

FORMAL TECHNICAL REPORT

Code Applicability Review: Pedestrian Tunnel vs Underground Building under SBC 201

Review of the use of SBC 201 Section 405, Underground Buildings, for a pedestrian tunnel with a dedicated Chapter 31 / Section 3104 code route

Discipline	Fire Engineering / Code Compliance Review
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Core opinion

A pedestrian tunnel should be assessed first under SBC 201 Chapter 31 / Section 3104 where it is a pedestrian walkway or tunnel used as a means of travel between buildings. SBC 201 Section 405 may only be applied as a governing requirement where the designer demonstrates that the tunnel is, in substance and scope, an underground building space, or where the AHJ/client/fire strategy requires Section 405-equivalent provisions as additional safeguards.

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1. Executive Summary

A pedestrian underground tunnel should not be classified or assessed primarily as an underground building merely because it is below grade. Where the facility is a pedestrian walkway or tunnel used as a means of travel between buildings, the correct starting point is the specific pedestrian tunnel provision in Chapter 31 / Section 3104.

Using Section 405 as the primary governing basis is not technically sound unless the designer demonstrates that the subject tunnel also satisfies the scope of an underground building space. Section 405 should not replace Section 3104 compliance.

The official SBC 201 table of contents places Section 405 within Chapter 4, Special Detailed Requirements Based on Occupancy and Use, and places Section 3104 within Chapter 31, Special Construction. The official SBC 201 summary identifies Section 3104 as the provision addressing pedestrian walkways and tunnels connecting two buildings.

2. Purpose and Review Question

The purpose of this report is to provide a structured fire engineering and code compliance opinion on the correct SBC 201 treatment of a pedestrian tunnel vs Section 405, Underground Buildings.

The primary review question is:

Should a pedestrian tunnel be regulated primarily as an underground building under SBC 201 Section 405, or as a pedestrian tunnel under SBC 201 Chapter 31 / Section 3104?

The report also identifies the technical distinction between a building, an underground building, and a pedestrian tunnel; the correct code hierarchy; the consequences of applying the wrong provision; and the information that should be requested from the fire design engineer before accepting the fire strategy.

3. Scope, Assumptions, and Limitations

Scope

This report addresses code applicability and fire engineering reasoning.

Assumptions

- The relevant dedicated pedestrian tunnel provision is Chapter 31 / Section 3104, Pedestrian Walkways and Tunnels.
- The facility under review is primarily intended for pedestrian movement and not for retail, assembly, storage, plant, office, or other sustained occupancy functions.

4. Regulatory Framework

Within SBC 201, Section 405 and Section 3104 are not interchangeable. They sit in different parts of the code and address different regulatory conditions:

Provision	Location	Regulatory subject
Section 405	Chapter 4 - Special Detailed Requirements Based on Occupancy and Use	Underground buildings / underground building spaces used for human occupancy beyond the stated depth trigger.
Section 3104	Chapter 31 - Special Construction	Pedestrian walkways and tunnels connecting buildings and used as a means of travel by persons.

This distinction matters because the correct fire engineering basis is not determined only by physical location below grade. It is determined by the regulated nature of the facility, its function, its occupancy, and the specific code provision written for that facility type.

5. Meaning of Building, Underground Building, and Pedestrian Tunnel

Building

The accessible SBC text defines a building as a structure used or intended for supporting or sheltering any use or occupancy. This is a broad definition. A structure may be part of a building, connected to a building, or associated with a building without necessarily becoming an underground building under Section 405.

A building is normally assessed using occupancy classification, construction type, allowable height and area, fire-resistance ratings, compartmentation, fire protection systems, means of egress, emergency power, fire service access, and operational controls.

Underground building under Section 405

Section 405 is titled Underground Buildings. The accessible SBC text indicates that it applies to building spaces having a floor level used for human occupancy more than 9 m below the finished floor of the lowest level of exit discharge, subject to stated exceptions.

Section 405 then introduces an underground-building package that may include Type I construction for the underground portion, automatic sprinklers, compartmentation, smoke barriers, smoke control, fire alarm, exits, smokeproof enclosures, standby and emergency power, and standpipes.

This is a deep underground occupied building-space model. It is suitable for deep basements, underground retail areas, underground assembly spaces, underground concourses with occupiable functions, and other

underground building spaces where occupants may dwell, work, assemble, shop, wait, or perform activities beyond simple passage.

Pedestrian tunnel under Section 3104

The official SBC summary identifies Section 3104 as the provision for pedestrian walkways and tunnels connecting two buildings. The accessible SBC text indicates that Section 3104 applies to connections between buildings such as pedestrian walkways or tunnels located at grade, above grade, or below grade, used as a means of travel by persons.

This wording is important: a below-grade tunnel is still contemplated within the pedestrian tunnel section. The fact that a tunnel is below grade does not automatically transfer the design to Section 405.

The accessible text also indicates that tunnels are designed and constructed under Sections 3104.2 and 3104.10, with Section 3104.10 addressing tunneled walkway separation from connected buildings by not less than 2-hour fire-resistance-rated construction and protected openings.

6. Code Hierarchy and Applicability Logic

The applicable code hierarchy is a central issue. The accessible SBC text states that where there is conflict between a general requirement and a specific requirement, the specific requirement applies; and where different sections specify different requirements, the most restrictive governs. It also indicates that specific provisions in Chapter 31 take precedence over general requirements.

Decision point	Correct interpretation
Is the facility below grade?	This alone is not enough to apply Section 405. Section 3104 also contemplates below-grade tunnels.
Is the facility a means of pedestrian travel between buildings?	This points directly to Section 3104 as the specific provision.
Is the facility an underground building space used for human occupancy beyond the Section 405 trigger?	This may trigger Section 405 as an additional or parallel requirement.
Did the AHJ require Section 405?	If yes, the requirement should be documented as an AHJ directive, not assumed from below-grade location alone.

7. Technical Difference Between a Pedestrian Tunnel and a Building

Criterion	Building / underground building	Pedestrian tunnel
Primary regulatory concept	Occupancy-supporting or occupancy-sheltering building space.	Special construction / circulation connection.
Typical function	Shelter, contain, or support an occupancy such as retail, office, assembly, plant, storage, parking, or other use.	Permit pedestrian movement between buildings or points.
Occupant behaviour	People may stay, work, shop, sit, wait, assemble, or perform activities for extended periods.	People are normally transient and moving through the space.
Fire load	Variable and potentially significant depending on occupancy and contents.	Should be low and strictly controlled; combustible storage should not be allowed.
Geometry	Rooms, floors, compartments, shafts, stairs, plant rooms, and service spaces.	Linear or corridor-like route with defined connections and limited branches.
Primary fire concern	Deep underground occupancy, vertical evacuation, smoke migration, firefighting access, and system reliability.	Smoke spread along a linear path, travel distance, wayfinding, protected building interfaces, and contents control.
Relevant SBC route	Section 405 where its underground building trigger is met.	Section 3104 where it is a pedestrian walkway or tunnel connection.

The difference is not academic. The two provisions address different fire scenarios. Section 405 assumes a deeper underground building-space risk profile. Section 3104 addresses the special construction risk of connecting buildings using a pedestrian walkway or tunnel.

8. Analysis of Section 405 Misapplication

Section 405 is not a generic underground tunnel clause

Section 405 is written for underground buildings or underground building spaces. Its trigger is not simply that a passage is below grade. The designer must demonstrate that the subject space is a building space used for human occupancy within the scope of Section 405.1.

Section 3104 expressly includes below-grade pedestrian tunnels

The accessible Section 3104 text refers to pedestrian walkways or tunnels located at grade, above grade, or below grade and used as a means of travel by persons. Therefore, below-grade status does not by itself remove the tunnel from Section 3104.

Section 3104 contains the dedicated tunnel route

The accessible Section 3104.1.1 text indicates that tunnels are designed and constructed under Sections 3104.2 and 3104.10. This is the direct tunnel application route and should be presented in the fire strategy compliance matrix.

Section 3104.10 is central to interface fire protection

For a pedestrian tunnel connecting buildings, the critical fire-safety issue is often the fire-resisting separation between the tunnel and each connected building. The accessible text indicates that a tunneled walkway shall be separated from the connected building by not less than 2-hour fire-resistance-rated construction, with protected openings.

If the fire strategy is based on Section 405 but does not prove the Section 3104 interface requirements, the fire strategy is incomplete.

Over-conservatism does not cure wrong classification

An opinion that Section 405 is more conservative because it can require sprinklers, smoke control, smoke barriers, standby power, emergency power, standpipes, and similar systems, is incomplete. A stricter provision can be voluntarily adopted, but it cannot replace the specific pedestrian tunnel provision unless the AHJ accepts that approach and the Section 3104 requirements are still addressed.

The correct approach is to comply with Section 3104 first and then add any Section 405-equivalent safeguards where independently triggered or justified.

9. Conditions Where Section 405 May Still Be Relevant

Section 405 should not be ignored where the facts support it. It may apply, or may be usefully adopted as an additional benchmark, in the following conditions:

- The tunnel is actually part of an underground building level rather than a simple pedestrian connector.
- The tunnel includes retail kiosks, seating, storage, plant rooms, offices, security rooms, control rooms, waiting areas, or similar occupiable functions.
- The space operates more like an underground concourse than a tunnel.
- The floor level is more than 9 m below the finished floor of the lowest level of exit discharge and the space satisfies the Section 405 human-occupancy trigger.
- The AHJ or Civil Defense has expressly required Section 405-equivalent provisions.
- A performance-based fire strategy uses Section 405 as a conservative safety benchmark.
- The tunnel connects directly into underground building spaces that themselves fall under Section 405.

In those cases, the proper outcome is not to abandon Section 3104. The proper outcome is a documented dual-basis analysis: Section 3104 for the pedestrian tunnel and tunnel/building interface, and Section 405 for underground building-space provisions where independently triggered.

10. Fire Engineering Risk Comparison

Fire engineering issue	Section 405 underground building model	Section 3104 pedestrian tunnel model
Design premise	Deep underground occupied building space.	Pedestrian connection / means of travel.
Occupant profile	Potentially static or semi-static occupants; possible high occupant loads depending on use.	Transient occupants moving through the route.
Fuel profile	Occupancy-dependent and potentially high.	Normally low and subject to contents restrictions.

Fire engineering issue	Section 405 underground building model	Section 3104 pedestrian tunnel model
Smoke concern	Smoke movement through underground compartments, shafts, stairs, and connected levels.	Longitudinal smoke movement along a tunnel and spread into connected buildings.
Egress concern	Vertical evacuation and protected exits from deep levels.	Travel distance, directional escape, wayfinding, protected interfaces, and exit discharge points.
System concern	Sprinklers, smoke control, smoke barriers, emergency/standby power, standpipes.	Interface separation, opening protection, detection/alarm, lighting/signage, ventilation/smoke strategy where risk justifies it.
Wrong-use consequence	Can overstate building-space requirements and still miss tunnel-specific interface provisions.	Can understate deep underground risks if the space is actually a building/concourse.

A good fire strategy should not select whichever section appears more severe. It should select the section that correctly characterises the facility, and then add other provisions where risk, geometry, use, or AHJ direction requires them.

11.Compliance Review Matrix

Review item	Expected compliant position	Current concern / required clarification
Facility classification	Identify whether the facility is a pedestrian tunnel, underground building space, concourse, service tunnel, transit facility, or basement level.	Designer appears to have treated a pedestrian tunnel as an underground building.
Primary SBC section	Use Section 3104 as the starting point for a pedestrian tunnel connection.	Section 405 was reportedly used as the main basis.
Below-grade condition	Recognise that Section 3104 includes below-grade tunnels.	Below-grade status may have been used incorrectly to trigger Section 405.
Tunnel application clause	Demonstrate the clauses specific to tunnels, including 3104.2 and 3104.10 where applicable.	Need a dedicated Section 3104 compliance matrix.
Tunnel/building separation	Show minimum fire-resistance-rated separation at each connected building interface, including the 2-hour separation requirement where applicable.	Need drawings, compartment lines, and details.
Opening protection	Provide fire door, fire shutter, glazed opening, damper, and service penetration protection details.	Need schedules and firestop details.
Connected buildings	Clarify whether connected buildings remain separate structures for code purposes.	Need explicit statement in code matrix.
Contents and fire load	Limit combustible contents and prohibit storage unless specifically assessed and approved.	Need contents-control and housekeeping strategy.
Section 405 trigger	Demonstrate floor depth relative to lowest level of exit discharge and prove the space is within Section 405 scope.	Need geometric and functional justification.
AHJ requirement	Document any Civil Defense/AHJ direction requiring Section 405.	No AHJ instruction provided yet.
Performance-based enhancement	State clearly if Section 405 measures are voluntary safeguards.	Must not be presented as the sole prescriptive code route if Section 3104 applies.

12.Information Required During a Design

Code basis

- Adopted SBC edition and all referenced codes.
- Classification of the facility and basis for that classification.
- Section 3104 compliance matrix.
- Section 405 applicability statement, including depth and occupancy analysis.
- AHJ or Civil Defense correspondence requiring Section 405, if any.
- Statement identifying whether Section 405 is mandatory, AHJ-imposed, client-imposed, or voluntary performance enhancement.

Geometry and depth

- Plan drawings, longitudinal section, and cross-sections.
- Tunnel length, width, gradient, changes in level, ramps, stairs, escalators, lifts, and discharge points.
- Floor level relative to grade and relative to the lowest level of exit discharge.
- Number and location of exits and connection points to buildings.

Functional use

- Confirmation that the tunnel is for pedestrian circulation only.

- Identification of any retail kiosks, seating, storage, advertising, plant rooms, security rooms, control rooms, or back-of-house spaces.
- Confirmation whether the tunnel forms part of the required egress system for either connected building.
- Expected occupant load and peak pedestrian flow assumptions.

Fire protection and life safety

- Sprinkler design basis, if proposed or required.
- Detection and alarm strategy.
- Emergency lighting and exit signage strategy.
- Smoke control or smoke ventilation strategy, if proposed or required.
- Standpipe, hose reel, hydrant, or fire department intervention provisions.
- Emergency/standby power provisions and controls reliability.
- Evacuation, tenability, or CFD analysis where relied upon by the strategy.

13. Conclusion

A building is a broad code concept: a structure used or intended to support or shelter a use or occupancy. An underground building under Section 405 is a specific deep underground building-space condition that triggers an underground-building safety package.

A pedestrian tunnel, by contrast, is specifically addressed under SBC 201 Chapter 31 / Section 3104 where it connects buildings and is used as a means of travel by persons. The official SBC summary identifies Section 3104 as the provision for pedestrian walkways and tunnels connecting two buildings

The design should not be approved on a Section 405-only basis unless the fire design engineer provides a clear, project-specific justification and a complete Section 3104 compliance demonstration.