Plaza Design for Longevity and Maintainability

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In the urban landscape, a plaza is a valuable amenity that provides both respite from the frenzy of city life and creative opportunities for community use. Constantly exposed to the elements, plazas will eventually succumb to time and weather, requiring increasingly involved maintenance practices to keep the space safe and orderly.

Together, the design team, owners, and managers can place the principles of access, maintainability and lifespan at the forefront of the design process with the goal of creating an inviting, attractive, and resilient plaza space. With thorough evaluation of plaza programming and caretaking practices, the team can develop a design that enhances durability and promotes longevity by addressing sustainability, efficiency, and ease of maintenance. The long-term impact of materials, accessibility, structural capacity, and water management decisions will result in a plaza that is both aesthetically pleasing at installation and continues to perform with an enduring beauty for many years to come.

Rehabilitation and Upgrade Considerations

In preparation for a plaza rehabilitation project, the design team and client should evaluate the benefits and drawbacks of the existing plaza. Considering the following initial elements creates an opportunity to plan for improvements, enrich the design, and prepare for maintenance over the long term.

Historic / Landmark / Zoning Status

Determine if the plaza contributes to the historic quality of a place or context. Is the space recognized as...
a landmark by local, state, or national jurisdictions? Are there zoning regulations; for example, is the plaza a privately owned public space? These conditions require sensitivity in the case of potential restrictions for material selection and reconfiguration.

Users and Operating Hours
Identify the current users of the plaza and activities within the space. Is the plaza open and used year-round? Do the use patterns change with the seasons? Are there daily operating hour restrictions? Is the plaza open to the public or is access limited?

Layout
Interpret the existing arrangement of the plaza based on the identified use and function. Does the current configuration allow for the flow of pedestrian or vehicular traffic? How does the plaza relate to entrances, desire paths, and sightlines? Can the plaza accommodate specialized requirements, such as for electrical or audio-visual needs?

Landscape
Assess how the plaza and landscape complement each other. Are there existing landscape elements to preserve, such as mature trees? To what extent is shade and/or sunlight desirable? Is the landscape integral to diverting or filtering surface water? Are plantings drought-tolerant or native to the climate and location?

Maintenance
Establish who is responsible for maintenance of the plaza. Does dedicated staff take care of daily, weekly, or annual upkeep? How is debris and snow removal handled? Will the landscape require seasonal care and watering?

Performance, Access, and Longevity
Based on the initial evaluation, the design should also address the need to be accessible, durable both through install and maintenance, and functional over the long-term. Layout and construction decisions start with vetting material selection, assessing system performance, and designing for adequate drainage. Furthermore, to the greatest extent possible, and as mandated by regulations, barrier-free access to plaza areas and building entrances must be provided. Design decisions have lasting implications around plaza care and maintenance to sustain function and usability of the rehabilitated plaza.

Material and System Performance
Plazas are subjected to all types of exposure and must be durable as well as maintainable. From the setting bed and base to the finished surface, the selected materials will address functional needs while also contributing to the aesthetic spatial experience.

Determining the elements of the assembly combines an understanding of existing conditions and anticipated usage. At on-grade plazas, soil composition and susceptibility to frost heave may make foundations extending to the frost line desirable to resist the movement associated with freeze-thaw cycles. Typical plaza construction includes an aggregate base, often topped with concrete or asphalt and finished with a sand, bituminous, or mortar setting bed for pavers. Depending on the expected traffic types, the foundation and finish surface must be able to support the anticipated and building code-mandated loads. For plazas or terraces over occupied space, loading is an even more significant structural concern, in addition to integration with the building envelope system.

The finish surface, commonly stone, clay pavers, concrete, or asphalt, is both performance-based and aesthetic. The chosen material must be slip- and skid-resistant, based on the anticipated pedestrian and/or vehicular traffic. Furthermore, the coloration
and reflectivity of the paving surface will directly contribute to the heat island effect. Environmental conditions also contribute to material lifespan. Saline environments, including from deicing salts, can cause accelerated degradation of materials, and may result in efflorescence or staining. Snow removal blades or materials spread to provide traction can also chip the paving surface or cause excessive wearing. The joint size and system, including provisions for expansion and control joints, accommodates differential movement and finished surface continuity. Routine maintenance may degrade the joints, allowing pavers to easily displace. For example, sand-swept joints, while resilient and easily maintained, are less resistant to aggressive cleaning techniques, such as pressure washing. In areas with pedestrian or wheeled traffic, the bonding pattern should be oriented perpendicular to movement where possible, as large joints may result in stuck wheels or heels. Interlocking patterns, such as a herringbone, can also more effectively distribute loads.

In combination, the specific paving material and joint system can create both vibrant and subtle effects. From the consistency of a manufactured paver, to the nuance of variegated and multi-textured brick, to the striking veining of natural stones, the range of scales, sizes, and orientation of pavers can create an expansive set of styles to reflect the aesthetic context of the plaza.

### Accessibility

In conjunction with material and system selection challenges, the rehabilitation of existing plazas creates an opportunity for greater access, usability, and potential for new connections between areas that were previously not accessible. Starting with the Americans with Disabilities Act (ADA) in 1990, the United States Department of Justice regulates and enforces accessibility mandates. These standards are currently codified in the 2010 ADA Standards for Accessible Design. Model building codes, such as the International Building Code (IBC) and the referenced ICC/ANSI A117.1 Accessible and Usable Buildings and Facilities, are harmonized with the 2010 ADA Standards for Accessible Design and include requirements for the topics discussed in this section.

**Slip resistance** and stable, and firm ground surfaces are necessary for safe navigation of walking surfaces. In an exterior environment, surface contaminants, such as oils and water, can reduce the frictional counterforce of a material. Sound walking surfaces also demand that floor surface openings, such as gratings, be limited to less than ½” in width and oriented with the longest edge perpendicular to the direction of travel. Smaller openings, such as ¼”, may be specified for “heel-proof” applications.

**Site gradient** will also significantly impact the design for access. The grading of plaza walking surfaces should not exceed a slope of 1:20 (5%) or a cross slope of 1:48 (2%).

In order to improve access across a site or to parking areas or building entrances, re-grading is often part of plaza rehabilitation. A combination of stairs, ramps, and handrails can be used to address connectivity. Based on evaluation of the existing layout, a similar or equivalent experience should be provided for users of stairs and ramps. If these assemblies are part of the means of egress system, further study must be given to the occupancy load and associated egress capacity.

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**A** Area drains provide bi-level drainage, at both surface and membrane levels.

**A** Trench drains remove surface water across the entire width of a ramp or slope.

**A** Slotted pavers over drains provide a clean look and even surface.
Creating plazas and terraces over occupied spaces poses unique challenges. They need to address all performance aspects of a plaza on grade, yet also compose part of the building enclosure system. Considerations for elevated plazas and terraces generally fall into one of two categories: structural support and building enclosure performance.

**Structural Capacity**

Retrofitting plazas and terraces on existing roofs requires evaluation of the load capacity of the supporting structure. Whether a conversion to a “green roof” or occupied terrace, or a renovation of an existing plaza space, rehabilitation may require augmentation of the existing structural framing to accommodate increased dead loads (plantings and fixtures) and/or live loads (occupants). For example, soil commonly weighs more than 100 pounds per cubic foot, which can quickly exceed the capacity of underlying framing. Also, with any new occupancies, egress may need to be supplemented, resulting in additional stairs, ramps, openings, guardrails, and/or parapets that must be coordinated with the existing structure. Determining these structural requirements early in the design process is a key component of managing project costs.

If increasing the structural capacity is cost-prohibitive or not feasible given the existing configuration, there are alternative options to achieve a new terrace space. Extensive plantings, which can flourish in shallower soil depths, or alternate materials such as geofills can reduce the load attributed to planting areas, while still providing desired green space. Limiting access, such as by elevating some roof areas and restricting pedestrian traffic, can decrease the associated occupancy loading and minimize or eliminate the need to increase roof deck capacity.

Furthermore, dependent on a combination of site topography, geographic location, height above grade, and roof configuration, the finish materials alone may be insufficient to resist the lateral and uplift forces created by wind and pressure differentials. To prevent these elements from being dislodged and potentially becoming hazardous wind-borne debris, interlocking or lock-down paving systems that can resist these forces must be designed and specified.

Planting areas subject to high wind loads are vulnerable to...
and can be finished with paint, anodized, or allowed to patinate. Similar materials are also used for infill, in mesh, perforated, or woven form, as well as glass.

**Water Management**

Drainage is a significant design concern, as unmanaged water is often the cause of maintenance problems. Water can be categorized as surface water, such as rainfall or runoff from impervious surfaces, and subsurface water, including aquifers or high water tables. Both must be accounted for in the drainage system and addressed through design, layout, and material choices.

Keeping in mind potential water sources, the existing drainage system, from inlet, to catch basin, to outlet piping should be assessed. Where there are known drainage issues, video inspection may be beneficial to determine if blockages are present and if hydrojet cleaning should be recommended. Depending on the condition of the system, replacement of elements, such as piping, may be required. Permeable or impermeable finish materials, jointing, setting bed, and base selections will affect how water flows through or is redirected from the plaza surface. The existing system may need supplementary drains or modifications, including new surface drains, catch basins, dry wells, and detention or retention ponds, as well as reconfiguration of the pitch and orientation of the finished surface. As with accessibility, the plaza gradient may require modification. Coordinating the positive flow of water to drains reduces potential areas for ponding water, which can cause staining, maintenance issues, and accumulation of ice in the winter months.

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scour (loss of plant and/or soil material), especially early in the establishment period before the plantings have produced full surface cover and a strong root system. Careful consideration of the types of plantings and soil/growth media at edges or corners of exposed elevated plazas is recommended; at a minimum, an erosion control material should be provided during plant establishment.

**Envelope Efficiency and Protection**

As part of the envelope system, a terrace is an integral part of the building performance. Whether part of a new amenity space or strictly for access by maintenance personnel, the plaza design will directly affect the ability of the roof to prevent water infiltration and balance energy code requirements for thermal performance and reduction of the heat island effect. The waterproofing system can range from a variety of cold- or hot-applied, single-ply, multi-ply, or fluid-applied membranes, each appropriate to the unique situations posed by variables such as the existing substrate, anticipated use, and spatial configuration.

Additionally, insulation is generally necessary for compliance with ever-increasing energy code requirements. This may result in modifying roof accessories such as guardrails, parapets, thresholds, stairs, and ramps. In conjunction with insulation, ballast is usually required, often in the form of pavers, which can come in a variety of shapes, sizes and materials. This surface material is subject to the material performance requirements discussed for plazas on grade, the aforementioned structural considerations related to wind, and also energy code requirements for surface reflectivity.

Despite challenges with waterproofing and structural integrity, adding plaza space provides benefits for occupants and the surrounding environment.
All new elements must be connected to the existing storm system and comply with local regulations for stormwater management. Selected drain covers should prevent detritus from entering the system and provide easy access for cleaning and debris removal from collection baskets. Finally, planters, fountains, and other unique fixed site features which could impede drainage or may require their own internal drainage must be coordinated with the overall water management design.

Site Furnishings and Amenities
In addition to the design of the ground plane, plazas often feature elements to enhance usability, interest, and foster a variety of experiences. Water features and landscaping can create a cooler microclimate and add ambience. Shade elements, such as trees and awnings, provide protection from the sun during summer months. Furniture, permanent and fixed, can be designed or specified from a variety of manufacturers whose offerings include metal, concrete, wood, or plastic products. The selection should weigh aesthetic qualities alongside durability, including resistance to weather and vandalism, as well as available storage on site. Trash disposal should also be accounted for, with discreet receptacles provided according to a waste management plan.

Lighting and provisions for power or audio can allow for greater flexibility in plaza programming and hours of use. Illumination includes general lighting, as well as accent lighting of landscaping and/or pathways. Innovations in exterior lighting include attractive designs to minimize light pollution, improve energy efficiency, and upgrade existing fixtures to long-lasting LED units.

All of these features and amenities, while providing opportunities to increase the vitality and life of the plaza, require coordination with the overall design performance, particularly when addressing maintenance, accessibility, safety, and water management.

Rehabilitation for Long-Term Maintenance
Plaza upgrades are an opportunity to provide safe and convenient access for people of all ages and ability, enhance amenities, and add dimension to an existing space, while simultaneously improving performance and reducing maintenance costs. Time and attention to the selection, design, and installation of paving and drainage systems can have a substantial impact on the durability and maintainability of the plaza, which in turn impacts the aesthetic and functional performance of the space and its value as a building amenity. For plazas over occupied space, structural concerns are also central to the design process. With planning that considers immediate needs alongside the long-term demands of the space, a plaza project can create a desirable feature that serves as an asset not only to the building owner and occupants, but to the greater community.
Plaza Rehabilitation

Whether restoring an historic plaza, upgrading accessibility, rehabilitating deterioration, or updating aesthetics, a plaza rehabilitation project offers the opportunity to re-think the space to better serve the needs of users and reduce maintenance demands.

For over 40 years, Hoffmann Architects has provided solutions for plaza and terrace design challenges at diverse facilities, including:

**Columbia University**
Morningside Campus  
New York, New York  
*Accessibility Retrofits, Plaza Rehabilitations*

**Manhattan House**  
New York, New York  
*Rooftop Garden, Terrace, and Portes-Cochere Rehabilitation*

**Yale University, West Campus**  
West Haven, Connecticut  
*Plaza Consultation*

**United States Capitol Complex**  
O’Neill House Office Building  
Washington, District of Columbia  
*Plaza Rehabilitation*

**Stony Brook University**  
Health Sciences Center  
Stony Brook, New York  
*Walkway and Campus Underpass Rehabilitation*

**Travelers Plaza**  
Hartford, Connecticut  
*Plaza Redesign and Reconstruction*

**Domus Luxury Apartments**  
Philadelphia, Pennsylvania  
*Plaza Rehabilitation*

**Morgan Stanley**  
Purchase, New York  
*Plaza Reconstruction*

**State Univ. of New York at New Paltz Administration and Student Union**  
New Paltz, New York  
*Plaza Replacement*

**The World Bank**  
Washington, District of Columbia  
*Terrace Rehabilitation*

**Scholastic Headquarters**  
New York, New York  
*Roof Terrace Rehabilitation*

**Columbia University**  
Mathematics Hall  
New York, New York  
*Plaza Rehabilitation*

**Phoenix Companies Headquarters**  
Hartford, Connecticut  
*Plaza Redesign and Renovation*

**Yale-New Haven Hospital**  
Dana Building  
New Haven, Connecticut  
*Plaza Investigation*

**Gracie Mews**  
New York, New York  
*Plaza Rehabilitation*

**Marsh & McLennan Headquarters**  
New York, New York  
*Plaza Investigation, Redesign, Reconstruction*

**New Jersey City University**  
Michael B. Gilligan Student Union  
Jersey City, New Jersey  
*Plaza Redesign and Reconstruction*
Design Considerations for Plaza Maintenance

As part of the plaza rehabilitation design process, a plan to make maintenance easier and less time-consuming is worth the up-front investment.

Snow and ice management. Consider adding a hydronic or electric snow melt system to simplify maintenance in the winter months. Chlorides used in snow removal, snow removal blades, or blowers, can quickly degrade material surfaces and impact plaza longevity. A plan for snow disposal and/or storage should also be established.

Landscaping choices. Capacity for long-term plant care, including pruning, fertilization, and supplementation, should be part of the plant selection process. Access and equipment required for upkeep, such as grasses that require mowing, will be an ongoing concern. Irrigation systems demand maintenance, including cleaning and, potentially, winterization.

Debris removal. Plan for ease when performing frequent and routine tasks, from clearing drains to keeping joints free from weeds. This will reduce the time and expense of maintenance activity. For elevated plazas and terraces, fall protection measures may need to be included to permit safe access.

Fixtures and finishes. Bulb replacement, repainting, furniture repair, and other tasks that keep the plaza well-lit and secure are integral to function and appearance. Durable fixtures with long lifespans mean less maintenance. However, maintenance is inevitable, so selecting fixtures that are designed for easy access and repair will make the process even more seamless.