



# Factors to Consider when Redesigning **Podium Decks**

By James Cooper, P.Eng., LEED AP

**P**odium (plaza) decks are structural slabs that extend beyond an above-grade building footprint and serve as roof slabs for below-grade levels. Often hidden by hard and soft landscaping finishes, these structural slabs can be forgotten and overlooked due to the relatively long service life of their protective waterproofing systems.

Podium decks are often the welcoming area of a property, providing access to primary entrances. They provide landscaped and naturalized environments, areas for rest and recreation, and a space to green-up environments in densely developed regions. A beautifully landscaped podium deck with well thought-out finishes can elevate a property, thus increasing value and demand.

While many waterproofing and structural components of a facility are fairly obvious—in a cursory tour of a property, one will see floor slabs, columns, walls and their surface finishes, parking levels and their waterproofing systems, and the roof can be accessed to check the installed systems—the podium deck waterproofing is hidden so as to blend into the surrounding on-grade areas. For the more visible and obvious structural and waterproofing components, it is easier to note visual cues of deterioration. However, the podium deck structure and waterproofing that are hidden beneath the landscaping finishes—while as important for overall building performance as roofs, walls, and parking garage systems—are often ‘out of sight,’ and therefore, ‘out of mind.’



*Structural deterioration as a result of a failure of the podium deck waterproofing system.*

### Construction of podium decks

Podium deck waterproofing systems are typically protected by overburden. Since the waterproofing system is not wholly impacted by what is happening at the surface, anticipated service lives of the system can be a useful guideline to inform assessment and rehabilitation timelines. In unfortunate scenarios, owners may be unaware of early signs of deterioration, such as leakage into the below-grade areas, and may implement podium deck landscaping redesign without consideration for waterproofing age and condition.

Deterioration can occur in any of the components, and often happen in the various components at different times. Whether the podium deck is a lush, tree-lined oasis or a utilitarian, paved access point, it is subjected to aggressive environments that are similar to what a parking garage or above-grade roof encounters. Podium deck waterproofing systems and surface finishes are intended to protect the underlying structure from the moisture and chloride ions (salts) they are exposed to, handle freeze-thaw cycles, and withstand wear and tear. The overburden, landscaping finishes,

and waterproofing systems have finite service lives. They require repair and, ultimately, replacement to maintain effective protection for the underlying structure. If podium deck moisture protection systems are neglected and remain past their period of effectiveness, moisture ingress into the structure can lead to costly deterioration that is invisible or unobvious, at least not as evident as a declining surface finish, such as a traffic coating in the parkade. Since the finished landscaping components are often expensive in comparison to the waterproofing system, it is important to ensure the latter still has an adequate service life prior to completing work on the overburden and landscaping above.

It is advisable to retain a specialist engineer to undertake a detailed assessment prior to significant podium deck landscaping redesign to ensure new finishes are not constructed on a waterproofing system near the end of its effective service life or a deteriorated structural slab. In fact, given the scale and potential costs of podium deck repair projects, an in-depth assessment is recommended before implementing any significant landscaping work

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Cross-sectional view of overburden installed on a podium deck at a condominium located at 30 Greenfield Avenue in Toronto.

As the podium deck waterproofing and overburden deteriorate over, potentially, a 25-, 30-, or 40-year effective service life, the podium deck assembly and types of finishes may become old or outdated. There may be a need for additional site parking and recreational space, outdoor seating, improved loading and unloading, waste management, or other changes.

### An appropriate course of action

An accurate understanding of the current site conditions is vital for a successful project. An incomplete or inaccurate understanding of existing conditions prior to rehabilitation planning can spiral into larger issues and costs through design and construction phases. A more detailed scope of assessment and testing, despite additional initial costs, will help define and refine repair needs, and often result in multiplied savings over-and-above those initial expenses—accurate design drawings are the first way to save money (*i.e.* no costly change orders). Get the scope defined, make sure the details are correct, and one will not run into nearly as many changes.

When performed proactively, the assessment is a tool to develop rehabilitation timelines and to anticipate costs, so repair and improvement work can proceed smoothly with detailed pre-planning and without any significant surprises. The condition assessment scope must be developed with consideration for the type of construction, age of the

may include a combination of onsite investigation, some type of destructive or intrusive testing, and a comprehensive review of the original building's structural and architectural drawings (if available). The focus of the review should be to understand the age and effectiveness of the podium deck waterproofing system by determining the extent of leakage and concrete deterioration below, and the physical condition, composition, and anticipated, remaining service life of the surface treatments.

A typical podium deck condition assessment would include the following:

- visual site assessment of a sampling of podium deck surface and accessible below-grade areas to document existing conditions and identify areas of obvious concern, such as accessibility issues, ineffective drainage, and deteriorated paths of travel to entrances and exits;
- acoustical testing of the underside of the podium deck slab to detect areas of concrete deterioration; and
- surface test openings to determine the composition of the overburden and allow for visual review of the waterproofing system.

Arborist assessment and reporting will inform design decisions in particular jurisdictions with more restrictive tree bylaws. Permits may be required to cut down or impact trees even when they are on private property. The arborist report is a necessary component in tree permit applications, and outlines the number and size of existing trees, as well as recommendations for protection or removal depending on the rehabilitation scope. An important design consideration is the potential for damage by a tree root system, both to landscaping and underlying waterproofing systems. Trees or other large plants with aggressive roots or taproots require the implementation of measures to protect podium deck waterproofing and landscaping. While drainage layers are often thought of as a root barrier, it is recommended to have a separate geotextile root barrier installed below any areas of planting or trees.

Assessment findings must clearly identify structural and waterproofing concerns, provide recommended courses of action to correct these issues, and outline the impact on landscaping finishes. The report will provide guidance on the finishes to be removed and the options for replacement—at this stage, topics

consideration for the type of construction, age of the structure, as-built conditions, type of membrane, and knowledge of typical failure and deterioration mechanisms. The scope is intended to allow for collection of necessary and detailed information, and

the options for replacement. At this stage, topics about accessibility and durability of finishes come into play. The landscape architect is engaged after this point, so the engineer should consider current design trends and make assumptions about the

types of finishes to be reinstated. Often, discussion with the client can bring out areas of concern and changes they may be looking to include in the redesign. The recommendations should be tailored to owner requirements, such as proposed or intended changes to the podium deck composition and features, since the cost implications guide decisions during design development and implementation.

### Design stage

Once stakeholder (*e.g.* owners, property managers) meetings have been completed and design objectives and budgets are in place, design development work for podium deck rehabilitation or renewal can begin. The design team will be led by a prime consultant, often the restoration (*i.e.* structural and envelop) engineer, and may include landscape architects, mechanical and electrical engineers, surveyors, arborists, and other specialty consultants. The project team requires an experienced leader to direct the various disciplines toward the project goal while keeping the project on schedule and within budget.

Some parts of design are completed independently of other disciplines, such as legal property surveying and arborist reports, and it is recommended to complete this work as early as feasible. The design team requires this information, and will work closely together throughout the design process. There are internal design team meetings and also progress submission meetings with all project stakeholders. These meetings allow for proper input by all stakeholders so the design progresses fluidly from concept to realization with an eye on budget and site implications. Key design considerations include the following.

#### *Understand site topography*

An up-to-date legal and topographical survey of the podium deck in its current state assists the design process and prevents incorrect assumptions that can lead to costly changes during construction. Existing and revised elevations impact site water management. It is important to accommodate for proper drainage that considers existing and revised conditions.

#### *Appropriate waterproofing system*

The design and detailing of appropriate moisture protection is a challenge unique to each site and structure, with consideration required for service life, overburden types, and environmental factors. Hydrostatic pressure is handled by

have a squeegee-applied hot rubberized asphalt waterproofing membrane overlain with a protection and drainage layer. In two-ply systems, the hot rubberized asphalt waterproofing is reinforced with inter-ply fabric reinforcing sheets.

Liquid-applied hot rubberized asphalt systems have useful installation characteristics—particularly, they can be easily installed at changes in elevation, over concrete curbs, and up perimeter walls. They also allow for simple tie-in details at drains and other termination points. When installed with appropriate protection courses, overburden can be readily installed with little risk of damage. The waterproofing work can also be completed in phases, with tie-in to previously installed waterproofing completed with a simple lap that provides a watertight seam.

#### *Plan for landscaping finishes*

Depending on the podium deck use, size, and existing conditions, the design may require input from various team members. It is important to share design ideas and concepts with the stakeholders early in the design process to set an achievable target that has anticipated costs in line with available budgets. It is important to design to an achievable goal to prevent rework or future surprises.



**CUSTOM METAL FABRICATION**

**MATERIALS**

- Galvanized/Cold Rolled Steel 26ga to 1/4"
- Painted and Mill Finish Aluminum 0.032" to 5/16"
- Painted Steel
- Stainless Steel/Brass/Copper/Zinc

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designing the waterproofing assembly to be drained with the drainage board and area drains (either existing or new ones). The whole design process focuses on creating an environment without hydrostatic water pressure and effective drainage systems in place. Informed selection requires knowledge and understanding of available products and their performance characteristics. Liquid-applied asphaltic waterproofing systems

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Completed podium restoration at 30 Greenfield Avenue.

Engineering firms experienced with podium deck rehabilitation work along with combined envelope and structural engineering expertise are valuable allies and can assist in setting and achieving reasonable rehabilitation targets to maintain the podium deck and meet functional and esthetic goals. The engineer reviews proposed changes and assesses their impact on the structure, including assuring applied loads remain within design capacity, or are accommodated for with structural strengthening. Other professionals may not realize they are exceeding allowable loads by changing overburden materials and depths, or by installation of structures, statues, or other elements.

An arborist should be consulted when replacing or adding new trees to a podium deck—whether required in a particular jurisdiction or not—to

should be constructed with non-slip and durable surfaces with handrails and other appropriate aids, where required. Use high contrasting materials at stairs and tactile warning plates where required by current accessibility guidelines or codes. This is an opportunity to create a safe and enjoyable space for everyone, and to correct obvious design issues building occupants may have discovered over the years.

Thermal performance should be considered where the below-grade areas are heated or can benefit from better heat retention. Depending on the construction and age of the building, rigid insulation may require replacement or may be warranted as an addition to the podium deck overburden. Understanding the original design and current site needs will inform placement of insulation, but, as a minimum, it is important to maintain at least the same level of thermal performance.

**Construction stage**

The timing between initial assessment, design, tendering, phasing, and construction can vary from a period of weeks to multiple years depending on existing conditions, site needs, and implementation timelines. However, once site work starts, it is vital to minimize the negative impacts of construction while ensuring prompt completion of work. Completing work in stages is required and preferable to maintain building access and site functionality. How the work is staged must be a design consideration that is clearly planned for and conveyed on the construction documents. The key components and considerations for a work staging or phasing plan are:

- means and procedures to maintain safe access to and from the building's primary access points and emergency egress locations (the construction of temporary walkways or temporary pathways may be required);
- maintenance of access for emergency vehicles and

requires a professional judgement of how to assess viability and growing conditions. Trees require minimum depths of soil, and specific soil and climatic conditions to grow, survive, and thrive. The engineer can cross-reference arborist recommendations to ensure the structure can safely support the weight of the growing medium and the mature tree, which will exceed the installed weight.

Older podium deck paths of travel may not meet current code requirements, accessibility recommendations, or public expectations. The design should accommodate for safe and functional walkways and travel paths through the site, which

includes:

- maintaining access for emergency services and site parking;

- co-ordinating work hours and closures to minimize the effect on building operations and reduce noise impacts on occupants and neighbours;
- maintenance of site security, waste management operations, and other servicing needs;
- installation of temporary structures or finishes to maintain functionality;
- temporary grading and water management for areas outside of the occupied work areas;
- co-ordinating soft landscaping installation with remainder of the work;

- protection of occupied spaces after removal of existing waterproofing systems until new systems are installed; and
- timelines for fabrication of custom elements that may affect construction schedule.

Contractors should be selected based on having previous, satisfactory experience in podium deck repair and protection, which may include the ability to manage multiple trades dealing with building occupants, understanding how to limit construction impacts on the public, and their ability to meld parts of the work into a cohesive finished restoration within the available schedule. The construction phase challenges everyone; it is stressful for the construction team and building occupants. The team must maintain good communication; focus on the safe operation of the building, and deliver a finished product that will last a (service) lifetime.

#### Case studies: 550 Ontario Street, Toronto

The owner of 550 Ontario Street, Toronto, is Hugh Garner Housing Co-operative Inc. RJC Engineers (the author's firm) was the prime consultant and structural engineer of the project. MWLA Landscape Architects managed the landscaping and the contractor was Structural Contracting. This project included a fundamental redesign of how many of the spaces on the site were segmented and utilized. The original design created closed-off corners and dark walkways. The original paving was in poor condition, and a large open courtyard was totally unused. The project progressed through a design and planning process featuring resident input to ensure key concerns were incorporated into the design. The focus of the redesign was on improving accessibility.



Ongoing installation of liquid-applied, hot rubberized waterproofing.

of a new layby area, a new, safe sidewalk, and stylized finishes to modernize the podium. While limited in space, the podium deck has increased functionality and a renewed waterproofing system. This project was challenging to phase due to the location of the entrances to the building as well as the underground parking—elaborate, temporary walkways were constructed to provide a safe, barrier-free entry point to the building. Daytime closures were utilized to allow for work in front of the building entrance and garage ramp. These temporary access structures often separate a successful project from a total failure. The client was engaged throughout the project and given advanced notice of closures or phase changes. Without this communication, the project could not have been completed with such little conflict and

creating a more welcoming and safe environment, increasing green space and gardens, and renewing a sense of pride in the building among all the residents.

### 30 Greenfield Ave., Toronto

The owner is MTCC No. 877 with property managers Crossbridge Condominium Services. The prime consultant and structural engineers were RJC Engineers, MWLA Landscape Architects was the landscape architect, and the contractor was Macdero Construction (Ontario). The original design for this podium deck left very little room for vehicles to pick-up/drop-off people without obstructing the entire circle. Additionally, it lacked a safe sidewalk on the west side of the property where most pedestrian traffic travelled. The design incorporated the creation

on time and budget. Planning for these temporary access points during the design stage mitigated costs and risks for all parties. 📌



*An associate at RJC Engineers, James Cooper, P.Eng., LEED AP, is responsible for managing projects from start to finish, including assessments, design, tendering, construction contract administration, and project close-out. He has more than 15 years of experience in the field of structural restoration and waterproofing, and has been involved in rehabilitation/retrofit projects throughout his career. He can be reached at [jcooper@rjc.ca](mailto:jcooper@rjc.ca).*