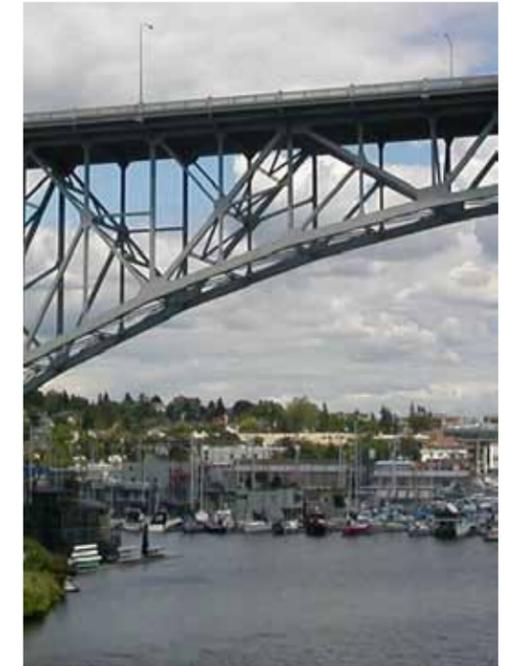


SR 99 AURORA AVENUE BRIDGE FENCE

Design Committee

Work Book



DRAFT
9 2008
PDK

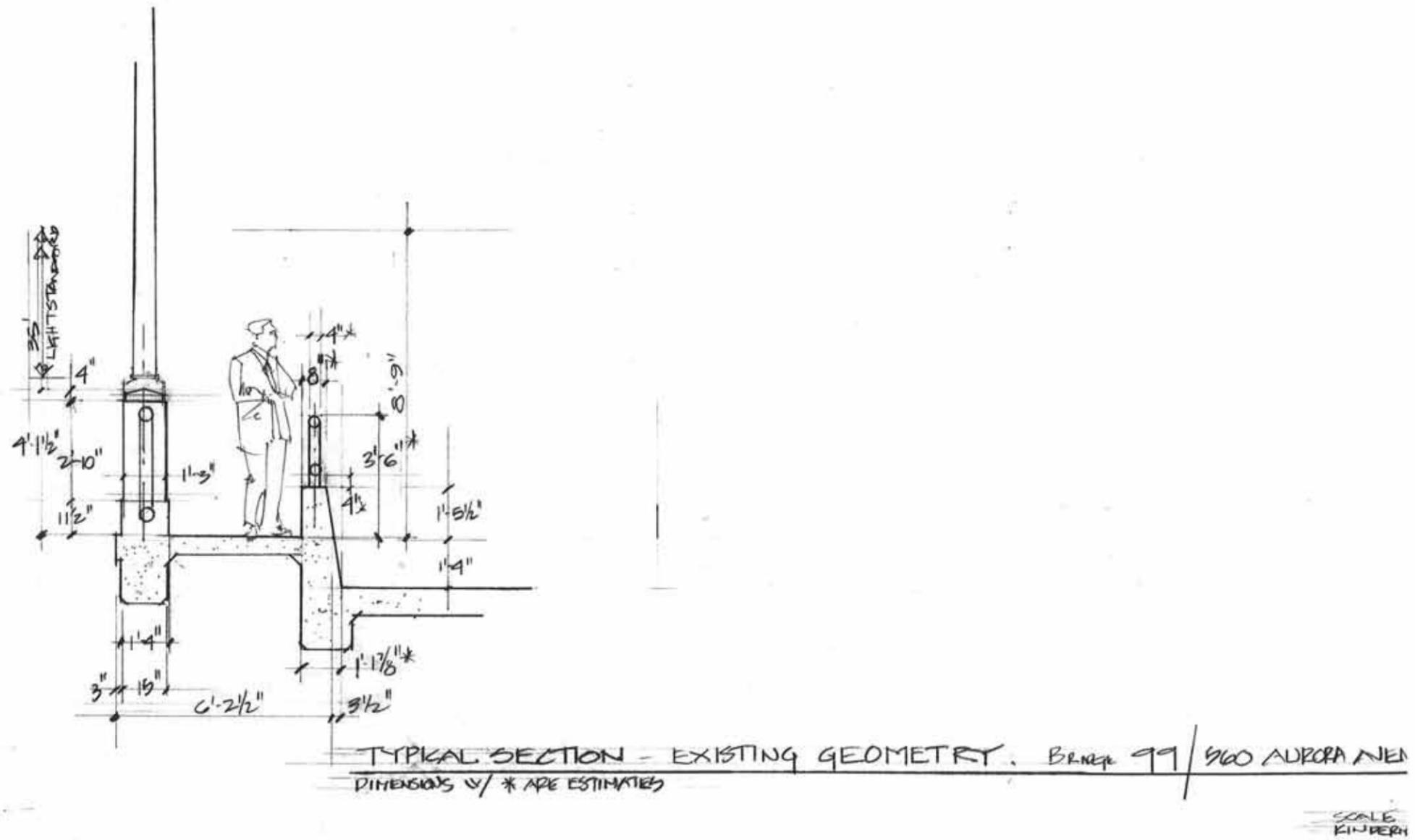
Index

Page

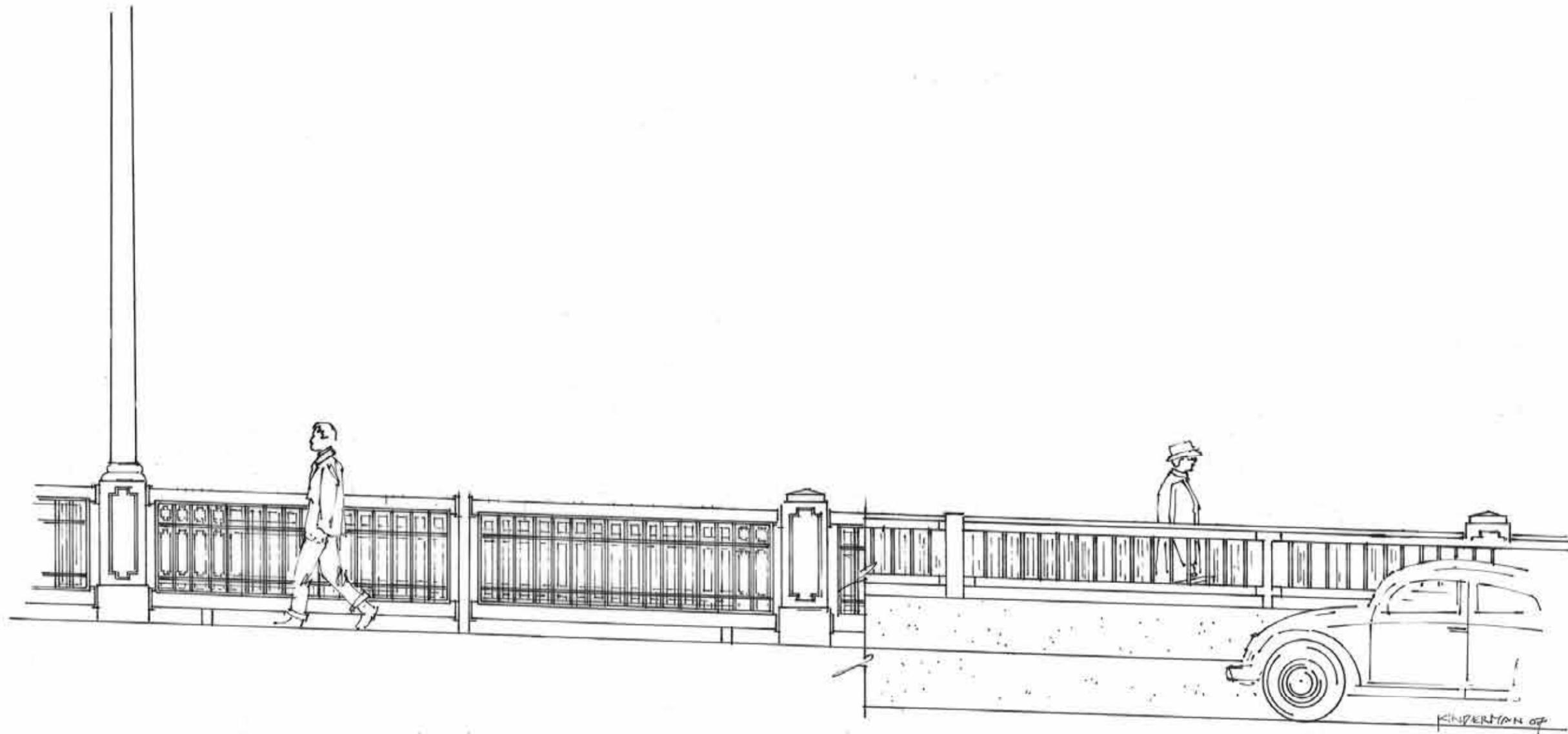
• Existing Conditions	• 3
• Design for the Secretary of Transportation	• 7
• Design for the state Legislature	• 8
• Designs from the Community Conceptual Design Report 2007	• 11
• City of Seattle Standard Lighting	• 16
• Anthropometric Data	• 18
• First Designs after the Community Conceptual Design Report	• 21
• Post Advisory Committee Meetings 1 and 2	• 28
• Post Advisory Committee Meeting 3	• 35
• Post Advisory Committee Meeting 4	• 42

Existing Geometry

- Typical Section of sidewalk
- Elevation View from the Roadway



Existing Typical Section

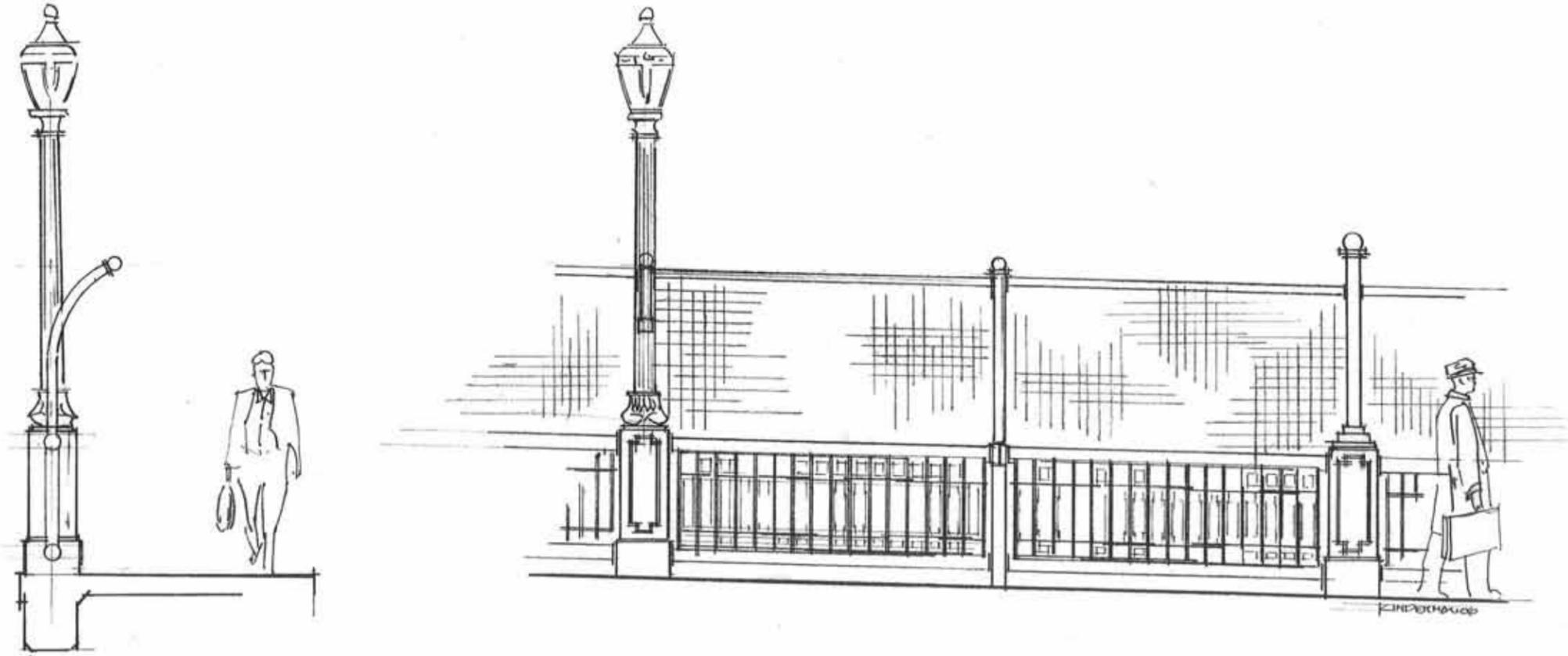


Existing Elevation

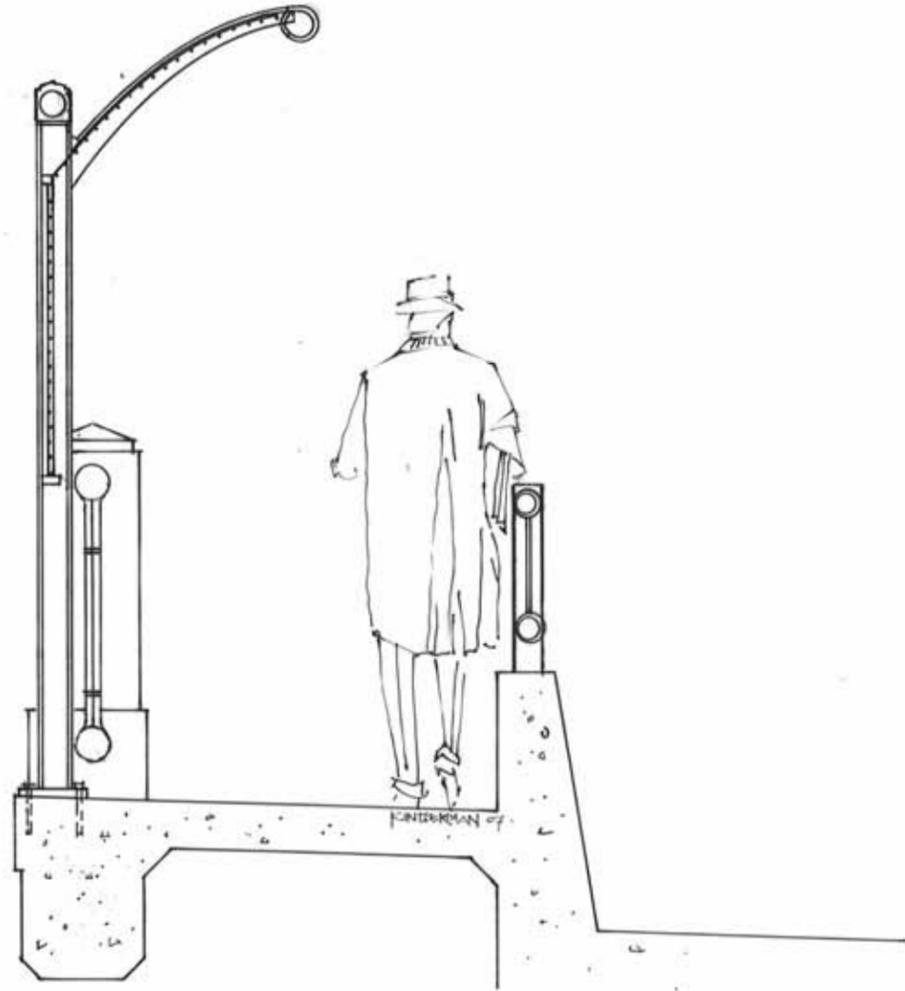
Preliminary Design Concepts

Provided during the early project funding phases

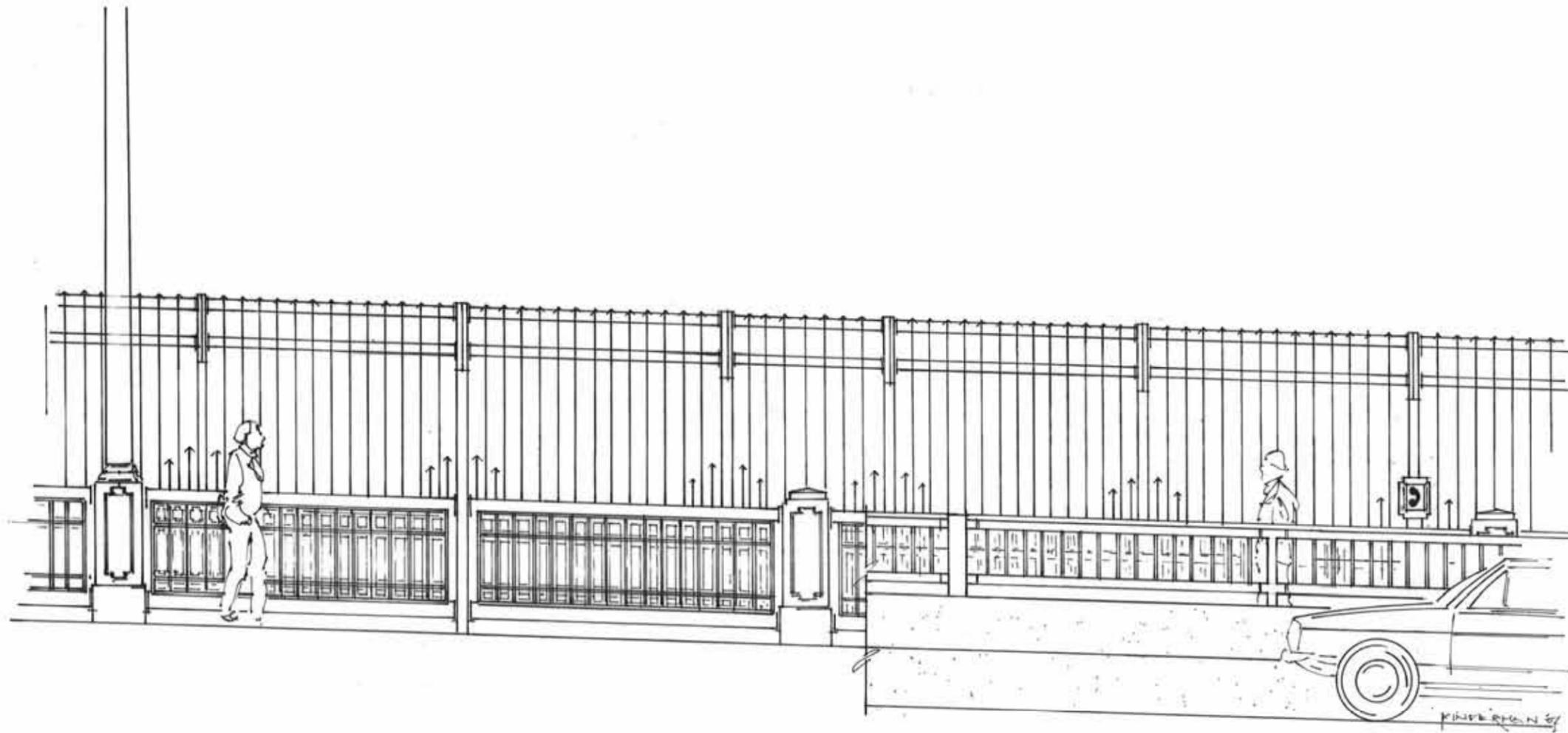
- Design for the Secretary of Transportation
- Design for the Washington State Legislature



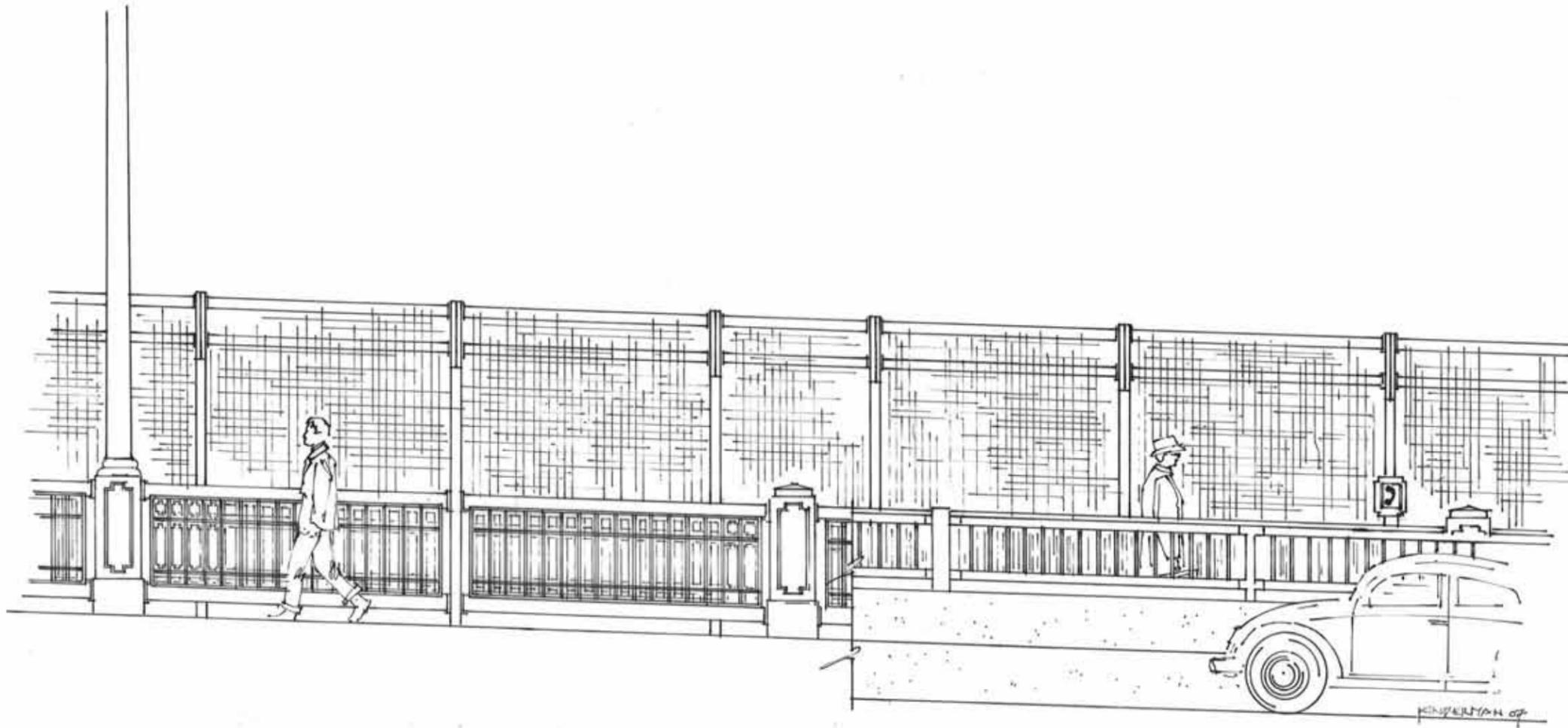
Design for the Secretary of Transportation



Design for the State Legislature



Design with Bars for the State Legislature

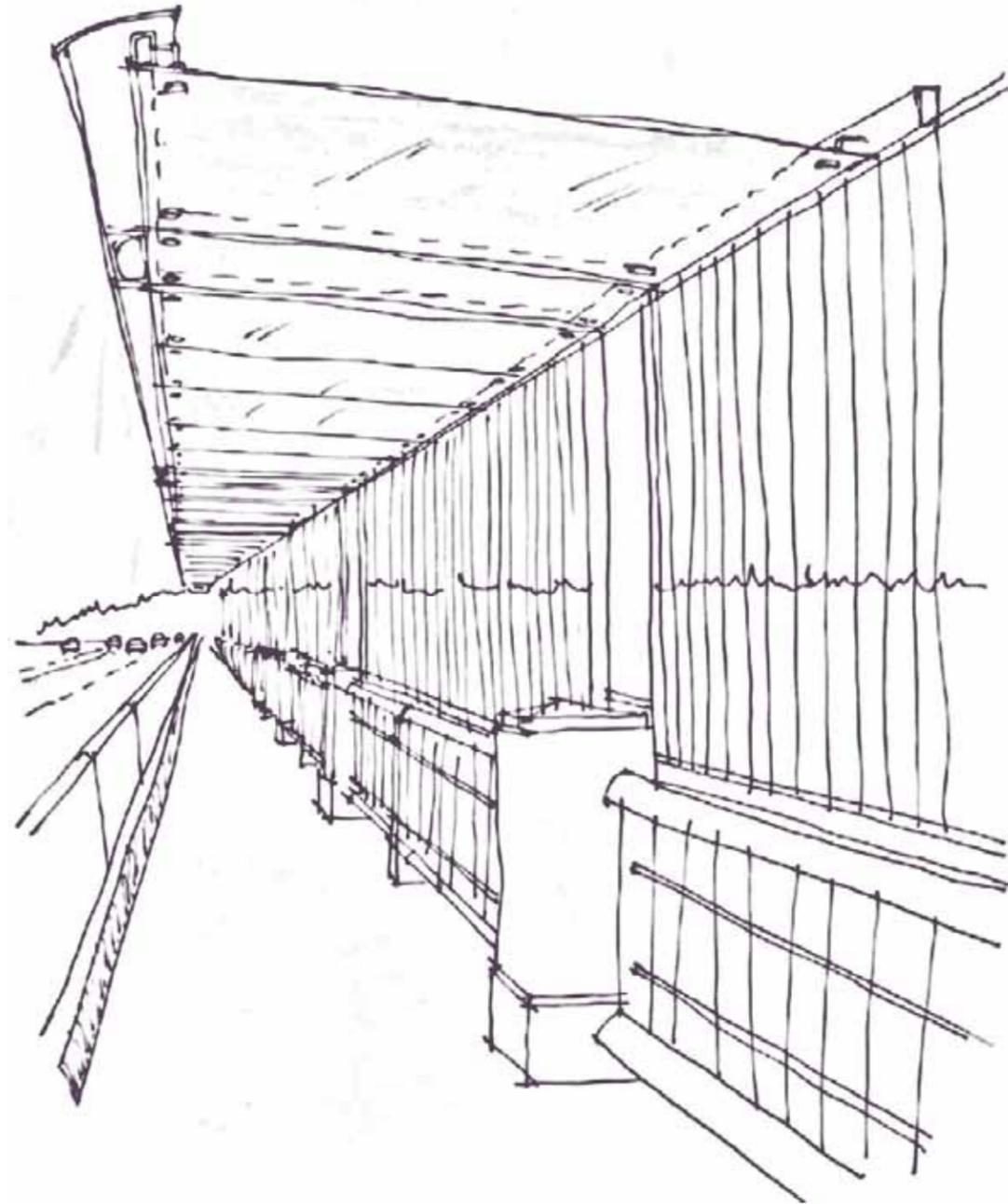


Design with screen for the State Legislature

Design Concepts

- Designs concepts from the *Community Conceptual Design Report 2007* to be integrated into the final design

Vertical Elements



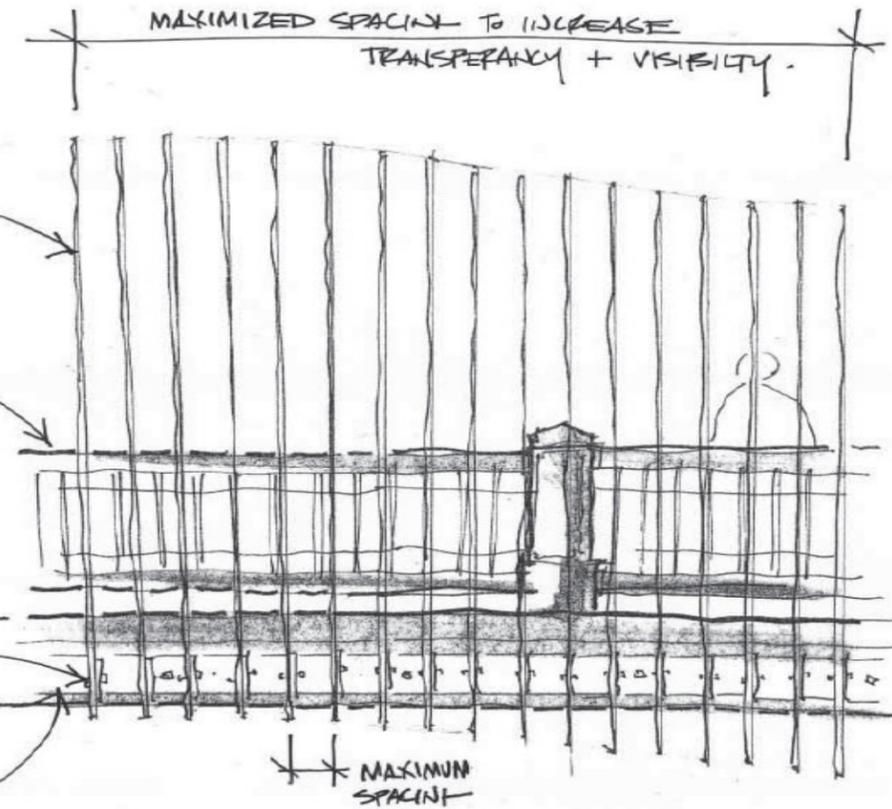
A SERIES OF
REPEATING METAL
RODS FORM THE
SIMPLE + EFFECTIVE
BARRIER.

EXISTING
HISTORIC RAILING

SIDEWALK

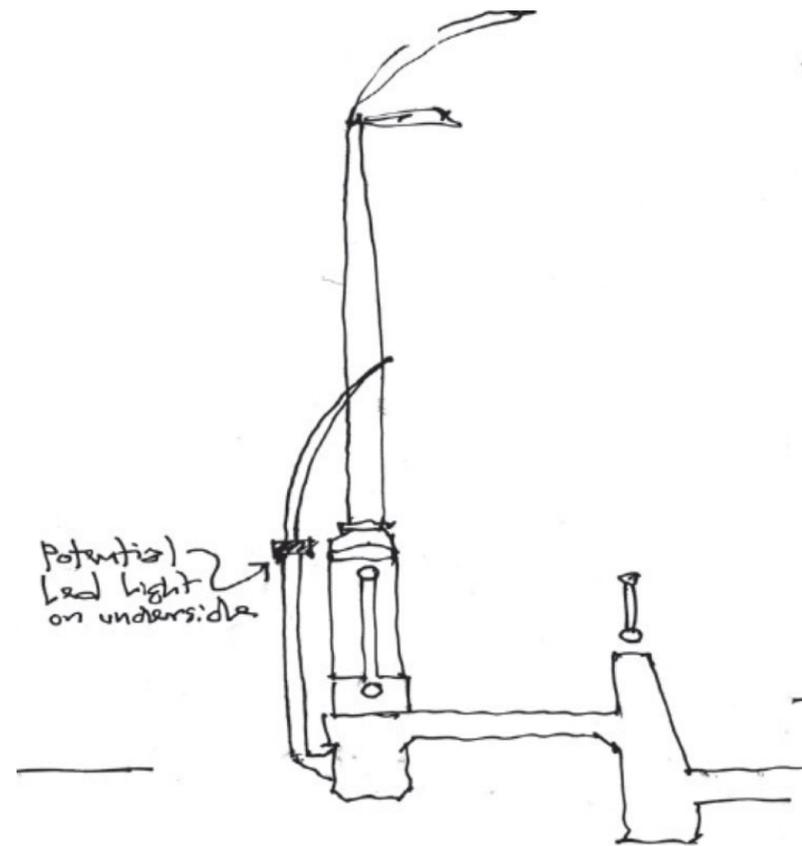
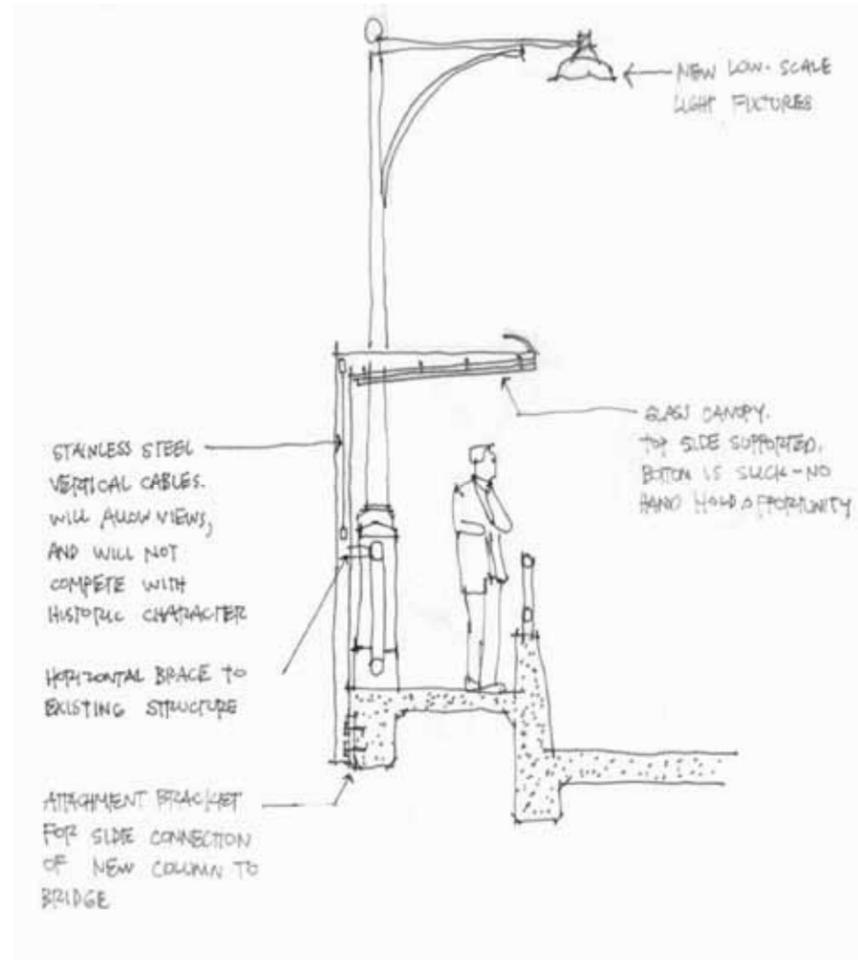
ATTACHMENT POINT

CONTINUOUS PLATE
STEEL ATTACHMENT

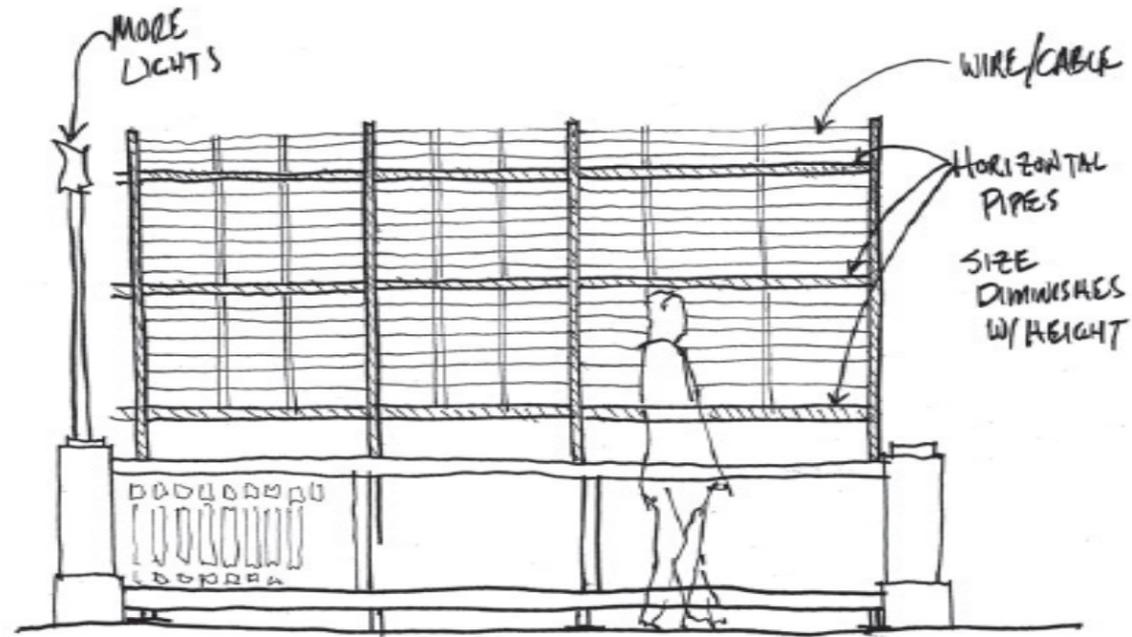




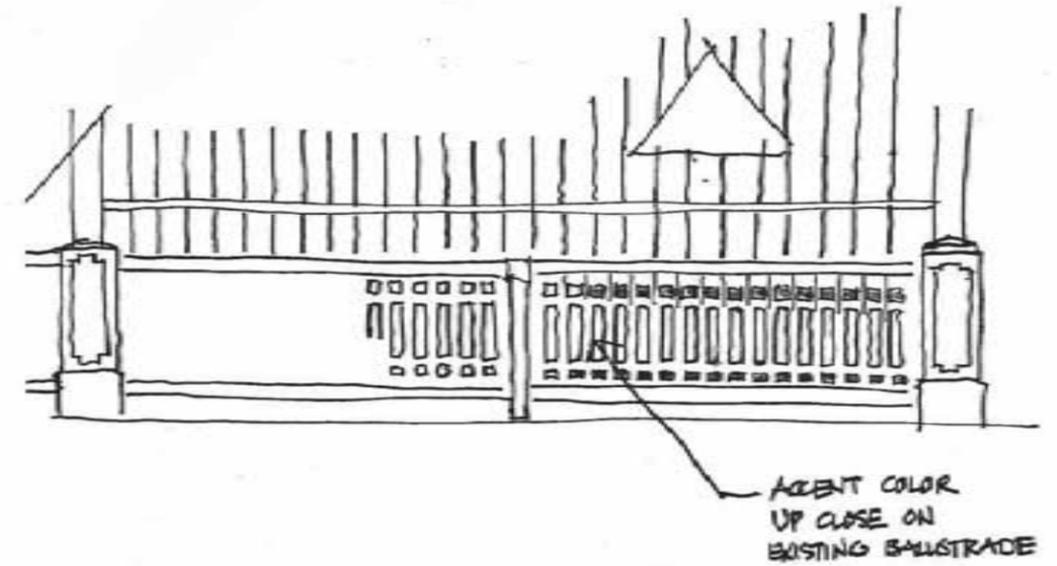
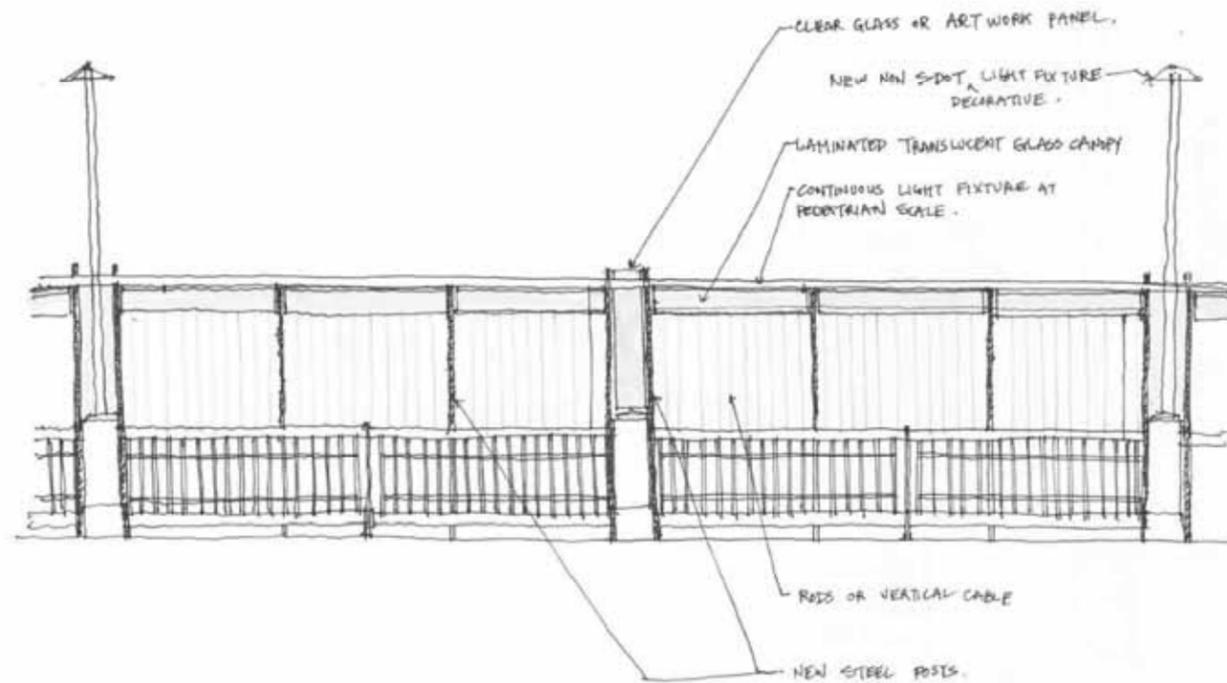
Pedestrian Lighting



Historic Character



Pedestrian Scale



City of Seattle Lighting Standards

- Standard lights from the City's Right of Way Manual



Z11



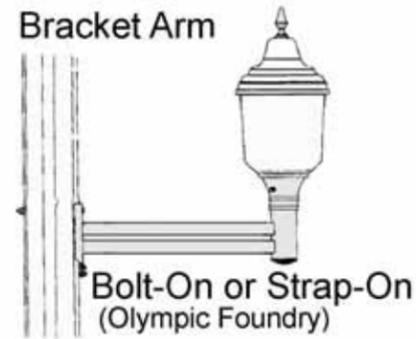
Z15



Z40



Z47A



Colors



BKTX, Textured Black



GYTX, Textured Grey

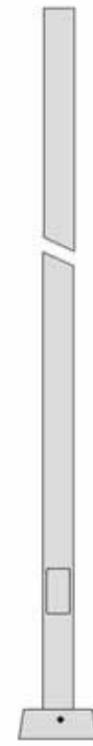


GN8TX, Textured Dark Green

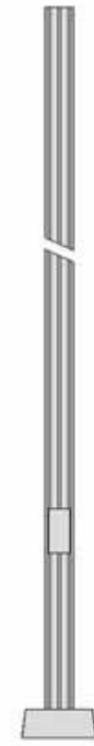


BRTX, Textured Bronze

Poles
and
Bases



APR4



P134A



B104



B40

Preapproved Manufacturer - Lumec

City of Seattle Pedestrian Lighting Design Standards

- City of Seattle Right of Way Manual figure 4-21

Anthropometric Data

- Human Dimensions

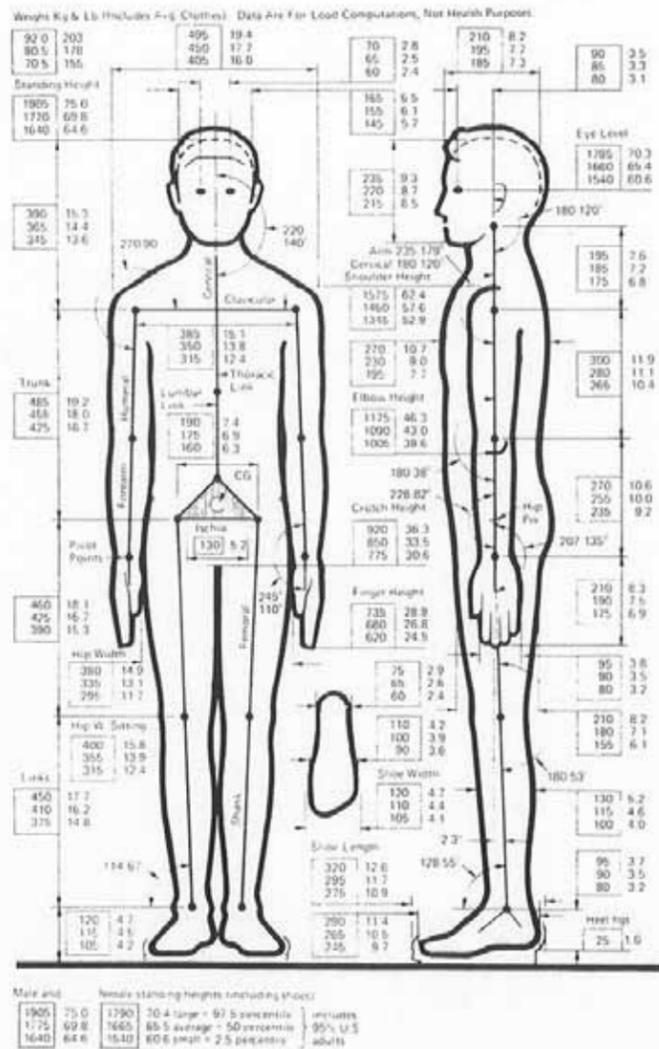
INTRODUCTION TO
ANTHROPOMETRIC DATA

The following anthropometric drawings show three values for each measurement: the top figure is for the large person or 97.5 percentile; the middle figure, the average person or 50 percentile; and the lower figure, the small person or 2.5 percentile. The chosen extreme percentiles thus include 95%. The remaining 5% include some who learn to adapt and others, not adequately represented, who are excluded to keep designs for the majority from becoming too complex and expensive. Space and access charts are designed to accept the 97.5 percentile large man and will cover all adults except a few giants. Therefore, use the 97.5 percentile to determine space envelopes, the 2.5 percentile to establish control and display heights. To accommodate both men and women, it is useful at times to add a dimension of the large man to the corresponding dimension of the small woman and divide by 2 to obtain data for the average adult. This is the way height standards evolve. Youth data are for combined sex. Although girls and boys do not grow at the same

rate, differences are small when compared with size variations.

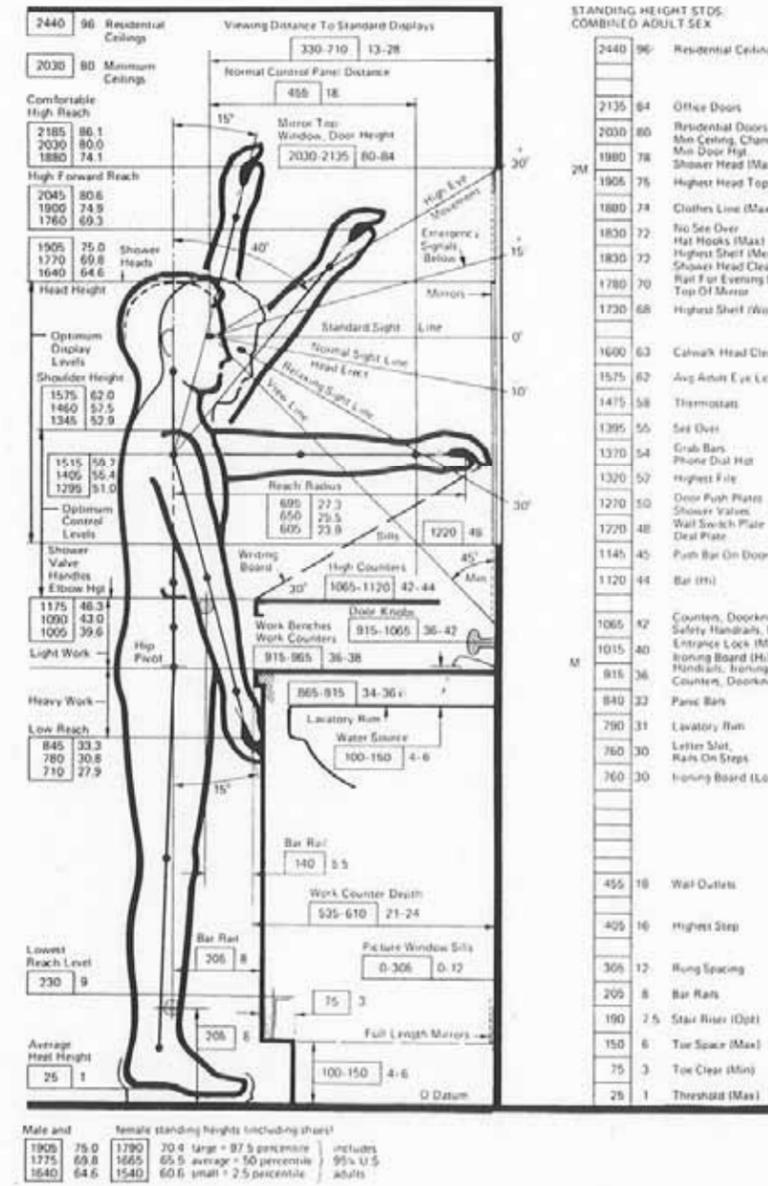
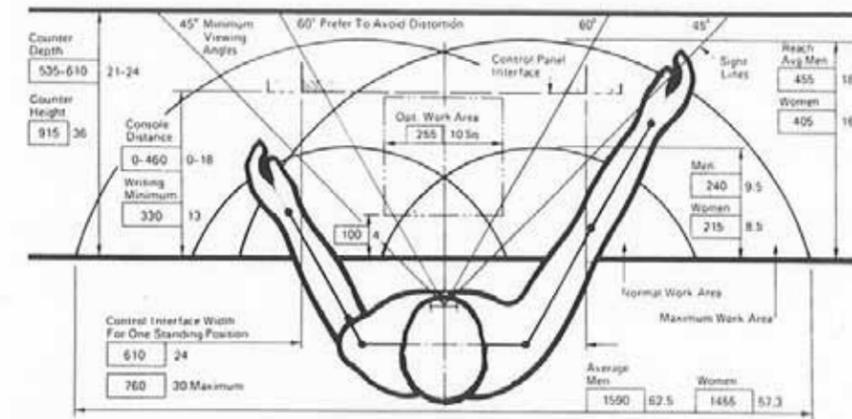
Pivot point and link systems make it easy to construct articulating templates and manikins. Links are simplified bones. The spine is shown as a single link; since it can flex, pivot points may be added. All human joints are not simple pivots, though it is convenient to assume so. Some move in complicated patterns like the roving shoulder. Reaches shown are easy and comfortable; additional reach is possible by bending and rotating the trunk and by extending the shoulder. Stooping to reach low is better than stretching to reach high. The dynamic body may need 10% more space than the static posture allows. Shoes have been included in all measurements; allowance may need to be made for heavy clothing. Sight lines and angles of vision given in one place or another apply to all persons.

The metric system of measurement has been included, since it is used in scientific work everywhere and is the most practical system of measurement ever devised. Millimeters have been chosen to avoid use of decimals. Rounding to 5 mm aids mental retention while being within the tolerance of most human measurements.



Niels Diffrient, Alvin R. Tilley, Henry Dreyfuss Associates, New York, New York

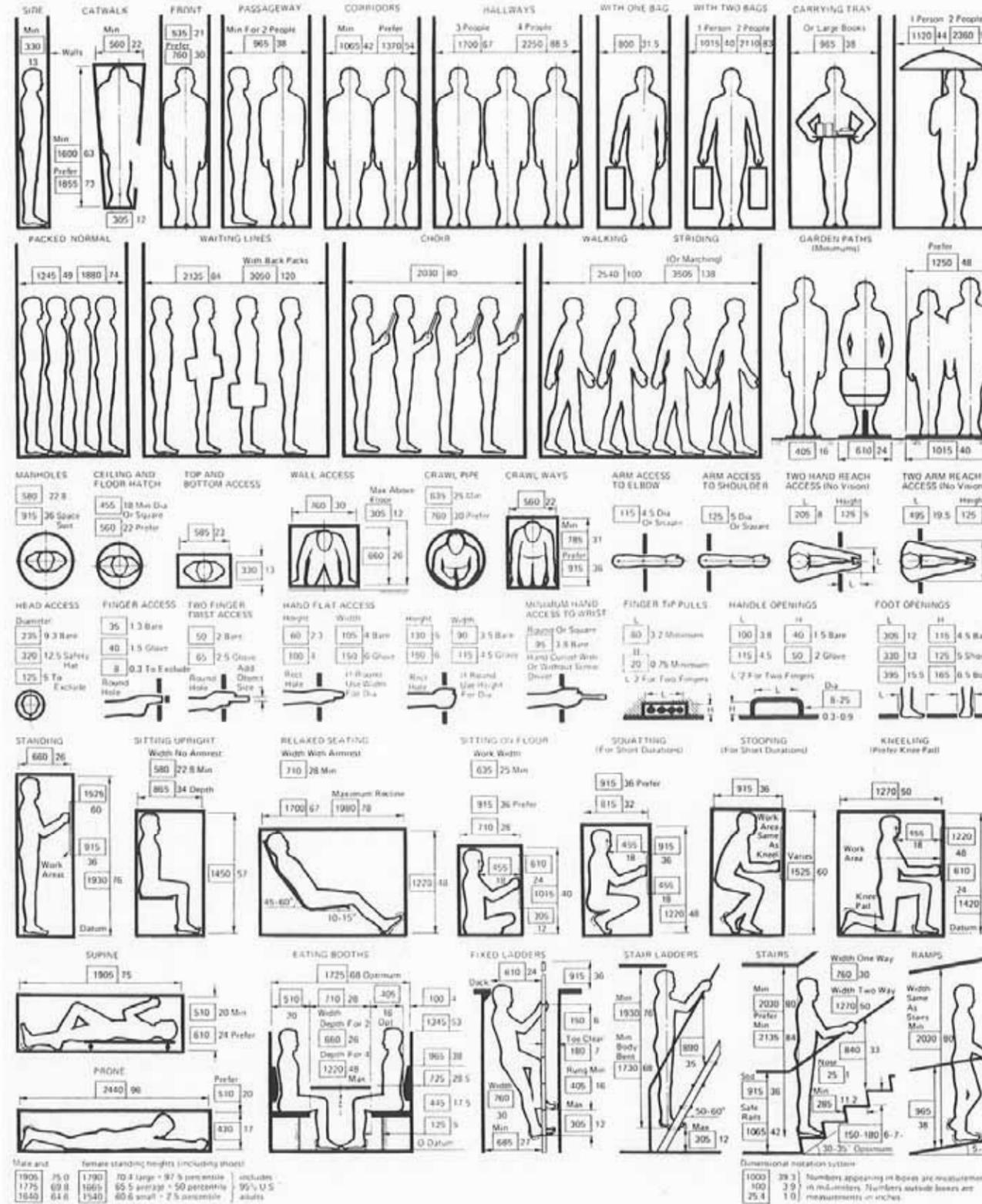
1 HUMAN DIMENSIONS



Niels Diffrient, Alvin R. Tilley, Henry Dreyfuss Associates, New York, New York

1 HUMAN DIMENSIONS

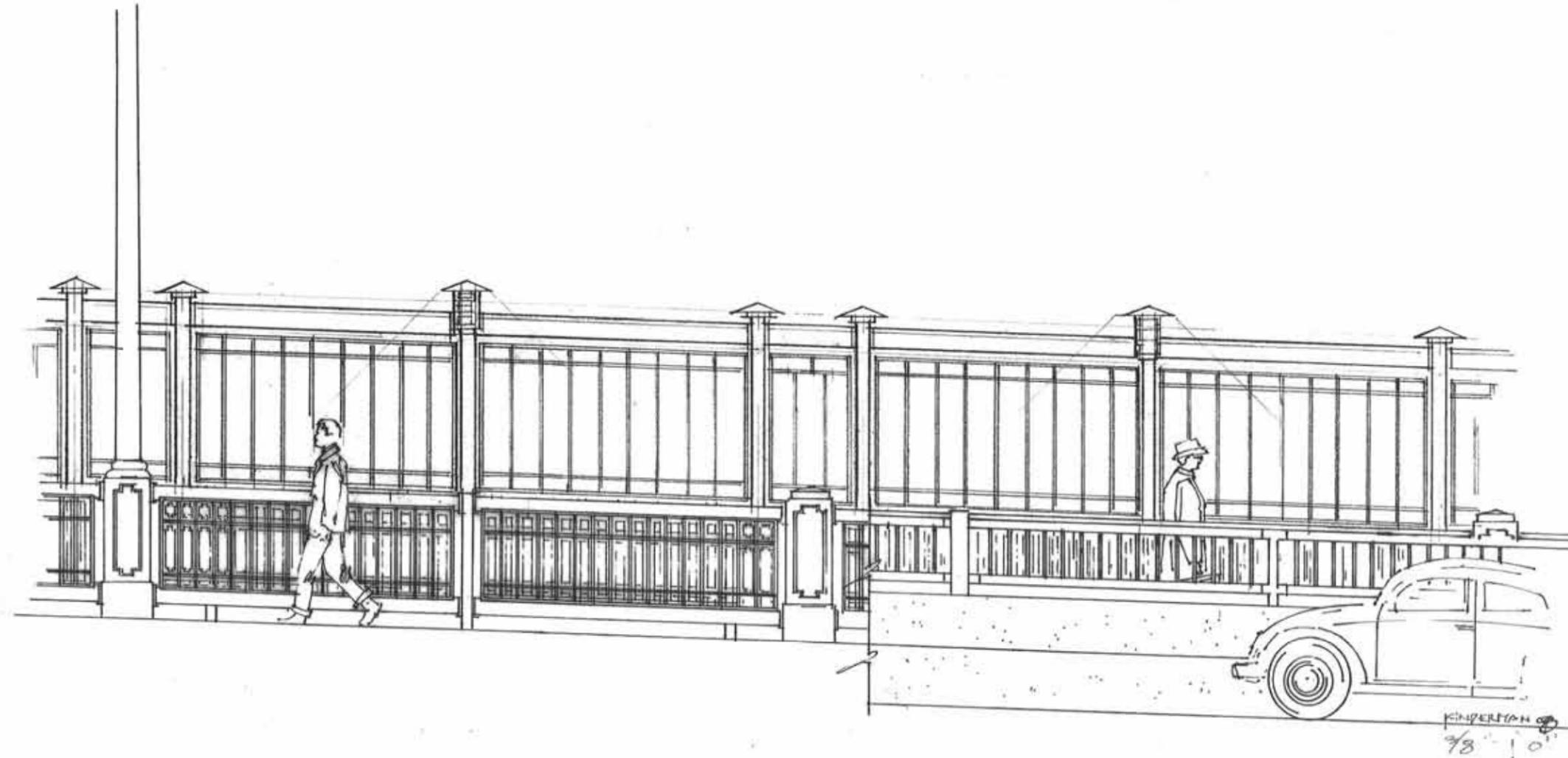
Anthropometric Data



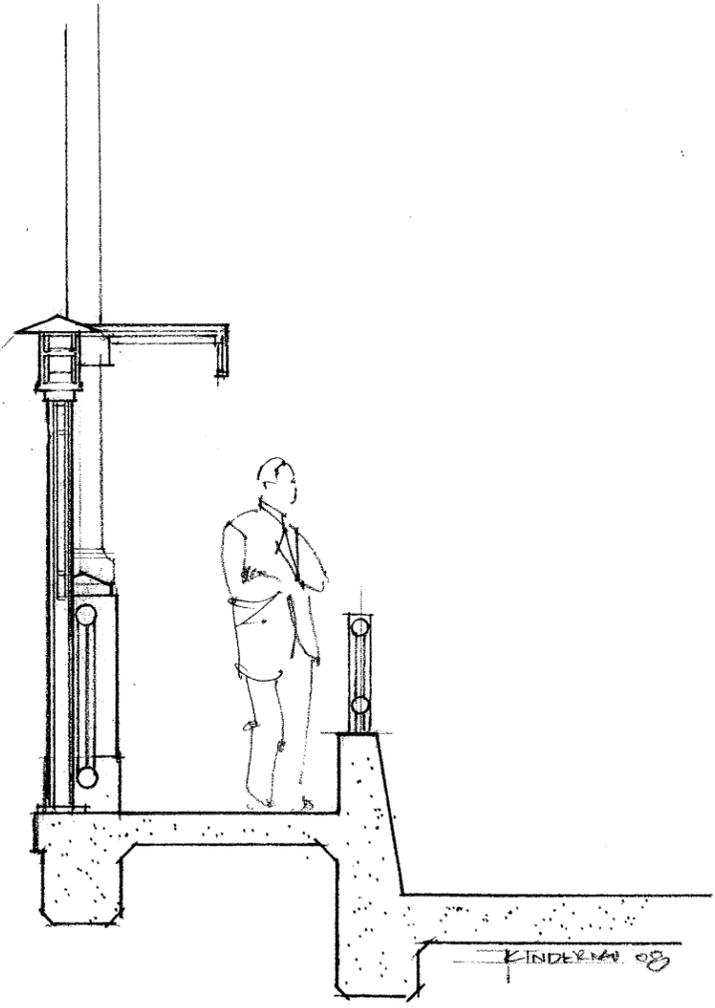
Info Diffrent, Alvin R. Tilley, Henry Dreyfuss Associates, New York, New York

Design Concepts

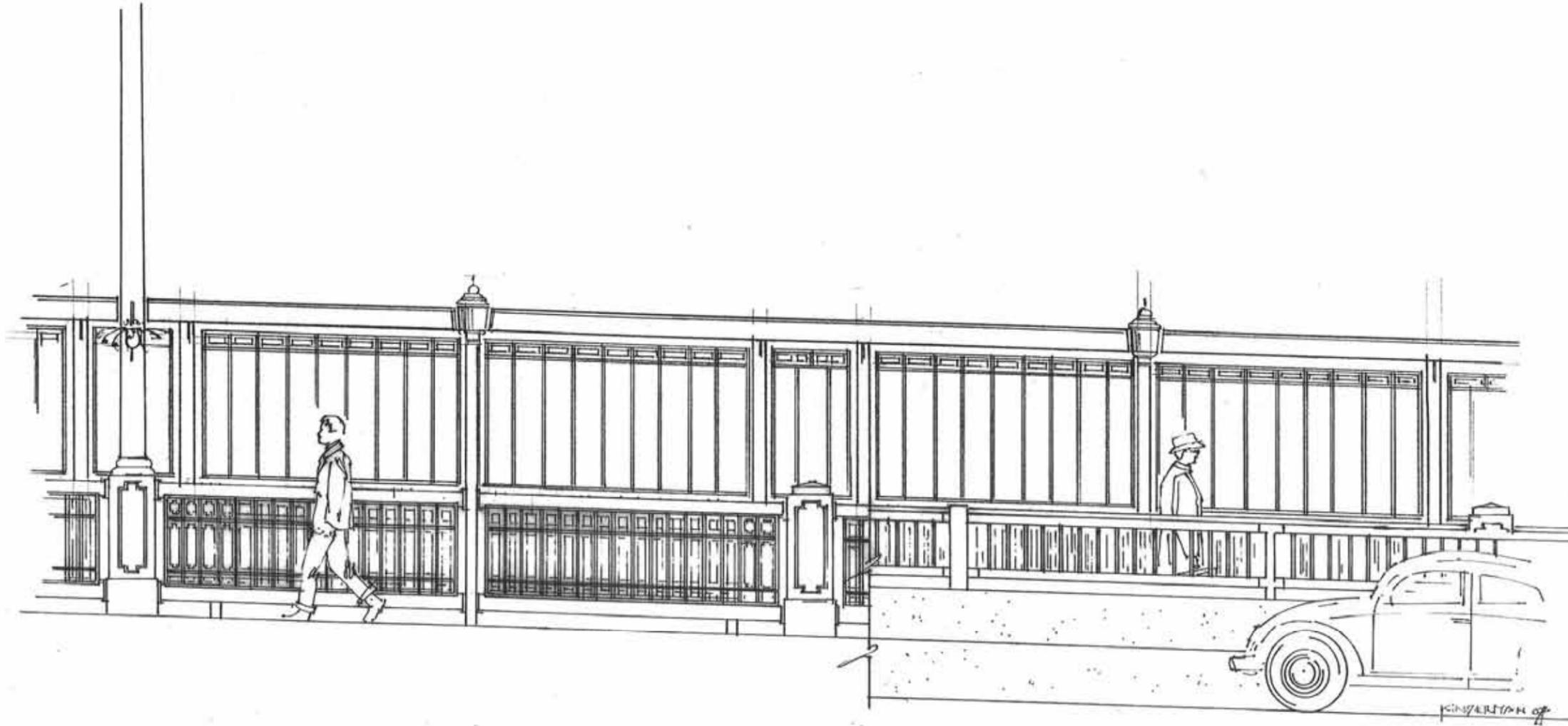
- First designs following the *Community Conceptual Design Report 2007*



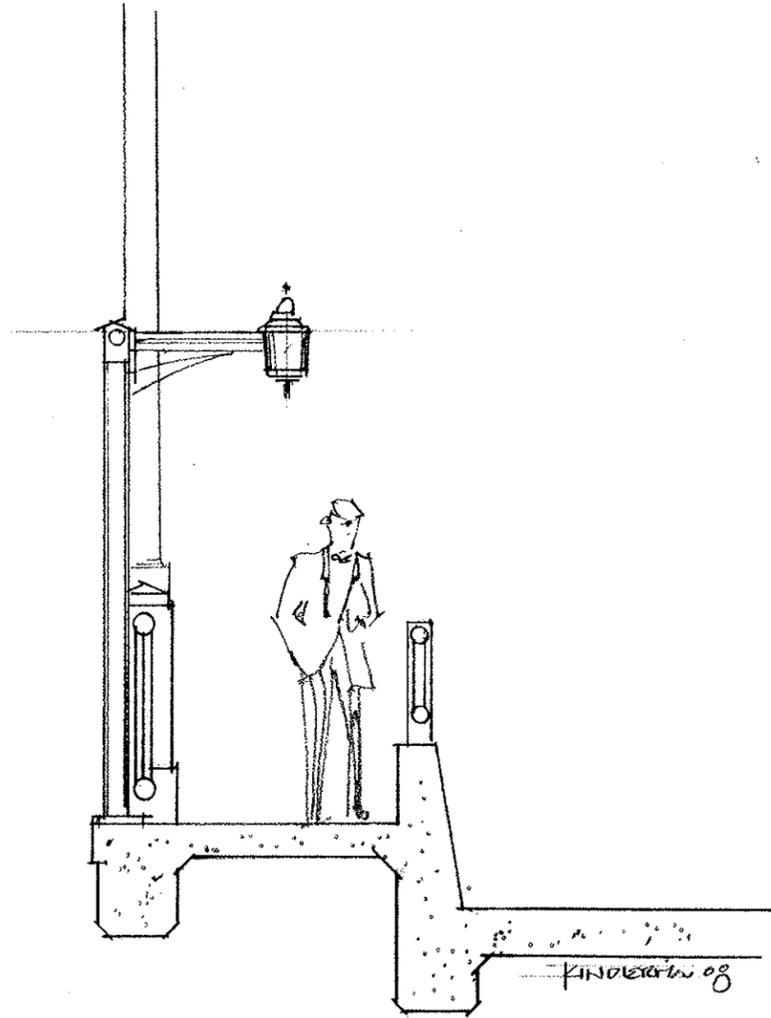
Concept A
Classic Fence with Pedestrian Lights
Niland Aspen Series light standard similar



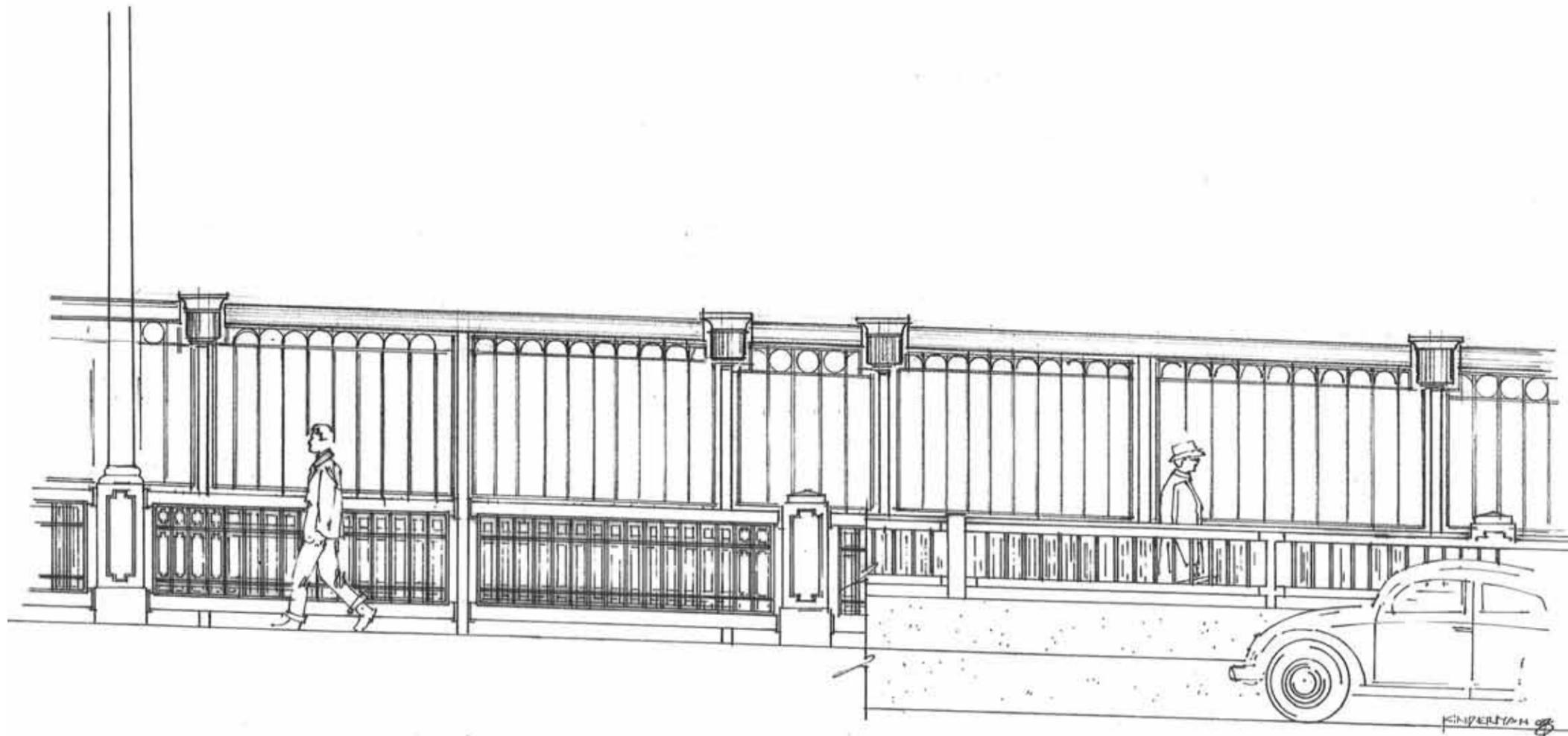
Concept A Typical Section
Classic Fence with Pedestrian Lights
Niland Aspen Series light standard similar



Concept B
Classic Fence with Pedestrian Lights
Lumec Z47A light standard similar



Concept B Typical Section
Classic Fence with Pedestrian Lights
Lumec Z47A light standard similar



Concept C
Classic Fence with Pedestrian Lights
Lumec Z11 light standard similar



**Concept C Typical Section
Classic Fence with Pedestrian Lights
Lumec Z11 light standard similar**

Post Advisory Committee Meetings 1 & 2

.

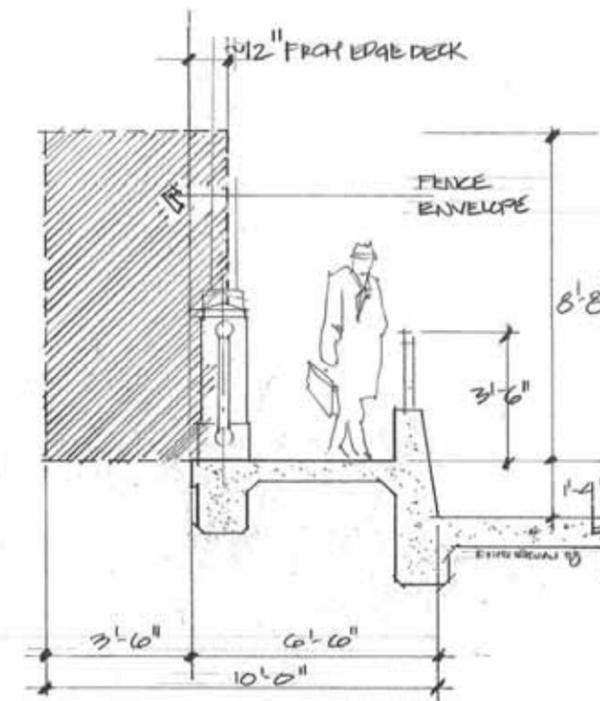
Design Considerations

Qualitative

- Use vertical elements as the main fence safety feature.
- Do not use mesh or wire fabric.
- The elements should be stainless steel wire rope or rods. Small diameters contribute to visibility from the bridge.
- The fence may extend only slightly 'outward' toward the water to provide a more 'open' experience for pedestrians. However, not required beyond that of a reasonable structural installation.
- The fence should have an overhang to discourage climbing. Recognize the 'face validity' of such an assembly. Although climbable by some, the overhang may be perceived as difficult to climb.
- The climb ability of the existing rail should be taken into account. Designs should discourage access to the fence top from the top rail or posts.
- Pedestrian lighting, if used, should be low wattage and essentially decorative.

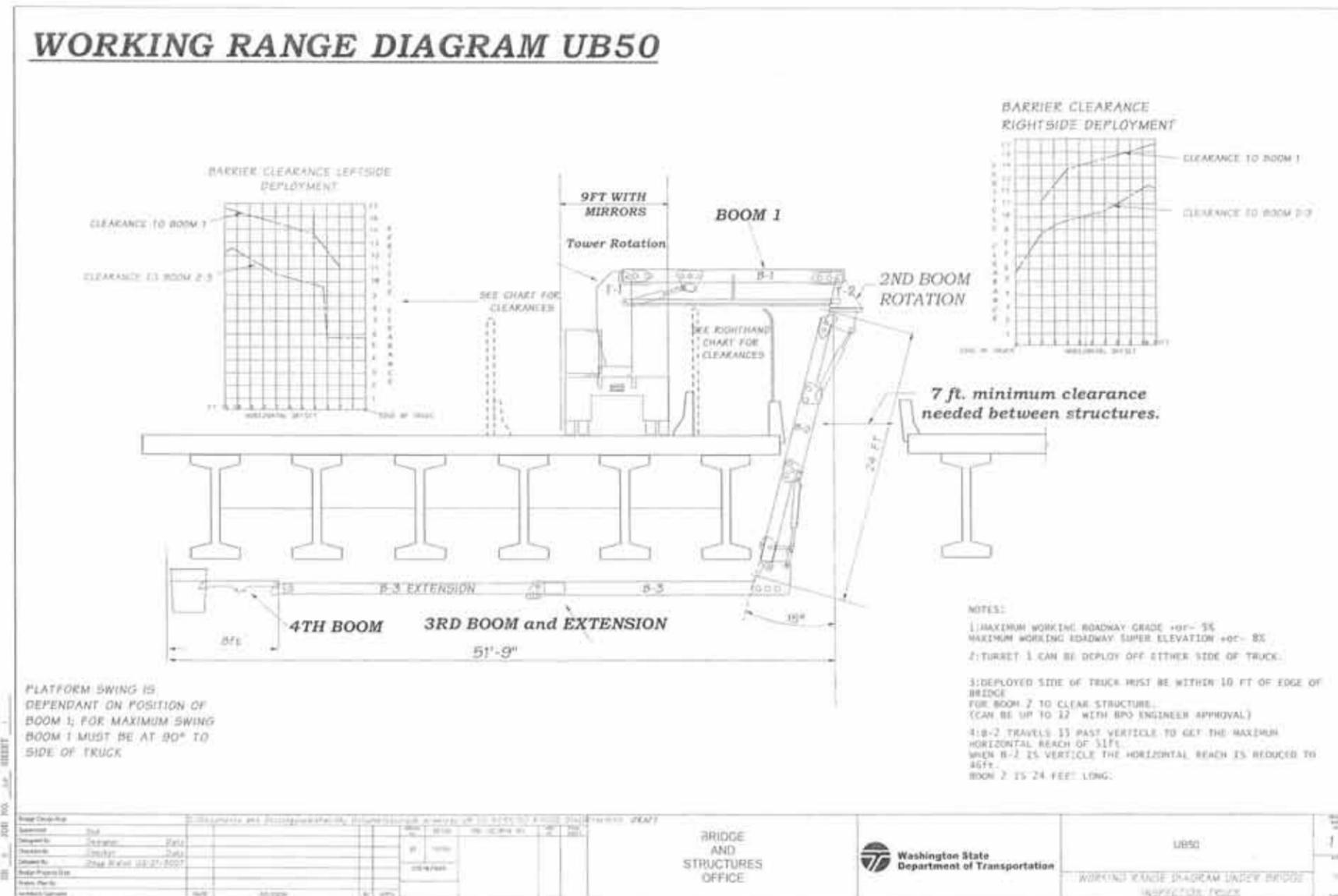
Quantitative

- The elements should be spaced no greater than 6" apart.
- The overhang is limited by inspection truck requirements. The Bridge Office is studying inspection traffic control requirements which may affect the dimension.

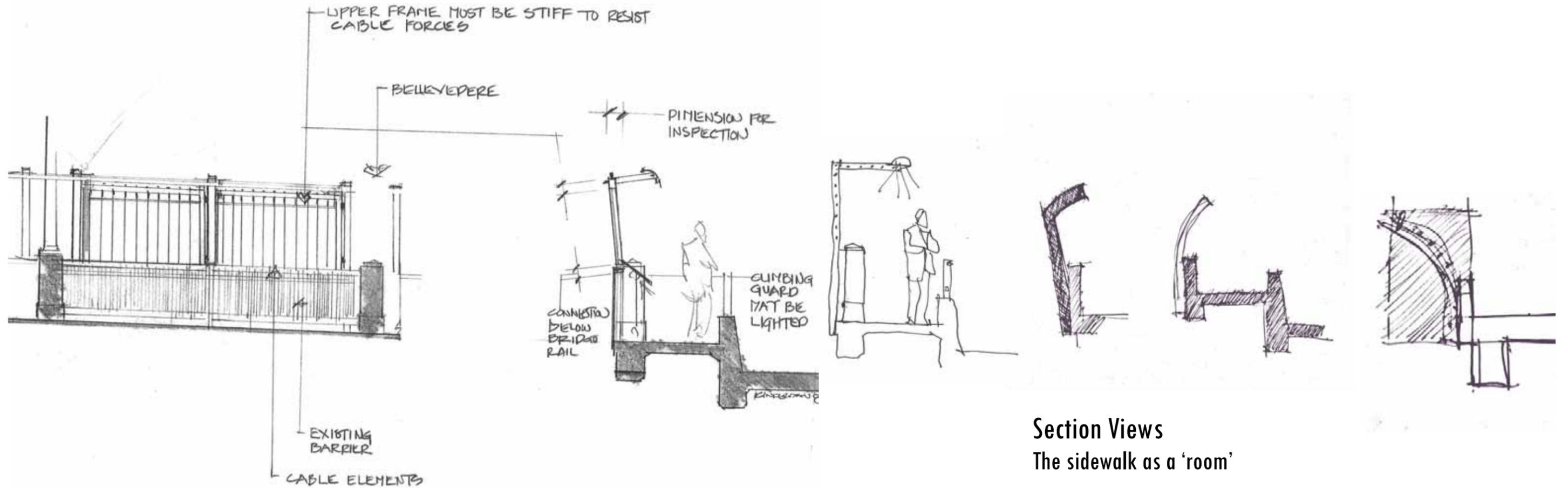


Fence Envelope

The fence must be contained within this space.

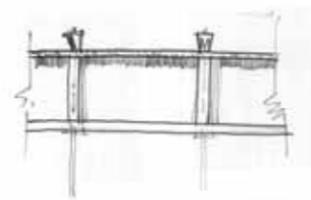


Under Bridge Inspection Truck (UBIT)

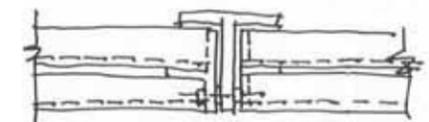
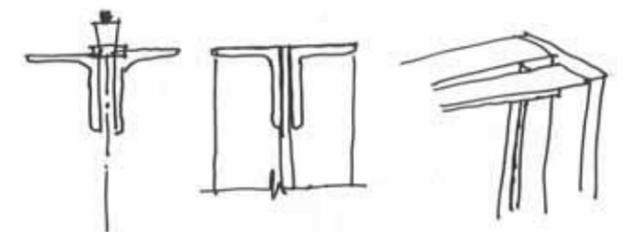
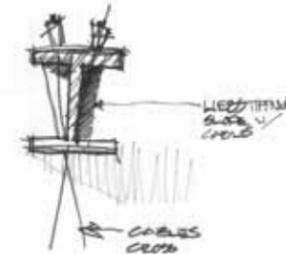
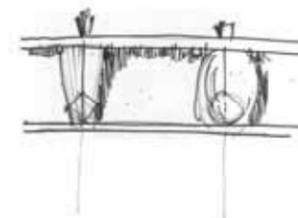
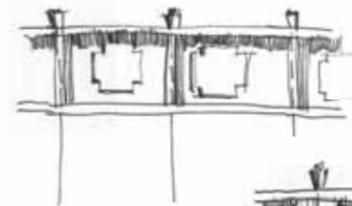


Section Views
The sidewalk as a 'room'

Elevation View
Vertical cables concept.



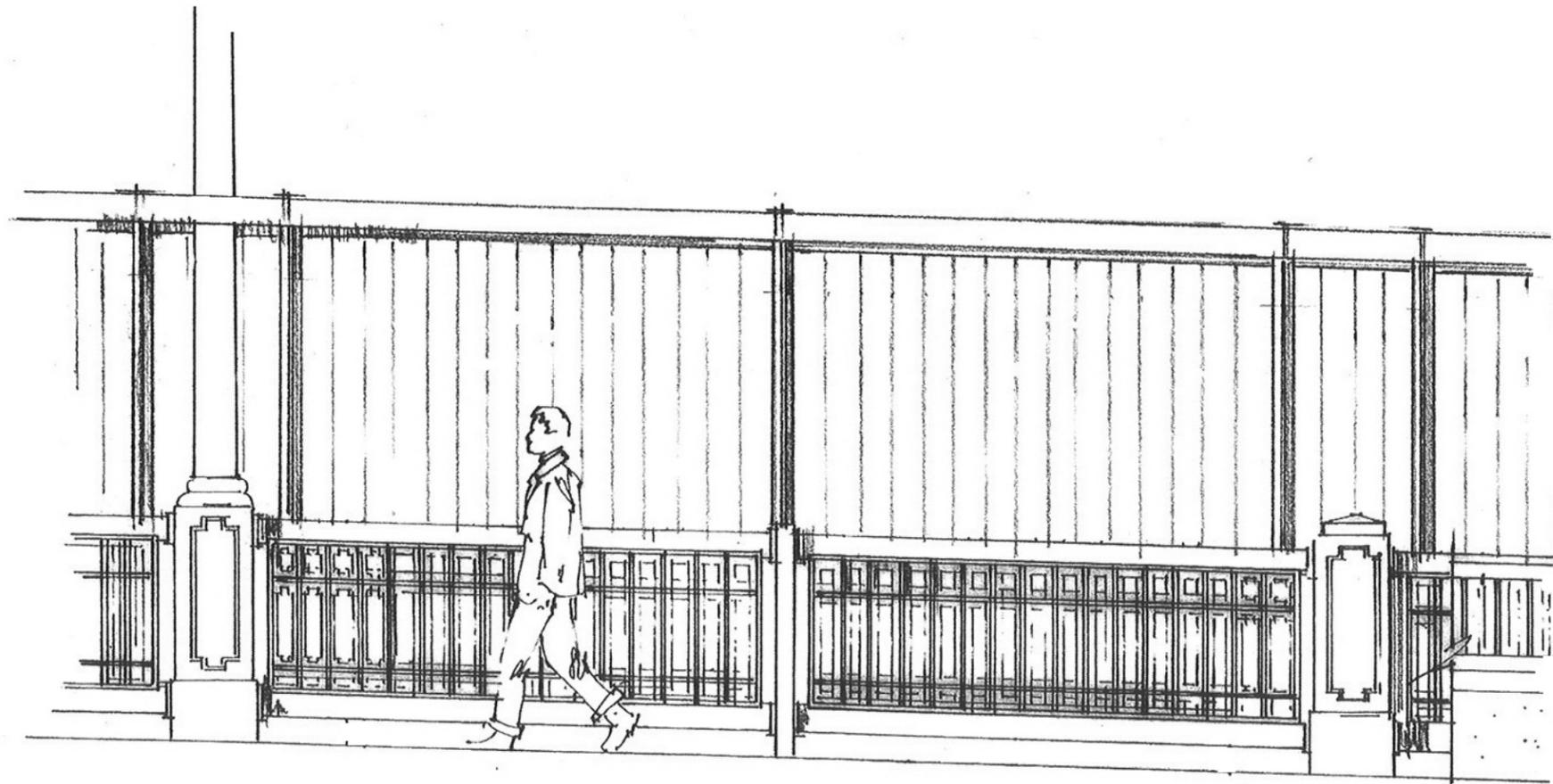
Upper frame style ideas.



Frame section shapes should be light in weight and appearance.

Design Committee: Sketch Diary

Conversations with citizen architects David Clinkston AIA and Marc Pevoto AIA



Elevation
Viewed from the traveled way

CURRENT DESIGN DISCUSSION

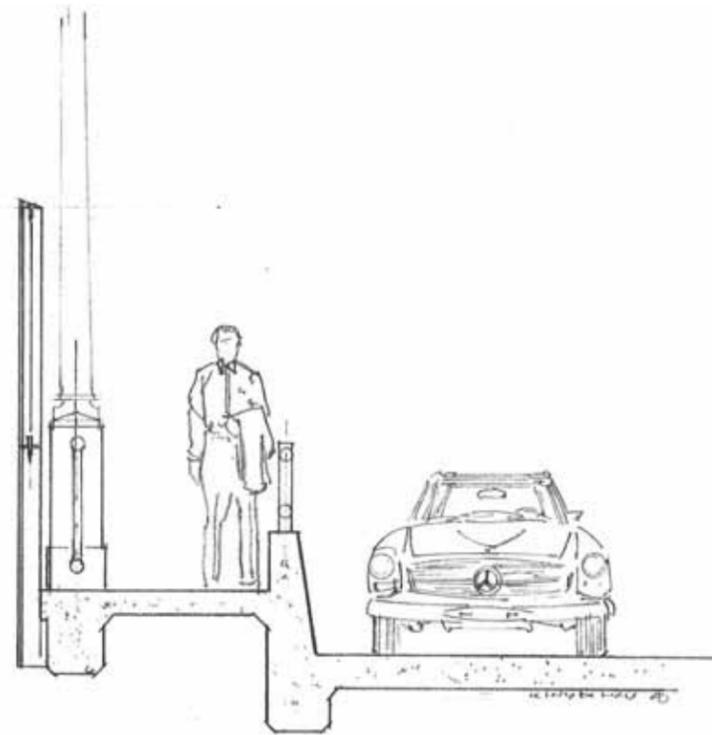
Provide a demountable double T frame system to house 3/16" stainless steel cables. Tension cables to prohibit spreading.

Design an overhang to discourage climbing.

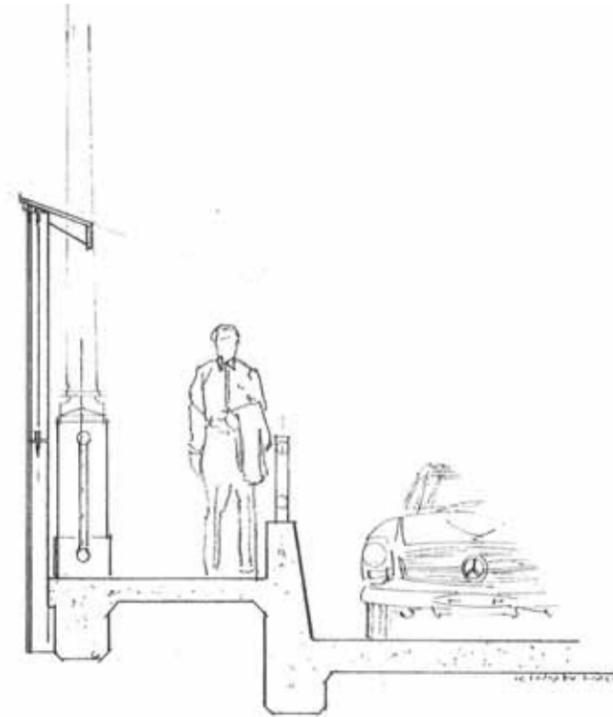
Frame detailing will be visually light to facilitate views.

The fence weight is critical to structural bridge preservation issues.

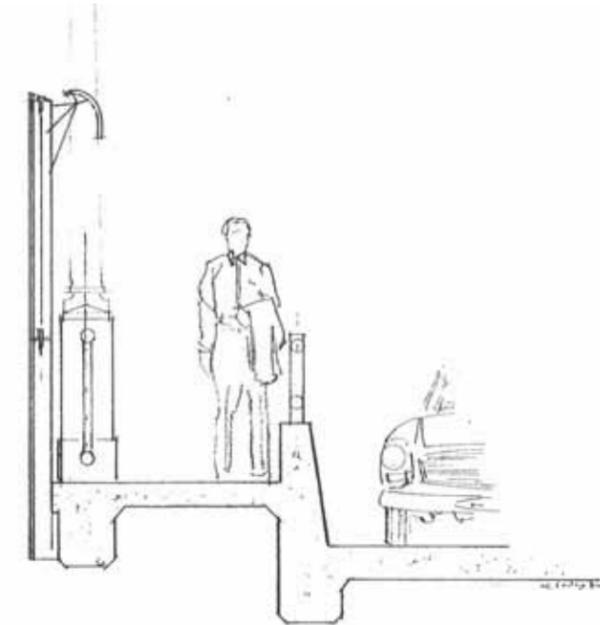
Vertical Cable Design



Straight Fence



Sloping Cap



Curved Cap

Discussion

The fence should have an overhang. The style will visually dominate the fence.

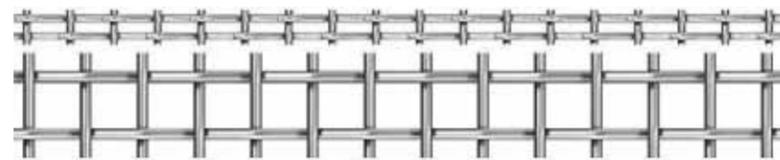
The designs shown are intended to be schematic in nature. The final design style will be developed as the project goes forward.

Typical Section Scenarios Study

Vertical Cable Design



Cable system hardware for vertical elements.

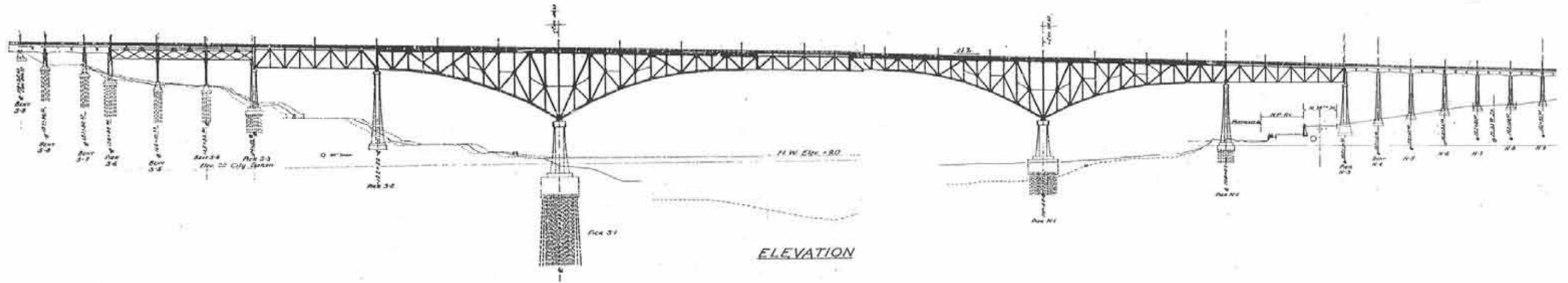


The top of the overhang for the straight cap option.

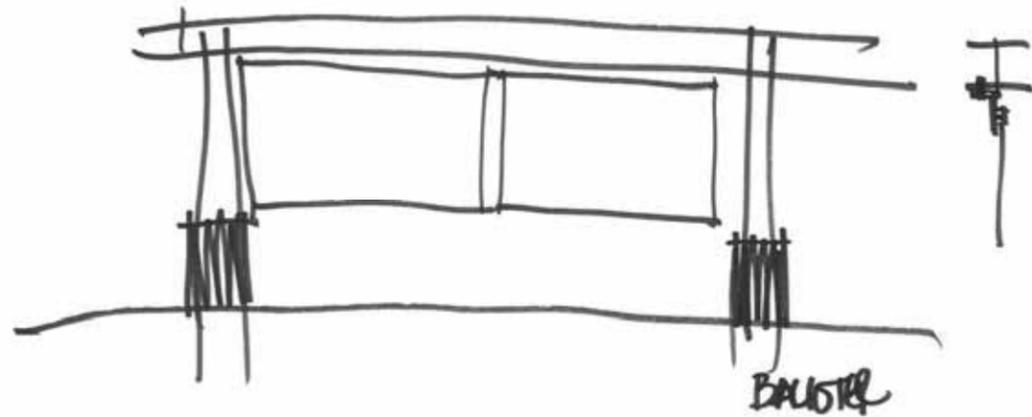
Materials

Currently under consideration.

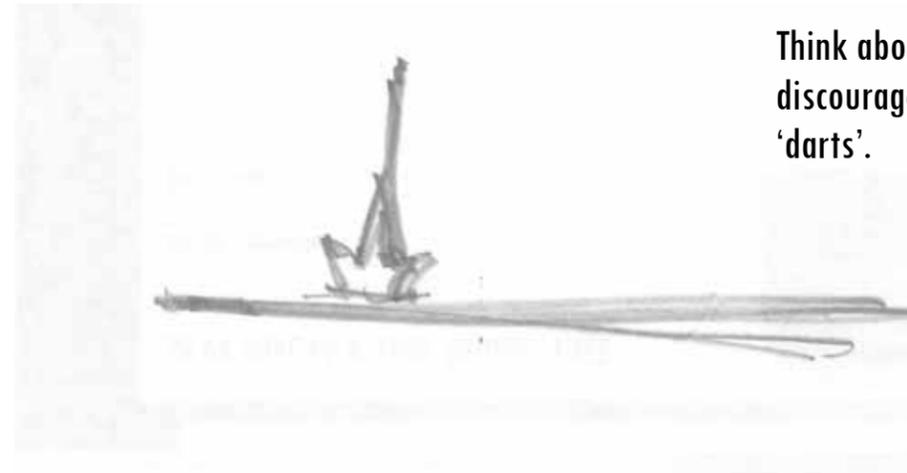
Post Advisory Committee Meetings 3



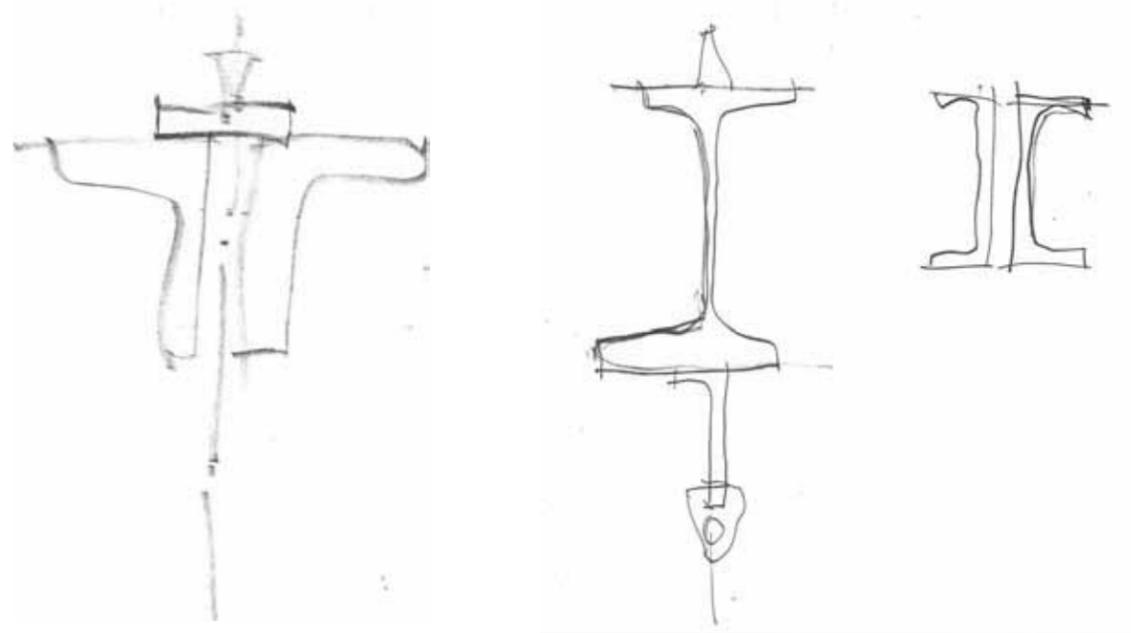
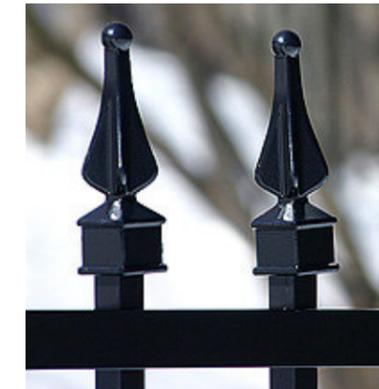
Elevation
Original 1930 Contract Plans



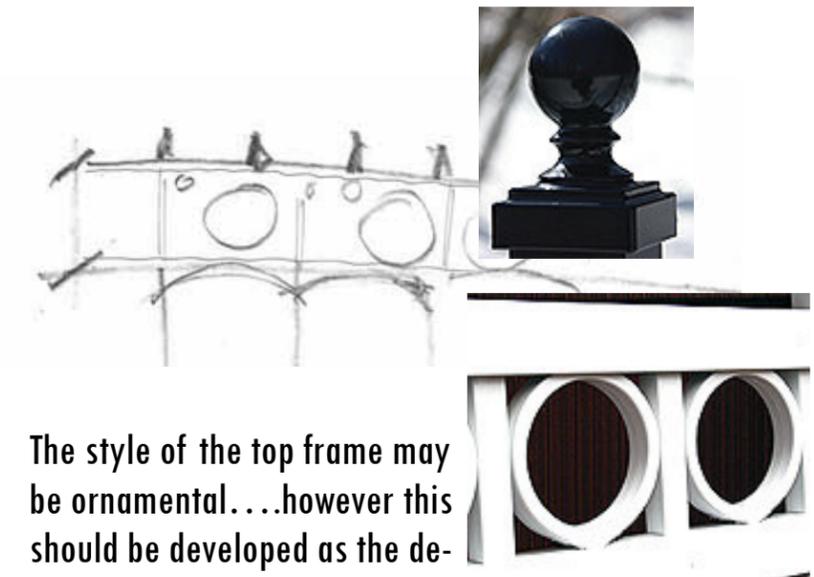
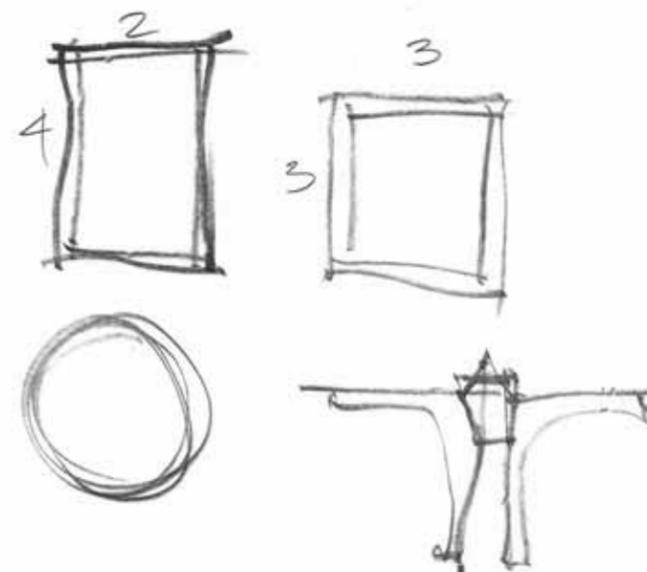
The top frame may span between main rail posts and the cable frame hang from the span.



Think about traditional methods to discourage climbing such as fence 'darts'.



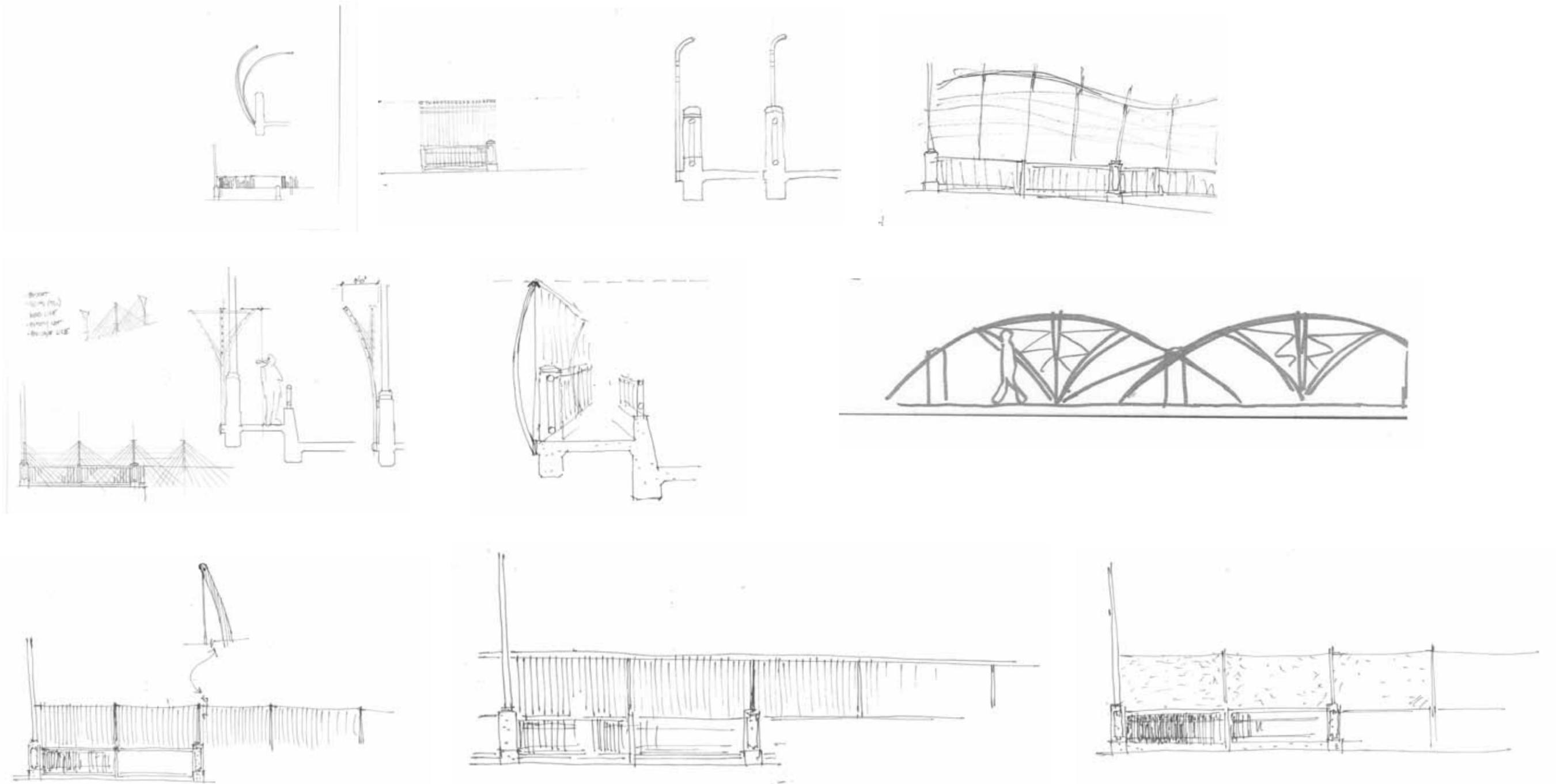
Sections under consideration for the frame. Look for sections that are visually light and produce interesting shadow lines.



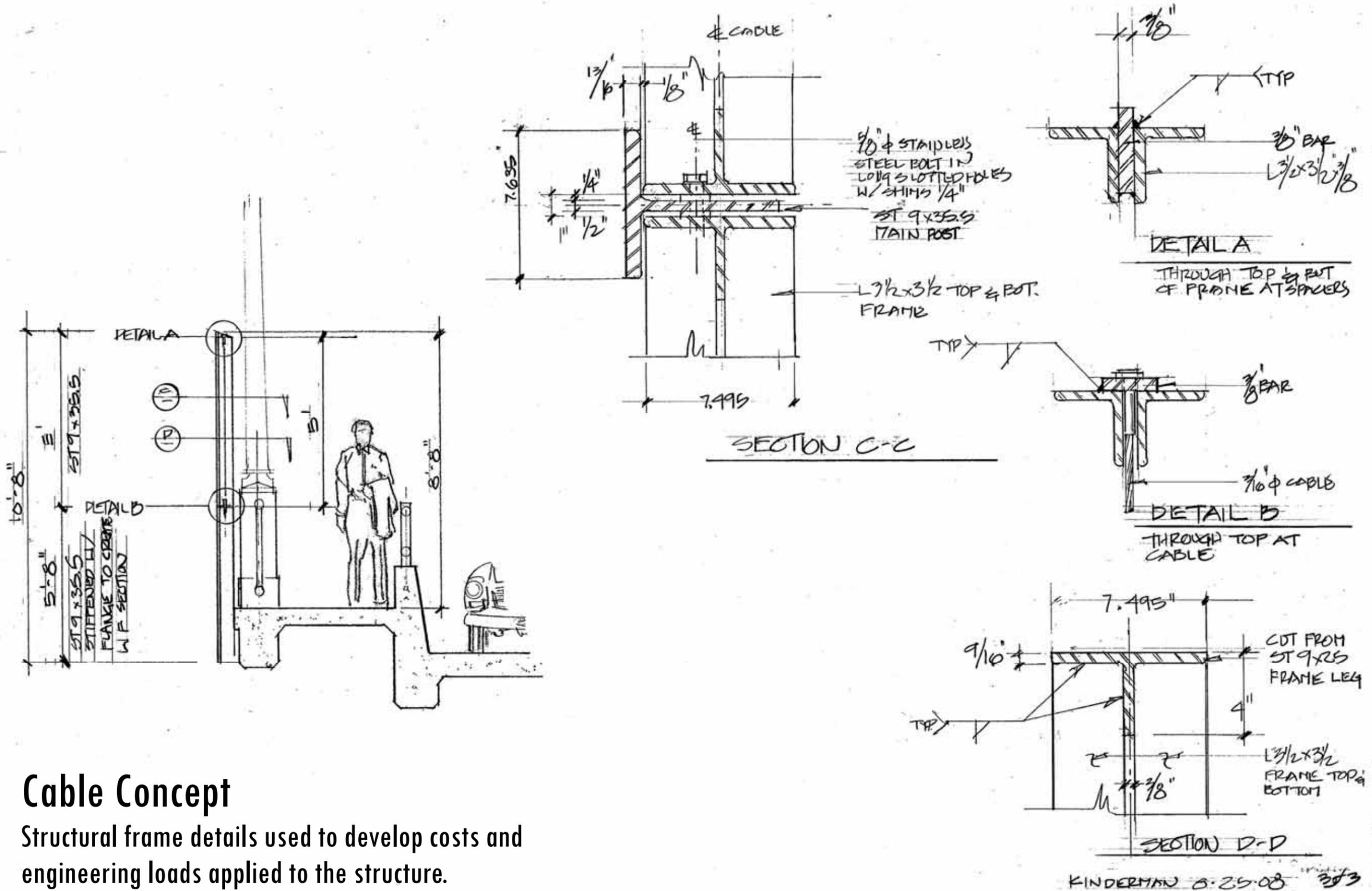
The style of the top frame may be ornamental...however this should be developed as the design progresses.

Design Committee: Sketch Diary

Conversations with citizen architects David Clinkston AIA and Marc Pevoto AIA

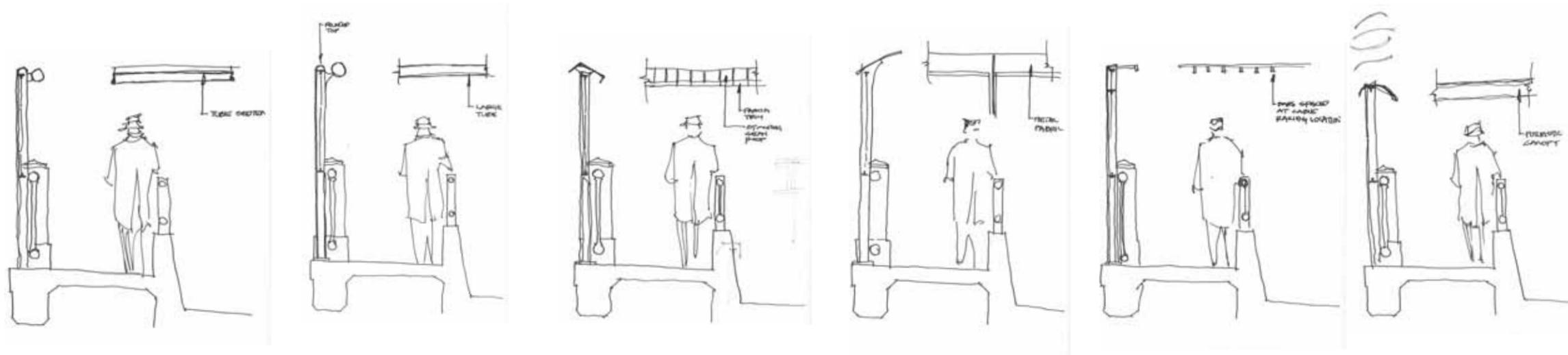


Sketches from Bassetti Architects
Provided following an afternoon in house charrette at the Bassetti office.

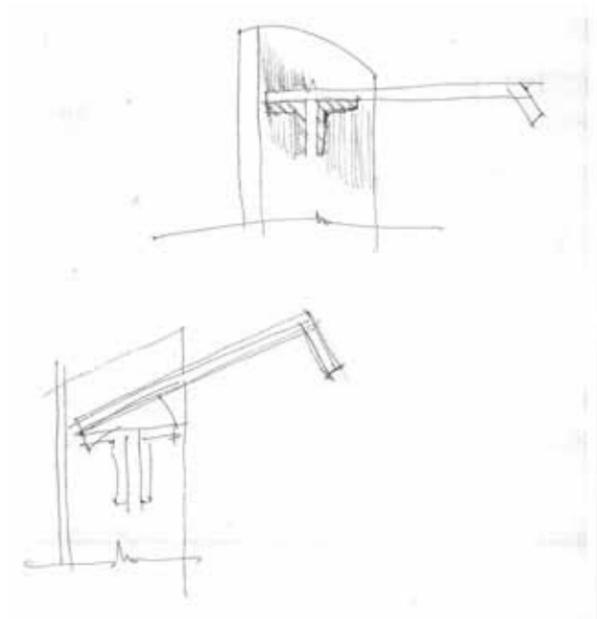


Cable Concept

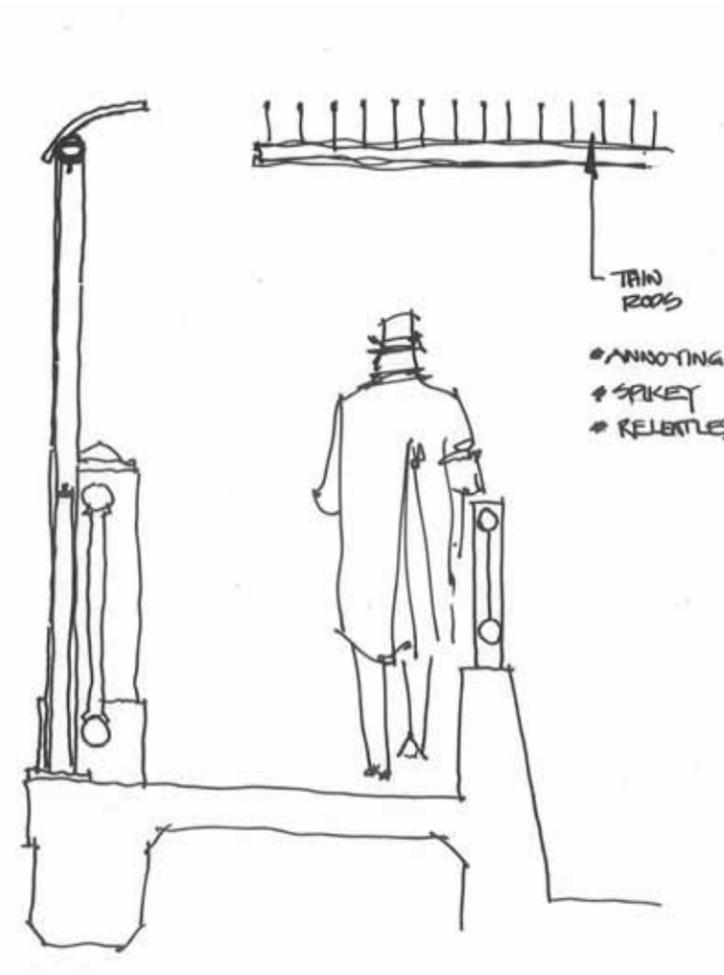
Structural frame details used to develop costs and engineering loads applied to the structure.



Section Views
Various scenarios.
'Prongs' vs. 'lidded canopy'.



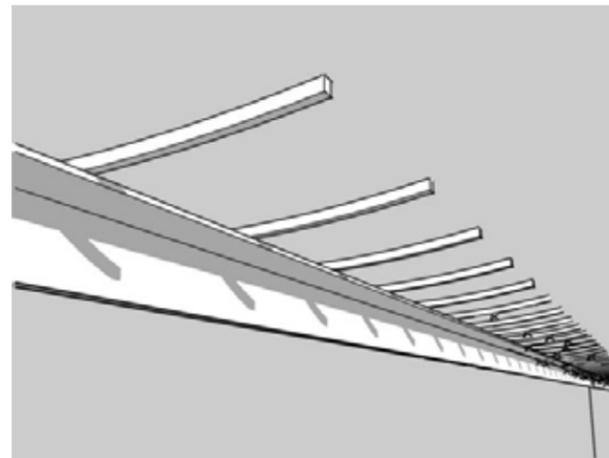
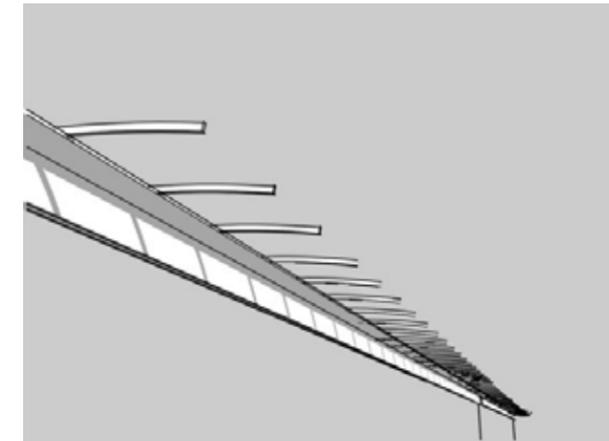
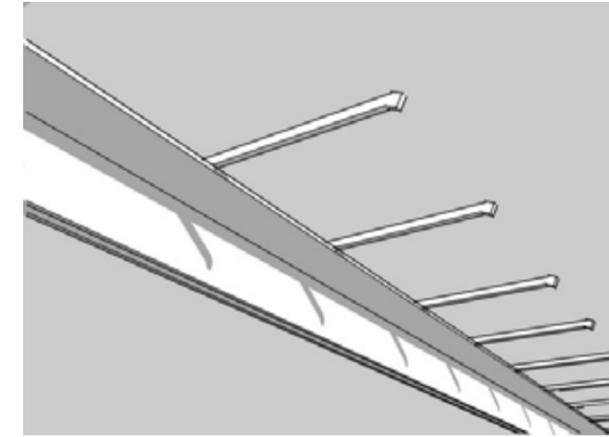
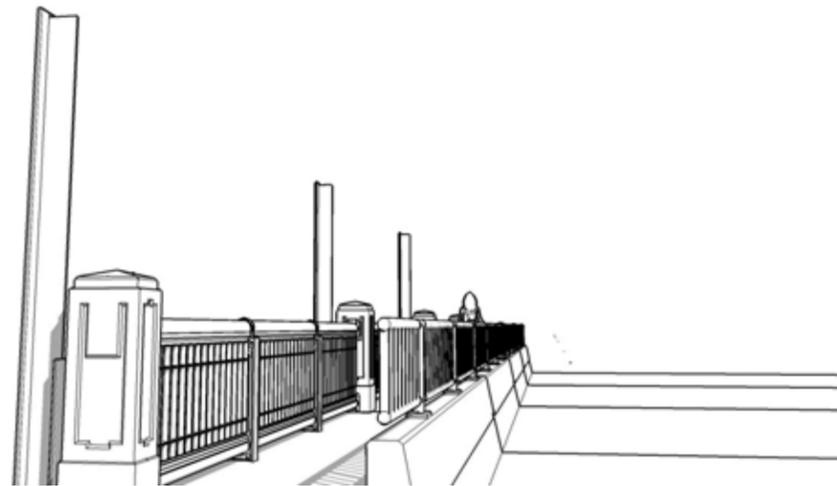
Connection ideas for
prong concept.



Recommend 'prongs' in lieu of
lidded canopy to discourage
climbing.climb.

Design Committee: Sketch Diary

Conversations with citizen architects David Clinkston AIA and Marc Pevoto AIA



Cable Concept

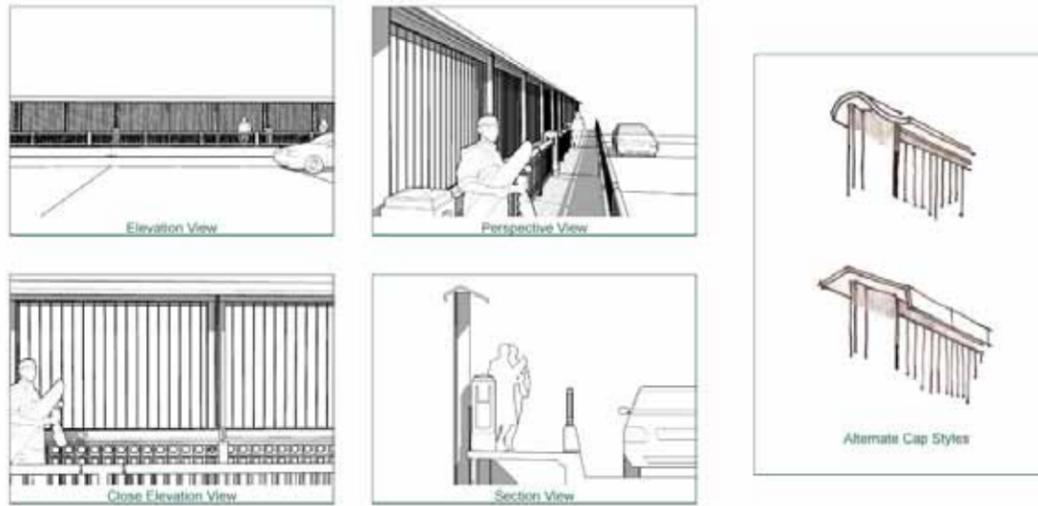
Three dimensional computer models.
WSDOT is beginning modeling.

Tine designs

Post Advisory Committee Meetings 4

SR 99 Aurora Avenue Bridge Fence

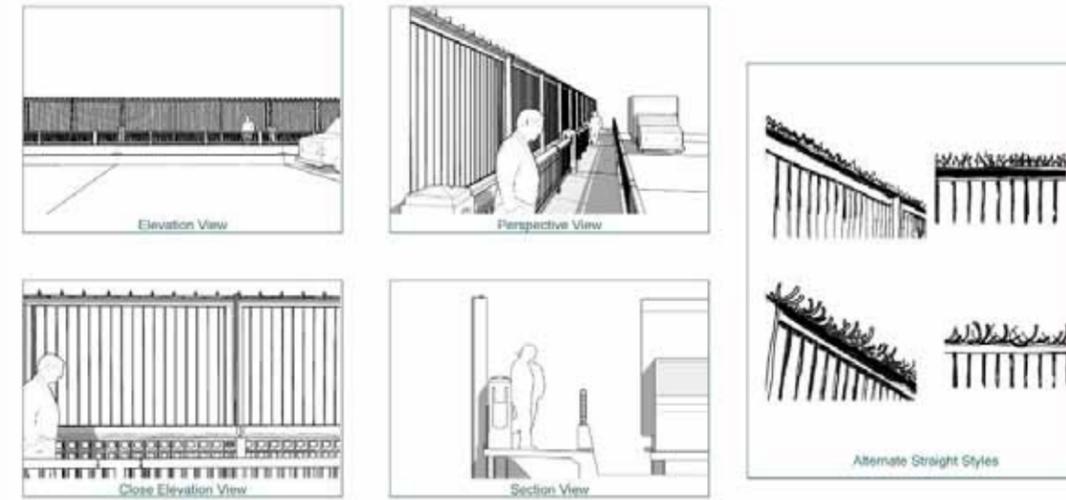
"Cap"



Draft Design Concepts

SR 99 Aurora Avenue Bridge Fence

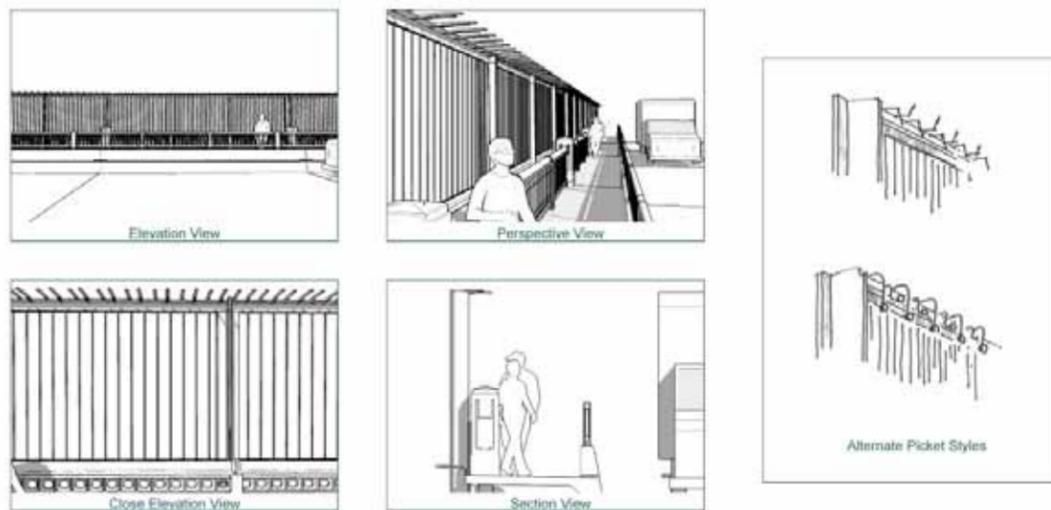
"Straight"



Draft Design Concepts

SR 99 Aurora Avenue Bridge Fence

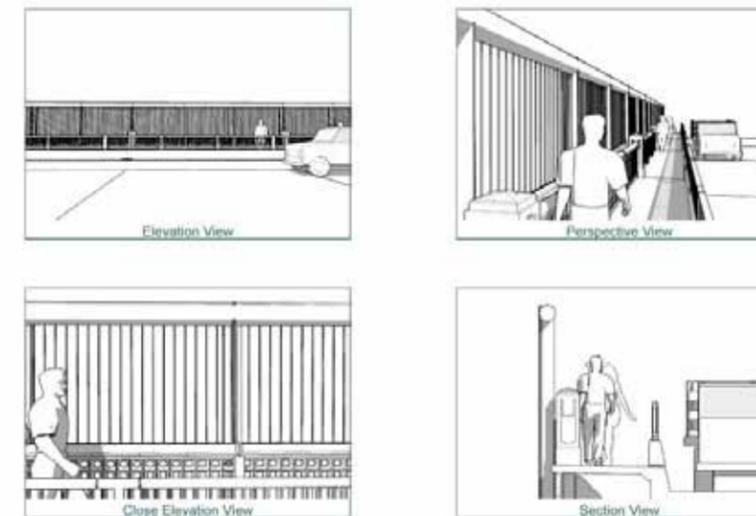
"Pickets"



Draft Design Concepts

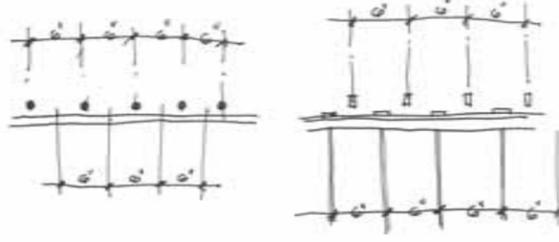
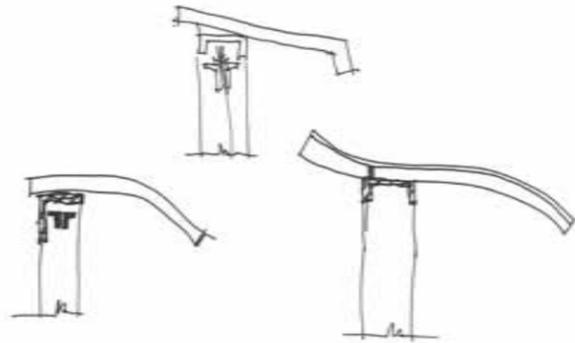
SR 99 Aurora Avenue Bridge Fence

"Tube"



Draft Design Concepts

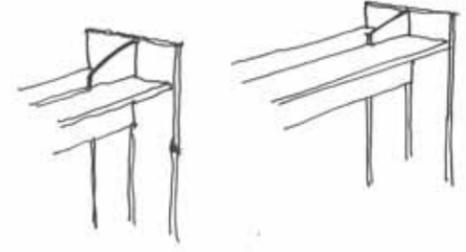
Concepts: The four families of top treatments



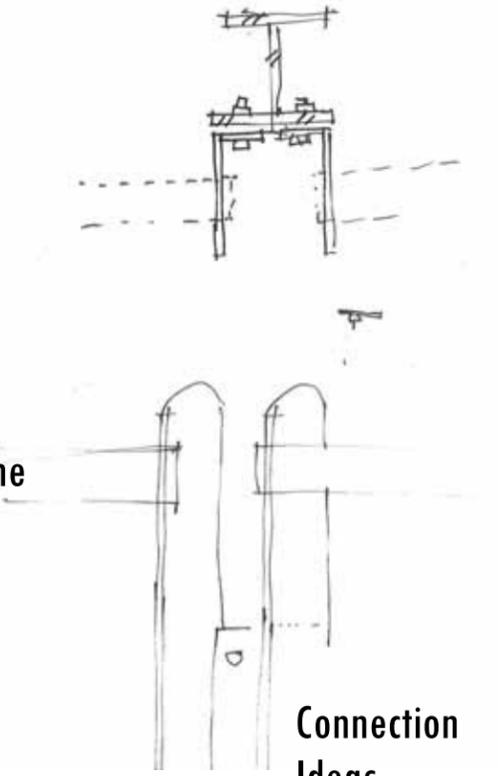
Spacing of top elements.



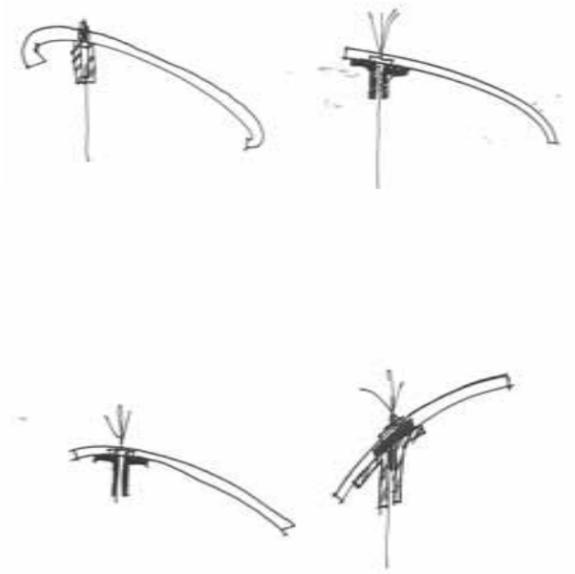
Straight top treatments
to discourage
climbing.



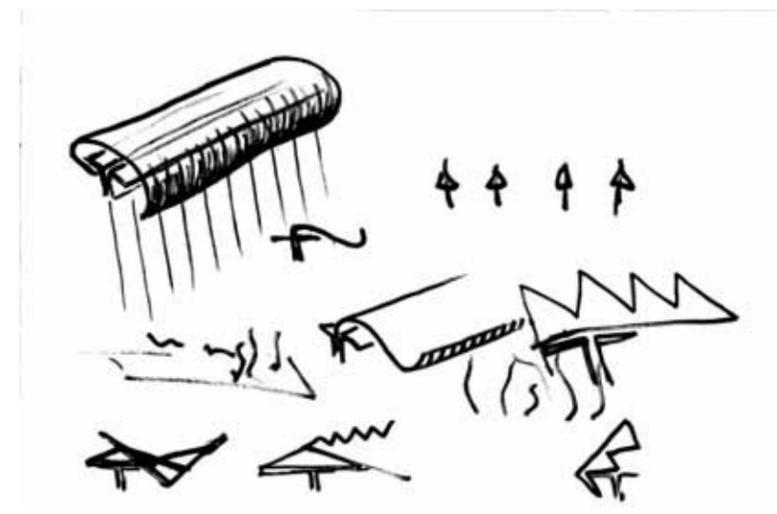
Sculpting the frame
by 'coping'.



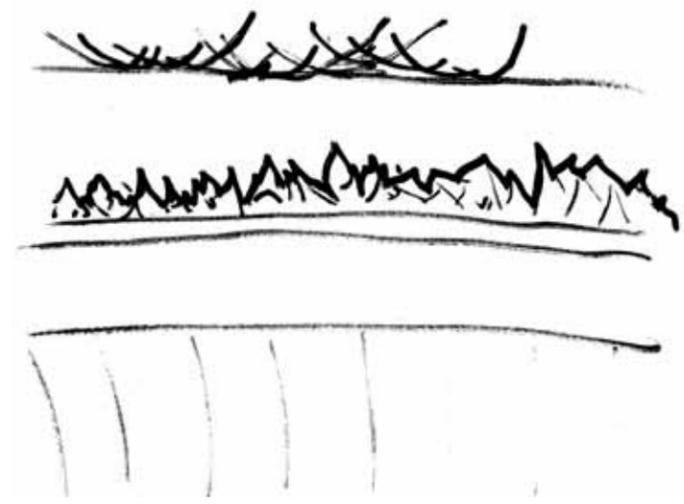
Connection
Ideas.



Picket Ideas



Cap Ideas

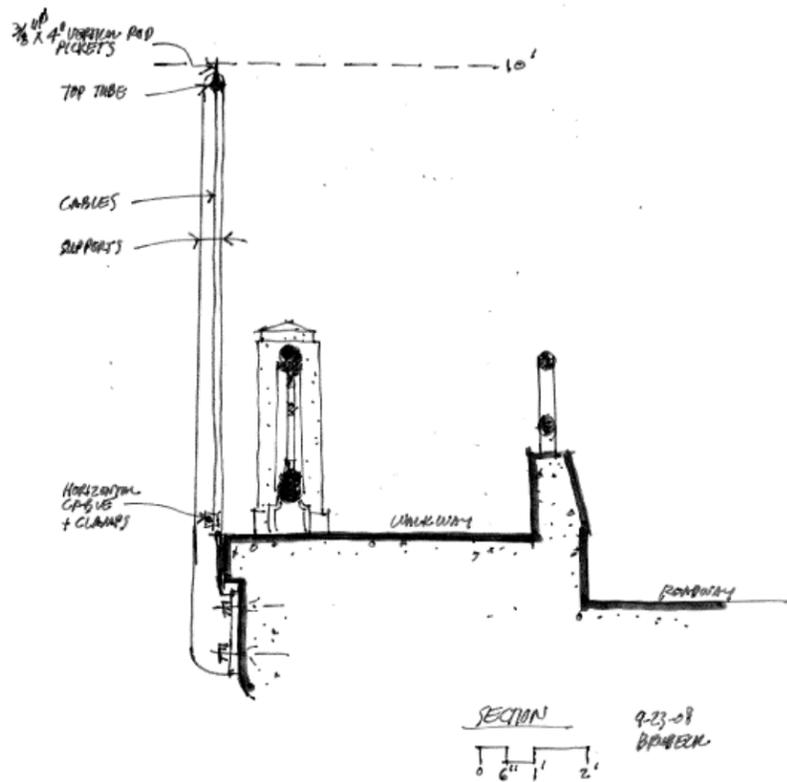


'Organic' straight top concept.

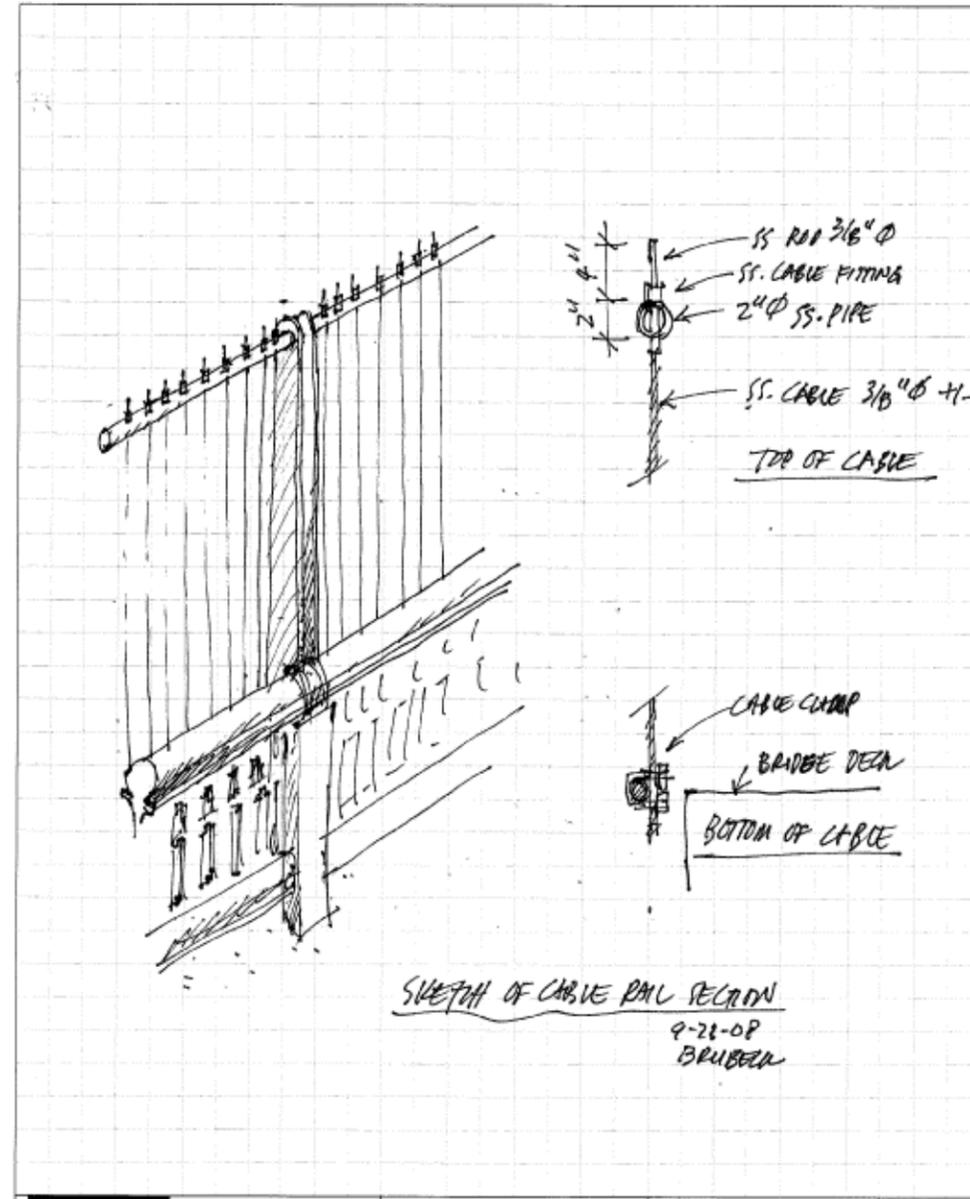
Design Committee: Sketch Diary

Conversations with citizen architects David Clinkston AIA and Marc Pevoto AIA

Brainstorming on various ideas within each of the four top treatment families..



Typical Section

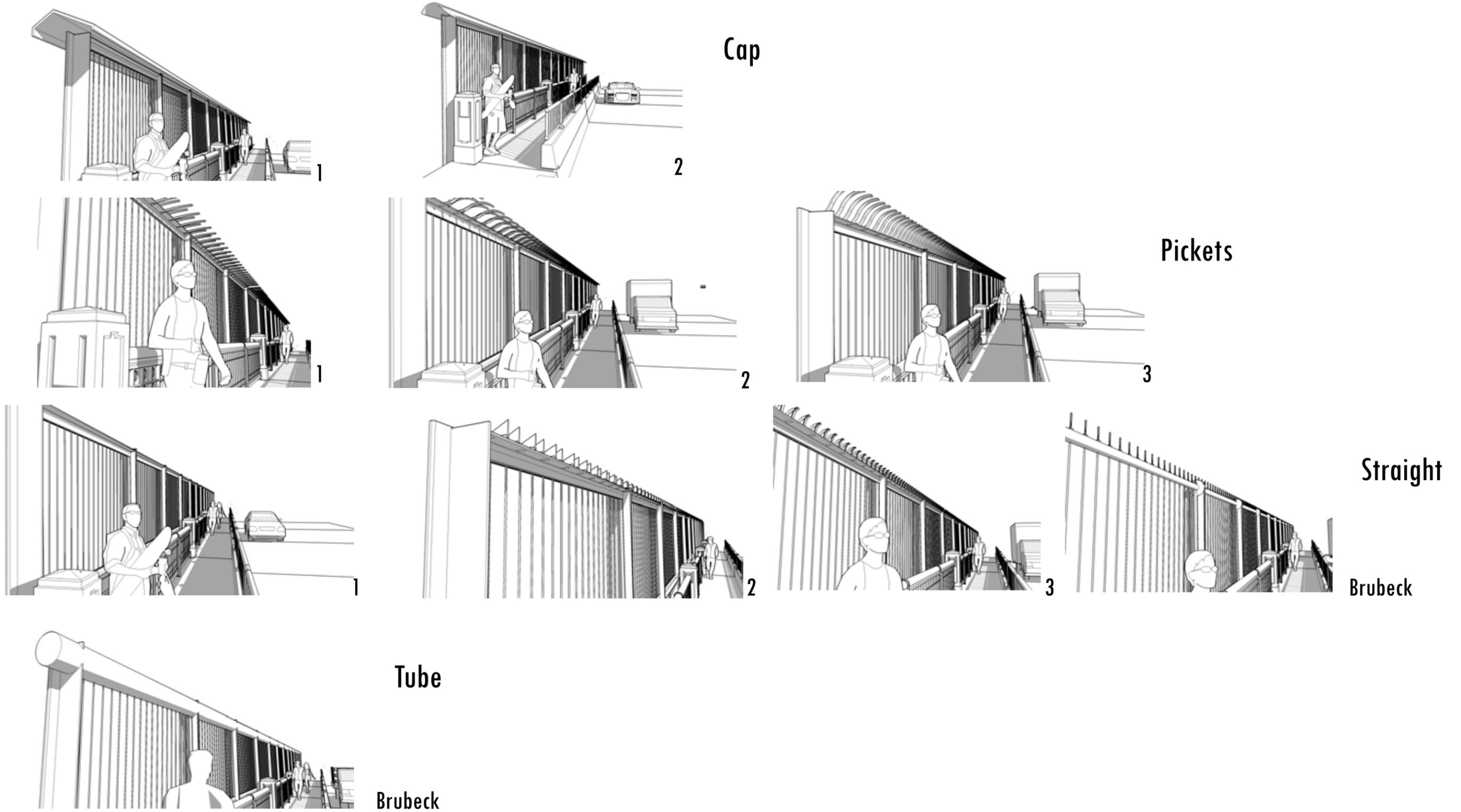


Isometric View showing smaller top tube and integral small pickets at top.



Manufacturer's photo's showing the range of possibilities for cable systems.

Don Brubeck AIA Concept Sketch: Smaller top tube and extended cable length



3D Computer Models: Exploring possibilities within the four families of top treatments