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Structural beauty: The role of hardscaping elements in sustainable landscape architecture

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Abstract

This paper examines the complementary roles of hardscaping and soft-scaping in landscape architecture highlighting their definitions, functions, material choices and impacts on outdoor environments hardscaping refers to non-living, man-made elements such as pathways, patios, walls, fences and garden furniture which provide structure, durability and ease of maintenance to outdoor spaces these features when integrated thoughtfully and constructed with high-quality materials enhance visual appeal, usability and long-term sustainability while also supporting efficient cleaning and reduced maintenance costs hardscape features such as different pathways, garden drives, arches, pergolas, fire pits, patios, seating units, garden walls, steps, pavilions, bandstands, gates and fences as well as innovative elements like moss graffiti each component is discussed in terms of its design, materials, function and contribution to the overall landscape gardening.

Keywords: Hardscaping, soft-scaping, walkways, pergolas, fences

Introduction

Hard landscape refers to all the non-living outdoor features like bricks, paving slabs, wooden fences, metal railings and other man-made structures (Blake, 2015) ^[4] which greatly enhance visual appeal, durability and ease of upkeep. They are often considered only in the final design stages rather than being prioritized in public urban spaces. It is important to emphasize these elements, especially hard-surfaced floors and street furniture with core principles of aligning materials and layout with the design to plan fulfillment of intended functions like social, structural and practical to ensure easy cleaning, maintenance and replacement. According to the design durability of garden ornaments use high-quality, long-lasting materials even if initially pricier they upfront save money over time by reducing upkeep (Carmona & Punter, 2013) ^[6]. Soft-scaping is the integration of living elements like soil, plants, and trees into landscape design to create natural, aesthetically pleasing environments

Advantages

- Hardscape elements like pathways and walls help organize outdoor areas, making them easier to use and navigate.
- Features such as patios, benches and lighting create places for people to sit, walk and gather making outdoor spaces more useful.
- Hardscaping materials (like stone, concrete or brick) are long-lasting and require less frequent replacement than plants.
- Hardscape areas usually need less care and water than lawns or flower beds.

Aspect	Hardscaping	Soft-scaping
Definition	Man-made elements and non living components (Real <i>et al.</i> , 2000) ^[23] .	Use of planting material and other organic elements which gives natural look.
Examples	Pathways, patios, walls, fences, chairs, pergolas, stones	Green wall, grass, (Rashid & Al Junid, 2014) ^[21] trees, (Ramesh, 2016) ^[19] shrubs, flowers, ground covers
Primary Function	Structure, improve air circulation, and durability.	Aesthetics, improve microclimate, environmental benefits, comfort and biodiversity.
Material Types	Concrete, stone, brick, metal, wood, gravel.	Plants, turf, mulch (susca <i>et al.</i> , 2011) ^[29]
Design	Durability, maintenance, cost, context compatibility.	Plant selection, sustainability, climate, maintenance and design quality.
Environmental Role	Can mitigate heat (high-albedo materials)	Improves air quality, reduces heat, supports wildlife.
Maintenance	Lower	Higher
Aesthetic Impact	Provides structure, order and defines spaces.	Adds colour, texture, seasonal interest and softness.
Sustainability	Depends on the material choice and permeability.	Enhanced by using native plants and efficient irrigation.

Disadvantages

- Too much hardscaping can make spaces look less green and natural reducing their visual and environmental appeal.
- Some hardscape materials like dark concrete or asphalt can absorb heat making outdoor spaces hotter.
- Hardscape areas don't provide the same air cleaning, cooling or wildlife habitat benefits as plants and trees.
- Hard surfaces don't absorb rainwater which can lead to more runoff and possible flooding.
- Installing hardscape features can be expensive at first even if they last a long time (Tousi, 2024) ^[31].
- Hardscaping involves various pathways, garden drives, arches, pergolas, fire pit, patio, moss graffiti (green graffiti), sitting units, garden wall, garden steps, garden pavilion, bandstands, garden gates, garden fence *etc.*

1. Pathways: A pathway is a route or track that people use to walk from one place to another usually outdoor pathways are often made from materials like gravel, stone, concrete or pavers are designed to guide people safely and comfortably through the garden.

Different types of pathways

1. Gravel paths

A gravel pathway is a type of pedestrian route commonly found in parks and urban open spaces. Constructed by laying a layer of small loose stones or gravel over a prepared base gravel pathways which offer a stable permeable and cost effective walking surface. It supports recreational and utilitarian walking. These pathways are valued for their natural appearance, ability to blend with landscaped environments and their role in encouraging physical activity and comfortable routes for park users of all ages including senior citizens (Zhai & Baran, 2016) ^[35]. Walking is one of the easiest and most popular forms of exercise for people of all ages (Siegel *et al.*, 1995) ^[28]. It helps reduce chronic diseases and boosts social confidence (Lee & Buchner, 2008 & Eyler *et al.*, 2003) ^[13, 8].



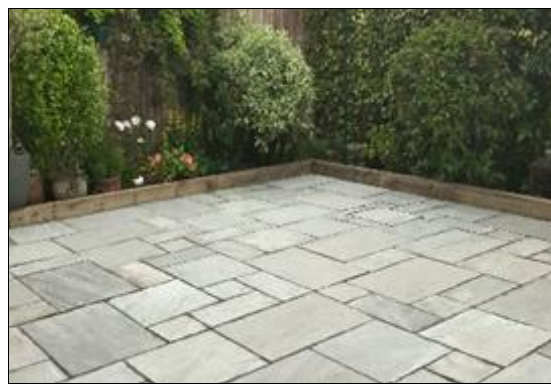
2. Brick pathway

A brick pathway is a constructed walkway or surface made by arranging bricks typically rectangular or square blocks of fired clay, concrete or alternative materials on a prepared base to create a durable, stable and visually appealing route for pedestrian movement these pathways are designed for outdoor use connecting spaces such as gardens, entrances, patios or public areas. These pathways are valued for their durability, aesthetic appeal and ability to guide movement through outdoor spaces (Almssad *et al.*, 2022) ^[1].



3. Stone paving

Japanese gardens a stone pathway is typically used with stepping stones set into gravel to create a naturally beautiful and practical walking surface. These stones are often irregular in size and shape mimicking natural stones and blending with the garden's landscape. The stones are usually set just below or slightly above ground level making them easy to walk on. The height of the stones above ground is usually about 3-6 cm based on historical garden master's preferences in Japanese gardens. Granite is a common material for these stones but other stones like slate or flint are also used (Buckeridge, 2006) ^[5].



4. Crazy Paving

Crazy paving is a style of paving where irregularly shaped pieces of stone, concrete or other materials are fitted together like a jigsaw puzzle to create a path, patio or terrace unlike traditional paving which uses uniform, straight-edged tiles or bricks, crazy paving uses pieces of different shapes and sizes resulting in a natural informal and often rustic appearance. This method mimics the random patterns found in nature making it popular in gardens designed to blend with the natural landscape (Low, 1991) ^[15].



2. Garden drives

A garden drive refers to a driveway designed as an integral part of the landscape where the functional path for vehicles is combined with thoughtful garden elements to enhance both utility and aesthetics (Salomon, 2017) ^[24]. Materials commonly used for constructing garden drives include gravel, asphalt and concrete.



Different types of garden drives

1. Gravel driveway

A gravel driveway is a type of unpaved vehicular access route constructed using layers of loose, compacted aggregate materials such as crushed stone, gravel or other granular substances. Gravel driveways are commonly used in residential, rural and low-traffic settings due to their cost-effectiveness ease of

installation and ability to provide a stable surface for vehicles (Rashedi *et al.*, 2018) ^[22].



2. Asphalt or concrete drive

A concrete driveway is a solid paved surface designed for vehicle access and parking, constructed using poured concrete over a prepared subgrade. Traditional concrete driveways are impermeable and runoff is directed to drainage systems or surrounding areas. Concrete driveways are valued for their durability, strength and long lifespan making them a common choice for residential and commercial properties (Cook, 2007) ^[7].



3. Arches

A garden arch is a curved or arched structure placed in a garden typically made from metal, wood or stone, designed to support climbing plants and create an ornamental passageway or focal point. It adds vertical interest to the landscape often marking entrances pathways or transitions between different garden areas and enhances the aesthetic appeal by allowing vines and flowers to grow over and around it (Harrison *et al.*, 1964) ^[12].



4. Pergola

A pergola is a long, narrow, linear outdoor structure featuring vertical pillars or posts that support a framework of flat crossbeams and an open lattice. This open framework is often adorned with climbing plants or vines creating a shaded walkway, passageway or sitting area. Pergolas may extend from a building, connect two buildings or stand alone to shelter. A terrace or path they can also lead from a doorway to a garden feature (Hansen, 2010) ^[11]. Pergolas are usually long and narrow with various lengths of walkways. The pergola may cover various types of flooring such as flagstones, sand or even grass and can be bordered by pathways (Shibles & Yasalonis, 2007) ^[26].



5. Fire pit

A fire pit is a designated space or structure typically located at the centre of a dwelling or communal area designed to safely contain and maintain a fire for heating, cooking, social, or ritual gatherings. (Teppati Lose & Rinaudo, 2024) ^[14] Usually round, made from durable materials such as stainless steel and may include features like removable handles, legs for elevation and a fitted lid (Arabi, 2024) ^[3].



6. Patio

A patio is an outdoor space that is directly connected to a house,

often serving as a multifunctional area for various daily activities. These spaces are frequently used for gardening, relaxation and reflecting different indigenous cultural influences of the city's patios. It plays a crucial role in urban green space, comprising more than 85% of the city's total private green areas and frequently features a mix of native and ornamental plants as well as multipurpose trees (Gonzalez-Garcia & Sal, 2008) ^[9].

7. Moss graffiti

Moss graffiti is a type of street art where artists use living moss to create words or pictures on walls and other surfaces in cities unlike regular graffiti. Moss graffiti is eco-friendly and doesn't damage buildings or the environment. It adds greenery to hard surfaces making urban spaces more beautiful and noticeable (Senturk & Altincekic, 2018) ^[25].



8. Sitting units

Garden seats are specially designed seating structures such as benches intended for use in gardens and outdoor public spaces. They are constructed from durable materials like iron, wood, concrete or fiberglass to withstand outdoor conditions and frequent use (Almandrawy, 2016) ^[2]. According to (Mexi & Tudora, 2012) ^[16], the ideal seating arrangements have following dimensions like seat height above the ground: 0.45 meters, backrest height: 0.27 meters, seat width (depth): 0.45 meters, angle between seat and backrest: 110-120°, angle between seat and ground: 0-30°, length per person: 0.6 meters (60 cm), typical length for 3 persons: 2 meters (200 cm).



9. Garden wall

A garden wall is a freestanding or retaining structure built from stacked stones or masonry materials designed to define spaces create boundaries or support the soil in landscaped areas. These walls are constructed by using specific techniques to ensure

stability and longevity, including proper foundation preparation, strategic stone placement and careful attention to the arrangement of joints between stones (Vivian, 2014) ^[34].



10. Garden steps

Steps can be made of various materials but usually the same material used for the path is also used for steps. The materials used are concrete, stone, wood or gravel. The gravel can be held in position with a stone retaining wall. The steps in the garden should be different than those in the building. Here the steps should be quite broad and the risers low, so that people can have an easier climb. A garden is meant for leisure, pleasure and comfort. Hence steep and narrow steps are unsuitable as they cause discomfort in climbing (Randhawa & Mukhopadhyay, 1986) ^[20].



11. Garden pavilion

A pavilion is a temporary or semi-permanent architectural structure often designed as a stand-alone building or shelter that serves as a platform for experimentation in architectural design, materials and spatial concepts. Pavilions are commonly used for exhibitions, events or as public gathering spaces and are characterized by their innovative use of new ideas, construction methods and materials (Tuncbilek, 2020) ^[32].



12. Bandstand

A bandstand is a covered, open-sided outdoor structure, typically situated in a park or garden setting designed as a platform for musical performances especially by bands or orchestras. (Swamy & Shankar, 2012) ^[30] Commonly found in public parks, recreation grounds and pleasure gardens, these structures provide shelter for performers and audiences during concerts, public gatherings and community events (Rabbitts, 2020) ^[18].



13. Garden gate

A garden gate is a physical entrance or barrier usually a small door or gate, placed at the edge of a garden or property. Mark the boundary between public and private spaces and control access for security and privacy. Symbolize protection, exclusivity and sometimes social status (Grant, 2005) ^[10].

14. Garden fence

A garden fence is a physical barrier or enclosure constructed around a garden or yard to define boundaries, provide security and control access. Garden fences serve multiple purposes including protecting plants from animals, enhancing privacy and contributing to the aesthetic appeal of outdoor spaces (Van der Ree *et al.*, 2015) ^[33].



Conclusion

People feel happier and healthier when they have access to natural spaces. Good landscaping helps connect people to nature even in busy cities as people's lifestyles and expectations have improved, they want outdoor spaces that are more comfortable,

attractive and sustainable. By applying hard landscape elements can become more useful, look better, helps to the environment, make people comfortable show respect for nature and select durable, reusable and recyclable materials such as stone that minimize resource consumption and environmental impact. Hardscaped outdoor spaces like patios or sitting areas provide a peaceful environment for relaxation, helping to lower stress and anxiety being able to enjoy a tidy, organized and attractive outdoor area can boost mood, enhance mindfulness and promote emotional well-being, gathering with family and friends, supporting social health. The study concludes that a balanced integration of hardscaping and soft-scaping is essential for creating outdoor spaces that are not only functional and durable but also beautiful, sustainable and supportive of social and emotional well-being. Well-designed landscapes connect people to nature, foster community and enhance quality of life in both urban and residential settings.

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