Project Summary
for
Asphalt Mixing Facility Construction Project

LD MANUFACTURINGAND TRADING INC.

CHAPTER 1: PROJECT OVERVIEW

1.1 Project Name and Undertaking Entity
LD MANUFACTURING AND TRADING INC.

1.1.1 Project Name:
Asphalt Mixing Facility Construction Project

1.1.2 Project Undertaking Entity:
LD MANUFACTURING AND TRADING INC. is a specialized company composed of professionals with years of experience in asphalt concrete production and construction. The company is engaged in asphalt pavement engineering, highway engineering, municipal infrastructure construction, asphalt concrete production and sales, as well as the recycling and reuse of reclaimed asphalt pavement (RAP). As an integrated enterprise combining production and pavement construction, it has established a strong presence in the Guyanese market over the years. Both the company and its personnel have accumulated extensive experience in production and market operations.

In response to the growing demand for asphalt pavement construction and maintenance in Guyana, the company plans to establish a new medium-to-large-scale environmentally friendly asphalt mixing facility project.

1.2 Project Location
Cultivation Lot 69 & 70 being a portion of Craig situate on the East Bank of Demerara (Bus Bee Dam, East Bank Demerara, Georgetown (Coordinates: 6°41’13. N, 58°10’14.4” W)

1.3 Project Scope and Construction Timeline
1.3.1 Project Scope:
The project involves the construction and operation of an Asphalt Plant and Concrete Batching Plant with a production line with an annual production capacity of 350,000 tons**.** Supporting facilities will include a quality control laboratory, office building, and dormitory building, construction of Office and Warehouses, Maintenance Workshop, Pre-Cast Concrete Laydown Yard, and Aggregate Storage.

1.3.2 Construction Timeline:
The construction period is scheduled from September 2025 to May 2026, with a total duration of 8 months.

1.4 Estimated Investment (USD 12 million)
The total investment for the project is estimated at USD 12 million.
Breakdown of costs:
Civil works: USD 4 million
Equipment: USD 6 million

Other expenses: USD 0.5 million
Working capital: USD 1.5 million

CHAPTER 2: BACKGROUND OF THE PROJECT

2.1 Project Rationale

In the past decade, Guyana's road infrastructure has developed rapidly. By the end of 2024, the total length of Guyana's road network reached approximately 8,770 kilometers, including around 1,820 km of primary roads, 2,170 km of secondary roads, and 4,780 km of tertiary roads. The total road mileage is a key indicator of regional development, with asphalt concrete pavements accounting for over 35% of the total length.

With the continuous advancement of the country's transportation infrastructure, asphalt concrete pavements have become increasingly favored due to their advantages such as smooth surface, driving comfort, wear resistance, environmental benefits including noise reduction, short construction period, easy maintenance, and recyclability. Asphalt concrete is now widely used in roads of various classifications, and the demand for it continues to grow significantly.

As urban road construction expands in both scale and quality, existing suppliers face challenges in meeting demand due to outdated operating processes and low equipment efficiency at their asphalt mixing facilities. This has become a "bottleneck" in the development of asphalt concrete road projects. As a result, there is a growing and realistic demand for establishing modern medium- and large-scale asphalt mixing facilities.

At the same time, as the technology for producing high-performance asphalt concrete and its recycling continues to improve, asphalt concrete has increasingly become the mainstream choice in Guyana's road construction.

2.2 Necessity of Construction

2.2.1 Market Demand

The Government of Guyana has identified road infrastructure upgrades as a national development priority. Over the next five years, the country plans to rehabilitate and expand more than 500 kilometers of primary roads to meet the rapidly growing transportation needs.

Asphalt mixing facilities serve as essential infrastructure in road construction, providing a stable and sufficient supply of asphalt mixtures to ensure high-quality and on-schedule project delivery.

2.2.2 Cost Efficiency

Currently, Guyana's asphalt supply mainly relies on a few small mixing facilities concentrated in urban areas. Their limited supply radius leads to long transport

distances for remote projects, resulting in high logistics costs and extended construction timelines.

Establishing modern asphalt mixing facility along major highways can enable localized material supply, reduce transportation time by 20%–30%, minimize material waste and fuel consumption, and lower overall costs by approximately 10%–15%.

Sufficient local production capacity also helps avoid delays caused by dependence on imported asphalt mixtures or long-distance inter regional transfers, thereby improving the overall efficiency of road construction.

2.2.3 Promotion of Local Economy and Employment

The construction of the project will directly stimulate related sectors such as civil works, transportation, equipment installation, and raw material supply, creating approximately 80–100 direct jobs and many more indirect employment opportunities.

The long-term operation of the asphalt mixing facility will generate consistent tax revenue, boost local fiscal capacity and support further infrastructure investments. In addition, the training of technical personnel and transfer of management expertise will contribute to improving the quality of local road construction and project management, ultimately facilitating the upgrade of the regional transportation industry chain.

2.3 Project Feasibility

The undertaking entity, **LD MANUFACTURING AND TRADING INC.**, is a professional enterprise composed of experienced personnel engaged in asphalt concrete production and road construction for many years. The company specializes in asphalt pavement engineering, highway and municipal infrastructure projects, asphalt concrete production and sales, as well as the recycling and reuse of reclaimed asphalt pavement (RAP). As an integrated company combining material production with road construction, LD has established a solid foundation and market presence in Guyana through years of local operation. The company and its staff have accumulated extensive production experience and valuable market resources.

LD MANUFACTURING AND TRADING INC. organizes production in accordance with standardized requirements, emphasizing quality inspection and supervision throughout the process. Its products have received broad recognition and positive feedback in the market. Moving forward, the company plans to fully implement standardized production systems, strictly following ASTM standards**.** Comprehensive and detailed protocols will be developed for all stages of production and transportation.

By establishing and enforcing rigorous standards, the entire production cycle — from pre-production, in-process operations to post-production handling — will be brought under standardized management to achieve optimal economic efficiency **and** social benefits**.**

The proposed project will focus on the development and production of high-quality asphalt concrete for premium-grade highways. By applying advanced technologies such as scientific mixture optimization, utilizing state-of-the-art equipment, improving product quality, and engaging in new product R&D, the project aims to set a positive example for the standardized production and widespread application of high-performance asphalt concrete materials**.**

CHAPTER 3: MARKET FORECAST

3.1 Current Supply Status of Asphalt Concrete Products

At present, there are very few asphalt concrete mixing facilities in the Georgetown area that have been officially approved by the relevant government authorities. Moreover, these existing facilities were constructed many years ago and are no longer capable of meeting the country's current requirements in terms of production capacity and environmental standards.

Given Guyana's strong emphasis on green, environmentally friendly, and energy-efficient development, these outdated facilities are unlikely to meet the future market demand—particularly the increasing need for high-quality asphalt concrete required for national infrastructure and urban development.

3.2 Forecast of Product Market Demand

As Guyana's transportation infrastructure continues to develop, asphalt concrete pavements are being increasingly adopted in both highway and urban road projects due to their advantages: smooth surface finish, driving comfort, wear resistance, environmental noise reduction, shorter construction cycles, and ease of maintenance and repair.

These performance benefits are driving sustained growth in demand for asphalt concrete especially in large-scale, high-standard road construction projects.

3.3 Target Market Definition

The primary target market will be **road construction projects in the Georgetown area**, while also serving surrounding regions. Key clients will include **major local road contractors**, as well as **owners of port facilities and industrial parks**.

CHAPTER 4: PROJECT CONSTRUCTION CONDITIONS

4.1 Transportation and Logistics Conditions

As the project is intended to serve multiple areas within Georgetown, transportation accessibility and environmental considerations were key factors in site selection. Upon completion, the facility is expected to deliver asphalt concrete products **efficiently, reliably, and with consistent quality** to various construction sites, ensuring smooth project execution across the region.

4.2 Site Selection and Environmental Compatibility

The project site is located at **Buzz Bee Dam, Craig Village, East Bank Demerara (EBD)**. It is situated on undeveloped land, far from residential areas, and will not negatively impact on the daily lives or production activities of local residents. During construction, appropriate engineering and environmental measures will be adopted, including enhanced landscaping and greenery. In the operational phase, strict environmental management practices will be implemented to ensure the site remains in harmony with environmental protection requirements.

4.3 Supply of Key Raw Materials

The primary raw materials for the project include **asphalt**, and mineral aggregates such as **sand, crushed stone, and mineral powder**. Sand and aggregates will be sourced **locally**, while asphalt will be **imported**.

4.4 Water and Power Supply Conditions

The selected site requires an estimated power load of **1,000 kVA**. To meet this demand, the project will be equipped with diesel generator sets of **600 kVA (1 unit)**, **500 kVA (1 unit)**, and **300 kVA (1 unit)**. In addition, a **1 MW rooftop solar photovoltaic power station** will be installed, and the facility will also be **connected to the national power grid (GPL)**.

The project only requires domestic (non-industrial) water**,** with relatively low consumption. Water will be sourced directly from the nearby municipal supply network.

4.5 Land Use Conditions

The proposed site is designated as industrial land in the regional development plan. The site offers an available area of approximately 5 acres**,** which is sufficient to meet the needs of the project's construction and operational requirements.

CHAPTER 5: TECHNICAL PLAN, EQUIPMENT PLAN, AND ENGINEERING PLAN

The proposed project involves the establishment and operation of an integrated industrial facility comprising an asphalt plant, concrete batching plant, offices and warehouses, maintenance workshop, precast concrete laydown yard, and aggregate storage areas. The facility will support the production, storage, maintenance, and distribution activities associated with road construction, civil works, and infrastructure development projects.

1. *Site Preparation and Construction Phase*

The project will commence with site preparation activities, including land clearing, grading, excavation, and the development of internal access roads and drainage systems. Construction activities will involve the erection of office buildings, warehouses, workshop facilities, foundations for the asphalt and concrete batching plants, utility installations, stormwater management infrastructure, and designated storage and laydown areas. Construction materials, equipment, and personnel will be mobilized to the site throughout this phase.

2. *Aggregate Reception and Storage*

Aggregates such as sand, gravel, crushed stone, and other construction materials will be transported to the facility by truck and stored in designated stockpile areas. Materials will be separated according to size and type to facilitate efficient use in asphalt and concrete production. Stockpiles will be managed to minimize material loss, contamination, and dust generation.

3. *Asphalt Plant Operations*

The asphalt plant will produce hot mix asphalt for road construction and rehabilitation projects. Aggregates will be conveyed from stockpiles to drying and heating units where moisture is removed. Heated aggregates will then be mixed with bitumen and, where required, additives such as fillers or recycled asphalt pavement. The finished asphalt mixture will be temporarily stored in silos before being loaded onto trucks for transportation to project sites.

4. *Concrete Batching Plant Operations*

The concrete batching plant will manufacture concrete for construction projects. Raw materials including cement, aggregates, water, and admixtures will be measured according to specified mix designs and combined within a batching system. The concrete will then be discharged into transit mixers or other transport vehicles for delivery to construction sites. Quality control procedures will be implemented to ensure compliance with engineering specifications.

5. *Maintenance Workshop Operations*

The maintenance workshop will support the servicing, repair, and upkeep of plant machinery, construction equipment, and vehicle fleets. Activities may include mechanical repairs, welding, lubrication, parts replacement, inspections, and routine maintenance. The workshop will also include storage areas for tools, spare parts, lubricants, fuels, and other maintenance-related materials.

6. *Precast Concrete Laydown Yard Operations*

The precast concrete laydown yard will be used for the storage, curing, staging, and handling of precast concrete products such as culverts, drains, barriers, slabs, and other structural components. Finished products will remain in the yard until required for transport to construction sites. Material handling equipment such as forklifts, cranes, and loaders may be used to move products within the facility.

7. *Office and Warehouse Operations*

Administrative functions associated with the project will be conducted from the office facilities. These functions may include project management, procurement, finance, engineering, environmental management, and workforce administration. Warehouses will provide secure storage for construction materials, spare parts, equipment, tools, safety supplies, and other operational inventory.

8. Product Loading and Transportation

Finished asphalt, concrete, precast products, and stored materials will be loaded onto trucks and transported to various project locations. Vehicle movements will occur daily and will include deliveries of raw materials to the site as well as dispatch of finished products. Internal traffic routes and loading areas will be established to facilitate safe and efficient transportation activities.

9. Stormwater and Waste Management

The facility will incorporate stormwater drainage systems designed to control runoff and reduce sediment transport. Waste generated from plant operations, maintenance activities, offices, and warehouses will be managed through waste segregation, recycling, reuse, and disposal at approved facilities. Wastewater generated from equipment washing and concrete operations will be collected and treated through designated containment systems prior to disposal or reuse.

10. Decommissioning and Site Closure (Future Phase)

At the end of the project's operational life, the facility may be decommissioned. Activities would include dismantling plant equipment, removing structures where necessary, managing residual materials and wastes, rehabilitating disturbed areas, and restoring the site to an agreed post-use condition in accordance with regulatory requirements.

5.1 Technical Plan

5.1.1 Mixing Process

The asphalt concrete mixing plant is a specialized facility designed for producing asphalt mixtures. It dries, heats, screens, and measures aggregates, adds an appropriate amount of filler (such as mineral powder), and blends them uniformly with hot liquid asphalt in a specific mix ratio to produce the final asphalt concrete product.

The main steps in the mixing process are as follows:

Drying and Screening Aggregates**:**

Aggregates (sand and stone) are dried at a temperature of 433–473 K (160–200°C)**,** then screened and weighed proportionally.

Heating Asphalt**:**

Asphalt is heated and melted to a temperature of 393–433 K (120–160°C)**,** maintained in a thermostatic state, and measured either by volume or mass.

Mixing**:**

The heated aggregates, with the appropriate amount of mineral filler, are uniformly mixed with the hot liquid asphalt to produce the desired asphalt mixture. The discharge temperature of the final product ranges from 110°C to 170°C**.**

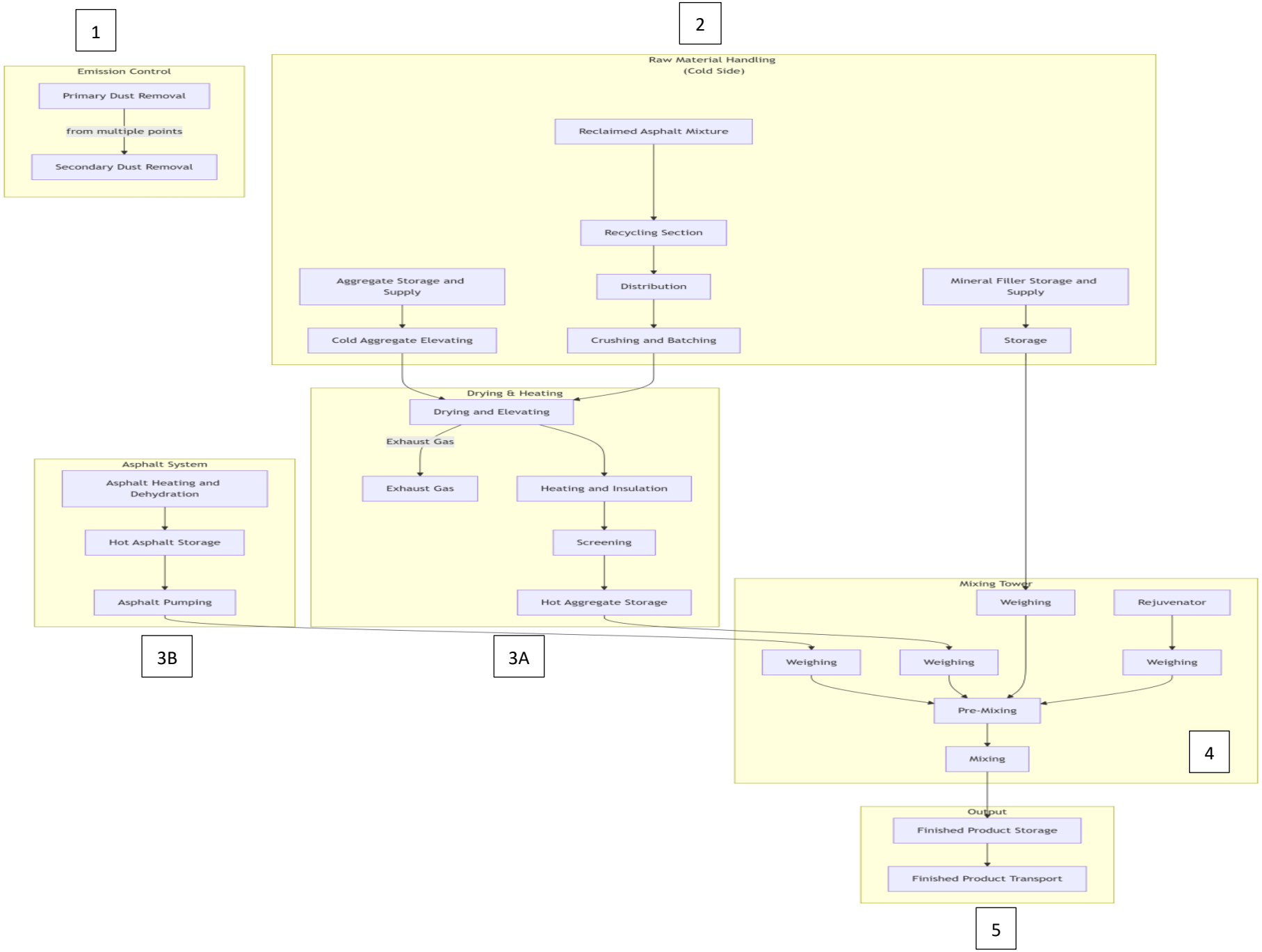
5.1.2 Process Flow

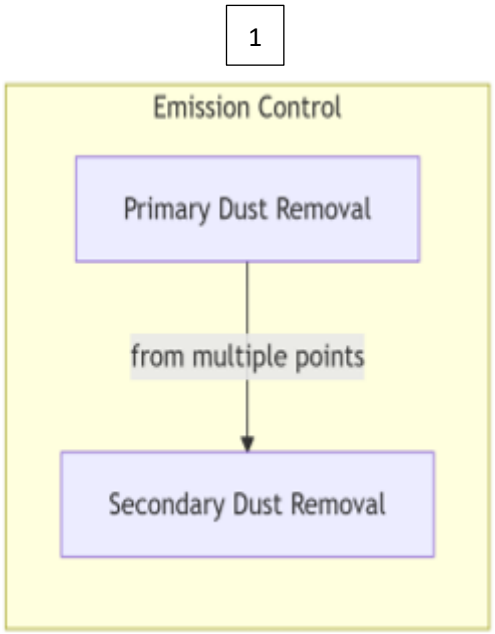
The drying, heating, and mixing of aggregates are carried out continuously within a single rotary drum**.** A burner is installed at the center of the drum's feed end to heat the aggregates in the direction of material flow. Hot liquid asphalt is injected into the front section of the drum, where it is combined with the heated aggregates and filler. The materials are mixed using a gravity-induced (falling) mixing method and discharged from the drum.

This design simplifies the production process and significantly reduces dust emissions**.** The finished asphalt mixture is then stored in a finished material silo for later use.

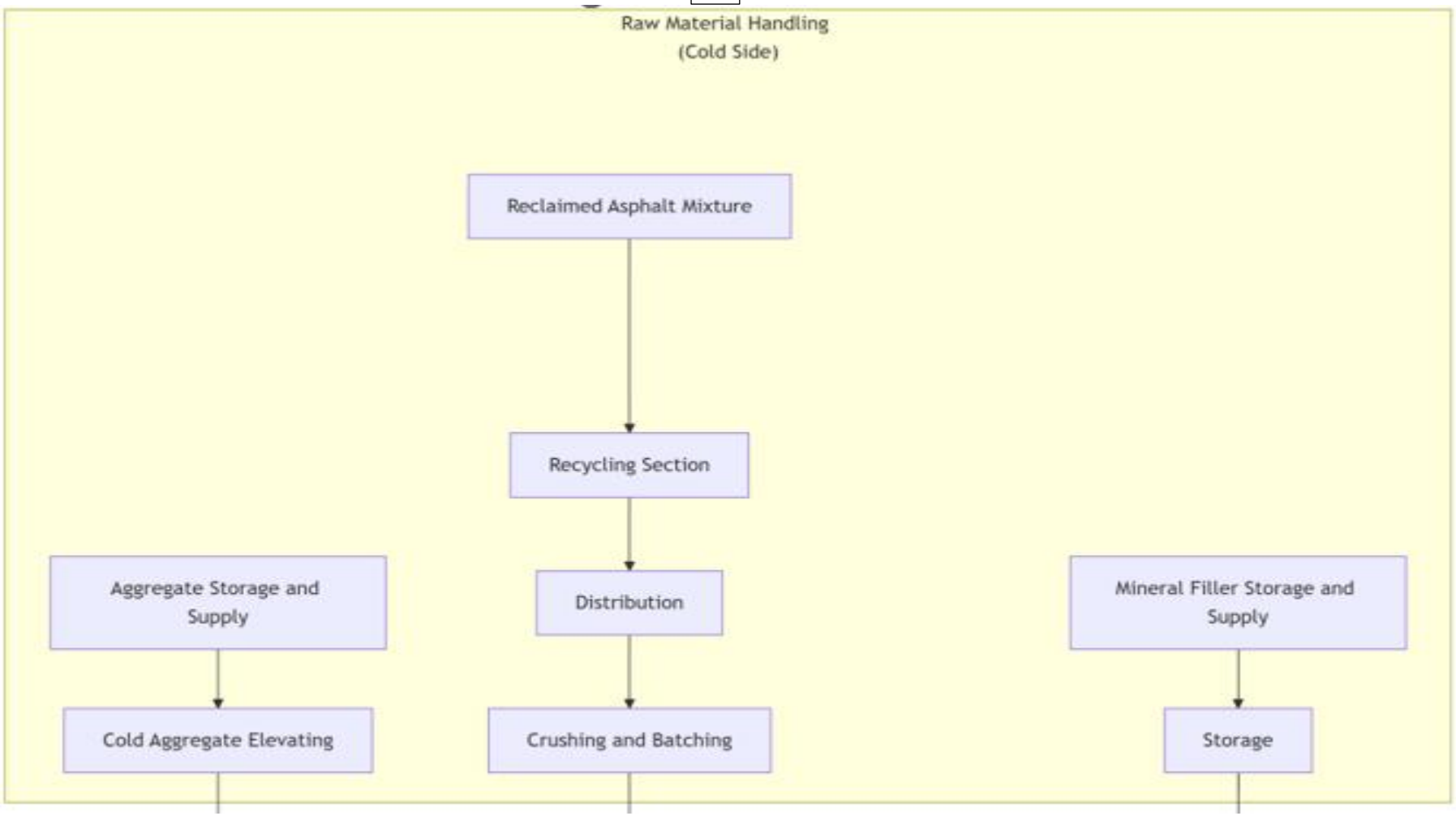
In recent years, this type of mixing equipment has been upgraded with advanced electronic control systems and modern sensors**,** enabling automated production**,** precise control of mix ratios**,** and stable, high-quality output**.**

The process flow diagram is illustrated below:


1
Emission Control
Primary Dust Removal
from multiple points
Secondary Dust Removal
2
Raw Material Handling
(Cold Side)
Reclaimed Asphalt Mixture
Recycling Section
Aggregate Storage and Supply
Distribution
Mineral Filler Storage and Supply
Cold Aggregate Elevating
Crushing and Batching
Storage
Drying & Heating
Drying and Elevating
Exhaust Gas
Exhaust Gas
Heating and Insulation
Screening
Hot Aggregate Storage
Asphalt System
Asphalt Heating and Dehydration
Hot Asphalt Storage
Asphalt Pumping
3B
3A
Mixing Tower
Weighing
Rejuvenator
Weighing
Weighing
Weighing
Pre-Mixing
Mixing
4
Output
Finished Product Storage
Finished Product Transport
5


1
Emission Control
Primary Dust Removal
from multiple points
Secondary Dust Removal

2


Raw Material Handling
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Reclaimed Asphalt Mixture
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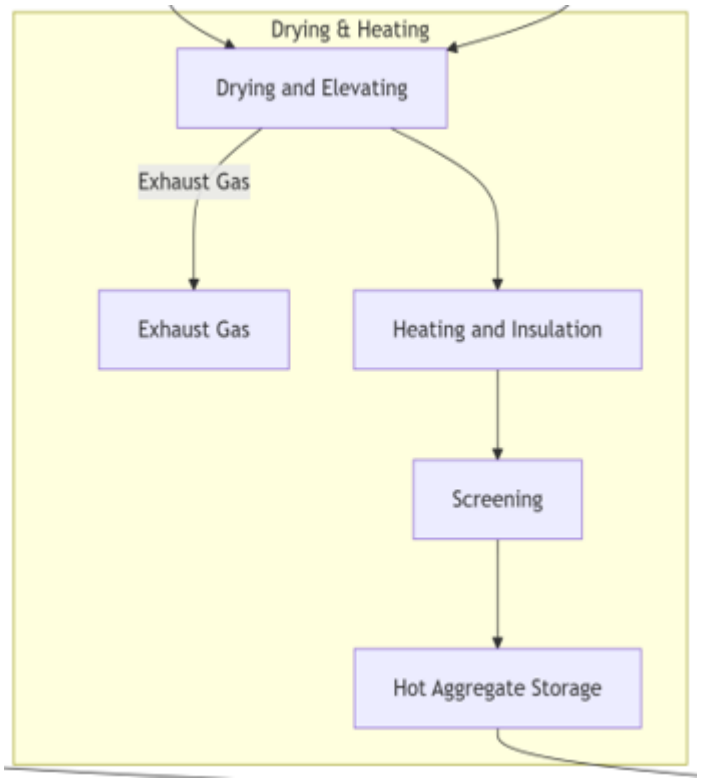
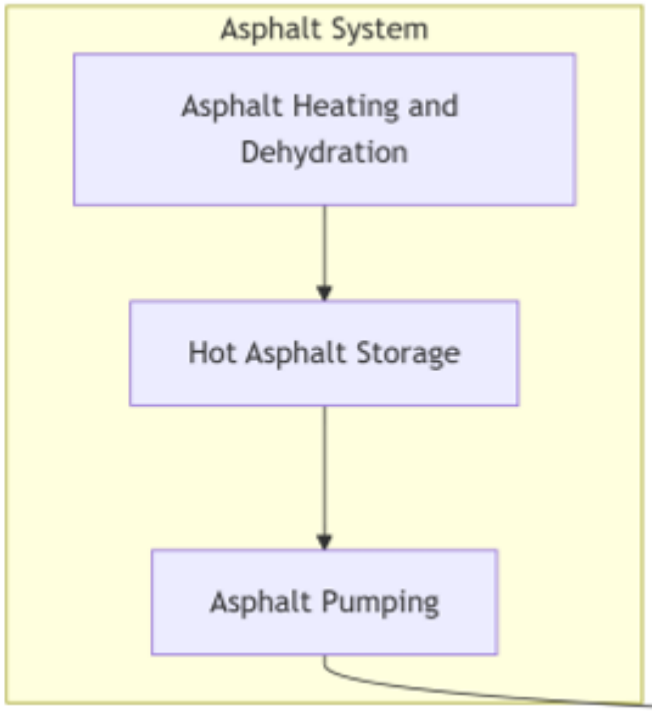
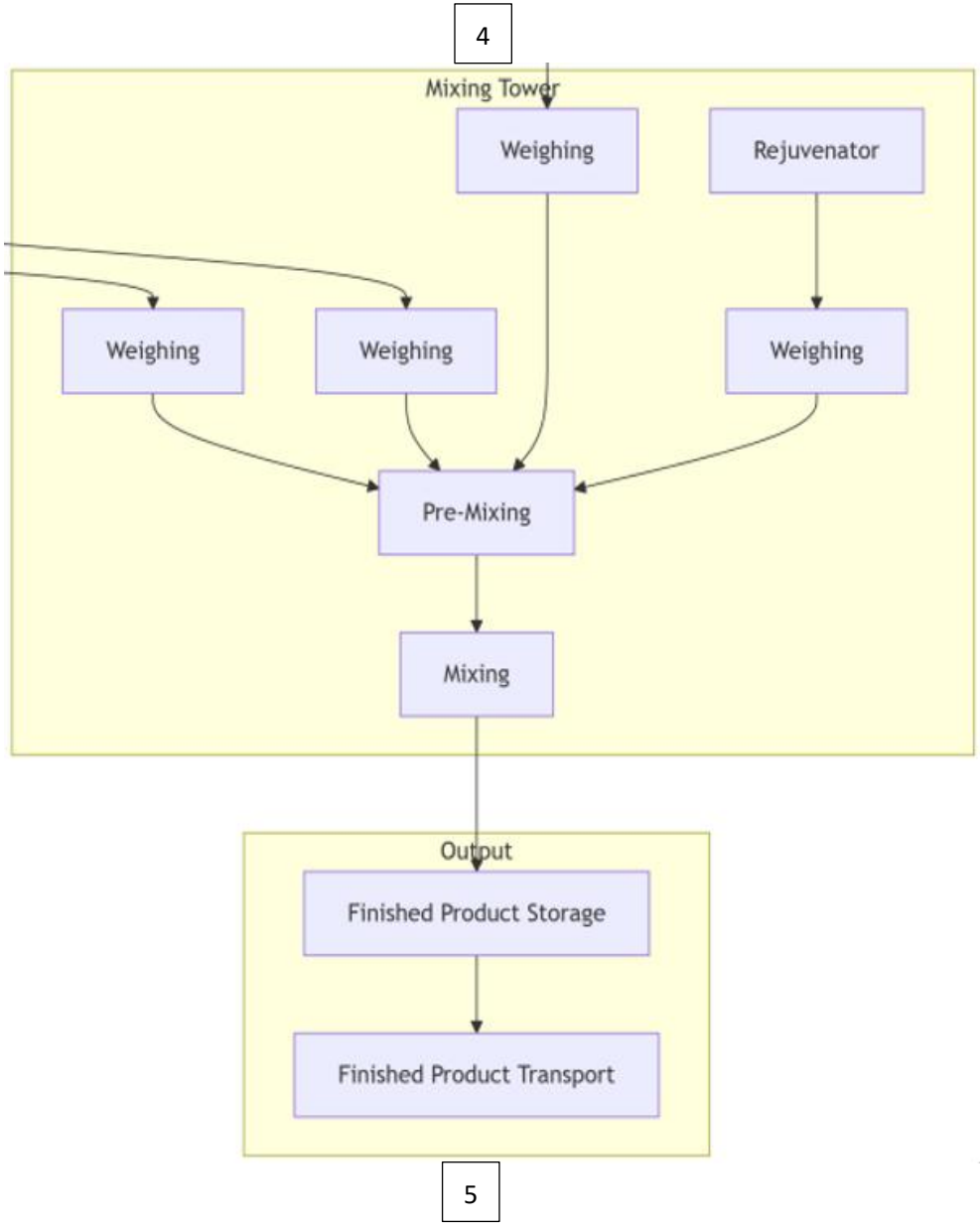
Storage

3A


Drying & Heating
Drying and Elevating
Exhaust Gas
Exhaust Gas
Heating and Insulation
Screening
Hot Aggregate Storage

3B


Asphalt System
Asphalt Heating and Dehydration
Hot Asphalt Storage
Asphalt Pumping


4
Mixing Tower
Weighing
Rejuvenator
Weighing
Weighing
Weighing
Pre-Mixing
Mixing
Output
Finished Product Storage
Finished Product Transport
5

5.2 Equipment Plan

5.2.1 Main Components of the Equipment

1. Drying and heating equipment for sand and aggregates;
2. Screening and weighing equipment for sand and aggregates;
3. Corresponding conveying and lifting equipment;
4. Bitumen heating and thermal insulation equipment;
5. Bitumen weighing equipment;
6. Mixing equipment;
7. Transmission system and control system;
8. Auxiliary/supporting facilities.

5.2.2 Equipment Selection

The asphalt concrete mixing plant is the mechanical equipment used for producing various types of asphalt mixtures. It is applicable to highway construction, urban roads, airports, ports, parking lots, and other engineering projects. As one of the key pieces of equipment in asphalt pavement construction, its performance directly affects the quality of the paved asphalt pavement.

Considering the above factors, the **LB2000 asphalt mixing plant** is selected for this project, with reserved interfaces for a hot recycling system (to be configured later based on the local pavement service life and the amount of reclaimed milling material).

Table 1: Main technical specifications of the asphalt mixing equipment for the project

Item	**Technical Specification**
Capacity	320 t/h (moisture content < 5%)
Inclined Belt Conveyor	Width: 600 mm
Max. Capacity	140 t/h
Drying Drum	Φ2250 × 9000 mm
Max. Capacity	160 t/h
Burner	Low-noise, high-pressure atomizing type (Diesel/Natural Gas)
Max. Fuel Consumption	1200 kg/h (Diesel), 1410 Nm^3/h (Natural Gas)
Baghouse Dust Collector	Reverse air-pulse type
Filtering Area	650 m^2
Recycle Screw Conveyor	25 t/h
Induced Draft Fan	110 kW
Hot Aggregate Elevator	Plate chain type
Max. Capacity	180 t/h
Vibrating Screen	Six-layer, seven-section linear type
Max. Capacity	≥180 t/h
Hot Aggregate Bin	6-compartment type
Capacity	40 m^3
Weighing System	Electronic weighing with remote display; Accuracy: Aggregate ±0.5%, Asphalt ±0.25%, Mineral Filler

	±0.3%
Mixer	Twin-shaft, forced type, batch mixer; Double motor drive; 2000 kg per batch
Asphalt Spraying Device	Gravity flow type
Discharge Rate	610 L/min
Filler Elevator	Bucket elevator
Max. Capacity	20 t/h
Screw Conveyor	50 t/h
Control Console	Industrial computers, dual-machine dual-control
Power Distribution Panel	Indoor type, 450 kW (excluding recycling system)

Table 2: List of experimental equipment

Category	**Instruments / Equipment**
Civil Engineering	Hydrometer, Automatic Compactor, Pavement Material Strength Tester, CBR Test Apparatus, Standard Sieve Shaker, Electronic Balance, Oven, Liquid-Plastic Limit Apparatus (photoelectric type), Multifunction Demolding Device
Aggregates	Standard Sieves, Aggregate Crushing Value Apparatus (for cement and asphalt), Compression Testing Machine, Los Angeles Abrasion Machine, Vernier Caliper, Accelerated Polishing Machine, Impact Testing Machine, Fine Aggregate Angularity Apparatus, Electronic Balance, Oven
Rock / Stone	Electric Cutting Machine, Grinding Machine, Low-Temperature Test Chamber
Cement	Electronic Balance, Cement Paste Mixer, Vicat Apparatus, Le Chatelier Mould, Boiling Water Bath, Mortar Mixer, Mortar Jolting Table, Standard Constant Temperature and Humidity Curing Room, Flexural Testing Machine (motor-driven), Compression Testing Machine, Blaine Air Permeability Apparatus, Negative Pressure Sieving Device
Inorganic Stabilized Materials	Curing Room, Direct-Reading Calcium Tester, Titration Equipment, High-Temperature Furnace, Electronic Balance, Oven
Bitumen (Asphalt)	Penetration Apparatus, Ductility Tester (low-temperature), Softening Point Tester, Flash Point Tester, Electric Furnace, Thin-Film Oven, Stopwatch, Electronic Balance, Rotational Viscometer, Colloid Mill, Oven
Asphalt Mixtures	Asphalt Mixture Mixer, Marshall Automatic Compactor, Immersed Balance, Oven, Marshall Stability Tester,

	Constant-Temperature Water Bath, Asphalt Extraction Apparatus, Wheel-Tracking Molding Machine, Rutting Tester, Low-Temperature Test Chamber, Maximum Specific Gravity Apparatus
Road Engineering	Cutting Ring, Sand-Cone Apparatus, Core Drilling Machine, Benkelman Beam Deflection Tester, Surface Evenness Tester, Friction Coefficient Tester, Bearing Plate, Texture Depth Gauge, Pavement Permeability Tester
Structural Concrete	Rebound Hammer, Carbonation Depth Measuring Device, Rebar Locator & Cover Thickness Gauge, Non-metallic Ultrasonic Testing Instrument, Reading Microscope
Foundation & Pile Testing	Static and Dynamic Penetration Tester, Bearing Plate, Base Strain Gauge
Highway Alignment & Geometry	Total Station, Level Instrument, Steel Tape

Table 3: List of major construction and building works of the project

No.	**Project Name**	**Quantity / Floors**	**Building Area (㎡)**
1	Office Building & Laboratory	2 floors	250
2	Weighbridge House	1 unit	50
3	Equipment Parking Shed	1 unit	250
4	Mechanical Workshop	1 unit	100
5	Power Distribution Room	1 unit	30
6	Spare Parts Warehouse	1 unit	30
7	Crushed Stone Stockpile	1 unit	250
8	Mineral Powder Warehouse	1 unit	150
9	Sand Storage	1 unit	250
10	Mixing Plant Foundation	1 set	1200
11	Asphalt Tank Foundation	1 set	500
12	Parking Lot	1 unit	500

CHAPTER 6 ENVIRONMENTAL IMPACT ASSESSMENT

6.1 Site Environmental Conditions

The project is located at **Lot 69** and **79, Buzz Bee Dam, Craig Village, EBD**. Within a 1,000 m radius of the proposed site, there are no residential settlements or shared public facilities. The surrounding land is currently undeveloped wasteland.

6.2 Environmental Impacts of Construction and Operation

The following potential impacts and mitigation measures can be considered for the Operation of an Asphalt Plant and Concrete Batching Plant, Construction of Offices and Warehouses, Maintenance Workshop, Precast Concrete Laydown Yard, and Aggregate Storage Area.

Construction Phase

Table 4: Potential Impacts and Mitigation Measures of the Construction Phase

Activity/Aspect	Potential Impact	Mitigation Measures
Site clearing and earthworks	Loss of vegetation and habitat disturbance	Minimize clearing to required footprint; preserve vegetation where possible; restore disturbed areas after construction.
Excavation and grading	Soil erosion and sedimentation of nearby waterways	Install silt fences, sediment traps, and drainage controls; stabilize exposed soils promptly.
Movement of construction vehicles	Dust generation affecting nearby communities and workers	Water unpaved roads; cover haul trucks; enforce speed limits.
Operation of heavy equipment	Noise and vibration impacts	Restrict work to daylight hours; maintain equipment; provide hearing protection to workers.
Construction traffic	Increased traffic congestion and road safety risks	Implement traffic management plan; provide signage and trained flagmen where necessary.
Fuel and lubricant storage	Soil and groundwater contamination from spills	Store fuels in bunded areas; maintain spill kits; train workers in spill response.
Construction waste generation	Land contamination and visual impacts	Segregate waste; recycle where feasible; dispose through approved facilities.
Worker presence	Community disturbance and occupational health and safety risks	Implement worker code of conduct; provide PPE; conduct safety training.
Concrete works	Alkaline runoff and water contamination	Contain wash water; prohibit discharge into drains or waterways.

Construction of buildings and workshops	Generation of debris and hazardous waste	Properly manage scrap metal, paint containers, oils, and other wastes.

(1) Major Pollutants

Construction activities include site leveling, foundation excavation, and the erection of the asphalt mixing tower, office building, and auxiliary facilities. The main pollutants generated are construction debris, noise, fugitive dust, wastewater, and domestic refuse from construction workers. Since the site is far from residential zones and shielded by natural barriers, noise and dust emissions will not adversely affect residents' living or production activities**.**

(2) Mitigation Measures

Dust Control: Dust originates mainly from stockpiled aggregates, construction processes, and waste handling. Measures include proper storage and covering of raw materials, installation of water spray/mist suppression systems**,** regular sprinkling on dusty surfaces, and landscaping/greening of open areas.

Domestic Waste: Waste will be collected at designated points, managed by appointed personnel, and regularly transported off-site to maintain environmental hygiene.

6.2.2 Impacts During Operation and Mitigation Measures

Table 5: Potential impacts and mitigation during the operational phase

Aspect	Potential Impact	Mitigation Measures
Combustion process	Air emissions (PM, SO_2, NO_x, CO, VOCs)	Install and maintain baghouse filters; use low-sulfur fuel where feasible; conduct stack monitoring.
Asphalt mixing operations	Odors and hydrocarbon emissions	Maintain optimal operating temperatures; inspect equipment regularly.
Material handling and loading	Dust emissions	Enclose conveyors where practical; use water suppression systems.
Burner operation	Greenhouse gas emissions	Maintain efficient combustion systems; optimize fuel use.
Equipment operation	Noise impacts	Install silencers; maintain equipment; establish buffer zones.

Table 6: Potential Impacts and mitigation of the Concrete Batching Plant

Aspect	Potential Impact	Mitigation Measures
Cement handling	Cement dust emissions	Use enclosed silos with dust collectors and filters.
Aggregate transfer	Fugitive dust generation	Use water sprays; cover conveyors; maintain stockpiles.

Truck washout	Alkaline wastewater generation	Construct washout pits; recycle wash water where feasible.
Concrete production	Solid waste generation	Reuse rejected concrete when possible; recycle hardened concrete as aggregate.
Mixer operations	Noise generation	Maintain equipment; provide acoustic barriers if required.

Table 7: Potential impacts and mitigation measures of the Aggregate Storage Area

Aspect	Potential Impact	Mitigation Measures
Equipment servicing	Oil and grease contamination	Conduct maintenance on impermeable surfaces with oil-water separators.
Used oil storage	Soil and groundwater contamination	Store used oil in labeled containers within bunded areas.
Hazardous materials	Worker exposure and environmental contamination	Maintain SDS sheets; train workers; provide PPE.
Welding and fabrication	Fumes and fire hazards	Ensure ventilation; implement hot-work permits; maintain firefighting equipment.
Waste generation	Improper disposal of hazardous waste	Use licensed waste contractors; maintain waste records.

Table 8: Potential impacts and mitigation measures of the Maintenance Workshop

Aspect	Potential Impact	Mitigation Measures
Equipment servicing	Oil and grease contamination	Conduct maintenance on impermeable surfaces with oil-water separators.
Used oil storage	Soil and groundwater contamination	Store used oil in labeled containers within bunded areas.
Hazardous materials	Worker exposure and environmental contamination	Maintain SDS sheets; train workers; provide PPE.
Welding and fabrication	Fumes and fire hazards	Ensure ventilation; implement hot-work permits; maintain firefighting equipment.
Waste generation	Improper disposal of hazardous waste	Use licensed waste contractors; maintain waste records.

Table 9: Potential impacts and mitigation measures of the Precast Concrete Laydown Yard

Aspect	Potential Impact	Mitigation Measures

Storage of precast elements	Visual impacts and safety hazards	Organize storage areas; secure stacked materials.
Material handling	Noise and dust generation	Maintain lifting equipment; control vehicle speeds.
Surface runoff	Sediment transport	Provide drainage controls and sediment traps.

Table 10: Potential impacts and mitigation measures of the Offices and Warehouses

Aspect	Potential Impact	Mitigation Measures
Office operations	Domestic solid waste generation	Implement waste segregation and recycling program.
Sanitary facilities	Wastewater generation	Connect to approved sewer/septic system; maintain facilities regularly.
Energy consumption	Increased carbon footprint	Use energy-efficient lighting and equipment.
Warehousing activities	Traffic and safety risks	Implement warehouse safety procedures and traffic management plans.

Table 11: Potential Cumulative impacts and mitigation measures

Impact	Mitigation Measures
Increased traffic from raw material and product transport	Develop Traffic Management Plan; schedule deliveries; maintain access roads.
Combined air emissions from asphalt plant and batching plant	Conduct ambient air quality monitoring; maintain pollution control equipment.
Noise from multiple facilities	Establish buffer zones; monitor noise levels; maintain equipment.
Stormwater contamination from industrial activities	Implement Stormwater Management Plan; install oil-water separators and sediment controls.
Occupational health and safety risks	Implement OHS Management System; regular training; incident reporting and emergency response procedures.
Fire and explosion risks (fuel storage, asphalt operations)	Develop Emergency Response Plan; provide firefighting equipment; conduct drills.

(1) Major Pollutants

Asphalt fumes and SO_2 from bitumen heating and storage.

Dust from the drying drum, hot aggregate screening, and mixing processes.

Noise from mechanical equipment such as the burner, drying drum, elevators, vibrating screen, mixer, induced draft fan, and trucks.

Domestic sewage and solid waste from production and office staff.

(2) Mitigation Measures

The primary pollution sources during operation are exhaust gases, noise, wastewater, and solid waste**.**

Exhaust Gas Control

The asphalt mixing plant is equipped with desulfurization and dust collection systems to minimize gaseous emissions.

The aggregate drying drum burner uses diesel fuel, ensuring complete combustion and reducing harmful gas generation.

Bitumen heating is performed via a thermal oil heating system with coil heat exchangers. The thermal oil heater is fitted with automatic ignition, PLC monitoring and control, and alarm systems.

The mixing tower is fully enclosed**,** preventing fugitive emissions of dust and fumes.

The plant adopts EU-standard eco-friendly asphalt mixing equipment featuring a waste-gas recovery and secondary combustion unit**,** where high-pressure exhaust gases are re-injected into the burner for complete oxidation of harmful components.

Noise Control

Noise arises mainly from mechanical equipment (dryer, screen, mixer, fans) and vehicle movement**.** Control measures include routine equipment maintenance, installation of acoustic panels/insulation around noise sources, rational plant layout, and provision of personal protective equipment (PPE) to workers.

Domestic Wastewater

Mainly from restrooms. Wastewater will be treated in septic tanks installed in the office building and discharged after meeting Class III effluent standards**.**

Domestic Solid Waste

Comprising mostly of packaging and food waste. Waste bins will be placed on-site, with dedicated personnel for timely collection and transportation to disposal facilities.

6.3 Environmental Protection Measures

6.3.1 Dust Collection System

The asphalt mixing tower adopts a two-stage dust control system**:**

Primary gravity settling chamber**,** capable of capturing particles ≥75 μm.

Secondary baghouse filter system**,** with dust emission ≤50 mg/Nm³ (≤15 mg/Nm³ achievable with pre-washed virgin aggregates).

Maximum air handling capacity: 54,000 m³/h at 115°C**.**

Collected dust at the secondary filter inlet is conveyed via screw conveyors back to the hot elevator feed inlet, enabling recycling into the mix.

6.3.2 Green Plant Design

The project utilizes an eco-friendly asphalt mixing plant**,** with integrated systems for:

1. Exhaust gas emission reduction
2. Noise attenuation
3. Recycling of dust and filler

These features align with green, sustainable equipment standards**.**

6.4 Environmental Impact Assessment

6.4.1 Current Site Environmental Conditions

The site is far from residential areas and shielded by natural barriers. Dust and noise generated during construction or operation are unlikely to cause significant negative impacts on nearby communities**.** Pollution control methods have been outlined above.

6.4.2 Overall Assessment

Comprehensive analysis shows that all potential pollution sources during construction and operation phases have been considered, with adequate preventive and control measures in place. The project balances pollution prevention and treatment**,** ensuring compliance with environmental protection policies and sustainable development requirements**.**

CHAPTER 7 ORGANIZATIONAL STRUCTURE AND HUMAN RESOURCES ALLOCATION

7.1 Corporate Governance Structure

The project implementing enterprise will adopt a general manager responsibility system under the leadership of the Board of Directors**.**

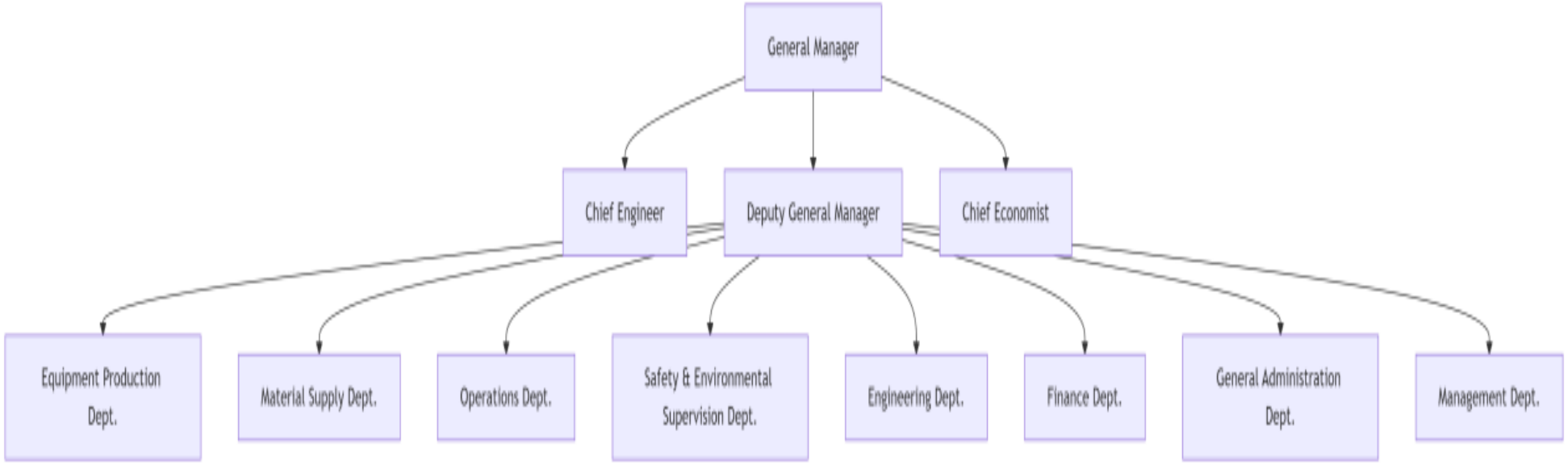
The Board of Directors serves as the supreme decision-making body of the enterprise, responsible for all major corporate matters.

The General Manager is responsible for implementing the resolutions of the Board, and for organizing and directing the enterprise’s daily operation and management.

7.2 Organizational Structure and Management System Diagram

The enterprise will establish the following departments under its management system: Equipment Production Department, Material Supply Department, Business/Operations Department, Engineering Department, Finance Department, General Administration Department, Management Department.

The organizational framework is shown in Figure 7-1 Organizational Structure Diagram**.**


General Manager
Chief Engineer
Deputy General Manager
Chief Economist
Equipment Production Dept.
Material Supply Dept.
Operations Dept.
Safety & Environmental Supervision Dept.
Engineering Dept.
Finance Dept.
General Administration Dept.
Management Dept.

7.3 Human Resources Allocation

7.3.1 Staffing Plan

The total workforce of the enterprise for this project is 40 personnel**,** consisting of:
Management staff: 8 persons
Technical staff: 5 persons
Quality control & testing staff: 2 persons
Marketing staff: 5 persons
Production workers: 20 persons

7.3.2 Staff Training

As the project is part of a technology-intensive industry, it requires highly qualified management personnel, technical specialists, and skilled operators. A comprehensive training program will be implemented, covering all staff in batches on a rotational basis. Selected employees may be sent to management and technical institutes or vocational training centers for advanced training, as well as to relevant manufacturing plants for on-site study and practical training, to cultivate the enterprise's core backbone team.
General operators will receive in-house training within the enterprise and will be certified to assume their positions only after passing examinations.

CHAPTER 8 PROJECT IMPLEMENTATION SCHEDULE

8.1 Construction Progress

TBD

CHAPTER 9 OCCUPATIONAL SAFETY AND HEALTH

Occupational safety and industrial hygiene shall strictly comply with all relevant codes, regulations, and standards. The design philosophy adheres to the principle of "safety first, prevention-oriented"**,** ensuring that occupational safety and health protection measures are integrated into the construction and operation of the asphalt mixing plant.

9.1 Safety Measures and Disaster Prevention

9.1.1 Fire Protection Measures in the Mechanical Workshop and Spare Parts Warehouse

Given the functional and structural characteristics of these facilities, portable fire extinguishers are provided throughout the workshop and warehouse for localized fire protection. Gas-based extinguishers are installed in the power distribution room and central control room to effectively prevent electrical fires.

9.1.2 Measures for Electrical Safety, Fire, and Explosion Prevention

- All socket circuits and portable electrical equipment are equipped with leakage protection devices.
- Emergency lighting is installed at critical locations, with illuminated exit signs along evacuation routes and exits.
- Portable maintenance lamps use a 36V safety voltage**.**

- Large-scale metallic equipment and pipelines are grounded, with reinforcement bars within beams, columns, and foundations forming a grounding network for lightning protection.
- All non-live metallic parts of electrical equipment are grounded.
- Ventilation systems in rooms emitting hazardous gases are fitted with explosion-proof fans**.**

9.1.3 Emergency Shutdown and Accident Response in Production

The selected mixing plant adopts an automated control system based on PLC (Programmable Logic Controller)**.** The system integrates monitoring, alarms, and control devices to ensure safe operation.

The PLC continuously supervises equipment performance and provides operators with real-time data via instrumentation and control interfaces.

> *In case of abnormal operation, the system issues an emergency shutdown command**,** immediately halting the faulty unit. The shutdown signal is transmitted to the operator station for prompt response.*

All protective actions are executed within the PLC station, ensuring that equipment and personnel safety are safeguarded during major incidents.

9.1.4 Hazardous Substances and Mitigation in Production

The system incorporates a gravity dust removal stage combined with a baghouse dust collector with reverse air cleaning. All filter bags are secured with elastic clamps and matched with customized cages, ensuring that particulate emissions and flue gas opacity meet environmental standards.

9.1.5 Fall Protection Measures

Handrails are installed along elevated corridors, platforms, ladders, and maintenance access areas where falls may occur. Pits, trenches, tanks, and hoisting openings are equipped with covers or protective grating.

9.2 Occupational Safety and Hygiene Management

9.2.1 Organizational Structure and Staffing

An Occupational Safety and Environmental Supervision Department will be established within the plant, staffed with dedicated safety inspectors and safety training personnel.

The plant is also equipped with a maintenance workshop and analytical laboratory, supported by mechanical maintenance staff, instrumentation technicians, and laboratory personnel responsible for equipment repair, servicing, and routine inspections.

9.2.2 Training Facilities and Personnel

The Occupational Safety and Environmental Supervision Department is responsible for overseeing workplace safety and industrial hygiene, as well as providing training and assessments.

New employees must undergo induction training and safety education before being permitted to work.

Ongoing safety education and refresher training are provided for all staff.
Workers are required to pass safety examinations to ensure compliance with operational safety procedures.

CHAPTER 10 CONCLUSION

The proposed project for asphalt concrete production is designed to address the significant supply gap in municipal engineering, highway construction, and maintenance works. High-grade pavements require asphalt concrete with superior performance characteristics, consistent with current trends in pavement material development.

The proposed project involves the construction and operation of an integrated industrial facility comprising an asphalt plant, concrete batching plant, offices and warehouses, maintenance workshop, precast concrete laydown yard, and aggregate storage areas. The facility will support the production, storage, maintenance, and distribution of materials required for infrastructure and construction projects. Activities will include site preparation, material handling, asphalt and concrete production, equipment maintenance, storage of construction materials and precast elements, and transportation of raw materials and finished products. Supporting infrastructure such as drainage systems, waste management facilities, and administrative offices will be established to ensure efficient operations. With the implementation of appropriate environmental, health, and safety management measures, the project is expected to provide essential support for construction activities while minimizing potential environmental and social impacts.

Based on market research and preliminary demand forecasts, the planned production capacity of 200,000–300,000 tons per year is well aligned with market needs. The project intends to adopt advanced, environmentally friendly mixing equipment, ensuring the production of high-quality asphalt concrete while minimizing adverse environmental impacts during operation.

Overall, the project demonstrates both sound economic feasibility and positive social benefits, contributing to the sustainable development of regional transportation infrastructure.