

**قرار وزاري رقم (١٢٢) لسنة ٢٠١٥
بشأن العمل على الأرصفة**

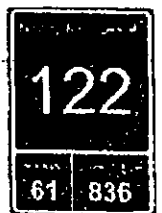
وزير البلدية والتخطيط العمراني ،

بعد الاطلاع على القانون رقم (٤) لسنة ١٩٨٥ بشأن تنظيم المباني ، والقوانين المعدلة له ،
وعلى القانون رقم (٢٩) لسنة ٢٠٠٦ بشأن مراقبة المباني ،
وعلى القرار الأميري رقم (١٦) لسنة ٢٠١٤ بتعيين اختصاصات الوزارات،
وعلى القرار الأميري رقم (١٨) لسنة ٢٠١٤ بالهيكل التنظيمي لوزارة البلدية والتخطيط العمراني ،
وعلى اعتماد مجلس الوزراء لمشروع دليل الاشتراطات الخاص بالحد من الاضرار الناجمة عن
اعمال البناء والصيانة والهدم في مواقع العمل في اجتماعه العادي الاول لعام ٢٠١٣ المنعقد
بتاريخ ٢٠١٣ /١/٢ ،

قرر ما يلي :-

مادة (١)

لا يجوز لأي مقاول أو شركة الحفر أو شق أو تحريك أو إزالة أو كسر الرصيف أو عمل تبليط
أو تحريك أو إزالة الحواجز الخاصة بالرصيف أو العمل بالقرب منه أو تحته أو إنشاء أي حواجز
أو إشغاله بأية أشياء ثابتة أو متحركة أو مؤقتة أو تخزين أو عرض أي مواد عليه أو غيرها من
الأنشطة ، بدون اخذ موافقة مسبقة من البلدية المختصة والجهات الاخرى ذات العلاقة .

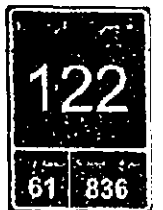


مادة (٢)

الشروط العامة

يجب مراعاة الشروط والاجراءات التالية عند العمل على الرصيف وكما يلي :-

- ١ . يجب على المقاول الالتزام بالأنظمة والتعليمات الصادرة من البلدية ، وقواعد تأمين سلامة المرور الواردة بدليل قطر المروري .
- ٢ . يجب على المقاول ان يقوم بوضع اللوحات التحذيرية والإرشادية والأضواء الليلية في مناطق العمل ، ووضع جميع مستلزمات الحماية اللازمة من حواجز ولوحات ارشادية حول الحفريات لتنبية وحماية المارة ، وعمل الجسور فوق الحفريات في الأماكن المناسبة لتسهيل المرور ، كما يجب عليه اخذ جميع الاحتياطات اللازمة لمنع حدوث أي أضرار أو عرقلة للسير من جراء الحفريات وتنفيذ الأعمال .
- ٣ . يجب على المقاول الحصول على ترخيص من البلدية في حالة الحاجة لاستخدام الرصيف أو لأي جزء منه لوضع مواد البناء أو المخلفات بصورة مؤقتة أثناء البناء أو الهدم أو الصيانة .
- ٤ . يجب إن يلتزم المقاول بعد نهاية العمل بإعادة الوضع كما كان عليه وإصلاح أي خلل في الأرصفة مع إزالة الأجزاء غير الصالحة وإعادة وضعها إلى حالتها الطبيعية التي كانت عليها .
- ٥ . يجب أن يتم العمل وفق الشروط التي تحددها الجهات المختصة .
- ٦ . يجب أن يتم العمل خلال المدة المحددة من قبل الجهات المختصة .



مادة (٣)

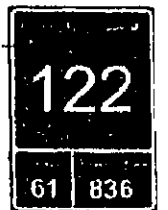
يجب أن تترك الأرصفة المخصصة للمشاة القريبة من مواقع العمل مفتوحة للحركة وعلى المقاول اتخاذ الاحتياطات اللازمة لحماية المارة ، وإذا تطلبت الحاجة إلى غلقها أو غلق جزء منها يجب على المقاول الالتزام بما يلي : -

١ . تغطية رصيف المشاة اثناء عملية البناء أو الهدم إذا كان المبنى بارتفاع دورين أو إذا كان العمل ملاصق لرصيف المشاة بمسافة تقل عن (٨) متر مقاس من حافة الرصيف أو الطريق، ويبعد مسافة أقل من (٥ متر) مقاساً من وسط رصيف المشاة ، على ان تتم التغطية وفق الشروط التالية :-

أ. يجب أن تكون التغطية على طول موقع العمل مع توفير عرض كافي في الرصيف للمشاة دون ان تتسبب في تكس أو عرقلة أو ازدحام للمشاة خلال الممر المغطى .
ب. يجب توفير الإنارة الضوئية (الطبيعية والصناعية) لجعل مرور المشاة آمن في جميع الأوقات .

ج. يجب أن يكون تصميم الجزء المغطى (السقف) على طول ممر المشاة يتحمل وزن لا يقل قوته عن (٨ كيلو نيوتن م^٢) و (١٠ كيلو نيوتن م^٢) في حالة استعمال الجزء المغطى (السقف) في تخزين بعض المواد ، وعلى يتم الأخذ بالنسب أعلاه في الحالات الغير مذكورة بكود الأحمال الإنشائية (أيهما اكبر) .

د. يجب حماية حواف سقف المظلة من الأعلى بألواح بارتفاع لا تقل عن (١٠٠) سم وذلك لمنع وقوع أي مواد من خارج السقف ، ويجوز إن يكون اللوح مائل للخارج على ألا تزيد درجة الميل عن ٤٥ ° درجة وبشرط التأكد من أن يكون محكم الربط مع السقف ولا يتعارض مع حركة مرور السيارات .



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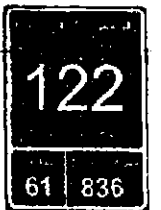
هـ . يجب أن تكون الفتحات المخصصة للتحميل والتنزيل في حالة وجودها بسقف المظلة مغلقة طول الوقت وتفتح فقط في حالة الاستخدام .

و . يجب أن تكون أرضية السقف المغطى مبنية من ألواح لا يقل سمكها عن (٥ سم) وملاصقة لبعضها وان تكون عازلة لتسرب المياه ، ويجب أن تكون محكمة الربط بينها وبين إطار الممر المغطى لتجنب تحريكها أو تفكيكها .

ز . إذا كان الممر المغطى ملاصق للمبنى الذي تحت الإنشاء أو الصيانة أو الهدم، فيجب أن يكون الممر مُسيج ناحية المبنى بشكل كامل، ويجوز استعمال أو إنشاء بوابات داخل الممر جهة المبنى .

٢ . للمقاول الخيار بين تغطية الرصيف أو إنشاء سياج على طول حافة الرصيف إذا كانت المسافة بين وسط الرصيف والمبنى الذي تحت الإنشاء أو الهدم أو الصيانة أكثر من (٥) متر و أقل من (٨ متر) .

٣ . يجب إنشاء مظلة لحماية المارة من مرتادي المبنى الذي تحت الصيانة تكون ممتدة إلى مدخل المبنى من حافة الرصيف على أن لا يقل امتدادها عن (٥) متر من مدخل المبنى ، وأن تكون بعرض كافي للمارة بحيث يكون عرضها أكبر من المدخل الخاص للمبنى بمسافة لا تقل عن نصف متر من الجهتين وتكون بنفس قوة تحمل المظلة المغطاة لممر المشاة المذكورة في الفقرة (ج) اعلاه .



مادة (٤)

الشروط العامة لممرات المشاة حول مواقع العمل والرصيف المؤقت :

١. يجب على المقاول الأخذ في الاعتبار حركة المشاة والسيارات حول المشروع عند تصميم الممرات والأرصفة المؤقتة للمشاة حول موقع العمل كما يجب عليه الأخذ بالاعتبار ما يلي :-

أ- فصل أرصفة المشاة المؤقتة عن منطقة العمل ، وعن حركة الآليات والمعدات والسيارات المتواجدة أو الداخلة أو الخارجة للموقع .

ب- فصل حركة ومرور المشاة وعدم تعارضها مع حركة مرور المركبات .

ت- أن تكون الأرصفة والممرات المؤقتة ذات مداخل و مخارج وأرضيات تكون مشابهة للممرات والأرصفة الأصلية المغلقة مؤقتاً .

٢. يجب على المقاول تقديم الخرائط التنفيذية للرصيف المراد غلقه إلى الإدارات المختصة في المرور موضحاً عليها الأبعاد والمسارات المخصصة للمشاة وذلك للحصول على تصريح قبل غلق الرصيف جزئياً أو كلياً .

٣. في حالة عمل ممر مؤقت للمشاة في حرم مسار السيارات يجب مراعاة الآتي :

أ. الحصول على تصريح من إدارة المرور لعمل ممر للمشاة داخل مسار الطريق إذا تطلب الأمر غلق الرصيف بشكل كامل ولا يوجد بديل لذلك.

ب. وضع اللوحات الإرشادية والتحذيرية والحوازر اللازمة لتوجيه حركة المشاة لرصيف آخر في حالة عدم إمكانية عمل ممر للمشاة داخل حرم الطريق.

ج. يجب حماية المشاة ووضع اللوحات الإرشادية المناسبة لتبنيه السيارات والمشاة إذا وقع تشييد الرصيف المؤقت داخل أو في مسار حركة مرور السيارات والتقييد باشتراطات مرافق المشاة الصادر من وزارة البلدية والتخطيط العمراني مع ملاحظة ما يلي :-

- إذا كانت حركة المرور كبيرة وكثافتها عالية فيجب حماية المشاة من السيارات المارة بالحواجز الإسمنتية ، على أن لا يقل ارتفاعها عن (٨٥ سم) وتكون كافية حسب حركة السيارات .
- إذا كانت حركة المرور قليلة والسرعة غير عالية فيمكن وضع الأقماع البلاستيكية لتحديد مسار المشاة .

٤. ضرورة الالتزام بالمواصفات العامة المعتمدة في هيئة الإشغال العامة عند تصميم وإنشاء أو إعادة إنشاء أو ترميم الأرصفة .

٥. لا يسمح بدخول السيارات أو وقوفها على الأرصفة المؤقتة ما عدا مداخل السيارات المخصصة لذلك .

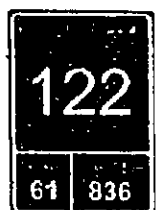
٦. لا يسمح بسير الدراجات الهوائية أو الزلاجات على الأرصفة المؤقتة ، ما عدا المسارات المصممة لذلك .

٧. يجب على المقاول المنفذ المحافظة على نظافة الرصيف المؤقت وإزالة جميع نواتج الحفر وكل ما من شأنه التسبب في الأضرار بالسلامة .

٨. يجب على المقاول توفير متطلبات ذوي الإعاقة في الأرصفة المؤقتة مثل عمل المنحدرات ومواد الرصف وتنفيذ اشتراطات مرافق المشاة الصادر من وزارة البلدية والتخطيط العمراني ، وغيرها من المتطلبات المذكورة في الاشتراطات الأخرى المعتمدة .

٩. أن يكون الرصيف خالياً من العوائق والبروزات ويكون سطحه خشناً لتجنب الانزلاق .

١٠. أن يكون الرصيف ملائماً للمقياس البشري ، ويشجع على المشي والشعور بالأمان للمشاة .



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- ١١ . مراعاة الاختلاف في إبعاد الأرصفة والعناصر التي تحويها حسب موقع الرصيف من الخدمات العامة .
- ١٢ . مراعاة فرق منسوب الطريق والرصيف ، وربط منسوب الرصيف بمنسوب الرصيف المجاور .
- ١٣ . تأمين الإضاءة وتقليل الإبهار خاصة في الأماكن التي يحتاج فيها المشاة لقراءة اللوحات المرورية الإرشادية .
- ١٤ . تأمين وسائل تحكم مروري وعلامات واضحة .
- ١٥ . تفادي الميل الشديد للمنحدرات حتى لا تعيق حركة المشاة أو المعوقين .
- ١٦ . الأخذ في الاعتبار عمل الميول المناسبة التي تضمن تصريف المياه عن سطح الأرصفة إلى منسوب الطريق أو الطرق المحيطة .
- ١٧ . يجب أن تكون الأرضية ثابتة وقوية وغير زلقة .

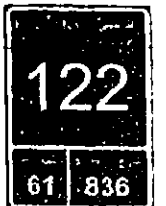
مادة (٥)

على جميع الجهات المختصة ، كل فيما يخصه ، تنفيذ هذا القرار اعتباراً من صدوره .

عبدالرحمن بن خليفة آل ثاني
وزير البلدية والتخطيط العمراني

صدر بتاريخ : / / ١٤٣٦ هـ

الموافق : ١٩ / ٥ / ٢٠١٥ م



Building No. 122 - Street 836 - Zone 61

رقم المبنى ١٢٢ - شارع ٨٣٦ - منطقة ٦١

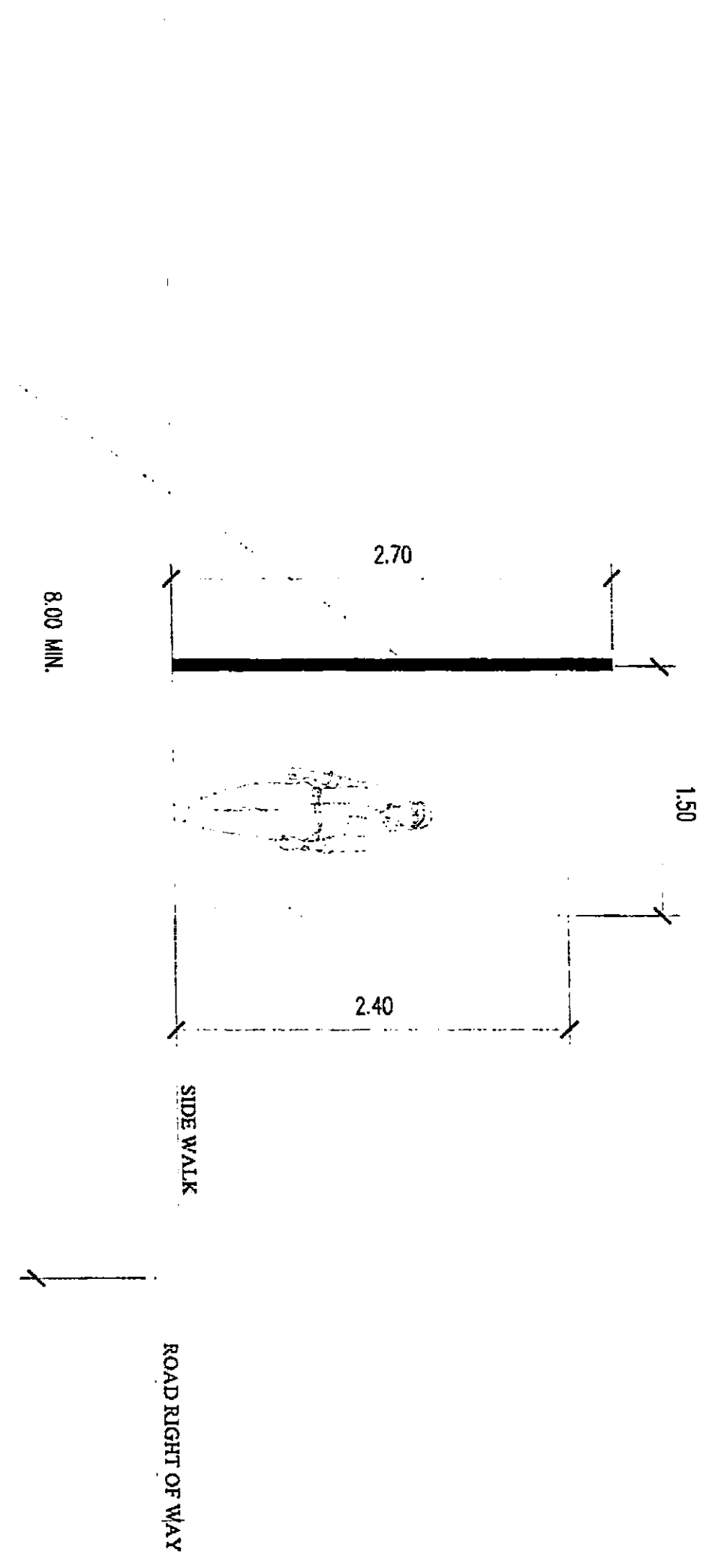
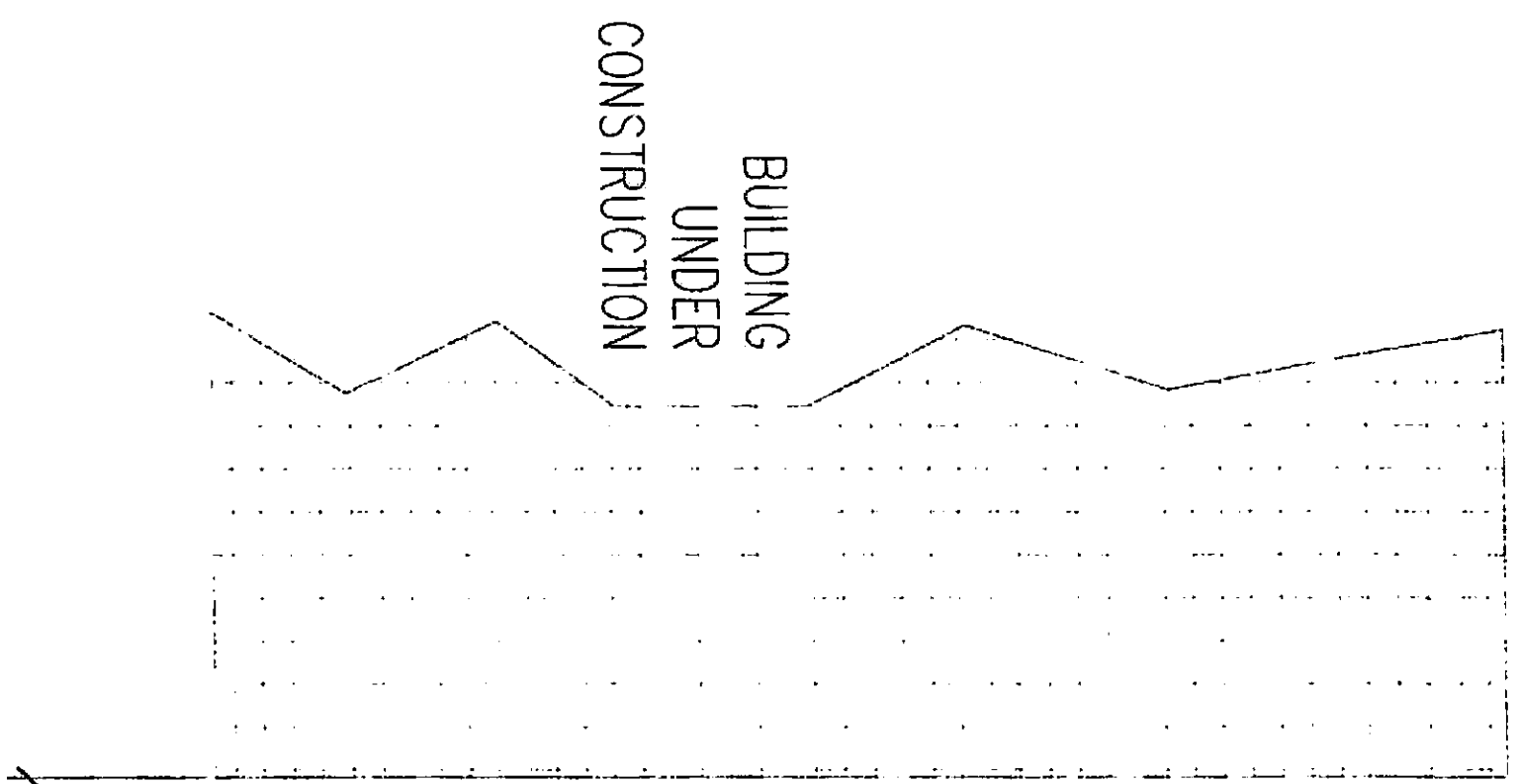
الملحق رقم (١)

”حماية الأرصفة بتغطيتها”

نموذج (١)

نموذج (٢)

نموذج (٣)

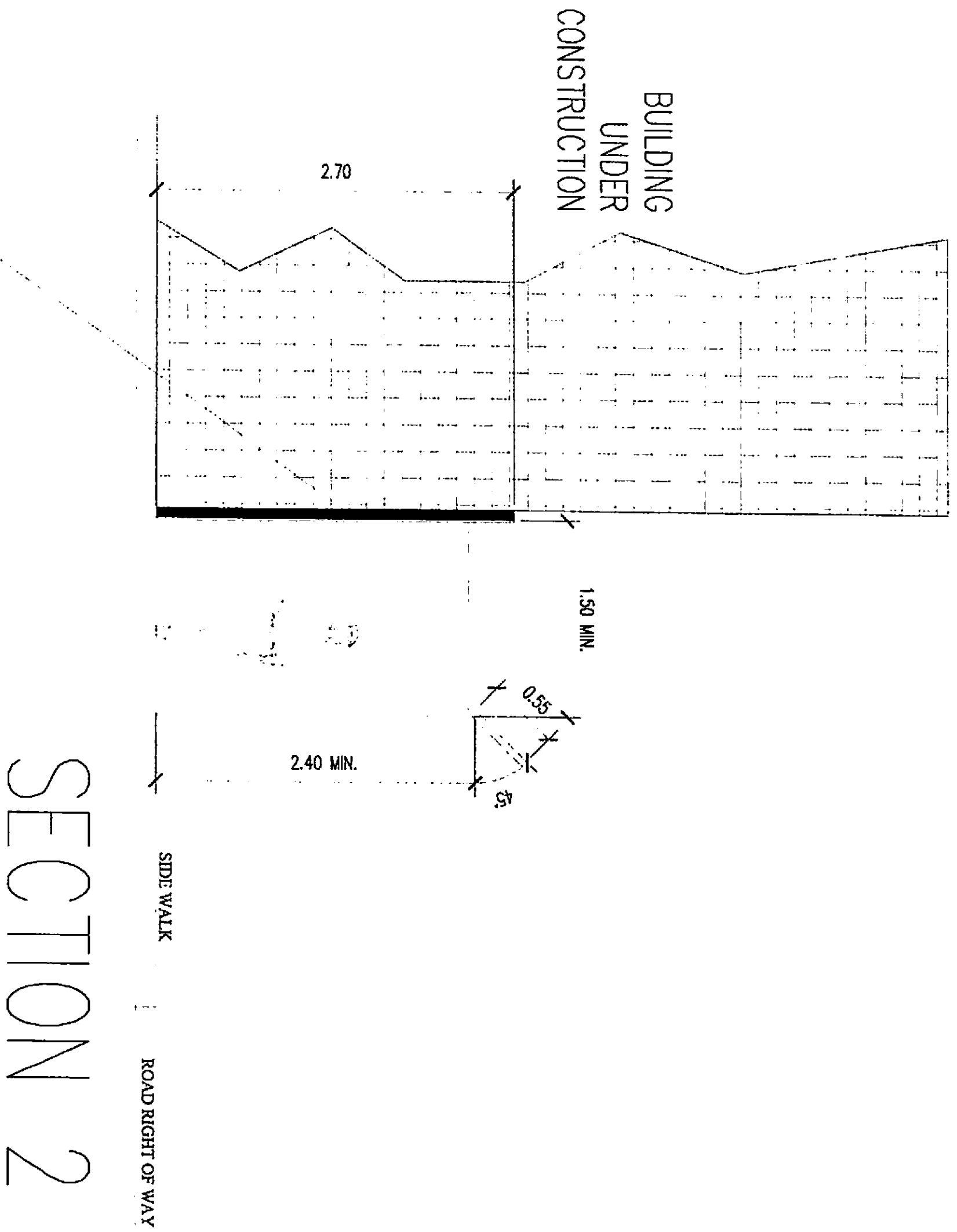


CONSTRUCTION FENCE

SECTION 1

حماية الارصفة بتغطيتها نموذج رقم (1)

CONSTRUCTION FENCE



SECTION 2

حماية الارصفة بتغطيتها نموذج رقم (2)

الملحق رقم (٢)

”دليل تصميم الطرق في قطر”

5.19 LANDSCAPING

Apart from the amenity benefits, the landscape treatment of medians, junctions and verges can have practical advantages. By ground modelling, perhaps in conjunction with planting, the layout of the road can be made more obvious to traffic.

Landscaping can play an important part in aiding drivers waiting to exit the minor road by providing reference points or features by which to judge the speed of drivers approaching on the major road. This is particularly useful where a major/minor junction is located in an open landscape, where there is a lack of natural reference points. Planting can also provide a positive background to the road signs around the junction, whilst visually uniting the various component parts. It is important that a wider view does not distract from the developing traffic situation as the driver sees it.

Specialised planting, which might be more appropriate in an urban area, generally requires greater maintenance effort if it is to be successful. The preferred maintenance method is an automatic irrigation system connected to a return effluent main. Approval for any such scheme must be sought from the Director of the Civil Engineering Department and the Drainage Division. If a return effluent main is unavailable, care should be taken so that watering does not require tankers to obstruct trafficked lanes at any time.

A well defined maintenance programme should be developed if extensive planting is used to ensure that such planting does not obscure either opposing traffic or traffic signs at any time.

In rural areas, planting should be restricted to indigenous species and be related to the surrounding landscape. In the desert, for example, any planting of other than local species would appear incongruous and landscape treatment would normally be restricted to ground modelling.

At roundabouts, the areas required for visibility envelopes can be planted with species having a low mature height, with higher and denser species of bushes and trees towards the centre of the island. Due allowance for the situation that will develop with matured growth must be made.

Apart from the amenity benefits, the landscape treatment of roundabouts can have practical advantages. By earth modelling, perhaps in conjunction with planting, the presence of the roundabout can be made more obvious to approaching traffic. The screening of traffic on

the opposite side of the roundabout to the point of entry can, without restricting necessary visibility, avoid distraction and confusion caused by traffic movements of no concern to a driver. Planting can provide a positive background to chevron signs and direction signs on the central island while visually uniting the various vertical features and reducing any appearance of clutter.

Generally the planting of roundabout central islands less than 10m in diameter is inappropriate as the need to provide driver visibility leaves only a small central area available. Such a restricted area of planting is out of scale with the roundabout as a whole, and becomes an incongruous "blob".

Recent experiments with a ring of black and white paving laid in a chevron pattern inside the central island perimeter at a gentle slope have proved successful in improving the conspicuity of central islands and they can be effective from a safety point of view (Figure 5.14).

It is common to construct features such as coffee pots etc. in roundabouts. They become a focus for the traveller, and if designed and positioned correctly will prove an asset to the surroundings.

Lighting of central islands or any landscape feature is important, though care should be taken to avoid distraction or dazzle to drivers.

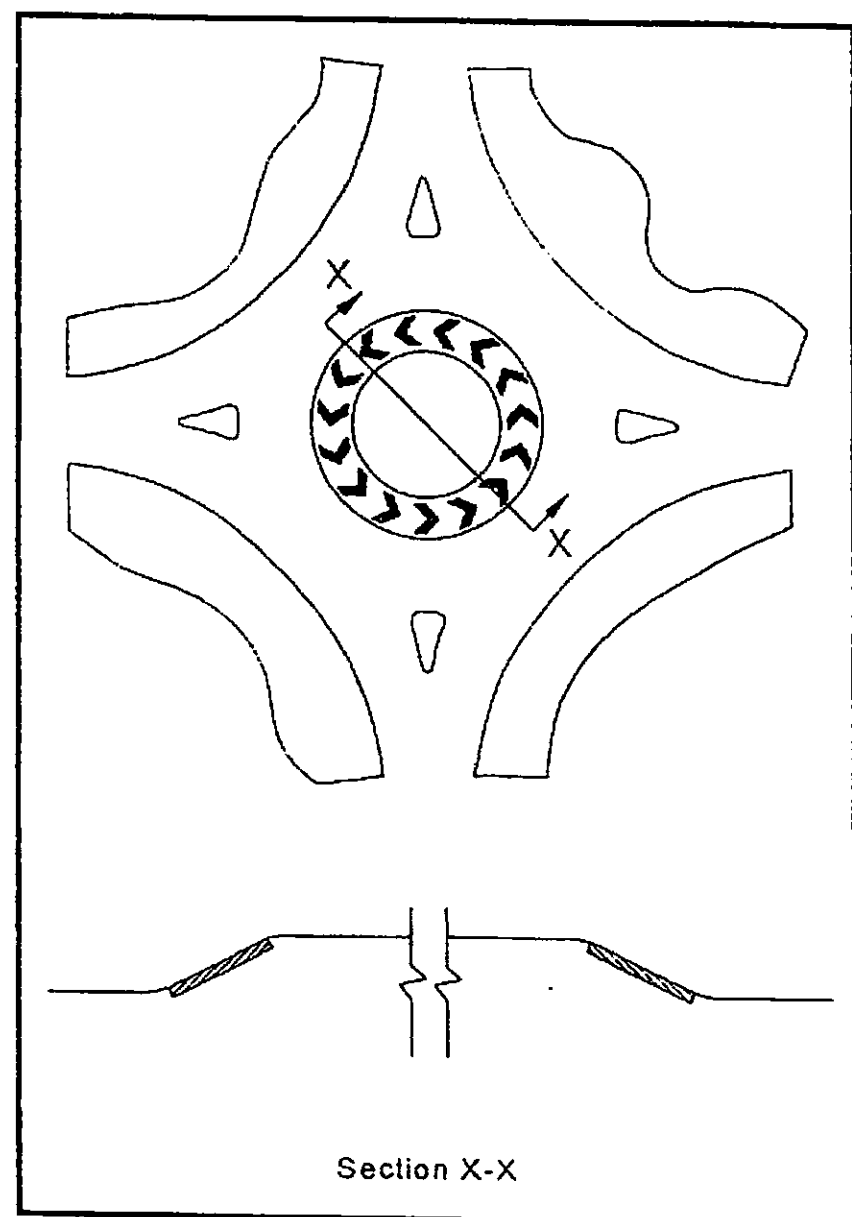


Figure 5.14 Contrasting Chevron Markings for Roundabouts

of carriageway available and the positions of existing property accesses that have to be accommodated by the closure.

Any barriers or turning heads shall be designed in such a way as to ensure that emergency vehicles are able to gain access. This is achievable by the use of lockable barrier gates or demountable bollards. Whichever is chosen, it must be capable of preventing private vehicles from passing through the restriction. For this reason, solutions such as a route through a landscaped area are not recommended as they are open to abuse, particularly by drivers of four wheel drive vehicles.

Whatever the designed restriction, adequate access and parking shall be provided for residents.

Partial closure allows access into areas. However, by the use of width restriction or raised road humps it is made unattractive for general road users.

Partial closure is often incorporated at undesirable locations along the major road to discourage use such as at accesses near to major junctions. Where the minor road has to remain open due to emergency vehicle access requirements or limited access routes into the development then partial closure is an easy way to control general use.

A safety fence is considered flared when it is not parallel with the carriageway. Flare is normally used to locate the barrier terminal section further from the carriageway, to minimise a driver's reaction to a hazard near the road by gradually introducing a parallel safety fence installation, to connect a roadside barrier to a hazard nearer the carriageway such as a bridge parapet or railing, or to reduce the total length of rail needed. Reference Figure 5.11.

Flare rates are a function of design speed and safety fence type. Bearing this in mind, Table 5.9 shows typical flare rates.

Design Speed (kph)	Flare Rate for Fence within Setback 1:x	Flare Rate for Fence beyond Setback	
		Rigid System	Semi-rigid System
140	1:35	1:23	1:17
120	1:30	1:20	1:15
100	1:26	1:17	1:13
80	1:21	1:14	1:11
70	1:17	1:11	1:9
60	1:13	1:8	1:7

*Refer to manufacturers technical literature for special conditions.

Table 5.9 Typical Flare Rates

The length of safety fence required should be such that it protects the vehicle for the full extent of the hazard. This includes the length of the approach flare, the length of the hazard and the runout length beyond the hazard. The runout length is particularly important on single carriageways where protection is required for vehicles travelling in the opposite lane.

Underground Obstructions

Where there is a risk of driven posts or standard concrete footings interfering with cables, ducts and pipes and the alignment of the safety fence cannot be adjusted to avoid the obstruction, or the depth of pavement construction is such that the standard driven post or concrete footing would not penetrate into the subgrade, special posts or footings shall be provided with the approval of the Director of Civil Engineering Department.

Existing Systems

With the development of technology and understanding of this subject, it is a fact that older installations are sub-standard and do not always meet current recommended performance levels. These deficiencies usually fall within two categories, those that have structural inadequacies and those that are improperly designed or located.

These installations will require upgrading to current standards and each installation should be considered on a site by site basis.

For further reference on the different types of safety fencing refer to the British Department of Transport document TD 19/85, Safety Fences and Barriers, and the American Association of State Highway and Transportation Officials publication, Roadside Design Guide. For details of specific safety fences the manufacturers' technical literature should be referred to.

5.16 CRASH CUSHIONS

Crash cushions or impact attenuators are protective devices designed to prevent errant vehicles from impacting fixed object hazards. This is achieved by gradually slowing down a vehicle to a safe stop (from possible head-on impacts) or by redirecting a vehicle away from the hazard (for side impacts). Crash cushions are ideally suited for use at locations where fixed objects cannot be removed, relocated or made to breakaway, and cannot be adequately protected by a normal safety fence.

Crash cushions primarily serve to lessen the severity of accidents rather than to prevent them from happening.

Crash cushions work on one of two principles, either absorption of kinetic energy or transfer of momentum. In the first instance the kinetic energy of a moving vehicle is absorbed by crushable materials. This can be achieved by the use of water filled containers. Crash cushions of this type require a rigid back stop to resist the impact force of the vehicle.

The second concept involves the transfer of momentum of a moving vehicle to an expendable mass of material or weights. This may be sand filled containers. Devices of this type require no rigid back stop.

The design procedure is relatively straight forward and basically relates to the number of crash cushion units being able to slow down a design vehicle, at a design speed under an acceptable deceleration force. Most manufacturers have design charts to select an appropriate layout.

The most common application of crash cushions is at an exit ramp at an elevated or depressed structure, where a bridge pier requires protection. However, they may also be used at temporary road works or used to slow a vehicle down on a slope when the brakes have failed. For optimum use, the crash cushion should ideally be placed on a relatively flat surface. Kerbs should also be

impacts, the roll angle toward the barrier imparted to high centre of gravity vehicles may be enough to permit contact of the top portion of the vehicle with objects on top of or immediately behind the fence, eg. bridge piers. Commonly used rigid systems are the New Jersey Barrier in the USA, and the British Concrete Barrier in the UK.

Typically the system is relatively low cost, has generally effective performance for passenger-sized vehicles and has maintenance-free characteristics.

End Treatments

The untreated end of a safety fence is extremely hazardous if hit, as the beam element can penetrate the passenger compartment and will generally stop the vehicle. A crashworthy end treatment is therefore considered essential if the safety fence terminates within 10m of the travelled way and/or is in an area where it is likely to be hit head-on by an errant vehicle. The termination of the safety fence should not spear, vault or roll a vehicle for head-on or angled impacts. For impacts within the length of need, the end treatment should have the same redirection characteristics as the standard safety fence, which means that the end must be also properly anchored.

There are a number of different types of end treatments which work on a range of principles, some of which are listed below:

- Breakaway Terminals
- Turned Down Terminals
- Energy Absorption Systems
- Special Anchorage for Cable Fence
- Anchorage into Embankment

Further reference is essential to select the most appropriate system for each particular situation.

Transitions

Transition sections of safety fence are necessary to provide continuity of protection when two different barriers join, when a barrier joins another barrier system (such as a bridge rail) or when a roadside barrier is attached to a rigid object (such as a bridge pier).

The transition section should be the same strength or stronger than the two systems.

The transition should be long enough so that significant changes in deflection do not occur within a short distance. Generally the transition

length should be 10 to 12 times the difference in the lateral deflection of the two systems in question eg. for a beam deflection of 1.5m the transition should be around 15m.

Drainage features such as ditches should be avoided at transition positions as they may initiate vehicle instability.

The stiffness of the transition should increase smoothly and continuously from the less rigid to the more rigid system. This can be achieved by decreasing the post spacing, increasing post size or strengthening the rail element.

Selection of Safety Fence

The selection process is not easily defined but the most desirable system is one that offers the required degree of protection at the lowest total cost. Table 5.6 summarises the factors to be considered.

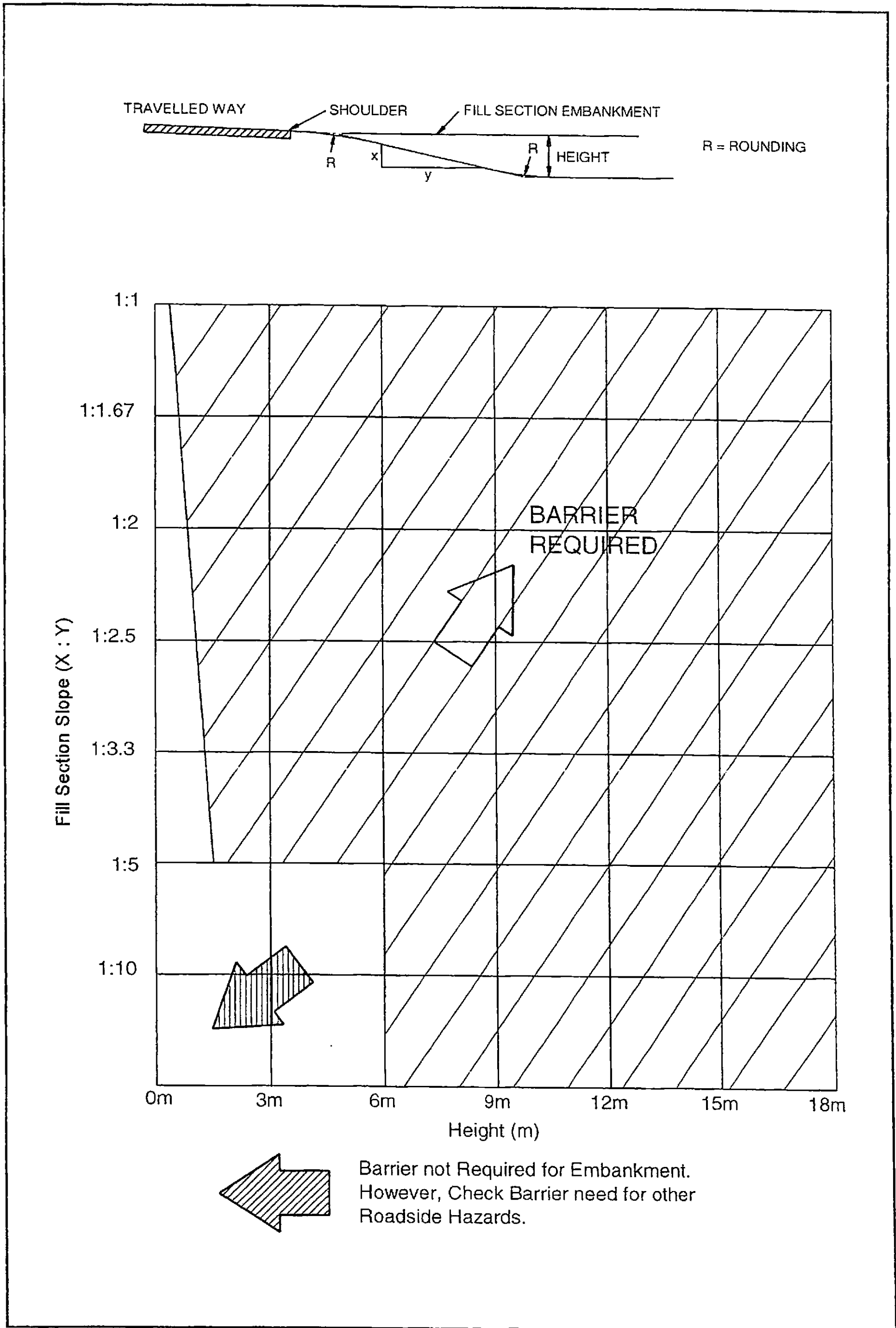


Figure 5.12 Requirement for Safety Fences on Embankments

5.15 SAFETY FENCES

General

A safety fence is a longitudinal barrier used to shield motorists from natural or man-made hazards located along a road. It may also be used to protect bystanders, pedestrians and cyclists from out of control vehicular traffic. Safety fences may be located in the verge or median depending on the particular requirements and location. Refer to Figure 5.11 for the definition of terminology used in safety barrier design.

The safety fence is designed to prevent an errant vehicle from leaving the carriageway and striking a fixed object or feature that is considered more hazardous than the barrier itself. This is accomplished by containing and redirecting the errant vehicle.

On a divided road, a safety fence is located in the median to separate opposing traffic.

Safety fences should only be installed if they reduce the severity of accidents. This may appear subjective, but generally a barrier should be provided if the consequences of a vehicle striking a fixed object, or running off the road are determined to be more serious than hitting the safety fence itself. Other considerations are traffic speed and traffic volumes and a cost analysis.

The cost analysis is based on:

- Removing or reducing the hazard so that it no longer requires protecting
- Installing an appropriate safety fence
- Leaving the hazard unprotected.

Median safety fences are generally provided where the median width is relatively narrow and the traffic volumes and speeds are high. They may also be provided where the separated carriageways are at different levels, as the likelihood of an accident increases the steeper the slope between carriageways. It is important to provide gaps in the median fencing for emergency use and maintenance.

Embankments

Embankment height and side slope are factors in determining safety fence need. The provision of safety fencing should be considered when slopes are steeper than 1 in 5 and/or the height of the slope is greater than 6m, refer to Figure 5.12. Rounding slopes reduces the chances of an errant vehicle becoming airborne. The optimum rounding may be defined as being the

minimum radius a standard size car can negotiate without losing tyre contact. This is dependant on approach angle and speed as well as the characteristics of individual vehicles.

Roadside Obstacles

A safety fence should only be installed if it is clear that the result of a vehicle striking the barrier will be less severe than the accident resulting from hitting the unprotected object.

Generally, if an object is greater than 10m from the travelled way, it does not require protection.

Table 5.5 summarises of the various needs for safety fencing.

Pedestrians

The most desirable solution to protect the innocent bystander is to separate pedestrians and vehicular traffic. If this is not achievable then consideration of safety fencing should be given at schools, busy commercial and retail centres, sports venues and other locations where high pedestrian movements are anticipated or observed.

appearance of both highway and the development adjacent to the highway.

Refer to HMSO publication, *Designing for Deliveries* for detailed explanation and guidelines of requirements for service roads/areas, and turning movements for different vehicle types.

5.12 PEDESTRIAN FACILITIES

Pedestrian facilities are generally found within the verge and at road crossing points. The provision of paved pedestrian areas is related to the function of the roadside development. It is often difficult to obtain reliable estimates of pedestrian volumes and movements. For this reason, studies should be carried out at the concept and preliminary design stage. All urban roads and junctions shall allow space for footpaths unless the area strictly forbids walking. A width of 2.0m should be provided depending on pedestrian needs. The width of paved pedestrian areas should be increased to a minimum of 3.0m near schools, large sports venues, commercial areas or other areas with high pedestrian volumes. Footpaths may be constructed of paving blocks or concrete and laid to crossfalls of 2% towards the roadway to permit drainage.

Where possible a separation area should be included within the verge which acts as a buffer between vehicular and pedestrian traffic. The separation width should be designed to discourage pedestrians from standing at the kerbside. This is achievable by providing a number of obstacles such as low planting, raised blockwork or pedestrian barriers. A minimum separation width of 1.2m is desirable. A separation width is not required in commercial areas with on street parking where wider footpaths are usually provided.

Pedestrians should be actively discouraged from crossing roads along the length of dual carriageways. Special pedestrian refuge sections should be provided at selected points, or ideally at junction locations. It is recommended that these refuge areas be a minimum of 3.5m wide and should be staggered so that pedestrians are not able to approach and cross both carriageways in one line.

On roads with a posted speed of 60kph or less, it is recommended to provide a pelican crossing (signalized pedestrian crossing) or a zebra crossing (pedestrian crossing defined by road markings) as a crossing point for pedestrians. These crossings should be located, signed and marked in accordance with this manual and with the Qatar Traffic Manual.

In areas with high volumes of pedestrian traffic, footpaths should be provided on both sides of the road. Some urban areas and most frontage roads can be served with a footpath on one side only. In these areas, footpaths must be continuous for the full pedestrian route.

On rural roads, footpaths are not usually required, except along sections of road where there is substantial residential or commercial development. In such situations, footpaths are usually located between the bottom of the embankment and the property line.

Pedestrian Ramps

In order to provide adequate and reasonable access for the safe and convenient movement of pedestrian and handicapped persons, including those in wheelchairs, kerb ramps should be included at all pedestrian crossing points. Kerb ramps should be at least 0.9m in width, sloped at the rate of 1 in 12 or flatter, and located on the pedestrian side of the kerb face.

The edge of the ramp facing the carriageway shall be flat and set 25mm above the level of the road pavement. Drainage equipment such as gratings should not be placed in ramp areas where they may caused a hindrance to wheelchairs.

Structures for Pedestrian Movements

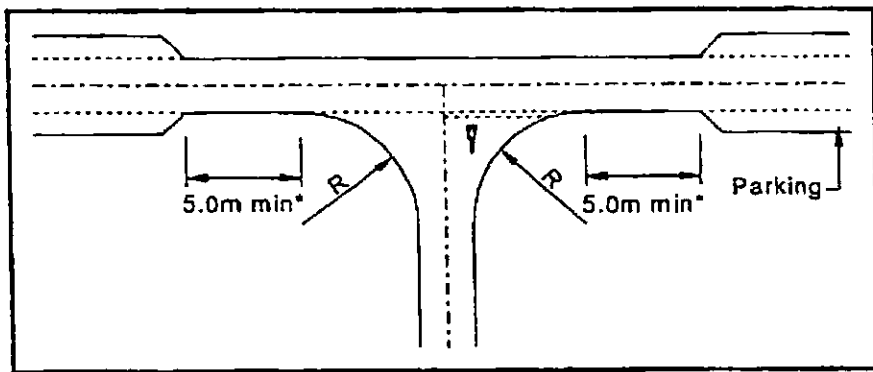
The need for a pedestrian grade separated structure such as a footbridge or underpass must be investigated in some depth for each particular situation. The investigation should cover studies of pedestrian generating sources, travelling patterns, crossing volumes, classification of road to be crossed, land use, location of adjacent crossing facilities, and social and cultural factors. The structure to be provided must accommodate handicapped pedestrians and those with wheelchairs. Ramps should be provided to a preferred grade of 1 in 12. However, a maximum grade of 1 in 10 may be used in difficult locations. Level landing areas of 1.5m length should be installed such that no individual ramp section is longer than 9.0m. Handrails should be provided on all steps and ramps. The width of the walkway should be a minimum of 2.5m between walls or railings. It may be necessary to install pedestrian barriers in the vicinity of the structure to deter pedestrians from crossing the road at-grade.

A pedestrian overstructure is preferred to an underpass. An over structure should be designed to be in keeping with the surrounding area in terms of geometry and architecture. The required headroom clearance for overstructures is detailed in Clause 4.6. Lighting and fencing should be considered on a site by site basis.

Parking Exclusions

Parking shall be excluded from the following locations:

- Junctions; to provide space for pedestrians to cross and to maintain adequate visibility. See Figure 5.10
- Bends; to maintain adequate forward visibility for drivers
- Pedestrian crossing points; to minimise crossing width and enable crossing pedestrians to be seen clearly by drivers
- Any other location where parking would cause unsafe conditions.



*In all cases parking must not encroach on visibility splays.

Figure 5.10 Typical Parking Lane Treatment at T-Junctions.

5.9 SIDE SLOPES

Side slopes fall into two categories, embankment and cutting. They serve two main functions; firstly they provide structural stability to the road, secondly they provide a surface on which out of control vehicles may travel and recover, minimising the chance of overturning.

Where possible the side slopes should fall away from the verge at a slope of 1 in 5. It is usual to consider the provision of a safety fence when slopes are steeper than 1 in 5 and/or the height of the slope is greater than 6m. Safety fencing is discussed in Clause 5.15. Generally, it is better to use flatter slopes, providing there is adequate fall for drainage. Slopes in cutting should not be steeper than 1 in 2 and preferably should be 1 in 3 to allow mechanical maintenance equipment to be used on the slope. If there is insufficient width which would require slopes steeper than 1 in 2, then partial or full retaining walls should be used or some method of slope stabilisation. Retaining walls should be set back from the carriageway to avoid a constricting feeling and reduce stress for the driver.

Cut and fill slopes should be flattened as appropriate with the topography and be consistent with the overall type of highway. The intersection of slope planes in the highway cross section should be well rounded to simulate natural earth forms. The rounding and flattening of slopes minimises drifting and wash out of loose material such as sand and hence reduces maintenance costs.

It is recommended to carry out an adequate geotechnical investigation prior to specifying slopes. The investigation will determine the maximum slopes for cut and fill and the criteria for benching or erosion protection if required.

Benches should ideally be 4.0m in width and laid to falls of approximately 1 in 20 to avoid ponding of water and consequential slip failure.

In rock cuttings it is recommended to include ditches and a debris verge to provide a safe landing and catchment area for possible rock fall, and removal of surface water run off. This additional width also provides a useful area for rock face maintenance. It is becoming common practice in the UK for rock outcroppings to be left in place for reasons of economy or aesthetics. This may be considered for application in Qatar. However in such situations this may prove lethal if a vehicle were to collide with the outcrop. It is recommended that at all such locations a safety fence be provided. Refer to Clause 5.15 for safety fences.

For details of sand slopes, wind blown sand and dune control refer to the Kingdom of Saudi Arabia, Ministry of Communications, Highway Design Manual, Book 2, Section 1.16, Sand Dune Control.

It is not recommended that narrow medians are used on rural roads.

A narrow median should not be considered if it is possible to provide an intermediate or wide median at that particular location. Acceptable standards for the remaining cross section elements should be maintained.

Intermediate

Intermediate width medians are those in the range 4.0m to less than 8.0m and are generally wide enough to provide for a left turn lane. A width of 6.0m is the desirable minimum to provide a left turn lane and a residual median, and a width of 8.0m is the desirable minimum to shelter a crossing vehicle undertaking a U-turn manoeuvre.

Wide

Medians 8.0m or greater in width provide space for effective landscaping and may be used for signing, services and drainage. Wide medians may also be used to absorb level differences across the road reserve. Rural medians should be a minimum of 8.0m wide with a central safety barrier.

A disadvantage of wide medians occurs at signalised junctions, where the increased time for vehicles to cross the median may lead to ineffective signal operation.

Wide medians should not be implemented at the expense of reduced verge widths. Verge widths are required for pedestrian walkways, installation of services, traffic signs, drainage channels, parking etc. Any significant reduction in verge width may result in hazards in the verge which negate the advantages of a wider median.

It is recommended that urban medians should be kerbed and that rural medians should be provided with an edge strip and not kerbed. A kerbed median is desirable where there is a need to control left turn movements and is also used when the median is to be landscaped. In the rural situation, a depressed median is preferred as this improves drainage of the road.

Special attention should be given to drainage of medians. If the median is kerbed, the median surface should be designed to have slopes of 2 percent, and should fall towards the centre of the median if unpaved, or slope out if paved. Depending on whether the median is paved or open, or planted or not, the drainage should not interfere with the operation of the highway. Paved medians may require positive drainage systems incorporating manholes, pipes etc. Non-paved medians may be self-draining, but

again, consideration should be given to the provision of additional storage capacity or outlets to allow for storm conditions. All drainage inlets in the median should be designed with the top flush with the ground, and culvert ends provided with safety grates so they will not be hazardous to out of control vehicles that run off the road.

It is common practice to landscape medians. This is seen to provide a better environment and reduce driver stress. Careful consideration should be given to the choice of planting to ensure that visibility and stopping distances are not impaired. Furthermore, the upkeep of the landscape and growth of the plants should be designed for minimal maintenance and hence less disturbance to the road user.

Watering shall not require tankers to obstruct the trafficked lanes at any time.

Where two abutting sections of highway have different carriageway widths it is desirable that a smooth transition should accommodate this difference. The transition should be as long as possible for aesthetic reasons and preferably occur within a horizontal curve.

5.7 VERGES

The verge is a width of the reservation which facilitates additional functions essential for the operation of the road. As a minimum verges must be able to accommodate highway signs, structures, utility services such as water, electricity, Q.TEL, drainage, and additionally such items as traffic signals and street lighting. Where a verge is adjacent to a development a set back may be required. Verge widths may vary from a desirable minimum of 3.0m up to the limits of the reservation, which could be in excess of 15.0m. Paved verges should be designed with a 2% fall towards the carriageway for drainage purposes. However, in larger paved areas, falls shall be designed to specific drainage collection points in the verge.

It is important to ensure that whatever is installed in the verge (such as structures, signs or landscaping) does not affect the sight distances required for the particular design speed of the road. Additional care should also be taken at traffic signals and junctions where more signage is implemented.

Verges may be paved, landscaped or graded depending on the intended use of the verge.

It may be necessary to increase the verge width if soakaways are to be installed within the verge.

5.3 LANE CAPACITY

In addition to strategic importance and safety, the desired characteristics of traffic flow will generally determine the class of a road. For example, high volumes of traffic are generally associated with urban Primary Routes, whereas low volumes are associated with Tertiary Routes.

In most urban situations, the capacity of intersections on a particular network will govern the capacity of the network as a whole. Uninterrupted flow only takes place when the influence of at-grade intersections can be neglected. This is rarely the case on most urban road systems.

The capacity of a highway is affected by the composition and the habits and desires of the traffic using the road system and the controls that the designer imparts onto the traffic. These include:

- Commercial vehicles
- Lane distribution
- Variations in traffic flow
- Traffic interruptions.

Under ideal conditions, vehicles can follow one another at average minimum headways of about 1.8 seconds, giving a maximum flow rate of about 2,000 vehicles per hour. A line of vehicles can start up with an average minimum headway of about 2 seconds giving a maximum starting-up rate of approximately 1,800 vehicles per hour. These maximum rates are reduced by many prevailing road and traffic conditions.

When two or more lanes are available for traffic in a single direction, the distribution in lane-use will vary widely. The lane distribution will depend on traffic regulations, traffic composition, speed and volume, number and location of access points, origin-destination patterns of drivers, development, environment, and local driver habits.

Due to the above factors, there are no typical lane distributions. The recommendation for 1,600 vehicles per lane per hour recognises that flow in some individual lanes will be higher and in others lower. Refer Table 5.1.

At the planning stage, major routes should be planned and designed as multi-lane, divided, controlled access facilities even though they may be developed by staged construction. In the plans for each stage of development,

provision should be made for further improvements to existing sections.

Lane Provision	Road Capacity (veh/hour)
Single Lane	1,600
2-Lane Dualling	3,200
3-Lane Dualling	4,800

Table 5.1. Recommended Road Capacity

For detailed assessment of highway capacity and level of service for different roads, refer to The Kingdom of Saudi Arabia, Ministry of Communications, Highway Design Manual, Volume 2, Design of Roadways, Section 1.03.

5.4 SHOULDERS

The addition of a shoulder to the nearside edge of a road has many advantages. Shoulders provide structural support for the pavement edges, emergency parking space for stopped vehicles and also provide side clearance between moving vehicles and stationary objects. They also provide additional running lanes for diversions and road maintenance. Shoulders are not usually required on urban single and urban dual carriageways as structural support is provided by the kerbs and channels and stopped vehicles can find a safe place to rest in driveways and side streets. The shoulder may be paved to the same standard as the carriageway or of lesser construction such as to road base construction. The merits of using a lesser construction should be considered accordingly for each particular situation.

Where there is a high traffic volume, narrow shoulders give very poor service. There is a greater number of accidents and they incur more frequent and costly maintenance.

In deciding whether to include a shoulder, the engineer should consider the following:

- a) Additional width provides a place for safe stopping because of mechanical difficulty, flat tyre or any other emergency. This also minimises disruption to traffic flow.
- b) Additional width provides space for increased mobility to escape potential accidents or reduce their severity.
- c) Stormwater drainage is improved as the water can be discharged further from the running carriageway.

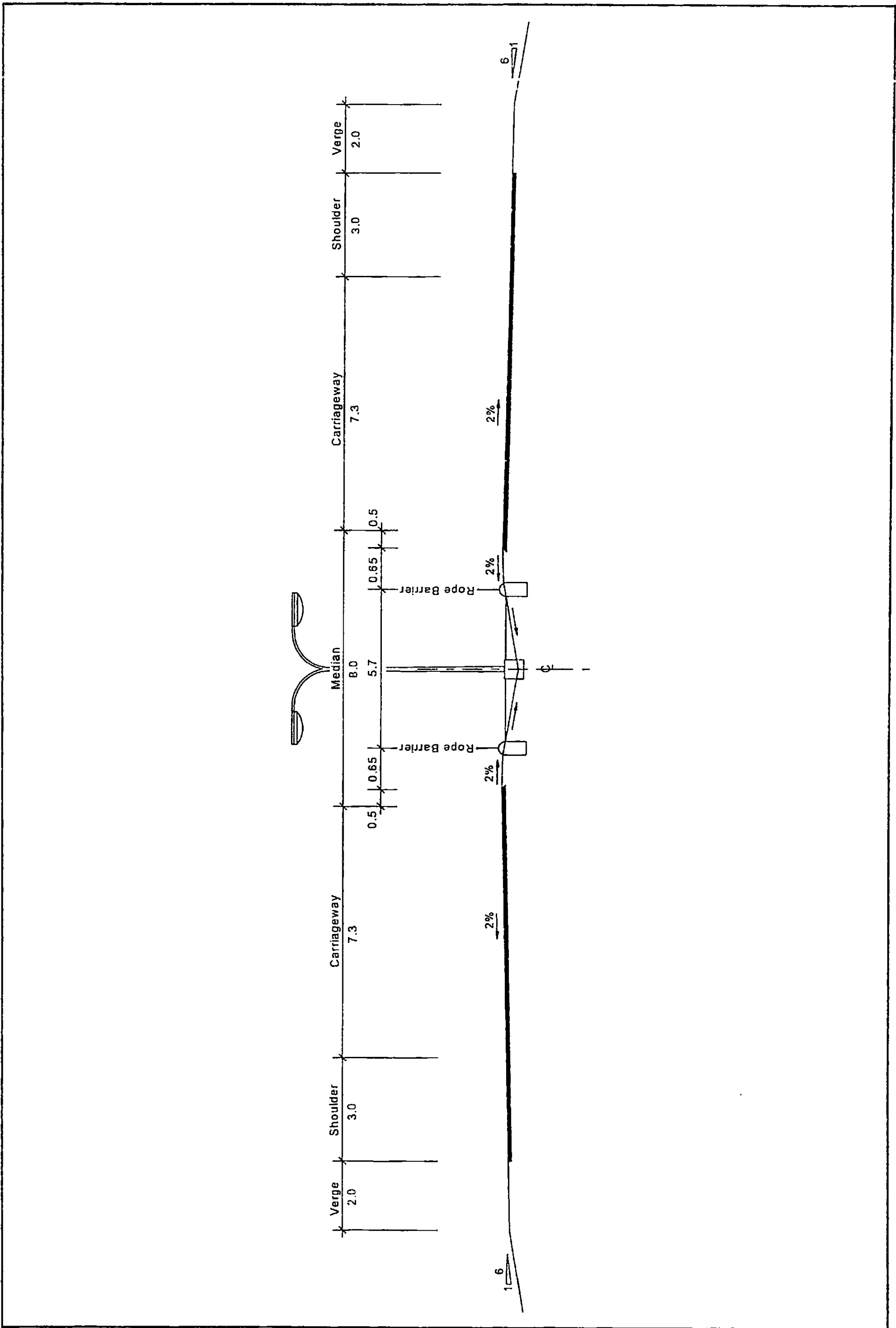


Figure 5.9 Typical Rural Dual Carriageway

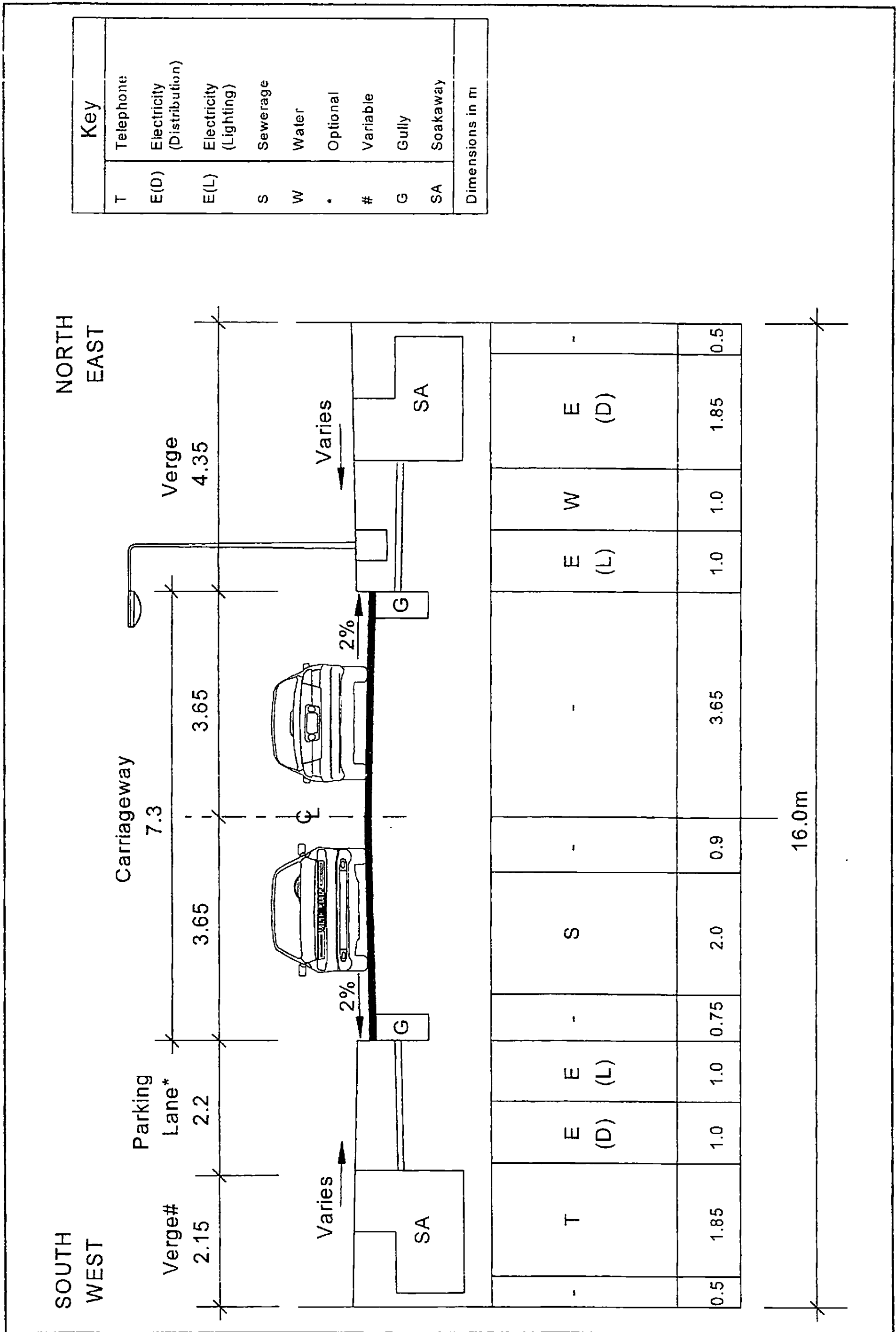


Figure 5.1 Typical Urban 16m Reservation