	2	m	56.00	112.00
4.8	21	Providing and fixing G.I tape 20 mm X 3 mm on parapet or surface of wall for lighting conductor compete as required.(for vertical run).	2	m	80.00	160.00
4.12	22	Providing and fixing testing joint, made of 20 mm X 3 mm thick G.I. strip, 125 mm long. With 4 nos of tinned brass bolts, nuts, check nuts and spring washers etc. complete as required.	2	Each	63.00	126.00
4.15	23	Providing and laving G.I. tape 32 mm X 6 mm				
		from earth electrode directly in ground as required.	5	m	28.00	140.00
		Lighting Fixtures and Fans				

				ΤΟΤΑΙ	28 387 66
	1200mm sweep	2	Each	1,203.33	2,406.66
25	Supplying installation,testing & comisioning of ceiling fan, complete with blades with suitable length of down rods shackle insulator earthing point including connection etc. as required. (MR)				
	1x 28W T5 (4' Fixture)	2	Each	900.00	1,800.00
	Supplying installation,testing & commisioning of following type recessed/surface mounted fluorescent light fixture complete with electronic choke earthing point and with TL-5 / CFL lamps complete as required. (Make - HAVELLS / WIPRO / BAJAJ))				

	BUTTERFLY PARK, ORMANJHI, RANCHI (JHAR Rates as per Market rates	KHAND)	
	BILL OF QUANTITIES: SUMMARY OF PRIC	CES	
S. No.	SECTIONS	Rs.	Amount
А	Miscellaneous Works	Rs	19,95,000.00
	TOTAL(Including GST, Labour Cess and Contingency)	Rs.	19,95,000.00
	·	Say	19.95 Lakhs

	PART- A: MISCELLANEOUS WORKS								
Item no.	Description of work	No.	Length	Width	Height	Qty.	Unit	Rate	Amount
1	Providing and installing Sculptures of								
	Butterfly as per design and								
	specifications.	2					Each	1,00,000.00	2,00,000.00
	(As per Market rate)								
2	Providing and installing Sculpture of								
	Butterfly life cycle as per design and								
	specification.	1					Each	1,00,000.00	1,00,000.00
	(As per Market rates)								
3	Providing and installing sculptural								
	signages displaying instructions as								
	per design and specifications.	25					Each	10,000.00	2,50,000.00
	(As per Market rates)								
4	Providing and installing Large Natural								
	Rock- signage as per design and								
	specifications.	2					Each	25,000.00	50,000.00
5	Providing and installing Natural Rock-								
	signage (Medium Size) as per design								
	and specifications.	1		ļ			Each	20,000.00	20,000.00
				ļ					
6	Providing and installing ornamental								
	stone pots as per specifications.								
	Large Pots	25		ļ		25.00	Each	12,000.00	3,00,000.00
	Medium Pots	10				10.00	Each	8,000.00	80,000.00
	Large Clay Pots of Lily/Lotus	10				10.00	Each	2,000.00	20,000.00
	(As per Market rates)								

7	Water Fountain (feature as per specification)	3				1,50,000.00	4,50,000.00
	Note: Inclusive of accessories and civil works required						
	(As per Market rates)						
8	Providing and laying fine dressed river pebbles, medium and large rocks of different sizes various sizes as per render and specification.						5,00,000.00
	(As per Market rates)						
9	Providing and installing electric appliance and accessories for water splash in Conservatory and waterbody.(Inclusive of Electrical and Plumbing accessories.)	1			Each	25,000.00	25,000.00
	(As per Market rates)						
							19,95,000.00







BUTTERFLY PAR					
S.NO.	Host Plants	N			
1	Dendrophthoe falcata (Banda)				
2	Dyerophytum indicum				
3	Indigofera Tinctoria				
4	Abutilon indicum (Indian Mellow)				
5	Abelmoschus moschatus (Musk Mellow)				
6	Malva sylvestris (Common Mellow)				
7	Mimosa pudica (Touch-me-not)				
8	Mimosa Pigra(Touch-me-not)				
9	Plumbago indica (Lal chitrak)				
10	Plumbago zeylanica (chitrak)				
11	Caesalpiniodae Leguminosae (Candle Bush)				
12	Helixanthera intermedia (Puluri)				
13	Magnolia grandiflora				
14	Michelia champaca (Champak)				
15	Sesbania bispinosa				
16	Jasminum auriculatum (Oleaceae); Orange Jasmine				

FLOWER BED: F-0						
S.no.	Host Plants	No. of Host plants	Nectar Plants	No. of Nectar plants		
1	Paramigyna monophylla	2	Vinca Rosea (Periwinkle Rose)	30		
2	Atlantia racemosa (Bombay Atlantia)	2	Crotolaria spp. (Rattle Pod)	2		
3	Arenga wightii	2	Zinnia elegans	50		
4	Asclepias curassavica	2	Lantana Camara (Ghaneri)	10		
5	Stephanotis floribunda (Madagascar Jasmine)	2	Mussaenda frondosa	2		
6	Cinchona sp.	2	Asteraceae (Chrysanthemum)	50		
7	Wendlandia thyrsoidea	2	Ixora Coccinea	4		
8	Hymenodictyon orixense	2	Red Ixora Coccinea hedge	50		
9	Cadaba fruticosa	2				

					Bunglow no. 2-GH. Vigyan Nagar Kota-324005 Rajasthan Copyright © 2019-20 All rights reserved.	A-21
Y PAR	K RANCH	II: PLANTING SCHED BED: F-1	ULE			
	No. of Host plants	Nectar Plants	No. of Nectar plants			
aranta) Crown	2 2	Zinnia elegans Lantana Camara(Ghaneri)	150 25			
a	2	Red Ixora Coccinea hedge	50	_	ARCHITECT's SIG	N AND STAMP
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FOR TENDER PURPOSE ONLY

FOR TENDER PURPOSE ONLY

07 SECTION 02 1:25

STREET-HO	USE
ARCHITE	CTURE
Bunglow no. 2-GHA-21 Vigyan Nagar	
Kota-324005 Rajasthan Copyright © 2019-20	
All rights reserved.	
ARCHITECT'S SIGN AND ST	AMP
REMARKS:	
NOTE	
ALL DIMENSIONS AR	E IN
DO NOT SCALE DRAV CONTRACTOR TO VE	VINGS. CRIFY
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DRAWN BY: YUKTA K	HURANA
CHKD BY: Gaurav C	haurasia
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SHEET NI MDED	
A-9.12	
FOR TENDER PURPOSE	

-Natural Stone Rock Signage as per spec.

		GRADE&MAKE
1	NB65Ø THIK 4.5	
2	NB40 THIK 4	YST250,TATA MAKE
Ρ1	PURLIN THIK 4.8	

	NOTES:-					
	1. READ THIS DR 2. UNLESS OTHERW HIGH YIED STRE WITH MIN. YEIL	AWING ALONG /ISE SPECIFIED ALL R ENGTH TWISTED BAR .D STRENGTH OF 50	WITH REL EINFORCEM S CONFORM 0 N/ SQMM.	EVANT ARCH.DRGS. ENT SHALL BE OF 4ING TO IS:1786-1985		
	3. NOMENCLATURE		NO OF BARS			
	(a) VERTICAL BA	ARS 8-20	Diameter in Strength (H Diameter in Deformed e	MM. OF HIGH YIELD .Y.S)DEFORMED BARS MM OF (H.Y.S) BARS		
	4. AT ANY SECTION LAPPED. MINIM BAR LAPPED AS	NOT MORE THAN 5 NUM LAP LENGTH SH S FOR CONC. GRAE	SPACING IN 50% OFF BAR IALL BE OF S <i>I</i> DE :-	MM. S SHALL BE MALLER		
(-1)	(a) GRADE M20 (c) GRADE M30 (e) GRADE M40	-57xBAR DIA (-46xBAR DIA (-38xBAR DIA	b) GRADE N d) GRADE N	125 -49xBAR DIA 135 -40xBAR DIA		
	 MAXIMUM AVAILABLE LENGTH OF BARS SHALL BE USED AND AVAILABLE NUMBER OF LAP SHALL BE KEPT TO A MINIMUM. IN THE COLUMN SCHEDULE, LEVELS SHOWN SHALL CORRESPOND TO THE RESPECTIVE LOCATION OF A PARTICULAR IN RELEVANT FRAMING PLANS. FOR CHANGES IN ORIENTATION OF COLUMN REFER RESPECTIVE FRAMING PLANS. WHERE THE SPECIFIED STRENGTH OF CONCRETE IN COLUMNS EXCEEDS THAT SPECIFIED FOR THE MEMBERS SUPPORTED CONCRETE OF THE STRENGTH SPECIFIED FOR THE FORMER SHALL BE PLACED IN THE MEMBERS IN THE HATCHED PORTION OF THE FLOOR AS SHOWN BELOW 					
	D= THE OVERA 9. ALL DIMENSION 10. CONCRETE SHA	S ARE IN M.M S ARE IN M.M SLL BE M-25 AS PER IS	S SUPPORTEE			
	11. R/F SHALL BE H. 12. CLEAR COVER T * RAFT (TOP) * RAFT (BOTTO * LINTELS * FLOOR BEAN	Y.D. BARS OF GRAD TO OUTER LAYER OF 50 MM. * R.C.C DM) 75 MM. * COLU 20 MM. * FLOC M 25 MM.	REINF. SHAL WALL 25 MN 40 R SLAB 25	NFIRMING TO IS:1786. L BE MM. MM. MM.		
	Drg. Title		LY MIXED &	Project North		
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IN (P1)						
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	Project no.	SATYAPAL SING	H			
	Project no.	SUB Drawing no.				
		S-CS-301				
	Structure Engnieer Tie Con 3211,4ti Paharga Ph.:011-2 E-mail:-	r h Floor, Dispan anj, New Delhi. 23589080,99710 rn. deshmukh@	sary Lane 18166 yahoo.co	e, om		

