INTERIM REPORT

TRANSPORTATION SURVEYS FOR ROADWAYS AND WATERWAYS

CLIENT

Preparation of Development Plan for Meherpur Zilla Project (MZDP)

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GOVERNMENT OF THE PEOPLE'S REPUBLIC OF BANGLADESH

Urban Development Directorate (UDD)

Interim Report
On
Transportation Surveys for Roadways and Waterways (Package-3)

Under
Preparation of Development Plan for Meherpur Zilla Project

Submitted to

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Executive Summary

This report presents the comprehensive findings and analyses of the Transportation Surveys for Roadways and Waterways conducted in Meherpur District as part of the district's broader development planning initiatives. The study aims to assess the existing transportation infrastructure, traffic conditions, travel behavior, and goods movement patterns to support informed decision-making for sustainable transport development and regional growth objectives.

Key components of the survey included traffic volume counts, origin-destination (O-D) studies, critical traffic junction assessments, trip generation and travel behavior analysis, and evaluation of goods movement modes. These efforts provided a clear picture of current mobility challenges, infrastructure limitations, and potential areas for targeted improvements.

Critical traffic junctions such as Meherpur College Mor, Gangni Bazar Intersection, and Mujibnagar Memorial Intersection were analyzed for road conditions, congestion levels, and strategic interventions. Recommendations for congestion reduction include traffic signal installations, road widening, creation of dedicated lanes for non-motorized transport, and development of bypass and ring roads to improve traffic flow and safety.

A significant focus was placed on the impact of the proposed establishment of Meherpur University. Drawing on comparative data from Jashore University of Science and Technology and Islamic University, Kushtia, the study projects a substantial increase in daily trips, especially during peak hours, resulting from student and staff commuting and related logistics. The report outlines infrastructure needs such as widened approach roads, pedestrian and cycling facilities, parking provisions, and shuttle services, emphasizing integrated transport and land use planning to mitigate traffic congestion and enhance campus accessibility.

The goods movement study highlighted the importance of improving logistics for agricultural and commercial freight, recommending the development of truck unloading zones, feeder roads, and dedicated transport lanes to facilitate efficient shipment.

In conclusion, the survey findings provide a solid foundation for transportation infrastructure upgrades, traffic management, and policy formulation to accommodate current demands and future growth in Meherpur District. Proactive planning, incorporating lessons from regional universities and tailored congestion mitigation strategies, will enable the district to achieve improved mobility, safety, and economic development through an efficient and sustainable transport network.

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Chapter 1: Introduction

The objectives of the traffic survey are two folds. Firstly, it provides idea about the existing traffic demand available supply in the form of infrastructure and services. Secondly, it acts as the input for the travel demand forecasting model that is to be constructed as the output of the project which will enable UDD to analyze various traffic scenarios with respect to changed network as well as land use scenarios.

According to the TOR, the consultant team will be responsible to construct a 20-year prediction model for transportation of the project area. A simple four-step travel demand-forecasting model will be constructed with the survey data that will determine the travel demand on the future road network of Meherpur Zilla.

To estimate the future traffic demand on the future road network of Meherpur District the following surveys will be conducted:

Seasonal Transport Survey Seasonal Transport Survey is a data collection process aimed at understanding the variations in transportation patterns, demands, and challenges that occur during different seasons.

Road Condition Survey This will document existing roads within the project area, noting pavement type (e.g., asphalt, concrete), condition (e.g., good, fair, poor), width, and potential for future extension. Establish a road network hierarchy (e.g., primary roads, secondary roads, local streets) and analyze the current circulation pattern, including connectivity and accessibility.

Traffic Volume and Origin and Destination (O-D) Survey facilitates identifying final Traffic Assessment Zones (TAZ), demand for different external and internal zones, as well as directional distribution at different intersections.

Study of Critical Traffic Junctions will examine critical traffic junctions to identify congestion points, safety issues, and inefficiencies. Graphically illustrate conditions at these junctions to facilitate analysis and planning of improvements.

Trip Generation Survey conducted at different locations within the project area to understand trip generation rates. This involves collecting data on the number of trips generated by different land uses (e.g., residential, commercial, industrial).

Travel Behavior Study facilitates conducting household interviews to gather data on travel behavior and patterns. This includes information on trip purposes (e.g., work, school, shopping), modes of transport used, trip frequencies, and travel times.

Goods Movement and Mode of Shipment Study will analyze the movement of goods within the project area, including the volume and types of goods transported and the modes of shipment used (e.g., road, rail, water). This study will inform freight planning and help identify infrastructure and policy needs to support efficient goods movement.

Land Port Study facilitates detail traffic volumes and movements at adjacent land ports (e.g., Benapole, Bhomra, Dharshana) will be done. This includes both passenger and freight traffic.

This report includes the final survey design and detailed methodology for the assignment. It also discusses the result analyses from the data obtained from the surveys/ studies which are already completed so far.

Chapter 2
Review of Plan and Policies

Chapter 2: Review of Plan and Policies

This chapter explains the interrelationship between the Project Area Development Plan and the country's national development plans. The development plans studied in this report include the Eighth Five Year Plan, Sustainable Development Plan and New Urban Agenda etc.

Development plans are established with the country's overall requirements and objectives for various development areas. Policies, plans, and objectives are formulated to achieve development goals, and budgets are allocated. The sectoral budgets are further subdivided into programs and initiatives within each sector for execution by multiple ministries. Any local development effort must link to national-level plans to achieve coherence and integrity with the country's overall development to accomplish national development goals. Therefore, it is vital to investigate the relationship between the Development plans and the country's national development plans.

2.1 Development Plans

Development Plans are comprehensive and strategic planning instruments designed to guide the physical, social, economic, and environmental growth of a region or locality over a defined period. These plans provide a spatial and policy-based framework for sustainable development, ensuring the efficient use of land, balanced distribution of infrastructure and services, and equitable socio-economic advancement.

2.1.1 Eighth Five Year Plan Allocation

The 8FYP allocated 17.4% of the Annual Development Plan (ADP) to the transport and communication sector. However, in the 2023-24 fiscal year, the transport and communication sector received 28.88% of the ADP allocation, which is 11.48% more than the 8FYP's allocation.

Development initiatives

The government has taken various development initiatives to implement the 8FYP, including programs to develop information and communication technology infrastructure, human resources, and e-governance.

Transport and communication sector contribution to GDP

The transport and communication sector contributed 7.34% to GDP in 2021-22 and 7.32% in 2022-23.

Connectivity

The 8FYP aims to ensure connectivity with regional and international transport networks.

The duration of the 7th Five Year Plan (7FYP) ended in June2020. However, due to the Covid- 19 pandemic the 8FYP has been delayed. The General Economics Division of the Planning Commission (GED) had to revisit and revise the targets and strategies in view of the pandemic. The 8th Five Year Plan, a projected course of action for a period of 5 year (July 2020 – June 2025), represents the first phase of the country's Perspective Plan 2041 (PP2041).

a) Broad themes of the plan

There are mainly two broad themes of the plan. Those are the following:

Promoting Prosperity:

The plan has emphasized on appropriate policies, frameworks and devised suitable and sustainable development strategies for promoting prosperity. For this, the first step is to bring Bangladesh closer to attaining Upper Middle-Income Country (UMIC) status, major Sustainable Development Goal (SDG) targets, and eliminating extreme poverty.

Fostering Inclusivity:

A broad-based strategy of inclusiveness with a view to empowering every citizen to participate fully and benefit from the development process and helping the poor and vulnerable with social protection- based income transfers has been adopted in the plan.

b) Main Parts

Plan is divided into two main parts. Those are:

i. Macroeconomic perspective
ii. Sectoral strategies

The 8th five-year plan centers on six sub-core themes. Those are:

i. Rapid recovery from COVID-19
ii. GDP growth acceleration
iii. A broad-based strategy of inclusiveness
iv. Development and improvement of critical institutions
v. Create a sustainable development pathway
vi. Attaining SDG targets

c) Challenges in Implementations of the Plan

During the implementation period of the 8FYP, the government will face a number of challenges. The four specific ones are the following:

i. Covid-19 pandemic
ii. Graduation from the least developed country (LDC) category
iii. Implementation of the Sustainable Development Goals (SDGs) and
iv. Climate change vulnerability.

Besides, Russia Ukraine war, rise in fuel price, disruption in supply chain & currency devaluation are some other major challenges that government needs to confront with.

d) Integration with Planning Projects

The 8FYP's development plan placed a strong emphasis on the necessity of narrowing the economic gap between rural and urban areas while increasing the production share of industry and contemporary services. By strengthening the non-farm sectors of the rural academy, it also places focus on reducing the gap between rural and urban economies. The same vision is the focus of this project. It can reduce the economic gap between urban and rural areas by providing urban area services in a rural location. This project achieved the 8FYP vision during this procedure.

The budget allocation for the transportation sector was given top priority in line with the 7FYP policy. The objective for the transportation sector for the 7FYP is to create a system of transportation that is effective, sustainable, safe, and regionally balanced, in which different modes complement one another, interface effectively where possible, and engage in healthy competition with one another. The masterplan will be designed in the project's final phase and will employ the same approach. Future population and need projections will be used to suggest new highways. It will fulfill the 8FYP's transportation objective during this period.

Soil, biodiversity, water, and population data will be collected as part of this project. Additionally, DEM data will be collected during the field level survey, allowing for the development of an all-inclusive drainage system to eliminate waterlogging. The location of the water basin can be determined in this process, and watershed analysis can predict the most vulnerable areas during sudden flash floods. It is possible to create a secure infrastructure using soil data. Though demographic and population data will be collected during this project, the most vulnerable areas can be predicted, and by taking precautions, loss and causality can be reduced.

2.1.2 Delta Plan

The government produced the Bangladesh Delta Plan 2100 in response to climate change and natural calamities (BDP 2100). The BDP 2100 seeks to integrate Bangladesh's medium- to-long-term aspirations to attain upper middle income (UMIC) status and eliminate extreme poverty by 2030 and be a prosperous country beyond 2041 with the longer-term challenge of sustainable management of water, ecology, environment, and land resources in the context of natural disasters and climate change. The BDP 2100 concentrates on the delta agenda through 2050, but it understands that today's decisions will have effects beyond 2050. It outlines a long-term vision for the development of the Bangladesh Delta by the end of the 21st century but also specifies short- and medium-term targets. Objectives, methods, policies, institutions, and investments are flexible. They adapt to changing natural events to respond effectively and achieve long-term goals. In light of Dutch Delta management best practices, the government has asked Dutch technical expertise to help Bangladesh establish BDP 2100. The Planning Commission of Bangladesh's General Economics Division (GED) created BDP 2100 alongside Dutch and national specialists.

a) Major Objectives Delta Plan

- Establishing effective institutions of inter-sectoral planning, programming, coordination and monitoring;
- Incorporating issues of climate change, environment, biodiversity, agriculture, fisheries, forestry, inland water transport and land management and their interaction with water to develop a comprehensive view of the delta issues and challenges; and
- Converting each of the related institutions of water, climate change and environmental management, agriculture and land management, and inland water transport management into strong institutions with adequate technical skills in the areas of economic management, financing, institution building, monitoring and evaluation and knowledge management.

b) Urban Planning

Under the effect of rural-urban migration, the nation's present urban centers will continue to expand in the following decades, and by 2045, cities will be home to most of the population. Although this plan emphasizes water-related concerns, it is crucial to address the broader context and difficulties facing metropolitan regions in the present and future. Water-related concerns, such as flood risk management, are closely tied to more general urban planning challenges, such as uncontrolled urban expansion and haphazard development. High population density and diverse socioeconomic and political reasons are at the root of the contemporary urban service delivery challenges. Consideration has been given to the impact and efficacy of the solutions for addressing water-related and broader urbanization challenges. Included among them are:

- Increase drainage capacity and reduce flood risk and waterlogging at in urban areas;
- Enhance water security and water use efficiency in the urban areas;
- Regulate and monitor river and other water body pollution from industries and human sources;
- Conserve and preserve urban wetlands and ecosystems and promote their wise-use;
- Develop effective urban institutions and governance;
- Integrated and sustainable use of urban land and water resources;
- Improved urban services: water supply, sanitation, wastewater and solid waste management. Place special emphasis on management of disposal of medical, electronic and other hazardous waste/materials; and
- Control and monitoring of water pollution caused by industry and other sources.

c) Sustainable Land Use and Spatial Planning

Planning, administering, and implementing land resource plans are critical components of BDP 2100. A land use plan includes natural regions for agriculture, forests, waterways, and urban and industrial sectors. Land usage involves agricultural and non-agricultural land uses; thus, integrating spatial planning into land use management is essential. Strategies consist of:

- Develop practical policy guidelines and rules for the Balu Mahal and sediment management;
- Preserve/conserve agricultural land from floods or erosion to sustain food grain production;
- Prevention of salinity intrusion and desertification;
- Management of newly accreted land in the Meghna Estuary;
- Sustainable coastal land management for enhancing agriculture and non-agriculture land;
- Development of Digital Land Resource Management System;
- Reviewing and updating/enactment of Laws/Regulations relating to Alluvion and Diluvian to improve the efficiency of land administration of accreting and reclaimed land;
- Formulation of necessary laws and acts to form Land Zoning;
- Increase climate change adaptation capacity for land management;
- Spatial land use planning for urbanization;
- Optimization of Land Use;
- Formulation of Spatial Planning and Land Resource Management Act;
- Enhance afforestation and plantation in the coastal zone for stabilizing land;
- Restoration and protection of soil health, erosion, and land loss; and
- Integrated management of coastal water infrastructures to protect land

d) Relation of Bangladesh Delta Plan 2100 to Transportation

The Bangladesh Delta Plan 2100's focus on sustainable, resilient, and integrated management of water, land, and urban systems naturally extends to transportation planning and infrastructure. Effective transport solutions are vital to support economic development, disaster resilience, and environmental sustainability in the delta region. Significance of Delta Plan in relation with transportation are following.

The **Climate Resilience and Disaster Management in Transport Infrastructure**

The Delta Plan emphasizes climate adaptation and disaster risk reduction, which directly impacts the design, construction, and maintenance of transportation infrastructure. Roads, bridges, and waterways in delta and coastal zones must be resilient to flooding, cyclones, erosion, and sea-level rise to ensure continuous connectivity and safe evacuation during disasters.

1. **Integrated Water and Land Transport Management**

   Since the delta region has vast inland waterways alongside road networks, BDP 2100 promotes coordinated planning of inland water transport with road and rail systems. This integrated multimodal transport approach supports efficient goods movement, reduces pressure on road networks, and improves accessibility for coastal communities.

2. **Urban and Regional Connectivity for Sustainable Development**

   The Plan recognizes rapid urbanization and rural-urban migration, calling for sustainable urban transport solutions that reduce congestion, improve drainage, and prevent waterlogging. Enhancing urban transportation links and their integration with land use planning will promote economic growth and quality of life in delta cities.

3. **Spatial Planning and Transport Land Use Optimization**

   Sustainable land use planning under BDP 2100 includes optimizing land for transportation corridors, terminals, ports (including the new sea port), and logistic hubs. Spatial planning policies will guide where transport infrastructure should be developed or preserved to prevent unplanned growth and protect valuable agricultural and ecological lands.

4. **Development of Climate-Smart Transport Policies and Institutions**

The Delta Plan aims to build institutional capacity for managing climate risks across sectors, including transportation. This entails developing policies for climate-resilient transport infrastructure investment, maintenance, emergency evacuation planning, and transport operation during extreme weather events.

5. **Digital and Data-Driven Transport Planning**

   Echoing the Delta Plan's emphasis on knowledge management, modern transport planning will utilize GIS, digital land resource management, and real-time data collection. These tools will enable better monitoring, planning, and decision-making to optimize transportation systems within the dynamic delta environment.

2.1.3 Sustainable Development Goals

(SDGs) are a set of seventeen global goals established by the United Nations in 2015 as part of the 2030 Agenda for Sustainable Development. They are designed to address a broad range of global challenges, including poverty, inequality, climate change, environmental degradation, peace, and justice. Each goal has specific targets (169 in total) and indicators to measure progress.

On the other hand, Localization of the Sustainable Development Goals (SDGs) refers to the process of adapting, implementing, and monitoring the SDGs at the local level, aligning the goal of SDG with local contexts, priorities, capacities, and resources. It ensures that sustainable development is driven from the ground up, engaging local governments, communities, and stakeholders.

The Sustainable Development Goals (SDGs), adopted by the United Nations in 2015 as part of the 2030 Agenda for Sustainable Development, comprise 17 interconnected goals aimed at ending poverty, protecting the planet, and ensuring prosperity for all. These global goals serve as a universal call to action for sustainable, inclusive, and resilient development.

The Physical Feature Survey and Plan Preparation for Magura District aligns directly with several SDGs by providing the foundational data and planning framework necessary to support evidence-based development. The project particularly contributes to:

- **SDG 6 – Clean Water and Sanitation** and **SDG 13 – Climate Action**: Through the mapping of river systems, khals (canals), and drainage networks, the project enables better water management and climate resilience planning.
- **SDG 9 – Industry, Innovation, and Infrastructure**: The data collected on transport networks, utilities, and built environments will guide future infrastructure planning and investment.
- **SDG 11 – Sustainable Cities and Communities**: By identifying and documenting physical features, infrastructure, land use, and urban dynamics, the project supports inclusive, safe, resilient, and sustainable urban development.
- **SDG 17 – Partnerships for the Goals**: The project emphasizes collaboration among government agencies, local authorities, and communities, reinforcing participatory planning processes.

By integrating SDG principles into data collection, analysis, stakeholder engagement, and planning outputs, this project contributes to building a sustainable and equitable future for Meherpur District. It lays the groundwork for development strategies that are environmentally responsible, socially inclusive, and economically viable.

Relation of Meherpur District Transportation Project with Transportation Planning and SDGs

The Meherpur District Transportation Project embodies comprehensive transportation planning principles that directly contribute to Sustainable Development Goals (SDGs) by addressing the following key aspects:

1. Integrated Transport and Land Use Planning

The project applies transportation planning to analyze current transport networks, forecast future travel demand, and assess the impacts of land use changes. This ensures efficient allocation of resources, guides sustainable urban and rural development, and supports SDG 9 (Infrastructure) and SDG 11 (Sustainable Cities).

2. Capacity Analysis and Traffic Impact Assessment

Through detailed capacity studies and traffic impact analysis, transportation planning identifies bottlenecks and designs improvements to enhance mobility and accessibility. This supports safer and more reliable transport services essential for economic activities and everyday life, contributing to SDG 8 (Decent Work and Economic Growth) and SDG 11.

3. Climate-Resilient and Disaster-Aware Planning

Incorporating simulations of extreme weather and disaster scenarios within transportation planning helps design resilient infrastructure and emergency evacuation strategies. This directly aligns with SDG 13 (Climate Action) by reducing vulnerability and enhancing adaptive capacity in transport systems.

4. Multimodal and Sustainable Transport Solutions

The project's focus on modeling multimodal operations (automobiles, motorcycles, bicycles, pedestrians) promotes inclusive and environmentally sustainable mobility options. This supports the transition toward low-emission transport systems and accessibility for all population groups, contributing to SDG 3 (Good Health), SDG 10 (Reduced Inequalities), and SDG 13.

5. Data-Driven Decision Making and Institutional Strengthening

Comprehensive data collection, GIS database management, and regular reporting facilitate evidence-based transportation planning and policy formulation. This strengthens institutional capacity and coordination (SDG 17 – Partnerships) for better governance and implementation of sustainable transport initiatives.

The Meherpur District Transportation Project leverages advanced transportation planning methodologies—integrating land use, traffic analysis, climate resilience, and multimodal solutions—to create a sustainable, inclusive, and adaptive transport system that supports the achievement of key SDGs at the regional level.

2.1.4 New Urban Agenda

The New Urban Agenda (NUA), adopted at the United Nations Conference on Housing and Sustainable Urban Development (Habitat III) in 2016, provides a global framework for sustainable urban development. It emphasizes inclusive, safe, resilient, and sustainable cities and human settlements and supports the implementation of the Sustainable Development Goals (SDGs), particularly Goal 11 – *Sustainable Cities and Communities*.

Key principles of the New Urban Agenda include:

1. **Leave No One Behind**: Promoting inclusive urbanization that ensures equal access to opportunities, services, housing, and participation for all, including marginalized groups.
2. **Sustainable Urban Development for All**: Encouraging compact, integrated, and connected cities that use resources efficiently and minimize environmental impact.
3. **Urban Governance and Planning**: Strengthening urban governance through inclusive, participatory decision-making and supporting long-term, integrated urban and territorial planning.
4. **Resilience and Risk Reduction**: Enhancing the resilience of cities to natural and man-made risks, including climate change and disasters.
5. **Local Implementation**: Empowering local authorities with tools, data, resources, and autonomy to effectively implement sustainable urban policies and actions.

Relation of the New Urban Agenda to Transportation Planning

The New Urban Agenda (NUA) provides guiding principles that align closely with sustainable transportation planning efforts in the Meherpur District region:

1. Leave No One Behind – Inclusive Mobility

Transportation planning under the project focuses on equitable access, ensuring marginalized and vulnerable groups can safely and affordably access transport services. This supports the NUA principle of inclusive urbanization by promoting accessibility for all users including pedestrians, cyclists, and public transit-dependent populations.

2. Sustainable Urban Development for All – Compact and Efficient Transport Networks

The project promotes integrated land use and transportation planning to create connected, compact urban and rural settlements. Efficient use of transportation infrastructure reduces environmental impacts, aligns with the NUA's call for resource efficiency, and supports sustainable mobility solutions.

3. Urban Governance and Planning – Participatory and Integrated Decision-Making

By engaging local authorities, communities, and stakeholders in data collection, GIS mapping, and planning processes, the project strengthens governance capacity and participatory decision-making. This leads to long-term, integrated transport and urban planning consistent with the NUA's focus on good urban governance.

4. Resilience and Risk Reduction – Climate-Resilient Transport Systems

Incorporating climate adaptation and disaster risk mitigation into transportation planning addresses the NUA's priority to build resilient cities. Simulations of disaster scenarios and evacuation planning enhance the ability of transport infrastructure to withstand shocks.

5. Local Implementation – Empowering Local Authorities

The project enhances local authorities' capacity through real-time data sharing, GIS database management, and training, empowering them to effectively implement sustainable transport policies and adapt plans over time, consistent with the NUA's emphasis on local action.

2.2 Spatial Translation of National Level Policies

2.2.1 Land Use Guidelines and Implications of the National Land Use Policy

Bangladesh is a major agricultural country. Agriculture is the livelihood of one-third of the people of this country. Therefore, the importance of land and water resources in Bangladesh is immense. Land is the basic natural resource that is the source of all the daily necessities of human beings such as food, industrial products, luxury, health protection materials, etc. Due to the increase in population, the amount of land per capita is decreasing day by day. Agricultural land is shrinking due to urbanization and other land uses. To safeguard the use of its land resources, particularly the valuable agricultural land of the country, the government in 2001 declared the National Land Use Policy. The policy proposed for the preparation of national land use plan, which is very much relevant to the current comprehensive plan of the Upazila. The land use plan is to be based on the criteria of land productivity, land capability and land suitability, use and requirement of land by agriculture, forestry, industrialization, recreation and open spaces, wetlands, urbanization and housing.

- Important guidelines of land use policy are as follows:
- Construction of multi-storied buildings instead of single-storied buildings should be encouraged to ensure optimum utilization of land used for housing.
- As far as possible flood control barriers/dams will be used as roads.
- It should be ensured that dam establishment does not cause waterlogging.
- The use of agricultural land should be limited to agricultural activities as much as possible.
- Family-wise land ceiling should be fixed for housing in urban areas.
- Instead of developing housing areas by acquiring land for housing in urban areas, measures will be taken to adopt practical strategies.
- Homesteads and fertile agricultural land should be avoided as much as possible for the construction of roads and highways.
- New industrial plants can be established near Industrial Zones. But care should be taken not to damage homesteads and fertile agricultural land.
- Only industrial plants of particular nature can be set up in the area identified for setting up similar industrial plants.
- Change in the category of land earmarked for forest should be prevented.

The policy emphasizes on the planned and the best use of land, and stressed on the most intensive use of this scarce resources of the country. The policy aims to introduce 'land use zoning' based on particular characteristics of land, prevent unplanned expansion of residential areas and control of indiscriminate growth of industrial and commercial activities. In absence of execution, the situation in land use and land management is severely being deteriorated.

2.2.2 Land Use Guidelines and Implications of National Land Transport Policy

A prerequisite for development is strong infrastructure. Land transport policy is essential to ensure adequate physical and institutional infrastructure of transport for national development. Roads and transport are an integral part of human life. In pursuit of livelihood, the people of Bangladesh spend a significant amount of time and money on commuting and transportation in their limited lives. Therefore, the National Land Transport Policy has been formulated in the light of the Government's commitment to establish a safe, affordable, modern, technologically sound, environment friendly and acceptable transport system in the light of globalization.

Important guidelines of the National Land Transport Policy are as follows:

- Providing safe and reliable transportation services.
- Removal of unnecessary regulation and formulation of regulations conducive to providing transport services in the public interest.

- Rent control.
- Identify the role of public and private sector.
- Maintaining economic and environmental balance.
- Ensuring maximum utilization of government funds as well.
- Expanding role of transport in growing economic activity.
- Reduction in transportation cost for export products as well.
- Traffic growth is consistent with economic development.
- Formulation of transport system for Dhaka metropolis.
- Introduction of centralized transport system.
- Introduction of alternative transport systems.
- Creating awareness about better living and safety.
- Poverty alleviation.

The project's activities—such as conducting reconnaissance and physical feature surveys, engaging with local authorities and communities, and preparing development plans in both Bangla and English—align with the NUA's core principles of participatory planning, social inclusion, and spatial justice. The emphasis on collecting data related to infrastructure, land use, population distribution, and environmental features further supports integrated and equitable urban development strategies.

Chapter 3
Methodology

Chapter 3: METHEDOLOGY

The objectives of the traffic survey are two folds. Firstly, it provides idea about the existing traffic demand available supply in the form of infrastructure and services. Secondly, it acts as the input for the travel demand forecasting model that is to be constructed as the output of the project which has enabled Project Team to analyze various traffic scenarios with respect to changed network as well as land use scenarios. The following sub sections elaborate the survey requirements along with the survey design.

3.1 Project Planning and Mobilization

3.1.1 Mobilization

i. **Personnel Deployment**

- **Team Formation**: Assembled a team of experts, including transportation engineers, surveyors, data analysts, GIS specialists, and project managers. Each member was assigned specific roles to ensure effective project execution.
- **Roles and Responsibilities**: Clearly defined the roles and responsibilities of each team member, including tasks related to data collection, analysis, model development, and training. This clarity helped in efficient task management and coordination.

ii. **Project Management Plan**

- **Milestones and Deliverables**: Established key milestones and deliverables with specific deadlines to monitor progress and ensure timely project completion. Examples include deadlines for data collection phases, model development stages, and final report submission.
- **Resource Allocation**: Allocate resources, including manpower, equipment, and budget, to support various project activities. Ensure that resources are utilized efficiently and effectively to achieve project goals.

iii. **Initial Meeting**

- **Stakeholder Engagement**: Conducted initial meetings with local stakeholders such as the Mayor, Union Parishad (UP) Chairman, and Councillors. This meeting introduced the project, gather local insights, and secure stakeholder support, facilitating smoother project implementation.
- **Local Insights**: Gathered information on local transportation issues, infrastructure needs, and community concerns. This engagement helped tailor the project to address specific local needs.

3.1.2 Reconnaissance Survey

The **Reconnaissance Survey** for the transportation study in Meherpur District is an essential early step that helps gather preliminary information, identify key issues, and set the foundation for detailed surveys. Below is a detailed approach to conducting the reconnaissance survey:

Objectives of the Reconnaissance Survey:

1. **Preliminary Assessment:** Identify major transportation routes, infrastructure, and facilities in Meherpur District.
2. **Stakeholder Engagement:** Engage with local authorities, representatives, and communities to understand local transportation needs, priorities, and challenges.

3. **Identification of Key Issues:** Identify potential bottlenecks, congested areas, critical junctions, and locations requiring immediate attention or further investigation.
4. **Preliminary Data Gathering:** Collect initial data on traffic flow, road conditions, transport infrastructure, and socio-economic factors impacting transportation.

Steps carried out in Conducting the Reconnaissance Survey:

1. **Mobilization of Survey Team:**
   - Deploying key personnel, including project managers, surveyors, GIS specialists, and data analysts.
   - Providing training on the objectives, methodology, and scope of the survey.
   - Ensuring all survey equipment, including GPS devices, cameras, and data collection forms, are ready for use.
2. **Initial Site Visit:**
   - Conducting field visits to key transportation nodes like highways, local roads, bus stations, and intersections.
   - Observing and record road conditions, traffic flow, and infrastructure status (e.g., bridges, culverts, signage).
   - Taking photographs and geo-tag locations to build an initial database.

Figure 1: Condition of Footpath in Gangni

Figure 2: Road Condition of Gangni Upazila Bazar

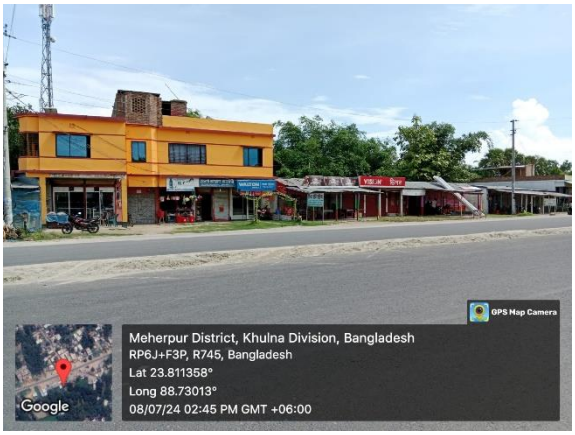


Figure 3: Condition of Road Median in Kushtia-Meherpur Highway

Figure 4: Condition of village road in Meherpur

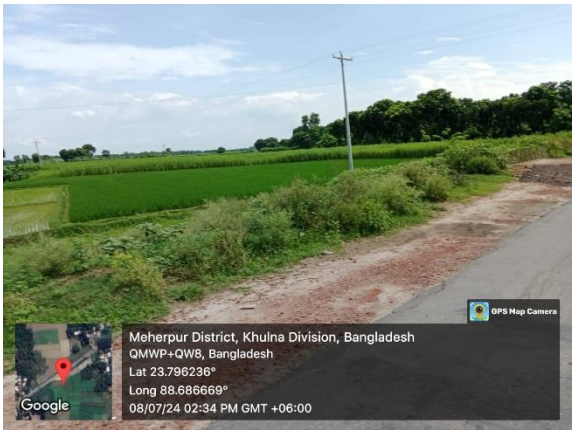


Figure 5: Condition of Road Edge in Kushtia-Meherpur Highway

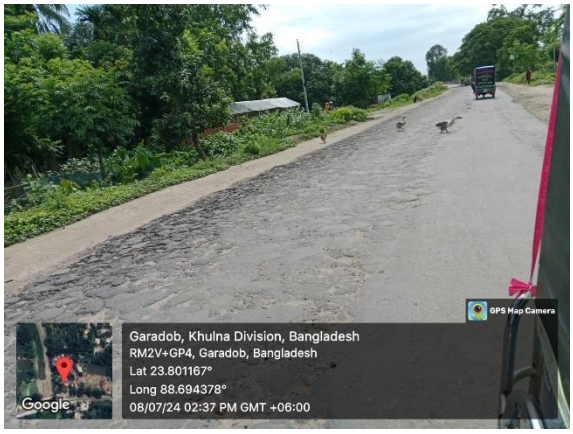


Figure 6: Condition of Road Edge in Garadob

Figure 7: Condition of Bridge in Kushtia-Meherpur Highway

Figure 8: Condition of under-construction Gopalpur Bridge in Kushtia-Meherpur Highway

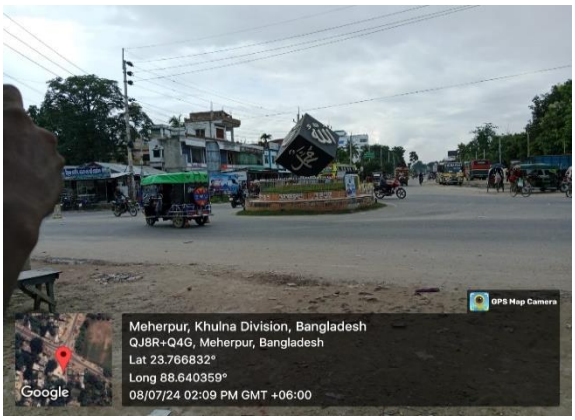


Figure 9: Important intersection in Chuadanga-Meherpur Highway

Figure 10: Condition of T-intersection in Garadob

3. **Stakeholder Meetings:**
    - Holding meetings with local authorities, community leaders, and other stakeholders.
    - Discussing transportation challenges, priorities, and opportunities.
    - Gathering local knowledge about transportation issues, such as road safety, congestion points, and seasonal problems (e.g., flooding, road wear).

Figure 11: Upazila Engineer, Mr. Sabbir-Ul-Islam, Meherpur Upazila Parishad and Consultant Team

4. **Focus Group Discussions (FGDs):**
    - Organizing FGDs with local residents, transport operators, and business owners.
    - Discussing transportation-related challenges, travel behavior, and local needs.
    - Gathering qualitative insights on transport demand, public transport usage, and freight movement.

Figure 12: Focus group discussion with Bus Drivers

Figure 13: Focus group discussion with Auto Drivers

5. **Tea stall meeting:**

A tea stall meeting was held near Gangni Chottor, involving participants engaged in various informal professions within the area. The participants identified several challenges and proposed solutions, summarized as follows:

a. Educational Institutions:

The participants emphasized a lack of quality primary education institutions in the region. Additionally, they expressed a strong preference for establishing a public university in Meherpur to enhance educational opportunities.

b. Congestion and Infrastructure Issues: The area around Gangni Chottor is heavily congested due to informal economic activities on footpaths and poor road conditions. A significant portion of the highway is obstructed by easy bike parking, further worsening traffic flow. The participants recommended expedited road reconstruction and the organized relocation of informal activities to ensure proper traffic management and a well-maintained environment.

c. Healthcare and Economic Development:
The participants stressed the need for improved healthcare facilities and enhanced income opportunities.

One attendee noted that agriculture and foreign remittances are the primary sources of income for the Gangni area, underscoring the importance of supporting these sectors for sustainable growth.

Figure 14: Tea stall meeting

6. **Data Collection on Traffic Volume and Flow:**
   - Conducting preliminary traffic counts at selected key points (e.g., busy intersections, markets, transport hubs).
   - Observing and preparing document for traffic types (passenger, freight, non-motorized transport) and peak traffic hours.
7. **Identification of Critical Locations:**
   - Identifying areas that require urgent attention or further investigation, such as:
     - Overcrowded junctions or intersections
     - Roads with poor maintenance or infrastructure gaps
     - Areas with high accident rates or road safety issues
     - Inadequate public transportation services or coverage
8. **Environmental and Socio-Economic Factors:**
   - Gathering basic socio-economic data that may influence transportation, such as population density, employment centers, economic activities, and accessibility to services.
   - Observing environmental factors that may impact transportation, such as agricultural zones with heavy transport usage.

3.1.3 Survey Stations/ Locations

Consulting team has performed reconnaissance survey on the following sites:

- Chowgacha, Gangni
- Vatpara (Kuthi)
- Tentulbaria
- Kumaridanga West
- Kumaridanga
- Rajapur
- Rajarpara Hemayetpur
- Hemayetpur Bazar
- Charchara Bazar
- Baradi Bazar
- Kutirghat, Ujolpur
- Borobazar, TNT More
- Mohajanpur Bazar
- Gopalnagar, Shibpur
- Bisshonathpur Koborsthan More
- Koborsthan More, Shibpur
- Kulbaria

3.1.4 Considerations for site selection

- The site was selected in such a way that the traffic can be counted easily without any interruption.
- Those counting spot was selected which was clear view of vehicles travelling in both directions of the road.
- A vantage point (e.g. an elevated space, Market place, Foot-over Bridge, a suitable veranda of a residential building etc.) for counting was given preferable.
- Safety and security of the surveyors was ensured.
- For OD and Traffic Count Survey site was selected where there were proper facilities such as: toilet and wash room, hotel, restaurant, tea stall etc.
- Contact with the police station was ensured by consultant team to avoid any uncertain situations.

3.1.5 Survey Equipment

The consultant team arranged all necessary survey equipment: wristwatch, sufficient pen, notepad, boards, cap, safety vests, transport costs, umbrella, banner and all these provided to surveyors.

3.1.6 Approval from PD

After the all-necessary arrangement and detail survey plans the consultant team discussed with Project Director, Ahmed Akhtaruzzaman, UDD for approval before mobilizing the survey activities.

3.1.7 Field Team Training

- Training on the use of digital tools, data collection techniques, and engagement protocols will be done.
- Conducted mock surveys to refine the team's approach and address potential challenges.

3.1.8 General Requirement During Survey Period

- The following requirements were taken into consideration during the entire survey period.
- Chairs or other seating arrangement was provided
- Lightening arrangement was ensured with backup power for uninterrupted work at night
- Cap, safety vests, working shoes was provided to surveyors.
- A Banner of the project was provided and placed beside surveyors
- For O-D Local Police assistance was ensured.
- Photos was taken regularly of work progress in the presence of survey supervisor
- Survey activities should not be done on weekends by all means. So all survey was conducted on weekdays.
- Raw data was collected from each survey team of each location in the presence of supervisor and consultant team

Data forging or malpractice was checked.

3.2 Surveys and Studies

The methodology adopted for conducting the transportation surveys has been carefully designed to reflect the characteristics of the existing road network, traffic conditions, and local travel behavior within Meherpur District. Each component of the survey has been tailored to capture relevant data in accordance with the physical and functional properties of the area's transport system. The approach integrates both quantitative and spatial data collection techniques, using digital tools to ensure accuracy, efficiency, and real-time validation. The surveys were implemented through a combination of intersection-based traffic counts, origin-destination studies, household interviews, and site-specific observations—providing a holistic view of travel patterns, infrastructure usage, and freight movement. The following subsections describe in detail the methodology adopted for each type of survey carried out under this study.

3.2.1 Data and Information of Vehicle Registration

In accordance with the project's Terms of Reference, data on vehicle registration was collected directly from the **BRTA office in Meherpur District**. This data includes detailed records of various types of motor vehicles registered within the district over the past several years. The information serves as a key input for understanding the growth trends in motorization and assessing the evolving transportation demand in the project area. The collected data has been systematically compiled and analyzed to identify trends in vehicle types, growth rates, and modal shifts, which are essential for future traffic forecasting and infrastructure planning.

3.2.2 Road Survey

The collection of transportation maps for Meherpur District is vital for understanding the current state of its transportation infrastructure and planning for future needs. These maps provide a detailed visualization of the district's roadways, waterways, public transit routes, and connectivity patterns, forming the foundation for a comprehensive Transportation Master Plan.

3.2.2.1 Road Network Map

The Road Network Map prepared by the Local Government Engineering Department (LGED) is a primary resource for understanding the transportation infrastructure in Meherpur District. This map provides detailed information about the existing road network, including road types, conditions, and connectivity, which are essential for transportation planning and infrastructure development.

Meherpur Sadar Upazila has a good road connectivity through highways leading to Kushtia, Khulna, Dhaka. There is a bus terminal used as the main transit station for the people. The internal roads of Sadar Upazila and Paurashava are relatively good. People uses auto rickshaw, rickshaw for their local transport. There is no railway communication system in Meherpur district. Two railway stations Chuadanga and Alamdanga are used for railway communication with all over Bangladesh. Chuadanga station is 29 KM far from Meherpur and Alamdanga station is 39 KM far from Meherpur Sadar.

Table 1: Road network according to type of road in Meherpur Sadar Upazila

Sl. No.	Road Type	Earthen (KM)	Pavement (KM)	Total Length (KM)
1	Upazila Road:	0.00	70.63	**70.63**
2	Union Road:	0.00	47.29	**47.29**
3	Village Road A:	56.27	204.15	**260.42**
4	Village Road B:	84.49	126.50	**210.99**
	Total Roads:	**140.76**	**448.57**	**589.33**

Source: LGED, 2020

In Gangni Upazila, the internal roads are wide and paved and the condition is very good. A large portion of village roads remains unpaved and consists of earthen surfaces, increase the difficulties, particularly during unfavorable weather conditions. Heavy rains or other adverse weather events turn these roads into muddy tracks, severely hindering traffic flow and causing problems for commuters and the transportation of goods. The poor road infrastructure not only inconveniences residents but also negatively impacts the economic activities of the entire region.

Table 2: : Road network according to type of road in Gangni Upazila

Sl. No.	Road Type	Earthen (KM)	Pavement (KM)	Total Length (KM)
1	Upazila Road:	0.00	71.79	**71.79**
2	Union Road:	0.20	138.76	**138.96**
3	Village Road A:	34.50	137.93	**172.43**
4	Village Road B:	168.70	194.33	**363.04**
	Total Roads:	**203.40**	**542.81**	**746.21**

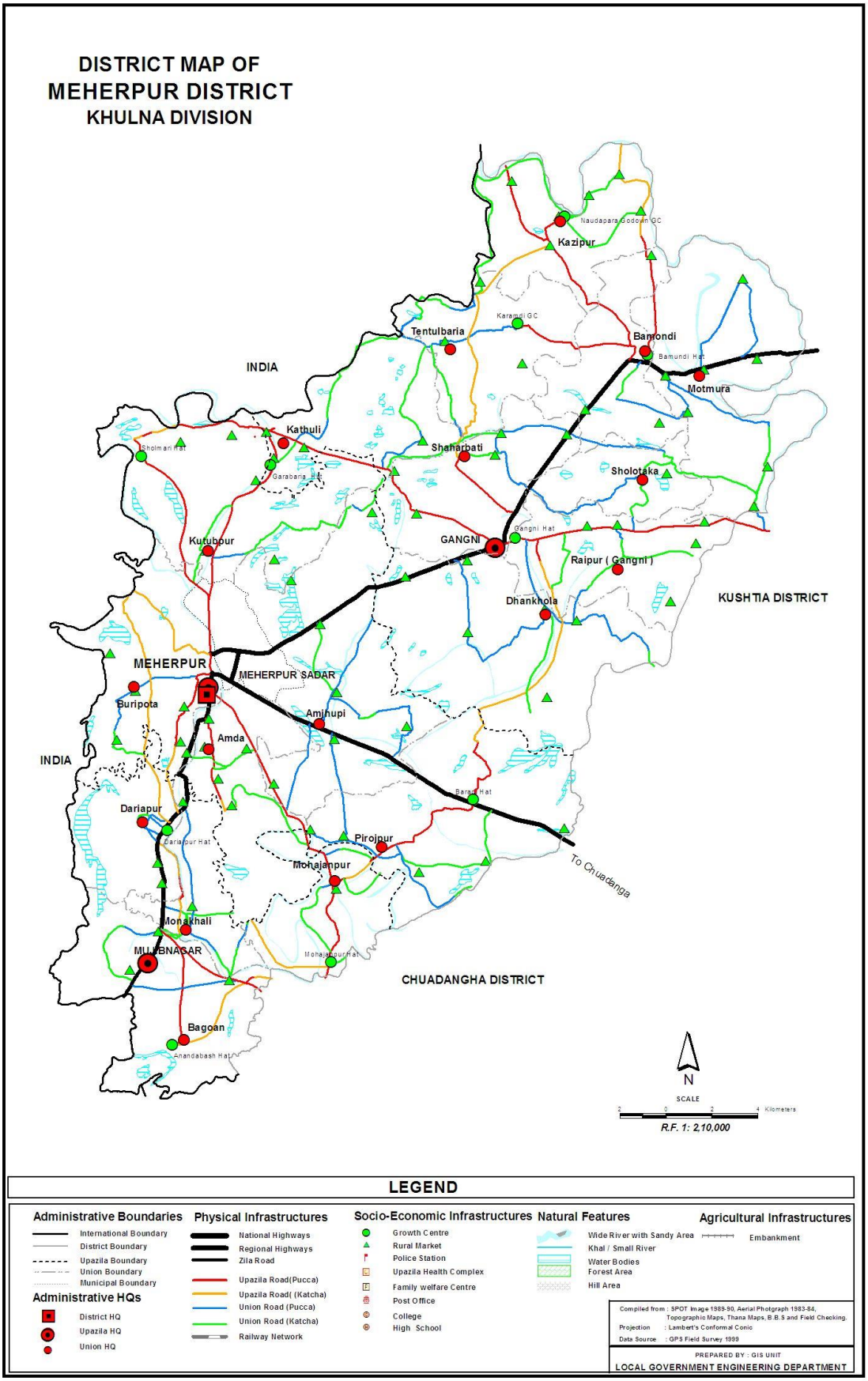
Source: LGED, 2020

The Upazila Road and the Union Road is in very good condition in Mujibnagar upazila. But the some of the village roads are unpaved and earthen. Particularly during adverse weather conditions, the roads become muddy. This situation hampers the smooth flow of traffic, causing difficulties for commuters and hampering the transportation of goods. The inadequate road infrastructure not only leads to inconveniences but also impacts the overall economic activities of the region.

Table 3: Road network according to type of road in Mujibnagar Upazila

Sl. No.	Road Type	Earthen (KM)	Pavement (KM)	Total Length (KM)
1	Upazila Road:	0.00	42.92	**42.92**
2	Union Road:	0.04	26.52	**26.57**
3	Village Road A:	35.34	59.50	**94.84**
4	Village Road B:	37.96	71.25	**109.2**
	Total Roads:	**73.34**	**200.19**	**273.53**

Source: LGED, 2020



Map 3-1: Existing Road Network Map of LGED

3.2.2.2 Rail Network Map

The Rail Network Map of Bangladesh provide crucial insights into the existing railway infrastructure, routes, stations, and connectivity within the country. While Meherpur itself does not have an extensive rail network, it is important to consider nearby railway connections and how they link Meherpur to other districts and major cities. This is essential for transportation planning, infrastructure development, and improving connectivity.

Darshana to Meherpur Rail Project: The Darshana to Meherpur Rail Project aims to enhance the connectivity between the Darshana Junction (located on the main railway line connecting Dhaka and Khulna) and Meherpur. This project would provide significant improvements in transportation, supporting both passenger and freight services, and is critical for promoting socio-economic development in the region.

Following two map shows Bangladesh Railway Network by Corridor and Bangladesh Railway Master Plan (Phase Period 2016-2020).

The Bangladesh Railway Network by Corridor Map provides a comprehensive view of the major railway corridors that connect different regions within Bangladesh.

The Bangladesh Railway Master Plan (Phase Period 2016-2020) was developed to guide the expansion, modernization, and improvement of the railway infrastructure in Bangladesh. The master plan outlines a series of strategic initiatives aimed at enhancing the railway network's capacity, efficiency, and connectivity to support the country's socio-economic development.

These maps show the upcoming Darshana to Meherpur Rail Route. There would be six stations along the line -- at Darshana, Bastopur, Kanaidanga, Mujibnagar, Monakhali and Meherpur.

Map 2: Project Area Overlay Map with Bangladesh Railway Network by Corridor

Source: Bangladesh Railway

Map 3: Project Area Overlay Map with Bangladesh Railway Master Plan (Phase Period 2016-2020)

Source: Bangladesh Railway

3.2.3 Traffic Volume and Origin-Destination (O-D) Survey

To assess the dynamics of transportation demand and infrastructure usage within Meherpur District, **Traffic Volume** and **Origin–Destination (O–D) Surveys** were carried out at strategically selected locations across **major road intersections** and **river ghats**. These surveys were conducted during both **day and night periods**, covering **peak and off-peak hours**, to capture variations in traffic flow and travel behavior across different times of the day.

The primary objective of these surveys was twofold:

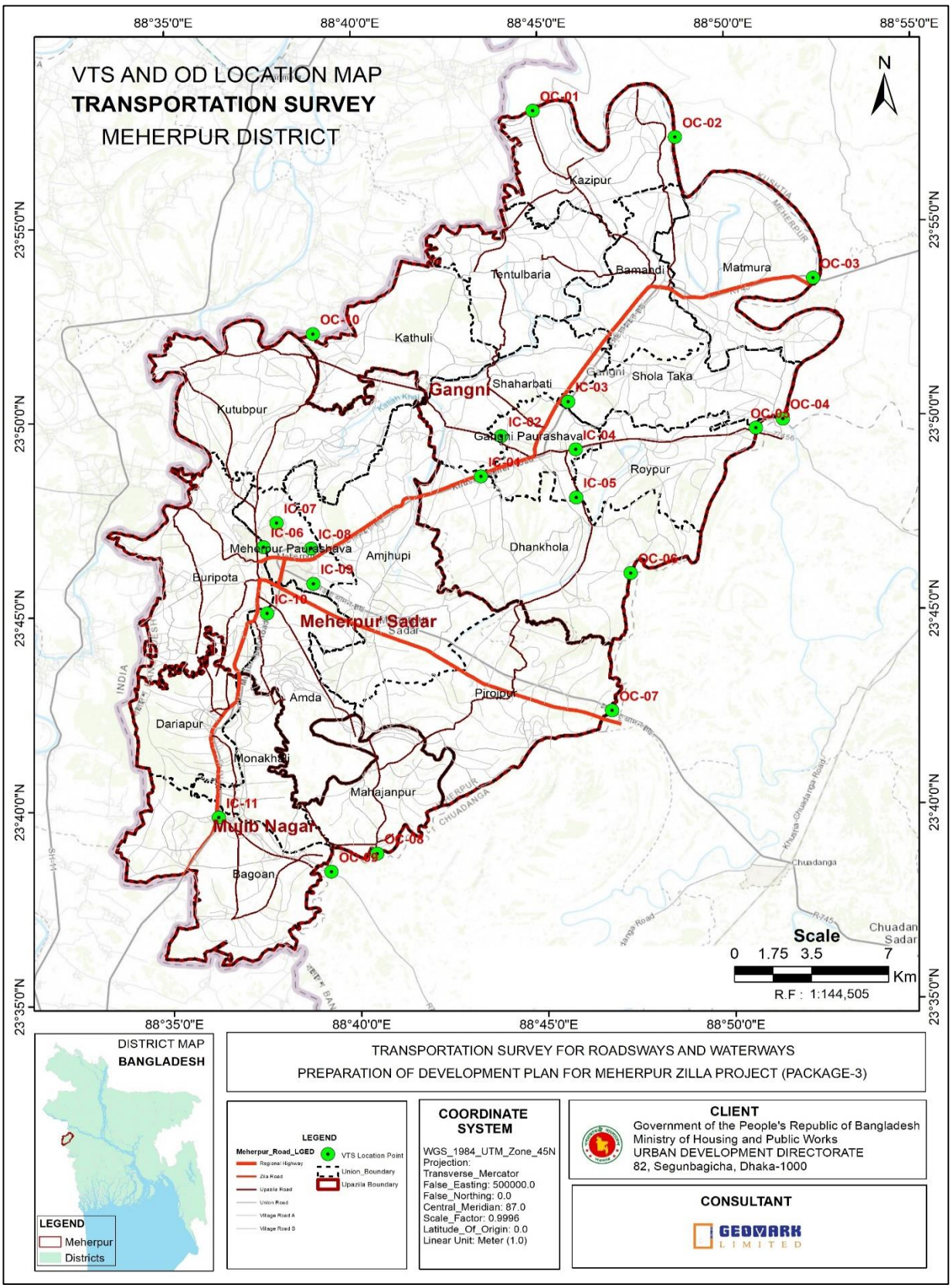
1. **To measure the volume and composition of traffic**, enabling an understanding of congestion levels, travel demand, and road usage intensity.
2. **To capture trip patterns and travel behavior**, identifying where trips are originating from and destined to, in order to inform future planning, zoning, and infrastructure development.

For a systematic and analytical approach, the entire project area was divided into **traffic analysis zones (TAZs)** based on **homogeneity in land use patterns**, such as residential, commercial, agricultural, and industrial zones. This zoning allowed for accurate mapping and correlation of travel flows with land use characteristics.

Traffic volume was recorded by **manual and digital counting methods**, and O–D data were gathered using **questionnaire-based roadside interviews** with drivers and passengers at selected survey points. Data included trip origin, destination, purpose, mode of transport, and trip frequency. All surveyed locations were geo-tagged, and photographs were captured and uploaded via **GIS-enabled tablets** to ensure real-time data validation and accuracy.

To analyze travel demand and assess traffic characteristics in Meherpur District, a comprehensive Traffic Volume Count and Origin-Destination (O-D) Survey was conducted. A total of 21 key survey points were strategically selected based on traffic intensity, connectivity, and functional importance of the road network. Both the traffic volume and O-D surveys were carried out continuously over a 24-hour period, starting from 8:00 AM on the first day to 8:00 AM on the following day. This approach ensured a full capture of daily traffic patterns, including peak and off-peak hours, as well as night-time and early morning traffic. The data collected through these surveys serve as critical input for developing travel demand forecasts, identifying traffic bottlenecks, and informing the transportation planning and infrastructure development strategies for the district.

The following map shows the locations of the Video Traffic Survey and Origin-Destination (O-D) Survey Points across Meherpur District. These 21 strategic points were selected based on traffic intensity, road hierarchy, and connectivity to capture a comprehensive picture of vehicular flow and travel patterns throughout the district.



Map 4: Video Traffic Survey & Origin-Destination Survey Location Map

To ensure accurate and detailed traffic analysis, all vehicles passing through the survey locations were classified into standardized categories. These classifications were essential for capturing the diversity of vehicular movement across the district, including both motorized and non-motorized transport modes. The categorization also supports the development of traffic models and helps in assessing the impact of different vehicle types on road capacity and congestion. The following table presents the vehicle categories used during the traffic volume count, grouped under major headings of non-motorized and motorized vehicles, along with their respective sub-categories and category numbers for reference.

Table 4: Vehicle Categories for Traffic Volume Survey

Vehicle Categories Used for Traffic Volume		
Major Category	Category No.	Sub Category
Non-Motorized	1	Bicycle
	2	Rickshaw/Battery Rickshaw
	3	Rickshaw Van (Peddle/Ba ttery)
	4	Battery Easy Bike/Auto
Motorized	5	Motorc ycle
	6	Motorized 3-wheeler/CN G
	7	Private Car
	8	Utility/4- wheel Drive/Jeep
	9	Human Hauler/Leguna/Tempo
	10	Micro Bus/NO AH
	11	Mini- Bus
	12	Large Bus
	13	Articulated Bus/Double-Decker Bus
	14	SGV/Pickup/Small Covered Van
	15	Medium Truck/MC V (2-Axle)
	16	Large Truck/LC V (3-axle)
	17	Container/Trailer (>3 axle)
	18	Tanker/Tan k Lorry
	19	Others

Camera Setup Process

To conduct the 24-hour video-based traffic volume survey, cameras were strategically installed at selected intersections and road sections across Meherpur District. High-resolution video cameras with night vision capability were mounted on stable poles, tripods, or existing elevated structures such as electric poles or building rooftops to ensure clear visibility of all traffic lanes. Each camera was positioned to capture both incoming and outgoing vehicle movements without blind spots. The setup process included determining the optimal camera height and angle to avoid obstruction and ensure accurate classification and counting of vehicles. Power supply and data storage were secured using portable batteries, and hard disks with sufficient storage capacity to support continuous 24-hour recording. The setup was verified through trial runs during off-peak hours to confirm camera alignment and field of view before the official survey period began. Safety measures and local authority permissions were ensured during installation in public areas.

Figure 15: Video Camera Setup Process

Video Recording Snapshot

The following image presents a snapshot from the video recording conducted as part of the 24-hour traffic volume survey. High-resolution cameras were installed at strategic points to capture continuous footage of vehicular movements across key intersections and road segments in Meherpur District. These recordings served as the primary data source for classifying vehicle types, calculating traffic volumes, and analyzing flow patterns during peak and off-peak hours. The snapshot below illustrates the field of view and recording quality maintained throughout the survey period.

Figure 16: Video Recording Snapshot

Traffic Volume Counting

To ensure accuracy and cross-verification of results, **traffic volume data** was recorded using both **manual and digital counting methods**. Manual counting was performed by trained enumerators using tally sheets and handheld devices, primarily during peak hours and at key intersections where close observation was necessary. In parallel, **digital video recordings** were captured continuously for 24 hours using high-resolution cameras. These recordings were later reviewed to extract detailed vehicle counts, categorized by type and direction. The combination of manual and digital methods allowed for data validation, minimized errors, and ensured comprehensive coverage of traffic flow patterns across all survey locations in Meherpur District.

Figure 17: Manual Video Traffic Counting

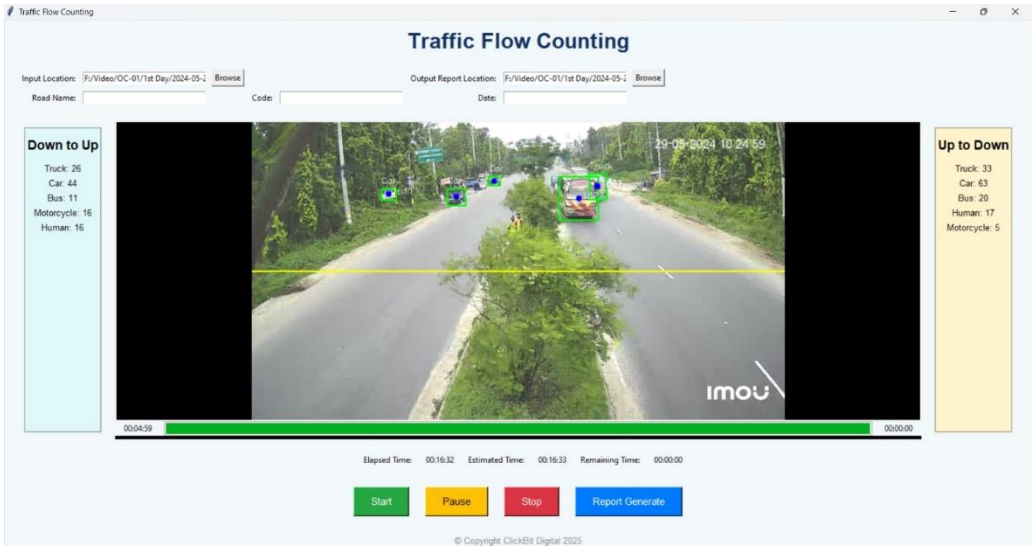
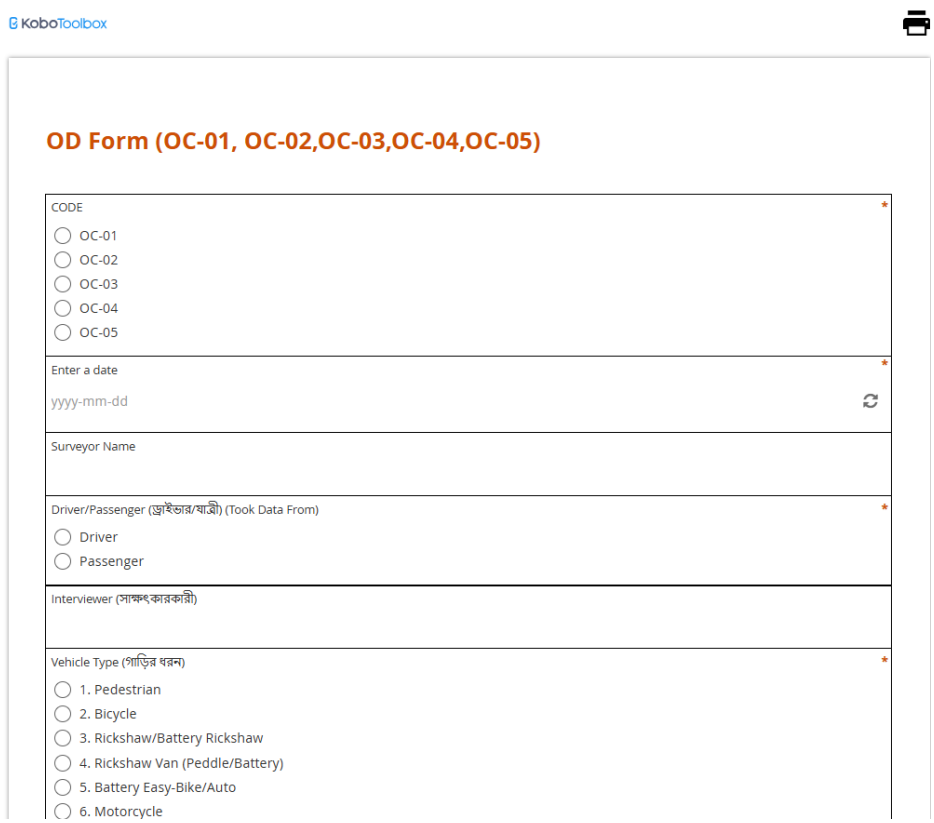


Figure 18: Digital Video Traffic Counting Using Software

OD Survey Entry Form

To facilitate efficient and accurate data collection, the Origin-Destination (O-D) survey form was designed and deployed using the Kobo Toolbox platform. This digital platform enabled real-time data entry using mobile devices, improving data accuracy, consistency, and ease of monitoring. The form was customized to capture essential trip-related information such as origin, destination, purpose of travel, mode of transport, vehicle type, travel frequency, and passenger details. It also allowed for GPS tagging and timestamping, which ensured spatial and temporal integrity of the data. The following screenshot shows the Kobo Toolbox-based digital form used by enumerators during the O-D survey.



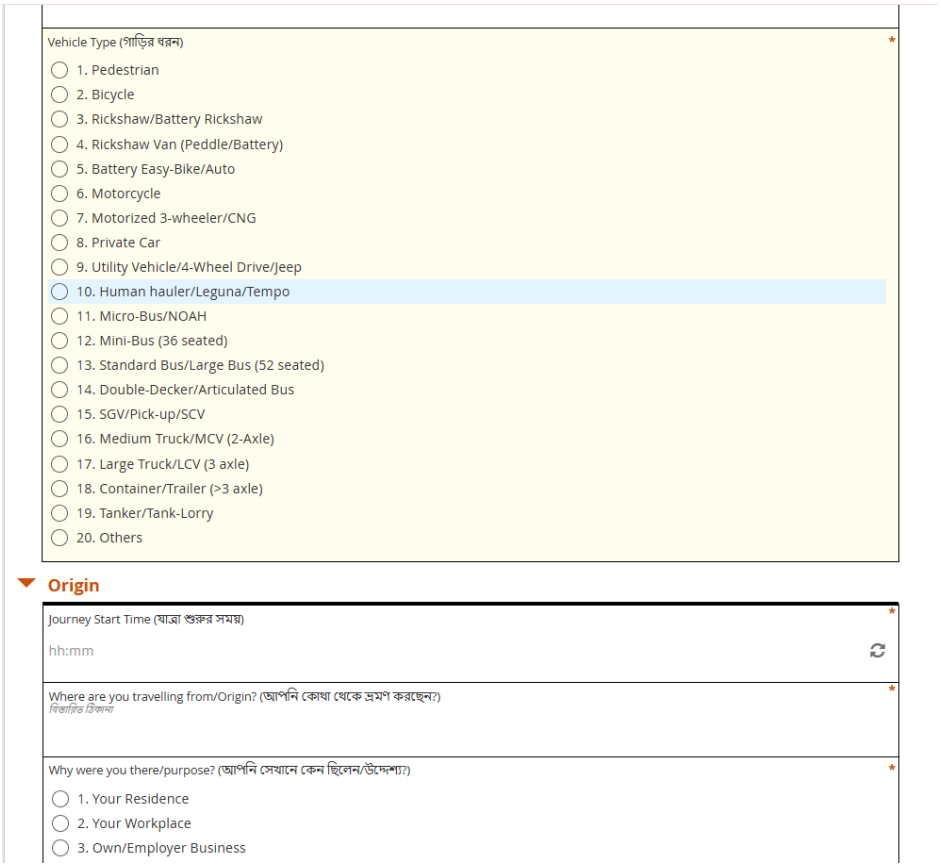
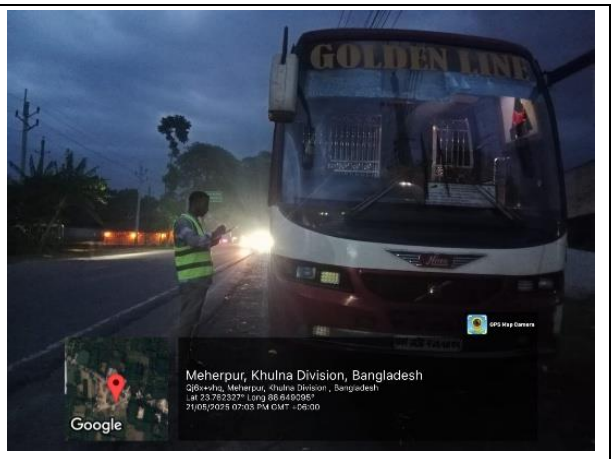


Figure 19: Kobo Toolbox Survey Form for OD Survey

The following images show surveyors in the field actively conducting the Origin-Destination (O-D) survey at various designated locations across Meherpur District. The surveyors engaged directly with travelers and vehicle operators to collect detailed information on trip origins, destinations, purposes, and travel modes. These field activities were carried out with proper identification, supervision, and adherence to survey protocols to ensure the reliability and accuracy of the collected data.

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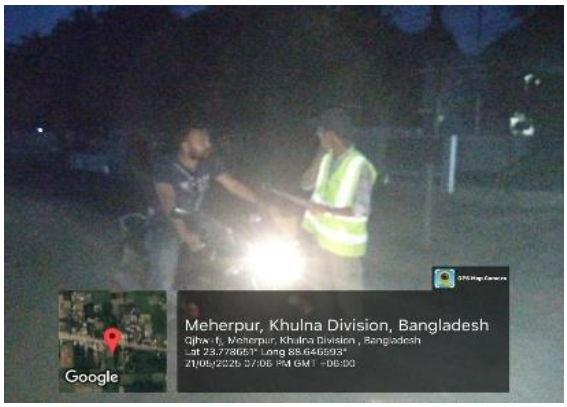
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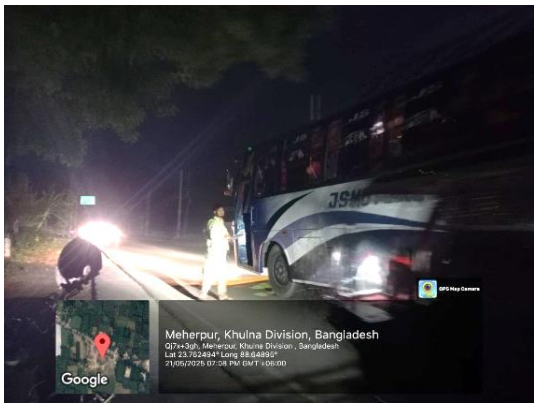
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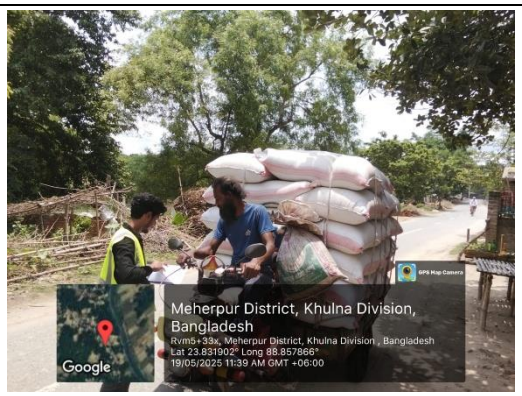


Figure 20: Field Actively For Conducting the Origin-Destination (O-D) Survey

3.2.4 Study of Critical Traffic Junctions

As outlined in the Terms of Reference (ToR), a dedicated survey was conducted to study **critical traffic junctions** within Meherpur District. These junctions represent points of high traffic concentration, potential congestion, and frequent vehicular conflicts, significantly influencing the overall efficiency and safety of the road network. The purpose of this study was to identify these critical nodes, evaluate their current operational conditions, and document challenges such as traffic delays, turning movement conflicts, insufficient road width, poor signalization, or inadequate pedestrian facilities. Data were collected through direct field observation, video recording, and geo-tagged photographs during peak and off-peak hours. Each identified junction was then graphically illustrated, showcasing traffic movement patterns, conflict points, and physical characteristics. These visual representations, combined with analytical observations, provide a basis for recommending design improvements, traffic management strategies, and intersection upgrades essential for the district's long-term transportation planning.

Critical Intersections of Meherpur District

1. **Meherpur Sadar Intersection (Meherpur Bus Stand / College Mor)**
   - **Type:** Major urban intersection.
   - **Significance:** Connects Meherpur town with Gangni, Mujibnagar, and Chuadanga; also key for inter-district buses.
   - **Key Roads:** Meherpur–Chuadanga Road (R745), Meherpur–Mujibnagar Road.
2. **Gangni Bazar Intersection**
   - **Type:** Semi-urban commercial junction.
   - **Significance:** Central hub for Gangni Upazila; connects agricultural hinterlands with Meherpur town and Kushtia.
   - **Key Roads:** Gangni–Kushtia Road, Gangni–Doulatpur Road.
3. **Amjhupi Mor**
   - **Type:** Urban-rural junction near historical site.
   - **Significance:** Access point to Amjhupi Nilkuthi and links Sadar with outlying areas.
   - **Key Roads:** Meherpur–Amjhupi–Gangni link road.
4. **Mujibnagar Memorial Intersection (Bhaberpara)**
   - **Type:** Strategic historical route junction.
   - **Significance:** Connects to the Mujibnagar Memorial Complex; important for tourism and inter-upazila traffic.

- **Key Roads:** Mujibnagar–Meherpur Road.

5. **Kazipur Mor (on Meherpur–Mujibnagar Road)**
   - **Type:** Rural growth node.
   - **Significance:** Link between Meherpur town and the Indian border areas; also used by agricultural and light transport vehicles.
6. **Kaliganj Border Point Intersection (Unofficial trade route)**
   - **Type:** Border trade corridor.
   - **Significance:** Often used informally for cross-border movement with West Bengal, India.
   - **Key Roads:** Mujibnagar–Kaliganj Border Road.
7. **Amdah Mor (intersection on Meherpur–Gangni Road)**
   - **Type:** Important rural node.
   - **Significance:** Connects agricultural zones and cold storage facilities; used for produce transport.
   - **Key Roads:** Gangni–Meherpur highway branch.
8. **Bamondi Intersection (Gangni Upazila)**
   - **Type:** Market-centered node.
   - **Significance:** Weekly haat activity, junction for intra-upazila roads leading to Kushtia District.

Prioritization Criteria:

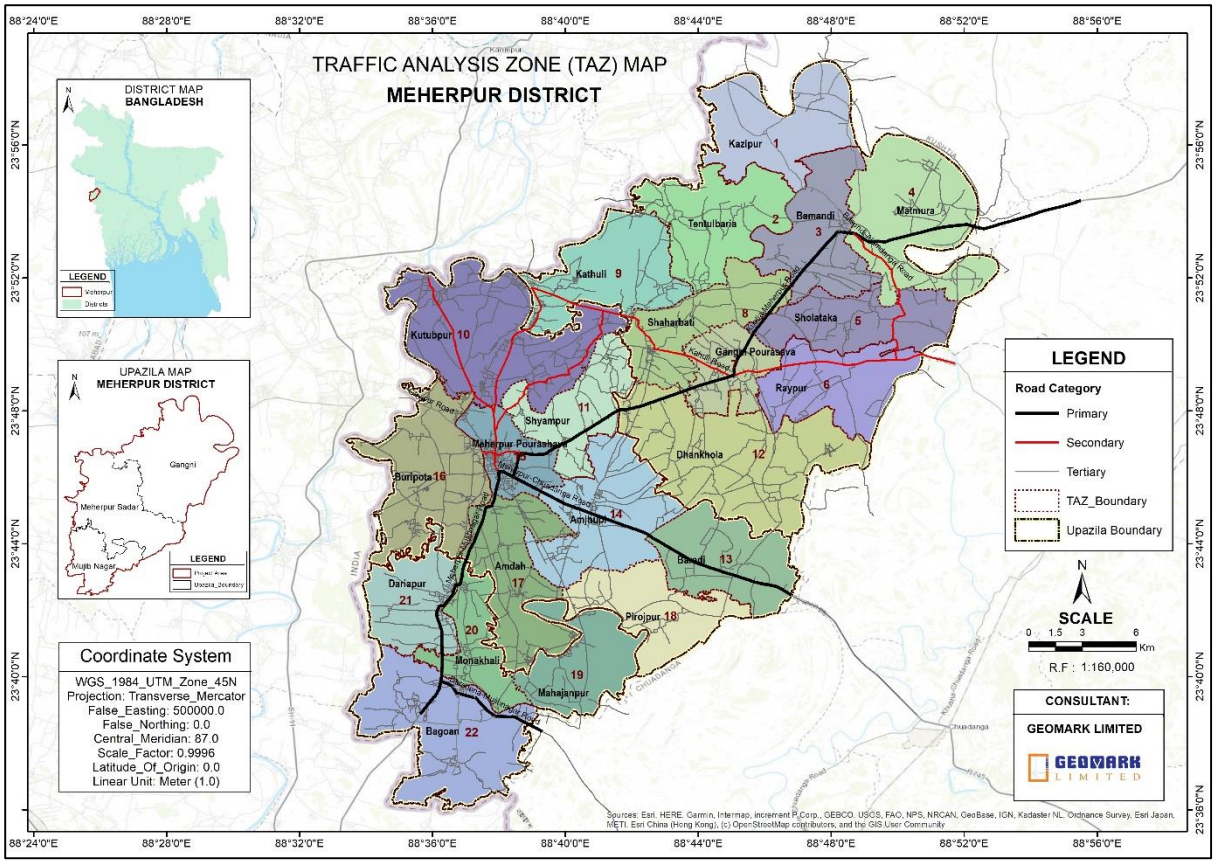
These intersections were identified based on:

- Volume of traffic (especially trucks, buses, and motorcycles)
- Connectivity to upazila headquarters and regional centers
- Proximity to markets, institutions, and border areas
- Strategic importance for inter-district and cross-border movement

3.2.5 Trip Generation Survey & Travel Behavior Study

Trip Generation Survey was conducted at household level throughout the Meherpur District to quantify the number of trips originating from and terminating in different parts of the project area. The entire area was first divided into traffic analysis zones (TAZs) based on homogeneity of land use, such as residential, commercial, educational, industrial, and agricultural areas. This zoning approach enabled the survey to accurately reflect the variations in trip generation characteristics influenced by land use patterns. Data were collected through household interviews and roadside surveys, capturing key trip-related variables including trip purpose, mode of transport, trip frequency, and travel time. The findings offer crucial insights into mobility demand across different zones, which will serve as a foundational input for transport modeling, infrastructure planning, and prioritization of interventions under the Meherpur District Development Plan.

Traffic Analysis Zone (TAZ) determination: TAZ is defined based on the Union and Paurashava boundaries. Meherpur has 2 Paurashavas and 20 Unions, making a total of **22 TAZs.**



Map 5: Traffic Analysis Zone Map

Travel Behavior Study was undertaken to assess the travel patterns, preferences, and constraints of residents within the Meherpur District. This study was conducted through household interview surveys, which were carried out across various traffic zones delineated based on land use characteristics. The number of survey questionnaires was finalized in consultation with the Project Director (PD) to ensure adequate representation across geographic and socio-economic segments. Key indicators captured in the survey included trip purpose, travel frequency, preferred travel modes, average travel distance and duration, modal shift behavior, and travel-related challenges. This data provides a clear understanding of how people move within the district, enabling the development of demand-responsive transport solutions and infrastructure planning aligned with local needs and behavioral trends.

To capture socio-economic, travel behavior, and infrastructure-related insights at the community level, a Household Interview Survey (HIS) was designed as part of the data collection process. A total of 2,000 households have been targeted as the sample size for this survey to ensure adequate representation across urban, peri-urban, and rural settings within the study area. The questionnaire was carefully structured and deployed using the KoboToolbox platform, enabling digital data collection with real-time validation, improved accuracy, and geo-referencing capabilities.

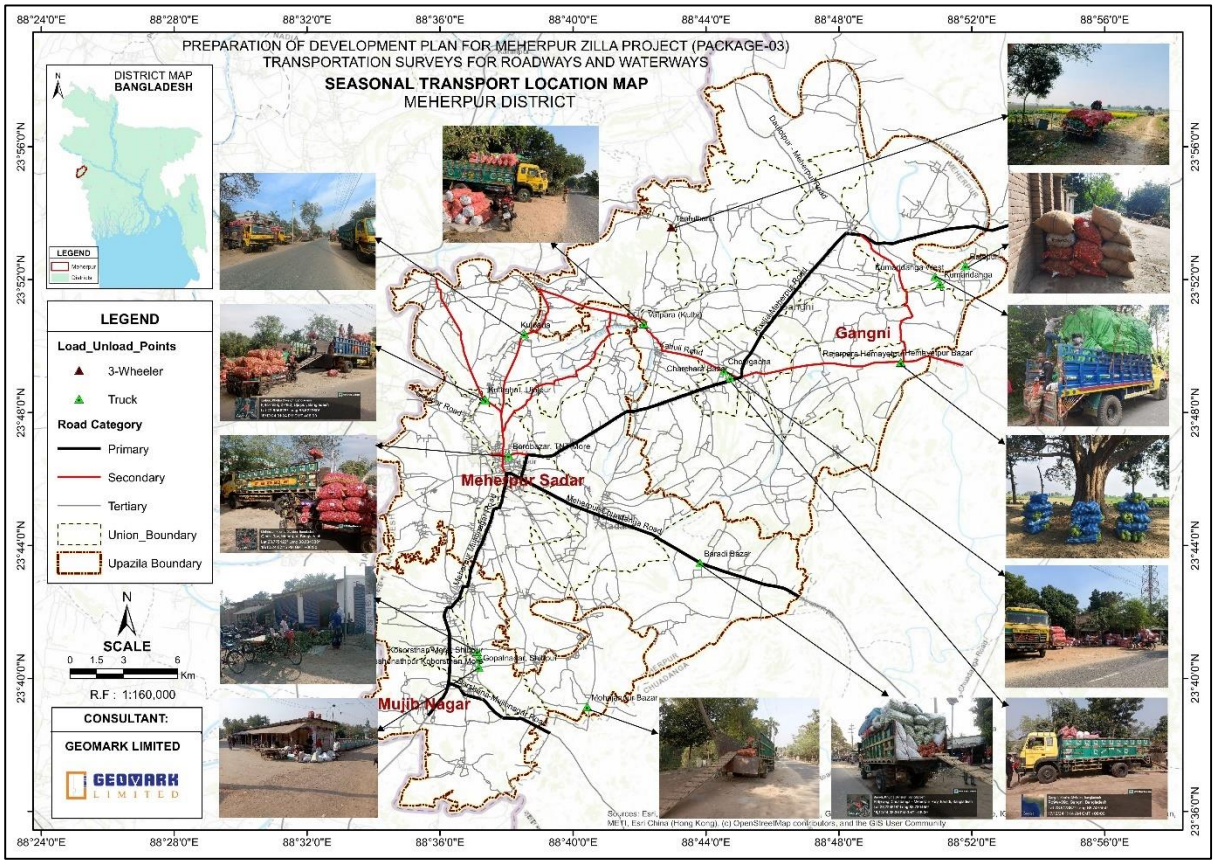
Table 5: TAZ wise Sample Distribution

District Name	Upazila Name	Municipality	Union Name	Taz Name	Sample Size
Meherpur	Gangni		Bamandi	TAZ_3	86
			Dhankhola	TAZ_12	130
			Kathuli	TAZ_9	72
			Kazipur	TAZ_1	123
			Matmura	TAZ_4	139
			Raypur	TAZ_6	66
			Shaharbati	TAZ_8	75
			Sholataka	TAZ_5	73
			Tentulbaria	TAZ_2	101
		Gangni Paurashava	Ward No. 01	TAZ_7	9
			Ward No. 02	TAZ_7	9
			Ward No. 03	TAZ_7	13
			Ward No. 04	TAZ_7	11
			Ward No. 05	TAZ_7	8
			Ward No. 06	TAZ_7	8
			Ward No. 07	TAZ_7	9
			Ward No. 08	TAZ_7	9
			Ward No. 09	TAZ_7	8
	Mujibnagar		Bagoan	TAZ_22	110
			Dariapur	TAZ_21	57
			Mahajanpur	TAZ_19	56
			Monakhali	TAZ_20	60
	Meherpur Sadar		Amdah	TAZ_17	89
			Amjhupi	TAZ_14	101
			Baradi	TAZ_13	70
			Buripota	TAZ_16	110
			Kutubpur	TAZ_10	135
			Pirojpur	TAZ_18	70
			Shyampur	TAZ_11	64
		Meherpur Paurashava	Ward No. 01	TAZ_15	18
			Ward No. 02	TAZ_15	11
			Ward No. 03	TAZ_15	9
			Ward No. 04	TAZ_15	17
			Ward No. 05	TAZ_15	12
			Ward No. 06	TAZ_15	10
			Ward No. 07	TAZ_15	20
			Ward No. 08	TAZ_15	12
			Ward No. 09	TAZ_15	19
Total					**2000**

3.2.6 Goods Movement and Mode of Shipment Study

Goods Movement and Mode of Shipment Study was carried out to understand the nature, volume, and movement patterns of goods within the Meherpur District. As part of the survey **Seasonal Transport Load-Unload Survey** was carried out. The study aimed to capture critical information related to the types of commodities transported, their origin

and destination points, shipment frequency, and the modes of transport used—such as trucks, pickup vans, rickshaw vans, river vessels, and other carriers. Surveys were conducted at key goods transfer points including markets, industrial zones, storage facilities, and river ghats. Data were collected through interviews with transport operators, traders, and logistics service providers. This study provides valuable insights into the freight movement dynamics of the district and highlights logistical bottlenecks, modal dependencies, and potential areas for infrastructure and policy interventions to improve goods transportation efficiency and support local economic activities.



Map 6: Seasonal Vegetable Load-Unload Location map

Seasonal Transport Load-Unload Survey

To understand the impact of seasonal agricultural transport on traffic congestion and logistics operations, a detailed Seasonal Transport Load-Unload Survey was conducted. The survey specifically focused on the movement of trucks transporting perishable goods such as fruits and vegetables, which contribute significantly to periodic spikes in traffic volume in key areas of the district. A structured questionnaire was developed to collect both qualitative and quantitative data from transport operators, drivers, workers, and local stakeholders.

Key aspects covered in the survey include the importance of loading and unloading locations, trip costs, payment methods, operating hours, and the geographic extent of the catchment areas served by these vehicles. Data was also gathered on the volume and frequency of truck operations, and the duration and peak periods of seasonal transport activities.

Importantly, the survey also assessed the impact of the Padma Bridge, which has significantly altered travel time, route preferences, and the operational dynamics of freight transport. The bridge's contribution to improved connectivity and reduced congestion in some corridors, as well as possible diversion of routes, was considered in the analysis.

In addition to transport patterns, the survey evaluated the basic needs of drivers and workers, such as access to food, resting places, and sanitation facilities—factors that directly affect their productivity, health, and road safety.

Furthermore, instances of delivery failures, where goods were not accepted at destination points due to late arrival or spoilage, were documented to assess inefficiencies and propose mitigation strategies.

Finally, the main transport routes used during these seasonal peaks were mapped and analyzed to identify congestion hotspots and infrastructural bottlenecks. This data will support future planning efforts aimed at improving the efficiency and resilience of agricultural supply chains, particularly during peak seasons.

Figure 21: Seasonal Transport Load-Unload Survey

An online questionnaire was carefully designed in Kobo Toolbox and deployed for the data collection process of the Seasonal Transport Load-Unload Survey. The digital format allowed for efficient outreach to a wide range of respondents, including truck drivers, transport operators, traders, and support staff involved in the seasonal movement of perishable goods. The questionnaire included both closed and open-ended questions, covering key aspects such as transport frequency, loading/unloading locations, trip costs, operational hours, logistics challenges, and infrastructure needs. The use of online tools enhanced data accuracy, ensured quicker response collection, and facilitated preliminary data analysis. The following figure shows the screenshot of online questionnaire.

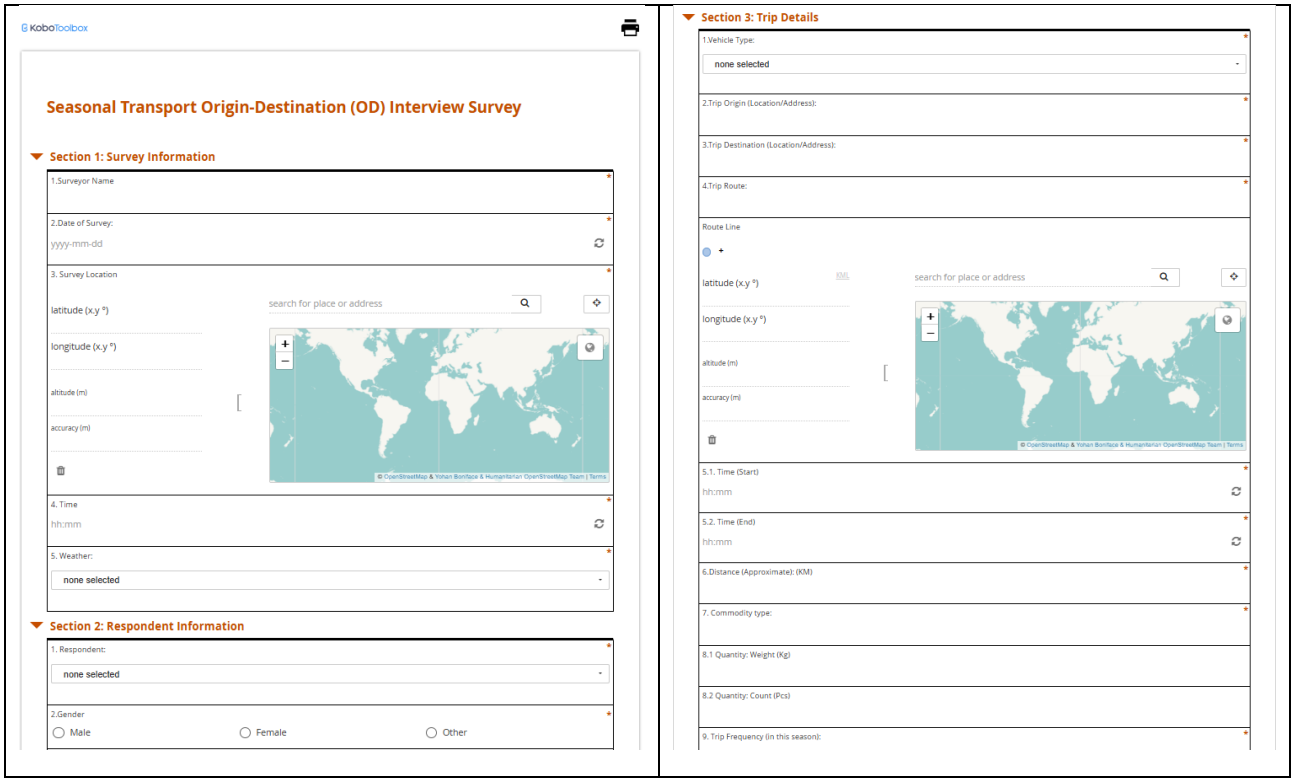


Figure 22: Online Questionnaire for Seasonal Transport Load-Unload Survey

3.2.7 Land Port Study

A comprehensive traffic volume and movement survey has been conducted at key adjacent land port areas—Benapole, Bhomra, and Dharshana. These land ports are significant gateways for cross-border trade and transport, generating substantial traffic flows that directly impact the surrounding project area. The primary objective of this study is to analyze the existing traffic conditions and to forecast future traffic demand generated by these ports. The findings presented here provide crucial insights into traffic patterns and help in planning for infrastructure development and traffic management in the project vicinity.

বাংলাদেশ স্থলবন্দর কর্তৃপক্ষের আওতাধীন স্থলবন্দরভিত্তিক ২০২২-২০২৩ অর্থবছরের যাত্রী গমনাগমনের তথ্যঃ

ক্রম	বন্দরের নাম	আগমন(জন)	বর্হিগমন (জন)	মন্তব্য
১.	বেনাপোল স্থলবন্দর	১০৪৯০০৮	১১১৭১৩০	যাত্রীদের অবস্থান, নিরাপত্তা, মহিলা, শিশু ও প্রতিবন্ধী যাত্রীদের জন্য বিশেষ সুবিধা এবং টয়লেট সুবিধা রয়েছে।
২.	বুড়িমারী স্থলবন্দর	১২১৫৬০	১৩৬৭৩৬	
৩.	নাকুগাঁও স্থলবন্দর	৬০	৬৩	
৪.	বাংলাবান্ধা স্থলবন্দর	২১০১৮	১৮২৮৬	
৫.	ভোমরা স্থলবন্দর	২১৯১২০	২২৯৮৩৮	ইমিগ্রেশন কার্যক্রম বন্দরের বাইরে সম্পন্ন হয় বিধায় যাত্রী ফি আদায় করা হয়না।
৬.	সোনামসজিদ স্থলবন্দর	৮৬১৬	৮৬৬৯	
৭.	হিলি স্থলবন্দর	১২৩৬৪১	১২৮৪৭২	
৮.	আখাউড়া স্থলবন্দর	১৬৯৪২৭	১৭২৭৪৬	
৯.	তামাবিল স্থলবন্দর	৪১১৯৯	৩৮৩৪৩	
১০.	বিবিরবাজার স্থলবন্দর	২৪১৬৩	২৬২৯৫	
১১.	বিলোনিয়া স্থলবন্দর	৩৫৬৭	৪১৭১	
১২.	শেওলা স্থলবন্দর	৪৮৭	৫৯৬	
১৩.	সোনাহাট স্থলবন্দর	০০	০০	ইমিগ্রেশন কার্যক্রম চালু নেই।
১৪.	গোবরাকুড়া কড়ইতলী স্থলবন্দর	০০	০০	
১৫.	টেকনাফ স্থলবন্দর	০০	০০	রোহিঙ্গা সমস্যার জন্য নভেম্বর-২০১৬ মাস হতে যাত্রী গমনাগমন বন্ধ রয়েছে।
	মোট (জন) =	১৭৮১৮৬৬	১৮৮১৩৪৫	

২৬/০৭/২৩

Figure 23: Passenger Information of the Land Port (2022-23 Fiscal Year)

Darshana Land Port currently lacks any infrastructure development. No measures have been undertaken to establish necessary facilities, primarily due to the absence of road connectivity linking the port to the main transport network. As a result, the feasibility of making this land port operational remains uncertain. The final decision regarding its development and operationalization is still pending.

The following figure describes the Export, Import & Passenger Information of Land Port (2023-24 Fiscal Year). This information is collected from Land Port Authority.

বাংলাদেশ স্থলবন্দর কর্তৃপক্ষ

এফ/১৯এ, শেরেবাংলানগর, আগারগাঁও, ঢাকা-১২০৭

বাংলাদেশ স্থলবন্দর কর্তৃপক্ষ এর ২০২৩-২৪ অর্থবছরের আমদানি,রপ্তানি ও যাত্রীর তথ্য:

ক্রম	স্থলবন্দরের নাম	আমদানির তথ্য		রপ্তানির তথ্য		যাত্রী তথ্য (সংখ্যা)		
		ট্রাক সংখ্যা (বিদেশী)	পণ্যের পরিমাণ (মে.ট.)	ট্রাক সংখ্যা (দেশী)	পণ্যের পরিমাণ (মে.ট.)	আগমন (জন)	বহির্গমন (জন)	সর্বমোট(জন)
০১	বেনাপোল	১১৯৪৯৩	২১৩০২২৮	৪৭৮২৮	৪৫৬৬৭২	১০৮০৪৭৪	১১২৫০০৪	২২০৫৪৭৮
০২	ভোমরা	৬৪২৬৬	২৪০২২৮৮	১৪৬৬৬৮	২৭৪১০৭	১৯১৬৮৩	১৮৭৪৫৩	৩৭৯১৩৬
০৩	গোবরাকুড়া-কড়ইতলী	৪৮	৯৬৪	৪৮	০	০	০	০
০৪	সোনাহাট	১৭৪২৪	৮২৫৬০৯	২১৫৭	১৭২৭২	০	০	০
০৫	সোনামসজিদ	৯০২৪৭	৩৭১০৪৭১	৪৬৫৪০	৩২০৩৫	৪৯৬০৬	৪৯৪৪২	৯৯০৪৮
০৬	বুড়িমারী	৭৩২৩৪	২৯৭৬৯৭৭	৭৩৫৫২	১৫০২২৯	৯৫৭৮৪	১০৪৮৫৮	২০০৬৪২
০৭	হিলি	২২৪৫৩	৬৬১১৯২	৩৯৪	৮৭৭৬	১০৯০৭১	১১০২৮৪	২১৯৩৫৫
০৮	বাংলাবান্ধা	৬৪৮৬৯	১৬৮২৫২১	৬৫১০৯	৭৩৩৫৫	৩৮৭২৩	৩৭৫৮০	৭৬৩০৩
০৯	ধানুয়া কামালপুর	১৪০১	২৪৫৫২	১৪১৫	১৩২	০	০	০
১০	বিবিরবাজার	৪৬৯	২৬৫০	৪৮৪৩	৮৯৭৭৫	৪০৬২৩	৪১৩১৫	৮১৯৩৮
১১	আখাউড়া	১৫৯৯	৩৪৮০২	৭০৬৫	৫৫৩২০	১৫৯৯১৬	১৪৫৫৭৮	৩০৫৪৯৪
১২	বিলোনিয়া	১১	৩৬	৪২০১	৯২৪২২	৭৩৩৭	৬৯০৯	১৪২৪৬
১৩	নাকুগাঁও	৯৭৪৯	৩৯১১৩৭	১০৭৮৯	১৫০	৭৩৯০	৮১১৫	১৫৫০৫
১৪	টেকনাফ	৮৫২৪	৭৯৯৬৬৬	০	১৪০৮			
১৫	শেওলা	৪২৫৫৭	৯৫৬০৫২	৪৩৬১৭	৭২৯৩	৮০৮৭	৮০২৫	১৬১১২
১৬	তামাবিল	১৩১২০	১১২৭৯১	৫১১০	২৯	৫৩০৩	৫৫২৪	১০৮২৭
	মোট	৫২৯৪৬৪	১৬৭১১৯৩৬	৪৫৯৩৩৬	১২৫৮৯৭৫	১৭৯৩৯৯৭	১৮৩০০৮৭	৩৬২৪০৮৪

17.09.24
রতন সরকার
সহকারী পরিচালক (প্রশাসন)

Figure 24: Export, Import & Passenger Information of Land Port (2023-24 Fiscal Year)

Source: Land Port Authority

Comprehensive data on export, import, and passenger movements through major land ports over the past five fiscal years (2019–20 to 2023–24) has been collected. This information has been collected from the official records of the Bangladesh Land Port Authority (BLPA). The data provides valuable insights into trade trends, port activity levels, and cross-border passenger flow, which are essential for evaluating the operational performance and future potential of land ports in the region.

Chapter 4
Traffic Survey Findings

Chapter 4: TRAFFIC SURVEY FINDINGS

4.1 Vehicle Registration Data

The vehicle registration data collected from the BRTA office of Meherpur District provides valuable insights into the nature and extent of motorization in the area. As of the reporting date, a total of **46,675 vehicles** have been registered in Meherpur, spanning a wide variety of classes that reflect both personal and commercial transport needs. The following table presents the findings of the vehicle registration for Meherpur District.

Table 6: Class Wise Vehicle Number

Sl. No.	Vehicle Class Name	No. of Vehicle
1.	Baby Taxi 3 Seat	3
2.	Pvt. Pass. (Jeep / St. Wagn)	32
3.	Heavy Public Goods	68
4.	Special Purpose Vehicle	3
5.	Private Service Microbus	4
6.	Agricultural Vehicle	45
7.	Dual Purpose Vehicle	18
8.	Delivery Van	1
9.	Public Service Minibus	56
10.	Light Public Goods	27
11.	Medium Public Goods	14
12.	Medium Private Goods	2
13.	Motor Cycle (Medium)	28,962
14.	Motor Cycle (Large)	16,457
15.	Public Service (Microbus)	71
16.	Auto Rickshaw	1
17.	Motor Cycle (Small)	855
18.	Auto Tempo (Private)	1
19.	Motor Car (Small)	1
20.	Private Passenger. Microbus	4
21.	Light Private Goods	12
22.	Heavy Private Goods	4
23.	Auto Tempo (Public)	1
24.	Motor Car (Large)	5
25.	Health Service Vehicle	4
26.	Public Service Omnibus	14

27.	Public Tank Lorry	10
	Total Vehicle	**46,675**

The analysis reveals that **two-wheeler motorcycles dominate the registered vehicle fleet**, accounting for the vast majority of all vehicles. Specifically, **medium motorcycles** number **28,962** and **large motorcycles** number **16,457**, jointly comprising more than **97% of the total registered vehicles**. This overwhelming dominance of motorcycles indicates a strong preference for low-cost, flexible, and efficient personal mobility solutions in both urban and rural settings of the district.

In contrast, the number of **private cars (small and large)** and **light private vehicles** is significantly lower, indicating limited ownership of higher-capacity private vehicles, possibly due to affordability or infrastructure constraints. Similarly, **public transport vehicles** such as **microbuses (71)**, **minibuses (56)**, and **public service omnibuses (14)** are relatively few, suggesting either underutilization of formal public transport systems or dependency on informal modes like auto-rickshaws and motorcycles for commuting.

Goods vehicles, including **heavy public goods (68)**, **medium public goods (14)**, **light public goods (27)**, and **light private goods (12)**, also show modest figures, reflecting the scale and structure of local economic activity. The presence of **agricultural vehicles (45)** and **special-purpose vehicles** signifies the importance of the agricultural sector and other specialized services within the district.

The data also reveals a very limited number of **delivery vans**, **auto tempos**, and **health service vehicles**, indicating potential areas for service improvement, particularly in last-mile delivery and emergency transportation.

Overall, the data illustrates that Meherpur District's transportation landscape is **heavily reliant on two-wheelers**, with **limited diversification** in terms of other vehicle types. This trend has important implications for transportation planning, particularly in areas of traffic safety, infrastructure design, public transport development, and environmental sustainability. The findings from this data will feed into broader travel demand forecasting and help shape effective interventions under the proposed Development Plan for Meherpur Zilla.

4.2 Traffic Volume and Origin and Destination (O-D) Survey

To ensure the accuracy, reliability, and completeness of traffic flow data, traffic volume counting was conducted using a dual-method approach—combining manual counting with digital video recording techniques. Manual traffic counts were carried out by trained enumerators stationed at strategic intersections and road segments, particularly during peak periods. Enumerators utilized tally sheets and handheld devices to record vehicle movements, ensuring detailed categorization by type and direction. Simultaneously, high-resolution video cameras were deployed for continuous 24-hour monitoring, capturing traffic patterns across day and night.

These video recordings were subsequently analyzed to extract precise vehicle counts and validate the manual data, significantly reducing potential counting errors and observer fatigue. This blended approach enabled a robust and comprehensive understanding of traffic dynamics across survey locations in Meherpur District. The following table presents the 24-hour traffic volume summary for the IC-05 location, situated along the Gangni to Dhankhola Road—a critical link in the regional transport network.

Table 7: Summary of Traffic Counting for IC-05 Location

Name of Road: Gangni to Dhankhola Road				**Code**	IC-05
Category	**Sl**	**Sub-Category**	**Direction**		**Grand Total**
			Gangni To Dhankhola Road	**Dhankhola Road To Gangni**	
Non-Motorized	1	Bicycle	76	52	**128**
	2	Rickshaw /Battery Rickshaw	0	0	**0**
	3	Rickshaw Van (Peddle/Battery)	498	466	**964**
	4	Battery Easy Bike/Auto	131	120	**251**
Motorized	5	Motorc ycle	911	944	**1855**
	6	Motorized 3-wheeler/CN G	126	128	**254**
	7	Private Car	5	5	**10**
	8	Utility/4- wheel Drive/Jeep	0	10	**10**
	9	Human Hauler/Leg una/Tempo	0	5	**5**
	10	Micro Bus/NO AH	11	11	**22**
	11	Mini- Bus	0	0	**0**
	12	Large Bus	0	0	**0**
	13	Articulated Bus/Double -Decker Bus	0	0	**0**

	14	SGV/Pickup /Small Covered Van	4	5	**9**
	15	Medium Truck/MC V (2-Axle)	14	3	**17**
	16	Large Truck/LC V (3-axle)	0	0	**0**
	17	Containe r/Trailer (>3 axle)	0	0	**0**
	18	Tanker/Tan k Lorry	0	0	**0**
	19	Others	8	7	**15**

The following table presents the 24-hour traffic volume summary for the IC-04 location, situated along the Purbo Malshadho Road, Gangni.

Table 8: Summary of Traffic Counting for IC-04 Location

Name of Road: Purbo Malshadho Road, Gangni				**Code**	IC-04
Category	**Sl**	**Sub-Category**	**Direction**		**Grand Total**
			Hat Boalia To Gangni	**Gangni To Hat Boalia**	
Non-Motorized	**1**	Bicycle	135	137	**272**
	2	Rickshaw /Battery Rickshaw	0	1	**1**
	3	Rickshaw Van (Peddle/Battery)	649	622	**1271**
	4	Battery Easy Bike/Auto	129	118	**247**
Motorized	**5**	Motorc ycle	1838	1741	**3579**
	6	Motorized 3-wheeler/CN G	135	130	**265**
	7	Private Car	21	20	**41**
	8	Utility/4- wheel Drive/Jeep	1	0	**1**
	9	Human Hauler/Leguna/Tempo	81	76	**157**
	10	Micro Bus/NO AH	13	12	**25**
	11	Mini- Bus	0	0	**0**
	12	Large Bus	0	0	**0**
	13	Articulated Bus/Double -Decker Bus	0	0	**0**
	14	SGV/Pickup /Small Covered Van	10	13	**23**

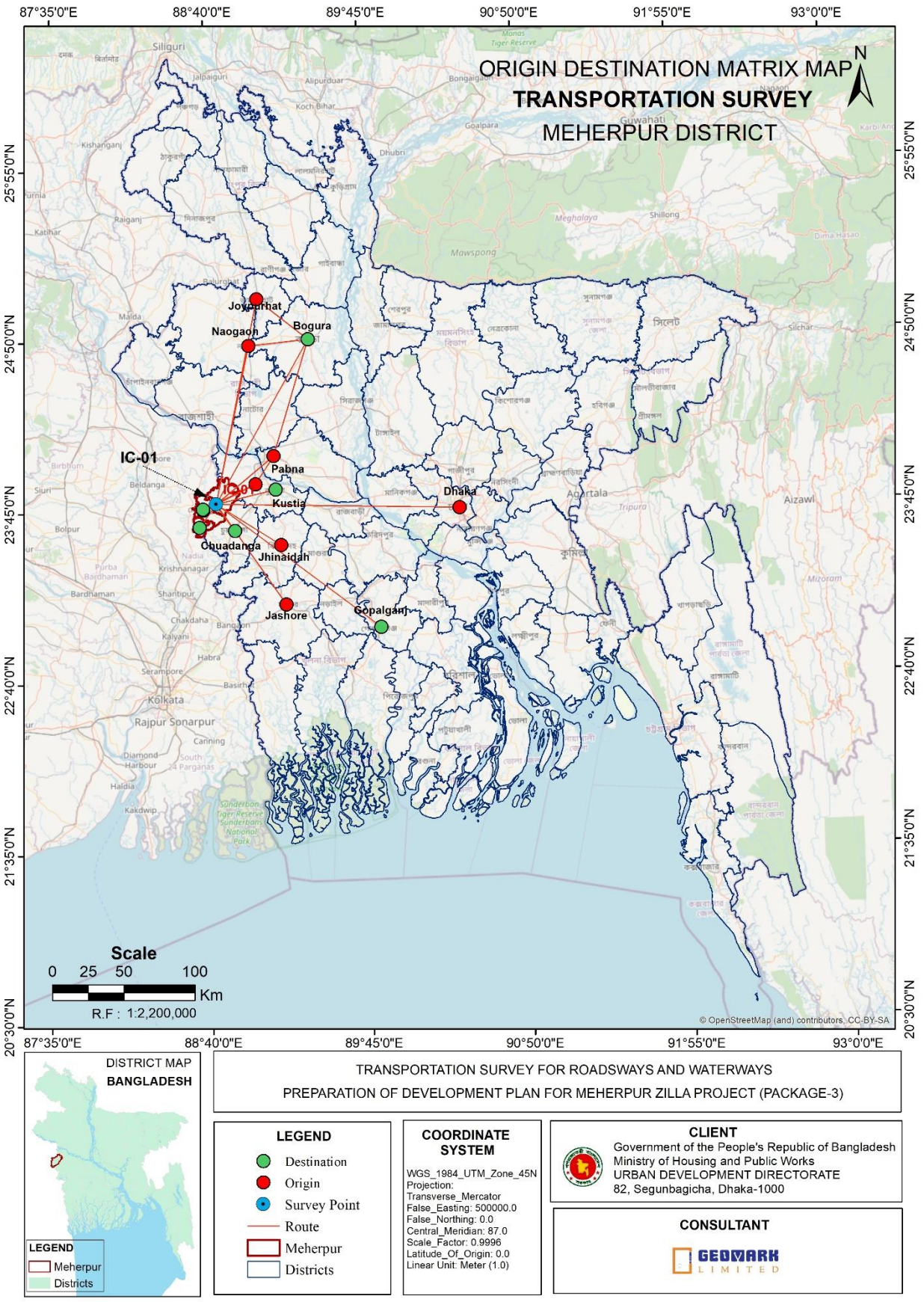
	15	Medium Truck/MC V (2-Axle)	5	4	**9**
	16	Large Truck/LC V (3-axle)	2	0	**2**
	17	Containe r/Trailer (>3 axle)	1	1	**2**
	18	Tanker/Tan k Lorry	0	0	**0**
	19	Others	1	3	**4**

The below table describes the institutions where the survey was conducted and the zones from which people originate their trips.

Origin-Destination Matrix

Origin-Destination	Alangi Police Camp,Gangni	Ansar Store,,Gangni	Bhangbaria Football Ground, Gangni	Bhangbaria High School,Gangni	Chandpur Government Primary schoo,Gangni	D.C Eco Park	Garabaria Bazar,Gangni	Hamayat pur bazar,Gangni	Hitimpara,Gangni	K&K Bricks,Gangni	Kathuli Bazar,Gangni	Koroygachi Bazar,Gangni	Kutumbari Children Park and Picnic Corner,Gangni	Md Sovon Store,Gangni	Mostofa Garmens, Gangni	Ms Rasel Ali	Mullah bari,Gangni	Raipur Bazar,Gangni	Saharbati Government Primary School,Gangni	Sojib store,Gangni	Variety store,Gangni	Grand Total
Alangi Police Camp,Gangni	2																17					19
Ansar Store,,Gangni		2								17												19
Bhangbaria Football Ground,Gangni			2													17						19
Bhangbaria High School,Gangni				2											17							19
Chandpur Government Primary schoo,Gangni					2								17									19
D.C Eco Park						2								18								20
Garabaria Bazar,Gangni							2														18	20
Hamayat pur bazar,Gangni								2	17													19
Hitimpara,Gangni								17	2													19
K&K Bricks,Gangni		17								2												19
Kathuli Bazar,Gangni											2							18				20
Koroygachi Bazar,Gangni												2								17		19
Kutumbari Children Park and Picnic Corner,Gangni					17								2									19
Md Sovon Store,Gangni						17								2								19
Mostofa Garmens,Gangni				17											2							19
Ms Rasel Ali			17													2						19
Mullah bari,Gangni	18																2					20
Raipur Bazar,Gangni											17							4	17			38
Saharbati Government Primary School,Gangni																		18	2			20
Sojib store,Gangni												18								2		20
Variety store,Gangni							17														2	19

Figure 25: Origin Destination matrix



Map 7: Origin Destination Map

4.2.1 Trip Purpose

The chart shows that virtually every person's travel revolves around home and work—"Your Workplace" hits 100% and "Your Residence" nearly 99%—while more discretionary trips for shopping (≈98%), business errands (≈98%), recreation or social activities (≈97%) and other purposes (≈96%) trail only slightly behind. This tight, 4-point spread highlights how daily movement is overwhelmingly driven by commuting and returning home, with non-essential outings making up just a small slice of total travel.

Table 9: Purpose of Trip

S.L	Purpose Summary	Count
1	Workplace	412
2	Residence	7
3	Shopping	1
4	Own/Employer Business	2
5	Recreation/Social	1
6	Other	1

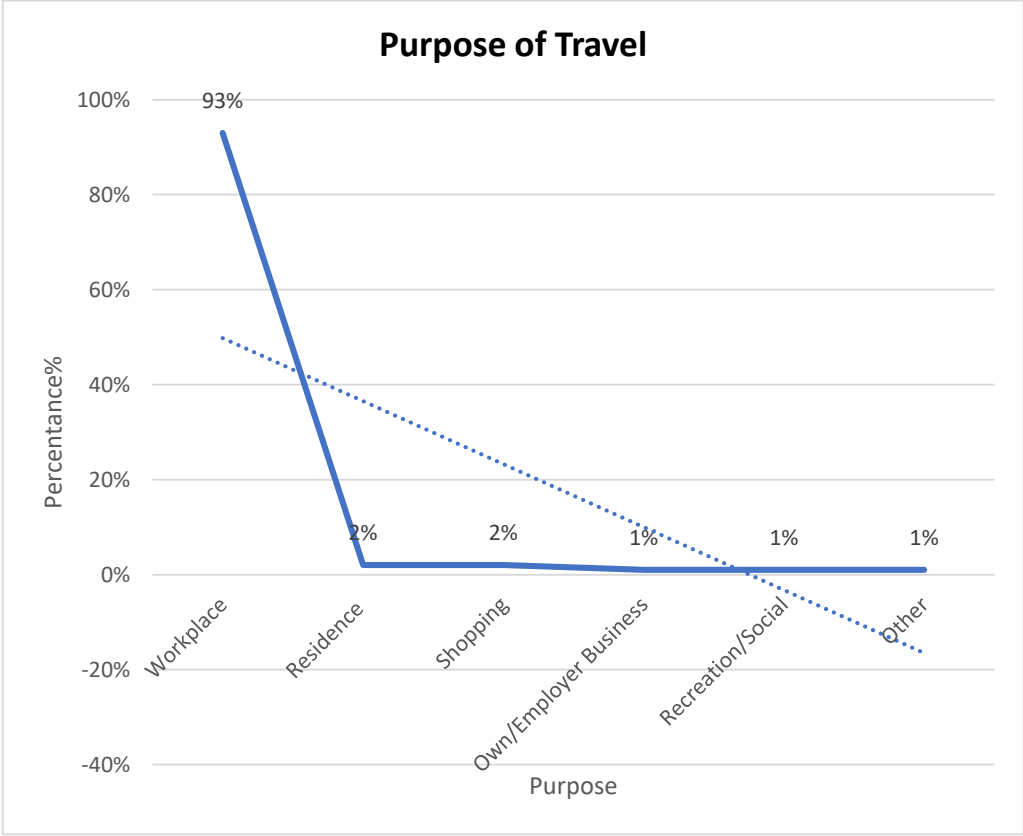


Figure 26: Purpose of Trip

4.2.2 Transportation Mode

The Mode Share chart makes it clear that two-wheelers dominate local travel—motorcycles alone account for 47% of all trips—while the iconic pedal-and-battery rickshaw vans fill another 27%. Battery-powered easy-bikes and autos contribute 9%, and both bicycles and motorized CNG three-wheelers each hold about 6%. All other modes—micro-buses, small goods vehicles, human haulers and the like—together barely register, underscoring how personal and semi-public two-wheeled transport solutions overwhelmingly meet urban mobility needs.

Table 10: Mode of Transportation

Mode Summary	Count
Rickshaw Van (Peddle/Battery)	113
Motorcycle	201
Bicycle	24
Motorized 3-wheeler/CNG	25
Battery Easy-Bike/Auto	40
Micro-Bus/NOAH	2
SGV/Pick-up/SCV	7
Human hauler/Leguna/Tempo	3
Private Car	1
Container/Trailer (>3 axle)	1
Medium Truck/MCV (2-Axle)	3
Utility Vehicle/4-Wheel Drive/Jeep	2
Large Truck/LCV (3 axle)	2

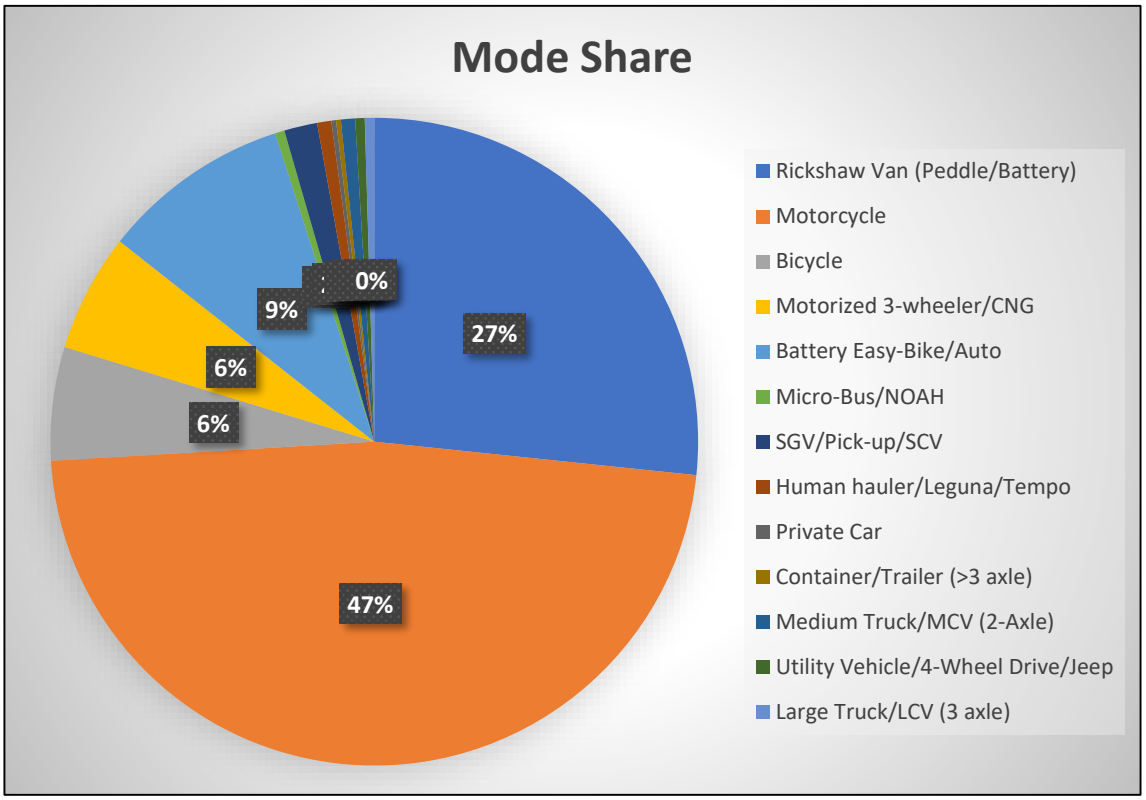


Figure 27: Mode of Transportation

4.2.4 Trip Count

The hourly trip chart reveals a clear commuter pattern: trips surge in the late morning, climbing from 38 between 8–9 AM to a midday peak of 42 around 12–1 PM, dip slightly in the early afternoon, then rise again to 39 during the evening rush at 5–6 PM. After 6 PM activity tapers off steadily—falling into the single digits between midnight and 5 AM—before a modest pre-dawn uptick, reaching back up to 19 trips by 7–8 AM. This rhythm underscores how daily travel concentrates around lunch and typical work-day start and end times, with minimal movement overnight.

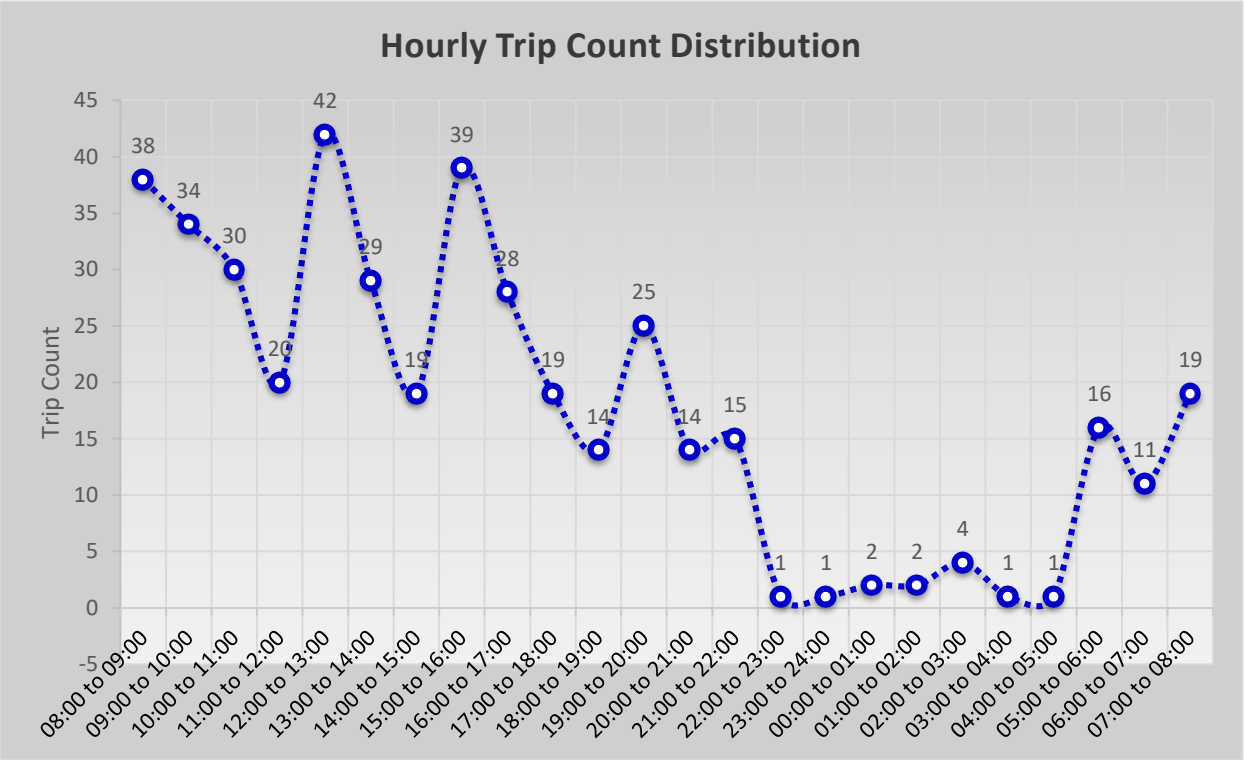


Figure 28: Hourly Trip Count Distribution

4.3 Study of Critical Traffic Junctions

To ensure effective transportation planning and congestion management in Meherpur District, it is essential to identify and analyze the critical intersections that serve as key nodes for traffic movement and economic activity. These intersections, often located at the convergence of major regional and local roads, experience varying degrees of vehicular and pedestrian pressure, particularly during peak hours, market days, and seasonal events. The following table presents a detailed assessment of the major intersections within the district, focusing on their current road conditions, congestion levels, potential strategies for congestion reduction, and future development perspectives. This analysis provides a foundation for targeted infrastructure improvements and strategic planning interventions aimed at enhancing mobility and accessibility across the district.

Table 11: Critical Traffic Junctions Overview

Sl. No.	Intersection Name	Roads Connected	Road Condition	Congestion Status	Congestion Reduction Strategy	Future Development Perspective
1	**Meherpur College Mor**	R745 (Meherpur–Chuadanga), Meherpur–Mujibnagar Road, Town Roads	Fair; surface cracks, edge damage	High; due to school, market, and office traffic	Install traffic signals; remove encroachments; create rickshaw/van stands	Bypass road; 4-laning of approach roads; modern bus terminal

2	**Gangni Bazar Intersection**	Gangni–Kushtia Road, Gangni–Meherpur Road, Market Roads	Fair; inner roads narrow	Moderate to high; haat day congestion, pedestrian-vehicle conflict	Truck unloading zone; widen roads; set up police post	Secondary ring road; reorganized haat layout
3	**Amjhupi Mor**	Meherpur–Gangni Road, Amjhupi–Mujibnagar Link	Fair; narrow and poorly lit	Light to moderate; agricultural and residential growth	Install signage; widen road; dedicated agri-transport lanes	Develop agri-logistics hub; improve culverts and road shoulders
4	**Mujibnagar Memorial Intersection**	Meherpur–Mujibnagar Road, Mujibnagar–Kazipur Road	Good; maintained due to tourism	Seasonal; on national events or holidays	Tourist parking zone; vehicle restriction at peak times	Eco-friendly shuttle service; widen for tourist bus access
5	**Kazipur Mor**	Mujibnagar–Kazipur Road, Border Access Roads	Fair; narrow rural road	Light; strategic for trade but occasional peak loads	Border check post; shoulder strengthening	Trade route integration; pave feeder roads
6	**Amdah Mor**	Meherpur–Gangni Road, Amdah Rural Roads	Poor to fair; patchy surface	Periodic; mainly due to slow vans and trucks	NMT lanes; regulate routes; speed breakers	Truck bypass; feeder node for agri-based zones

4.4 Trip Generation Survey & Travel Behavior Study

As part of the transport planning component under the Meherpur District Development Plan, a detailed analysis of trip generation and travel behavior was conducted based on data collected from the Household Interview Survey (HIS). The study aimed to quantify the volume and characteristics of trips originating from and terminating in various parts of the district. For a more accurate spatial representation, the district was divided into Traffic Analysis Zones (TAZs). These zones were delineated based on land use typologies such as residential, commercial, educational, industrial, and agricultural areas to reflect homogeneity in travel characteristics.

The findings indicate that trip generation rates and patterns vary significantly across land use types. Residential and educational zones showed a higher frequency of daily trips, especially during peak hours, while agricultural and industrial zones demonstrated more seasonally influenced movement patterns. Commercial areas, particularly within Meherpur Sadar, generated trips across all hours, largely driven by economic activities and service-related travel.

Data collected through household interviews, including trip purpose, travel mode, frequency, duration, and trip length. A dominant share of trips was observed for work, education, and business purposes, with a growing reliance on motorized two-wheelers and non-motorized modes like rickshaws and bicycles in both urban and rural settings.

In parallel, the Travel Behavior Study provided insights into the population's mobility preferences and constraints. The analysis revealed that while walking and rickshaws remain the most accessible and commonly used modes for short-distance travel, there is a rising demand for public transport services for medium- to long-distance commuting—

especially from peripheral unions to the district headquarters. Travel frequency was found to be highest among students, business owners, and agricultural workers, each group exhibiting distinct modal choices and time-of-day preferences.

Several challenges were also documented, including long travel durations due to poor road conditions in remote areas, lack of reliable public transport options, and limited connectivity to regional hubs. These findings underscore the need for targeted transport interventions, including infrastructure upgrades, improved service delivery in underserved areas, and a better-integrated transport network that aligns with land use dynamics and socio-economic profiles.

Overall, the analysis of trip generation and travel behavior provides a critical evidence base for transport demand forecasting, prioritization of infrastructure investments, and design of mobility solutions that are responsive to the unique spatial and socio-economic context of Meherpur District.

4.4.1 Occupation of The Trip maker

As part of the Trip Generation and Travel Behavior Studies under the Meherpur District Development Plan, data on the occupation of trip makers was collected through the Household Interview Survey (HIS). Understanding the occupational profile is essential to determine the types of mobility needs and travel patterns prevalent in the area. Different occupations influence travel frequency, purpose, timing, and mode choice. For instance, farmers and agricultural workers typically exhibit seasonal travel variations, while business owners and employees may require consistent access to commercial hubs. The survey results reflect a diverse mix of employment types, with a significant portion engaged in agriculture (41.12%), followed by business (16.40%), and self-employment (7.42%). This occupational distribution highlights the district's agrarian economic base and suggests the need for both rural-access and market-oriented transport interventions. The following table summarizes the percentage share of trip makers by occupation:

Table 12: Percentage Share of Trip Makers by Occupation

Sl. No.	Occupation	Percentage (%)
1	Student	0.22
2	Public Employee	4.27
3	Private Employee	3.37
4	Business	16.40
5	Agriculture/Farmer	41.12
6	Housewife	3.60
7	Unemployed	3.37
8	Retired	2.25
9	Other (Occupation)	9.44
10	Labor	8.54
11	Self-Employment	7.42
Total		100.00

4.4.2 Education Level

Understanding the educational background of household heads is essential for interpreting socio-economic behavior, mobility choices, and access to services across Meherpur District. The level of education often influences employment type, income level, awareness of transportation options, and willingness to adopt new travel behaviors. The following table presents the distribution of education levels among household heads based on data collected from the Household Interview Survey. It shows a significant concentration in the below-primary category, indicating limited formal education

across a large portion of the population, which may have implications for planning awareness programs, training initiatives, and service accessibility.

Table 13: Education level of the Household Head

Sl. No.	Occupation	Percentage (%)
1	Below Primary	40.67
2	Six-Ten	26.07
3	SSC	13.71
4	HSC	6.97
5	BA/BSc	5.62
6	MA/MSc	3.15
7	Not Applicable	3.37
8	Others	0.45
Total		100.00

4.5 Goods Movement and Mode of Shipment Study

The Goods Movement and Mode of Shipment Study was undertaken to understand the nature, volume, and movement patterns of freight transport within Meherpur District. The study focused particularly on capturing insights into commodity types, origin-destination flows, shipment frequency, and the transportation modes used, including trucks, pickup vans, rickshaw vans, and river-based vessels. A total of 33 structured questionnaire surveys were conducted at key goods transfer points across the district.

Seasonal Transport Load-Unload Survey

In order to evaluate the seasonal impact of agricultural transport, particularly the movement of perishable goods such as fruits and vegetables, a Seasonal Transport Load-Unload Survey was carried out. These goods often cause periodic spikes in traffic congestion, especially during harvest and distribution periods. The survey utilized a structured questionnaire targeting transport operators, drivers, logistics workers, and key local stakeholders.

Key aspects covered in the survey included:

- Loading and unloading point characteristics
- Trip costs and payment practices
- Operating hours and peak-time behavior
- Catchment area and regional trade routes
- Volume and frequency of trips by vehicle type
- Seasonal variations in freight demand

Impact of the Padma Bridge

A significant component of the study was the evaluation of the Padma Bridge's impact on goods transport in Meherpur. With the bridge drastically improving east-west connectivity, the survey observed:

- Reduced travel times
- Changes in preferred freight corridors
- New routing behavior and bypassing of traditional nodes
- Partial reduction in congestion in some areas and route diversions in others

This infrastructure improvement has played a pivotal role in shaping freight movement trends across the district.

Logistics Operations and Labor Welfare

The survey also explored the basic operational needs of freight workers, revealing critical issues that influence productivity and road safety:

- Lack of adequate resting spots, sanitation, and food facilities
- Irregularities in trip scheduling due to infrastructure or climatic conditions
- Instances of delivery failures, often resulting from delays or product spoilage, were recorded—especially critical for perishable goods

These inefficiencies offer insight into gaps in the current freight logistics ecosystem and form the basis for recommending strategic infrastructure and service improvements.

Identification of Bottlenecks and Congestion Hotspots

The survey mapped the main transport corridors utilized during peak seasonal periods. Specific intersections and road segments were analyzed to identify:

- Congestion-prone areas
- Infrastructure limitations (e.g., narrow roads, weak pavement, lack of bypass)
- Inadequate handling or loading zones at rural markets and aggregation centers

These findings will directly inform the planning and design of future freight corridors, traffic management plans, and rural transport infrastructure development, ensuring a resilient and efficient agricultural supply chain for Meherpur District.

The following table describes the vehicle category distribution of the Seasonal Transport Load-Unload Survey.

Table 14: Seasonal Transport Load-Unload Survey Vehicle Category

Sl. No.	Vehicle Type	Vehicle Count	Percentage (%)
1	Large Truck	17	51.52
2	Medium Truck	4	12.12
3	Motorized 3-wheeler	10	30.30
4	Van	2	6.06
Total		33	100.00

The initiation timeline of seasonal transport load-unload processes in Meherpur District demonstrates a clear evolution in goods movement management over the past three decades. Beginning from **1990**, the frequency of such processes remained low through the 1990s and early 2000s, reflecting limited institutional engagement with seasonal logistics. A noticeable shift occurs from **2018 onward**, with the most significant increase in **2020**, during which **8 processes** were initiated—likely a response to the COVID-19 pandemic's disruption of supply chains and the subsequent emphasis on agricultural logistics. This momentum continued in the following years, particularly in **2022** and **2023**, showing growing awareness of transport bottlenecks during peak seasons. The upward trend through **2025** indicates continued policy interest in building a more resilient and efficient freight system, especially for perishable and time-sensitive goods.

The following figure presents the distribution of the starting years of the processes.

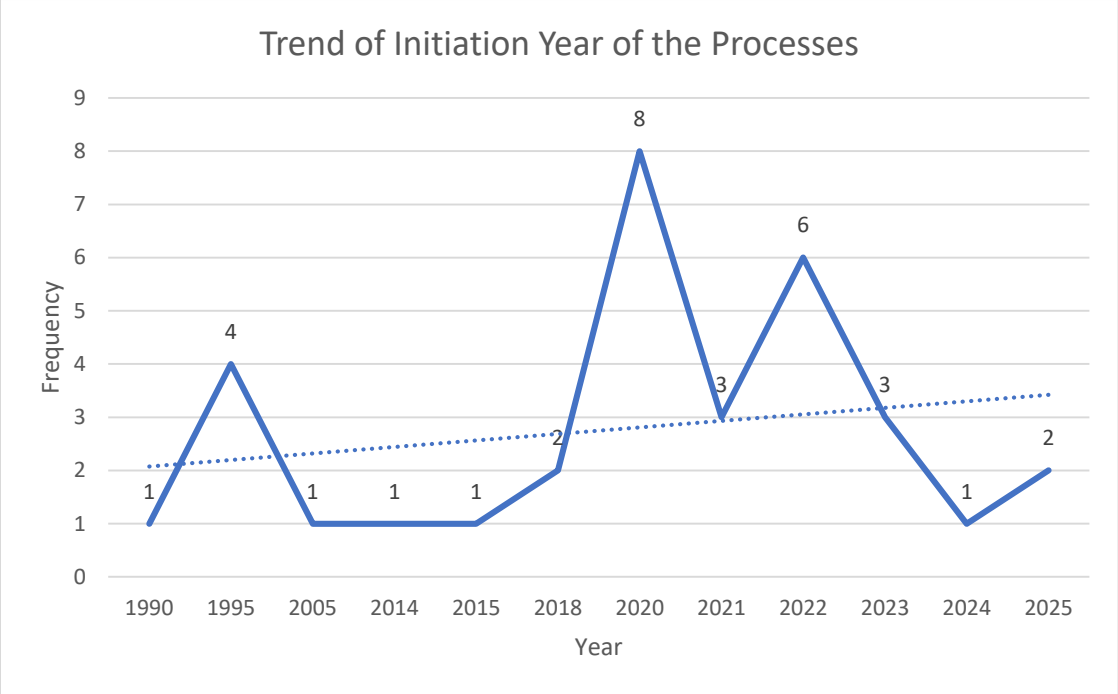


Figure 29: Seasonal Transport Load-Unload Process Initiation Trend

4.6 SWOT Analysis and Problem Area Identification

SWOT (strengths, weaknesses, opportunities, and threats) analysis is one of the most effective tools to assess the strategic situation and helps to identify strategic options for an area. Strength is a resource that the area can use effectively to achieve its objectives. A weakness is a limitation, fault, or defect in the organization that will keep it from achieving its objectives. An opportunity is any favorable situation in the area of transportation, and a threat is any unfavorable situation in the area of transportation that is potentially damaging to its strategy (Rowe et al. [15]). In this study, we use to analyze the characteristics of the Meherpur district transport system from Roadways and waterways.

Strengths:

- ✓ High personal mobility with two-wheelers – Over 45,000 registered motorcycles enable widespread access.
- ✓ Well-utilized local freight routes – Peak-season transport of vegetables and fruits handled efficiently by light trucks and vans.
- ✓ Multi-modal origin-destination coverage – Roadway access supported by key river ghats and informal water routes.
- ✓ Strategic junction nodes identified and studied – College Mor, Gangni Bazar, Mujibnagar Memorial all analyzed for interventions.
- ✓ *Comprehensive Road Coverage* — Combined paved and unpaved roads cover all three upazilas (589.33 km in Sadar, 746.21 km in Gangni, 273.53 km in Mujibnagar).
- ✓ *Local Mobility Preference for NMTs* — High usage of rickshaws, bicycles, and easy bikes indicates potential for low-emission, inclusive planning.

Weakness:

- ✓ Poor road conditions in rural zones – Narrow, worn surfaces with edge damage; risks worsen in monsoon.
- ✓ *Critical Intersections Congested* — College Mor (Meherpur Sadar) and Gangni Bazar show high congestion due to poor signalization, narrow turns, and roadside vending.
- ✓ Waterway infrastructure underutilized – Ghats lack terminals or scheduled services for passengers/goods.
- ✓ Limited public transport fleet – Only 56 minibuses and 14 omnibuses registered.
- ✓ Inadequate resting/sanitary facilities for freight workers – Impacts logistics productivity and driver safety.
- ✓ *No Rail Connectivity Yet* — Though Darshana–Meherpur rail route is proposed, absence of current rail service limits inter-district access.
- ✓ *Weak Transport Resilience* — Seasonal flooding near agricultural TAZs (like Monakhali, Kazipur, Sholotaka) disrupts road access and freight operations.

Opportunities:

- ✓ Padma Bridge impact on routing and logistics – Travel times to Dhaka, Chattogram, and Barishal reduced by 2–5 hours.
- ✓ *Railway Station Nodes* — Proposed stations at Monakhali, Mujibnagar, and Meherpur Sadar offer chance to plan intermodal hubs and stimulate township development.
- ✓ *Land Port at Buripota* — Opportunity to plan export-driven freight park and agri-logistics chain linked to border trade.

Threats:

- ✓ Unregulated electric vehicles and informal rickshaws – Rising traffic conflicts and congestion.
- ✓ *Climate Change and Waterlogging* — Kutubpur, Matmura, and Dariapur unions experience seasonal disruptions, affecting both freight and school commuting.
- ✓ Inconsistent funding for rural infrastructure – Roads, drainage, and terminals risk neglect due to budget shortfalls (Shibpur–Kulbaria–Baradi agricultural zone, which lacks sealed feeder roads).
- ✓ Seasonal overloads during harvest – Traffic spikes cause road damage and delivery failures (Vegetable belt: Baradi, Kutirghat, Ujolpur, Borobazar, TNT Mor).

4.7 Proposed Development Initiatives

4.7.1 Meherpur University

As part of the broader development initiative in Meherpur District, the establishment of a permanent university campus has been identified as a transformative step toward enhancing access to higher education and promoting regional socio-economic growth. This chapter provides a comparative analysis using data from similar institutions like Jashore

University of Science and Technology (JUST) and Islamic University, Kushtia (IU) to assess the likely impact of the proposed Meherpur University on transport, infrastructure, and service demand in the district.

4.7.1.1 Comparative Institutional Profile

The following table presents the data of two comparative institutions.

Table 15: Data for Predicting University Impact

University	Jashore University of Science and Technology	Islamic University, Kushtia
Establishment year	2007	
Address	Sadhinata Sarak, Churamonkati, Jessore, 7408, Bangladesh	24 kilometers south of Kushtia and 22 kilometers north of Jhenidah district-town in a lush green countryside, the university is by-passed by Khulna-Kushtia National Highway.
Area:	Suburb, 35 acres	175 acres
Students	6213	15417; Foreign Students: 39
Residential Hall	4	8(4 male, 4 female)
Teachers	347	412
Officers	163	425
Staff	312	399
Faculties and departments	36 Departments are Organized into 8 Faculties.	8 Faculties, 34 Departments

4.7.1.2 Implications for Meherpur University

Projected Student and Staff Numbers

Based on the enrollment and employment statistics from JUST and IU, it is reasonable to project that **Meherpur University**, within 10–15 years of establishment, may serve between **8,000–12,000 students**, supported by approximately **350–400 faculty members**, **150–200 officers**, and **300–350 administrative staff**. This population will result in substantial daily movement to and from the campus.

Transportation and Mobility Demand

The expected increase in daily trips includes:

- **Student commuting** (private vehicles, public buses, rickshaws, bicycles)

- **Faculty and staff movement**
- **Logistics and service vehicles**

This could result in an estimated **5,000–7,000 additional daily trips**, particularly concentrated during morning and afternoon peak hours.

Campus-Related Travel Pattern Analysis

Drawing from data trends at IU and JUST:

- **Modal split** is likely to be a mix of non-motorized (25–30%) and motorized (70–75%) trips.
- **Peak hours** are expected to align with typical university schedules (8:00–10:00 AM inbound and 3:00–5:00 PM outbound).
- High demand for **access roads**, **campus shuttle/bus service**, and **safe pedestrian facilities** is anticipated.

4.7.1.3 Infrastructure and Land Use Considerations

Given the chosen site's proximity to the **Technical Training Center (TTC)** and regional road networks, the campus will likely become a major node in the area's urban expansion. The following infrastructure will be necessary:

- **Widening of approach roads**
- **Designated bus bays and auto-rickshaw stands**
- **Pedestrian and cycle lanes**
- **Drainage and utility upgrades**

The projected **spillover development** (hostels, student housing, food and retail services) will also necessitate proper land use zoning and traffic management planning in adjacent areas.

4.7.1.4 Lessons from IU and JUST: Planning Benchmarks

From analysis of the existing institutions:

- **IU's rural setting** demonstrates the importance of internal transport services and direct highway links.
- **JUST's suburban development** highlights how university development can catalyze town-scale economic growth and commercial activity.

Both examples underscore the need for:

- **Integrated transport planning**
- **Dedicated parking and loading areas**
- **On-campus transport demand management policies** (e.g., shuttle, cycle-sharing)

Table 16: Forecasted Challenges and Mitigation Measures

Challenge	Mitigation Strategy
Increased traffic and congestion	Upgrading road capacity; traffic signalization
Safety for pedestrians and cyclists	Marked crossings, footpaths, and cycle lanes
Public transport inadequacy	Introducing university shuttle service; coordinating with local operators

Parking demand	Developing multi-use parking facilities
Land use conflict in surrounding areas	Zoning regulations and campus-buffer planning

The comparative analysis indicates that the establishment of Meherpur University will significantly impact the local transport network, land use patterns, and socio-economic landscape. Learning from JUST and IU provides a realistic baseline for estimating traffic volume, infrastructure needs, and service delivery models. To ensure that the university is integrated seamlessly into Meherpur's growth trajectory, proactive planning—particularly in transportation, zoning, and public service provision—is essential. With these considerations addressed, Meherpur University has the potential to emerge as a regional hub for education, innovation, and mobility.

4.7.2 Railway Connectivity

The proposed alignment of the new railway line within Meherpur District has been preliminarily identified to enhance regional connectivity and transport efficiency. The new railway line is expected to integrate the district into the national railway network, offering enhanced mobility for both people and goods. After preliminary assessments, three strategic locations have been selected for the establishment of railway stations:
(i) **Meherpur Station** – envisioned as the central hub within the district, this station will serve the district headquarters and surrounding urban and rural areas, enabling passenger transit and small-scale freight operations.
(ii) **Monakhali Station** – located near the border with India, this station is strategically important due to its potential to support future cross-border trade and connectivity.

(iii) **Mujibnagar Station** – proposed to serve the historically significant Mujibnagar area, this station is aimed at supporting local tourism, heritage conservation efforts, and improving access for nearby communities.

The alignment has been tentatively designed to ensure minimal disruption to existing settlements and agricultural lands, while maximizing accessibility and connectivity. Once implemented, the proposed railway infrastructure will act as a catalyst for regional development, facilitating economic diversification, reducing transport costs, and promoting inter-district and transnational linkages.

4.7.3 Land Port Establishment

A tentative location for the establishment of a land port has been identified at Buripota, in Meherpur District. This proposed port is expected to enhance regional trade and cross-border connectivity, particularly with neighboring India. The strategic positioning of Buripota aims to facilitate the movement of goods and promote economic activities in the southwestern region of Bangladesh.

To assess the potential future impact of this proposed port, a comparative analysis will be undertaken using operational and performance data from similar land ports in the region, specifically Bhomra Land Port in Satkhira and Benapole Land Port in Jashore. These reference ports offer valuable insights into expected traffic volumes, customs operations, infrastructure requirements, employment generation, and the broader socio-economic benefits of a functioning land port.

The analysis will support forecasting of trade flows, transport demand, logistics infrastructure needs, and the port's implications for the surrounding transport network. The findings will guide infrastructure planning, policy formulation, and investment prioritization, ensuring that the Buripota Land Port, once operational, contributes effectively to both local development and national trade facilitation goals.

4.7.4 Policy and Strategic Planning Support

4.7.4.1 NMT-First Strategy

- Prioritize **non-motorized transport (NMT)** infrastructure (e.g., cycle tracks, pedestrian zones) across all urban growth centers like **Meherpur Sadar**, **Gangni**, and **Mujibnagar Paurashavas**.
- Leverages high usage of bicycles, rickshaws, and easy-bikes (as seen in OD data).
- Suitable for short-distance commuting and low-income populations.
- Implementation Priority: Inner town roads, school zones, and market centers.
- Phased Integration: Connect NMT routes to emerging nodes like the university campus.

4.7.4.2 Ring-Radial Road Development Strategy

- Develop bypasses, radial connectors, and ring roads to decentralize traffic from key intersections (e.g., Gangni Bazar, College Mor).
- Supports both inter-upazila and inter-district movement.
- Support regional freight and market access.
- Implementation Priority: Medium- to long-term bypass construction and rural connectivity upgrades.

4.7.4.3 Transit-Oriented Development (TOD)

- Encourage land use and zoning policy that promotes **high-density development around future transit hubs**, such as the proposed **Meherpur Railway Station**, **Mujibnagar**, and **Monakhali**.
- Integrate **bus terminals, cycling facilities, and walkable neighborhoods**.
- Implementation Priority: Urban policy reform, land reservation, and integrated transport-land use master planning.

Suggested Implementation Phases and Investment Prioritization:

Table 17: Suggested Implementation Phases and Investment Prioritization

Phase	Timeline	Key Actions
Short-Term (0–2 yrs)	2025–2026	Introduce traffic signals, NMT lanes in congested intersections, enforce encroachment control in College Mor, Gangni Bazar
Mid-Term (2–5 yrs)	2027–2030	Develop university access corridor, initiate ring-road feasibility, pilot TOD around proposed railway stations
Long-Term (5–10 yrs)	2031–2041	Construct full ring-radial network, operationalize Buripota Land Port with logistics access, implement TOD zoning and parking policies

4.7.5 Analysis of Alternative Strategies

To align with the ToR and strengthen planning decisions, the report include a comparative assessment of strategic alternatives using available survey and spatial data.

4.7.5.1 Suggested Strategy Simulation Scenarios:

Table 18: Suggested Strategy Simulation or Narrative Impact Scenarios

Strategy Option	Narrated Impact Summary
Bypass Construction (Meherpur College Mor)	Diverts ~40% of heavy vehicles; relieves peak congestion; improves school zone safety; requires ~2.5 km new alignment and land acquisition
Shuttle Service for University	Serves projected 5,000–7,000 daily trips; reduces private vehicle demand; supports transit-oriented development (TOD) around TTC area
Truck Unloading Zones at Market Areas	Reduces double parking and congestion at Gangni, Bamondi, and Kazipur; improves goods movement efficiency during haat days
Ring-Radial Network	Enhances rural-urban access; connects upazila growth centers; requires phased implementation with road hierarchy upgrades

4.7.5.2 Decision-Making Criteria for Evaluation:

Using collected data to simulate or narrate alternative strategy impacts, including decision-making criteria (efficiency, cost, equity, environment).

Efficiency – Congestion reduction, travel time savings

Cost – Estimated capital investment, land acquisition cost

Equity – Access for vulnerable groups, coverage in low-income TAZs

Environment – Potential reduction in emissions, waterlogging impact

Feasibility – Land availability, political/institutional support

Table 19: Evaluation Matrix

Option	Efficiency	Cost	Equity	Environmental Impact	Feasibility
Bypass Road	High (urban decongestion)	High (land cost)	Medium (urban only)	Positive (emission zone reduction)	Medium
University Shuttle	Medium	Low	High (students, staff)	Positive	High
Truck Zone	High (market flow)	Medium	Medium	Neutral	High
Ring-Radial	High (district-wide impact)	Very High	High	Positive (optimized flow)	Medium-Long Term

Chapter 5
SEASONAL TRANSPORT ORIGIN DESTINATION SURVEY

Chapter 5: SEASONAL TRANSPORT ORIGIN DESTINATION SURVEY

Seasonal changes significantly influence transport behavior, especially in rural and disaster-prone areas. Understanding these dynamics is essential for designing resilient transport systems, enhancing mobility, and improving access to essential services throughout the year. This chapter presents findings from a Seasonal Origin-Destination (OD) Survey conducted to capture how people's travel patterns change across different seasons.

The study aimed to capture critical information related to the types of commodities transported, their origin and destination points, shipment frequency, and the modes of transport used—such as trucks, pickup vans, rickshaw vans, river vessels, and other carriers. Surveys were conducted at key goods transfer points including markets, industrial zones, storage facilities, and river ghats. Data were collected through interviews with transport operators, traders, and logistics service providers. This study provides valuable insights into the freight movement dynamics of the district and highlights logistical bottlenecks, modal dependencies, and potential areas for infrastructure and policy interventions to improve goods transportation efficiency and support local economic activities.

The Seasonal OD Survey was designed to:

- Identify the origin and destination of transport movements in Meherpur during different seasons.
- Document the types of transport used and their operational challenges.
- Understand the impact of seasonal barriers on goods and passenger transport.
- Recommend actionable improvements in transportation infrastructure and services.

To understand the origin-destination patterns, transport challenges, and user behaviors, a detailed Seasonal Transport Origin Destination Survey was conducted. The survey specifically focused on the movement of trucks transporting perishable goods such as fruits and vegetables, which contribute significantly to periodic spikes in traffic volume in key areas of the district. A structured questionnaire was developed to collect both qualitative and quantitative data from transport operators, drivers, workers, and local stakeholders.

Key aspects covered in the survey include the importance of loading and unloading locations, trip costs, payment methods, operating hours, and the geographic extent of the catchment areas served by these vehicles. Data was also gathered on the volume and frequency of truck operations, and the duration and peak periods of seasonal transport activities.

Importantly, the survey also assessed the impact of the Padma Bridge, which has significantly altered travel time, route preferences, and the operational dynamics of freight transport. The bridge's contribution to improved connectivity and reduced congestion in some corridors, as well as possible diversion of routes, was considered in the analysis.

In addition to transport patterns, the survey evaluated the basic needs of drivers and workers, such as access to food, resting places, and sanitation facilities—factors that directly affect their productivity, health, and road safety. Furthermore, instances of delivery failures, where goods were not accepted at destination points due to late arrival or spoilage, were documented to assess inefficiencies and propose mitigation strategies.

Finally, the main transport routes used during these seasonal peaks were mapped and analyzed to identify congestion hotspots and infrastructural bottlenecks. This data will support future planning efforts aimed at improving the efficiency and resilience of agricultural supply chains, particularly during peak seasons.

An online questionnaire was carefully designed in Kobo Toolbox and deployed for the data collection process of the Seasonal Transport Load-Unload Survey. The digital format allowed for efficient outreach to a wide range of respondents, including truck drivers, transport operators, traders, and support staff involved in the seasonal movement of perishable goods. The questionnaire included both closed and open-ended questions, covering key aspects such as transport frequency, loading/unloading locations, trip costs, operational hours, logistics challenges, and infrastructure needs. The use of online tools enhanced data accuracy, ensured quicker response collection, and facilitated preliminary data analysis. The following figure shows the screenshot of online questionnaire.

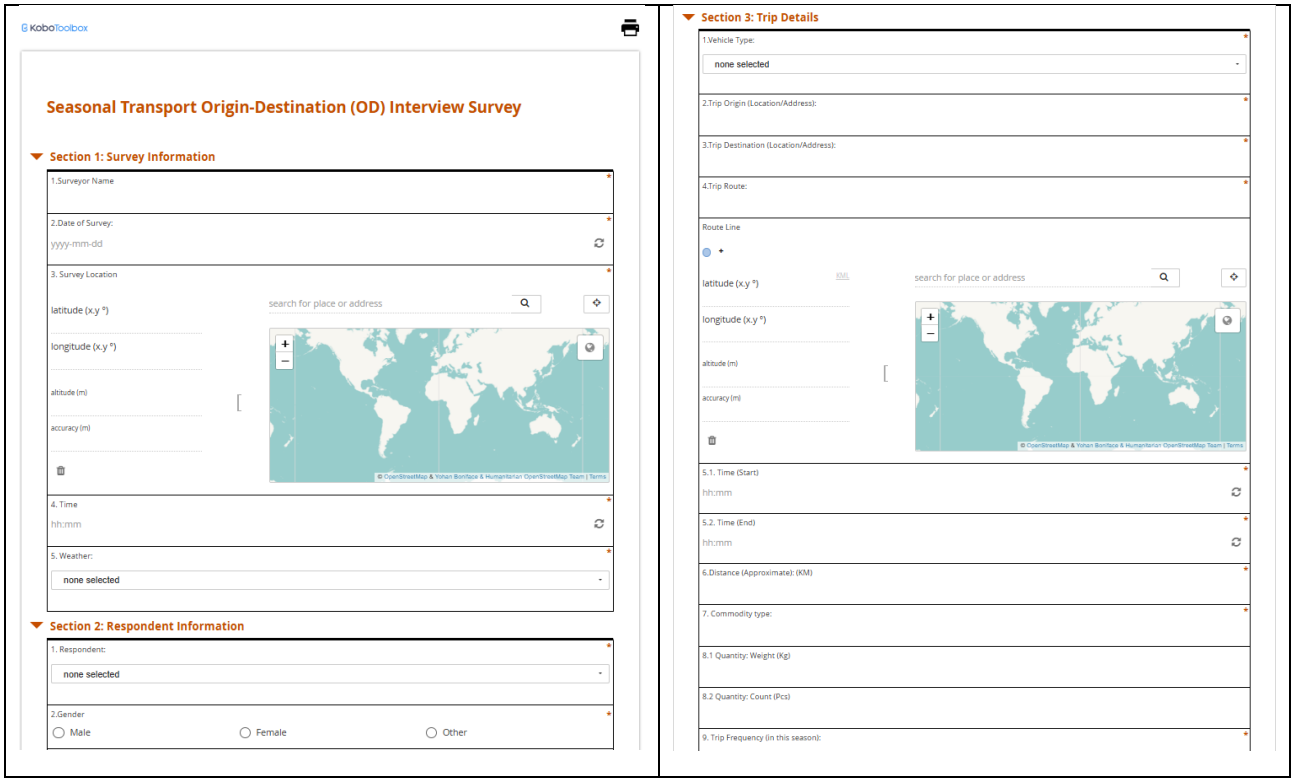


Figure 30: Online Questionnaire for Seasonal Transport Load-Unload Survey

Figure 31: Seasonal Transport Load-Unload Survey

5.1 Vehicle Type and Trip Frequency

The following table describes the vehicle category distribution of the Seasonal Transport OD Survey

Table 20: Vehicle Type and Trip Frequency

Vehicle Type	Trip Frequency	Presentence%
Large Truck	2-3 times a week	12%
	Daily	82%
	Weekly	6%
Medium Truck	2-3 times a week	50%
	Daily	25%
	Weekly	25%

Motorized 3-wheeler	2-3 times a week	20%
	Daily	70%
	Weekly	10%
Van	2-3 times a week	50%
	Daily	50%

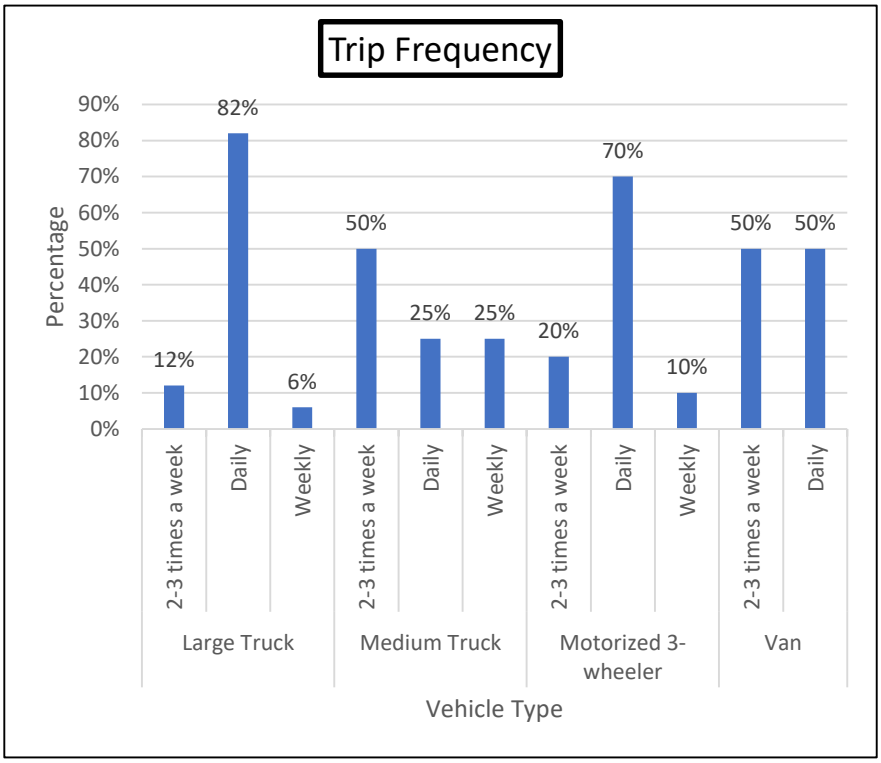


Figure 32: *Trip frequency*

This chart, illustrates the percentage of trips made by various vehicle types—Large Truck, Medium Truck, Motorized 3-wheeler, and Van—categorized by frequency: daily, 2-3 times a week, and weekly.

Here's a breakdown:

- Large Trucks mostly operate daily (82%), with smaller proportions using them 2-3 times a week (12%) or weekly (6%).
- Medium Trucks have a more balanced split: 50% use them 2-3 times a week, while 25% each operate them daily and weekly.
- Motorized 3-wheelers are predominantly used daily (70%), with fewer running 2-3 times a week (20%) and weekly (10%).
- Vans operate daily (50%) or 2-3 times a week (50%), but not at all on a weekly basis (0%).

5.2 Trip Route Distribution

The table in the Seasonal Transport Origin Destination Survey document presents detailed information on various trips, including trip origin, destination, route, distance (in kilometers), and trip duration (one way, in minutes).

The table outlines that trip from Kulbaria, Meherpur to Chittagong follows the Meherpur-Kustia-Padma route, covering 600 km in approximately 720 minutes (12 hours), trip from Baradi Bazar to Khulna via the Jhenaidah-Jashore-Khulna route covers 150 km in 420 minutes (7 hours), shorter trips, such as from govipur to ujalpur kuthirghat, span 6 km and take about 30 minutes.

Table 21: Trip Route Descriptions and Transport Dynamics

Sl. No	Trip Origin	Trip Destination	Trip Route	Distance (Km)	Trip Duration (One Way) (Minutes)
1	Kulbaria, Meherpur	Chittagong	Meherpur-Kustia-Padma	600	720
2	Baradi Bazar	Khulna	Jhenaidah-Jashore-Khulna	150	420
3	Meherpur Tnt Morh	Dhaka	Meherpur-Magura-Padma	300	8
4	Shaharbati, Charchara	Sylhet	Meherpur-Kustia	500	720
5	Ujolpur Kuthirghat	Feni	Meherpur-Magura-Padma	400	720
6	Hemayetpur	Brishal	Meherpur-Bhanga-Barishal	260	600
7	Vatpara	Chittagong	Meherpur-Kustia-Padma-Chittagong	600	840
8	Tetulbaria	Barishal	Meherpur-Bhanga-Barishal	250	10
9	Rajapur, Meherpur	Khulna	Meherpur-Jashore-Khulna	160	420
10	Kumaridanga Meherpur	Dhaka	Meherpur-Kustia-Padma-Dhaka	250	360
11	Malsadah	Vatpara Loading Point	Malsadah-Shaharbati	5	30
12	Tetulbariya	Meherpur	Bamundi-Tetulbariya Road	20	60
13	Garabaria, Gangni	Allar Dorga, Kustia	Garabaria-Gangni-Kustia	50	180
14	Kulbaria, Meherpur	Himsa	Kulbaria- Meherpur-Chuadanga-Padma-Dhaka-Himsa	350	600
15	Ujolpur, Kuthirghat	Chittagong	Ujolpur-Meherpur-Magura-Padma-Dhaka-Chittagong	500	840
16	Vatpara(Kuthil), Gangni	Chittagong	Vatpara-Bamundi-Kustia-Padma-Dhaka-Chittagong	500	840
17	Nambihin Rasta	Gangni	Nambihin-Vatpara-Gangni	30	60

18	Malshadha	Dhaka	Malshadha-Gangni-Kustiya-Padma-Dhaka	280	480
19	Monohorpur Maath	Kulbaria Loading Point	Monohorpur Maath-Kutubpur-Kulbaria	2	15
20	Bhatpara	Shylet	Vhatpara-Gangni-Kustiya-Padma-Dhkha-Shylet	500	660
21	Himda	Gangni	Himda-Gangni	6	30
22	Govipur	Ujalpur Kuthirghat	Govipur-Fatehpur-Ujalpur	6	30
23	TNT Morh, Borobazar, Meherpur	Shambazar, Dhaka	Meherpur-Magura-Padma-Dhaka	270	420
24	Monohorpur Maath, Kulbaria	Tnt Morh, Borobazar, Meherpur	Kulbaria To Meherpur Road	8	30
25	Amjhupi	Baradi Bazar Loading Point	Amjhupi To Baradi	5	15
26	Baradi Bazar	Khulna	Meherpur-Chuadanga-Khulna	160	360
27	Hizoli	Baradi Bazar Meherpur	Hizoli To Baradi	5	20
28	Mohajonpur	Barishal	Mohajonpur- Chuadanga-Jhenaidah-Magura-Barishal	270	540
29	Ekuri Gangni	Dhaka	Ekuri(Gangni) To Chuadanga To Magura To Dhaka	250	540
30	Ekuri	Khulna	Ekuri(Gangni)-Chuadanga-Jhenaidah-Jashore-Khulna	170	420
31	Hemayetput Maath	Ekuri(Gangni)	Hemayetpur To Ekuri Loading Point	5	30
32	Kodailkathi	Dhaka	Kodailkathi-Kholisakundi-Kustia-Dhaka	270	600
33	Bholadanga	Kodailkathi Loading Point	Bholadanga To Kodailkathi	4	20

5.3 Trip Cost Payment Distribution

The pie chart shows that a whopping 78% of all trip costs are settled in cash, leaving just 22% recorded as payments due.

Table 22: *Trip cost Payment Distribution*

S.L	Trip Cost	Frequency	Percentage (%)
1	Cash	26	78%
2	Due	7	22%

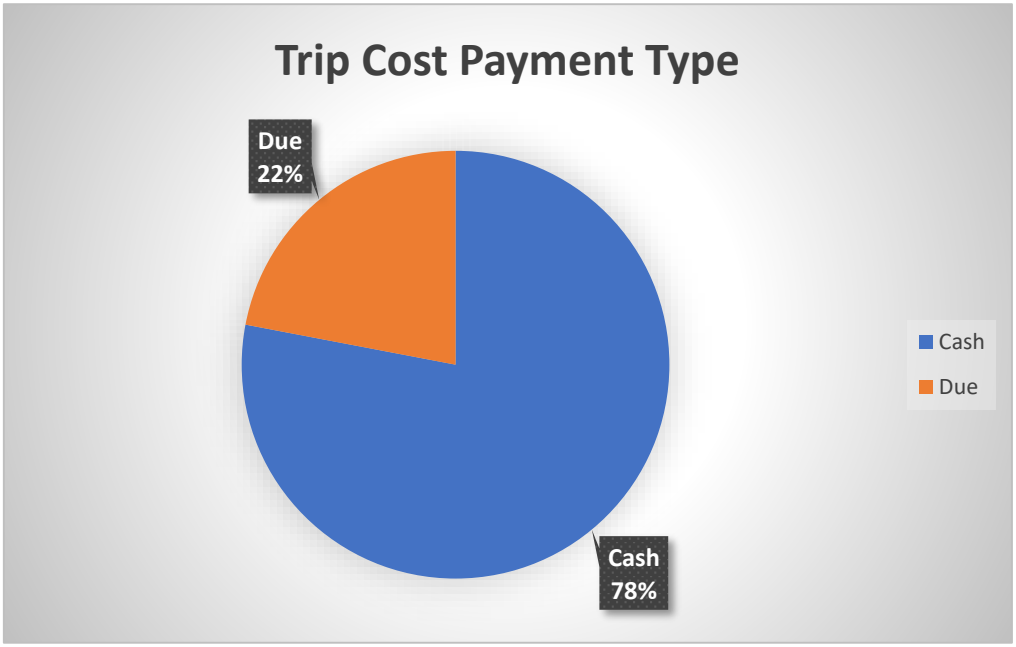


Figure 33: Trip Cost Payment Distribution

5.4 Seasonal Transport Process Initiation Trend

The initiation timeline of seasonal transport load-unload processes in Meherpur District demonstrates a clear evolution in goods movement management over the past three decades. Beginning from **1990**, the frequency of such processes remained low through the 1990s and early 2000s, reflecting limited institutional engagement with seasonal logistics. A noticeable shift occurs from **2018 onward**, with the most significant increase in **2020**, during which **8 processes** were initiated—likely a response to the COVID-19 pandemic's disruption of supply chains and the subsequent emphasis on agricultural logistics. This momentum continued in the following years, particularly in **2022** and **2023**, showing growing awareness of transport bottlenecks during peak seasons. The upward trend through **2025** indicates continued policy interest in building a more resilient and efficient freight system, especially for perishable and time-sensitive goods.

The following figure presents the distribution of the starting years of the processes.

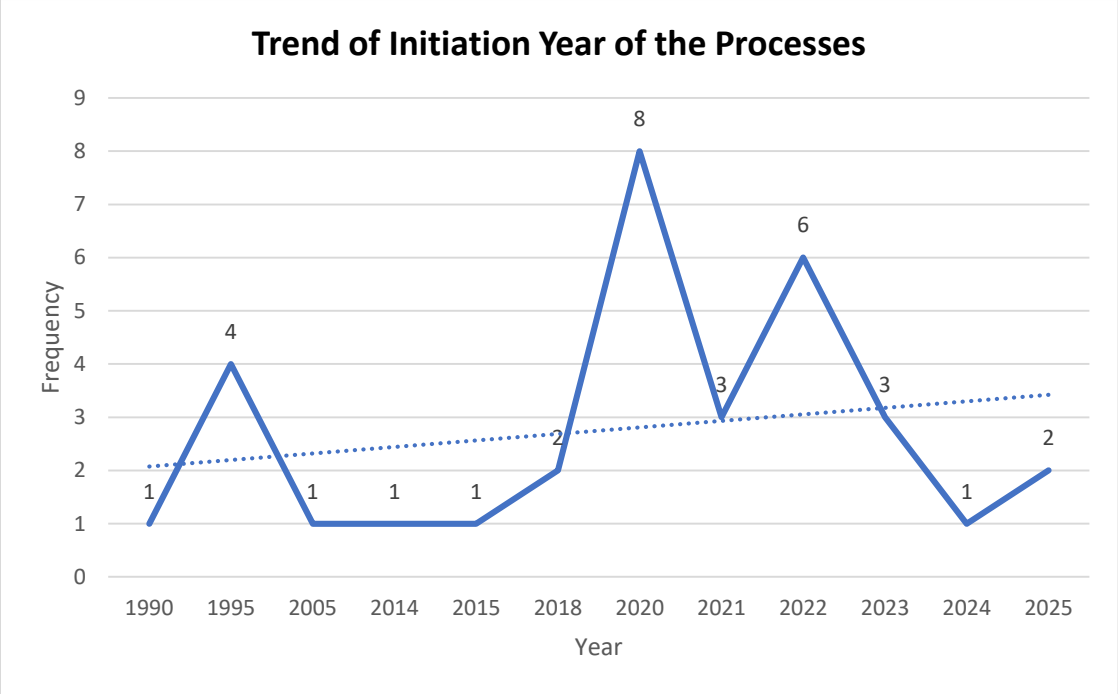


Figure 34: Seasonal Transport Load-Unload Process Initiation Trend

5.5 Vehicle Operation Type

The "Vehicle Operation Type" chart reveals a striking skew toward rentals: of the 33 vehicles tracked, only 8 (25%) are owner-operated while a full 25 (75%) are rented. Blue bars plot the raw counts and an overlaid orange line traces the percentage split, underscoring how rental arrangements have become the dominant model—likely driven by cost efficiencies or the need for flexible fleet scaling.

Table 23: Vehicle Operation Type

S.L	Vehicle Operation Type	Frequency	Percentage (%)
1	Owner Operated	8	25%
2	Rented	25	75%

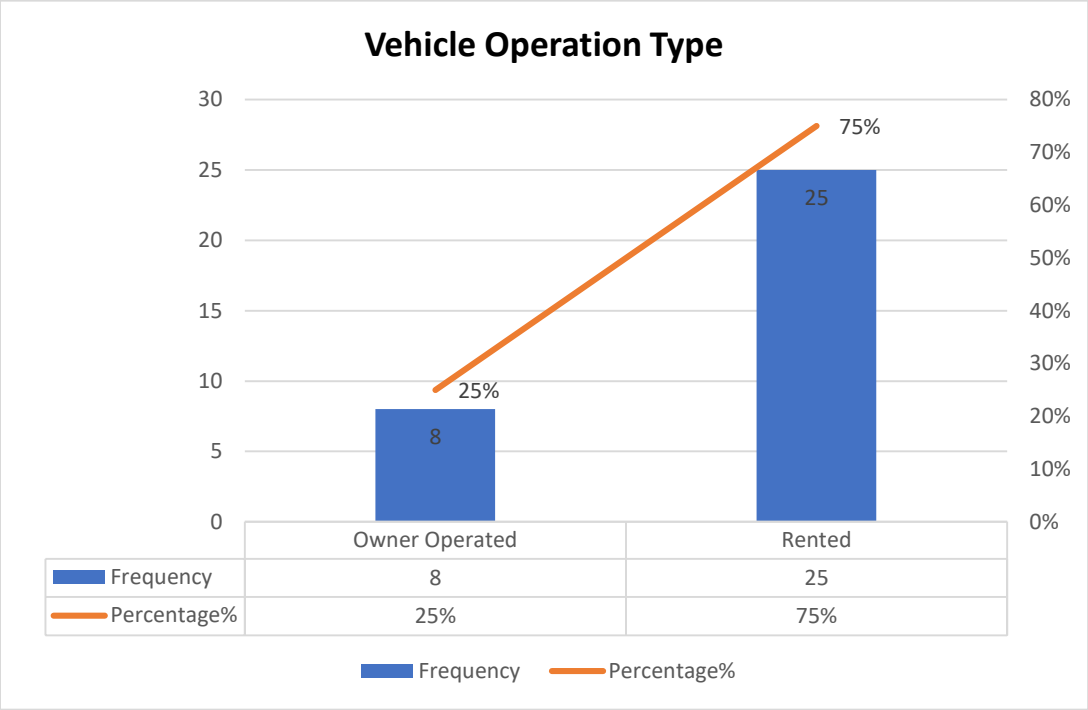


Figure 35: Seasonal Transport Vehicle Operation Type

5.6 Facing difficulties during transportation

The bar chart "Facing difficulties during transportation" shows that 60% of respondents (20 people) reported no issues, while the remaining 40% (13 people) said they did face difficulties. This split—roughly three in five traveling smoothly versus two in five encountering problems—highlights that a substantial minority still struggles with transit, pointing to clear opportunities for targeted service or infrastructure improvements.

Table 24: Facing difficulties during transportation

S.L	Facing difficulties during transportation	Frequency	Percentage (%)
1	No	20	60%
2	Yes	13	40%

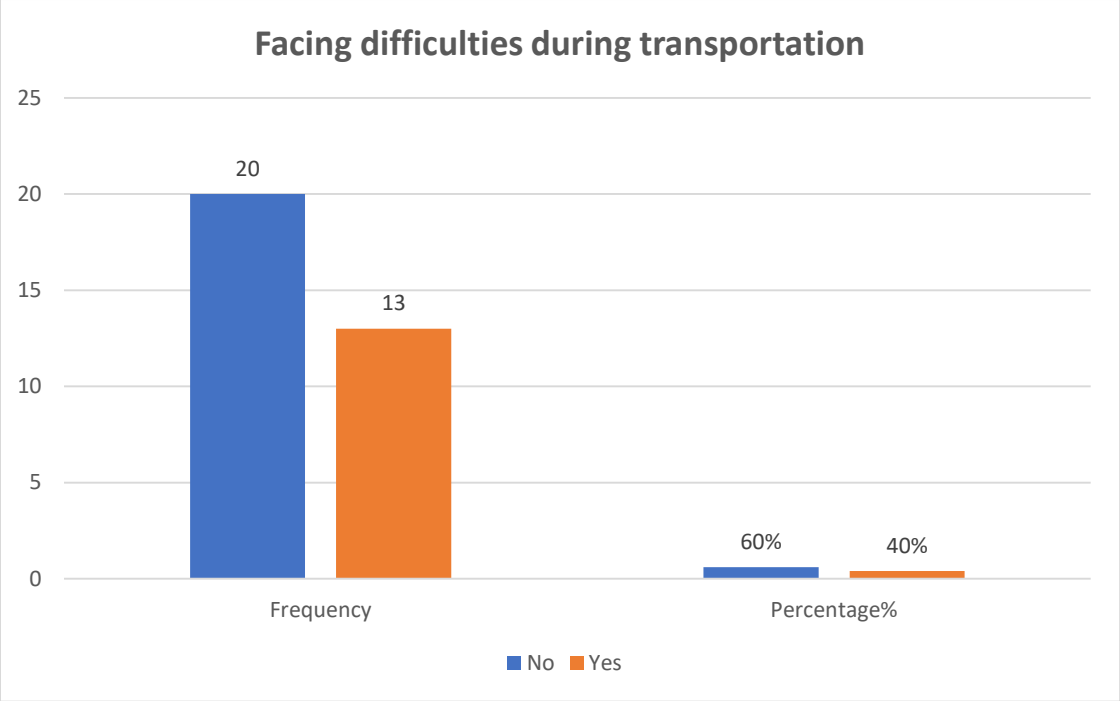


Figure 36: Facing difficulties during transportation

Chapter 6
Conclusion

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The transportation surveys for roadways and waterways in Meherpur District have provided valuable insights into the current state of the district's transport infrastructure, traffic patterns, and mobility challenges. The study identified key congestion points, critical junctions, and the existing deficiencies in road conditions and traffic management. The anticipated establishment of Meherpur University is projected to significantly increase traffic demand, underscoring the urgent need for infrastructural enhancements and integrated transport planning.

The findings highlight that while some roads are in fair to good condition, many require widening, resurfacing, and better management to handle increasing traffic volumes. Congestion at major intersections during peak hours, especially near educational institutions, markets, and border access points, necessitates targeted interventions such as traffic signalization, dedicated lanes for non-motorized transport, and development of bypass routes.

Moreover, the goods movement study revealed the importance of improving freight logistics, especially for agricultural products, which are critical to the local economy. Overall, the survey underscores the interconnected nature of transport, land use, and socio-economic development in the district.

To effectively plan for future growth and align with the Government's Vision 2041, it is essential to move beyond descriptive surveys and develop advanced analytical tools that can forecast travel demand and evaluate transport interventions. This will enable data-driven decision-making for infrastructure investments and sustainable mobility solutions.

Way Forward

Building on the survey findings, the next phases of the project will focus on the following key activities:

1. Development of a Computer-Based Travel Demand Forecasting Model
    - Prepare a robust methodology employing the classical four-step transport modeling process:
        - Trip Generation: Estimating the number of trips originating and destined within traffic zones.
        - Trip Distribution: Predicting spatial trip patterns between origins and destinations.
        - Mode Choice: Modeling the selection among different transport modes based on cost, time, and convenience.
        - Traffic Assignment: Allocating predicted trips to specific routes on the transport network.
2. Sub-Model Development and Calibration
    - Design and calibrate detailed sub-models tailored to the unique socio-economic and geographic context of Meherpur District.
    - Incorporate demographic, land use, and economic variables to enhance prediction accuracy.
    - Utilize survey data and stakeholder inputs to refine model parameters.
3. Formulation of a Long-Term Transportation Master Plan
    - Develop a 20-year master plan for Meherpur District integrating all transport modes—roadways, waterways, and non-motorized transport—to optimize resource use and improve connectivity.
    - Align the master plan with the Government's Vision 2041 goals, emphasizing sustainable, inclusive, and climate-resilient transport systems.
    - Identify priority infrastructure projects, policy measures, and operational strategies to address future demand and mobility needs.
4. Integration of Land Use and Transport Planning

- Ensure coordination between transport infrastructure development and land use zoning to promote transit-oriented growth.
- Plan for emerging urban nodes, including the proposed university area, to manage travel demand effectively.

5. Stakeholder Engagement and Capacity Building
   - Collaborate with local authorities, transport operators, and communities during model development and master plan preparation.
   - Build institutional capacity to maintain and update travel demand models and implement master plan recommendations.

By adopting this forward-looking approach, Meherpur District will be better equipped to anticipate transport challenges, prioritize investments, and foster sustainable mobility solutions that support economic growth and social well-being over the next two decades.