January). Therefore, it is considered desirable to establish the precision approach from the southwest.

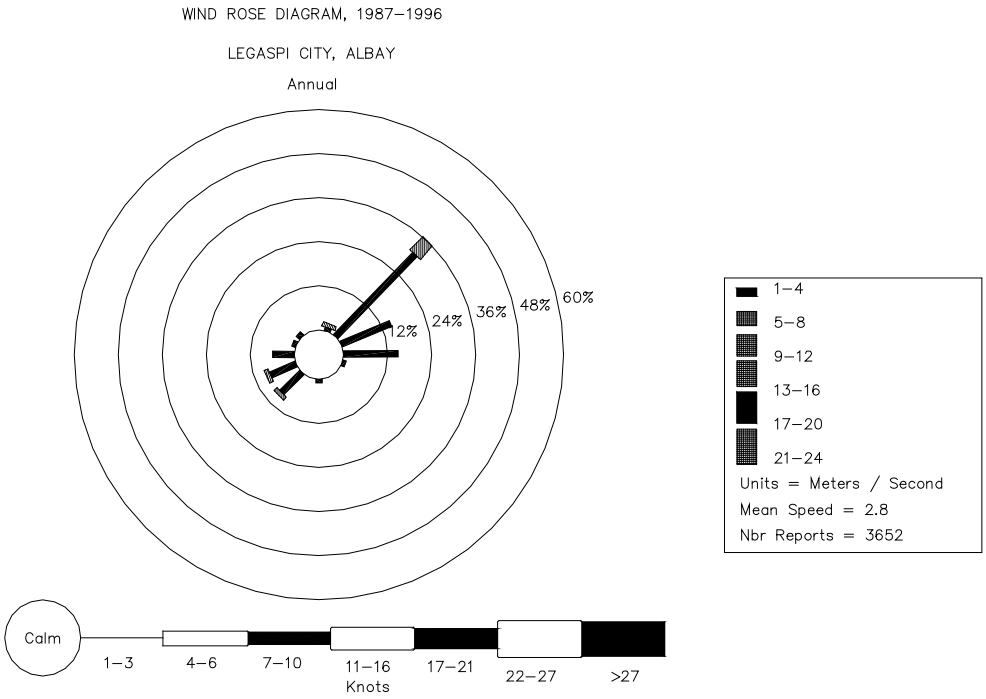

Fig. 6.2-1 Annual Wind Rose (Legaspi City)

c) Obstacle Clearance

The hilly terrain infringes a portion on the western part the inner horizontal and conical surface, but no adverse influence is expected for safe aircraft operation by establishing the circling approach and traffic pattern on the eastern side of the runway. The approach surface on the south is penetrated by a hilly terrain, but this could be cut and removed and use as filling materials on the airport site. The transitional surface is free from obstacles.

d) Aircraft Noise Impact

There is no significant aircraft noise impact is anticipated for major urban center. A densely populated community in Barangay Cotmon, Camalig, Albay is close on the west of the proposed site, but it is not adversely affected by aircraft noise as it is not located in the approach and take-off zone.

e) Location of Terminal Area

The terminal area should be located considering the following:

- Shortest access to the national road,
- Shortest travel distance to and from the City Centers,
- Existing topography of the site.

Considering the above requirements, the terminal area should be best located on the eastern side of the runway.

f) Location of Borrow Pit

The airport needs to have a higher elevation than the existing ground level for easy drainage of storm water. Considerable amount of backfilling materials should be sourced from a borrow pit and transported to the site. The ideal location of borrow pit should be close to the project site. Since a hilly terrain on the southern portion of the site protrudes the approach surface as stated in section 6.2.1c), this could be a possible borrow pit for the project.

6.2.2 Runway Layout Alternatives

Following the completion of the aerial photography (Annex H) and the resulting topographic map (Annex I), three possible runway orientations had been identified taking into account the planning considerations presented above for airport runway layout. These three alternatives are as follows:

a) Alternative 1: Runway 05/23

This alternative has been conceptualized by orienting the runway almost along the extended centerline of the existing runway. The declination from the north is 52º 48' 55". On this layout, the runway will cross some of the tributaries of the Abagao River system. The runway will also cross a barangay road, thus necessary to be diverted. Further south is a municipal road, which will be crossed by the Precision Approach Lightings System (PALS) area. Diversion of this road is not required, however necessary fencing along both side of this road needs to be provided to secure the PALS area. A densely populated community of barangay Cotmon on the west side of the runway will be slightly affected by aircraft noise. The hilly terrain on the south end of the runway will infringe the approach surface but could be remove and serve as borrow material.

b) Alternative 2: Runway 05/23

On this alternative, the runway has been oriented almost similar in direction with the alternative 1, but the runway was moved to the southeast by about 300 meters to avoid crossing the tributaries of Abagao River system in the south end. From this position, the runway is slightly rotated counter clockwise and the declination from the north is 47º 06' 55". On this position the densely populated community in barangay Cotmon has also been avoided and will not be affected by aircraft noise. The runway will cross a barangay road on the south and need to be diverted. Further south is a municipal road, which will be cross by the Precision Approach Lightings System (PALS) area. Diversion of this road is not required, however necessary fencing along both side of this road needs to be provided. The hilly terrain on the south end of the runway will infringe the approach surface but this could be removed and use as backfilling material for the airport site.

c) Alternative 3: Runway 04/22

From the position of the runway of Alternative 2, the runway is further rotated counter clockwise to avoid crossing the municipal road in the south and the declination from the north is 38º 14' 17". On this position the

densely populated community in barangay Cotmon has been avoided will not be affected by aircraft noise. The runway will cross a barangay road on the south and need to be diverted. The approach and take-off surface in the south is free from obstructions, however the Precision Approach Lighting Systems (PALS) will lie in a low-lying area and will cross the upstream tributaries of Jovellar River system. A location for proposed borrow pit need to be sourced outside the project site area.

6.2.3 Selection of Preferred Option

Three alternative runway orientations have been identified and evaluated on the proposed site. From airport functional viewpoints, no significant difference had been found on the three alternatives. However, Alternative 2 had been selected as the most preferred layout from the economical viewpoint. The summary of evaluation is tabulated in **Table 6.2-1.**

Table 6.2-1 Comparison and Evalauation of Alternative Runway Orientation

PARTICULARS	ALTERNATIVE 1	ALTERNATIVE 2	ALTERNATIVE 3
– Runway Orientation	Rwy 05/23 N13^{0}07'17.66";E123^{0}40'33.98"	Rwy 05/23 N13^{0}07'08.23";E123^{0}40'41.55"	Rwy 04/22 N13^{0}7'03.73";E123^{0}40'4"
– Runway Elevation and Slope	89.0 m @ 0.1%	90.0 m @ 0.1%	91.0 m @ 0.15%
– Removal of Obstacles	Obstacles on the approach surface can be removed and used as backfill material on site.	Obstacles on the approach surface can be removed and used as backfill material on site.	No obstruction, but the approach surface will be on the slopes of Mayon Volcano
– Distance from Proposed Borrow Pit	Within the Project Area	Within the Project Area	1.0 km. From the Project Area
– Flood Control	Diversion of water channel is required on the south end of the site.	No water channel is to be diverted	The PALS area will cross a water channel
– Earthwork Volume	1.5 million cubic meters	1.0 million cubic meters	1.3 million cubic meters
– Primary Access Road			
– Ingress/ Egress	Legaspi – Sorsogon National Road	Legaspi – Sorsogon National Road	Legaspi – Sorsogon National Road
– Alignment	New Road	New Road	New Road
– Total Approx. Length	2.5 kms.	2.3 kms.	2.2 kms.
– Overall Evaluation	Good Orientation	Preferred Orientation	Good Orientation

6.3 LONG-TERM DEVELOPMENT PLAN

6.3.1 General Airport Layout

The long-term development plan for the New Legaspi Airport was formulated based on the updated air traffic demand forecast and derived facility requirements. The proposed program of development is divided into two (2) stages, namely:

Stage	Target Year	Passenger Estimate ('000)
Medium-term development	2015	217
Long-term development	2025	257

Based on the demand forecast and computed facility requirement in the year 2025, the general airport layout plan was formulated as shown in **Figure 6.3-1**. The following objectives guided the preparation of the general airport layout:

a) Provide adequate runway/taxiway separation distances to meet requirements for ICAO code 4E;
b) Establish precision approach from the south;
c) Locate the terminal area equidistant in length from the runway ends;
d) Expand the terminal facilities in the future, if necessary, to the north;
e) Satisfy functional requirements of radio and visual navigation aids facilities;
f) Secure PALS and SALS light planes;
g) Prevent public access to restricted area; and
h) Provide direct access to terminal facilities.

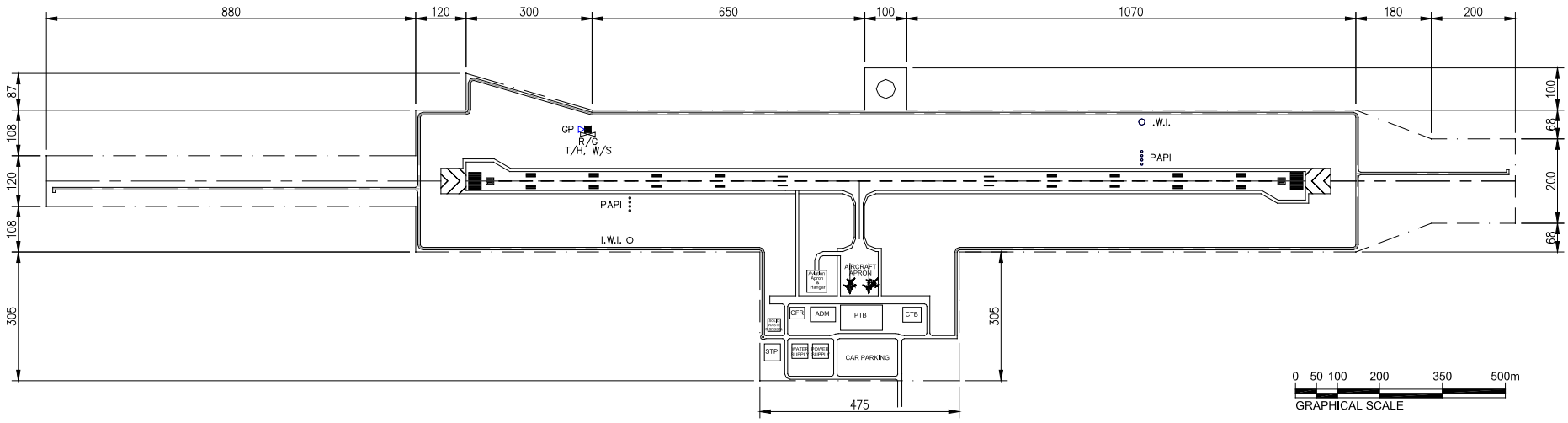

Fig. 6.3-1 General Airport Facility Layout Plan

6.3.2 Terminal Area Layout Plan

Based on the computed facility requirements, the following facilities and areas are to be provided in the terminal area:

a) Passenger aircraft parking apron,
b) Passenger terminal building,
c) Cargo terminal building,
d) Administration building and control tower,
e) Fire station,
f) Power sub-station,
g) Airport maintenance building,
h) Vehicle parking,
i) Aviation fuel supply facilities,
j) Water supply facilities,
k) Solid waste disposal facilities,
l) Sewage treatment facilities
m) General aviation aircraft parking apron; and,
n) General aviation hangar area.

The preparation of the terminal area layout, shown in **Figure 6.3-2**, considers the following:

a) Future expansion of the terminal area should be towards the north. Therefore, fixed facilities such as administration building and control tower, power station, fire station, etc. should be located in the southern area of the terminal. The passenger and cargo terminal buildings should be located in the northern portion of the airport.

b) The passenger terminal building together with vehicle parking should be located in the central part of the terminal area and adjacent to the aircraft-parking apron. Adequate spaces should be secured on both sides of the building for future expansion, if the need arises.

c) The cargo terminal building should be located next to the passenger terminal building close to the apron for ease in transporting cargo.

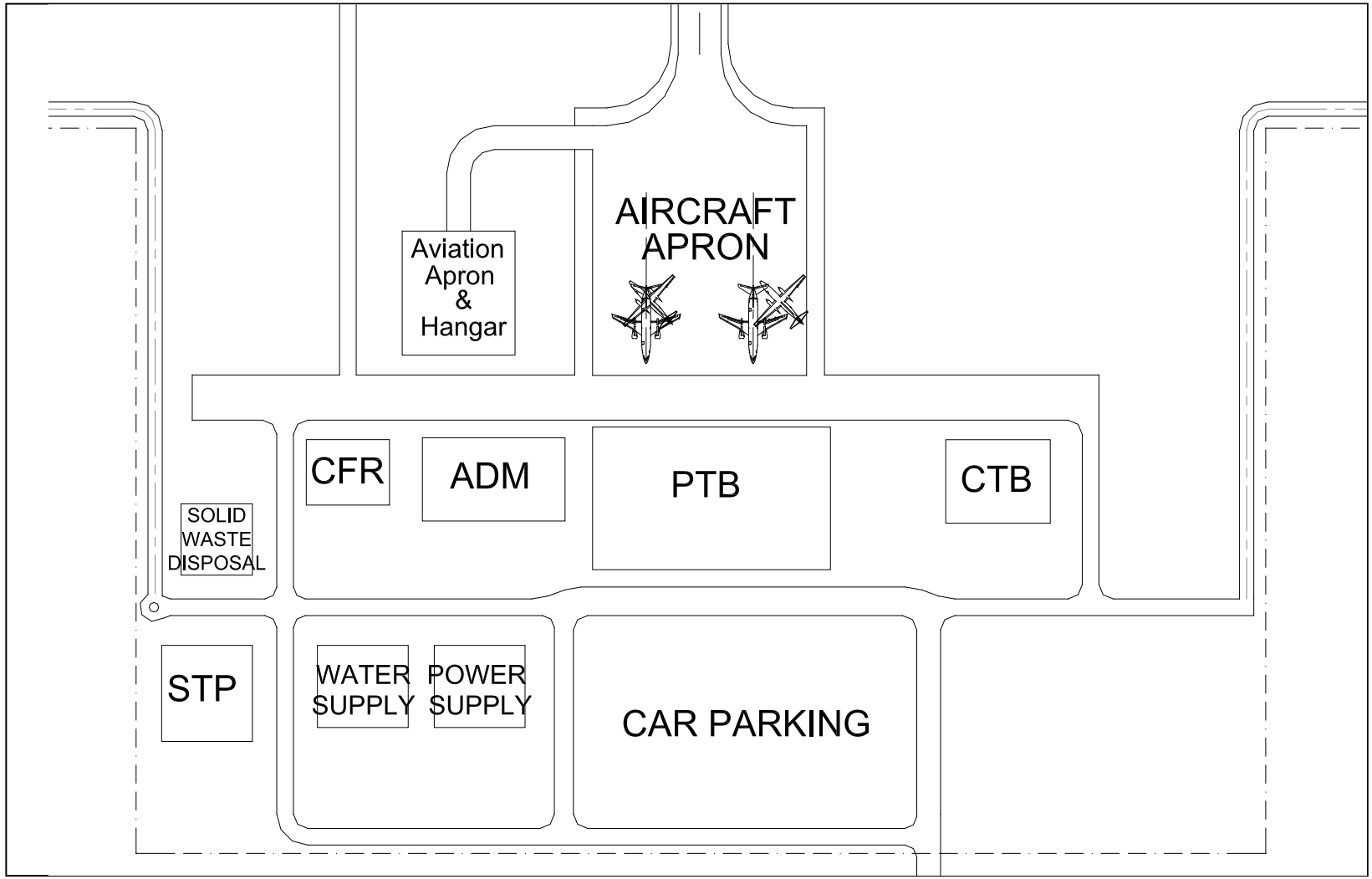

Fig. 6.3-2 Terminal Facility Layout Plan

d) The administration building and control tower should be located equidistant in length from runway thresholds to meet line-of-sight requirement.

e) Utility facilities are to be located in the southern portion of the terminal area so as not to disturb expansion of the other facilities.

f) The passenger and cargo-related traffic should be segregated from those related to airport administration and utilities.

6.3.3 Obstacle Assessment for Airspace Utilization

Using the existing 1:50,000 NAMRIA map, obstructions that infringe the obstacle limitation surfaces have been identified and evaluated in the previous sections of the report.

The obstacles penetrating the approach and northern inner horizontal surfaces have to be removed and can be done as part of earthworks during site development. Obstacles penetrating the conical and western inner horizontal surface could be left untouched.

However, once cleared of these obstructions, it can be concluded that adequate air space can be secured to establish the approach and departure procedures of the aircraft.

6.4 MEDIUM-TERM DEVELOPMENT PLAN

The medium-term development plan for the New Legaspi Airport has been prepared as described hereunder.

6.4.1 Land Acquisition

The development of the New Legaspi Airport will involve approximately 144 hectares of land to cover the airfield, the PALS and SALS light planes and terminal area. In addition, land for the access road needs to be acquired covering a 30-m wide road right-of-way. The total land acquisition area will be approximately 150 hectares. A more precise land acquisition area will be finalized once the parcellary survey is conducted.

6.4.2 Runway, Taxiway and Apron

The horizontal and vertical alignment of the airfield facilities have been set out in accordance with the international standards and recommended practices of ICAO. **Figure 6.4-1** shows details of the horizontal alignment.

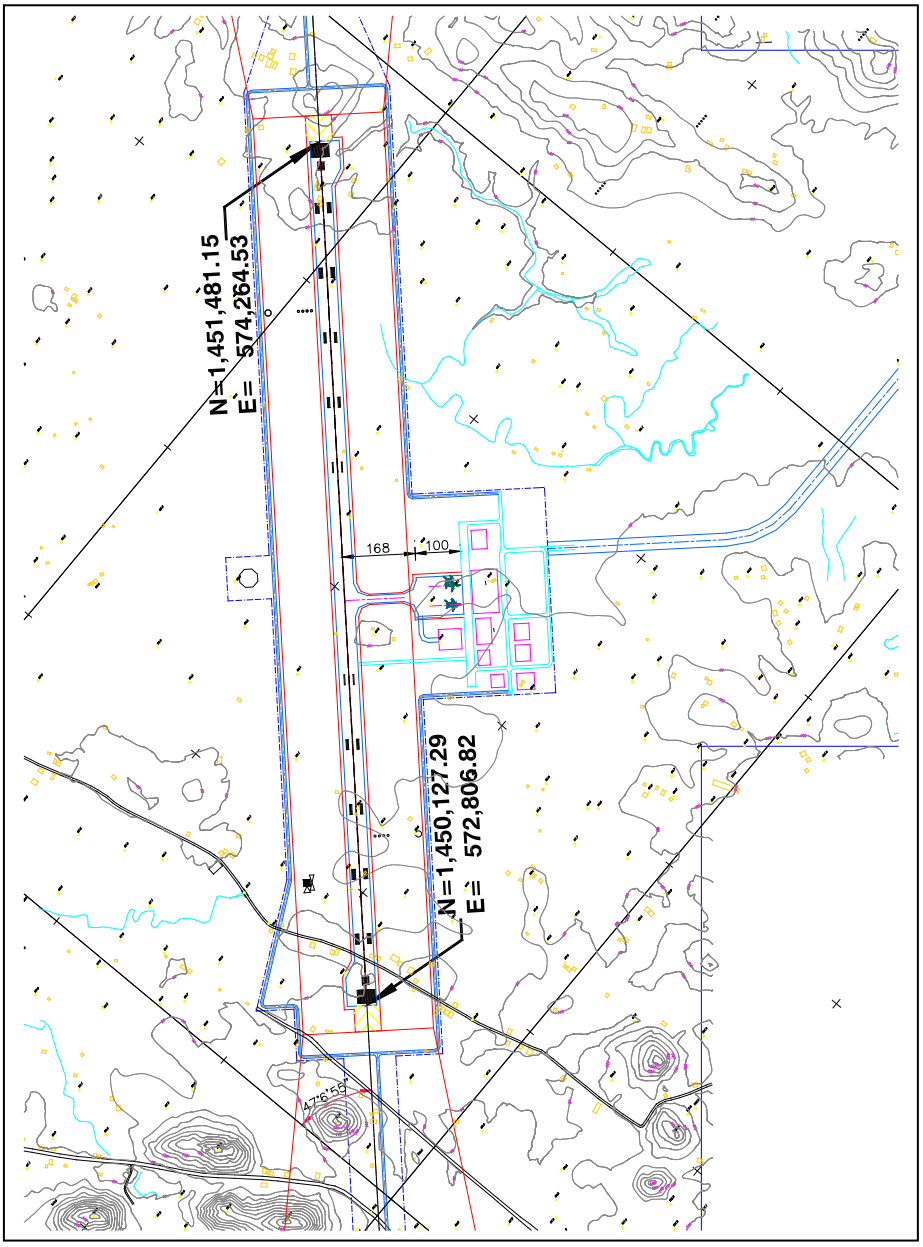

Fig. 6.4-1 Horizontal Alignment of Airfield Facilities

a) Runway

The 2000-m x 45-m runway with 7.5-m wide shoulders is to be constructed. Turn-around pads shall be provided at Runways 05 and 23. The longitudinal profile of the runway has been set at 0.2% in order to optimize the adequate storm drainage system as well as the volume of earthwork as shown in **Figure 6.4-2**. The maximum transversal slope have also been adopted considering the surface water drainage and economical aspects:

- runway pavement - 1.3%
- shoulder - 2.2%

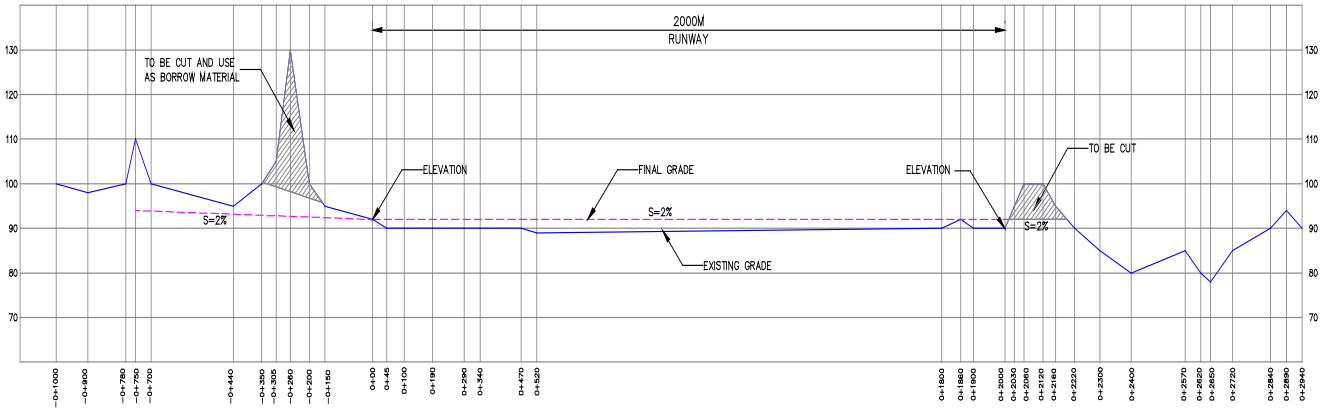

Fig. 6.4-2 Longitudinal Profile of the Runway

b) Taxiway

One stub taxiway is to be provided at 900 m from the south end of the runway. The typical taxiway width to be adopted is 23 m with 10.5 m-wide shoulders on both sides. Additional fillet has also been provided at 90-degree turning portion of the taxiways. The width of the apron taxilane has also been set at 23 m.

The maximum longitudinal and transversal slope of the taxiways employed are shown below:

- longitudinal slope of taxiway - 1.3%
- transversal slope of taxiway - 1.3%
- transversal slope of shoulder - 2.2%

c) Apron

An apron measuring approximately 110-m wide x 130-m deep is required for the medium-term commercial aviation activities of the New Legaspi Airport. The possibility for future expansion to 150-m wide is considered by providing a back-up area for an additional aircraft stand.

For the operation of the general aviation aircraft, 75-m wide 50-m deep general aviation apron with six (6) aircraft parking stands has been provided. The parking stand is capable of accommodating twin-engine aircraft of up to 18-m wingspan. Between parking and/or taxiing aircraft, a clearance of 3m has been provided.

6.4.3 Design Considerations for Airport Pavement

a) Applicable Standard

The design of the airfield pavement facilities will be carried out in accordance with Advisory Circular No: 150/5320-6D "Airport Pavement Design and Evaluation" of FAA.

The pavements for road and car park will be designed in accordance with standards of Department of Public Works and Highways (DPWH) and related guidelines of the American Association of State Highway and Transportation Officials (AASHTO) Handbook.

b) Pavement Design Life

The New Legaspi Airport is expected to open in the year 2010, and the target years for medium- and long-term development have been set at 2015 and 2025, respectively. The airfield pavements are designed to have a life of 20 years.

c) Design Aircraft

Small class jet aircraft such as A320 and propeller-driven aircraft such as YS-11 are expected to operate at the New Legaspi Airport, with the former taken as the design aircraft for the medium-term development.