

A photograph of a modern residential garden at dusk. The garden features a wooden slat fence, a concrete patio area with a built-in bench and a small waterfall, and a lawn. The scene is illuminated by warm, yellow lights, highlighting the textures of the wood and stone. The sky is a deep blue, and the overall atmosphere is serene and sophisticated.

RESIDENTIAL GARDEN LIGHTING

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‘Find beauty not only in the thing itself but in the pattern of the shadows, the light and the dark that thing provides’

Junichiro Tanizaki

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Introduction

As life begins to return to normality, many homeowners will be looking at ways to illuminate their garden to create a space for re-engaging with family and friends over the summer months.

Lighting in residential gardens has gained popularity in recent years and there are several reasons why homeowners wish to spend money illuminating the space around their property. Installing artificial lighting can extend the time spent outdoors, allowing people to enjoy the benefits of their garden into the darker hours. In addition to its aesthetic benefits, artificial illumination can provide safer access around garden and building areas, as well as increasing security.





When considering illuminating a garden, as well as the paths, patio, feature areas and buildings, an installation need not require extensive investment in lighting equipment and controls to provide for a superb lighting solution. Selecting the appropriate lighting equipment for the application can also offer the benefits of an energy efficient lighting installation. As the sun sets, lighting control can offer an optimum solution. It can be used to introduce artificial lighting to maintain an acceptable level of illuminance, while also revealing the beauty and aspects of the garden space, such as paths, flowerbeds, shrubs and trees, as well as patio areas or water features, in a highly attractive manner and without significant electricity cost.

The orientation of a property will have an influence on a design, depending on where the passage of the sun moves across the garden during daylight hours. Many homeowners now consider this an important factor when viewing and looking to purchase a property. They are keen to consider where in the garden the sun will be, during the day and throughout the year.

In creating garden lighting, the basic objectives of outdoor lighting are:

- to promote safe access of the area by illuminating safety hazards
- to provide security at night
- to enhance the appreciation of the surroundings
- to accentuate the general scene by illuminating dark areas which detract from the visual appearance

Often a small amount of light can fulfil the desired requirements. Indeed, subtle effects may be ruined by installing an excessive amount of illumination, whilst also consuming more energy. No attempt should ever be made to illuminate everything in sight, as the desirable balance between the various illuminated areas is a matter of subjective judgement, rather than engineering expertise, with calculations being subservient to the guidance offered by the lighting designer in dealing with this type of lighting installation.

The main features of interest, and any route of progress through the garden which visitors are likely to follow, should be carefully selected to provide different scenes which reveal the areas as people walk through the space. The availability of different viewing directions, as well as the practicality of concealing the lighting equipment, will determine the feasibility of influencing visitors to follow a predetermined route through the garden.

If there is a requirement to vary a lighting scene or provide variety within the installation locally, controlling the switching and dimming of the equipment or varying the colour, either in a tuneable or RGB format, can be factored in. Control of these luminaires can be provided either centrally or locally or, alternatively, through an 'app' based lighting system, controlled from a smartphone.

As far as practicably possible, lighting should be carefully installed and screened from direct view by plants, shrubs, boulders and objects to minimise or prevent the experience of glare by visitors. Any lighting equipment, when not concealed, must be acceptable to view as part of the illuminated scene during the hours of darkness and not have a detrimental effect on the scene during daylight. This may influence the type of lighting equipment suggested for installation, as well as the positioning or spacing of the equipment in order to maintain the visual quality of appearance within the environment. It is important that the mounting of lighting fittings is considered carefully, so that when installed they are not deemed to be intrusive.

Establishing the optimum illuminating and aesthetically pleasing theme throughout the garden will facilitate cohesion between the elements within the different scenes. A high-key scene has mainly bright tones with higher values of illuminance which are evenly distributed, whereas a low-key scene has mainly dark tones with variations in illuminance to provide the contrast between light and dark.

In terms of scale, this is determined as being that of the perceived size of buildings, features and spaces relative to other structural forms or of people within the garden scene. As artificial lighting can be selective, the scale interpretation of an environment can differ when viewed at night from that being experienced by day, and an intimate scale can be created by controlled contrasts in luminance to significant areas. Lighting can also emphasise the scale of a building, where only certain selected features are illuminated, resulting in a more intimate scale appearance than if the building was totally floodlit.





The spacing of lighting fittings within a scene, and that of the light produced, is perceived as rhythms - the wider the spacing between the fittings, the slower the rhythm beat and more solemn the response, whereas the closer the spacing, the faster the rhythm beat and more positive the response. An example of this is with festive festoon lighting, which tends to utilise multiple small elements of light, evenly spaced at very short intervals, thus creating that faster rhythm beat.

The highlights and shadows which give effect to a scene can create modelling by the luminous intensity and the direction of light in relation to the form and texture of the surfaces being illuminated. This interest is created by the variation in lighting effects, such as key tones, colour, luminance and modelling. Illumination of this form offers subjective impressions and as such cannot be measured with a light meter.

The effect of distance can be varied by the luminance of a more informal and less regular installation design, which provides an aspect of depth within the landscape and, with the addition of colour, can also be used to compliment the variations of distance within the illuminated scene. The feature of illuminating by silhouette can help to change the apparent relationships between objects within a field of view and will allow visitors to be directed through the garden scene from one feature to another by these variations.

When looking at the planning and development of an exterior residential garden lighting project, it can generally be summarised as a series of four basic stages, that of Site Survey, Review, Lighting Design and Evaluation. Let's consider each of these facets of the garden lighting application in turn.

Site Survey

Before commencing any lighting installation, it is important to fully understand the garden areas being illuminated and, to that end, the space(s) should be surveyed, culminating in a drawing to highlight the features within the garden scenes. This process should commence with the building(s), in respect of height, shape, location, texture and colour etc. Next is to consider the built features within the garden such as pergolas, arches and seating, followed by the construction elements of patios, paths, steps and ramps, then onto any water features, pools and water channels and, finally, to consider the natural features of the garden - the trees, shrubs, hedges, etc.





Review

This stage of the process is entirely based upon the need for illumination for the activities of people within the space. It is important to discuss the performance brief and obtain the criteria upon which the design can be produced. There are many factors which require consideration and those offered here do not constitute an exhaustive list; rather, they are suggestions for the thought process. These include site conditions, changes in direction, changes in vertical level, specific movement patterns, planned pedestrian routes through the garden, vehicle access routes (if any) and the level of security required. Finally, consider the subjective requirements for illuminating the space, such as the character, ambience, image, mood and perceived effect gained from a completed installation.



Lighting Design

The basis of all lighting is that of human need, perception and response. A successful design should satisfy the practical requirements of safety and security as well as those relating to both psychological and aesthetic need. From a more technical stance, the eye adjusts to ambient light and can be extremely sensitive to a very weak light source, where only the minimum of visual information is required. Lighting is required to function at several different incremental levels, providing low levels of illumination for safe access and security, to a general ambient lighting for normal activities, through to specialist feature lighting for visual impact and aesthetic appearance.

In creating a design, there is no definitive solution to any lighting situation, with no right or wrong lighting installation. However, the basic design should constitute a correlation of light sources, their geographical position, mounting height, spacing and distance from the objects to be illuminated, as well as the specification of the lighting being proposed. Consider its intensity and distribution pattern, its colour and colour rendering properties. The design needs to take account of the visibility of the light sources being proposed - whether they are concealed, visible or seen directly within the field of view. Finally, before planning a solution, a discussion with the client is beneficial, covering the proposed equipment and installation costs, as well as the energy efficiency of the completed installation.

Having now obtained all the required information, the final process in this stage is to get something down onto paper. This can be just a simple layout sketch or a full architect drawing, but either way it should include the location of light fittings and their specification, switching arrangements and/or lighting control method. Add the location of the power supply and any control equipment for the operation of the lighting. Whilst this might seem a lengthy process, it will clarify the requirements of the installation, making sure the completed solution matches the proposed design.

Evaluation

Having completed work on the proposed solution, it is now time to evaluate the design prior to installation and to verify that it meets the specification. This can be done in many ways, from looking at a layout sketch or drawing to viewing created visual illustrations and/or images which show the completed visual effects. Next, consider whether the equipment and installation costs fall within the budget and if the operating and maintenance costs meet the customer's approval. Consider the appropriateness of the solution, the viability of the lighting installation and whether the lighting installation offers the benefits of increased safe access, increased security, resistance to weather and mechanical damage, as well as increased aesthetic appeal.

If this is the optimum solution, then its looks like you have nailed it!!



Dos and Don'ts

Before actually creating the ultimate lighting installation in the garden, it is worth bearing in mind a few words of caution, which will hopefully allow the installed lighting to offer an aesthetically pleasing and energy efficient solution without exceeding the budget.

- Paint a picture in your mind of the lighting proposal you wish to install, by viewing the garden environment in its entirety, rather than just considering individual or local features on a one-by-one basis.
- You can illuminate virtually anything in the garden, from architectural features, decking, trees and planting to ponds or fountains, pergolas, patios or paths, etc. But just because you can illuminate almost anything, that doesn't mean you should.
- You have probably heard this saying many times before, but for garden lighting, less is definitely more! Shadows can provide a feeling of mystery and offer subtle rather than excessive illumination, which can look very artificial. Remember it's not Hampden Park or Wembley Stadium, it is a residential garden you are lighting.
- Try to conceal the luminaires wherever possible. It is the light produced by the luminaire, which is to be seen, rather than the fitting itself.
- Design many differing effects into the garden scene by throwing light onto walls, reflections





across ponds, and creating silhouettes, etc.

- It is important to create a different look to the garden scene by night to that which will be seen by day, as this can offer two differing solutions. This can be achieved by highlighting individual features with artificial light, which would not normally be seen or provide a feature during the day.
- Vary the light distribution beam angles and the light source wattage to create a precise effect. A lower wattage with a narrow beam angle could produce a greater effect by way of a controlled light pattern, rather than a higher wattage fitting with a wider beam angle, which may just give that floodlit effect.
- Colour is critical in a garden lighting project, so utilise colour to create that optimum illuminating effect. But be careful not to exceed what is considered a lighting effect, as that could make the area look too artificial, more like your local fairground.
- Remember to use quality equipment wherever possible on all external lighting projects. This will help to prevent issues with corrosion, water ingress or short light source life, which may result in product failure just when they are required to illuminate the garden scene.
- Avoid glare at all costs and do not dazzle users in the garden. This can be achieved by angling light away from the lines of sight by reflecting it off other features. However, where this is not possible, consider a controlled beam type fitting or use the garden foliage to help control the glare.
- The positioning of inground or ground based lighting equipment in walkway and transit areas is important so that they do not cause a trip hazard with users.

- The intended location of lighting equipment in planted areas is critical - you are providing an installation not just for now, but for future years. Do not position fittings near fast growing plants or shrubs as these may have grown during the winter months, removing the light effect created by the original design.
- It is important to note that some larger light source fittings can create excessive heat during long periods of operation. Take care when positioning luminaires, particularly at low level, so people using the space, particularly children, do not come into direct contact with them.



Lighting effects within the garden scene

Providing illumination to any space requires the installer, in conjunction with the client, to consider how to implement a selection of lighting effects within the garden scene which, when installed, meet the scope of the lighting design created and agreed. Some flexibility may be required in the use of different aspects of the lighting effects and, in darkness, a small amount of light can often appear particularly bright against a dark unlit background.

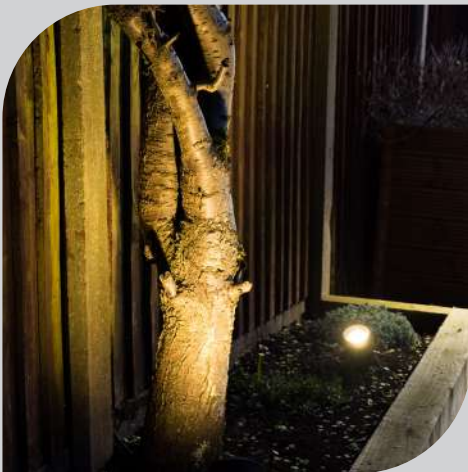
Different lighting effects offer several possible solutions for the garden and their use is considered project specific, with no 'one solution fits all' type scenario. This non-exhaustive list of lighting effects offers several possible solutions which work well in gardens.





Down-Lighting

This is simply using lighting fittings to provide illumination in a downward direction from a building or other structure within the garden to project light onto a surface or feature positioned below. This form of lighting tends to be used for general ambient illumination within selected areas, or to provide illumination for safe access and/or security, as well as to offer contrast to other forms of feature lighting.



Up-Lighting

Providing up-lighting from below is considered one of the most common techniques for illuminating features within the garden environment, as it has the ability to create dramatic effects which can reverse the perspective given by light from above.



Wall-Washing

Another form of feature lighting for building or structure is from downward facing luminaires positioned adjacent to a wall or structure. These provide illumination onto the vertical surfaces to facilitate definition to the structure and create an atmosphere for the surrounding space. The resultant effect can be varied by the fitting type and distance between fittings, their beam angle and intensity, or whether the light produced is continuous (such as in LED Strip) in an attempt to offer even and uniform coverage of the structure being illuminated. Non-continuous type luminaires placed on the structure, directing light downwards, will create a scalloped effect across a flat surface, whereas luminaires positioned away from the structure can have the light directed and tilted towards the feature to be illuminated.



Floodlighting

This is area lighting on a large scale, where the lighting is designed to illuminate a specified target area from a single or multiple position to replicate the appearance of daylight. For any application, floodlighting generally requires height, however, in the residential garden application this may not always be possible and, if mounted at low level, the lighting produced may cause unwanted glare. It is also likely that there will be some difficulty in retaining the light within the boundaries of the garden, resulting in spill light trespassing into the surrounding neighbours' properties - a situation which could cause confrontation.



Accent Lighting

This is a very common form of illumination, installed in many types of applications, both internally and externally, using directional lighting to display individual features or focal points. This illumination is installed so that a feature within the garden scene will stand out from the lesser illuminated surrounding area. Accent lighting can be undertaken with many different types of luminaires, whether they are positioned at ground level or mounted onto a structure at a much higher level.



Ground Lighting

This is lighting placed at low level, usually recessed into the floor, which is designed to provide ground coverage illumination only. The installed luminaires have covers or shields to prevent skyward illumination and may offer lighting in NSEW segments, with either one, two, three or four providing illumination. This type of luminaire will provide glare-free ground coverage illumination for areas such as pathways through the garden and is ideal for achieving safe access.



Grazing

This is an effect created by providing illumination at an acute angle from a fitting position, which is close to the surface being illuminated. This illumination can be used to emphasise a structure and, in doing so, can create strong shadows. The effects can be achieved with both ground-based up-lighting or with down-lighting, and the use of luminaires which utilise differing beam angles will help produce some dramatic effects.



Cross-Lighting

This is an ideal form of illumination, widely used when illuminating water features such as waterfalls. Luminaires are positioned to either side of the feature, so the lighting 'crosses over' from side to side, making the feature stand out from the surrounding area.



Mirroring

This is the effect of installing accent lighting on the far side of the feature and of a body of water, so the image of the feature being illuminated is produced on the body of water in the foreground.



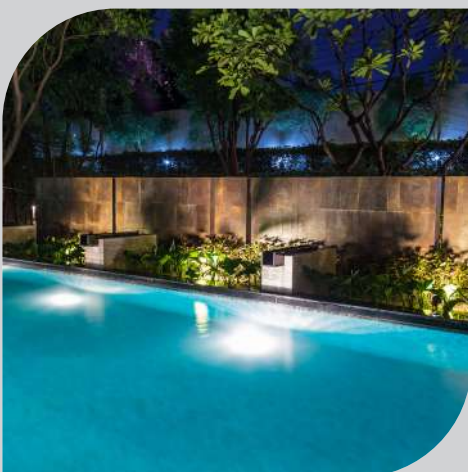
Spotlighting

This refers to the direct illumination of a feature, whereby a fitting with a narrow beam and increased intensity is placed at some distance away from the subject and directed towards it. The distance from the luminaire to the feature and the beam width of the lamps will determine the area of coverage and the amount of illumination projected onto the feature.



Moonlighting

This is the illumination of a tree or foliage where low powered lighting is used to create the effect of 'moonlighting' within the foliage, providing a subtle lighting effect.



Silhouetting

This is the effect of creating the silhouette of a feature by directly illuminating the surface behind it, such as a wall, a structure or a fence. This creates an illuminated background, which itself has no illumination placed upon it, and the item to be seen is shown as a silhouette in the foreground.

Step-Lighting



This is a functional lighting requirement to ensure steps between various levels of the garden can be climbed safely. This can be achieved by recessing fittings into the flanking walls on one or both sides of the steps, providing safe access as well as offering a lighting feature. For installations being proposed with lighting on both sides, and dependent upon the distance being illuminated, fittings may not need to be installed on every step on both sides. A staggered pattern may offer a solution which meets the specification, utilises less equipment and as a result is energy saving.

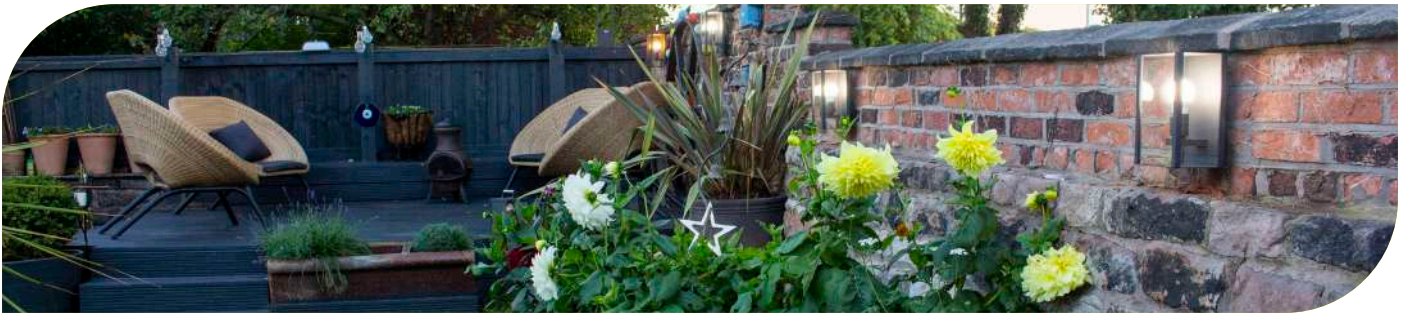


Shadowing

This is the projection of the outline of a feature onto the surface behind it, such as a wall. The luminaire is placed in front of the feature, either directly or angled, to produce an illuminating shadowing effect on the selected surface on the far side of that being directly illuminated - an ideal effect when providing a shadow onto a light coloured, textured or painted wall.

Illuminating Constructed Features

Having carried out a process of surveying the site, designing the lighting, evaluating the project solution, and considering the different lighting effects it is possible to create, you are now at the point where all that knowledge can be turned into action. Included here is the detail which evaluates the illumination of the different features within the whole garden scene and offers some sample solutions.



Building Features

The illumination of modern building exteriors today has changed from a time, not that long ago, when floodlighting simply involved the installation of powerful floodlights positioned around a building at height, washing down the walls and along the surrounding area or, alternatively, at floor level projecting uncontrolled illumination onto the building to create a flat surface impression. These solutions tended to result in the light going everywhere, mainly due to a combination of poor positioning and the lack of adequate beam control within the fittings. It also wasted energy unnecessarily for the homeowner.



Thankfully, this outdated solution of illumination is no longer being designed into lighting projects. In contrast, modern lighting solutions take account of the three-dimensional aspects of the building, such as the roof line, any installed columns, cornices, door and window recesses, as well as detailing any feature brickwork. A modern, well-designed exterior lighting installation can intensify the true character of the building and enhance its aesthetic appeal.

However, before embarking on the illumination of the building exterior, several points should be considered. Start by reflecting on the character of the structure, as well as the construction material used, in conjunction with the structural detail of any features. Next, consider its use and, in the case of a domestic residential dwelling, do not look to illuminate the whole building, but light the outstanding features to create the effect between light and shadow. By designing in this way, any features can be accentuated, any flatness caused by the illumination removed, and it will be much more energy efficient than just floodlighting.

The types of equipment and their position within the installation is extremely important to the overall effect, as unsightly luminaires would detract from the aesthetic appeal of the building during daylight hours, when the luminaires are not in use. To this end, it may be pertinent to use a larger number of smaller sized luminaires, positioned along a building to enhance the architectural features, as this reduces the physical size of the equipment installed. With the innovation and development of LED light sources, together with the many and varied types of lighting equipment available, unobtrusive solutions are much easier to achieve.

Pergolas

Pergolas in gardens can either be lit from the ground upwards using recessed in-ground fittings or illuminated downwards with fittings mounted on the structure itself. Using up-lighting can create an aesthetically pleasing effect, with no fitting visible, however, consideration should be given to the presence of glare, which may present an issue with the design. A glare shield or a frosted lens may help alleviate this problem, though any addition to the fitting which is above ground level could result in a trip hazard, and as such may not be a viable solution. As an alternative, downlighting or up-lighting/downlighting fixed to the structure may provide the favoured option as glare would be less of a problem to garden users. It may also allow several differing types of luminaires to be installed with which to create the right effect.



Steps

Lighting steps for safe access is an obvious requirement, but functionality can be coupled with aesthetic appearance if the lighting to be installed is subtle. Cross-lighting from the flanking step walls is one of the best techniques. Using wall positioned LED fittings at low level, to project a beam of light across the steps from either one side, or both sides if the steps are fairly wide, can provide the desired effect. Positioning lighting from both sides on alternate steps is another potential solution. Luminaires can either be recessed or surface mounted, however, for surface mounting, consider the physical size so as not to present a trip hazard to users.





Paths

In some ways, this has a similar requirement to steps, in that lighting is predominantly offered to provide safe access. Where side walls exist, cross-lighting from either side offers a suitable effect providing the light is subtle. As an alternative, many users prefer up-lighting, with fittings placed on either side of the path, either opposite or positioned diagonally apart. However, check the physical size and bezel depth above ground level so as not to present a trip hazard to users. Consideration should also be taken regarding glare, which may present issues with this type of solution. Another possible option is to utilise low height architectural bollard lighting which, if directional and well positioned, can control the illumination to the pathway areas only. Care should be taken not to position lighting equipment in close proximity to fast growing plants and shrubs, as any lighting may be lost in future years as the garden develops.

For more open areas of the garden where paths exist and where there is a lack of flanking walls or structures, or where equipment above ground level may be obstructive, the installation of ground recessed LED marker lights could provide illumination along the line of the pathway. Alternatively, utilise recessed inground lighting, which features a controlled light pattern by way of a stainless-steel cover providing ground illumination in either a two, three or four segment arrangement.

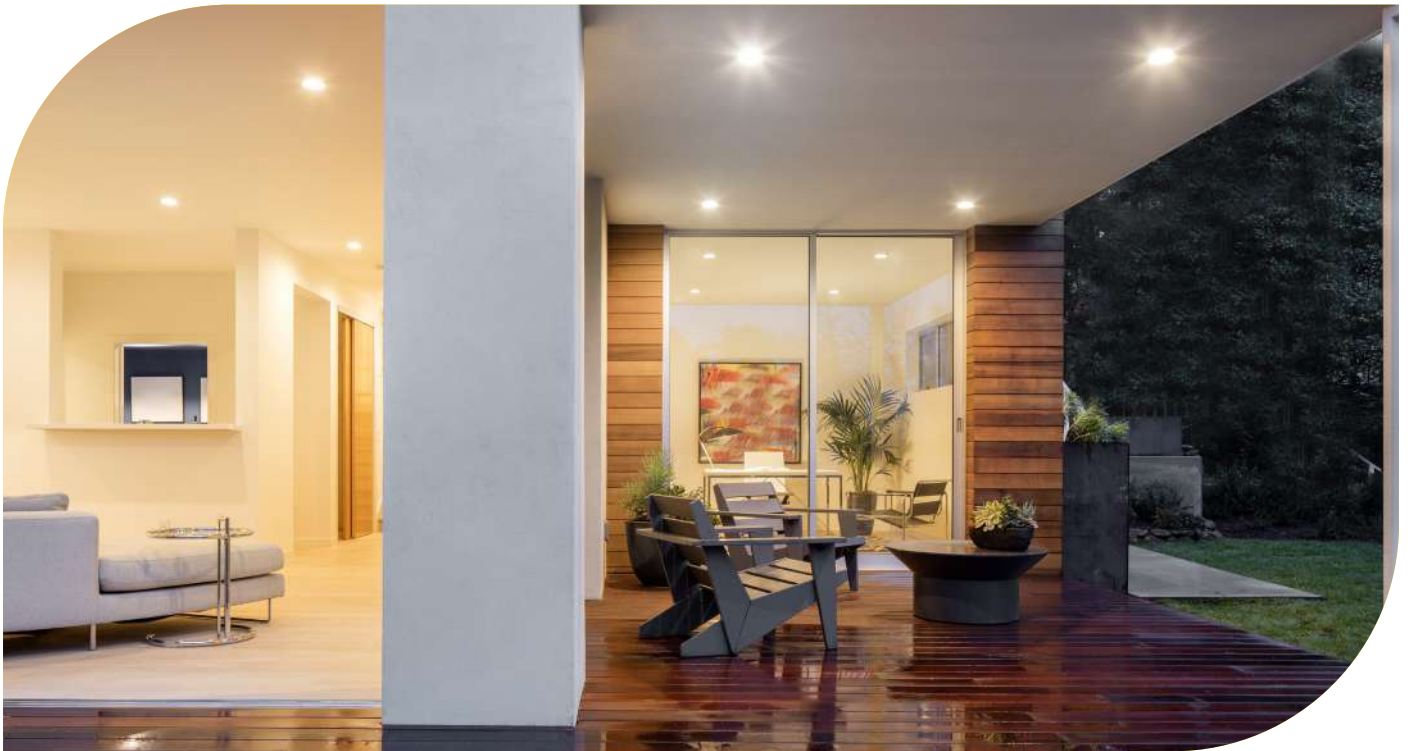
Vehicle Driveways

Lighting the vehicle driveway can be a question of compromise, as lighting equipment is highly visual during daylight hours. In many cases, the preference is to provide good lighting without seeing the luminaires. Available options include using ground recessed uplighters, however, verify that the maximum static loading of any equipment exceeds that of the vehicle weight. Also, installation should only be where the fitting can be made secure. Bollard lighting offers an alternative solution as long as the position of bollards will not impact on safe vehicle access. Also consider whether, if positioned within open areas, they might provide good, controlled illumination at night, but detract from the aesthetic effect of the garden during daylight hours. Bollards do, however, offer an ideal solution along the side of driveways, adjacent to a fence or wall where their appearance can provide beneficial impact without detracting from the garden scene.

For smaller driveway scenarios, recessed inground lighting which features a controlled light pattern by way of a stainless-steel cover, providing ground illumination in either a two, three or four segment arrangement, may offer an ideal solution. But this type of fitting requires installation outside of the area used for vehicular access, as the maximum static load of the fitting would not accept impact by a vehicle.

As with any recessed inground lighting, it is important to consider the ingress protection of the equipment, and that the installation must be carried out to retain the level of protection provided by the manufacturer. Also consider the location, as inground fittings have a bezel which is above the finished ground level and, if poorly positioned, may cause a possible hazard to vehicles and pedestrians.





Patios

This is certainly a large topic area to discuss, as the combination of lighting effects is infinite, so here are just a few of the numerous options available to the designer.

Downlighting from wall mounted luminaires can offer an effective way of lighting both the areas around the building, such as a pathway, and that of the patio(s) adjacent to the building. If well positioned and suitable orientated, they will also help provide the 'grazing' effect to illuminate the wall area below the lighting position. Another option is to install ingress protected downlights into the eaves, which again may provide both wall illumination and spill light onto an adjacent patio area.

If the patio area has a provided structure, an alternative solution may be to install suitable luminaires onto the timber posts or brick/stone columns, in the form of either downlighting or spotlighting effect. Using a fitting with either frosted or opaque lens will soften the lighting and prevent glare. Up-lighting of the column features may also offer a solution, however, as with any upward lighting, glare should be considered.

Another option involves placing freestanding luminaires or bollards around the perimeter, but again consider glare and utilise fittings which have a downward facing louvre, a hood or controlled beam pattern, to prevent illumination on the vertical plane. Importantly, remember that in many cases users will be seated rather than standing, and the level of eye height will be that much lower, at around 1200mm above floor level, which is significantly lower than when standing.

Finally, if there is a perimeter low level wall, recessed lighting could be installed to provide horizontal illumination across the floor. Again, these, may require downward facing louvres, shields or an opaque lens, to create an illumination pattern on the horizontal plane at floor level without causing any issues with glare.

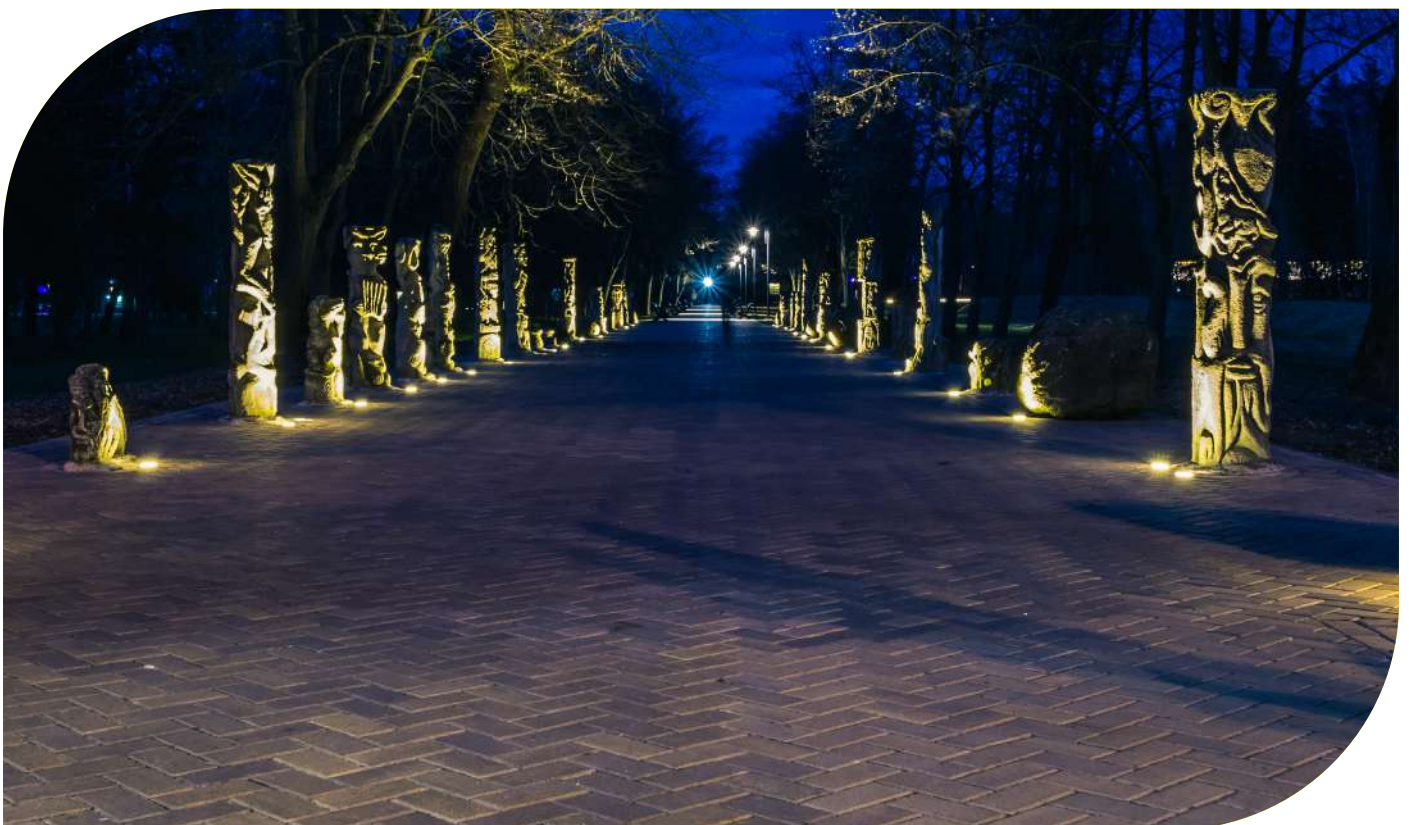
Statues

The primary consideration of lighting statues is to achieve a natural appearance. A statue or sculpture may be either traditional or abstract and may be intended for viewing either from within a restricted angle or from all sides. Artificial lighting at night offers an exciting opportunity to create an alternative perception to that of daylight, and three basic methods can be suggested to illuminate statues and sculptures - spotlighting from above, spotlighting from below and close offset highlighting.

Spotlighting from above is used where features are intended for frontal viewing. Structures can be lit from within the forward hemisphere using lighting fittings with a symmetrical beam pattern, which are located some distance away and at a height greater than the statue being lit. The ideal angle is 45 degrees to the side and 45 degrees up from the horizontal. A natural modelling effect will be created if the focus of illuminance is supplemented and balanced with that of ambient light which, having around 10% of the intensity of the focus light, will enhance the illuminated scene and soften the shadows.

Spotlighting from below offers a useful alternative, where the luminaires are set into the ground, providing a flush finish. These should be positioned so the light hits the feature at the optimum angle of between 45 and 60 degrees. This method is the opposite of natural lighting, with the light coming from below. If installed well, it can provide stunning effects, however, care should be taken so as not to create a grotesque effect. In-ground lighting can present glare issues, another consideration with this form of illumination.

Close offset highlighting may be appropriate. Use small discreet luminaires on a plinth or elsewhere within the structure to illuminate the structure from the inside. But consider the physical size and wattage of any luminaires, as it is the illumination, which is the focus, not the equipment.



Illuminating Natural Features

Planting

Colour considerations are a significant factor in determining the light source to be used in lighting flower beds and shrubs. The uniformity of any lighting is not massively important if there is a graduation from bright light to darkness in order to benefit the installed appearance. During the varying seasons of the year, foliage and flowers will change from being less dense in winter to being much denser in the summer, and the lighting may appear less bright in the summer months than in the winter months because of this thicker foliage. Darker foliage tends to be less reflective than lighter foliage so additional lighting may be required to create the desired effect. The use of downward and upward lighting using spotlights may provide what is required.

Spotlighting from structures in the locality of planting areas may offer illumination without unwanted sight of the luminaire. Alternatively, the use of small spotlights mounted within the foliage either at ground level or mounted onto small posts, but out of direct sight of users, may provide the required effects of illumination.

Plants with large leaf shapes provide opportunities to project shadows through the planting area or onto adjacent surfaces to make a striking feature. Cross-lighting within shrubs and borders, rather than frontal based lighting, is another option. Positioning the fitting at an appropriate oblique angle to provide an oval beam pattern will increase the area of coverage, but at a lower average level of illumination.

The colour characteristics of plants, flowers and foliage mean that a white light source is generally selected, but with LED as the light source the opportunity to use colour within the illuminated scene can provide superb effects. Select colours, if used, carefully as it is a garden lighting scene not a theme park.

Trees

The most common way of providing illumination to trees is by up-lighting, however, for the purposes of illumination, there are three basic groups of trees to consider, identified by the following basic characteristics:

Open Trees are those whose main character comes from the structure of their branches. These types of tree can form a tracery effect, which is best seen when in sharp focus. The types of tree which fall into this category are deciduous trees such as birch and ash.

Solid Trees have a more complete canopy or crown which has dense foliage. The outer silhouette can be quite interesting and offers a good backdrop for illumination. This type includes most conifers, beech, chestnut, elm and many large trees in summer foliage.

Transparent trees are those which, at certain times during the year, have leaves which become transparent and, if lit from behind, can glow with colour. These include many deciduous trees, especially lime in the spring, some other deciduous trees in the autumn and even horse chestnut, which is normally very opaque. During the hours of daylight, these trees are normally seen as dark objects



against a bright background, whereas this can be reversed during the hours of darkness, with bright trees being illuminated against a dark background.

Generally, the lighting of trees can be achieved by using three basic methods.

Up-lighting from beneath, which is achieved by mounting luminaires at ground level, either ground recessed or ground mounted, near to the tree trunk. This technique best suits large and rounded trees with an open foliage, such as a weeping willow. Symmetrical or asymmetrical lighting can be used, either sunk into the ground or discreetly installed and camouflaged from view. Care needs to be taken so that the beam angle is wide enough to cover the foliage, without being so wide that skyglow or glare is caused.

Up-lighting internally within the structure, where small, well screened luminaires are attached to the upper trunk of the tree or to its main branches, it is critically important that any bands used to secure lighting equipment do not restrict the natural growth of the tree. Another option is to install a festoon cable or LED Strip, which is attached to the branches and follows their path.

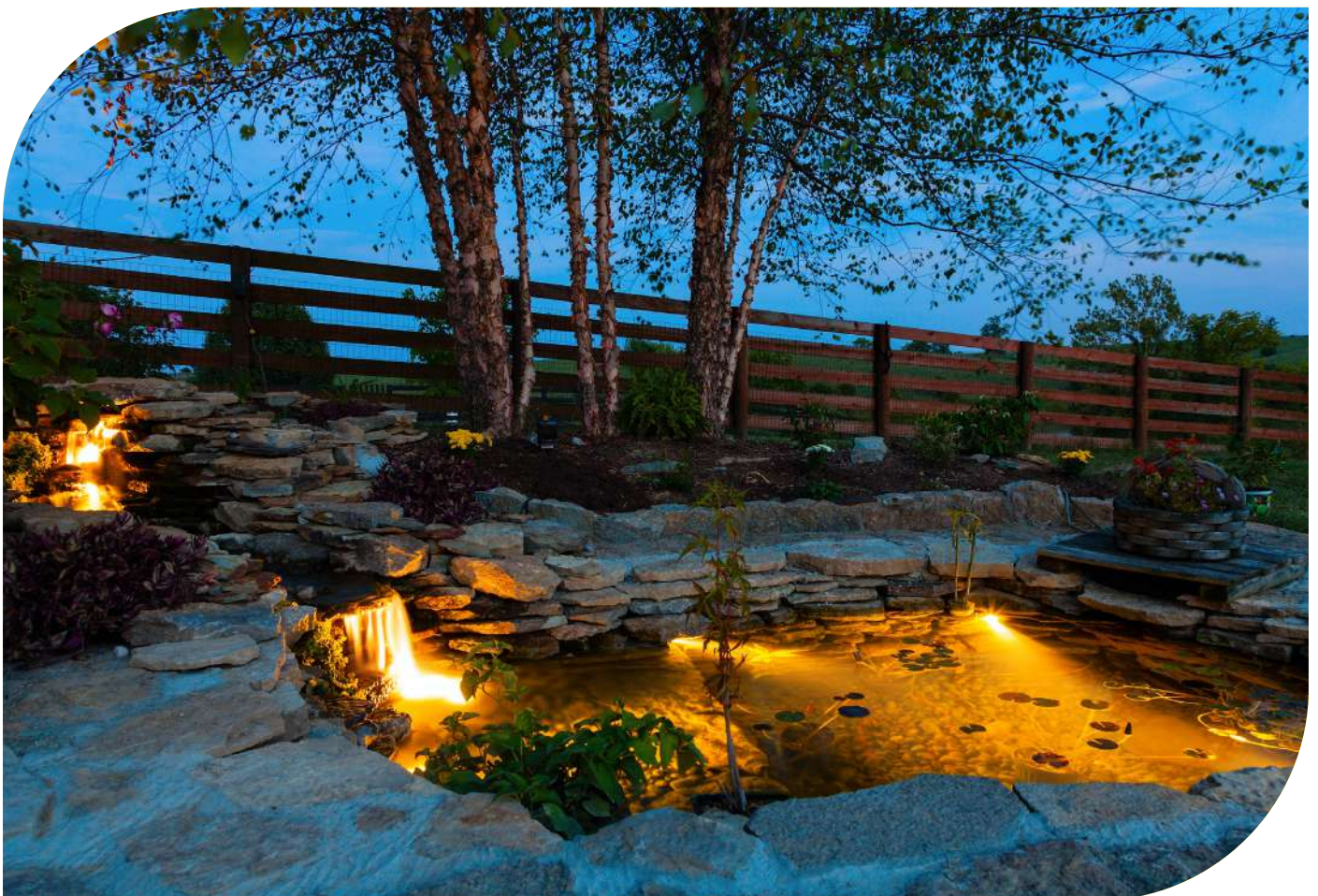
Frontal floodlighting, which is normally suitable for tall, narrow trees and those with a dense foliage, involved the installation of restricted beam symmetrical or asymmetrical floodlights, which can be mounted well away from the tree being illuminated. This form of lighting is especially effective where there are only one or two principal directions of view and the tree is seen against a dark background. Additional depth can be created by directing light from the sides, avoiding a flat appearance from the principal position of view.

WATER FEATURES:

The illumination of water can be a very attractive element to the landscape and the inclusion of a water feature within the garden will generally create a sense of tranquillity. Still water is the perfect medium for the reflection of a floodlit building, sculptures or trees. Fountains and cascades sparkle and glitter when suitably illuminated, whilst distorted reflections of light from moving water create interest on the surrounding surfaces.

The illumination of vertical jets of water is often from below using submersible lighting, either small type floodlights or LED Strip, installed so that the luminaire is positioned within the jet stream. However, in doing so, beam angles are critical to create the optimum effect within the vertical jets or waterfalls. Illuminating water sprays by installing symmetrical beam floodlights can offer a solution but is dependent upon the distance of water projection. To create the right effect this may require illumination at both ends of the trajectory. Submersible LED floodlights or LED Strip positioned near a bank or within a water feature will provide reflections in the water and create a stunning effect.

For ornamental ponds or a swimming pool (if you are lucky enough to have one), submersible lighting provides the optimum solution, being generally installed some distance below the surface. For ornamental ponds, the installation of small spotlights or IP rated LED Strip offers an ideal solution, but for swimming pools the lighting equipment tends to be from a specialist company and is generally installed during construction.





CONNECTED LIGHTING:

What used to be referred to as lighting control was, in the main, limited to an increase or decrease of illuminance, either for fittings individually, in groups or the complete installation. Development in the technology has created the opportunity to install a completely connected lighting installation. This offers infinite control in the creation of lighting scenes throughout the garden areas, and can potentially change the lighting effects being created, making the garden scene a unique illuminated environment.

The variety of LED lighting equipment available to clients is massive and allows significant variation in the illumination of materials such as sandstone, brick, granite, marble and steel, all of which can all be aesthetically and effectively lit. The opportunity to add coloured light sources, either single colour or RGB, can further enhance the creation of unique and optimum solutions. This small LED light source has allowed for a greater range of available luminaires in a more compact size, so they do not detract from the aesthetic appeal of the garden scene during daylight hours when the luminaires will be in view.

The Ansell OCTO system offers smart lighting solutions, using light to transform efficiency and ambience of commercial and residential spaces. The OCTO solution is an easy to use wirelessly controllable system which gives complete control of the luminaries via an intuitive app or smart accessories. Utilising both Casambi and WiZ Connected technology OCTO delivers the complete smart lighting package and has a comprehensive range of features that interact flawlessly with a smart device. This offers the optimum solution for residential exterior applications.

OCTO WiZ Connected is ideal for illuminating garden features and creating outdoor ambience. Luminaires can be dimmed via the WiZ app and you can take advantage of millions of colours and 64,000 shades of white. Schedules can be set to save energy and for different times of day. It's also compatible with voice control devices such as Hey Google and Amazon Alexa (Wi-Fi range must be considered)

There is also the OCTO powered by Casambi solution Utilising Casambi technology, This offers an alternative solution for residential applications, it automatically forms a fast-wireless mesh network which allows the homeowner to have complete control of their garden lighting and the ability to create and vary scenes from their mobile phone.

The gallery feature makes control more intuitive than ever - users simply tap the one(s) they want to control. The homeowner can switch fittings on and off, dim or change the colour temperature (where installed), set groups and set schedules for lighting scenes to create the perfect ambience for the different occasions and needs. And with the calendar and timer functionality, scenes and animations can be turned on and off at a convenient time and date to suit a user's needs.

The OCTO lighting app is loaded with lots of helpful content to ensure the homeowner gets the most from the connected lighting solution, and with videos, helpful guides and inspiration it becomes the perfect tool to assist in the set up and control of the OCTO system.



Conclusion

In concluding this 'White Paper' on residential garden lighting, I wish to impart some final comments relating to the intervention of electric lighting within the modern world. It is well known that since the introduction of the incandescent lamp during the 19th century, electric lighting has done much to improve and enhance the surroundings in which we live, work and have recreation, and in providing our security and safety requirements, as well as safeguarding the environment in which we live. However, if the lighting solution is not well designed and executed with suitable controllability, then unwanted obstructive light, (light that impedes your view of the night sky or travels into your space) could result in light trespass (the spilling of light beyond the boundary of the property in which the light source is located) or in light pollution.

As with all external lighting installations, residential garden lighting must be a combination of achieving a balanced approach in a quantitative and qualitative installation, which is aesthetically pleasing and offers visual impact of the illuminated scene, without causing an adverse effect on the local environment by way of light trespass into surrounding properties, skyglow, or in the excessive use of energy.

The very last piece of advice I can offer is 'Do not over-light!' as this not only causes a nuisance to others, wastes energy and therefore increases operating costs, but also, most importantly, it helps to destroy the earth's energy resources, resulting in unnecessary emissions and green-house gases.

Notes

NOTE-1: *A specialist tree conservation person should be consulted prior to fixing any form of lighting equipment directly onto any trees or bushes.*

NOTE-2: *All submersible and water feature lighting must be totally sealed to the relevant Ingress Protection Rating (IP) and be suitable for the type of environment into which it is being installed. It is to be installed with extreme care and should only be undertaken by a qualified and approved electrical contractor.*

NOTE-3: *The installation of ground recessed lighting should only be undertaken by a qualified or approved electrical contractor, as care is required to maintain the sealed integrity of the fitting when installed. Poor installation can result in water ingress through the bottom of the fitting or cable access point by way of capillary action, allowing water ingress to cause possible failure of the equipment, especially where the base of the fitting is constantly in water.*

NOTE-4: *All lighting and electrical equipment which is installed externally MUST be adequately ingress protected and deemed suitable for use in the outdoor environment into which it is to be used and it is to be installed by a qualified or approved electrical contractor in compliance of the current IEE Wiring Regulations (BS7671-18th Edition). Under normal operating conditions, lighting fittings can become hot, so equipment must not be fixed onto, or adjacent to, flammable surfaces. Precautions must be taken into the positioning of luminaires, particularly at low level, so as they will not encounter the users of the space, and this is especially important where children use the garden.*



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