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SECTION 3
ROADS AND PARKING

3.1 SCOPE

a) This section deals with the road and pedestrian standards which should be applied to the design of roads in the OECS. Guidance is provided on the layout of roads and pedestrian facilities, and on the preliminary layout of vertical and horizontal curves required to provide safe driving conditions.

b) Annex A provides Tables for the layout of curves. This information is provided for preliminary guidance only, and to assist planners in determining the amount of land required for road construction.

c) The structural design of roads is not discussed in this document and designers are recommended to refer to any standard text on road and highway design to determine the structure of the road suitable for the traffic, topography, and local soil conditions. Designers must also be aware that many roads traverse areas where deep side hill cuts and significant fills are inevitable. It is recommended that such problems be referred to a specialist soils engineer for guidance on the appropriate side slopes to be constructed for the embankments and for the cuts.

d) Care must be taken in the layout of all roads in the hilly terrain of the OECS so as to avoid damage to the road structure resulting from storm waters using the road surface as the main channel. Arrangements for proper drainage are essential. Storm water drainage is dealt with in Section 2 of this document.

e) Standards for provisions for access by handicapped persons to roads and parking facilities are given in Section 6.

3.2 ROAD CLASSIFICATION AND RIGHT OF WAY (ROAD RESERVE)

Roads are classified into five main categories for which the minimum right of way dimensions are:

- **Main Roads (Highways)** There are the main roads which are designed to carry large traffic volumes and heavy vehicles. These roads have limited or controlled access and skirt rather than penetrate small settlements. These roads may be constructed as dual highways with a median strip usually 10ft. wide. A minimum road reserve of 75 ft. is recommended. A minimum road reserve of 75 ft. is recommended. However, the
right of way width may vary depending on the topography of the areas (Plate 3-1).

- **Secondary Roads**
  These are main roads between towns and villages which are frequently traveled traffic routes. A right of way of 50 ft. is recommended. (Plate 3-2).

- **Secondary Roads**
  These are intermediate collector roads for traffic generated by service roads. Minimum right of way recommended is 35ft.

- **Residential/Commercial Access**
  These are used for direct access to individual lots within a residential area or for access to commercial premises. Minimum right of way recommended is 31ft. (Plate 3-4).

- **Agricultural Feeder Roads**
  These roads provide access to agricultural areas. They generally penetrate the hilly country and consequently have steep slopes and sharp bends. Because of the generally low volumes of vehicular traffic using these roads, the economic justification for the roads does not allow the construction to be at the accepted standards of gradients or sight distances for such traffic. The structure of the roads and drainage provisions must be sound as to avoid complete destruction from heavy rainfall. It is recommended that the minimum paved width be 14ft. with 4ft. shoulders and the right of way 28 ft. (Plate 3-6.)

These reserve widths are minimums and do not include any out of the ordinary drainage requirements, or side slopes for roads on steep terrain which may be required by local topographic conditions.

Table 3-1 summarizes the recommended right of way and carriageway widths of various classes of roads.
### Table 3.1
Recommended Right of Way and Carriageway Widths (ft.)

<table>
<thead>
<tr>
<th>Road Type</th>
<th>Minimum Right of way</th>
<th>Carriageway</th>
<th>Reserved on each side for shoulder, sidewalks, etc.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Main (Highway)</td>
<td>75</td>
<td>24 (may be dual with 5 ft median strip)</td>
<td>23*</td>
</tr>
<tr>
<td>Main (Primary)</td>
<td>50</td>
<td>24</td>
<td>13</td>
</tr>
<tr>
<td>Secondary</td>
<td>35</td>
<td>20</td>
<td>7.5</td>
</tr>
<tr>
<td>Residential Collector</td>
<td>31</td>
<td>18</td>
<td>6.5</td>
</tr>
<tr>
<td>Residential Access</td>
<td>29</td>
<td>16</td>
<td>6.0</td>
</tr>
<tr>
<td>Agricultural Feeder Roads</td>
<td>28</td>
<td>14</td>
<td>7.0</td>
</tr>
</tbody>
</table>

* Sidewalks are not normally constructed on dual carriageway main roads except when required by the volume of pedestrian traffic.

### 3.3 Road Design

#### 3.3.1 General

a) Road design is dictated by the topography and volume of traffic expected to use the road. Economical road layout is essential to allow for ease of access, to allow for future expansion of the transportation network. Main roads should skirt rather than penetrate a residential or commercial development.

b) The hierarchy of streets in a development should ensure that traffic on a particular element is compatible with adjacent land uses. For example, through traffic should be catered for on main or secondary roads, and access should be arranged so that through traffic is deterred from using them.

c) Plate 3-2 shows the suggested cross-section layout for a main road. Note that the utility services should be placed away from the road pavement (carriageway) as far as possible. Where medians are constructed for a dual carriageway, the right of way will be increased accordingly. Such a road design is required where the traffic volumes are expected to be high and where it is possible and economical to increase traffic speeds. The dual highway with a median is inherently safer for high speed traffic than the double lane highway. The construction of medians also allows the easy introduction of turning lanes, besides allowing for future widening of the road.
3.3.2 Residential and Commercial Access Roads (Plates 3-4 & 3-5)

a) These roads collect traffic from individual lots within a residential or commercial area. The layout and design of these roads should be determined after examination of the topography and the need to access the main roads at convenient intervals.

b) Considerable problems have occurred where accesses have been created in an ad hoc fashion in hilly areas, thereby causing damage to the main road due to inadequate arrangements for dealing with storm water running down the access road from the main roads, or running down the main roads from the access roads. Traffic accidents also occur due to poorly planned intersections with the main road.

c) The following guidelines apply where new accesses are being created off main roads:

- All residential, commercial and industrial accesses to be properly constructed to a minimum carriageway width of 16 feet with a well compact fill and concrete or bitumen surface. Minimum turning radius to be 25 feet.

- Minimum visibility to and from the accesses to be 300 feet in both directions along the main road (safe stopping distance for a vehicle traveling at 40 mph). Where the topography prohibits minimum sight distance, the posted speed limits should be reduced and warning signals placed on the main road. In any event, vehicles entering a main road must come to a complete stop before entering the main road.

- Drainage ditches and culverts must be constructed to prevent the storm water from damaging the road. (See Section 2)

3.3.3 Layout of Access Roads

Access roads are normally seen in the following arrangements:

a) Grid (Plate 3-7)

This is the traditional layout which developed before the automobile. Although this form may be appropriate in some of the older urban areas, care must be taken to determine if a grid layout is suitable for new developments. The topography of the site may not permit this type of road layout to be constructed at acceptable costs; also the traffic pattern and traffic controls must be such that potential hazards are reduced to
minimum. Where a grid or modified grid is considered to be appropriate
the following factors should be taken into consideration:
- As few houses as possible should front onto the linking roads
  which should normally be about 200 feet in length;

- Continuous road lengths without street intersections should not
  exceed 1,200 ft. This distance can be increased to a maximum of
  1,600 ft. if a public pedestrian access way with a minimum width
  of 10 ft. is provided near the mid-point of the access road. The
  public pedestrian access must be developed in a right-of-way
  leading from the access road to the adjacent road.

b) Other Road Systems

Roads systems may utilize other forms of layouts including cul-de-sacs,
loop roads and P-loops. In the use of these access ways, the following
factors should be considered:

- **Cul de Sacs.** (Plate 3-9), When a cul-de-sac is used in residential
  development it should be provided with a curved turning circle of
  sufficient width to facilitate easy access and the turning of not only
  cars but trucks and other heavy vehicles. The recommended
  minimum radius is 33ft. The cul de sac should serve no more than
  20 dwellings.

- The maximum length of a cul de sac should be 350 ft to the turning
  circle. This distance may however be increased to 600 ft if any
  emergency vehicular access and pedestrian walkway of a
  maximum width of 10 ft is provided from the turning circle of the
  cul de sac, giving direct access to an adjacent road. A cul de sac
  should not be located as a direct extension of a local road.

- **P-Loops.** (Plate 3-8). These roads are defined as loop roads from
  a single access point. They should have an entrance leg not
  exceeding 700 ft and should have an emergency vehicular access
  way with a minimum width of 10 ft. from the loop giving direct
  access to an adjacent road. The loop should have a road length not
  exceeding 1,400 ft.

3.3.4 Horizontal and Vertical Curves

a) Horizontal curves connect two straight stretches of roadway and vertical
curves connect two straight stretches of sloping roads. In general, the tighter
the horizontal curve, the greater the pavement widening that is required to
provide for safe handling of vehicles.
b) In the topography of the OECS islands, it may be difficult and too costly to provide horizontal curves of radii greater than 500 feet, hence the sight distance required for safe driving at the designated speeds may not be obtained. In such circumstances, the posted speeds should be lowered and warning speeds installed.

c) The appropriate radii of the horizontal and vertical curves on main and secondary roads are functions of the desired traffic speed and of the required unobstructed sight distance required for safe driving. The minimum radii required, the pavement width at curves and the required sight distance for safe driving are functions of the required minimum speed of the traffic.

d) Annex 1 provides information for the calculation of minimum radii and length of curves required for safe driving at the designated speeds.

3.3.5 Road Gradient

Road gradients are normally dictated by the topography and costs of earthworks. However the following guidelines should be considered in the design of new roads:

a) Minimum Slopes - 0.5% (6” in a 100 feet). This facilitates drainage in flat terrain.

b) Maximum Slopes - 10% for long stretches. 15% possible for stretches not exceeding 200 ft.

c) Cross Slopes - For paved roads, 1” in 8 ft
For unpaved roads, 1” in 4 ft.

3.3.6 Intersections

The topography of most of the OECS islands, preclude the placing of intersections at areas where adequate visibility is assured. However the following guidelines should be followed as far as it is possible to do so.

a) All road intersections should be designed to reduce traffic conflicts. Ideally the intersections should be T-junctions at right angles to the main road (Plate 3-10). This alignment should be maintained for a distance of at least 100 feet from the intersection.

b) The minimum radius for intersections should be as follows:
   - for entrance or exits to and from main roads, 35 feet
   - for entrance or exits to and from secondary roads, 25 feet

c) Cross road junctions are permissible in residential areas where the junction may be controlled by traffic lights or if the traffic density permits by four way
physical planning and development authority

stop signs. For junctions of access roads or secondary roads with main roads, every effort should be taken to avoid cross over intersections. Such intersections should be staggered and a minimum distance of about 130 feet maintained between junctions.

d) Intersections on the inside curves of through roads should be avoided if possible.

e) Y intersections on the inside curves of through roads should be avoided.

f) Junctions of any kind should be avoided near the brow of a hill or where the driver’s vision is obstructed by the natural topography or by buildings, fences etc.

g) Stop signs should be placed at the junction of all roads where the minor road meets the major road. For streets where both roads are equally important, it may be desirable to have four-way stop signs or to determine by traffic counts, the road which should be given priority.

3.3.7 Shoulders (Plate 3-11)

a) Shoulders are required to support the paved surface of the road and to provide areas for safe emergency stopping of vehicles. Shoulders should never be used as permanent parking places for vehicles.

b) The construction of shoulders should be done as carefully as the construction of the main paved area of the road except that shoulders on access roads would not normally be paved. It is recommended that shoulders on main roads be paved with at least one course of asphalt surface dressing.

c) Unpaved shoulders should be properly grassed and maintained. Shoulders not maintained may allow storm water to enter the base and affect the stability of the road.

d) The recommended widths and cross slopes of shoulder are given in table 3-6. It is assumed that all shoulders are properly compacted and grassed.

Table 3-1
Recommended Right of way and Carriageway Widths (ft)
<table>
<thead>
<tr>
<th>Road Type</th>
<th>Width of Shoulder (ft)</th>
<th>Cross Slope (inches per ft.)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Main (Highway)</td>
<td>8</td>
<td>½</td>
</tr>
<tr>
<td>Main (Primary)</td>
<td>6</td>
<td>½</td>
</tr>
<tr>
<td>Secondary</td>
<td>5</td>
<td>¾</td>
</tr>
<tr>
<td>Residential Collector</td>
<td>4</td>
<td>¾</td>
</tr>
<tr>
<td>Agricultural Feeder Road</td>
<td>4</td>
<td>7/8</td>
</tr>
</tbody>
</table>

### 3.3.8 Visibility at Junctions (Plate 3-12)

a) Intersections of more than two roads should be avoided where possible as they represent potential collision points and unless clearly marked the classifications of roads will not be apparent. Y-junctions can also misleading unless one route is given obvious precedence over that adjoining it. T-junctions should be avoided on the inside curves of through roads.

b) Roads forming an intersection should meet one another at an angle of 90 degrees plus or minus a tolerance of 10 degrees. This alignment should be maintained for a distance of 100 ft. measured from the center point of the intersection.

c) As stated (in 3.3.6f), driver’s visibility at junctions near the brow of the hill is impaired.

d) Visibility splays (Plate 3-13) i.e. the angles of visibility at road junctions are show below in relation to road type. They are intended to facilitate the unobstructed vision of motorists from one street to another thus reducing the risk of accidents.

<table>
<thead>
<tr>
<th>Road Type</th>
<th>Visibility Splay Angle (degrees)</th>
<th>Splay Distance (feet)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Main Road</td>
<td>30</td>
<td>12</td>
</tr>
<tr>
<td>Secondary Road</td>
<td>30</td>
<td>10</td>
</tr>
<tr>
<td>Residential Collector</td>
<td>45</td>
<td>10</td>
</tr>
<tr>
<td>Residential Access</td>
<td>45</td>
<td>6</td>
</tr>
</tbody>
</table>

### 3.4 PARKING REQUIREMENTS (PLATE 3 – 14)
Provision should be made within the boundaries of the site of all new and extended buildings for the parking of customers’ vehicles in accordance with the standards set out in the schedule below provided that:

- Special consideration can be given to dual use of parking areas where the uses alternate in terms of time scale;

- Where the use of any building is not specially mentioned in the schedule or more than one use is involved, the Board shall determine the parking provision;

- For each car a standard of approximately 300 sq.ft. of parking site area (inclusive of driveways) should be made.

- The areas in which parking spaces are provided should be of practical shapes, which allow for the parking and manoeuvring of vehicles. Narrow and obstructed spaces however large in area are of no value for this purpose.

- Provision should also be made within the site boundaries for loading of trucks and goods vehicles. In accordance with the standard set out in the schedule. The Board may, however, waive this requirement when the building area is too small, the frontage of the site is short and service is not possible from the rear.

b) For both enclosed and unenclosed parking, an obstructed rectangular space 18ft. by 18ft. minimum shall be provided for each car except that:

- Where parking is parallel to the kerb, the length of the car parking space shall be increased to 22ft.

- Where circumstance allow a vehicle to overhang the kerb by 2 ft. and such overhanging does not seriously limit the use of a sidewalk or other access, the length of the car parking space may be reduced to 16ft.

- Where the use of one car parking space is limited on both sides by a wall or column, the unobstructed width (face to face obstruction) of the parking space shall be 10ft. or if a door opens into the parking space on its long side 11ft.

- Where the use of one parking space is limited on one side by a wall or column, the unobstructed width (face to face obstruction) of the parking space shall be 10ft.
The minimum width of a parking aisle shall be 18ft. except where parking is provided at a lesser angle to the aisle than 60 degrees and access in one way only, in which case the following aisle widths will apply.

c) Table 3-4 and 3-6 provide guidance on the parking requirements for various developments.

**TABLE 3-4**

<table>
<thead>
<tr>
<th>Type of Development</th>
<th>Minimum of Vehicles Parking Space Required</th>
</tr>
</thead>
<tbody>
<tr>
<td>Shops, inclusive of Store rooms</td>
<td>1 for each 500 sq.ft. of gross floor area</td>
</tr>
<tr>
<td>Officer, Banks</td>
<td>1 for each 700sq.ft gross floor area inclusive of passages, toilets, circulation spaces, etc.</td>
</tr>
<tr>
<td>Restaurants</td>
<td>1 for each 50 sq.ft. of public dining room</td>
</tr>
<tr>
<td>Industrial Buildings</td>
<td>1 for each building up to 5,000 sq.ft.</td>
</tr>
<tr>
<td>Warehouses/Storage</td>
<td>1 for each 1000 sq.ft. in area in excess of 5,000 sq.ft.</td>
</tr>
<tr>
<td>Hospitals</td>
<td>1 for each 4 beds</td>
</tr>
<tr>
<td>Gallery, Museum, Library</td>
<td>1 for each 700sq.ft of gross floor area including passages, toilets, circulation space, etc.</td>
</tr>
<tr>
<td>Exhibition Hall, Games Hall, Discos</td>
<td>1 for each 100 sq.ft. of area</td>
</tr>
<tr>
<td>Lecture Halls, Meeting Halls, Cinema, Theatre, Churches</td>
<td>1 for each 10 seats</td>
</tr>
<tr>
<td>Clinic/Doctor’s Office</td>
<td>3 for each practitioner</td>
</tr>
<tr>
<td>Apartment Buildings</td>
<td>1.25 for each individual unit, whether of one, two of three bedrooms and one (1) for studio units. These standards may be modified in special areas.</td>
</tr>
<tr>
<td>Hotel</td>
<td>1 for each 3-guest bedrooms plus 1 for each 50 sq.ft. of public dining room area</td>
</tr>
</tbody>
</table>

**TABLE 3-5**

<table>
<thead>
<tr>
<th>Types of Building</th>
<th>Number of Loading or Off Loading Bays Required</th>
</tr>
</thead>
<tbody>
<tr>
<td>Shops</td>
<td>1 for each building up to 10,000 sq. ft. plus</td>
</tr>
<tr>
<td>Hospitals</td>
<td>1 for each 20,000 sq. ft. of floor area in excess of 10,000 sq.ft. to a total of 3; one for each 10,000sq.ft. thereafter</td>
</tr>
<tr>
<td>Storage Warehouse/Industry</td>
<td>1 for each building up to 5,000 sq.ft. plus 1 for each 10,000 sq. ft. of floor area in excess of 5,000 sq.ft. to a total of 3; one for each 50,000 sq.ft. thereafter</td>
</tr>
</tbody>
</table>
TABLE 3-6
PARKING WIDTHS

<table>
<thead>
<tr>
<th>Angle of Parking</th>
<th>Aisle Width Minimum</th>
</tr>
</thead>
<tbody>
<tr>
<td>30 degrees</td>
<td>11 feet</td>
</tr>
<tr>
<td>45 degrees</td>
<td>13 feet</td>
</tr>
</tbody>
</table>

3.5 PEDESTRIAN REQUIREMENTS

The major types of pedestrians’ access ways are footpaths and sidewalks.

a) Footpaths

Footpaths are paved pedestrian access ways designed to accommodate heavy volumes of pedestrian traffic. They do not necessarily run parallel or alongside a road as in the case with sidewalks, but they must:

i) Be connected to public thoroughfare;
ii) Be limited in length to allow for servicing (fire, health, utilities)
iii) Allow easy garbage disposal
iv) Be so designed as to allow future upgrading;
v) Have a maximum gradient of 1 in 16 (approximate 6%). Where gradients are in excess of 6%, steps of at least 3 flights with handrails must be constructed at suitable intervals. See Section 6 for provision for handicapped persons)
vi) Have a minimum width of 4’-0”

b) Sidewalks

i) Sidewalks are part of the road right-of-way- (reservation) used for pedestrian movement. Sidewalks vary in width depending on the volume of pedestrian traffic to be accommodated. Widths of 3’-6” to 6’-0” are recommended;
ii) They should wherever possible be complemented with planted verges and be landscaped with flowering and ornamental shrubs.
iii) Sidewalks are usually constructed of concreted or asphalt. Where asphalt sidewalks are constructed, concrete curbs must be installed to support the edge of the road.
iv) Table 3 – 1 gives the recommended widths (within the right-of-way) to be reserved for construction of sidewalks and other facilities.
3.6 STREET FURNITURE (Plate 3-15)

Street Furniture is an essential feature of the environment. Special consideration should be given to its location, design and maintenance. It should be sensitively designed, sturdily constructed and functionally appropriate. The more common examples of street furniture are: benches, modular seats, public telephone booths, bulletin kiosks, picnic tables, planters, mail boxes, rest rooms, refuse bins, small shelters and street lighting fixtures.