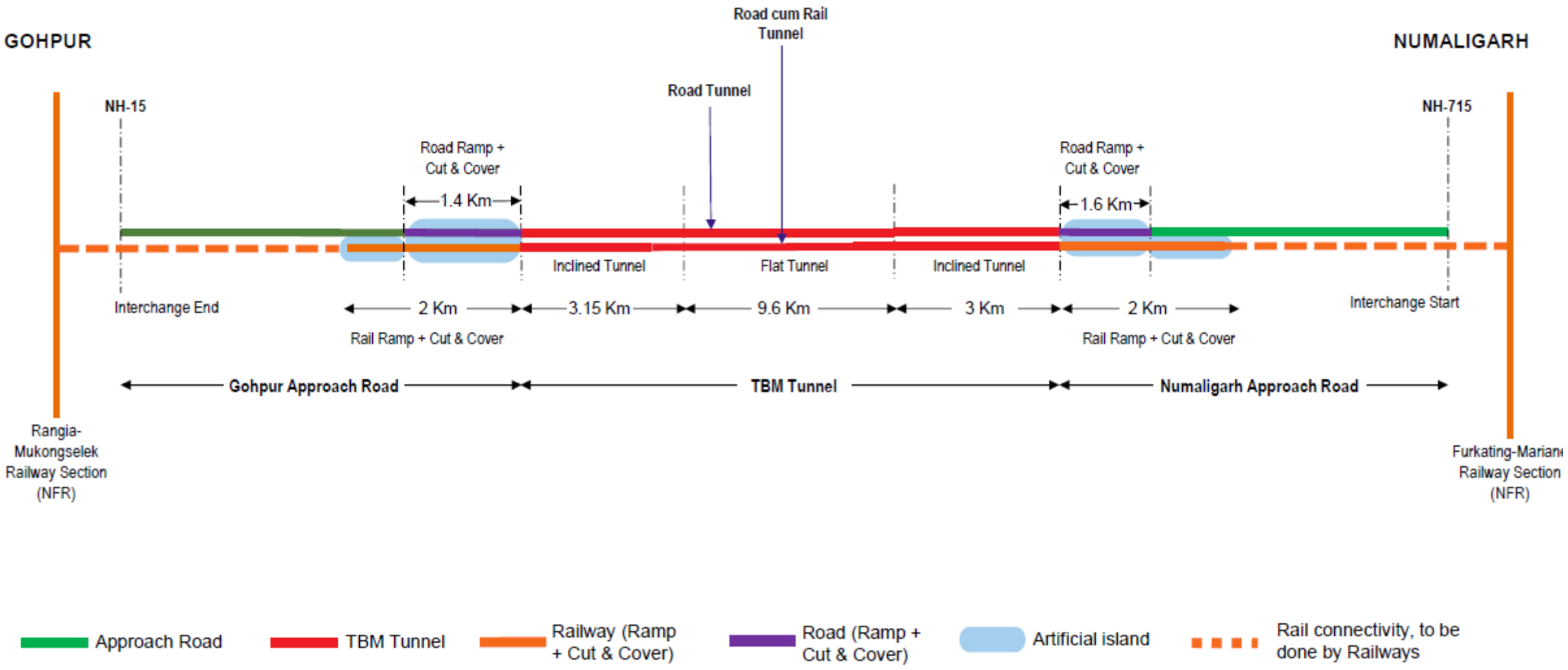
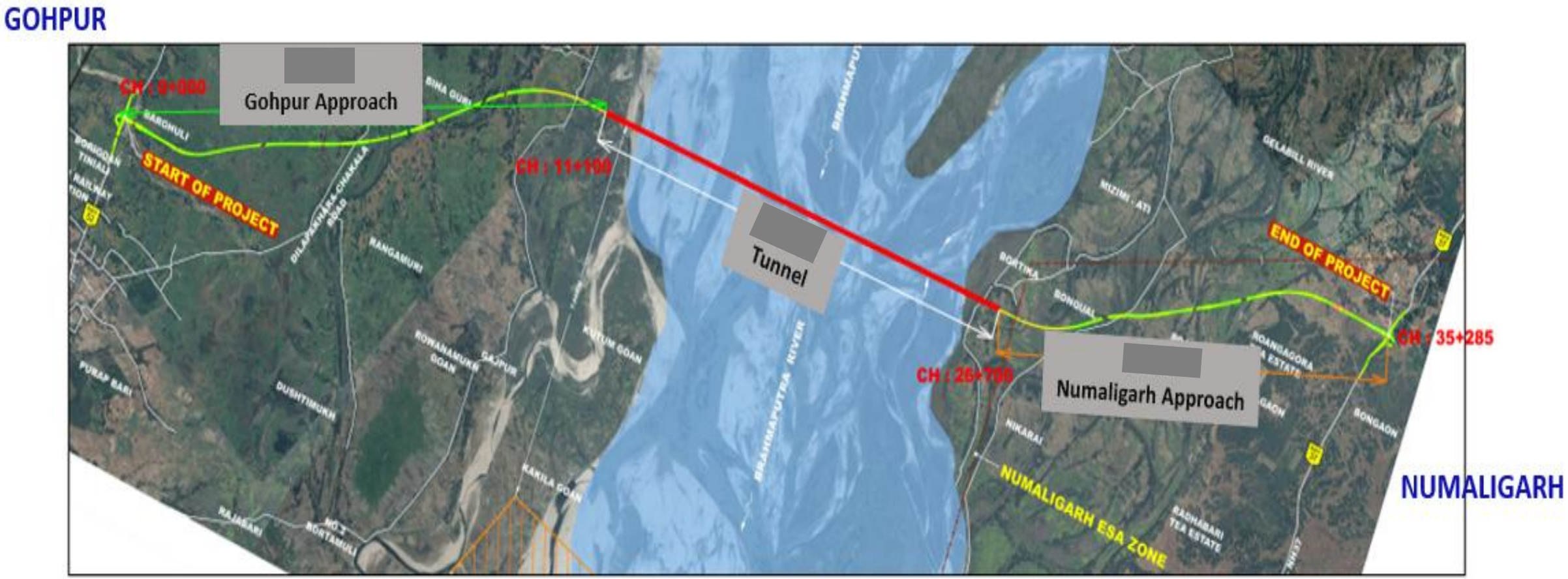
Annexure –A

Strip Chart (details Indicative only)



Indicative Project length

The 4 lane project connectivity between Numaligarh on NH-715 & Gohpur on NH-15 is approx. **33.77 km**. The project connectivity envisages underwater **Road cum Rail tunnel of length approx.15.79 km (twin tube)**.



Indicative Key Features of project

Sr. No.	Salient Features	Design Proposal
1	Geometric Improvement/ Reconstruction of existing road	Greenfield Alignment of length 33.7Km.
2.	TBM Tunnel length (Twin Tube)	15.79 Km. each tube
3	Intersection	Numaligarh Approach Road – 01 Trumpet Interchange
		Gohpur Approach Road– 01 Trumpet Interchange
4.	Artificial island (Road + Rail):	02 in Tunnel approaches on both banks
5.	Total Construction Period + O&M	5 Years + 15 years

Functional requirement

1. Functional Requirements of Tunnel - Twin Tube uni directional (1/2)

1. **Traffic** – 7,026 PCUs (at time of tunnel opening) & **design traffic** – 30756 PCU (Year 2050).
2. **Design Speed & design life of structure** – 100 kmph & 100 years
3. **Construction & O&M Period**: 05 years & 15 years.
4. **Carriageway width** – 9.2 m with no lane divider
5. **One tube Road tunnel and One tube is Road cum rail tunnel.**
6. **Maximum Vertical Gradient- 1 % for both tubes (Road as well as road cum rail tube).**
7. **Tunnel by TBM -** (04 Nos. slurry TBM with Dia of 13 m).
8. **Internal finished Dia-** 11.5m min.
9. **Lining thickness-** 500 mm min.
10. **Clear height-** 6.3 m min.
11. **Rail** – Embedded railway track in one tube (broad gauge) including overhead conductors, signals and telecom services as per Railway requirements.
12. **Ventilation System** - Transverse in TBM tunnel.
13. **Min Fire rating** of 50 MW, with suppression system.
14. **Cross passages** at every 500 m (min clear 4.5 m width X 5.5 m Height)
15. **Clear distance between tubes** - 25 m
16. **Inspection Gallery** present below pavement (1.8 m height) with provision of Optical Fiber Cables (OFC) duct provisions. + Drainage Gallery for Road tube.

Functional Requirements of Tunnel - Twin Tube uni directional (2/2)

17 Intelligent Tunnel Management System (ITMS) – Broad provisions and functions in ITMS and tunnel supervision system (hardware & software) i.e. SCADA.

18. **Expected Geology :** Expected geology – very dense compacted sand and fully saturated soil conditions. However, all detailed investigations and design are to be done by contractor. GBR would be provided by NHIDCL.

19. **Hydrological consideration**: Min. 25m of river bed cover above tunnel crown at maximum scour depth.

20. **Pavement Design consideration**: CC pavement DLC +PQC.

21. **Electricity Charges for the Project**: Construction + 2 Yrs in O&M to be borne by Contractor

22. All power sources in construction & operation phase to be arranged by contractor.

2. Functional Requirements of Artificial islands

1. **02 Nos Road Artificial islands –** Length – 1.4 Km (Gohpur) minimum and 1.6 Km. minimum (Numaligarh) with width of 320 m
2. **02 Nos Railway Artificial Island** – 2 km each side minimum with width of 50 m
3. **Road Cut & Cover Section -** Gohpur Side – 578 m minimum | Numaligarh Side – 690 m minimum
4. **Rail Cut & Cover Section** – 2 km each side (with clear width of 7m) minimum including S&T and electrification of section
5. **Maximum Vertical Gradient- Maximum 1 % for rail infrastructure in artificial islands including common stretches for rail and road infrasture and upto 3% for road infrastructure.**
6. **Laybye provisions** – 04 Nos. Truck laybye with RCC box structure on cut & cover section (50m length X 35m width X min. 6 m height) at suitable locations.
7. **Design Speed & design life of structure** – 100 kmph & 100 years
8. **FRL of Artificial island :** 2.5 m above HFL.
9. **Protection measures** of artificial island as per site requirement.
10. **Construction & O&M Period**: 05 years & till O&M period of tunnel .
11. **Carriageway width** – 9.2 m
12. **Clear height -** 6.3 m min.
13. **Ventilation System -** Transverse
14. **Min Fire rating** of 50 MW, with water suppression system.
15. Provisions for control building and other ancillary buildings on the island on both sides.
16. **Intelligent Tunnel Management System** (ITMS) – broad provisions and functions in ITMS and tunnel supervision system (hardware & software).
17. **Pavement Design consideration**: CC pavement DLC +PQC.

3. Functional Requirements of Approach Roads from Gohpur & Numaligarh side.

1. **Gohpur Side Approach requirement-** for Tunnel connectivity to NH-15 & Numaligarh side approach requirement for connectivity to NH-715.
2. **Traffic** – 7,026 PCUs (at time of tunnel opening) & **design traffic** – 30756 PCU (Year 2050).
3. **Design Speed & design life of road** – 100 kmph & 20 years
4. 4 Lane + PS with 100% Access controlled
5. **Construction & O&M Period:** 5 years & till O&M period of tunnel (after 18 months at least 02 lane Highway i/c structure should be completed) .
6. **Carriageway width** – 2X 11 m.
7. **Pavement Design consideration**: Flexible pavement of with CBR range from 8%-10%, min 48 MSA.
8. **Structures:** Major bridges, Minor Bridges & VUP are per site requirement.
9. **Ground Improvement-** As per site requirement.
10. **Interchanges :** 01 Interchange (trumpet) at junction of NH-15 on Gohpur Side & 01 Interchange (trumpet) at junction of NH-715 on Numaligarh side as per projected traffic requirement.
11. **Toll Plaza**: 8+8 staggered
12. **Temporary Approach road** : Construction for temporary approach roads for launching of TBM on Gohpur & Numaligarh side by contractor.