Abstract—Highway Rest Centre is a public facility, located next to a large thoroughfare such as a highway, expressway, or freeway at which drivers and passengers can rest, or refuel without exiting on to secondary roads. Facilities may include park-like areas, fuel stations, restroom and restaurants. Like most other countries in the world, road transportation is the most important communication in Myanmar. Public facilities for rest area are, however, still lacking and not enough to meet the travellers’ needs and demands. Every appropriate site interval should be located highway rest centres for the travellers and drivers to relax before continuing their journey. This study is meant to improve the facilities and amenities for future Highway Rest Centres. An attempt has been made to catch up with high level international standards and also to negotiate with the traditional customs of people in Myanmar. This study will include literature reviews, overview of existing road network in Myanmar and observation on existing highway rest centres of Yangon-Mandalay Expressway. This attempt will be useful to upgrade the planning layout and facilities for future rest centres. This study can be expected to be useful in providing architectural design guidelines to create more comfortable and convenient route for highway users in Myanmar from the architectural point of view.

Keywords—Highway Rest Centre, Driver Fatigue, Road Transportation, Roadside Facilities, Site Interval

I. INTRODUCTION

In Myanmar, road transportation is the most useful and important transportation system in connecting distant towns and cities. During the last few years, road infrastructures of most highways have been developing throughout the country. Rest areas and other roadside facilities are still lacking and enough services and facilities for the travellers have not been obtained yet. Drowsy driving and related crashes may be a result from driving long periods without taking a rest. Passengers and drivers may also get health problems for sitting on the bus for long time. Rest centres could be critical components in efforts to reduce traffic collisions or other crashes that occur as a result of driver fatigue. These centres provide cosy places for travellers to rest and manage their needs. Attractive and useful rest centres can encourage travellers to use a safe location off the roadway to take a break and return more alert to the highway.

In our country, there should be more developed and serviceable highway rest centres in adequate intervals along the way.

II. BACKGROUND STUDY

The following section describes the road network in Myanmar and existing conditions of Highway Rest Centre along the new highway.

A. Road Network in Myanmar

In Myanmar, Union Highway Network Master Plan with 36 roads from north-south and 49 roads from east-west cut across 7 Regions and 7 States. The main highways or corridors, as shown in figure 1, running north-south in Myanmar are described in the following section.

1) Yangon – Mandalay Highway

Passes through major cities in the central Burma such as Bago (Pegu), Taungoo, Pyinmana, new capital Naypyidaw and Meikhtila. This road is 695 km long.

2) Western Union Highway

This is part of a proposed Pathein – Monywa Highway, which connects towns and cities on the west of Irrawaddy River (Ayeyarwaddy). [8]
A number of important roads extend from these main corridors.

1) Mandalay-Lashio Road

From Mandalay to Lashio, it is 262 km in length.

2) Meikhtila-Taunggyi Road

From Meikhtila to Taunggyi, it is 205 km in length.

3) Pyay – Magway Road (Prome – Magwe Road)

It has the length of 202 km.

Moreover, the following Asian Highways also link with the neighbouring countries such as Thailand, China and India.

1) AH1 ~ 1650 km (Myawaddy – Yangon – Mandalay – Tamu)
2) AH2 ~ 807 km (Tachileik – Meikhtila – Tamu)
3) AH3 ~ 93 km (Mongla – KyaingTong)
4) AH14 ~ 453 km (Muse – Mandalay) [8]

The new Highway was opened in January 2009. Along this highway, rest centres with restaurants are being built which runs from Hlegu Township in Yangon Region to Tada Oo Township in Mandalay Region. These rest centres are located respectively as Rest Centre-1 at 115 mile, Rest Centre-2 near Naypyidaw and Rest Centre-3 at 285 mile.

II. LITERATURE REVIEWS

A review of pertinent rest centre literature was an additional step in the plan development process. According to the literature reviews, rest area can be classified as the following categories.

<table>
<thead>
<tr>
<th>TABLE I</th>
<th>CATEGORIES OF REST CENTRES [4]</th>
</tr>
</thead>
</table>
| Wayside Stops | Small areas.  
Vehicle may park for a short time. |
| Rest Areas | Areas for vehicles to Stop.  
Generally offer fireplaces, picnic tables, drinking water, toilets and shelters. |
| Truck Parking Areas | Areas clear of the carriageway of a road provided primarily for the parking of trucks. Generally rubbish bins are the only facility provided. |
| Service Centres | Personal and automotive services are available.  
Personal services – food and drink, resting facilities, toilets, picnic areas, public telephones and information  
Automotive services – fuel, oil, water, running repairs and breakdown services |
| Commercial Service Centres | Provide an array of services including petrol and motor repairs, restaurants, accommodation, refreshment, camping areas and caravan parks. |
Literature surveys for Highway Rest Centres are tackled with the guideline check-lists which are Layout Planning, Site Planning, Site Interval, Facilities and Amenities, and Driver Fatigue.

A. Layout Planning

The primary goals of rest centre layout design is
1) To provide suitable facilities in an environment that promotes effective and safe rest and/or sleep opportunities
2) To ensure that there is adequate provision for vehicles and pedestrians to move safely within the site
3) To offer range of facilities and separate parking areas for heavy and light vehicles

B. Site Planning

The site orientation of the rest centres can be provided two basic orientations (i.e., inward and outward) as shown in the following figures.

C. Site Interval

Intervals between rest areas should depend on the category of rest area selected, the volume and mix of traffic and the demand for parking and rest opportunities.

D. Facilities and Amenities

The primary goals of rest area layout design is to provide suitable facilities in an environment that promotes effective and safe rest and/or sleep opportunities, and to ensure that there is adequate provision for vehicles and pedestrians to move safely within the site.
The typical facilities of the rest centre can be mainly classified as automotive and personal. The automotive service should include parking bays, workshop and fuel station. And the personal service should include restaurant, public restroom etc. [2] Moreover, the other facilities may be added according to the local demands.

E. Driver Fatigue

Approximately half of the drivers experienced feeling fatigued on their last trip and the majority reported that their driving was worse while fatigued. Those who reported regularly falling asleep were more likely to be involved in a crash. The Australian Driving Hours Regulations propose that drivers can drive for no more than 12 hours a day, within 14 hours of work for any 24 hour period. Further, drivers must take a minimum six hour continuous rest break in every 24 hour period, with 30 minutes of rest taken for every five hours of driving (this can be taken as two 15 minutes intervals or one 30 minute break). These regulations pose some limitations and difficulties and are consequently currently under review.

In order to manage fatigue, and meet the current driving hour’s regulations, drivers need the opportunity to take rest breaks (both major and minor) while on route, either on the side of the road or at a designated rest area. Therefore, it is essential that rest areas be appropriately located and provides adequate facilities to assist drivers in managing their own fatigue, and to meet current (and future) driving hour’s regulations. [5]

III. FOREIGN CASE STUDIES

In this section, the rest area at France and the rest area at Malaysia are selected as foreign case studies. Both of these rest centres have different architectural features.

A. Ora Ito: Aire De La Chaconne, Highway Rest Area

Burgundy, France

This rest area located on the A6 auto route, linking Paris to Lyon. Designer Ora Ito sought to create a ‘non-architecture’ by integrating program into the volume of a hill. An ample green roof makes a single entity of structure and environment. [6]
3) Strength and Weakness

The landscape is an inhabited shelter containing a sleek curved program of eateries and seating, while a prairie-like exterior helps break the monotony of vehicular travel by providing an opportunity to picnic and play. The circular arrangement of the space makes for optimal visibility and practicality, allowing a totem-like smattering of signage distinguished by shape and colour. The fluidity of the form remains warm, harmonious and reassuring at night when the volume of the building is illuminated from the ground and trees.

2) Ayer Keroh Highway Rest Centre, Malaysia

This rest area provides a variety of facilities for users. This one stop convenient centre is the first of its kind in the country, enabling users to enjoy the facilities offered at each bound of the highway. The rest stop is located on the north bound side of the E1-road, Malaysia, as shown in figures 10. [7]

Fig. 10 Exterior View of Ayer Keroh Rest Area [7]

1) Site Planning

According to the planning arrangement, this center provides mixed use of outward and inward orientation.

Fig. 11 Site Plan of Ayer Keroh Rest Area [7]

2) Facilities and Amenities

Several of the facilities offer more than just a pit stop for the weary traveller. Some of the available amenities include children's playground, petrol stations, 'surau' or the prayer room for Muslims, auto-teller machines (ATM), wakaf (rest shelters), public telephones and air-conditioned restaurants. [7]

Fig. 12 Ayer Keroh Rest Area [7]

3) Strength and Weakness

This rest area provides the cosy places for travellers to rest and manage their needs. Covered walkways are also provided for the user comfort and direct access to public facilities. The raised walkways from the suspended truck stop allow visitors to explore the jungle while the Muslim prayer room gives others a place to explore their faith. From the architectural point of view, this rest centre provides user friendly facilities, and resort-like feature.

IV. LOCAL CASE STUDIES

Along the Yangon-Mandalay Highway, there are rest stops and filling stations at 115-mile, 285 mile and near Naypyidaw. According to the field observation, the following rest centres are selected to study and analyse for the user’s demands.

A. Rest Centre at 115-mile

The rest centre, described in figure 13, is located at 115mile, near Phyu Township. There are altogether 5 restaurants, 2 workshops and 1 public restroom. The parking spaces are large enough for nearly 150 numbers of vehicles. The vehicle weight is limited up to 5 ton. This rest centre has the higher demand than the other two.
1) Site Planning

Outward Orientation was used for planning this rest centre. Provides parking stalls for all vehicle types between the highway and the major use area.

2) Zoning Classification and Ratio

In this centre, the zoning utilisation can be classified as Admin, Public and Private. According to the field surveys, 49.74% is designed for public zone and 8.04% for admin zone.

Zoning Classification and Ratio

<table>
<thead>
<tr>
<th>Zone</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Admin</td>
<td>8.04%</td>
</tr>
<tr>
<td>Staff</td>
<td>3.22%</td>
</tr>
<tr>
<td>Public</td>
<td>49.74%</td>
</tr>
<tr>
<td>Others</td>
<td>39.00%</td>
</tr>
</tbody>
</table>

3) Facilities and Amenities

The facilities and amenities of this rest centre are restaurant, workshop, inn, public rest room, fuel station, and parking and first-aid.

4) Strength and Weakness

This rest centre provides good range of restaurant facilities for users. But no safety route between pedestrians and vehicle for users to the public facilities. No covered walkway and outside seating area for travellers. The public restroom is not enough for users to meet the demands. The parking area is large enough for about 150 numbers of vehicles. From the architecture point of view, the rest centre should provide the beautiful landscaping and picnic table for highway users to get more attractive. The planning arrangement also should be well designed to provide the convenient circulation route for people with disabilities.

B. Rest Centre at 285-mile

The rest centre, described in figure 19, is located at 285mile, near Meikhtila Township. There are altogether 4 restaurants and 1 public restroom.
1) Site Planning

Outward Orientation was used for planning this rest centre. Provides parking stalls for all vehicle types between the highway and the major use area.

2) Zoning Classification and Ratio

In this centre, the zoning utilisation can be classified as Admin, Public and Private. According to the field surveys, 40.00% is designed for public zone and 10.00% for admin zone.

3) Facilities and Amenities

The facilities and amenities of this rest centre are restaurant, workshop, public rest room, fuel station, parking and first-aid.

4) Strength and Weakness

This rest centre provides good range of restaurant facilities for users. But no safety route between pedestrians and vehicle for users to the public facilities. No covered walkway and outside sitting area for travellers. The parking area is large enough for about 150 numbers of vehicles. From the architecture point of view, the rest centre should provide the beautiful landscaping and picnic table for highway users to get more attractive. The planning arrangement also should be well designed to provide the convenient circulation route for people with disabilities.
V. COMPARATIVE STUDIES

After studying the local and foreign rest centres, the following factors are found to be considered comparatively for providing more adequate site interval and the modern facilities for the future rest centres in Myanmar.

1) Zoning Classification and Ratio

According to the studies, the zoning of the rest centres can be classified as public zone, admin zone and private zone. Among them the ratio of public zone is often higher than that of other zones.

2) Site Planning

The local rest centres widely use the outward orientation while the foreign centres provide the mixed use of outward and inward orientation.

3) Site Intervals

In general, a comparison on the site intervals of the rest centres is shown as the following table.

<table>
<thead>
<tr>
<th>Literature</th>
<th>Foreign Case Studies</th>
<th>Local Case Studies</th>
</tr>
</thead>
<tbody>
<tr>
<td>From 70 miles – 120 miles</td>
<td>From 50 miles – 65 miles</td>
<td>From 80-miles</td>
</tr>
</tbody>
</table>

4) Facilities and Amenities

By field observation and literature reviews, the facilities and amenities of the rest centres can be described as follow.

Table IV

<table>
<thead>
<tr>
<th>Facilities and Amenities</th>
<th>Literature</th>
<th>Foreign Cases</th>
<th>Case</th>
<th>Local Case Studies</th>
</tr>
</thead>
<tbody>
<tr>
<td>Restaurant</td>
<td>✔</td>
<td>✔</td>
<td>✔</td>
<td></td>
</tr>
<tr>
<td>Inn</td>
<td>✔</td>
<td>✔</td>
<td>✔</td>
<td></td>
</tr>
<tr>
<td>Workshop</td>
<td>✔</td>
<td>✔</td>
<td>✔</td>
<td></td>
</tr>
<tr>
<td>Fuel Station</td>
<td>✔</td>
<td>✔</td>
<td>✔</td>
<td></td>
</tr>
<tr>
<td>Public Rest Room</td>
<td>✔</td>
<td>✔</td>
<td>✔</td>
<td></td>
</tr>
<tr>
<td>First Aid</td>
<td>✔</td>
<td>✔</td>
<td>✔</td>
<td></td>
</tr>
<tr>
<td>Convenience Shop</td>
<td>✔</td>
<td>✔</td>
<td>✔</td>
<td></td>
</tr>
<tr>
<td>Children Playground</td>
<td>✔</td>
<td>✔</td>
<td>❌</td>
<td></td>
</tr>
<tr>
<td>Outside Seating Area</td>
<td>✔</td>
<td>✔</td>
<td>❌</td>
<td></td>
</tr>
<tr>
<td>Landscape</td>
<td>✔</td>
<td>✔</td>
<td>❌</td>
<td></td>
</tr>
</tbody>
</table>

VI. CONCLUSIONS

Rest centres could be critical components in efforts to reduce traffic collisions or other crashes that occur as a result of driver fatigue. These centres provide clean, safe and comfortable places for travellers to rest and manage their needs. In general, the zoning of the rest centre can be classified as Public zone, Private zone and Admin zone. Most of the foreign rest centres provide the mixed use of outward and inward orientation. The local rest centres provide the outward orientation so that the users have to take the long walking distance to the public facilities. After studying the existing conditions of local rest centres, the site intervals between each rest centre is from 80-mile and greater than that of literature review and foreign rest centres. Based on the tradition of highway users in Myanmar, the facilities and amenities of the future rest centre should be more developed in accordance with the international standards. With comparative study on local case studies and literature reviews, this study is expected to be useful in providing adequate intervals to locate the highway rest centres along the highway, to determine the appropriate spaces as well as convenient facilities and amenities.

REFERENCES


Note: All Photos described in local case studies are taken by Tint Tint Tun in research area.