The Hidden Structure of Architecture
The Pervasiveness of Code in Architecture
28.00: ELEVATORS

28.8 CAR CONTROLS
Elevator control panels shall have the following features:

28.8.1 Location: If cars have center opening doors, controls shall be located on the same wall or walls. If cars have side opening doors, controls shall be located at the side wall or at the front wall next to the door. See Fig. 28d.

28.8.2 Height: All floor buttons shall be no higher than 54 inches (54" = 1372mm) above the finish floor for side approach and 48 inches (48" = 1219mm) for front approach. Emergency controls, including the emergency alarm and emergency stop, shall be grouped at the bottom of the panel and shall have their centerlines no less than 35 inches (35" = 889mm) above the finish floor. See Fig. 28e and 28f.

28.9 CAR POSITION INDICATORS
In elevator cars, a visual car position indicator shall be provided in compliance with the following:

28.9.1 Location: The car position indicator shall be located above the car control panel or over the door to show the position of the elevator in the hoistway.

28.9.2 Visual and Audible: As the car passes or stops at a floor served by the elevators, the corresponding numerals shall illuminate and an audible signal shall sound.

a. Numerals shall be a minimum of ½ inch (½" = 13mm) high and shall be illuminated on a contrasting background.

b. The audible signal shall be no less than 20 decibels with a frequency no higher than 1500 Hz.

c. An automatic verbal announcement of the floor number at which a car stops or which a car passes may be substituted for the audible signal.

28.10 EMERGENCY COMMUNICATIONS
Where a service location is maintained in a building, a two-way emergency communication system shall be provided between the elevator car and the service location.

28.10.1 The highest operable part of a two-way communication system shall be a maximum of 48 inches (48" = 1219mm) from the floor of the car.

28.10.2 It shall be identified by a raised symbol and lettering complying with 521 CMR 41.00, SIGNAGE, and located adjacent to the device.
407.4.6.1 Location. Controls shall be located within one of the reach ranges specified in 308.

EXCEPTIONS:

1. Where the elevator panel serves more than 16 openings and a parallel approach is provided, buttons with floor designations shall be permitted to be 54 inches (1370 mm) maximum above the finish floor.

2. In existing elevators, car control buttons with floor designations shall be permitted to be located 54 inches (1370 mm) maximum above the finish floor where a parallel approach is provided.

407.4.6.2 Buttons. Car control buttons with floor designations shall comply with 407.4.6.2 and shall be raised or flush.

EXCEPTION: In existing elevators, buttons shall be permitted to be recessed.

407.4.6.2.1 Size. Buttons shall be 3/4 inch (19 mm) minimum in their smallest dimension.

407.4.6.2.2 Arrangement. Buttons shall be arranged with numbers in ascending order. When two or more columns of buttons are provided they shall read from left to right.

407.4.6.3 Keypads. Car control keypads shall be in a standard telephone keypad arrangement and shall comply with 407.4.7.2.

407.4.6.4 Emergency Controls. Emergency controls shall comply with 407.4.6.4.

407.4.6.4.1 Height. Emergency control buttons shall have their centerlines 35 inches (890 mm) minimum above the finish floor.

407.4.6.4.2 Location. Emergency controls, including the emergency alarm, shall be grouped at the bottom of the panel.

407.4.7 Designations and Indicators of Car Controls. Designations and indicators of car controls shall comply with 407.4.7.

EXCEPTION: In existing elevators, where a new car operating panel complying with 407.4.7 is provided, existing car operating panels shall not be required to comply with 407.4.7.
Otis systems offer aesthetic options with the energy efficiency of LED lighting – an ideal solution for any application.

**CAR FIXTURES**

- Metal micro-motion push buttons
- Blue and white LCD display
- Optional firefighter control panel with locked door
- Satin stainless steel or gold satin finish

**HALL FIXTURES**

- **Hall Position Indicator**
  - LCD screen
  - Satin stainless steel or gold satin finish

- **Hall Lantern**
  - LCD screen
  - Satin stainless steel or gold satin finish

**BUTTONS**

- **Flush Mount Buttons**
  - LED illuminated halo available in blue or white
  - Satin stainless steel or gold satin finish*

- **Projecting Buttons**
  - 1/8" Projecting
  - LED illuminated halo, available in blue or white
  - Satin stainless steel or gold satin finish*
  - Gold satin buttons only available with white LED lights

- **Vandal-Resistant Buttons**
  - LED illuminated center panel, available in blue
  - Push mount
  - Satin stainless steel finish

- **Lexan Buttons**
  - Fully illuminated with white LED
  - 1/8" projecting

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*For Both Car and Hall Fixtures
Code = Standardization
Generic Solutions
Off-The-Shelf Proprietary Systems
Code ≠ Innovation
Concept
Abstraction
Theory
DESIGN
Like genes – obscure, difficult to trace and often misunderstood as to their impact on bio-organisms, so too are the influence of codes on the built environment opaque.

- Eran Ben-Joseph
Code

A systematic collection of laws or regulations.
‘the criminal code’

A set of conventions governing behavior or activity in a particular sphere.
‘a dress code’

A set of rules and standards adhered to by a society, class, or individual.
‘a stern code of honor’
Code

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‘a stern code of honor’

Computing Programming Instructions
‘hundreds of lines of code’

A system of words, letters, figures, or other symbols substituted for other words, letters, etc., especially for the purposes of secrecy.
‘the Americans cracked their diplomatic code’
Caudex

The term “code” derives from “caudex” which was simultaneously the trunk of a tree and a set of laws. It is one of several terms clustering around the idea of power being resident in a sacred tree; the Roland at the center of a village. A code, then, is etymologically and functionally the trunk around which a settlement arranges itself.

- Patrick Pinnell
Types of Code

Codes reflecting an individual or group’s attitude
Types of Code

Codes purposefully established to govern aesthetic outcomes

- Zoning (by-laws, ordinances, resolutions)
- Historical Preservation
- Sign and Billboard
- Satellite Dish and Cell Tower
- View Protection
- Open Space

Codes premised on protecting health and safety and welfare

- Building
  - Mechanical, Electrical Plumbing and Fire Protection
  - Accessibility
  - Sustainability

Impact on aesthetics are a by-product of regulating non-aesthetic concerns.
Types of Code

Codes purposefully established to govern aesthetic outcomes
Types of Code

Codes premised on protecting health and safety and welfare

Impact on aesthetics are a by-product of regulating non-aesthetic concerns.
Building Code

A system of regulations, adopted into law by governing body, which mandates minimum levels of general health, safety and welfare that will be acceptable by society in the built environment.
Why do Architects Generally Dismiss Code?
Codes Limit Self-Expression

Collective Unity (Public)

Code

Individual Articulation (Architect)
Codes Limit Self-Expression
Codes Limit Self-Expression

Milstein Hall, Cornell University
Codes Limit Self-Expression
Codes Limit Self-Expression

Width of fire barrier wall (shown in red above)

25% width of fire barrier

Aggregate width of openings

Window Sprinklers are NOT listed to protect windows when intermediate horizontal mullions are present.

FIGURE 3B-3 - WINDOWS WITH HORIZONTAL MULLIONS
Codes Limit Self-Expression

Milstein Hall, Cornell University
Codes Limit Self-Expression
Codes Limit Self-Expression

(a) Section through Milstein Hall

(b) Composite photo from Crit Space

Case I: Two floors with mezzanine

Case II: Two floors with basement
1028.13.2 Intermediate handrails. Where *handrails* are provided in the middle of aisle stairs, there shall be an additional intermediate *handrail* located approximately 12 inches (305 mm) below the main *handrail*.

524.1 Every part of a required yard shall be open to the sky and unobstructed. Awnings, arbors, fences, flagpoles, recreational and laundry drying equipment and similar objects shall not be considered obstructions when located within a required yard.

29.1 Ground and floor surfaces including floors, *walks*, *ramps*, and *curb cuts* shall be stable, firm, slip resistant, and maintained with materials that ensure continued slip resistance.

1308.6.2 Interior Lighting Power Allowance: The *interior lighting power allowance* for a *building* or a separately metered or permitted portion of a *building* shall be determined by either the *building* area method described in 1308.6.2.1 or the Space-by-Space method described in 1308.6.2.2.
Codes are Incremental in Nature

Code requirements from the 2003 IBC
Codes Become Ingrained in Design
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Codes Become Ingrained in Design
Why Building Codes?
1,800 BC The Code of Hammurabi

229 If a builder build a house for some one, and does not construct it properly, and the house which he built fall in and kill its owner, then that builder shall be put to death.

230 If it kill the son of the owner the son of that builder shall be put to death.

231 If it kill a slave of the owner, then he shall pay slave for slave to the owner of the house.

232 If it ruin goods, he shall make compensation for all that has been ruined, and inasmuch as he did not construct properly this house which he built and it fell, he shall re-erect the house from his own means.

233 If a builder build a house for some one, even though he has not yet completed it; if then the walls seem toppling, the builder must make the walls solid from his own means.
64 AD  The Great Fire of Rome
    Common walls constructed of fire-resistant materials

1630  Boston outlaws chimneys made with wood and thatched roof coverings.

1666  The Great Fire of London
    London Rebuilding Act

1770  George Washington recommends that height and area limitations be imposed on wood frame buildings in his plans for the District of Columbia.
    George Washington and Thomas Jefferson encouraged the development of building regulations to provide for minimum standards that would ensure health and safety.

1788  First known formal building code written in Old Salem, North Carolina.
1865 New Orleans is the first city to enact a law requiring inspections of public places.

1871 The Great Chicago Fire
Lead to fire and building codes for spacing and construction

1903 Iroquois Theater Fire
Created standards for exiting pathways, exit doors, exit signs and markings, maximum seating

1905 The National Board of Fire Underwriters publishes its Recommended National Building Codes

1909 San Francisco Earthquake and Fire

1911 Triangle Shirtwaist Company Fire
Fire proofing, sprinkler systems, improved exiting from high-rises, and development of the NFPA 101 (Life Safety Code)
1915  The **Building Officials and Code Administration (BOCA)** is Established.

1927  The International Conference of Building Officials (ICBO) is established. This organization developed what is now known as the **Uniform Building Code (UBC)**.

1929  **Cleveland Clinic Hospital Fire**
Safety film required for all x-ray film

1940  **The Southern Building Code Congress International (SBCCI)** is founded. This organization developed what is now known as the **Standard Building Code (SBC)**.

1940  **Rhythm Club Fire**
Standards for number of fire exits required, additional standards for door swing requirement, Interior finish standards
1942  Cocoanut Grove Night Club Fire
Outward swinging doors, fire suppression systems, collapsible revolving doors, number of exit doors

1992  Hurricane Andrew
Required a complete retro fit of sprinklers within casinos throughout the city

1994  Northridge Earthquake
Code upgrades for seismic

2000  The first comprehensive and coordinated set of the International Building Code was published. All three organizations (BOCA, ICBO, & SBCCI) agreed to adopt the IBC and cease development of their respective individual codes.

2003  The Station Night Club Fire
New standard requires sprinkler systems in new clubs w/ 50 or more occupants and existing clubs w/ 100 or more occupants.
Model Codes

Building Officials and Code Administration (BOCA)
BOCA National Building Code (BOCA/NBC)

International Conference of Building Officials (ICBO)
Uniform Building Code (UBC)

Southern Building Code Congress International (SBCCI)
Standard Building Code (SBC)
Model Codes

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  Standard Building Code (SBC)

= International Code Council (ICC) + NFPA®
Model Codes

Proposes and Develops

Adopts, Amends and Enforces
<table>
<thead>
<tr>
<th>Prescriptive</th>
<th>Performance Based</th>
</tr>
</thead>
<tbody>
<tr>
<td>Specific and prescribed responses to problems which have been identified.</td>
<td>Do not define, describe, or predetermine the solution.</td>
</tr>
<tr>
<td>Designers identify the problem to be addressed and then look up the prescribed</td>
<td>Defines the problem and allow the designer to devise the solution.</td>
</tr>
<tr>
<td></td>
<td>Object: What is to be accomplished?</td>
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<tr>
<td></td>
<td>Functional Statement: Why do we want to accomplish this?</td>
</tr>
<tr>
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<td>Performance Requirement: How is this to be accomplished?</td>
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Prescriptive

Guardrail heights are prescribed to be 42” high and are required when adjacent changes in grade exceed 30”

Performance Based

Smoke control systems which require detailed calculations and modeling
Codes Limit Self-Expression

Codes are Incremental in Nature

Codes Become Ingrained in Design
Codes Limit the Self-Expression
Codes Limit the Self-Expression

Building Codes
Codes Limit the Self-Expression

Building Codes
Codes Limit the Self-Expression

THE HANNOVER PRINCIPLES
DESIGN FOR SUSTAINABILITY

FOR THE CITY OF HANNOVER GERMANY FOR EXPO 2000, THE WORLD'S FAIR
1. RESPECT RIGHTS OF HUMANITY AND NATURE TO CO-EXIST IN A HEALTHY,
   SUPPORTIVE, DIVERSE AND SUSTAINABLE CONDITION. 2. RECOGNIZE
   INTERDEPENDENCE, THE ELEMENTS OF HUMAN DESIGN INTERACT WITH
   AND DEPEND UPON THE NATURAL WORLD WITH BROAD AND DIVERSE
   IMPLICATIONS AT EVERY SCALE. EXPAND DESIGN CONSIDERATIONS TO
   RECOGNIZE EVEN DISTANT EFFECTS. 3. RESPECT RELATIONSHIPS
   BETWEEN SPIRIT AND MATTER. CONSIDER ALL ASPECTS OF HUMAN SETTLE
   MENTS INCLUDING COMMUNITY, DWELLING, INDUSTRY AND TRADE IN
   TERMS OF EXISTING AND EVOLVING CONNECTIONS BETWEEN SPIRITUAL
   AND MATERIAL CONSCIOUSNESS. 4. ACCEPT RESPONSIBILITY FOR THE
   CONSEQUENCES OF DESIGN DECISIONS UPON HUMAN WELL-BEING, THE
   VIABILITY OF NATURAL SYSTEMS AND THEIR RIGHT TO EXIST. 5. CREATE
   SAFE OBJECTS OF LONG-TERM VALUE. DO NOT BURDEN FUTURE GENERA-
   TIONS WITH REQUIREMENTS FOR MAINTENANCE OR VIGILANT ADMINIS-
   TRATION OF POTENTIAL DANGER DUE TO THE CARELESS CREATION OF
   PRODUCTS, PROCESSES OR STANDARDS. 6. ELIMINATE THE CONCEPT OF

WASTE, EVALUATE AND OPTIMIZE THE FULL LIFE-CYCLE OF PRODUCTS
AND PROCESSES TO APPROACH THE STATE OF NATURAL SYSTEMS, IN
WHICH THERE IS NO WASTE. 7. RELY ON NATURAL ENERGY FLOWS, HUMAN
DESIGNS SHOULD, LIKE THE LIVING WORLD, DERIVE THEIR CREATIVE
FORCES FROM PERPETUAL SOLAR INCOME. INCORPORATE THIS ENERGY
EFFICIENTLY AND SAFELY FOR RESPONSIBLE USE. 8. UNDERSTAND THE
LIMITATIONS OF DESIGN. NO HUMAN CREATION LASTS FOREVER AND DESIGN
DOES NOT SOLVE ALL PROBLEMS. THOSE WHO CREATE AND PLAN SHOULD
PRACTICE HUMILITY IN THE FACE OF NATURE TREAT NATURE AS A MODEL
AND MENTOR NOT AS A SLAVES AND INCONVENIENCE TO BE ELIMINATED OR CONTROLLED
9. SEEK CONSTANT IMPROVEMENT BY THE SHARING OF KNOWLEDGE
ENCOURAGE DIRECT AND OPEN COMMUNICATION BETWEEN COLLEAGUES
PATTERNS, MANUFACTURERS AND USERS TO LINK LONG-TERM SUSTAINABLE
CONSIDERATIONS WITH ETHICAL RESPONSIBILITY AND RE-ESTABLISH THE
INTEGRAL RELATIONSHIP BETWEEN NATURAL PROCESSES AND HUMAN
ACTIVITY. THE HANNOVER PRINCIPLES SHOULD BE SEEN AS A LIVING
DOCUMENT COMMITTED TO THE TRANSFORMATION AND GROWTH IN
THE UNDERSTANDING OF OUR INTERDEPENDENCE WITH NATURE, SO
THAT THEY MAY ADAPT AS OUR KNOWLEDGE OF THE WORLD EVOLVES

BY WILLIAM McDOMOUGH ARCHITECTS
Codes Limit Self-Expression

Codes Become Ingrained in Design

Understand code in a larger context of our society.

Codes are Incremental in Nature
Codes are Incremental in Nature
Codes are Incremental in Nature
Codes Limit Self-Expression

Understand code in a larger context of our society.

Codes are Incremental in Nature

Integration into the design process. Understand Intent.

Codes Become Ingrained in Design
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<td>Codes Become Ingrained in Design</td>
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Questions

1. Do we understand how pervasive codes are in shaping the buildings we create?

2. Do we view codes as onerous and barriers to free undertaking of design?

3. Should we be more interested in the production of codes, or more engaged with their mandates?