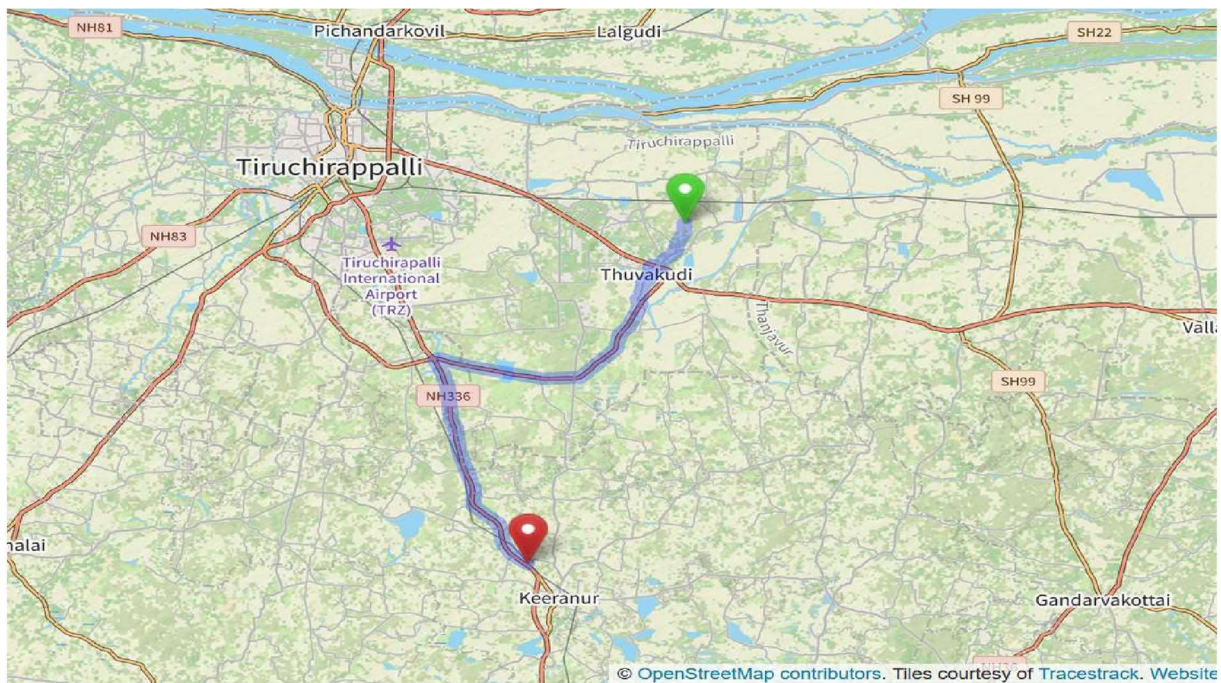
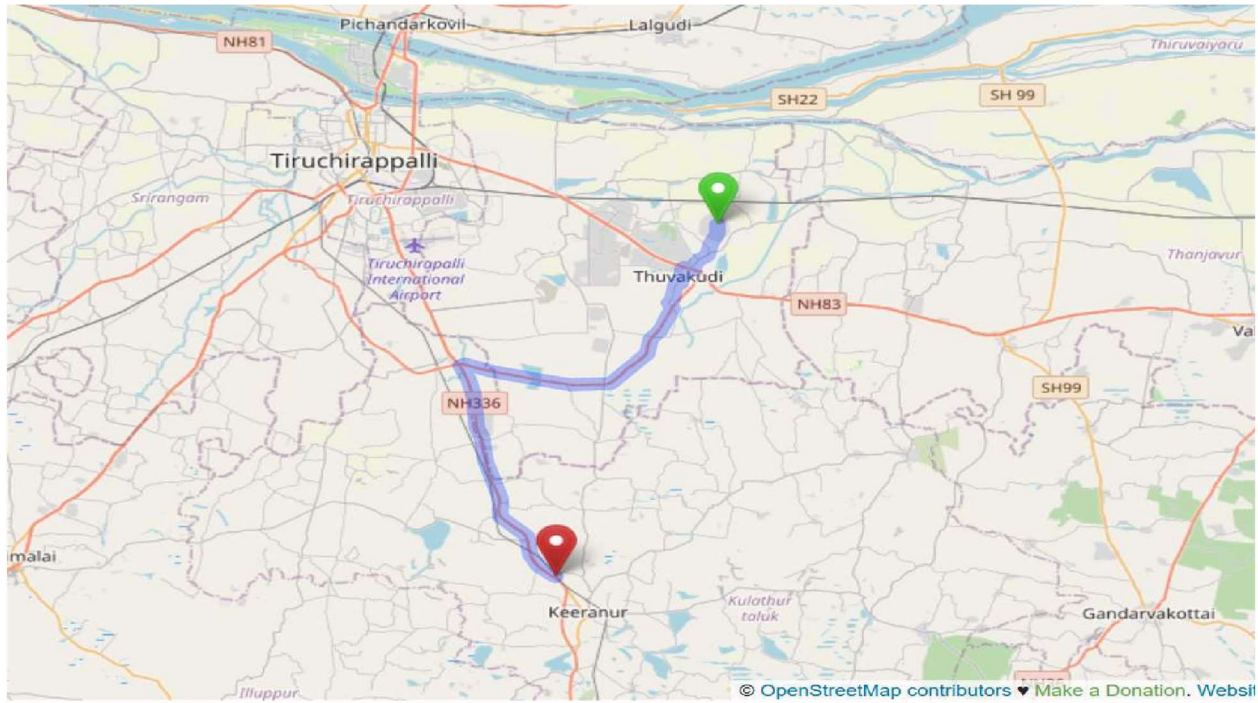




**IndianOil**

**WELCOME TO JOURNEY**  
**RISK MANAGEMENT**  
**(JRM) STUDY USING**  
**ARTIFICIAL**  
**INTELLIGENCE (AI)**  
**FOR IOCL TRICHY**  
**TERMINAL**

**IOCL TIRCHY TERMINAL (10.7753, 78.8368) TO ANAND PETROLEUM (10.591559, 78.771011), TOTAL DISTANCE -25 KM**





# Welcome to the Journey Risk Management Study for ANAND PETROLEUM

**Total distance: 25 km; Start with: (10.7753, 78.8368), End with: ( 10.591559, 78.771011)**

## ❖ Route Safety Analysis Report

### 1. Overview of the Route Map

The route from Trichy Terminal (T.N) To Anand Petroleum. The route passes through several key points including SIDCO to Indian oil Storage, Thuakundi, Thircy –Thircy Thuakundi, Thircy – Tanjore Road, Palandanpatti Rd , Ms Manivijay Nagar Rd/Pallathuppatti Rd and Total distance from Trichy Terminal To Anand Petroleum is 25 km for heavy vehicles carrying hazardous materials.

## Typical Weather Conditions and Potential Weather-Related Hazards

Weather Conditions: Trichy Terminal (T.N) To Anand Petroleum experiences a tropical climate with heavy monsoon rains from June to September, high humidity, and moderate temperatures throughout the year, The summers are short and sweltering; the winters are short, cool, and dry; and it is mostly clear year-round. Over the course of the year, the temperature typically varies from 58.8°F to 106°F and is rarely below 56.8°F to 108°F.

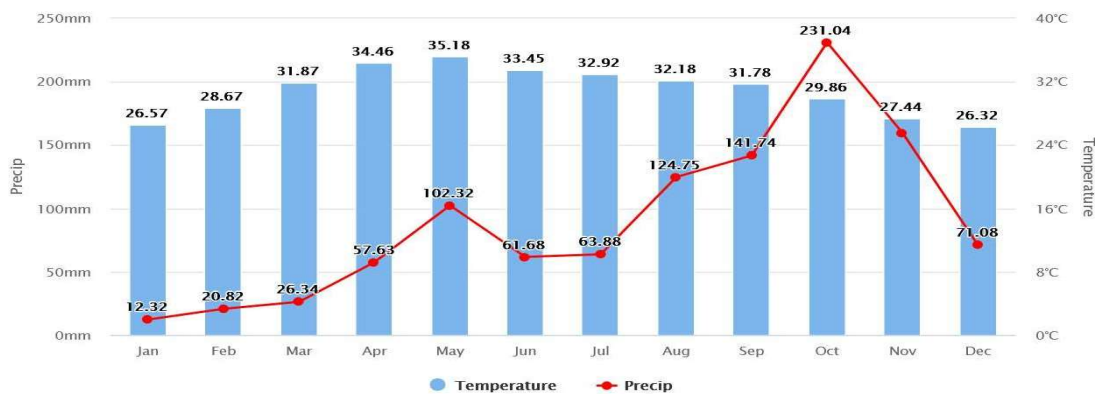
| Month                                 | Jan              | Feb              | Mar              | Apr               | May               | Jun              | Jul              | Aug              | Sep              | Nov              | Oct              | Dec              | Year             |
|---------------------------------------|------------------|------------------|------------------|-------------------|-------------------|------------------|------------------|------------------|------------------|------------------|------------------|------------------|------------------|
| Record high °C (°F)                   | 33.0<br>(91.4)   | 38.0<br>(100.4)  | 41.0<br>(105.8)  | 43.0<br>(109.4)   | 43.0<br>(109.4)   | 42.0<br>(107.6)  | 40.0<br>(104.0)  | 39.0<br>(102.2)  | 38.0<br>(100.4)  | 37.0<br>(98.6)   | 34.0<br>(93.2)   | 33.0<br>(91.4)   | 43.0<br>(109.4)  |
| Average high °C (°F)                  | 30.27<br>(86.49) | 32.88<br>(91.18) | 36.0<br>(96.8)   | 38.27<br>(100.89) | 38.79<br>(101.82) | 36.78<br>(98.2)  | 36.17<br>(97.11) | 35.4<br>(95.72)  | 35.03<br>(95.05) | 32.9<br>(91.22)  | 30.38<br>(86.68) | 29.34<br>(84.81) | 34.35<br>(93.83) |
| Daily mean °C (°F)                    | 26.57<br>(79.83) | 28.67<br>(83.61) | 31.87<br>(89.37) | 34.46<br>(94.03)  | 35.18<br>(95.32)  | 33.45<br>(92.21) | 32.92<br>(91.26) | 32.18<br>(89.92) | 31.78<br>(89.2)  | 29.86<br>(85.75) | 27.44<br>(81.39) | 26.32<br>(79.38) | 30.89<br>(87.6)  |
| Average low °C (°F)                   | 19.88<br>(67.78) | 20.93<br>(69.67) | 24.04<br>(75.27) | 27.62<br>(81.72)  | 28.89<br>(84.0)   | 27.59<br>(81.66) | 27.04<br>(80.67) | 26.45<br>(79.61) | 25.95<br>(78.71) | 24.64<br>(76.35) | 22.43<br>(72.37) | 20.93<br>(69.67) | 24.7<br>(76.46)  |
| Record low °C (°F)                    | 16.0<br>(60.8)   | 17.0<br>(62.6)   | 19.0<br>(66.2)   | 22.0<br>(71.6)    | 25.0<br>(77.0)    | 25.0<br>(77.0)   | 24.0<br>(75.2)   | 23.0<br>(73.4)   | 22.0<br>(71.6)   | 21.0<br>(69.8)   | 18.0<br>(64.4)   | 17.0<br>(62.6)   | 16.0<br>(60.8)   |
| Average precipitation mm (inches)     | 12.32<br>(0.49)  | 20.82<br>(0.82)  | 26.34<br>(1.04)  | 57.63<br>(2.27)   | 102.32<br>(4.03)  | 61.68<br>(2.43)  | 63.88<br>(2.51)  | 124.75<br>(4.91) | 141.74<br>(5.58) | 231.04<br>(9.1)  | 159.62<br>(6.28) | 71.08<br>(2.8)   | 89.44<br>(3.52)  |
| Average precipitation days (≥ 1.0 mm) | 3.09             | 3.27             | 5.36             | 7.36              | 16.73             | 12.36            | 13.55            | 18.91            | 19.64            | 22.73            | 17.55            | 9.73             | 12.52            |
| Average relative humidity (%)         | 72.01            | 65.19            | 58.27            | 53.97             | 51.56             | 50.59            | 51.14            | 56.11            | 60.33            | 70.18            | 77.39            | 76.61            | 61.95            |
| Mean monthly sunshine hours           | 11.19            | 11.34            | 11.34            | 11.63             | 12.65             | 12.68            | 11.83            | 11.24            | 11.05            | 9.11             | 7.68             | 8.29             | 10.84            |

Weather-Related Hazards: Trichy Terminal (T.N) To Anand Petroleum Providing a local hourly weather forecast of rain, sun, wind, humidity and temperature.

The Long-range 12 day forecast also includes detail for weather today. Live weather reports from Trichy Terminal (T.N) To Anand Petroleum weather stations and weather warnings that include risk of thunder, high UV index and forecast gales.

### Climate Graph

The chart below shows the mean monthly temperature and precipitation of Tiruchirappalli in recent years.



## Analysis of Traffic Patterns

### Peak Hours:

Typically, Trichy Terminal (T.N) To Anand Petroleum peak traffic hours are from 8:00 AM to 12:00 AM and 5:30 PM to 9:30 PM on weekdays.

### Congestion-Prone Areas:

- M. J. Agencies
- Bismi Briyani
- Sri Muthumari Amman Thirukovil
- Ajs Maligai
- Sengipatti
- Suriyur
- Lakshminapati
- Palandamati
- M.Marimuthu Coffee Shop

## ❖ **Assessment of Road Quality and Infrastructure**

**Road Quality:** Generally, the roads are well-maintained but can suffer from potholes and waterlogging on State Highway during the monsoon season.

**Infrastructure:** Adequate signage, street lighting, and traffic signals are present, but some areas may lack proper drainage systems, leading to waterlogging.

## ❖ **Suggestions for Alternative Routes for Emergencies**

**Alternative Route 1:** Bismi Briyani, Thuvakudi to SIDCO& Indian oil Storage, NH 83, U-turn at TNSTC TRICHY RE CONDITIONING, Ms Manivijay Nagar Rd, M.Marimuthu Coffee Shop

**Alternative Route 2:** NIL

## ❖ **Summary of Local Regulations Affecting Hazardous Material Transport**

**Regulations:** Transport of hazardous materials is regulated by the Petroleum and Explosives Safety Organization (PESO) and the Motor Vehicles Act. Specific routes and timings may be restricted for hazardous material transport.

**Permits:** Ensure all necessary permits and documentation are in place.

## ❖ **Overview of Historical Incidents**

**Historical Incidents:** There have been occasional incidents involving heavy vehicles, particularly during the monsoon season due to waterlogging and poor visibility. No major incidents involving hazardous materials have been reported recently.

## ❖ **Environmental Considerations and Sensitive Areas**

- **Sensitive Areas:** M. J. Agencies, Jude Digital Studios, Ajs Maligai, Sengipatti, Suriyur, Lakshminapati, Palandamati, M.Marimuthu Coffee Shop
- **Educational institutions:** - Trichy School, Sneha Girls Hostel,
- **Hospital:** - Government Hospital Alangudi, Noble Hospital, MGM Healthcare, Cauvery nagar hospital quarters, Ozone Hospitals, Chirag Hospital And Institute Of Proctology

- **Gas Station:** -Bharat Petroleum, Reliance Petrol Pump, R.M Traders, M/S R.K Agencies, Ranjith Petrol Pump, GTN Indian Oil, Nayara Petrol Pump, Amuthusurabhi Agencies Indian oil petrol pump,KR Fuels IRM CNG Station.

**Environmental Impact:** Minimize noise and air pollution, especially in residential and sensitive areas.

**Air pollution:** Volatile chemicals evaporate during the filling and discharge process, or from leaks.

- **Loss of habitats:** Oil and gas operations can degrade animal habitats and disrupt migratory pathways.
- **Oil spills:** Oil spills can be devastating for animals and humans.
- **Greenhouse gas emissions:** Oil and gas operations can emit greenhouse gases like methane.

#### ❖ **Analysis of Communication Coverage**

Communication Coverage: Generally good throughout the route, but potential dead zones may exist densely built-up areas or underpasses.

Dead Zones: Monitor for any communication blackouts, especially in underpasses or near large buildings.

#### ❖ **Estimated Emergency Response Times**

Indian oil Storage, Sacred Heart School , Tiruchirappalli , Ram Krishna Nagar areas like have quicker response times (15- 20 minutes).

- Congested areas may experience delays (up to 30-40 minutes).

#### ❖ **Overall Summary of Risk Assessment**

- **Risk Level:** Moderate to High, especially during monsoon season.
- **Key Risks:** Waterlogging, traffic congestion, and potential communication dead zones and State Highway.


- **Mitigation Measures:** Plan travel during non-peak hours, ensure proper vehicle maintenance, and have alternative routes and emergency contacts ready and control on the speed limit of the vehicle.

## ❖ Road Signage for TT/PT Driver

### Road Traffic Signs in India

#### Mandatory/Regulatory Signs

|   |   |  |   |
|---|---|--|---|
|    |    |    |    |
| Stop  | Give way  | No entry   | Straight prohibited   |
|    |    |    |    |
| One way   | One way   | Vehicles prohibited in both directions   | Horn prohibited   |
|  |  |  |  |
| Pedestrians prohibited  | Cycles prohibited   | Right turn prohibited  | Left turn prohibited  |
|  |  |  |  |
| U-turn prohibited   | Overtaking prohibited   | Trucks prohibited  | Tonga prohibited  |

|  |   |   |  |
|--|---|---|--|
|  <p>All motor vehicles prohibited</p> |  <p>Hand cart prohibited</p>   |  <p>Bullock cart prohibited</p> |  <p>Bullock and hand carts prohibited</p> |
|  <p>No parking</p>                    |  <p>No parking or stopping</p> |  <p>Speed limit</p>             |  <p>Axle load limit</p>                   |
|  <p>Width limit</p>                 |  <p>Weight limit</p>         |  <p>Length limit</p>          |  <p>Load limit</p>                      |
|  <p>Restriction and</p>             |   |   |  |



## Cautionary signs

|   |   |  |   |
|---|---|--|---|
|    |    |    |    |
| Right hand curve  | Left hand curve   | Right hand pin bend  | Left hand pin bend  |
|    |    |    |    |
| Right reverse bend  | Narrow bridge   | Gap in median  | Cycle crossing  |
|  |  |  |  |
| Pedestrian crossing   | School  | Men at work  | Roundabout  |
|  |  |  |  |
| Narrow road   | Road widens   | Side road left   | Side road right   |

## Information signs

|                               |                            |                      |                      |
|-------------------------------|----------------------------|----------------------|----------------------|
|                               |                            |                      |                      |
| Advance direction             | Map type advance direction | Rotary intersection  | Reassurance          |
|                               |                            |                      |                      |
| Direction                     | Direction                  | Place identification | Truck lay bay        |
|                               |                            |                      |                      |
| Toll booth ahead              | Parking this side          | Parking both sides   | Cycle stand          |
|                               |                            |                      |                      |
| Scooter and motor cycle stand | Taxi stand                 | Auto-rickshaw stand  | Cycle-rickshaw stand |
|                               |                            |                      |                      |
| Public telephone              | Filling station            | Hospital             | First aid post       |

## Conclusion

The route for Trichy Terminal (T.N) To Anand Petroleum is generally manageable but poses several risks, particularly during the monsoon season. Proper planning, adherence to regulations, and awareness of potential hazards can significantly mitigate these risks.

### ❖ Risk Assessment - Sharp Turns

| <b>Risk Type</b> | <b>Risk Level</b> | <b>Coordination</b>                   | <b>Distance From Start</b> | <b>Recommendation Speed</b> |
|------------------|-------------------|---------------------------------------|----------------------------|-----------------------------|
| Sharp turn       | Medium            | 10.769008535749057, 78.83723765484662 | 300 M                      | 20km/hr TO 30 Km/Hr         |
| Sharp turn       | Medium            | 10.765497799294907, 78.83604620042777 | 700 M                      | 20km/hr TO 30 Km/Hr         |
| Sharp turn       | Medium            | 10.764009578128617, 78.83419636244746 | 950 M                      | 20km/hr TO 30 Km/Hr         |
| Sharp turn       | Medium            | 10.758028485487644, 78.8334001457567  | 1.6 KM                     | 20km/hr TO 30 Km/Hr         |
| Sharp turn       | Medium            | 10.756122556562806, 78.83055889901199 | 2.0 KM                     | 20km/hr TO 30 Km/Hr         |
| Sharp turn       | Medium            | 10.751420920596344, 78.82521649200099 | 2.8 KM                     | 20km/hr TO 30 Km/Hr         |
| Sharp turn       | Medium            | 10.739011461069182, 78.83858885050212 | 4.9 KM                     | 20km/hr TO 30 Km/Hr         |
| Sharp turn       | High              | 10.732693078871645, 78.8744004316786  | 9.1 KM                     | 20km/hr TO 30 Km/Hr         |
| Sharp turn       | Medium            | 10.717181602413664, 78.95464873306916 | 17.9 KM                    | 20km/hr TO 30 Km/Hr         |
| Sharp turn       | Medium            | 10.720753025938777, 78.96377618938521 | 19.0 KM                    | 10km/hr TO 20 Km/Hr         |
| Sharp turn       | Medium            | 10.71097912745339, 78.9558694661921   | 20.2 KM                    | 20km/hr TO 30 Km/Hr         |
| Sharp turn       | Medium            | 10.71089603398133, 78.95587353077819  | 20.8 KM                    | 10km/hr TO 20 Km/Hr         |
| Sharp turn       | Medium            | 10.710510777725322, 78.95815078770025 | 21.1 KM                    | 10 km/hr TO 20 Km/Hr        |
| Sharp turn       | Medium            | 10.707892309680394, 78.9581432313126  | 21.4 KM                    | 10km/hr TO 20 Km/Hr         |

❖ **Risk Assessment - Elevation Changes**

| Risk Type        | Specific Risk | Risk Level | Coordination                   | Elevation Change | Gradient | Recommendation Speed |
|------------------|---------------|------------|--------------------------------|------------------|----------|----------------------|
| Elevation Change | Descent       | Low        | <b><u>10.7753, 78.8368</u></b> | 3.02m            | 1.96 %   | 40 km/hr to 50 km/hr |
| Elevation Change | Descent       | Low        | 10.591559, 78.771011           | 6.28m            | 4.28%    | 40 km/hr to 50 km/hr |

❖ **Risk Assessment – Key Location:**

| Sr No | Location           | Lat, Lon.                             |
|-------|--------------------|---------------------------------------|
| 1     | Hall/Hotel         | 10.757627679523425, 78.83287045929539 |
| 2     | OLD Burma Colony   | 10.75810448259808, 78.83342945889828  |
| 3     | School/College     | 10.751940259658717, 78.824855152166   |
| 4     | School/College     | 10.751244043943656, 78.82964545444308 |
| 5     | Bank               | 10.749935829138195, 78.8268757083185  |
| 6     | Toll Plaza         | 10.739223590189045, 78.82491390378034 |
| 7     | Hotel/Restaurant   | 10.701444574062581, 78.73129207330703 |
| 8     | School/College     | 10.703678000471413, 78.73189375630369 |
| 9     | Hostel             | 10.72417231487581, 78.68718618406425  |
| 10    | BPC Retail Outlet  | 10.758181036689974, 78.65598357301882 |
| 11    | School/College     | 10.74008121723329, 78.6379129330532   |
| 12    | IOCL Retail Outlet | 10.733112284745776, 78.63240994992489 |



|    |                |                                       |
|----|----------------|---------------------------------------|
| 13 | School/College | 10.751575145484235, 78.614060731372   |
| 14 | School/College | 10.75066744861209, 78.59905450362704  |
| 15 | Temple         | 10.746887750005037, 78.59479570906672 |
| 16 | School/College | 10.720295382587906, 78.55149351755783 |

## SHARP TURN IMAGE

Total distance: 25 km; Start with: (10.7753, 78.8368), End with:( 10.591559, 78.771011)

❖ **SHARP TURN PICTURE FOR TRICHY TERMINAL TO ANAND PETROLEUM**



## **SHARP TURN IMAGE START FROM TRICY TERMINAL**



IMAGE :- SHARP TURN RISK LEVEL :- MEDIUM COORDI. 10.765497799294907, 78.83604620042777



**IMAGE :- SHARP TURN RISK LEVEL :- MEDIUM COORDI. 10.756122556562806,  
78.83055889901199**



**IMAGE :- SHARP TURN RISK LEVEL :- MEDIUM COORDI. 10.739011461069182,  
78.83858885050212**



**IMAGE :- SHARP TURN RISK LEVEL :- MEDIUM COORDI. 10.720753025938777,  
78.96377618938521**



**IMAGE :- SHARP TURN RISK LEVEL :- MEDIUM COORDI. 10.573492136690625,  
79.01365840917202**





**IMAGE :- SHARP TURN RISK LEVEL :- MEDIUM COORDI. 10.489673396392101,  
78.97667721669097**



**IMAGE :- SHARP TURN RISK LEVEL :- MEDIUM COORDI. 10.461719875337447,  
78.98089783911972**



**IMAGE :- SHARP TURN RISK LEVEL :- MEDIUM COORDI. 10.366911225762008,  
78.986394253703**



**IMAGE :- SHARP TURN RISK LEVEL :- MEDIUM COORDI. 10.494374169846944,  
78.97771872041729**



**IMAGE :- SHARP TURN RISK LEVEL :- MEDIUM COORDI. 10.361143177391408,  
78.98166916302662**