

FACILITIES INFRASTRUCTURE RENEWAL MODEL (FIRM)

SUBSYSTEM ELEMENTS AND LIFE CYCLES

A. ROOFING (Note 1)

LIFE CYCLE: 25 YEARS

- Membrane, single ply, built-up, or shingle roofing
- Sheet metal flashing
- Rigid insulation at roof
- Roof hatches
- Skylights
- Applied membranes at roofs and decks

B. BUILDING EXTERIORS, DOORS, WINDOWS (HARD) LIFE CYCLE: 30 YEARS

- Prestressed concrete, brick or cinderblock exteriors
- Exterior doors and door hardware
- Exterior windows, frames, glass and glazing
- Caulking and sealant
- Brick pointing
- Railings

C. ELEVATORS AND CONVEYING SYSTEMS

LIFE CYCLE: 25 YEARS

- Elevators, escalators, and dumbwaiters
- Cables
- Control Systems
- Pneumatic tubes
- Any vertical, motorized transportation (both hydraulic and traction)

D. HVAC - EQUIPMENT / CONTROLS

LIFE CYCLE: 30 YEARS

- Exchangers and circulating pumps
- Fan coil units
- Condensing units
- Exhaust and ventilation units
- Direct Digital Controls, Energy Management Systems
- Pneumatic, temperature controls

E. HVAC - DISTRIBUTION SYSTEMS

LIFE CYCLE: 50 YEARS

- Ductwork
- Grilles, diffusers, piping, storage and insulation

F. ELECTRICAL EQUIPMENT

LIFE CYCLE: 25 YEARS

- Building transformers, service panels and fuses
- Emergency power within the building

- Light fixtures
- Power receptacles
- Fire alarm detection devices, horns, strobes, heat detectors, pull stations

G. PLUMBING FIXTURES

LIFE CYCLE: 30 YEARS

- Water closets, lavatories, service sinks, drinking fountains and showers
- Laboratory sinks, eye washes and fixtures
- Water heaters
- Floor and roof drains
- Condensate drain piping

H. FIRE PROTECTION SYSTEMS

LIFE CYCLE: 40 YEARS

- Fire sprinkler systems
- Gas or halon systems

I. BUILT-IN EQUIPMENT & SPECIALTIES

LIFE CYCLE: 25 YEARS

- Casework and shelving, bench tops
- Chalk boards, marker boards and tackable wall surfaces
- Operable partitions
- Fume hoods
- Laboratory, medical equipment, etc.
- Autoclaves, glassware washers
- Cold rooms, dark room equipment

J. INTERIOR FINISHES: WALLS, FLOORS, DOORS

LIFE CYCLE: 15 YEARS

- Vinyl wall covering
- Interior doors and hardware
- Carpet and resilient flooring

K. PAINTING - PUBLIC AREAS

LIFE CYCLE: 15 YEARS

- Painting
- Public Areas includes hallways, public restrooms, lobbies, classrooms, stairwells, entryways, etc. (Approximately 25% of GSF.)

L. FOUNDATIONS

LIFE CYCLE: LIFETIME

- Basement excavation and disposal of excavated material
- Temporary or permanent shoring for support of excavation at below-grade structure
- Concrete piles, piers, footings, grade beams, caissons

M. VERTICAL ELEMENTS

LIFE CYCLE: LIFETIME

- All columns and pilasters
- All exterior wall framing including plaster, gypsum board and insulation
- Applied fire proofing
- Stairs with at least one-story height

N. HORIZONTAL ELEMENTS

- Grade and non-grade floors
- Beams, girders, trusses, joists and decking
- Concrete topping slabs
- All roof and ceiling framing
- Applied fire proofing
- Ceiling insulation

LIFE CYCLE: LIFETIME

O. INTERIOR PARTITIONS

- Interior wall framing including gypsum wall board
- Insulation
- Non-wear finishes such as gypsum board, acoustical tiles, plaster soffits and ceramic tile
- Interior windows, glass and glazing

LIFE CYCLE: LIFETIME

P. PLUMBING ROUGH-IN

- Sanitary sewer waste and vent piping
- Domestic and industrial water supply
- Air, gas and vacuum piping
- All building service piping within 5 feet of building

LIFE CYCLE: LIFETIME

Q. ELECTRICAL - ROUGH-IN

- Conduit and wire

LIFE CYCLE: LIFETIME

R. SITE PREPARATION

- Site clearing and grading
- Site demolition
- Hazardous material abatement

LIFE CYCLE: NA

S. SITE DEVELOPMENT - SOFTSCAPE (Note 2)

- Landscaping
- Irrigation

LIFE CYCLE: Infrastructure

T. SITE DEVELOPMENT - HARDSCAPE

- Concrete sidewalks, curbs, gutters and paving
- Asphalt paving and parking
- Fencing and gates
- Site furniture, art, signage

LIFE CYCLE: Infrastructure

U. SITE UTILITIES - EQUIPMENT (Note 3)

- Site main switchboards and switchgear
- Site transformers
- Electric substations
- Storm or sewer lift stations
- Site pumps and generators
- Local chillers and boilers

LIFE CYCLE: Infrastructure

- Rooftop AC and heating units
- Window units
- Furnaces

V. SITE UTILITIES - DISTRIBUTION

LIFE CYCLE: Infrastructure

- Electrical conduit, wire, manholes, pull boxes to within 5' of the building
- Storm, sewer, gas and water lines to within 5' of the building
- Chilled water and steam supply and return piping to within 5' of the building
- Communication systems conduit and pull boxes to within 5' of the building

W. MARK UPS

- General conditions, contractor's administration costs
- Overhead and profit, fee for profit of performing work
- Insurance and bonds
- Escalation
- Contingency or market factor

X. REMOVAL COSTS

- Cost allowance associated with removing old and worn out system prior to renewal
- Do not include removal of associated systems in the vicinity of system to be removed

Y. SOFT COSTS

- Costs associated with design, management and inspection of renewal project
- Design fee, approximately 10 percent of construction costs
- Management and inspection, approximately 3.5 percent of construction costs
- Specifications and bidding, approximately 1.5 percent of construction costs
- Construction contingency, approximately 5 percent of construction costs

Notes:

1. Roofing excludes tile roofing (which is assumed to have a life cycle of 65 years or greater) and metal roofing (there is very little metal roofing on the UC campuses).
2. Infrastructure (utility generation systems, utility distribution systems, hardscape and softscape) is treated separately and included as an averaged annual amount.
3. Site Utilities - Equipment includes many items that are typically included in item D, HVAC - Equipment and Controls for the building. These are included in this category in order to keep campuses with very different utility plans (i.e., local building vs. central) equivalent.