Government of the people's Republic of Bangladesh
Ministry of Road Transport and Bridges
Roads Transport and Highway Division
Roads and Highways Division

User Manual of Distance Measurement Tool

HDM Circle

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Developed by
CEGIS

User Manual

of

Distance Measurement Tool

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Development of Distance Measurement Tool

Background

Road Distance Measurement Tool is an effective tool for RHD that provides facility to measure the road distance from one place to another smoothly. Such a tool that calculates the shortest path or distance from origin to one or multiple destinations via user-defined routes has been planned and designed. Anyone with this service is expected to be able to calculate distance for their desired routes.

This tool is browser dependent. Any kind of internet browser will be able to run this tool by browsing the following link: https://gis.rhd.gov.bd/dmt.

After browsing the link, the dashboard interface of **Distance Measurement Tool** will be shown to browser window.

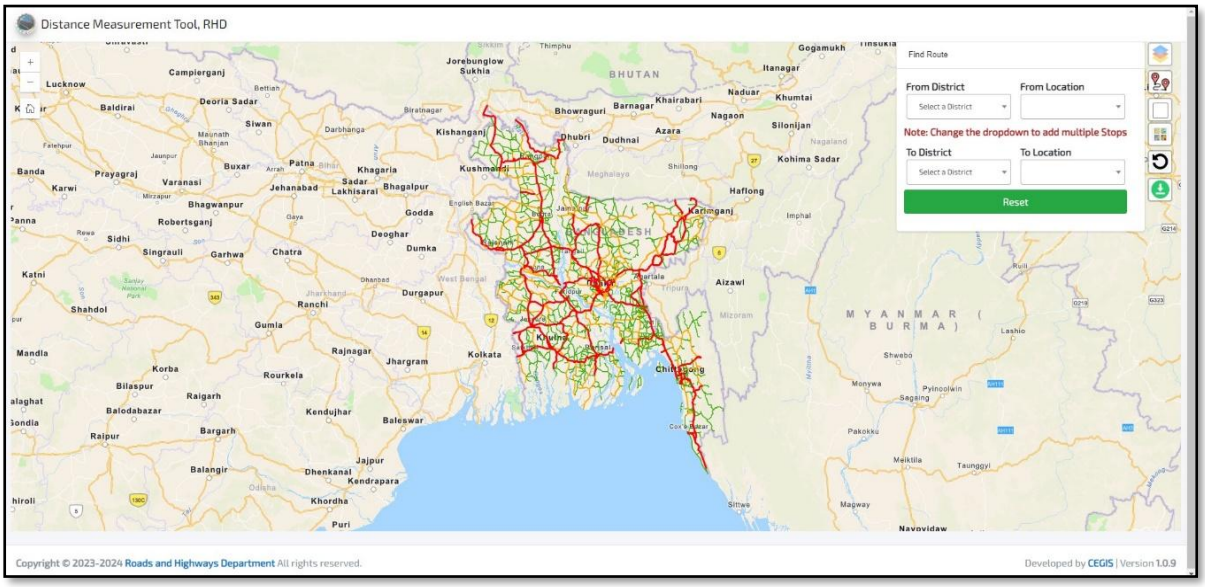


Figure 0.1: Dashboard Interface of Distance Measurement Tool

ArcGIS Enterprise is being used for analysis of network datasets and ArcGIS API is being used for building web mapping applications. ArcGIS Desktop has been used to create a map document that contains a network analysis layer in order to create a network analysis service for road networks. A new road network analysis layer has been created based on a network layer (referencing a network dataset) by using the Network Analyst toolbar. After that the map has been published as a service, ensuring that the Network Analysis capability is enabled.

ArcGIS SDK for JavaScript is a powerful JavaScript library to visualize ArcGIS enterprise-published map layers on a web page. Using this library, web-based distance measurement tool has been developed. To do that, firstly, the network routing service from RHD Network Analysis Server has been called, which is prepared and published using ArcGIS Pro. After that, an API token has been generated using the RHD credential to access RHD routing services. Finally, destinations from the drop-down list can be selected, and calculated the distance from one location to another. The locations incorporated in the drop-down list have been shared by RHD officials.

Key Features of the Distance Measurement Tool

The key features of the Distance Measurement Tool are:

1. Find Route
2. Add Map Layer
3. Calculate Distance (By Clicking)
4. Show or Hide Map Legend
5. Select the Map Background Layer
6. Reset Map
7. Download Map

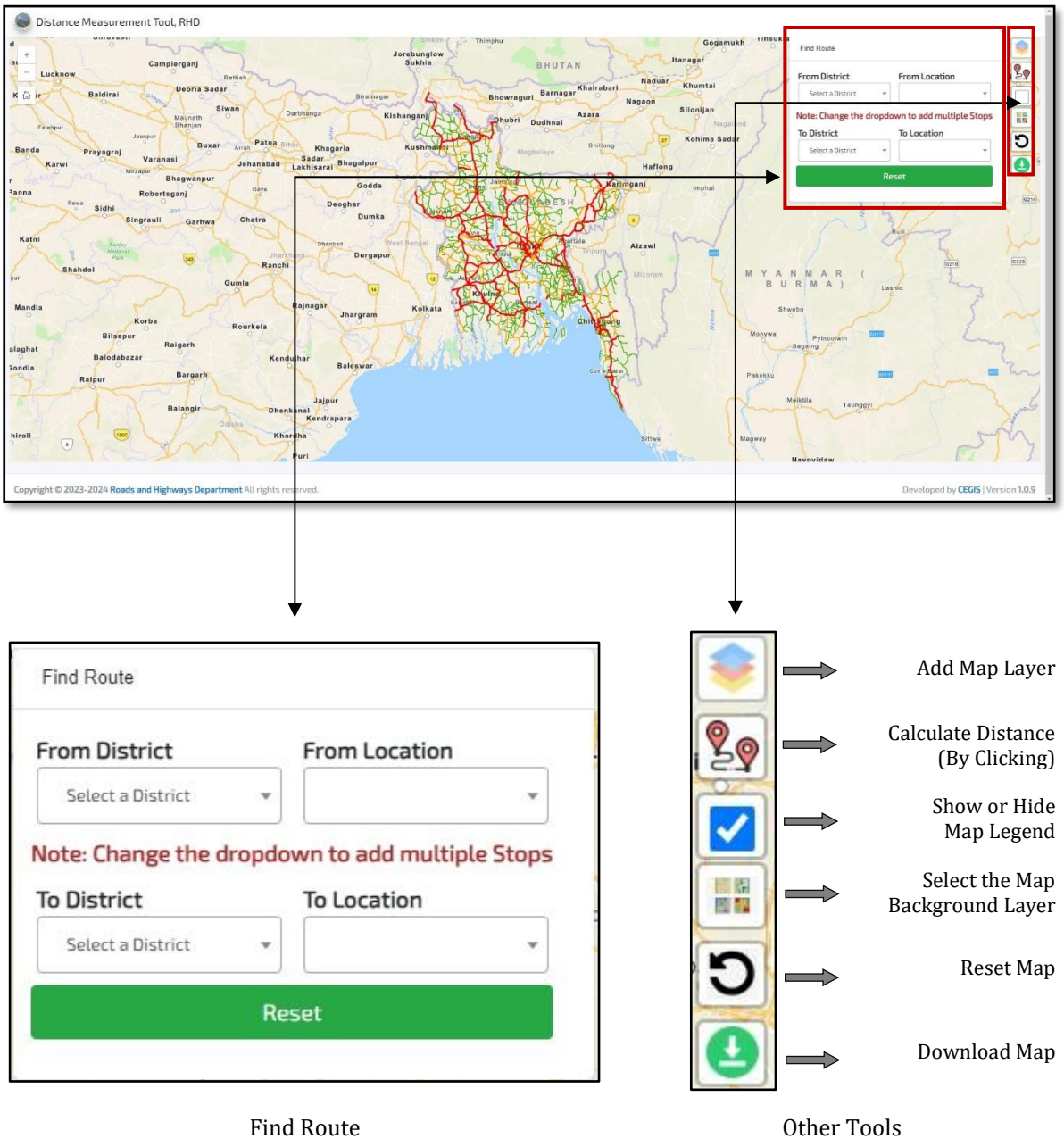


Figure 0.2: Key Features of Distance Measurement Tool

Add Map Layer

In ArcGIS, layers are collections of geographic data. Through this feature, any geographical dataset can be visualized in the interface of this dashboard. Also, the datasets can be dragged up and down to set data visualization order. By clicking this feature, dataset layers of the map will pop up at the upper right section of the dashboard.

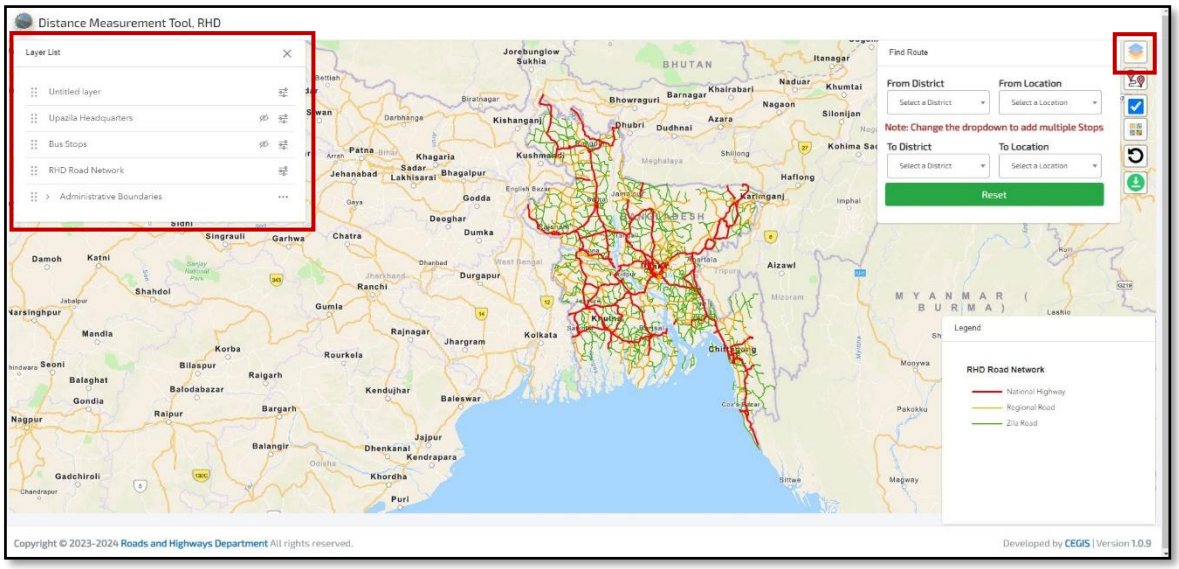


Figure 0.3: Adding Different Map Layers on the Screen

In **Figure 03,** dataset layer list of the map has been shown at the upper right section of the dashboard. The layers can be dragged up and down for the sake of visualization. By enabling the **eye** any data layer can be visualized on the screen easily.

There are a number of layers have been published to this service. A summary of these layers is given bellow:

Untitled Layer

This layer is the default layer for showing the route for one place to another. This layer directly comes from the NA Server which is published in Arc GIS Enterprise Database.

District Head Quarters

This layer shows the location of the district headquarters as point symbol.

Upazila Head Quarters

This layer shows the location of the upazila headquarters as point symbol.

Bus Stops

This layer shows the location of the different bus stops as point symbol which is defined by RHD.

RHD Road Network

This layer shows the detailed road network as line symbol which is defined by RHD.

Administrative Boundaries

This layer shows the administrative boundary as polygon symbol. The administrative boundaries are:

1. Division Boundary
2. District Boundary
3. Upazila Boundary
4. Union Boundary

Show or Hide Map Legend

This feature is only for viewing legend in the interface of the "Distance Measurement Dashboard". By clicking on this option, a legend of the map will pop up at the bottom left section of the dashboard.

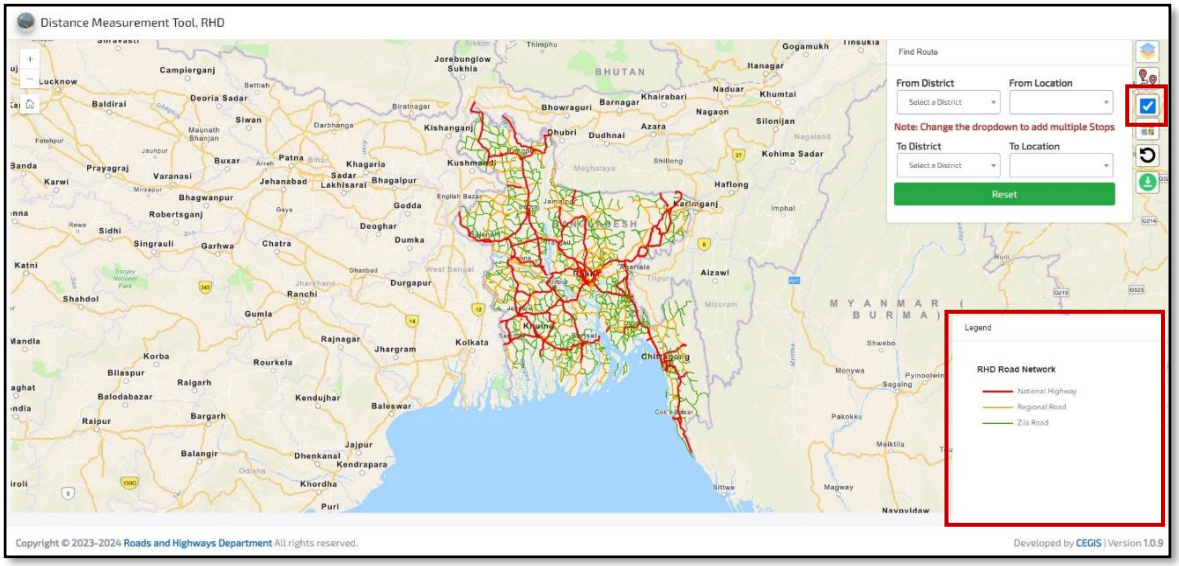


Figure 0.4: Adding Legend at the Interface

In **Figure 04**, legend has been enabled and shown at the interface.

Select the Map Background Layer

With this feature, any kind of base map can be added to the screen. Such as Imagery, Imagery Hybrid, Streets, Topographic, Navigation, etc. By clicking this feature, a base map list will pop up at the bottom right section of the dashboard.

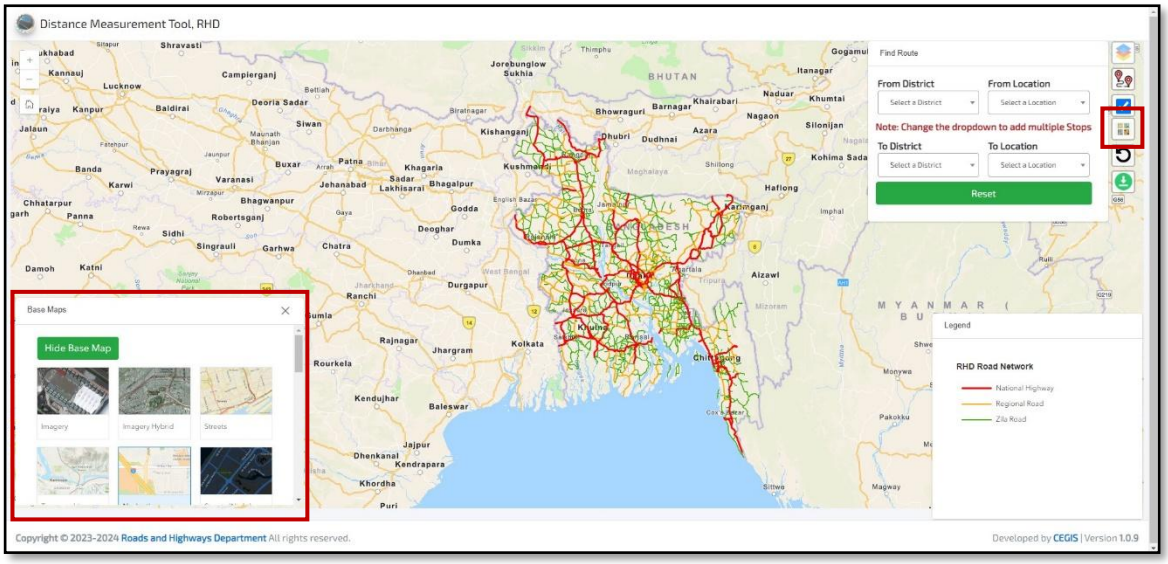


Figure 0.5: Adding Different Base Map Layers at the Interface

In **Figure 05**, Base Map Layer has been enabled and shown at the interface. Different kind of base maps can be added at interface by clicking on base maps. At the Distance Measurement Dashboard interface "Navigation" base map has been enabled always by default.

Reset Map

This feature can be used to reset the whole page at any condition.

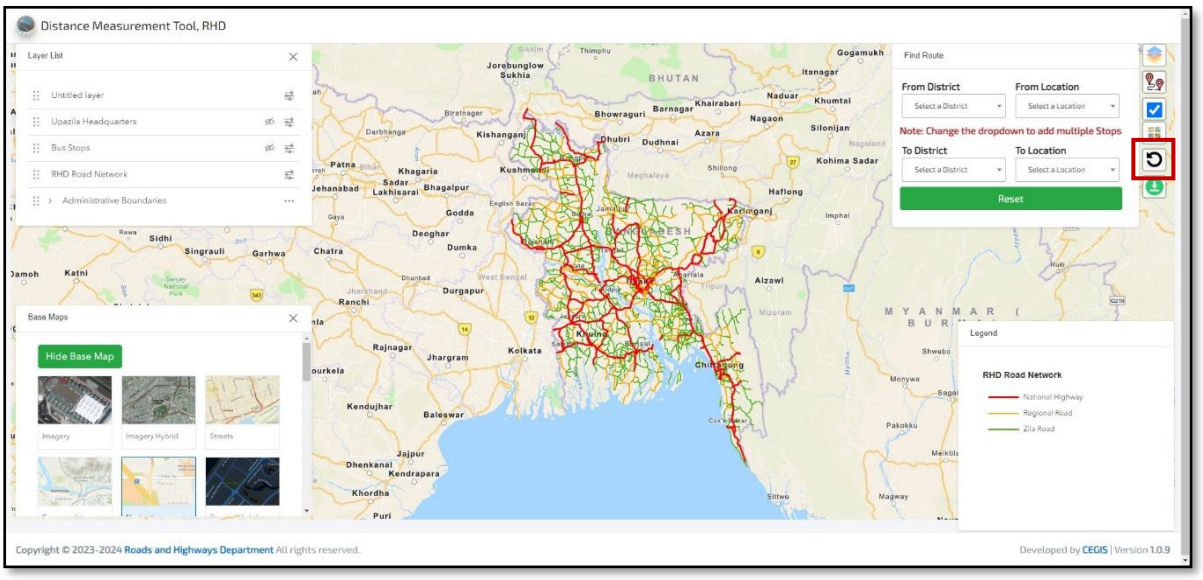


Figure 0.6: Interface of the Key Features of Distance Measurement Tool

Find Route

This is the main feature of this "Distance Calculating Dashboard". This will be viewed in the upper left part of the interface by default. In this section, four dropdowns have been incorporated. These are

1. From District (Select district to find starting location)
2. From Location (Select starting location by selecting location name)

3. To District (Select district to find ending location)
4. To Location (Select ending location by selecting location name)

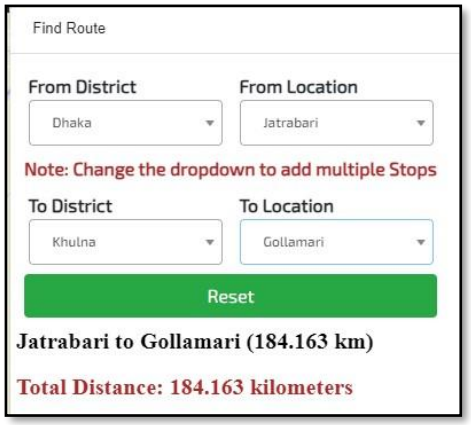
In the "From" section, starting point needs to be entered and in the "To" section, ending point needs to be entered. After filling up the all four sections from the drop-down list, a shortest route will be viewed on the screen and the distance will be shown between these two particular points.

If any user selects any wrong input mistakenly, then the user needs to reset by clicking "Reset" and run the whole procedure again.

Distance Calculation for the Shortest Route

In **Figure 07**, shortest distance between to particular point has been shown. Here starting point is Dhaka (Jatrabari) and the ending point is Khulna (Gollamari). For that the "From District" has been selected "Dhaka" and "From Location" has been selected "Jatrabari" from the drop-down list. For the destination point "To District" has been selected "Khulna" and "To Location" has been selected "Gollamari" from the drop-down list.

After Selecting all four sections from the drop-down list, a shortest route has been viewed on the screen and the distance will be shown between these two particular points.



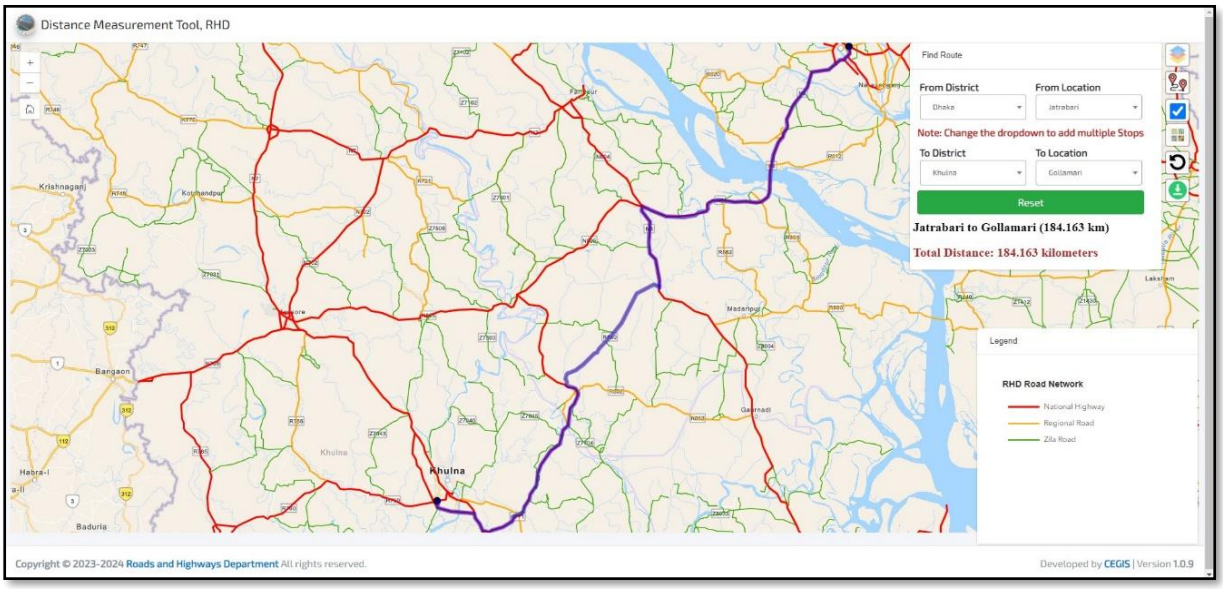


Figure 0.7: Distance Calculated for the Shortest Route

Distance Calculated for the User Defined Route

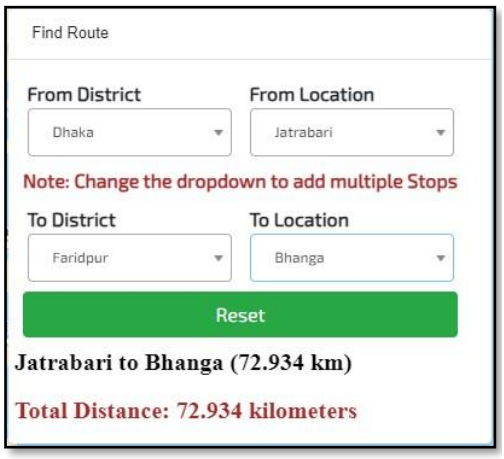
To add more intermediate locations, first need to fix the "From District" and "From Location" and then need to change the "To District" and "To Location" section serially and the sum and the breakdown of the calculated distance will be automatically viewed in the window.

In the **Figure 07,** the route of Dhaka (Jatrabari) to Khulna (Gollamari) has been shown. The distance has been calculated by using a defined route. The defined route is -

1. Start Point: Dhaka (Jatrabari)
2. 1st Intermediate Point: Faridpur (Bhanga)
3. 2nd Intermediate Point: Gopalganj (Bhatiapara)
4. 3rd Intermediate Point: Bagerhat (Katakhali)
5. End Point: Khulna (Gollamari)

1st Step:

In order to do that at first need to set the starting point. In **Figure 08,** starting point has been set to Dhaka (Jatrabari). Here "From District" is "Dhaka" and "From Location" is "Jatrabari". After setting the starting point, the location at "To District" and "To Location" need to be selected from drop-down. Here 1st intermediate point is Faridpur (Bhanga). So that for the 1st intermediate section "To District" is "Faridpur" and "To Location" is "Bhanga". After setting the 1st intermediate section, distance has been calculated automatically and shown in the dashboard.



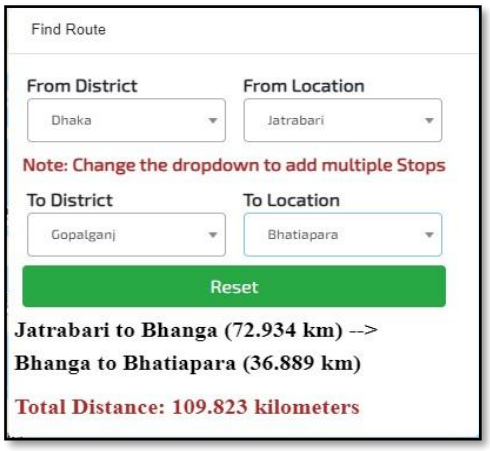
Route:

Jatrabari to Bhanga (72.934 km)

Total Distance: 72.934 kilometers

2nd Step:

After that 2nd intermediate section has been selected from drop-down. Here 2nd intermediate section is Gopalganj (Bhatiapara). So that for the 2nd intermediate section "To District" is "Gopalganj" and "To Location" is "Bhtiapara". After setting the 2nd intermediate section, distance has been calculated again and shown in the dashboard.



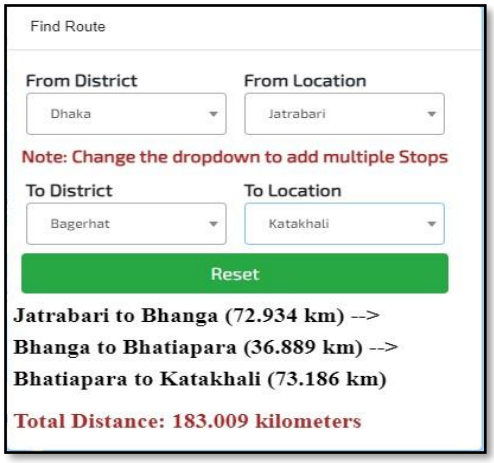
Route:

Jatrabari to Bhanga (72.934 km) --> Bhanga to Bhatiapara (36.889 km)

Total Distance: 109.823 kilometers

3rd Step:

After that 3rd intermediate section has been added. Here 3rd intermediate section is Bagerhat (Katakhali). So that for the 3rd intermediate section "To District" is "Bagerhat" and "To Location" is "Katakhali". After setting the 3rd intermediate section, distance has been calculated again and shown in the dashboard.



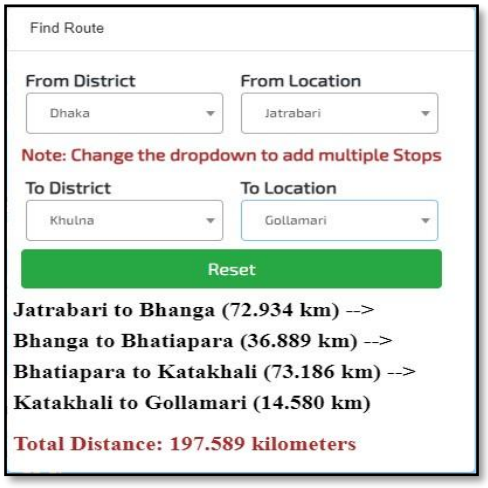
Route:

Jatrabari to Bhanga (72.934 km) --> Bhanga to Bhatiapara (36.889 km) --> Bhatiapara to Katakhali (73.186 km)

Total Distance: 183.009 kilometers

4th Step:

After that the final destination point has been selected from the drop-down list. Here the final section is Khulna (Gollamari). So that for the final section "To District" is "Khulna" and "To Location" is "Gollamari". After setting the final destination, distance has been calculated again and shown in the dashboard.



Route:

Jatrabari to Bhanga (72.934 km) --> Bhanga to Bhatiapara (36.889 km) --> Bhatiapara to Katakhali (73.186 km) --> Katakhali to Gollamari (14.580 km)

Total Distance: 197.589 kilometers

By following this process, user can calculate distance for any defined route.

Figure 0.8: Distance Calculated for the User Defined Route

Calculate Distance (By Clicking)

With this feature, anyone can calculate distance from one place to another by clicking multiple times at different sections. 1st click will address the start point and the last click will address the end point and the intermediate points will address the via route. Through this tool, any route distance can be calculated but no via route will be shown at dashboard or in the "Find Route" section. Just total distance will be calculated and shown in the "Find Route" section.

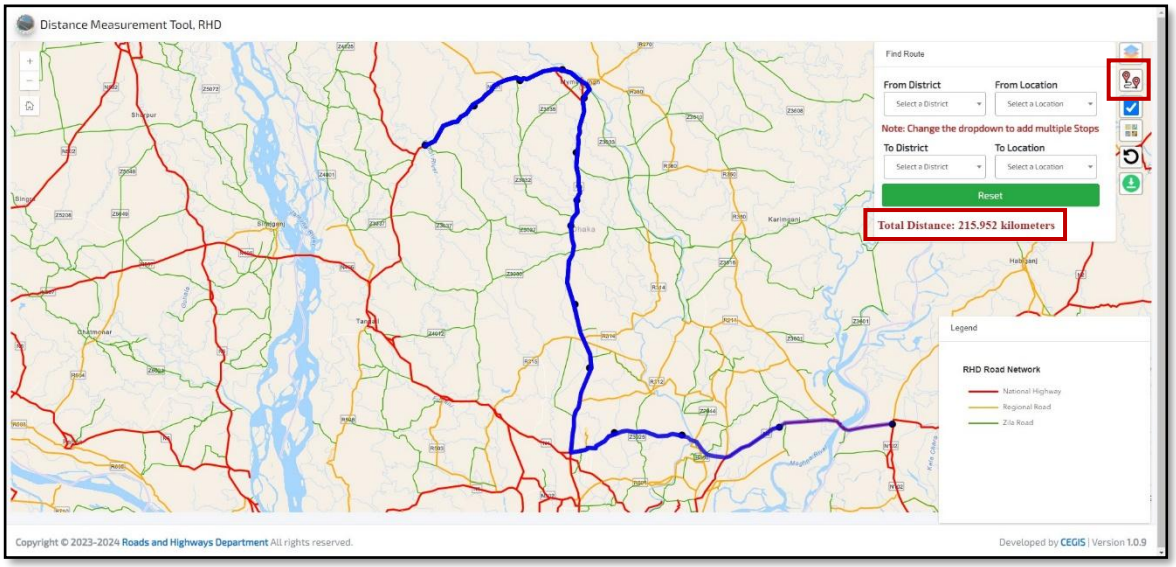


Figure 0.9: Distance Calculated by Clicking

In **Figure 09**, distance has been calculated by clicking at multiple sections. Total distance has been calculated and shown in the "Find Route" section. But no via route has been shown up at dashboard or in the "Find Route" section.

Download Map

With this feature, maps can be downloaded in different formats. Such as PDF, JPG, PNG, and others. In this section title needs to be written manually by the user who needs to select the template. By clicking this feature, a section will pop up at the upper right section of the dashboard.

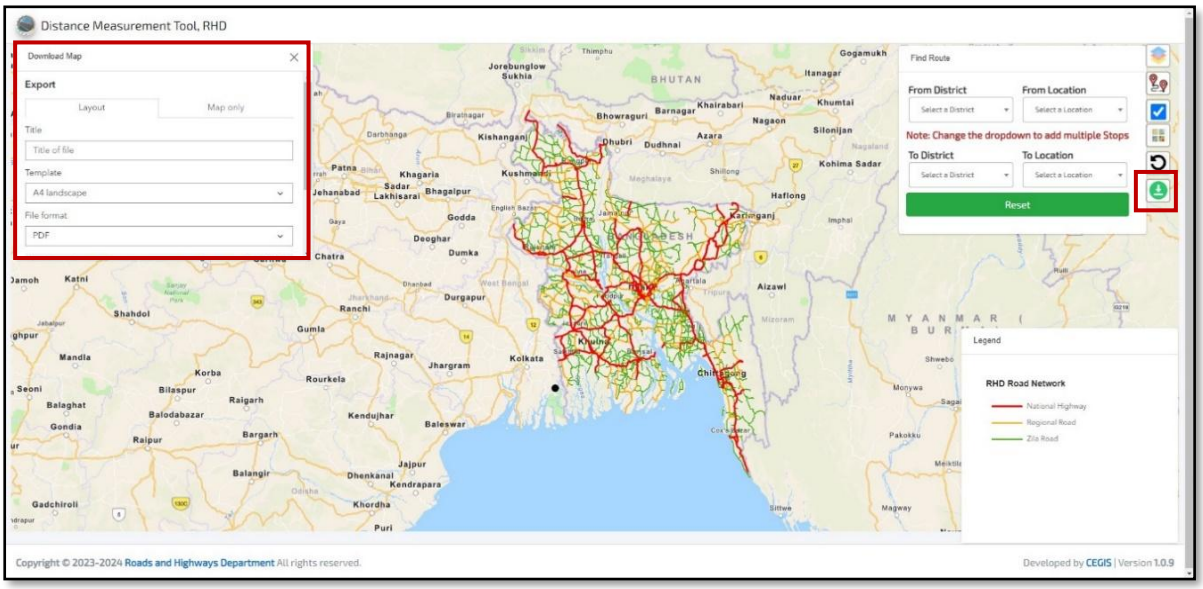
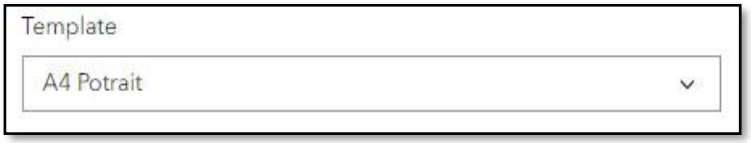


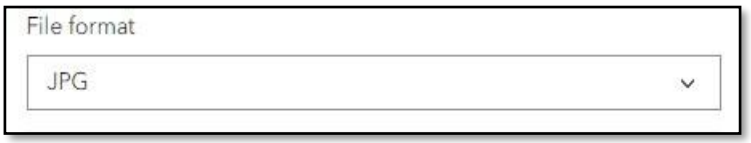
Figure 0.10: Downloading Map

In the "Download Map" section Tittle of map can be added at the "Tittle" section.

Template can be fixed at the "Template" section.



File format can be fixed at the "File Format" section.



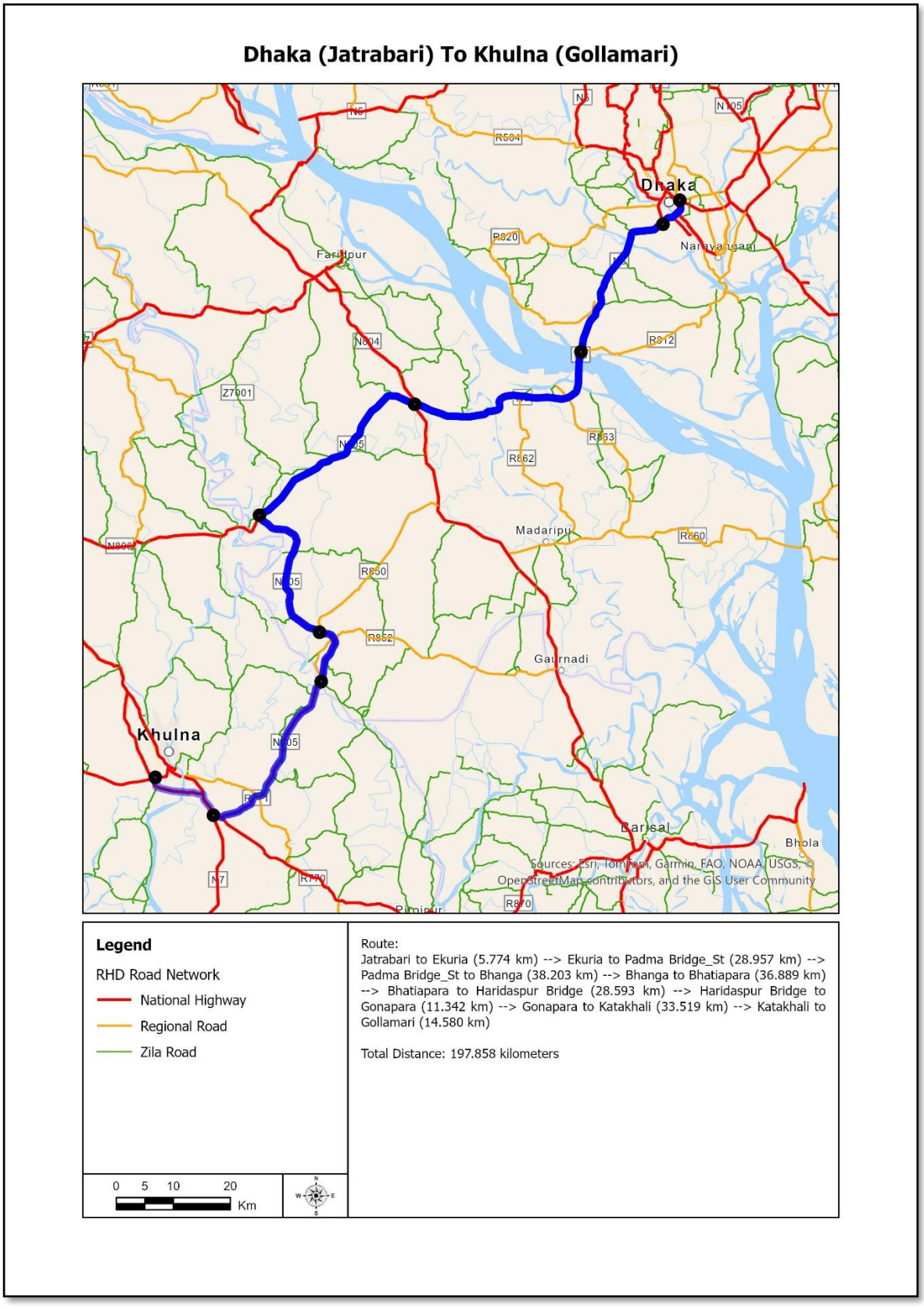


Figure 0.11: Downloaded Map from Distance Measurement Tool

Center for Environmental and Geographic Information Services
http://www.cegisbd.com