Transit Design Guide

Ancillary Structures

City of Toronto

Transit Design Guide

Acknowledgements:

Access Planning

Perkins&Will

Figure 1: Emergency Exit Building along the Toronto-York Spadina Subway Extension (Photo Credit: Ben Rahn/A-Frame Studio)

1.0 INTRODUCTION

1.1 Definition

Ancillary buildings and structures are supporting elements that are necessary to the function and maintenance of transit infrastructure. These include restricted access sites such as a **Traction Power Substation (TPSS)**, **Emergency Exit Building (EEB)** and **vent structures or shafts**. These are critical and necessary to the operation of the transit line and should be planned and designed to integrate seamlessly into their surrounding context.

A series of factors influence the location and design of ancillary structures, including:

- Functional requirements of the transit infrastructure
- Surrounding context and urban fabric
- Integration with Transit Oriented Development (TOD)
- Required access and proximity to transit infrastructure
- Access and visibility from public realm

Components of ancillary structures are typically as follows (varies with each type):

- Building structure
- Fencing/Screening
- Landscaping
- Parking and Access

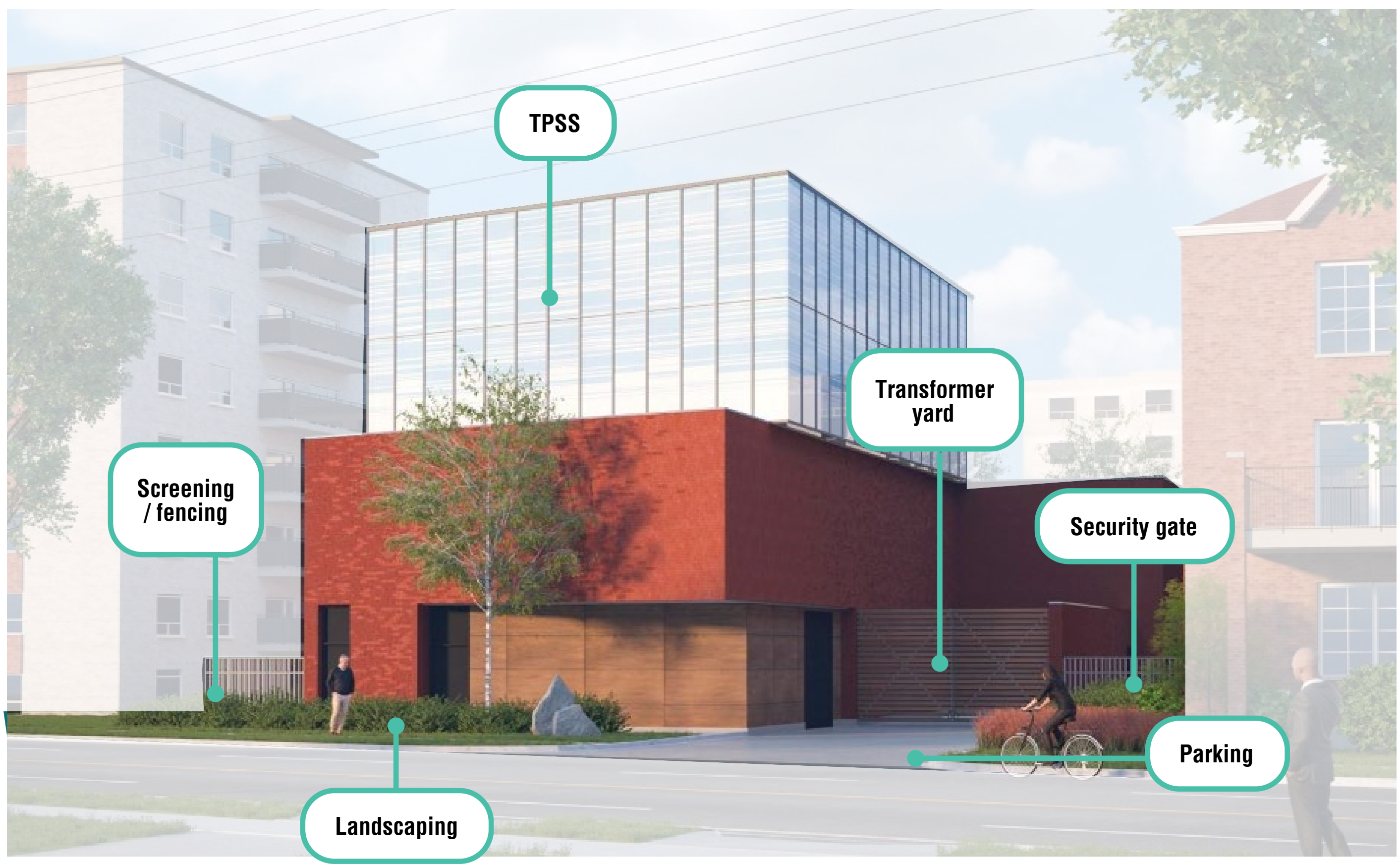


Figure 2: Diagram depicting the various components of a TPSS. Conceptual rendering of TPSS building at Eglinton Ave/Danforth Road (Photo Credit: TTC)

1.2 Areas of Influence

In the context of ancillary buildings, the areas of influence can be defined as follows:

Zone 1: Includes the surrounding context where the building fronts onto a main road or access.

Zone 2: Includes the interface between the structure and the surrounding public realm (e.g., architecture and material treatment of the structure or building), and the landscape and public realm surrounding the structure itself. This zone may include parking, fencing or retaining walls, landscaping and trees treatments such as treed areas, and immediate pathways or roadways.

Zone 3: Includes the ancillary structure or building, including its internal layout and functions.

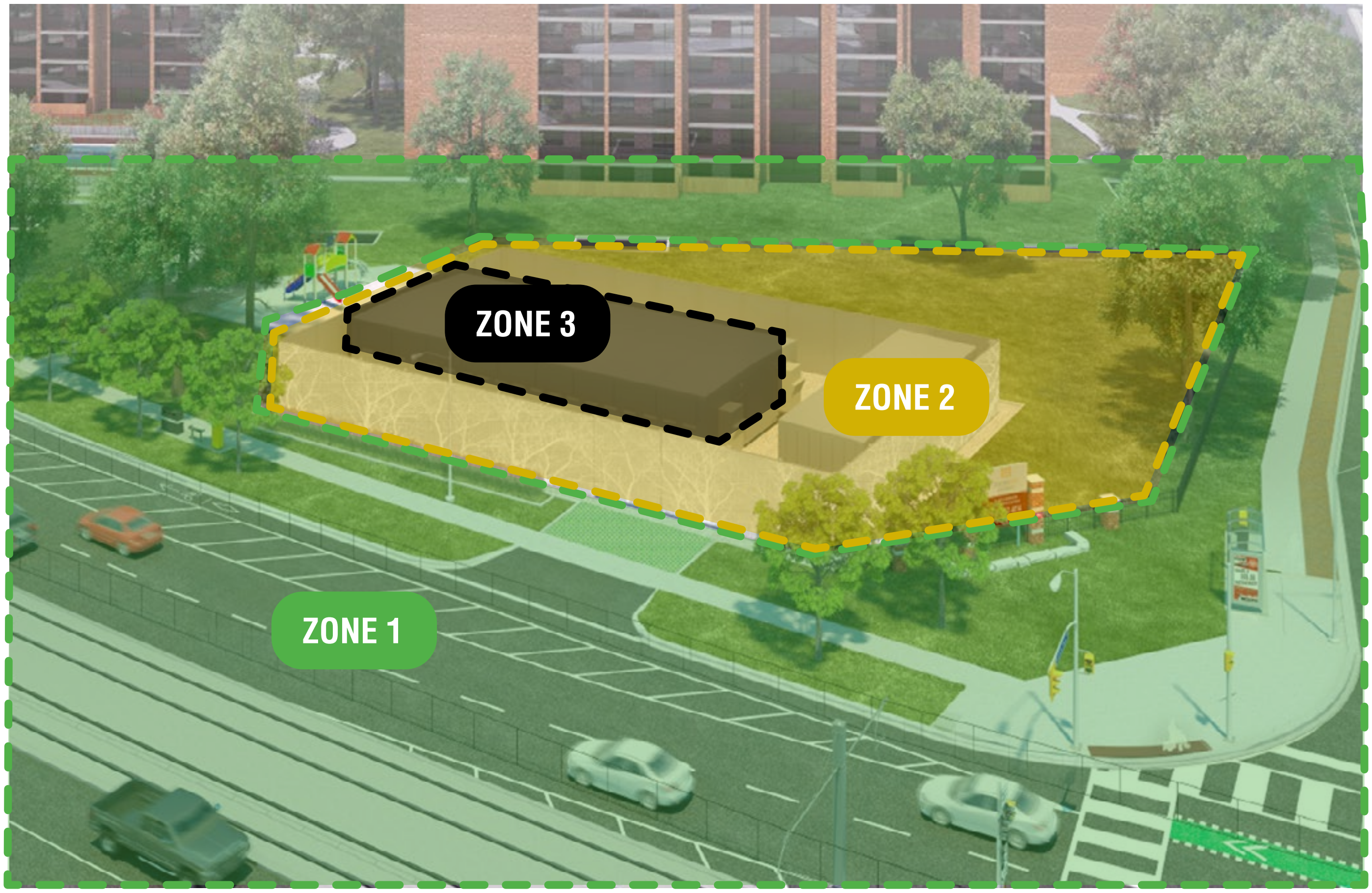


Figure 3: Annotated diagram depicting how the areas of influence apply to ancillary structures. Conceptual rendering of TPSS at Eglinton Ave/Victoria Park Ave (Photo Credit: Metrolinx)

1.3 Applications of Ancillary Structures

Figure 4: Transgrid Ventilation Shaft, Queensland (Photo Credit: Choi Ropiha Fighera)

Independent Structure

This application refers to stand-alone structures, with their own immediate public realm: setback, landscaping, and supporting uses such as parking.

Figure 5: Salvation Army at 7 Eglinton East designed to house Crosstown LRT Utilities (Photo Credit: City of Toronto)

Integrated

This application refers to ancillary structures that are integrated into other development or infrastructure.

1.4 Typical Project Delivery

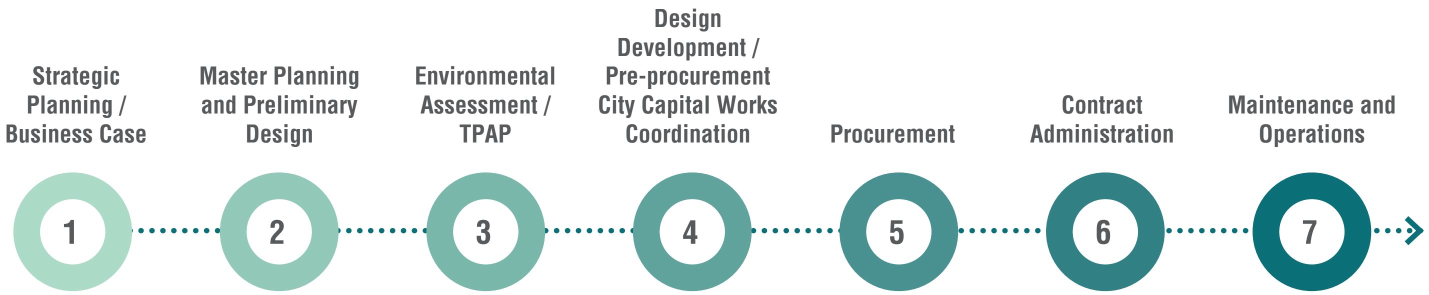


Figure 6: The typical delivery process for transit infrastructure

Ancillary structures are required for many kinds of transit projects. In most cases, they are part of the delivery of large new transit line projects (e.g., LRT line) and identified early on in the process, during the preliminary design stage.

Start with **Business Case** level planning guidance on site selection for ancillary structures. This stage will provide guidance on location with respect to placement within the ROW or setback from the ROW.

Master Planning and Preliminary Design stages should define the context to be considered in a design brief, with a range of design solutions.

Documents related to project scope need to determine whether custom TPSS buildings are in scope, and whether pre-fabricated buildings are undesired. The project requirements can specify that ancillary structures be responsive to the larger context, with a list of desired materials and details.

2.0 EXISTING GUIDANCE

The Official Plan speaks to the design of transit infrastructure, noting that related facilities should be integrated into the local community in a manner that provides a "high-quality pedestrian experience, supports the envisioned context, facilities the creation of complete communities and contributes to place-making", emphasizing the priorities of **Urban Integration** and **User Experience.**

The following is a non-exhaustive, illustrative list of existing guidance and requirements that should be read together with this Guide.

- **ECLRT Dx Requirements, 5.4 Ancillary Structures:** Ancillary structures should serve as lower-profile facilities that prioritize a simple, clutter free presence. Strategies include high-quality exterior panels that achieve a visually light, smooth and sleek design expression.
- **ECLRT Dx Requirements, 2.1.4.3 Ancillary Structures without Public Use:** Specifies that these structures shall reflect the design language and rhythm of adjacent structures, with a focus on the ground-level.
- **FWLRT Dx, 4.4 TPSS and Ancillary Structure:** Adapt the same design and material language as the station and stops, reflecting the design language of the larger transit line.

For ancillary structures that fall within natural areas, standards related to sustainability are provided within the Toronto and Region Conservation Authority Post-Construction Restoration Guidelines.

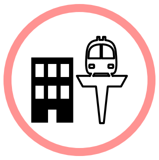
Most existing guidance, as listed above, speaks to objectives of **Urban Integration** and **User Experience**. There is minimal existing guidance specifically in regard to the **Sustainability, Intermodal Operations,** and **Accountability** for ancillary structures as futher elaborated below:

- Mixed direction around station sizing (from **TTC Design Manual, DM-0402-04**) may render inflexibility around achieving certain urban integration objectives.
- Minimal guidance in regard to sustainability, intermodal operations and accountability, mostly about landscaping (permeable pavement and lifecycle/maintenance considerations).
- Minimal guidance to help meet Official Plan policies and environmental performance targets of the Toronto Green Standard through 'Greening' Surface Parking Lots.

These will be addressed in the guidance section of this document.

3.0 OBJECTIVES

Ancillary structures are necessary elements of some transit infrastructure and should be designed as high-quality features of the public realm and minimal negative impact.



Urban Integration

Ancillary Structures should fit seamlessly within the existing and planned urban context as integrated and/or consolidated elements within adjacent infrastructure or buildings. Standalone structures, where required, should ensure minimal visual and physical disruption to maintain and/or enhance the quality of the public realm, while allowing access for operations and maintenance.

User Experience

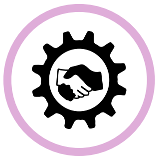
Ancillary structures should maintain and/ or enhance safe, accessible and direct access for all modes of active transport to the surrounding public realm rather than create barriers within a community.

Sustainability & Resilience

Ancillary structures should be sustainably designed with low-carbon materials, optimal use of green infrastructure, and increased resilience to climate change.

Intermodal Operations

From a transportation operations perspective, ancillary structures must be located and designed to meet or exceed the minimum operational and life safety requirements of the transit line.



Accountability

Ancillary structure design should consider the entire lifecycle, use of materials and construction methods that account for whole life cost, and foresee the need to accommodate new transit lines, improved service, changes in capacity and new technology. Importantly, the siting and design of ancillary structures should allow for views and physical access to frontages of surrounding development.

4.0 DESIGN GUIDANCE

Urban Integration

4.1 Urban Integration

1. Coordinate the location and design of any ancillary structure to respond to existing and planned context.
2. Locate ancillary structures to minimize the frontage onto public streets.
3. Reduce the scale of structures and locate away from the public realm with limited visibility.
4. Integrate ancillary structures into the station building envelope to minimize their presence and provide a coordinated architectural expression for all structures. Alternatively, integrate with adjacent development.
5. Incorporate architectural and landscape treatments that enhance the surroundings of ancillary structures, while allowing for planned development of adjacent properties.
6. Screen ancillary structures where the integration into other structures is not possible, with preference for landscaped screening methods.
7. Avoid locating ancillary structures on sites that are anticipated for development with active frontages.
8. Design visually interesting standalone structures where they have high visibility.
9. Design and detail ancillary structures with public street frontage to address human scale and the scale of surrounding buildings.
10. Establish a minimum clear space required around the ancillary structure and equipment for maintenance and access.
11. Avoid dedicated curb cuts for ancillary structures.

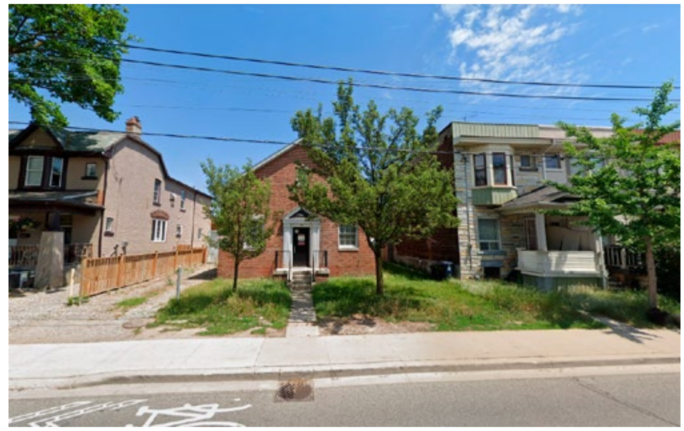


Figure 7: TPSS building at 587 Lansdowne Avenue is integrated into a house to blend into the surrounding residential context (Photo Credits: Google Earth)

Figure 8: Hydro substation at Yonge and Glengrove, also known as The Castle, demonstrating how ancillary structures can be integrated into other buildings or structures, to blend into the context (Photo Credit: HikingtheGTA.com)

Figure 9: Hydro substation at Yonge and Glengrove (Photo Credit: HikingtheGTA.com)

12. When vehicular access is required, avoid locating wide driveways along public streets, particularly close to transit station access or entrances fronting street with major pedestrian activity. Vehicle access can be provided from existing and shared driveways or from streets with less pedestrian activity.
13. Share access with existing service and maintenance roads already built within larger sites.
14. Protect for vehicular access to the property, if applicable, for maintenance purposes.
15. Use transparent noise barriers to decrease visual disruption when sound barriers are required.

Figure 10: Toronto York Spadina Subway Extension Emergency Exit Building (EEB) (Photo Credit: Urban Toronto)

Case Study

Emergency Exit Buildings, Toronto York Spadina Subway Extension

The main goal of this suite of emergency exit buildings (EEBs) was to design elegant yet contextually-sensitive ancillary structures for the Toronto-York Spadina Subway Extension. Going against the grain of typical EEBs, this effort explored an elevated design while maintaining its necessary function as transit infrastructure. Each structure utilized its own unique material expression, from an elegant and landmark mosaic pattern at 2 Whitehorse Road, to a subdued nature-inspired treatment at 45 The Pond Road, paired with tall grasses in the surrounding landscape. These structures are an example of how beauty does not have to be sacrificed for function.

Figure 11: (From left to right) 2 Whitehorse Road, 18 St. Regis Crescent, 2 Toro Road, 45 The Pond Road (Photo Credits: Ben Rahn, A-Frame)

User Experience

4.2 User Experience

1. Use a consistent language of materials, design expression, landscaping and art integration line-wide for ancillary structures.
2. Coordinate the architecture of the ancillary structure with on-site and adjacent development.
3. Avoid fencing ancillary structures and free-standing equipment. When security fencing is required, use in conjunction with trees, shrubs, vegetative screens, vines, decorative fences and barriers to minimize visual impact.
4. Prohibit chain link security fencing and barbed wires for screening.
5. Avoid decorative screen fences that are solid wood, plastic, concrete, or corrugated fiberglass fastened to chain link fence.
6. Use concrete, masonry or stone walls for screening purposes, where these materials compliment the surrounding context.
7. Plant large canopy street trees along the street edge of large sites.
8. Incorporate living walls for screening particularly adjacent to natural areas and/or park space.
9. Minimize visual impact of ancillary structures by designing the surrounding landscape to:
    a. Use native plant species within and adjacent to natural areas;
    b. Screen all free-standing equipment in the site with landscaping;
    c. Provide year-round interest in landscape areas by using a mix of plant materials; and
    d. Limit the use of turf, prioritize naturalized green areas.
10. Locate ancillary structures to preserve existing trees.
11. Minimize parking spaces for staff, seek shared spaces with adjacent development where feasible.
12. Provide pedestrian-scaled lighting along pedestrian paths and other access points.
13. Apply graffiti management strategies to enhance perception of safety.
14. Integrate lighting with architecture and public art to elevate the expression of the structure and surrounding landscape.

Figure 12: Larkin Street Substation, San Francisco (Photo Credit: Mikiko Kikuyama)

Sustainability & Resilience

Accountability

4.3 Resiliency and Sustainability

1. Incorporate visible and functional sustainable features on ancillary sites, such as on-site stormwater management features and low impact development features, such as bioswales and rain gardens, draught-tolerant native species that foster biodiversity, living walls and green roofs.

4.4 Accountability

1. Develop or consult an existing Block Concept Plan to identify opportunities for the site.
2. Locate and design ancillary structures to ensure feasible future developnment parcels.
3. Ensure fencing does not impact visibility, maintenance and inspections.
4. Prioritize integrated solutions for ancillary structures.
5. Future-proof ancillary structure sites by:
    a. Designing ancillary structures with compact footprints;
    b. Locating the ancillary structure along the perimeter of sites rather that in the middle of the property, with consideration of potential future installation of structural elements for overbuild;
    c. Preserving street frontage for future potential development; and
    d. Protecting for egress routes required for potential future buildings.

Figure 13: EEB and vent shaft, Vaughan Metropolitan Centre

Figure 14: Substation and transformer yard on second floor, Finch West Station, Toronto (Photo Credit: Wade Zimmeran)

Figure 15: Integration of TPSS at street level, within the terminal structure between buildings and under the bridge, Paris

4.5 Applications Specific Guidance

Vent Shafts

1. Integrate vent shafts into development where possible to reduce visual and physical impacts. In scenarios where this is not feasible, design vent shafts to be:

    a. Oriented in a way that considers prevailing winds and limits impact on TOD

    b. Considerate of vertical and horizontal setbacks based on the movement and direction of exhaust smoke.

    c. Accommodated for minimum distances and limits from surrounding land uses (including operable windows and building air intakes) based on safety, regulatory, or technical requirements.

    d. Sited away from active street frontages and public realm, avoiding main paths of travel such as sidewalks or cycling routes.

Traction Power Substations (TPSS)

2. Provide screening around the entire yard that houses visually undesirable elements such as parking, switchgears, and storage.

3. Design screening of TPSS to be attractive and creative while consistent with the line-wide character.

4. For urban conditions such as a main street or blocks with no setbacks, design screening to be well integrated to the local context at the human scale.

5. Locate TPSS underground at underground stations where their presence at grade would interfere with the public realm or development potential.

Emergency Exit Buildings (EEB)

6. Determine approach to siting early on in the planning process. In suburban locations with deep setbacks and limited development potential (ex. parks) EEB structures can be discrete pavilions in the landscape. In more urban (or urbanizing) locations and planned TOD, EEBs should be designed as modest steel structures, retrofitted or integrated into development. In these cases, EEBs should be sited relative to property lines in a manner that maintains a street-wall consistent with local planning guidance and allows for the insertion of future foundations for overbuild.

7. Provide access for emergency vehicles at EEB sites. If required, ensure that temporary access and parking for emergency vehicles is well integrated into the surrounding public realm.

8. Provide setbacks for maintenance and access purposes.

9. Reference applicable fire and life safety requirements in regards to maximum exit distances systems.

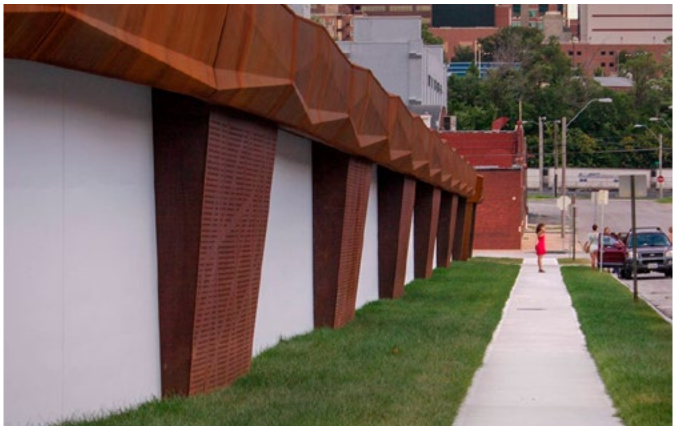


Figure 16: Architectural expression framing the substation, adding visual interest, Kansas City (Photo Credit: Zahner)

Figure 17: Architectural expression and landscaping around substation, Kansas City (Photo Credit: Zahner)

Figure 18: Substation prior to artistic treatment (Photo Credit: Leigh Brinkley, City of Charlotte)

Figure 19: Substation after a commissioned artist's treatment allows it to blend it more seamlessly into the surrounding context (Photo Credit: Leigh Brinkley, City of Charlotte)

Figure 20: Copeland Transformer Station with corten steel details, Toronto (Photo Credit: Craig White)

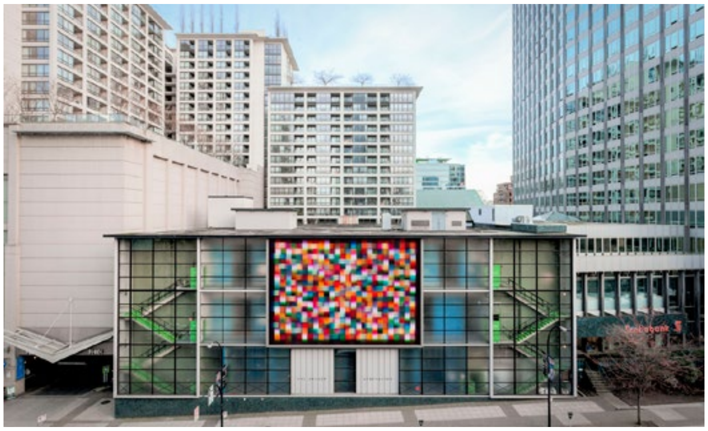


Figure 21: BC Hydro's Dal Grauer Substation Dal Grauer (Photo Credit: Capture Photofest)