

REVIEW OF SYSTEM SOLUTIONS

System 1

Isolation of public from non-public areas; mech. rooms, train control, tracks

- To Reduce the number of openings between public and non-public areas, -
Group non-public areas
Escalator and track ~~XXXXXXXXXX~~ access under station at suburban stations.

System 2

Location of lighting and ads relative to the use of areas.

For maximum exposure - ads in circulation path
Ads in series repeated 3 times projecting down from ceiling at different angles to make them visible from any number of positions with luminaires equidistant apart between them - this would make direct lighting vary because of the different angles of the signs and thus create pools (question - do we want pools in the circulation path?)

System 3

Meeting places - relation to city and view

KR used also as off-peak parking and station ~~off~~ adjacent to street (tracks running across this street) - station asymmetrical to length of platform in order to keep commuter parking undivided on one side of this street. ~~W~~

Waiting area on platform directly over this street.

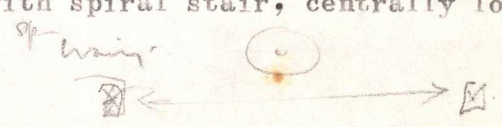
Side of platform serving S.F. open to view of parallel street (tracks closer to one street than the other) so people waiting can see over parked cars to street.

Coffee shop adjacent to escalator.

System 4

Station agent surveillance of the entire station.

Station attendant in elevator or booth with spiral stair, centrally located.
TV only as supplement for rush hour columns at center of platform.



System 9

Relation between openings to the surface and openings to subway tunnels to control air movement and noise.

Full height and continuous platform barrier with ~~minimum~~ ^{no} number of openings. Muffle chamber under platform and baffle of resilient material extending from platform edge.

Sound absorptive material on tunnel side of barrier and along ceiling immediately adjacent to barrier.

Glass barrier and compartmentalized platform to reduce cavernous feeling.

System 11

Easy access from the street without dangerous enclosed passageways.

No corridors

Wide continuous openings leading from street to subway.

Station entrances on both sides of the street at any entry point.

System 12

Definition of responsibility where BART meets store property in subway stations.

Subway entrances and windows to stores must be on private property and have way of closing them off physically from the station.

System 13

Access from street to train

(Waiting and ticketing at the surface.

Station agent with direct access to the surface.)

Escalators straight from the street to the platform.

System 14

placement of entrances relative to tributary area of station.

Major entrances at ends of station.

Wider circulation path so that it is widest at the end entries and narrows down toward the center.

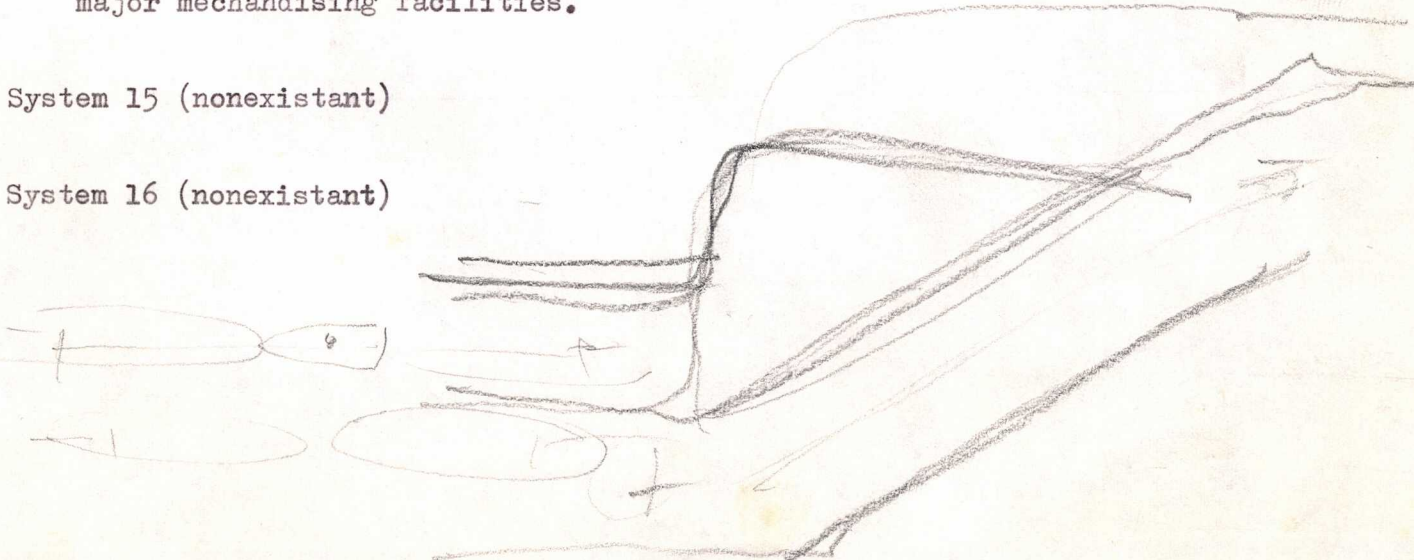
No point in the station must be greater than 280' from an exit.]

Points where escalators reach street need covered area for "hesitation" point. (COULD BE AT FOOT ESCALATORS).

Points where escalators reach street should be near concessions and major merchandising facilities.

System 15 (nonexistent)

System 16 (nonexistent)



System 17

Feeder connection to station (suburban)

Bus and kiss-ride traffic must be organized so that they have right hand loading and unloading in immediate proximity to central escalators. Pedestrian flows from either must not conflict ~~with~~ and should not be forced to cross the path of vehicular traffic.

Kiss and ride drop off line ~~xxxxxxx~~ should be a concave curve to allow approaching motorists to spot an empty space ~~xxx~~

As much of the bus and Kiss-ride area (drop off) should be under station structure, as possible.

Bus line should be convex with spaces for busses to pull partially in so that the front of the busses are all exposed ~~from~~ for easy identification from one point, the bottom of the down escalator.

System 18

Relation of various feeder ~~are~~ areas to a suburban station.

Bus and kiss-ride area must be adjacent to the center of passenger distribution on train, the point where the two car train stops, the point at which the minimum installation of escalators are located. Kiss ride drop off can be anywhere along the 700 foot length. Commute parking should ^{occupy} ~~be~~ the rest of the area around the station which is not taken up ~~xxxxxxx~~ by the kiss-ride pick-up area. Shopper parking and off shift commute parking should overlap the ~~xxxxxxx~~ kiss-ride lot.

System 19

Organization of entrances at suburban stations.

Ticket gates should be concentrated at a central point for efficiency, security and close to concessionaire.

Room for additional gates as volume increases.

Parking should be organized so that commuter is always walking more or less in a straight line to the point where he enters station(?????????????)

System 20

Exterior organization and recognition of entrances.

Break up parking lot into small enough components so people can see where empty spaces are (4 double aisles, 200' long aisles).

Each component have controlled entry (counters and signs) and are in sequence so that driver goes past all filled ones to get to an empty one.

90° parking with dead end aisles to reduce auto circulation

Parking lot in shape of shallow V (in section) so area closest to station is visible from access road.

Each component should be equally desirable relative to station entry and parking within component should be organized so most desirable spaces are furthest from entry.

To make entrances conspicuous (downtown), entrances should be 20' from building line and extending above 12' to clear obstructions.

Massive - projecting on both sides of street lamps.

Ticketing on street to help distinguish RT from Muni if express escalators ~~xxx~~ to RT, otherwise at Muni level.

Muni entrance only at center BART entrance - strong & prominent

End entrances only for BART (direct), - hidden, facing outward (ticketing at top)

People originating from area between end entrances should naturally be led to center entrance and those originating from area outside end entrances go past these end entrances toward center one - so that if end entrances are closed they are still walking in the right direction.

System 21

Catalogue of sign types

Sign types have distinguishing characteristics (shape, light, color)

Types categorized as Entering, Exiting, Emergency, System symbol, System information, Map and Service Signs.

Zoning of signs

Ads not in same area as directional signs, at different height and fixed in ~~xxxx~~ size.

Signs on right hand side of circulation paths and so that people will not stand in front of it and obstruct others' view of them.

System 22

Entering sign sequence

Complete list of stations at ticketing and platform -10' wide, wall mounted and placed behind point of diverging paths.

Lines - Eastbay, Southbay, Northbay, Westbay.

Intermediate sign - ceiling mounted with name of line bold and list of stations in small print to the right.

Barrier sign - 6' high slanted down with list of stations lighting up as appropriate train comes into station.

System 23

Exiting sign sequence

- ✓ One possible exit - compartmentalized platform with inconspicuous connection between compartments.
Curved walls at exits with signs mounted on them and illumination on walls increasing toward exit - Exit itself highly illuminated.
- ✓ Arrows in a string (Market Street, Emporium, Fifth Street, etc.)

System 26

Concessions in station layout.

- Cant face of concession 45° to main flow.
- Concession face station entrance (not closer than 20') adjacent to sidewalk.
- Concession in unpiad area - range 10' max below surface level.
- Itinerant vendors for peak hours at entrances having no concessions and at suburban station entry with possibility of it becoming fixed in future.
- Vending machines strung along length of platform
- Store entrances set back minimum of 15' from main flow passage.
- Concessions placed near store entrance (30' from concession on one side of store entry to concession on other side (45° to face of store entrance)
- Window display at either sides of entrance.

System 27

Doors in platform barrier

- Offset crack of barrier door to crack of train door.
- Barrier door should close a second before train door.
- Allow only one train load on platform at a time.

unresolved as to tension & anxiety build up. pulsate flow.

System 28

Emergency Exiting

- Induce situations which are likely to create cooperation among people
- Gates which require no bodily contact with strong identification of direction
- Each gate openable by one individual and in a group by attendant.
- 1-1/3 times normal gates, doors, stairs for emergency and near them.
- Max distance to exit - 150'
- More economical and efficient to increase normal exit rather than add one.
- Wavy passage wall to accommodate people wanting to step out of flow.
- Mirrors to discourage panic
- No wide open spaces and no constrictions - slight turn where pace changes
- Separate emergency lighting for signs, exits, etc.
- ✓ Point of emergency egress should also be source of fresh air

System 29

Reversible flows

- Group escalators as much as possible - off peak escalator only one in that direction. - ~~very visible~~ non-reversible
- Up non-reversible must be very visible from platform - centrally located and running perpendicular to platform - stagger with respect to down escalator so people reach up-escalator first & it is more visible because it would be higher.
- Differentiate strongly stairs from escalators with direction of escalators very obvious
- Separate traffic before intersection point with signs before intersection

System 30

Movement thru ticket gates

Stagger gates to allow easy escape from jammed machine .
Commodious ticket facilities at street or ~~xxx~~ at platform level in
subway stations.

System 31

Efficient flow - in bound A.M.

No machines, agents, or concessionaires should be oriented ~~where~~ so
the a que could form perpendicular to the flow.
Distance from concession facility to ticket gates must be sufficient
to allow ~~for~~ people to get ready for the machine.

System 32 (non existant)

System 33

Reducing conflicts between fast and slow users of ticket gates

More room at ticket gates ~~xxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxx~~
Sign right hand slow lanes by a considerable distance before
gates to allow unfamiliar ~~xxxxxxx~~ more time can also be done
if gates are ~~diag~~ on a diagonal line accross the path of passengers
so that they all pass they sign at the same time but arrive at
gates eirlier if in the center and later if ~~in~~ on the right.

System 34

General circulation

- Escalators far away from platform (trains).
- Flow cannels should gradually increase in size as they reach exterior.
- No sudden change in flow capacity- especially an increase in the train bound direction.
- operating stair of escalator must land next to operating train ,or ticket gates should be moved in station to ~~the~~ correspond to position of operating trains.
- Vending machines out of intense traffic areas - close enough to trains to prevent running with drinks.
- Stairs need to be 50% wider than the ~~capacity~~ corridor that they serve to equalize the flow capacities.
- concessions should precede stairs and escalators sufficient distance to keep litter off.
- Ticket gates before or after stairs depends on when people are most likely to run-unresolved as yet?????????

System 35 (nonexistent)

System 36

Walking surfaces.

At train door-tongue and groove nosing .
Change of surface and slight upgrade ~~at~~ platform edge at train door.
Stairs- non-slip nosing and treads
change in surface 48" before the top and bottom of the run
extend hand rails 18" beyond top and bottom step.

System 37

Vertical movement.

Stairs-desirable max. verticle run= 7 risers
with 4' landins between
Bunch stairs and landings together.
Risers 7.2" & treads=10.8"
Escalators-extend fixed handrails out beyond end of escalator moving rail
(and begining).

System 38

A Special path for handicaped. *with the following characteristics*

Higher ventilation rate than rest of station

~~Separate from fast moving crowds.~~

~~Go past station attendant.~~

More rest places-more frequent landings in stairs.

Handrails, ~~must~~ prevent diagonal movement across stairs.

Textured surface for blind.

Continuous hand rail from outside to train.

Handrail should hold people away from the wall. *handrail stands out from wall from intersection.*

Lead always to one point along tain with special loudspeaker for blind.

Train should have special section designed for the handicaped, which must always stop opposite the special path

System 39 (nonexistent).

System 40

Safety at the barrier

Continuous floor to ceiling full length platform barrier - solid or fine mesh
Barrier and train doors immediately next to one another
Barrier doors should shut ahead of the train doors.
~~Barrier slanting toward platform side from bottom to top for train clearance.~~ *platform edge 3" - at top of train 9" clearance*

System 41

Separation of passengers waiting for different trains - vending machines, distribution
Vending machine located conveniently for 4 car train.
Vending machine located as far away from escalator bottom as possible
Vending machines located conveniently to train door.
~~For commuters - vending machines along passage, starting 20' from escalator to 20' (2) before furthest point from escalator~~

System 43

Capacity of peak load waiting areas

Loading zones, A, B, C for next train, second train, third train on right hand side of train door - encouraged by placing benches furthest away, leaning rail in middle and nothing near door, and sign perpendicular to barrier between 1st and 2nd area which indicates next train. Sign at barrier at an angle to be seen by 1st crowd and people in passages. Areas equidistant from circulation path and equally accessible. Escalator should land in between doors of train. Crowd buildup will be such that more room is needed for Area A than Area B and Area B needs more room than Area C.

System 45

Special Access for wheeled vehicles and the handicapped.

Station attendant in view of ticket gates, stair and escalator.
Each station should have one special gate and a mechanical mode of moving vertically, for handicapped, employees, services, etc.
Special gate - two leaves so one side can be used as normal gate.
Angled elevator in view of attendant to fit regular circulation and very slow.
Call button.
Gate, elevator, call button all on special path.

System 46

Appearance of wall surfaces and safety of floors

DETAIL SPECS.
→ More critical that drainage be good on path of entering than exiting flows.
→ At top of stair slope should be in direction of travel away from stair.
→ If a special floor material with grooves is used, drainage across passage.
→ Places where people stand should be as close to entry as possible
→ Drain at bottom of stairs (Clurman)
→ Places where people stop high so water drains. *{ slope floors to drain away from queue areas around ticket gates readers, concession.*
→ Sandwich wall (Clurman) to prevent condensation
→ Minimum overhang before a stair -



System 49

Cleaning and litter removal

- Platform barrier solid to keep tracks clean
- cut in* Litter gutter at barrier wall - sloped to push litter out of view
- Barrier sloped like a V sideways - handrail at apex - to keep top away from heads and bottom away from feet.

System 50

Safe and pleasant waiting area

- Station open to the outside as much as possible
- ~~Muni level open to Bart platform where Muni stop does not occur.~~
- Transparent barrier
- LARGE* Open stairs and escalators *PORTALS ALLOWING CLEAR VIEW OF PLATFORM*
- Waiting area close to surface and in view of street

System 51

Area immediately inside train door used to handle special passengers

- Visual barrier on both sides of door to lead people in
- ~~No wide open spaces in car~~ → 5'
- Seats should face door to which they are closest
- Easy in and out of seats and passages) - *aisle next to every seat*
- ~~Seat to door distance short~~
- Padded seats and railing (59)
- (One way to seat from door)
- (Information about next stop)

System 52

27 Feb - B

Boarding and alighting circulation

- ① Marking in floor of platform on left hand side to keep waiting passengers off and to direct alighting passengers
~~Passengers off train~~
- ② A corresponding mark in the train car to keep people from standing in front of the left hand door
- ③ The platform doors should be one piece and open from right to left and vice versa in the train
Triangles Sign over the door should indicate boarding to the right and exiting to the left and destination signs should be on the right hand side.
Waiting area on platform should be oriented to the right side of the train door on the platform and standing area on train.

System 53

Waiting area in the station

- Waiting at platform next to barrier to the right of doors, *BENCHES 1 to*
- Barrier with railing far enough from wall to set packages down, *back of benches form rail, described in 52*
- ~~benches furthest to the right left of door facing left curved away from door.~~
- ~~If No benches at car doors nearest escalator or in other than 4-car train.~~
- BENCHES AT FURTHEST POINTS FROM ESCALATORS*
- & MAINTAIN SECTION COVERED BY 4 CAR TRAIN.*

System 54

Waiting passengers' needs

Connection between smoking areas and ventilation

If there are smoker sections of the car, the smoking areas of the ~~platform~~ station must correspond to that part or parts of the train.

Waiting so that people face each other at right angles

Gates and doors so that people approach them at right angles

System 55

Transit car facilities for long distance riders

Seats should face door to which they are closest

rack in back of seat which pulls down to serve as desk for seat behind - used to hang umbrella and coat

Variety of seating arrangements

System 57

Relative position of sitting and standing areas in the transit car

→ Seats must ~~have~~ have solid backs, ~~and~~ ~~so~~ so that there is no gaps *between sides, back & bottom.*

No standing space directly in front of seat

? (If threshold time is limiting factor - max 50 standing per car

If platform load is limiting factor - max 110 standing per car

Standing space outside of circulation area

~~Seating reversible~~ - ~~Seats near door for courtesy~~

System 58

Extra comfort in the car seats

For those seats furthest from door (long distance)

Individual upholstered seats ^{OF MONOLITHIC CONSTRUCTION} with (no gaps or openings)

Bucket seats that wrap around hips and shoulders

Head rests on back part of seats ~~FURTHEST FROM~~

Hooks for coats and umbrellas - especially on seats furthest from doors.

System 59

Circulation in the Car

Jump seats

Railing which serves to store things, hang on to, lean against

Visual barrier on both sides of door *in car*

Doors on opposite sides of car - staggered by 9 feet so jump seats and standing room are opposite doors, and people stand perpendicular to direction of travel.



System 60

Train Windows

No columns at platform edge
flaps on top of transit car sounding against grooves in tunnel for station identification

System 61

Location of advertisements (see 2)

→ Separation of ads and signs - distance from which they are viewed, location height (ads lower and easier to maintain)
Prime ad space for moving passengers is near stairs and escalators
Clocks should be in center of platform facing both directions
Light fixtures so that they can be pulled down

System 62

Control of parking lots

~~Entry into parking - furthest point from station entry~~

System 63

Shops in relation to entrances and exits

~~KR parking in near shops~~

Viewing platform, elevated, for KR below platform to which all KR passengers come by escalator(s) which would ^{also} ~~also~~ serve two or four car train.

~~for reversibility~~ all ticket gates located in a group with middle ones reversible

One concession ~~opposite ticket gates~~ in direct view of ticket gates, ^{outside} convenient for view of exiting passengers and K&R ^{WAITING}.
All stations should have same basic organization

System 64

14-17-18

Ways of minimizing the facilities required to handle rush hour fluctuations

~~MI - RHI~~

MI corresponds to center of passenger distribution (as determined by 73)

MI ~~contains~~ is served by the escalators and it contains all special access and service facilities

RHI @ min. width platform (directional) - broken into segments each served by stair

Access to RHI stairs through commuter ticket gates

RHI stairs oriented toward MI area

Access to regular ticket gates at lower level because of narrow platform (regular ticket gates in MI area).

concession in MI area

System 65

visibility through platform barrier

9-40-53-51-55-60

Lean and resting rail along barrier.

No structural obstruction within 10' of line of trains

Glass should start at 3'-6" and stop at 6'-6"

(Mullions should be as small as possible in depth
Individual panes should be small enough to be easy to replace.)

System 66

Traffic flow around station on public streets.

Right hand flow around stations

No left turns from or to station from major roads

No ~~tra~~ station induced queues on major roads.

(see BART memo on parking)

System 67

Relation between stairs and escalators ^{for} in emergency conditions.

Walking distance to stair is 150' w/out sprinkler system, 220 w/ sprinkler system.

(Exit stairs ~~used only in emergency conditions and~~ would not be available without attracting the attention of the agent-center stair integrated with attendants station.)

→ A total of 30' of exit stair width will be necessary. ←

System 68

Location of loudspeakers and telephones

- Use many small speakers in stead of a few large ones.

- Horizontal spacing of speakers equal distance of speaker above ears.

Announcements should be preannounced to alert people to listen for the message.

EM Telephone booth should be deep and low - lined on back and sides w/ 2" of PF339 fibreglass, perforated facing, 25 to 35% open. (SOROKA)

System 69

Emergency room.

emergency - Near stairs, escalators and ticketing areas.

Near the stopping point of the two car train.

Attendants station connected to paid and unpaid area- have ticket gate near by, but he should not be right adjacent to the ~~ticket~~ main bank of gates.

System 70

Transit car seating

→ aisle seats

seats either facing or ~~side~~ adjacent to aisle
have one side

~~No crossing~~ ~~over~~ seated passengers legs to get to empty seats.

Majority of seats should be individual seats.

Variety of seating arrangements.

Seats/fixed-flip back seats are inefficient and uncomfortable.

Opportunity for group seats

→ Suspend seats from wall wherever possible with minimum of pole supports (see Clurmans memo on transit cars)

Provide place for packages.

System 71 (see system 17)

Land use immediately around station.

Use area under tracks for parking

System 72

Short term and long term riders

no solutions

System 73

Even passenger distribution

X. Station entries should reflect direction and magnitude of approaching users (*urban stations*)
The sum of passengers picked up from a downtown station by one train will result in even loading (not solved)
The sum of passengers boarding an in bound train on a suburban line must result in an even distribution of passengers.

System 74

Access to and from and movement with the train.

no solutions

System 75

Station boundary and access to and from BART property.

no solutions

1. Isolation of public from non-public areas: mech. rooms, train control, tracks (9)
2. Location of lighting relative to the use of areas.
3. Meeting places.
- ④ 4. Station agent surveillance of the entire station. (64, 19)
9. Relation between openings to the surface, and openings to subway tunnels to control air movement and noise
11. Surveillance of enclosed passageway.
12. Demarcation of responsibility around concessions and stores: fire, maintenance, cleaning, crime
- ⑬ 13. Access from surface to trains.
14. Overall circulation. (19, 27, 22, 23, 41, 43, 64, 67, 13)
17. Feeder to station entrance connection.
18. Position of feeders along the train length.
- ⑰ 19. Number and distribution of entrances (73, 13)
20. Exterior organization and recognition of entrances.
21. Catalogue of sign types.
22. Entering sign sequence. (21)
23. Exiting sign sequence. (21)
26. Concessions in station layout.
27. Doors in platform barrier. (59)
28. Emergency exiting.
29. Reversible flows.
30. Circulation around ticket gates.
31. Methods for speeding flows.
33. Places to step out of flows.
34. Interruption in flow.
36. Materials and details affecting safety of walking surfaces.
37. Stairs.
38. Special path for handicapped.
40. Safety at the barrier.
41. Separation of passengers waiting for different trains.
43. Capacity of peak load waiting areas.
45. Special access for wheeled vehicles and handicapped.
46. Appearance of wall surfaces.
49. Cleaning and litter removal.
50. Safe and pleasant waiting facilities.
51. Area immediately inside train door used to handle special passengers.
52. Boarding and alighting circulation (59)
53. Waiting areas in the station.
55. Transit car facilities for long distance riders.
57. Relative position of sitting and standing areas in the transit car.
58. Extra comfort in the car seats.
59. Circulation in the car (72)
60. Train windows.
61. Location of advertisements.
62. Control of parking lots.
63. Shops in relation to entrances and exits.
- ⑰ 64. Ways of minimizing the facilities required to handle rush hour fluctuations. (73)
65. Visibility of train from platform. (52, 27)
- ⑰ 67. Relation between escalators and stairs.
68. Loudspeaker and phone locations.
69. Emergency room.
70. Maximum capacity train seating.
71. Land use immediately around station.
- ⑰ 72. Long ride and short ride seats in the car.
- ⑰ 73. Even passenger distribution on trains.

23 June 1964

Bay Area Rapid Transit

BREAKDOWN OF CONCEPTUAL ARCHITECTURAL DESIGN

	Kuesel's Priority	Time required to complete (days)
1. Isolation of public from non-public areas: mechanical rooms, train control, tracks. (9)	A	1
2. Location of lighting relative to the use of areas.	C	1
3. Meeting places.		1.5
4. Station agent surveillance of the entire station. (64, 19)	A	2.5
9. Relation between openings to the surface, and openings to subway tunnels to control air movement and noise.	A	1.5
11. Surveillance of enclosed passageway.	B	.5
12. Demarcation of responsibility around concessions and stores: fire, maintenance, cleaning, crime.		2
13. Access from surface to trains.	B	1
14. Overall circulation. (19, 27, 22, 23, 41, 43, 64, 67, 13)	A*	3.5
17. Feeder to station entrance connection.	B	1
18. Position of feeders along the train length.	B	1
19. Number and distribution of entrances (73, 13)	A	2
20. Exterior organization and recognition of entrances.	C	1.5
21. Catalogue of sign types.	C	2
22. Entering sign sequence. (21)	C	1.5
23. Exiting sign sequence. (21)	C	1.5
26. Concessions in station layout.	A	1.5
27. Doors in platform barrier. (59)	A	1
28. Emergency exiting.	A	1



29.	Reversible flows.	C	1.5
30.	Circulation around ticket gates.	B	1
31.	Methods for speeding flows.	B	1
33.	Places to step out of flows.	B	1
34.	Interruption in flow.	B	1
36.	Materials and details affecting safety of walking surfaces.	C	1
37.	Stairs.	C	.5
38.	Special path for handicapped.	C	.5
40.	Safety at the barrier.	B	.5
41.	Separation of passengers waiting for different trains.	A	2
43.	Capacity of peak load waiting areas.	A	1.5
45.	Special access for wheeled vehicles and handicapped.	A	.5
46.	Appearance of wall surfaces.	C	1
49.	Cleaning and litter removal.	C	1.5
50.	Safe and pleasant waiting facilities.	C	1
51.	Area immediately inside train door used to handle special passengers.	C	.5
52.	Boarding and alighting circulation (59)	A	1.5
53.	Waiting areas in the station.	B	2
55.	Transit car facilities for long distance riders.		1
57.	Relative position of sitting and standing areas in the transit car.		1
58.	Extra comfort in the car seats.		1
59.	Circulation in the car (72)		1.5

60.	Train windows.		1
61.	Location of advertisements.	B	1
62.	Control of parking lots.	B	1
63.	Shops in relation to entrances and exits.	C	1.5
64.	<i>Rush hour flows</i> Ways of minimizing the facilities required to handle rush hour fluctuations. (73)	A	1.5
65.	Visibility of train from platform. (52, 27)	A	.5
67.	Relation between escalators and stairs.	A	1.5
68.	Loudspeaker and phone locations.	C	.5
69.	Emergency room.	B	1
70.	Maximum capacity train seating.		.5
71.	Land use immediately around station.	B	2
72.	Long ride and short ride seats in the car.		1.5
73.	Even passenger distribution on trains.	A	1.5

NOTE:

Numbers in parenthesis indicate those systems which must be dealt with in advance of the system they are listed under.

Time estimates in days, as shown, are working days, not mandays, and do not include any contingencies. It is anticipated that an additional ten systems will be resolved during the course of the work outlined. Figured at an average of 1.3 days per system this is equal to 13 additional days.

STATION AGENT AND SURVEILLANCE

M - 29
P - 24
P + M = 3

- 1. This drawing will locate train control equipment areas, station mechanical rooms, escalator repair access points, track access points and the controls necessary to keep the public out of non-public areas.
- 2. This drawing will show the height of lighting fixtures in different parts of the station with special emphasis on the difference between waiting and circulation areas.
- 3. This drawing will describe the features of rendez-vous points which waiting passengers need in order to pass the time--telephone, snacks, view of people and street, etc.
- 4. ⁶This drawing will show the sight lines which the station agent and others require for surveillance, crime prevention and detection, and the details of associated alarm facilities.
- 5. This drawing will show the location of various wall and ceiling finishes throughout the station with specified soiling and cleaning characteristics, without detracting from the 'luxury' and pleasantness of station interior.

Admission layout

6-4

EXTERIOR FACE AND FEEDER CONNECTIONS

This drawing will show station layout for the quick evacuation of passengers in times of emergency including any special stairways, or exits required. *with exit. special stairs.*

- 8. This drawing will show, according to mode of access to the station, how far people will be required to walk and how direct their path will be.
- X 9. ~~Is identical to #47.~~ *→ see 47 for statement.*
- 10. This drawing will describe the typical configuration of stairways, passageways, concessions, columns, other possible isolation points to maximize surveillance capabilities of station from a few points and to minimize opportunities for crime.
- X 11. This drawing will show the relationship between waiting areas of the station and the general surveyability of the areas surrounding the station in an effort to alleviate isolated, enclosed waiting areas.
- X 12. This drawing will show how the use of glass as windows or walls will be controlled to avoid hazardous conflict with passenger movement and facilitate cleaning.

- X
13. This drawing will show what emergency ^{Design Statement} space provisions will be provided in light of train delays or other unknowns and the associated ventilation provisions needed.
14. This drawing will show the location of entrances and exits, widths of flow channels, placement of ticketing and concessions relative to the volume and direction of entering and exiting passengers over an entire operating day. Included in this drawing will be a statement of the anticipated flow rate and capacity of the station and transit car relative to the number of flow channels, distribution of passengers at each train door and the permissible movement within transit car.
15. This drawing will show in detail the controls at entrances for avoiding slick surfaces where water is tracked into the station and in particular provisions to keep stairs dry.
16. This drawing will show in detail the widths and capacities of entrances and exits including the provisions against congestion due to the number of different activities that occurs at entrance and wait points.
- X 17. This drawing will show the space provisions and layout of bus and kiss-ride drop off points and of adjacent sidewalk areas, entrances and rain canopies including provisions for passengers who need to get quickly into the station to move safely around and through the congestion of arriving and departing buses and cars.
- see 71

SIGN AND FARE-COLLECTION SEQUENCES

- X
18. This drawing will show the configuration and required widths of flow channels and variations in space and equipment needed to handle fluctuations in traffic over an entire operating day, according to established and projected volumes and requirements for system efficiency.
19. This drawing will show location and organization of ticket machines and strong rooms with special reference to the operational needs of collecting money, efficient use of machines and future equipment needs.
- see 64
20. This drawing will specify the information an infrequent user or uninitiated passenger is given as he enters the station.
21. This drawing will show the required size, shape, viewing angle and spacing sequence of key directional signs to facilitate correct orientation and unhesitant movement through station.
22. This drawing will show how throughout the station directional signing maintains the passenger's sense of orientation.

23. This drawing will show the kind and placement of dynamic signs and other communication devices intended to inform passengers of daily fluctuations in station use: reversing peak flows, closing of portions of the station, reducing of train length, location of emptiest incoming cars, etc.
24. This drawing will explain what devices to be used at train doors, on stairways and escalators and along critical portions of flow channels, to separate boarding and alighting flows of passengers. These devices will conform to and rely heavily upon the habit-forming characteristics of passengers.
25. This drawing will show the anticipated distribution of passengers along the platform and the handling of cross flows of passengers transferring between trains.

SAFE FLOW PATTERNS

26. This drawing will show what built in capacities are required in areas of the stations where build up of a crowd, as around ticketing, concessions or at entrances, must not interfere with the through flow of station traffic.
27. This drawing will describe in detail the opening and closing of train doors as a function of train control devices and crowding on the platform and in the car.
28. This drawing will describe the detailed surroundings and mechanization of the ticket gates, to ensure that accidents cannot occur when one person is pushed by a crowd behind him; especially in emergencies, provisions for crowds to escape through the gates under outward pressure.
29. This drawing will describe the location of signs along reversible flow channels - designation and location so as not to confuse passengers.
- X 30. This drawing describes the approach to ticket gates that is required for a passenger who is held up by malfunction, packages, no money, or any other reason so that he can immediately get away from the gate and find the agent, without holding up the flow of people behind.
31. This drawing will show the placement and organization of all operational areas, one leading to the next, entrances and exits, concessions, ticketing, boarding, so that overall time required and delays encountered by passengers are kept to a minimum.
32. This drawing will show exactly what the commuter must do to be ready for each operation in the station as it comes with an established maximum annoyance or delay factor assigned to each operation. This drawing will serve as a key to information and circulation coordination drawings.

- 33. This drawing will treat each special operating area of the station such as ticketing, concessions, escalators, exits and entry as hesitation points and momentary stopping points and indicate how conflicts between moving and stopped passengers can be avoided.
- 34.⁼¹ This drawing will describe the organization of overall flow, showing how morning and evening rush hours can make use of the same areas, in opposite directions, and specifying the provisions necessary at special places such as doors and ticket machines to avoid bottlenecks.
- 35.⁼³⁴⁺³⁶ This drawing specifies safety measures to be taken at critical points such as stair tops, stair bottoms, and places where running passengers may knock down slower passengers.
- 36. This drawing will specify details of floor surfaces and illumination at the train-platform interface, and at steps or stairs closely associated with the boarding process, with special attention to the problems encountered by handicapped and aged passengers.
simultaneous
- 37. This drawing will show provisions needed for the handicapped and elderly such as handrails and slow moving lanes on stairs, escalators and at critical points along circulation paths.
- X ● 38. This drawing will describe the level of lighting on, and acceptable limits of irregularities in walking surfaces along major paths through the station.

TRAINBOUND FLOW

- 39. This drawing will describe the size, shape, and location of stopping places, where passengers can step out of the flow, but which are not so dangerously isolated that they invite assaults and crimes late at night.
- 40. This drawing will show the relationship between the platform barrier necessary openings in it and the surrounding proximity of people waiting on the platform with special attention given to avoiding accidents and crime at station-train interface.
- 41. This drawing will show the visual connection between any intended waiting area and the arrival of an incoming train, reflecting what people look for in identifying a train and the car, they choose to board.
- 42.⁼³⁴ This drawing will show provisions necessary for commuters to pass through the station faster than occasional users especially in the area of ticketing, escalators and boarding and alighting.
- 43. This drawing will show the configuration of the floor area in front of the train doors on the platform as described by passengers leading up to and away from this point including critical widths, correct placement of key signs, and any variations which will arise over an entire operating day.

44. This drawing will show preferred locations for concessions, and according to vending type, the dimensional relationship between these locations and the rapid high volume circulation through the station.

CLEANING METHODS AND DEVICES

- X
- wheeled vehicles vs. verticle Circulation*
45. This drawing will show all access required for mechanical cleaning equipment, service equipment, garbage and cleaning. *Elevators. Escalators*
46. This drawing will show all the details required to keep water brought in by passengers, and condensation, or seepage, from leaving permanent marks and discolorations on wall surfaces, advertisements, signs, seats, etc.
- ⁼⁹ 47. This drawing will show the relationships between vent stacks, passages, openings to the sky, and platform barrier required to control noise, wind and flying dust.
- ⁼⁴⁶ 48. This drawing will show cross sections and surface materials required to cut-down echo in passages, and to create, at minimum costs, a feeling of luxury rather than grimness.
49. This drawing will show the organization required for an efficient cleaning sequence: the provision for unbroken wall and floor surfaces, standard corner details to avoid dirt and litter, and method of litter disposal which reflects litter build up throughout the station.

STATION-TRAIN INTERFACE

50. This drawing will show how waiting areas must be arranged so that women waiting alone will not feel uneasy. How properties of finishes, lighting and outlook can be controlled to avoid feeling of isolation.
51. **This drawing will show those aspects of the seating and car layout design which affect the speed and ease with which people move from a seated position in the train to the platform, and visa versa. These features of the car design will be described for the anticipated capacities and varying types of users. The material described will be essential to the control of train dwell time in the**
52. **stations.** drawing will show the physical arrangements required to accommodate both the circulation of passengers arriving at and waiting on the platform and the circulation of passengers moving toward and trying to board train. The drawing will include provisions necessary to distribute passengers along the platform, handle crowd build up due to train delays and avoid accidents due to last minute rushing.
53. This drawing will locate waiting and rendez-vous points throughout the station relative to the overall circulation through the station.

- 54. This drawing will show the placement of vending machines, smoking areas, seating and other leaning supports required by waiting passengers which will allow them to relax comfortably while waiting for a train.
- 55. This drawing will show the organization of the transit car which is suitable to passengers travelling long distances (travel time greater than 6 minutes). In particular special provisions are needed for commuters to make their travel time more enjoyable and useful.

TRANSIT CAR

- 56. ^{= 53+54} This drawing will show the organization of the station waiting areas, the facilities needed by waiting passengers, the conditions required for comfort.
- 57. This drawing will show the relation between standing areas to sitting and in particular how the seats will fill under crowded conditions; what spacing and arrangement of seats to aisle will best satisfy the needs of people trying to get in and out of seats.
- 58. This drawing will show the elements of car layout, lighting, sound control, and coloring which will effect the pleasantness and general feeling of the car interior, considering the extremes from crowding to near emptiness; tunnel darkness to bright sunlight.
- 59. This drawing will show the various means for stabilizing passengers when seated and standing, and the aids for safe movement in accelerating and decelerating trains. On the premise that standard grab-bars and stanchions are unacceptable in some respects, there must be provisions for safe movement in the car which correspond to the anticipated smooth performance of vehicles and high percentage of seated passengers.
- 60. This drawing will show the relationship between the placement of windows in the car, people's view from the car and from the platform into the car, the amount of direct sun desired by passengers, and the means of controlling excessive heat gain and sun glare from direct sunlight.
- 61. This drawing will show the relationship between general lighting of spaces and the lighting of advertisements and the factors controlling brightness contrast and glare.

System 70

This drawing you have. It deals with maximizing seating capacity without sacrifice to passenger comfort.

System 74

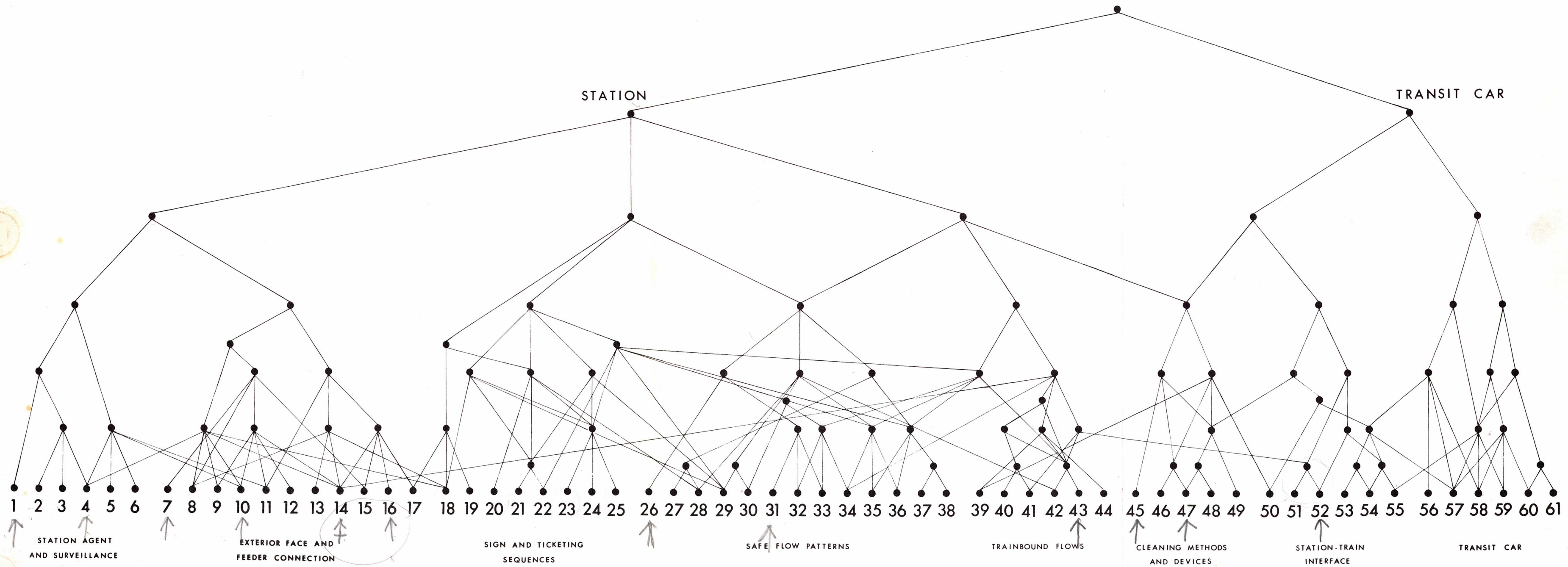
This drawing will show the provisions for people to move longitudinally along the length of the train. It will show the relationship between this movement along the train and movement along the platform. In particular the provisions for easy movement from one car to the next will be specified.

62. This drawing will ~~now~~ show the controls to be used in regulating the use of parking lots so that these lots are not misused either by non-users of the system or by pranksters.
- X 63. This drawing will show the relationship between concession and vending facilities and circulation of various passengers types during a total operating day.
- X 64. This drawing will show the separation between inbound and outbound circulation flow through the station with special attention given to the ~~xxxxx~~ efficient use of space over and entire operating day. Included will be modifications which will be possible as a result of unpredictable change in the future.
65. This drawing will show the relationship between waiting areas on the platform and ~~the and~~ the clear view into a transit car that waiting passengers require as the train pulls into the station: a comfortable place to wait with an easy view of the incoming train.
- 66.
67. This drawing will show the organization of verticle circulation through the station so that the path using exelators is clearly marked, the path using stairs is clearly marked; so as to provide unambiguous movement through ~~xxx~~ station both in normal and special conditions such as emergencies.
68. ~~Trainx~~ This drawing will show the placement of loudspeakers along the platform so that announcements will not be masked by in-station noise.
- X 69. This drawing will show the palcement of an "emegerncy roome" including ~~the~~ toilet and the control necessary over such a room by station attendant.
- X 70. This drawing will show the basic organization of seats in the transit car including provisions for arm rest, package racks, easy seat access, and easy car cleaning.
71. This drawing will show the best use of the land around the station over years as a result of its adjacency value (subsystem of 17)
- X 72. This drawing will show the layout of the ~~trainx~~ transit car which will accomodate both long and short distance travellers and the accomodations peculiar to their trip lengths.
- X 73. This drawing will show the desirable boarding and alighting pattern ~~alongxxxxxxxofstations~~ (platform access points within station) which will ~~assume~~ ^{assure} better passenger distribution along the train.

72
In the process of working with the material in System 72, we were able to arrive at the conclusion that about 21% of the total number of rides on the system will be short distance rides or rides of six minutes or less duration. This roughly covers a range of up to three urban stops, i. e. Montgomery Street to Van Ness; McArthur Boulevard to Ashby Avenue. In order to accommodate this substantial percentage of users and the characteristics of their riding needs as different from the needs of passengers travelling twice or five times as far, places to stand, places to lean and certain seats which are easier to use than those for long distance riders will be required.

When the statement of System 72 has been made it will be the resolution of conflicting interests between these two gross categories of users (short distance - long distance).

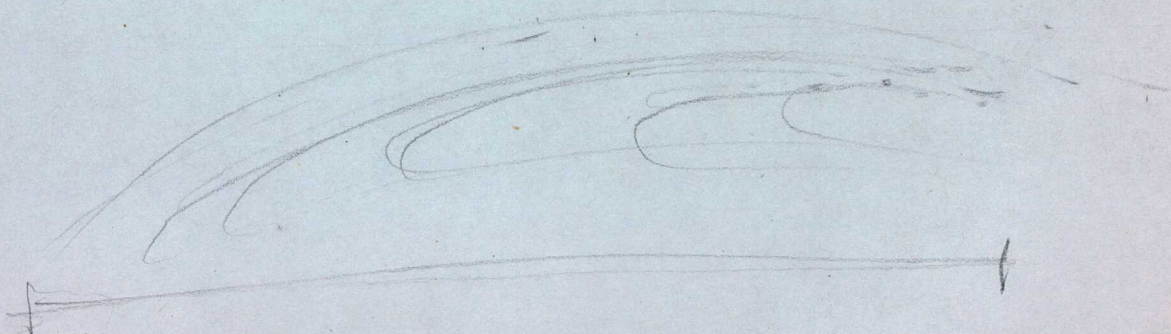
DRAWING COORDINATION CHART



WUBSTER BE...ARDI AND EMMONS
JOB REFERENCE
TO
FROM
COMPANY
MESSAGE OR INSTRUCTIONS

— get some of the cleaning systems to
Churman

Specifically what can be done.



SYSTEM 1

- 12. Keep kids off the tracks.
- 142. At no point must non-public areas be open to the public (in existing systems these often invite crime, e.g., women being pulled into tunnels and molested).
- 161. Workmen and emergency crowds must be able to get from the tracks into the station.
- 175. Every escalator requires a motor housing and an area for servicing underneath it.
- 226. There must be no places where it might become difficult or ambiguous to assign responsibility for maintenance or liability for accidents (BART vs city or BART vs private owner).
- 228. Any device intended as a barrier must not allow people to vault over, climb over, squeeze past, or crawl under it.
- 233. Very easy access to electronic train control equipment and fixtures in the station. (This is likely to be such a frequent need that the access must be possible without causing any disruption of service or delay to passengers).
- 1. Prevent people falling, being pushed, or jumping off the platform onto the tracks - either to commit suicide or to retrieve a fallen object.

SYSTEM 2

29. To avoid offending passengers, and to keep down cleaning and maintenance costs, advertisements must be placed to resist mutilation, obscene scrawling, tearing, etc.
209. Since any maintenance or replacement to be done on site must be done during the repairman's working day (8 AM to 5 PM), on site maintenance must not interfere with normal daytime operations.
212. Glass should only be used if absolutely necessary and must then be placed in such a way that it is least vulnerable to accidents, vandalism and people walking into them.
213. It must be easy to replace ads, especially those which must be changed often.
214. Repair and replacement needs must come to the attention of maintenance department immediately.
215. All light bulbs should be easy to replace.
218. To reduce payroll, use minimum number of personnel to run, clean, police, supervise, patrol, and maintain the stations and transit cars.
138. Keep all places well illuminated to prevent possible crimes- these crimes often take place in the darker section between two places which are well lit for functional reasons.
200. Every waiting area, including places where people are standing in line, requires a level of illumination which allows people to read comfortably.
201. The floor needs enough light on it to make people confident that they can walk as fast as they want.
276. People seek (need) the definition of area provided by pools of light.
325. Arrange waiting facilities so that a woman will not become uneasy if she has to wait alone at night.

SYSTEM 3

27. Wherever a person wants a phone, there must be one placed in such a way that he may hear the person he is talking to but not be over heard by people around him.
125. There need to be places where a person can grab a snack or cup of coffee and still be within view of the mainstream of the crowd, either for the pleasure of watching, or to watch for some specific person.
165. Escalator should be located so that any accident is likely to have a witness. The shutoff must be in plain view so that the witness can stop the escalator even under stress conditions, yet placed so that kids will not abuse it.
247. The wife picking her husband up at the station must be able to wait and have something to do for a few minutes in the uncertain interval before the train he is on arrives.
317. To get system accepted as part of the city, the station and tracks should face streets rather than backyards and alleys.
325. Arrange waiting facilities so that a woman will not become uneasy if she has to wait alone at night.
327. Wherever they are, people prefer a view of living things (people, automobiles, movement, color) to a view of dead things (buildings, rooftops, parking lots).
328. There is a need for rendezvous points. These must be easy to describe (so that people will actually use them for meeting), very easily accessible to the outside, and close to the tickets and trains.
385. Many people enjoy a chance to use mirrors, especially when they are waiting or just before they emerge from the station.

SYSTEM 4

140. Since any long uninterrupted enclosed passageway is frightening because of the danger of assault in the middle, such passageways must always be short.
163. A passenger in distress should scream or shout for help and be heard without having to overcome screening high background noise level, the fact that help is out of range, the fact that the attendant has no way of knowing the difference between false alarms and real distress, the feeling that it is useless.
256. Parking lots and structures must not create opportunities for night-time crime.
139. There should be no places like telephone booths which, under the pretext of use, can become operation points for perverts because they are concealed from view.
204. Any area under surveillance requires a high enough level of illumination so that details can be observed at the maximum surveillance distance.
89. Avoid nooks and corners which attract dirt and litter, because they are unused, because letter gets blown into them, because they are hard to clean manually, because they cannot be reached by mechanical cleaning equipment.
138. Keep all places well illuminated to prevent possible crimes—these crimes often take place in the darker section between two places which are well lit for functional reasons.
230. Trainman must be able to check all train doors before they close.
343. Structural columns must not obstruct any essential view of trains, people signs.
325. Arrange waiting facilities so that a woman will not become uneasy if she has to wait alone at night.
131. Displays and entrances which require extra work, extra maintenance, and extra policing, as they do when they are on a mezzanine, are a nuisance to store owners and should be avoided.
385. Many people enjoy a chance to use mirrors, especially when they are waiting or just before they emerge from the station.
314. Transition from outside of the station to the inside must be psychologically immediate: interior of the station, trains, boarding and alighting, etc., should be so visible and accessible from the outside that no one will think it too much trouble to use the system.

SYSTEM 4

135. Every part of the station that is open must very obviously be under surveillance, as much to discourage crime, as to detect it (especially at night).
136. Reduce entirely the feeling of isolation and enclosure which tempts assaults (exits, toilets, stair landings, vending machines, blind corners in passages, between columns, etc.).
141. To reduce crime, no part of the station should be deserted when it is in operation.
309. The station attendant should have a general overview of the station as a whole and must be able to investigate any one incident in detail without losing this general overview.
334. Station agent must be watching entering ticket gates and in case of a malfunction or passenger difficulty be able to reach them.

→ next page

1. Prevent people falling, being pushed, or jumping off the platform onto the tracks - either to commit suicide or to retrieve a fallen object.

23. Anywhere where passengers are waiting, the noise of incoming trains must not be deafening.

24. Reduce echoes, shouts, and noise produced by footsteps, pranksters, and crowds talking in passageways.

91 } 92. Reduce to a minimum all areas and surfaces which must be cleaned.

93. Brake dust and vaporized grease, flying through the air when train comes into the station and applies brakes, must not settle on visible surfaces.

106. All areas where people have to be must be protected from the rain and wind.

~~107.~~ All areas where people spend more than a minute or two without moving should be provided with an economical way of controlling temperature and humidity.

~~113.~~ Passage to and from automobiles and buses must be protected from rain (including shelter for waiting).

162 } 129. Concessions need to be placed somewhere where dust and dirt do not settle on food or goods on display.

182. Reduce the difference between outside air temperature and the inside temperature so that the passenger dressed for the outdoors does not encounter uncomfortable changes.

185. The quantity of fresh air and the rate of air movement must be adequate to eliminate stuffiness and smells.

186. Passageways and entrances must not act as channels for 'high speed air movement and flying dust.

187. The stale tunnel air brought into the station by trains must be vented out so that it does not bother passengers.

212. Glass should only be used if absolutely necessary and must then be placed in such a way that it is least vulnerable to accidents, vandalism and people walking into them.

235. To avoid the feeling of being in some undeterminate underground cavern while in a subway station people like to see the sun, daylight or some indication of a maintained connection with the outside world which they have temporarily lost touch with.

267. Eliminate the feeling of claustrophobia caused by being underground, in a packed transit car, crowded passageways, windowless rooms, etc.

314. Transition from outside of the station to the inside must be psychologically immediate: interior of the station, trains, boarding and alighting, etc., should be so visible and accessible from the outside that no one will think it too much trouble to use the system.

389 } 342. Minimize the effect of extreme subterranean forces due to soil loads and hydrostatic pressure by keeping any non-cylindrical volumes near the surface.

Subway Ventilation

9 and 77 -

MyS team

Passageways

Tunnels

enclosed volumes.

~~Sub-surface passageways~~

Entrances - Sub-surface passageways.
(subway)

SYSTEM II

Any passageway is closable.
Under these circumstances can be near amission

- 24. Reduce echoes, shouts, and noise produced by footsteps, pranksters, and crowds talking in passageways.
- 82. Rush hour pedestrian flows crossing streets must not reach such volume that they create traffic jams.
- 113. Passage to and from automobiles and buses must be protected from rain (including shelter for waiting).
- 140. Since any long uninterrupted enclosed passageway is frightening because of the danger of assault in the middle, such passageways must always be short.
- 267. Eliminate the feeling of claustrophobia caused by being underground, in a packed transit car, crowded passageways, windowless rooms, etc.
- 327. Wherever they are, people prefer a view of living things (people, automobiles, movement, color) to a view of dead things (buildings, rooftops, parking lots).
- 334. Station agent must be watching entering ticket gates and in case of a malfunction or passenger difficulty be able to reach them.
- 342. Minimize the effect of extreme subterranean forces due to soil loads and hydrostatic pressure by keeping any non-cylindrical volumes near the surface.
- 385. Many people enjoy a chance to use mirrors, especially when they are waiting or just before they emerge from the station.
- 314. Transition from outside of the station to the inside must be psychologically immediate: interior of the station, trains, boarding and alighting, etc., should be so visible and accessible from the outside that no one will think it too much trouble to use the system.

#12

Arguments concerning fire control
when exits and openings are
direct from stores:

- projection into the space.
- w/ respect to property line.

SYSTEM 12

88. The entire station must look clean 24 hours a day.
89. Avoid nooks and corners which attract dirt and litter, because they are unused, because letter gets blown into them, because they are hard to clean manually, because they cannot be reached by mechanical cleaning equipment.
92. Reduce to a minimum all areas and surfaces which must be cleaned.
95. Since heavy mechanical cleaners are moved from station to station by train, any area which requires mechanical cleaning must be accessible for such a machine from the train level.
118. A concessionaire wants to expose potential buyers to his display for so long that they make up their minds to buy before they pass it.
130. The area immediately around vending machines and concessions must be kept free from continual dirt, litter, candy wrappers, spilled drinks, empty cartons, which will keep potential buyers away.
131. Displays and entrances which require extra work, extra maintenance, and extra policing, as they do when they are on a mezzanine, are a nuisance to store owners and should be avoided.
134. If a large store is likely to have huge sales, and the store opens directly off the subway, there must be provision for the crowds of customers who will wait outside the doors before the sale opens - this will probably be just at the worst moment of the rush hour.
141. To reduce crime, no part of the station should be deserted when it is in operation.
212. Glass should only be used if absolutely necessary and must then be placed in such a way that it is least vulnerable to accidents, vandalism and people walking into them.
226. There must be no places where it might become difficult or ambiguous to assign responsibility for maintenance or liability for accidents (BART vs city or BART vs private owner).

SYSTEM 13

141. To reduce crime, no part of the station should be deserted when it is in operation.
314. Transition from outside of the station to the inside must be psychologically immediate: interior of the station, trains, boarding and alighting, etc., should be so visible and accessible from the outside that no one will think it too much trouble to use the system.
327. Wherever they are, people prefer a view of living things (people, automobiles, movement, color) to a view of dead things (buildings, rooftops, parking lots).
182. Reduce the difference between outside air temperature and the inside temperature so that the passenger dressed for the outdoors does not encounter uncomfortable changes.
92. Reduce to a minimum all areas and surfaces which must be cleaned.
135. Every part of the station that is open must very obviously be under surveillance, as much to discourage crime, as to detect it (especially at night).
136. Reduce entirely the feeling of isolation and enclosure which tempts assaults (exits, toilets, stair landings, vending machines, blind corners in passages, between columns, etc.).
140. Since any long uninterrupted enclosed passageway is frightening because of the danger of assault in the middle, such passageways must always be short.
235. To avoid the feeling of being in some undeterminate underground cavern while in a subway station people like to see the sun, daylight or some indication of a maintained connection with the outside world which they have temporarily lost touch with.
236. Pattern of movement through the station should be so simple in form that even a stranger can grasp it without thinking about it.
267. Eliminate the feeling of claustrophobia caused by being underground, in a packed transit car, crowded passageways, windowless rooms, etc.
315. At any point where a passenger is aware that he is entering the station, he needs to be met by a welcoming atmosphere.
323. The system must appeal to the California temperament of being on the go, out-of-doors, quick and easy, etc.
325. Arrange waiting facilities so that a woman will not become uneasy if she has to wait alone at night.

342. Minimize the effect of extreme subterranean forces due to soil loads and hydrostatic pressure by keeping any non-cylindrical volumes near the surface

8. Make it impossible for people to get pushed and knocked down by people in a hurry or crushed by crowds behind them.
37. No one train door should hold up the train because it has more passengers going through it than the others. However a perfectly uniform distribution of boarding passengers along a train is not necessarily the best. Some cars may have more people getting off than others; some may have less available seats than others and empty cars fill faster.
60. Total effective cross section of flow channels must be large enough to take maximum required flows.
61. Capacity of flow channels, in persons per minute, must be the same at every point along the channel so as to avoid bottle-necks.
81. If access to the station is from the sidewalk, the sidewalk must be wide enough to accommodate the additional flows created and the width of the entrance itself without pushing people on the street at rush hour.
115. Stores and concessions want to be on the most heavily traveled paths.
133. Certain stores may require that pedestrian flow around them should not be too smooth and channeled - people enjoy elbowing and fighting their way through crowds when they are shopping so that from the store owners' point of view, congestion is useful because it contributes to the excitement of buying, and therefore increases sales.
134. If a large store is likely to have huge sales, and the store opens directly off the subway, there must be provision for the crowds of customers who will wait outside the doors before the sale opens - this will probably be just at the worst moment of the rush hour.
159. In case of fire or major accident, people must not be caught in a constricted space, but must have ample space to expand out into. (A panicked crowd requires more space per person than an orderly crowd.)
178. Sizes of various exits and entrances must be proportional to volumes of passengers going to and coming from different directions.
179. There must be enough doors and enough capacity just inside them so that entering passengers can walk straight into station, and will under no circumstances have to wait outside.
181. There must be a hesitation point, just before people emerge into outside, where people can stop to put up an umbrella, fasten coat, decide which way to go.
220. System must be able to accommodate rush hour traffic without wasting capital investment on space and machines that are idle for 23 hours of the day.
242. Groups of people waiting for the bus must not interfere with people going in and out of the station.
260. Waiting areas must accommodate the maximum crowd which can accumulate during the worst 90 second head at peak hour with a safety factor to allow for a five-minute train delay.

SYSTEM 17

81. If access to the station is from the sidewalk, the sidewalk must be wide enough to accommodate the additional flows created and the width of the entrance itself without pushing people on the street at rush hour.
82. Rush hour pedestrian flows crossing streets must not reach such volume that they create traffic jams.
101. Do not allow the exhaust from starting buses to blow in the faces of waiting passengers or to discolor walls or buildings.
113. Passage to and from automobiles and buses must be protected from rain (including shelter for waiting).
239. Passengers who transfer from train to feeder should not feel that his trip is being interrupted. The trip from door to door should "read" as a planned part of a total transportation operation.
- X 240. "Distance" from bus to train should be minimal.
243. Buses and cars must be able to load and unload, without impediment, on their right hand side.
- X 244. Incoming cars and buses must not spray waiting passengers during rainy weather.
245. All the buses that ever need to be at the station at one time must be able to wait either at the boarding platforms or else in view of the boarding platforms.
- X 248. There must be a way for the kiss-and-ride commuter to be driven to within a few feet of the train.
- X 250. People should be able to get to and from their cars without crossing high volume streams of moving vehicles or walking so close to them that they get splashed in rainy weather.
258. Provision for several taxis to wait right next to station exit at rush hour.

System 18

file copy - leave in file

37. No one train door should hold up the train because it has more passengers going through it than the others. However, a perfectly uniform distribution of boarding passengers along a train is not necessarily the best. Some cars may have more people getting off than others; some may have less available seats than others and empty cars fill faster.
60. Total effective cross section of flow channels must be large enough to take maximum required flows.
64. "Distance" from parked car to train must be minimal.
65. "Distance" from sidewalk to train must be minimal.
- ~~67. Whenever a pedestrian can see his objective, he must be able to walk straight towards it (bee-line), not need to make a visible detour.~~
68. Any path through the station should deviate as little as possible from a straight line (zig zags, hairpins, back-tracking irritate passengers).
136. Reduce entirely the feeling of isolation and enclosure which tempts assaults (exits, toilets, stair landings, vending machines, blind corners in passages, between columns, etc.).
140. Since any long uninterrupted enclosed passageway is frightening because of the danger of assault in the middle, such passageways must always be short.
158. In any emergency, it must be possible to empty the station in a few seconds (supplemented by fire escapes, escape hatches).
236. Pattern of movement through the station should be so simple in form that even a stranger can grasp it without thinking about it.
222. Operation of a two car train must be as efficient as the operation of a ten car train: in particular, passengers must never go toward boarding areas from which they cannot reach a car.
240. "Distance" from bus to train should be minimal.
303. High cost of stairways and escalators makes it necessary to reduce their total number and get the maximum use from each.
314. Transition from outside of the station to the inside must be psychologically immediate: interior of the station, trains, boarding and alighting, etc., should be so visible and accessible from the outside that no one will think it too much trouble to use the system.
318. Transferring between trains on different tracks must be quick & easy

SYSTEM 19

49. Passengers want to use that car which will minimize the walking distance to an exit at the destination station after they alight.
123. Passengers leaving trains need candy stores, flower shops, camera supplies. In addition, at suburban stations, they need cleaners, groceries, and larger stores.
148. To discourage holdups, the public should never be allowed to see actual money handled or the inside of money machines.
149. Storage of money received from ticketing and change operations must be proof against, and not encourage, robbery.
152. The money collectors must be able to collect money from the strongroom or ticketing machines and transfer it to their armored car safely and easily.
219. In view of uncertain information about expected and future volumes, it must be possible to add extra ticket machines, change machines and ticket gates.
223. There must be no way for a passenger to reach the trains without passing through a ticket control.
227. There must be an alternate machine (or person) to take over the instant an operating machine breaks down.
246. Passengers coming home at night must be able to find the car waiting for them without trouble.
332. The high cost of ticket machines makes it necessary to justify investment by guaranteeing a minimum amount of business for each machine.
334. Station agent must be watching entering ticket gates and in case of a malfunction or passenger difficulty be able to reach them.
381. People are prepared to wait longer getting into the system than they will wait to get out of the system: i.e., exiting ticket gate delays are more irritating than entering ticket gate delays.

placement of machines - existing
procedure will have some effect
on platform distribution (and crowding
on train)

SYSTEM 20

176. Entrances should stand out so sharply from their surroundings that they are immediately visible from any point up to a quarter of a mile away.
195. Information about schedule changes, temporarily closed stations, exits under repair, forthcoming system changes, must reach all passengers.
236. Pattern of movement through the station should be so simple in form that even a stranger can grasp it without thinking about it.
252. When you drive into a parking garage or parking lot, you want to know exactly where to go to find an empty parking space.
255. Make it very easy for passengers to remember where they left their car parked (in station lot) so that they have no trouble finding it in the evening.
277. At any point in the system, a passenger must always be able to tell from his surroundings and from the signs visible to him at that point, just which point he needs to go to next.
297. System must be designed to serve many kinds of people (sizes, occupations, pleasures, purposes, status groups, and nationalities).
330. At no point should a passenger be confronted with an operation that he cannot complete because of no change, inadequate ticket, etc.
331. Strangers to the system should have sufficient warning of the need for an automatic ticket and how to get it so that they do not make mistakes based on assumptions about the way other systems work.
339. Passengers who need them must know where to find ticket machines and change machines.

System 21

~~Special Signage
Orientation~~

30. The placing, illumination and organization of advertisements must not compete with, obscure, or detract from operational signs and displays.
63. Eradicate conflicts between commuters who do everything fast and automatically, and irregular passengers who do not know where to go, how to pay, which way to turn, what sign to look at for what information, etc.
193. If the level of information a passenger wants is too detailed to be displayed at a given point, there must be a sign at that point indicating where he can get this information.
194. Wherever people need it, there must be a system map, schedule and other overall system information (at station entrance, transfer points and on the trains.)
197. Each community will want to give passengers information about all their own special features which are near the station (stores, theaters, parks, zoo, building, museums).
277. At any point in the system, a passenger must always be able to tell from his surroundings and from the signs visible to him at that point, just which point he needs to go to next.
280. Each sign of different operational type needs a distinctive graphic character (e.g., green triangle for the station name, blue and yellow stripes for the exit).
282. At any point where a passenger tries to read a sign, the sign must subtend an angle small enough to fall within the foveal cone and large enough for its characters to be legible.
283. The total amount of information in any one sign or collection of signs should not be so great that a viewer cannot easily pick out the item he is looking for at a single glance.
285. A passenger should not have to know more than the name of his destination station in order to reach that destination. The signs he follows should not require him to know its compass direction, the line it is on, the terminal station, etc.
288. Passengers will require a great deal of redundant information for the sake of his own peace of mind and confidence. That is, he must be assured that he is in the right place, even when he could not possibly be in the wrong place.
289. No sign should have as a possible outcome that the passenger has to go back where he came from; in other words, it should never be necessary to go up to a sign only in order to find out that one ought to be going the opposite way.

finding way into the station

40. Before the train stops boarding passengers need to be waiting at those points along the platform where the incoming cars are emptiest.
43. Since signs on trains are hard to read and not dependable, boarding passenger must get the right train without having to read any sign on the train itself. Ideally he should never be in contact with a train he does not want to ride.
234. However a person orients himself in the city normally he must be able to maintain this orientation as he moves through the station.
236. Pattern of movement through the station should be so simple in form that even a stranger can grasp it without thinking about it.
278. Wherever possible information should not be carried by signs, but by the architecture itself, which is both more potent, and less liable to confuse the reader by proliferated messages.
279. On any path whatever through the station, the signs a passenger encounters must form a properly coordinated sequence.
280. Each sign of different operational type needs a distinctive graphic character (e.g., green triangle for the station name, blue and yellow stripes for the exit).
284. Train bound passengers must know how to get to the train he wants.
285. A passenger should not have to know more than the name of his destination station in order to reach that destination. The signs he follows should not require him to know its compass direction, the line it is on, the terminal station, etc.
289. No sign should have as a possible outcome that the passenger has to go back where he came from; in other words, it should never be necessary to go up to a sign only in order to find out that one ought to be going the opposite way.
314. Transition from outside of the station to the inside must be psychologically immediate: interior of the station, trains, boarding and alighting, etc., should be so visible and accessible from the outside that no one will think it too much trouble to use the system.
347. Any passenger transferring from one train to another must know exactly where to go and what to do.

System 23

Sheet 1 of 2
Wray
5/11

55. So that alighting passengers do not hesitate as they reach the platform, there must be only one way to walk away from the car door, and the passenger must know in advance which way this will be.
59. Once on the platform, after leaving the train, the exit must be the most prominent thing in sight.
72. Ambiguous points where passenger can become unsure he is going the right way because he has had to make an arbitrary decision in order to continue, must be eliminated.
62. Encourage people to move faster wherever possible so that the station's flow capacity (ij passengers per minute) can reach the required maximum.
74. Any section of flow that needs to be reversed during any part of the operating day must dovetail smoothly in both directions and while stationary with the remainder of the flow (passages, ticket gates, reversing or reversible escalators).
137. There must be at least two ways of getting away from every single point in the system, so that there are no dead end places where a woman can be trapped - unescorted women will not use the system at night if it appears unsafe in this respect.
158. In any emergency, it must be possible to empty the station in a few seconds (supplemented by fire escapes, escape hatches).
160. It must be clear at once what to do in case of emergency (fire, accidents) - both in the signing, natural actions, communications, and in the natural actions which the physical layout invites.
168. If escalators are restricted in number, people who specially want to use them must know from the outset of their passage through the station where they must go so as to be in the escalator flow.
234. However a person orients himself in the city normally he must be able to maintain this orientation as he moves through the station.
236. Pattern of movement through the station should be so simple in form that even a stranger can grasp it without thinking about it.
237. Passengers must know which exit will get them onto the street where they want to be.

Wray
Pan

System 23

269. Since regular passengers need to rely on habit, allow them to get a complete feeling of certainty, reliability and familiarity with the pattern and sequence of operations (comparable to the feeling of reaching for a familiar light switch in the dark). For example, the position of exits in the car and the relation of entrances to ticket machines, etc. should always be the same.
277. At any point in the system, a passenger must always be able to tell from his surroundings and from the signs visible to him at that point, just which point he needs to go to next.
278. Wherever possible information should not be carried by signs, but by the architecture itself, which is both more potent, and less liable to confuse the reader by proliferated messages.
378. Wherever there is more than one opening, people tend to go to the nearest one even if they are not sure it is the right one.
280. Each sign of different operational type needs a distinctive graphic character (e.g., green triangle for the station name, blue and yellow stripes for the exit).

SYSTEM 26

32. Advertisers want all advertisements and show cases to be placed at points of maximum passenger volume, so that they are exposed to the largest number of potential buyers.
35. The temptation to stop and look at shop windows must never occur where steady uninterrupted flow is required.
77. The people who accumulate in front of concessions, shops and stands, must not interfere with through flows.
115. Stores and concessions want to be on the most heavily travelled paths.
116. Stores want to get customers both from station traffic and from other passing traffic.
118. A concessionaire wants to expose potential buyers to his display for so long that they make up their minds to buy before they pass it.
119. Store windows should not be obscured by crowds walking or standing in front of them.
124. Passengers about to board trains need newspapers, cigarettes, magazines, drinks, mailboxes, candybars.
127. The thing that makes people buy is a view of other people buying.
132. It is highly desirable for a store owner if his store has an entrance which people treat as a meeting place.
133. Certain stores may require that pedestrian flow around them should not be too smooth and channeled - people enjoy elbowing and fighting their way through crowds when they are shopping so that from the store owners' point of view, congestion is useful because it contributes to the excitement of buying, and therefore increases sales.
134. If a large store is likely to have huge sales, and the store opens directly off the subway, there must be provision for the crowds of customers who will wait outside the doors before the sale opens - this will probably be just at the worst moment of the rush hour.
226. There must be no places where it might become difficult or ambiguous to assign responsibility for maintenance or liability for accidents (BART vs city or BART vs private owner).
374. People tend to follow one another sheep-like, tend to gravitate toward existing lines, and to use the person in front of them as the best indicator of where to go next.
383. People tend to buy when getting off the train rather than when getting on (so that they do not risk missing any trains).

SYSTEM 27

1

4. To prevent people being dragged along by the train, no one must be in contact with the outside of the transit car as the train starts to move out of the station.
36. Minimize dwell-time.
45. People should be warned when the train doors are about to close and should not be allowed to hold the doors open and thus delay the train.
47. When a car is jam packed to the edge prevent the last boarding passenger getting caught in the door because he can't squeeze far enough in.
50. Boarding passengers start moving the moment their train comes into the station.
191. At every point in the station and surrounding shops and parking lots a passenger must know how many minutes and seconds he has before his train.
192. Departing passenger should not be aware that train is coming, or about to leave, if he cannot catch it from where he is (this would only induce frustration).
265. People waiting should feel certain that they will get on the train and get a seat without having anxiously to keep their place in line.

5. Prevent the accident in which the horizontal bar of a turnstile catches men or women in the groin as they push through.
8. Make it impossible for people to get pushed and knocked down by people in a hurry or crushed by crowds behind the.
17. Prevent a door pushed open by one person, springing back and hitting the next person in the face.
85. No passenger should encounter a closed door.
156. Prevent panic during emergencies.
157. In an emergency isolated persons or crowds must be able to open all doors and gates outward. If crowds are involved the gates must stay open.
158. In any emergency, it must be possible to empty the station in a few seconds (supplemented by fire escapes, escape hatches).
159. In case of fire or major accident, people must not be caught in a constricted space, but must have ample space to expand out into. (A panicked crowd requires more space per person than an orderly crowd.)
207. There must be a provision for emergency lighting which will provide the minimum necessary lighting in the case of a power failure.

System 28

*Talk w/ Engineers about:
earthquake
Fire sprinklers.*

System 29

72. Ambiguous points where passenger can become unsure he is going the right way because he has had to make an arbitrary decision in order to continue, must be eliminated.
74. Any section of flow that needs to be reversed during any part of the operating day must dovetail smoothly in both directions and while stationary with the remainder of the flow (passages, ticket gates, reversing or reversible escalators).
137. There must be at least two ways of getting away from every single point in the system, so that there are no dead end places where a woman can be trapped - unescorted women will not use the system at night if it appears unsafe in this respect.
170. People must always be able to choose a stair instead of an escalator if the escalator is crowded or they don't like escalators.
172. People must not try to walk up a down-escalator, or down an upescalator.
177. Since entrances cannot be successfully distinguished from exits by an entering passenger, he must be able to enter through any opening in the exterior face of the station and still find his way smoothly and immediately to the train-bound flow.
236. Pattern of movement through the station should be so simple in form that even a stranger can grasp it without thinking about it.
269. Since regular passengers need to rely on habit, allow them to get a complete feeling of certainty, reliability and familiarity with the pattern and sequence of operations (comparable to the feeling of reaching for a familiar light switch in the dark). For example, the position of exits in the car and the relation of entrances to ticket machines, etc. should always be the same.
277. At any point in the system, a passenger must always be able to tell from his surroundings and from the signs visible to him at that point, just which point he needs to go to next.
278. Wherever possible information should not be carried by signs, but by the architecture itself, which is both more potent, and less liable to confuse the reader by proliferated messages.
377. People are used to keeping to the right.

17. Prevent a door pushed open by one person, springing back and hitting the next person in the face.
60. Total effective cross section of flow channels must be large enough to take maximum required flows.
84. Ticket gates must not break stride of walking passenger.
85. No passenger should encounter a closed door.
87. Women with strollers should be able to use the system.
177. Since entrances cannot be successfully distinguished from exits by an entering passenger, he must be able to enter through any opening in the exterior face of the station and still find his way smoothly and immediately to the train-bound flow.
179. There must be enough doors and enough capacity just inside them so that entering passengers can walk straight into station, and will under no circumstances have to wait outside.
223. There must be no way for a passenger to reach the trains without passing through a ticket control.
266. The passenger must not encounter more than some maximum number of gates, turnstiles, fare-paying operations, transfers, holdups, delays, lines, and queues, on his passage through the system.
277. At any point in the system, a passenger must always be able to tell from his surroundings and from the signs visible to him at that point, just which point he needs to go to next.
314. Transition from outside of the station to the inside must be psychologically immediate: interior of the station, trains, boarding and alighting, etc., should be so visible and accessible from the outside that no one will think it too much trouble to use the system.
320. Avoid situations where mechanization is oppressive.
329. Prepare people so that by the time they reach any machine they have in their hand, exactly what that machine requires (correct change, ticket oriented the right way, etc).
330. At no point should a passenger be confronted with an operation that he cannot complete because of no change, inadequate ticket, etc.
331. Strangers to the system should have sufficient warning of the need for an automatic ticket and how to get it so that they do not make mistakes based on assumptions about the way other systems work.
334. Station agent must be watching entering ticket gates and in case of a malfunction or passenger difficulty be able to reach them.
338. A passenger who gets stopped at the ticket control because of an incorrect ticket, must not hold up the flow of passengers behind him.

System

61. Capacity of flow channels, in persons per minute, must be the same at every point along the channel so as to avoid bottle-necks. Methods of guiding flow

70. Many commuters, in the nervous pattern of cummting, want to keep moving without stopping from the moment they enter the system until the moment they leave.

77. The people who accumulate in front of concessions, shops and stands, must not interfere with through flows.

84. Ticket gates must not break stride of walking passenger.

120. Newspaper and cigarettes stands need to be in the main stream of rush hour flow, so placed that a buyer does not have to cross a fast moving stream of other passengers to reach them.

121. People in a hurry want to throw down the correct change for a paper, pretzel, etc. without waiting to hand it to a busy salesman.

122. Those who do not want a newspaper must not have to hesitate even as much as a single step at points where others are buying newspapers.

126. Many concessionaires will welcome the opportunity to make change, as a way of getting more customers within selling range.

266. The passenger must not encounter more than some maximum number of gates, turnstiles, fare-paying operations, transfers, holdups, delays, lines, and queues, on his passage through the system.

268. Need for a sense of control over your own destiny as you ride the system (the same as you have when you drive a car).

329. Prepare people so that by the time they reach any machine they have in their hand, exactly what that machine requires (correct change, ticket oriented the right way, etc).

333. Purchaser requiring change should not have to go to more than one machine to get a ticket, i.e. automatic change making venedor.

336. So he can choose the fastest queue, a passenger approaching a set of queus must be able to see all of them.

337. People waiting in a line for one purpose, will be irritated if there are others ahead of them in the line waiting for other more time-consuming purposes.

338. A passenger who gets stopped at the ticket control because of an incorrect ticket, must not hold up the flow of passengers behind him.

341. These places should be designed to reduce this effect and should be organized so that people can recover their lost objects with the least effort, causing the least trouble to others. In particular, eliminate cracks between machines and walls, holes between ticket gates, downhill paving under change machines, etc.

380. If he has a choice the person will always go to a man rather than a machine.

SYSTEMS

Ticketing - System which deals
with passenger
handling through
ticketing procedure.

30 }
31 }

This needs to be complete
before Aug 17

31. Methods of speeding flows at critical operation points (ticket gates, concessionaire)
This system has bearing on the concessionaire placement and the use of the concessionaire as an aid to ticketing and assistance to passengers who have trouble with ticketing.

33. This systems is dealing with points of hesitation in flows what causes them and solutions to how such hesitations can be tolerated without upsetting the overall flow. And avoiding crossing flows or collisions if crossing is necessary.....basically it deals with the fine line between points along flow channels (concessions, umbrella put-up points, stopping points) which are immediately next to main stream and close enough that they will work for the crowd they are indented for and yet not upset the basic flow pattern.

SYSTEM 33

63. Eradicate conflicts between commuters who do everything fast and automatically, and irregular passengers who do not know where to go, how to pay, which way to turn, what sign to look at for what information, etc.
75. If conflicting flows are unavoidable all people involved must be able to see what is going on.
76. Two lines of people leaving ticket machines or gates must not cross paths.
78. Moving people must not bump into or have to go around knots of people standing, talking, or saying good-bye.
80. Along any high volume flow there need to be periodic places where people can step out of the flow to tie a shoelace, get a better grip on the package they are holding, blow their noses, etc.
86. Passenger needs time to complete or prepare for an operation. (looking for money, looking for ticket, putting away ticket, closing purse) without slowing down the flow of passengers behind him, and without losing his place in line.
117. Neither stores nor concessions want to locate their displays or selling counters in an area which people pass through in a hurry. The best location is a place where potential customer has just completed something and is therefore open to suggestion, i.e., just after turnstile where he is still almost stationary.
120. Newspaper and cigarettes stands need to be in the main stream of rush hour flow, so placed that a buyer does not have to cross a fast moving stream of other passengers to reach them.
181. There must be a hesitation point, just before people emerge into outside, where people can stop to put up an umbrella, fasten coat, decide which way to go.
340. People who accumulate in front of one machine must not interfere with people trying to reach another or with a through flow.
375. Friends who get separated at escalators, exit and entrances, train doors, etc. tend to stop and turn and wait for each other.
376. Wherever paths diverge, people will stop to talk and say goodbye etc.

6. The last minute rush for a train that is about to leave must not lead to accidents, tripping, slipping on wet areas of floor.
7. Wherever it would be dangerous for passengers to run, the form of the passage (or whatever else) must discourage running.
16. Since stairs are a major source of accidents due to slipping and misteps, such accidents must be prevented, i.e. by reducing the total number of steps along any path through the station.
62. Encourage people to move faster wherever possible so that the station's flow capacity (in passengers per minute) can reach the required maximum.
70. Many commuters, in the nervous pattern of cummuting, want to keep moving without stopping from the moment they enter the system until the moment they leave.
71. Since people do not all want to walk at the same speed, each person must have full control over his own movement, move at whatever speed he chooses, and not be swept along by a crowd.
75. If conflicting flows are unavoidable all people involved must be able to see what is going on.
156. Prevent panic during emergencies.
159. In case of fire or major accident, people must not be caught in a constricted space, but must have ample space to expand out into. (A panicked crowd requires more space per person than an orderly crowd.)
171. Make it possible for people in a hurry to pass others who are standing on a moving escalator.
379. In loose crowds of moving people, individuals will dodge and run towards gaps and openings in the moving crowd.
63. Eradicate conflicts between commuters who do everything fast and automatically, and irregular passengers who do not know where to go, how to pay, which way to turn, what sign to look at for what information, etc.
69. Wherever possible avoid crossing flows of moving passengers.
79. People with children, seeing eye-dogs, packages, coats, umbrellas, and briefcases must be able to move smoothly through the system without nuisance to themselves and others, through ticket gates, in and out of seats, in and out of train and station doors, and through crowds.
83. Wherever handrails accompany a flow, the surface of the hand-rail must allow hands to move along it smoothly and continuously without interruption. (Since they are one of the first direct sensory impressions the passenger encounters as he enters the station, they should be pleasant to hold onto, not cold and moist.
374. People tend to follow one another sheep-like, tend to gravitate toward existing lines, and to use the person in front of them as the best indicator of where to go next.

377. People are used to keeping to the right.

- 2. Make it impossible for passengers to fall or step into the gap between the platform and the train.
- 3. Make the change in level between train and platform so smooth, and consistent from station to station and door to door, that there is no danger of tripping during boarding or alighting.
- 11. Anywhere a person is likely to lose balance (steps, transit car, ramp, single step, etc.) there should be a handrail or grab bar placed just at the point his arms reach for instinctively.
- 16. Since stairs are a major source of accidents due to slipping and misteps, such accidents must be prevented, i.e. by reducing the total number of steps along any path through the station.
- 18. Old people who do not want to show their age will resist grabbing onto anything which is awkward or indicates their old age.
- 20. Since elderly people lack muscular control when stepping down and tend to misjudge heights and distances and so get into accidents, all places where this can happen must be protected against it (escalator off and on, stair off and on, boarding and alighting, doors, machines).
- 22. Breaks in surface continuity of floors like vent grills which will catch women's heels must be kept to a minimum.
- 83. Wherever handrails accompany a flow, the surface of the handrail must allow hands to move along it smoothly and continuously without interruption. (Since they are one of the first direct sensory impressions the passenger encounters as he enters the station, they should be pleasant to hold onto, not cold and moist.
- 202. Grills, litter, treads, and breaks in walking surfaces must be easy to see.
- 206. At those points where the eyes are forced to adjust to a very extreme change in overall brightness the walking surface must remain continuous to prevent stumbling and falling accidents.
- 225. Special provision must be made for handicapped persons - the blind, deaf, deformed, crippled, and old (cane guides, seeing eye dogs, a way of attracting the attendant's attention, etc.).
- 269. Since regular passengers need to rely on habit, allow them to get a complete feeling of certainty, reliability and familiarity with the pattern and sequence of operations (comparable to the feeling of reaching for a familiar light switch in the dark). For example, the position of exits in the car and the relation of entrances to ticket machines, etc. should always be the same.
- 307. A person walking in a crowd cannot see the ground and, therefore, cannot tell where stairs start (especially at down flight there must be something to mark the beginning of stairs, above head height.
- 308. Stairs should be placed so as to discourage and make unnecessary any diagonal or lateral movements across it, because these lead to accidents and flow constrictions and general instability.

OS
METS
51 STEPS

SYSTEM 37

16. Since stairs are a major source of accidents due to slipping and misteps, such accidents must be prevented, i.e. by reducing the total number of steps along any path through the station.
20. Since elderly people lack muscular control when stepping down and tend to misjudge heights and distances and so get into accidents, all places where this can happen must be protected against it (escalator off and on, stair off and on, boarding and alighting, doors, machines).
62. Encourage people to move faster wherever possible so that the station's flow capacity (in passengers per minute) can reach the required maximum.
71. Since people do not all want to walk at the same speed, each person must have full control over his own movement, move at whatever speed he chooses, and not be swept along by a crowd.
225. Special provision must be made for handicapped persons - the blind, deaf, deformed, crippled, and old (cane guides, seeing eye dogs, a way of attracting the attendant's attention, etc.).
270. Need for feeling of luxury associated with deep carpets, slow motion, measured pace, quiet, dark rich colors, acoustic absorption, muffle.
304. The total amount of climb that people are forced to make by stair must never be a strain.
305. Unless angle of climb and the number of risers in a flight of stairs are standard, comfortable for normal walking rhythm, people will trip, misjudge the stairs, slow up the people behind them, etc.
308. Stairs should be placed so as to discourage and make unnecessary any diagonal or lateral movements across it, because these lead to accidents and flow constrictions and general instability.

SYSTEM 38

225. Special provision must be made for handicapped persons - the blind, deaf, deformed, crippled, and old (cane guides, seeing eye dogs, a way of attracting the attendant's attention, etc.).
11. Anywhere a person is likely to lose balance (steps, transit car, ramp, single step, etc.) there should be a handrail or grab bar placed just at the point his arms reach for instinctively.
71. Since people do not all want to walk at the same speed, each person must have full control over his own movement, move at whatever speed he chooses, and not be swept along by a crowd.
74. Any section of flow that needs to be reversed during any part of the operating day must dovetail smoothly in both directions and while stationary with the remainder of the flow (passages, ticket gates, reversing or reversible escalators).
79. People with children, seeing eye-dogs, packages, coats, umbrellas, and briefcases must be able to move smoothly through the system without nuisance to themselves and others, through ticket gates, in and out of seats, in and out of train and station doors, and through crowds.
83. Wherever handrails accompany a flow, the surface of the handrail must allow hands to move along it smoothly and continuously without interruption. (Since they are one of the first direct sensory impressions the passenger encounters as he enters the station, they should be pleasant to hold onto, not cold and moist.
168. If escalators are restricted in number, people who specially want to use them must know from the outset of their passage through the station where they must go so as to be in the escalator flow.
269. Since regular passengers need to rely on habit, allow them to get a complete feeling of certainty, reliability and familiarity with the pattern and sequence of operations (comparable to the feeling of reaching for a familiar light switch in the dark). For example, the position of exits in the car and the relation of entrances to ticket machines, etc. should always be the same.
308. Stairs should be placed so as to discourage and make unnecessary any diagonal or lateral movements across it, because these lead to accidents and flow constrictions and general instability.
377. People are used to keeping to the right.

SYSTEM 40

1. Prevent people falling, being pushed, or jumping off the platform onto the tracks - either to commit suicide or to retrieve a fallen object.
2. Make it impossible for passengers to fall or step into the gap between the platform and the train.
4. To prevent people being dragged along by the train, no one must be in contact with the outside of the transit car as the train starts to move out of the station.
43. Since signs on trains are hard to read and not dependable, boarding passenger must get the right train without having to read any sign on the train itself. Ideally he should never be in contact with a train he does not want to ride.
47. When a car is jam packed to the edge prevent the last boarding passenger getting caught in the door because he can't squeeze far enough in.
144. Avoid pursesnatching by malcontents on trains who try to grab something from a passenger on the platform as the train moves out, or vice versa.
230. Trainman must be able to check all train doors before they close.
273. Incoming train should not be frightening; people do not feel safe if they are too close to moving train as it comes into station.

SYSTEM 40

1. Prevent people falling, being pushed, or jumping off the platform onto the tracks - either to commit suicide or to retrieve a fallen object.
2. Make it impossible for passengers to fall or step into the gap between the platform and the train.
4. To prevent people being dragged along by the train, no one must be in contact with the outside of the transit car as the train starts to move out of the station.
43. Since signs on trains are hard to read and not dependable, boarding passenger must get the right train without having to read any sign on the train itself. Ideally he should never be in contact with a train he does not want to ride.
47. When a car is jam packed to the edge prevent the last boarding passenger getting caught in the door because he can't squeeze far enough in.
144. Avoid pursesnatching by malcontents on trains who try to grab something from a passenger on the platform as the train moves out, or vice versa.
230. Trainman must be able to check all train doors before they close.
273. Incoming train should not be frightening; people do not feel safe if they are too close to moving train as it comes into station.

SYSTEM 41

CON. TO
SYSTEMS:

51
53
54

37. No one train door should hold up the train because it has more passengers going through it than the others. However a perfectly uniform distribution of boarding passengers along a train is not necessarily the best. Some cars may have more people getting off than others; some may have less available seats than others and empty cars fill faster.
40. Before the train stops boarding passengers need to be waiting at those points along the platform where the incoming cars are emptiest.
41. People waiting for a second train on a particular track must not interfere with passengers boarding on a first train.
42. To cut down movement in the train, people must see enough of the train before they get on to get a general sense of which part of which car they want to be in.
50. Boarding passengers start moving the moment their train comes into the station.
128. Vending machines, snacks and drinks, are of most use to waiting passengers and must be placed accordingly.
263. Many people like to pace up and down when they are waiting and must be given the opportunity to do so without moving away from whatever they are waiting for.
265. People waiting should feel certain that they will get on the train and get a seat without having anxiously to keep their place in line.
36. Minimize dwell-time.
56. Alighting passenger should not be required to get up before the train has reached a standstill.
357. Reduce the danger, apparent danger, difficulty, and unpleasantness of passing from one car to the next.

SYSTEM 43

8. Make it impossible for people to get pushed and knocked down by people in a hurry or crushed by crowds behind them.
21. Any seating must be situated with respect to the flow of people so that those seated may stretch their legs without tripping those who are walking past and those standing and walking do not step on the toes of those seated.
37. No one train door should hold up the train because it has more passengers going through it than the others. However a perfectly uniform distribution of boarding passengers along a train is not necessarily the best. Some cars may have more people getting off than others; some may have less available seats than others and empty cars fill faster.
39. Boarding passengers should know in advance exactly where the car door will stop, so that they can wait at the right place, and not waste precious time and energy running backwards and forwards during the train's very limited dwell time.
41. People waiting for a second train on a particular track must not interfere with passengers boarding on a first train.
48. Passengers should not have to fight their way through a crowd in order to get on and off the train.
52. Passengers who want to stand as close to door as possible (because they are only going one station, and decide to remain standing) must not stop just after boarding in a way which holds up rest of boarding flow.
60. Total effective cross section of flow channels must be large enough to take maximum required flows.
61. Capacity of flow channels, in persons per minute, must be the same at every point along the channel so as to avoid bottle-necks.
146. Make it impossible for pickpockets to operate in crowds.
134. If a large store is likely to have huge sales, and the store opens directly off the subway, there must be provision for the crowds of customers who will wait outside the doors before the sale opens - this will probably be just at the worst moment of the rush hour.

(200) - man in facilities

Next page also

SYSTEM 43 (cont)

159. In case of fire or major accident, people must not be caught in a constricted space, but must have ample space to expand out into. (A panicked crowd requires more space per person than an orderly crowd.)
260. Waiting areas must accommodate the maximum crowd which can accumulate during the worst 90 second head at peak hour with a safety factor to allow for a five-minute train delay.
291. Signs should not be obscured by crowds.
295. People particularly want to avoid unexpected contact with each other. If circulation difficulties make people feel they are being pushed or shoved by others, they will stereotype the offenders and decide the system is no good.
373. People will not walk more than a few feet from any entrance into a waiting area, and, therefore, tend to congregate about the entrance.
375. Friends who get separated at escalators, exit and entrances, train doors, etc. tend to stop and turn and wait for each other.

Wheeled vehicles.
Handicapped

8/STEM 45

X

87. Women with strollers should be able to use the system.
95. Since heavy mechanical cleaners are moved from station to station by train, any area which requires mechanical cleaning must be accessible for such a machine from the train level.
96. At each level where mechanical cleaning is done, there must be an access to hot water, soap water sump basin, with hose access, electrical outlet and storage for barrels of sawdust, soap, washbuckets, hot water tanks, electric panel box, tool storage, storage and drying racks for wet mops, etc.
151. Newsboys, janitors, station agents, police, cleaning crews with mops must be able to get into the station without paying.
152. The money collectors must be able to collect money from the strongroom or ticketing machines and transfer it to their armored car safely and easily.
153. Wholesalers must be able to drive their trucks close to entrances and to wheel their stock close to booths, storage points and vending machines.
154. Simplify the operations involved in getting trash and refuse from points where it accumulates to points where it can be picked up by truck.
155. Trash collection requires access for garbage trucks someplace where it does not offend passengers.
166. Rescue, fire, and police equipment - (ladders, stretchers, and fire hoses, etc.) must be easily admitted to any point in the station in case of emergency.

SYSTEM 46

①

14. Protect all walking surfaces from water which will make a slippery surface (rain penetrating entrance doors, rain and mud from outside being tracked in on people's shoes, seepage, condensation, etc.)
34. Advertisements must be designed so that water running down the walls will not make ads look grubby, especially when station and train cars are hosed down.
88. The entire station must look clean 24 hours a day.
102. There must be a way of preventing people from tracking water, mud and dirt into the station.
107. All areas where people spend more than a minute or two without moving should be provided with an economical way of controlling temperature and humidity.
183. Do not allow any wall, ceiling or floor surfaces near a passenger to have a lower temperature than air temperature; if it does have, the body will lose heat to this surface and the passenger will feel that the surroundings are dank and chilly.
184. Eliminate excess humidity caused by moisture sources like puddles, wet walls, crowds, wet raincoats. Humidity is undesirable because it accentuates heat, cold, mustiness and smells.
185. The quantity of fresh air and the rate of air movement must be adequate to eliminate stuffiness and smells.
188. Collect condensation where warm moist air meets cold surface so that it will not drip onto passengers or floors (stations and transit cars).
270. Need for feeling of luxury associated with deep carpets, slow motion, measured pace, quiet, dark rich colors, acoustic absorption, muffle.
315. At any point where a passenger is aware that he is entering the station, he needs to be met by a welcoming atmosphere.
316. Prevent feeling of tiredness, gloom and low illumination associated with transit and subway stations, even when walls are faded or under a thin skin of aging dirt, by maintaining a high overall brightness contrast.
318. The system should encourage people to be on their best behavior by making them feel over-awed by a situation better than they are used to (the hick in the Waldorf Astoris).
386. Wall surfaces should be inviting to lean against. Since they are perpetually disfigured by kids who spray paint and scratch names and remarks on them, and by slow deterioration, there must be some way to freshen up or replace them.
387. Certain kinds of discoloration are beyond maintenance and must be prevented from occurring in the first place - dirt around heating vent openings, seat backs where sweaty shirts stick in summer, lights where moths beating themselves to death discolor ceiling, hair oil on glass panels and seat backs.
388. Wherever the station is underground, seeping ground water must be carried past the structure and surfaces so that it will not seep through and crack and stain the finish and so create the "damp" feeling of being underground.

SYSTEM 49

- 15. Refuse anywhere where people walk (stairs, escalators, passage-ways, etc.) causes accidents of slipping and falling, and must therefore be avoided.
- 80. Along any high volume flow there need to be periodic places where people can step out of the flow to tie a shoelace, get a better grip on the package they are holding, blow their noses, etc.
- 88. The entire station must look clean 24 hours a day.
- 89. Avoid nooks and corners which attract dirt and litter, because they are unused, because letter gets blown into them, because they are hard to clean manually, because they cannot be reached by mechanical cleaning equipment.
- 90. Make it possible to clean the station in an uninterrupted sequence without having to go over areas twice.
- 91. Floor, wall and ceiling surfaces must be unbroken so that large areas can be cleaned in a single sweep.
- 94. There must be some way of detecting and dealing with urgent cleaning problems as they occur - a bottle breaks and spatters its contents, a passenger vomits in the car.
- 99. To prevent fires there must be some way of keeping the tracks free of litter.
- 103. People need to dispose of waste and put out cigarettes at those places where it occurs to them to do so -- in the transit car, just after leaving the transit car, just before boarding, just after leaving the station, while walking, and anywhere else there is a pause in people's time scale.
- 104. Since people do not like to get on a littered train which looks used and dirty, trains must be kept free of debris 24 hours a day.
- 105. The maintenance crew must be able to clean and wash the cars without any special operations like closing windows, moving furniture, fooling with doors, etc. If possible the car should be hosed in one operation, inside and out.
- 128. Vending machines, snacks and drinks, are of most use to waiting passengers and must be placed accordingly.
- 130. The area immediately around vending machines and concessions must be kept free from continual dirt, litter, candy wrappers, spilled drinks, empty cartons, which will keep potential buyers away.

Next page also

SYSTEM 49

-
136. Reduce entirely the feeling of isolation and enclosure which tempts assaults (exits, toilets, stair landings, vending machines, blind corners in passages, between columns, etc.).
-
154. Simplify the operations involved in getting trash and refuse from points where it accumulates to points where it can be picked up by truck.
-
271. People have a need for the psychological support of something (like a column or wall) to stand by.
-
290. Since signs which prohibit actions (i.e. "don't spit", "no smoking", etc.) are irritating, these messages must be conveyed by other means.
-
382. The means of litter disposal must reflect habits of throwing litter. People have a tendency (hence a need) to throw litter into corners, gutters, secret places where it cannot be seen and where the act of disposal can be concealed.
-
390. The bottom foot of walls, stair risers and other vertical surfaces must be scuff-proof.

→ feeling of the interior of transit car.
SYSTEM 50

235. To avoid the feeling of being in some undetermined underground cavern while in a subway station people like to see the sun, daylight or some indication of a maintained connection with the outside world which they have temporarily lost touch with.
267. Eliminate the feeling of claustrophobia caused by being underground, in a packed transit car, crowded passageways, windowless rooms, etc.
270. Need for feeling of luxury associated with deep carpets, slow motion, measured pace, quiet, dark rich colors, acoustic absorption, muffle.
315. At any point where a passenger is aware that he is entering the station, he needs to be met by a welcoming atmosphere.
316. Prevent feeling of tiredness, gloom and low illumination associated with transit and subway stations, even when walls are faded or under a thin skin of aging dirt, by maintaining a high overall brightness contrast.
318. The system should encourage people to be on their best behavior by making them feel over-awed by a situation better than they are used to (the hick in the Waldorf Astoris).
322. Passengers, especially women, should be able to enjoy the Fifth Avenue feeling of being looked at (a kind of Easter parade where people go to see and to be seen). Encourage the pleasure of flirtation which people thrive on - the flash of the eyes that pass between a man and a girl, even if it leads to nothing, can make the day for both of them.
325. Arrange waiting facilities so that a woman will not become uneasy if she has to wait alone at night.
327. Wherever they are, people prefer a view of living things (people, automobiles, movement, color) to a view of dead things (buildings, rooftops, parking lots).
385. Many people enjoy a chance to use mirrors, especially when they are waiting or just before they emerge from the station.
386. Wall surfaces should be inviting to lean against. Since they are perpetually disfigured by kids who spray paint and scratch names and remarks on them, and by slow deterioration, there must be some way to freshen up or replace them.

SYSTEM 51

10. Anybody who stumbles in the car must within a few inches fall against something resilient which will break his fall.
36. Minimize dwell-time.
44. Platform to car seat "distance" should be minimum.
46. Every passenger must be able to find a seat before the train starts without holding up the boarding flow because he stops at the door to look around.
54. To speed up the alighting process, alighting passenger should be encouraged to get up, move to the door, etc., far enough in advance.
56. Alighting passenger should not be required to get up before the train has reached a standstill.
62. Encourage people to move faster wherever possible so that the station's flow capacity (in passengers per minute) can reach the required maximum.
79. People with children, seeing eye-dogs, packages, coats, umbrellas, and briefcases must be able to move smoothly through the system without nuisance to themselves and others, through ticket gates, in and out of seats, in and out of train and station doors, and through crowds.
352. The shorter the distance a passenger is travelling, the closer he wants to sit to the door of the train.
359. Make it easy to get in and out of seats without bumping your head, tripping over another passenger's legs, having to excuse yourself as you push past him, disturbing his paper, having to bend your body as you slip sideways into the seat, etc.

SYSTEM 51

Z₃ 01

10 36 44 46 54 56 62 79 359
48 51 352 357



378

Enter through my hole.

SYSTEM 52

④

21. Any seating must be situated with respect to the flow of people so that those seated may stretch their legs without tripping those who are walking past and those standing and walking do not step on the toes of those seated.

38. To reduce conflict, boarding and alighting passengers should never meet.

39. Boarding passengers should know in advance exactly where the car door will stop, so that they can wait at the right place, and not waste precious time and energy running backwards and forwards during the train's very limited dwell time.

51. In accelerating and decelerating trains walking passengers will lose their balance unless they walk in the same direction as the dynamic forces acting on the train (forwards in an accelerating train, backwards in the decelerating train).

55. So that alighting passengers do not hesitate as they reach the platform, there must be only one way to walk away from the car door, and the passenger must know in advance which way this will be.

66. Passengers on their way to the train and passengers on their way away from the train must never get in each others way anywhere in the station.

67. Whenever a pedestrian can see his objective, he must be able to walk straight towards it (beeline), not need to make a visible detour.

108. At any point where a person may wait more than a few seconds (at the platform, in line, at bus stop, change machines, ticketing) there must be an opportunity to sit, lean or rest.

221. Flexible operation demands that the car be able to travel in both directions: seating arrangement, driver's compartment, door positioning.

232. It must be possible to turn an individual car through 180° and still have it marry with the rest of the train.

293. Passenger does not want to be forced to be near other passengers he finds undesirable. This requirement becomes most critical at rush hour.

328. There is a need for rendezvous points. These must be easy to describe (so that people will actually use them for meeting), very easily accessible to the outside, and close to the tickets and trains.

349. Transfers must be easy between different trains traveling on the same track.

373. People will not walk more than a few feet from any entrance into a waiting area, and, therefore, tend to congregate about the entrance.

SYSTEM 53

21. Any seating must be situated with respect to the flow of people so that those seated may stretch their legs without tripping those who are walking past and those standing and walking do not step on the toes of those seated.
37. No one train door should hold up the train because it has more passengers going through it than the others. However a perfectly uniform distribution of boarding passengers along a train is not necessarily the best. Some cars may have more people getting off than others; some may have less available seats than others and empty cars fill faster.
39. Boarding passengers should know in advance exactly where the car door will stop, so that they can wait at the right place, and not waste precious time and energy running backwards and forwards during the train's very limited dwell time.
108. At any point where a person may wait more than a few seconds (at the platform, in line, at bus stop, change machines, ticketing) there must be an opportunity to sit, lean or rest.
263. Many people like to pace up and down when they are waiting and must be given the opportunity to do so without moving away from whatever they are waiting for.
264. Passengers carrying packages must be able to put them down while they're waiting.
265. People waiting should feel certain that they will get on the train and get a seat without having anxiously to keep their place in line.
276. People seek (need) the definition of area provided by pools of light.
384. People need something to stare at vacantly while they daydream.
200. Every waiting area, including places where people are standing in line, requires a level of illumination which allows people to read comfortably.
328. There is a need for rendezvous points. These must be easy to describe (so that people will actually use them for meeting), very easily accessible to the outside, and close to the tickets and trains.

SYSTEM 54

107. All areas where people spend more than a minute or two without moving should be provided with an economical way of controlling temperature and humidity.

108. At any point where a person may wait more than a few seconds (at the platform, in line, at bus stop, change machines, ticketing) there must be an opportunity to sit, lean or rest.

112. People who want to smoke should be able to do so, and people who dislike smoking should be able to find a place where there is no smoking.

124. Passengers about to board trains need newspapers, cigarettes, magazines, drinks, mailboxes, candybars.

125. There need to be places where a person can grab a snack or cup of coffee and still be within view of the mainstream of the crowd, either for the pleasure of watching, or to watch for some specific person.

128. Vending machines, snacks and drinks, are of most use to waiting passengers and must be placed accordingly.

191. At every point in the station and surrounding shops and parking lots a passenger must know how many minutes and seconds he has before his train.

261. People will not tolerate a wait of more than three minutes at any point in the station without becoming restless and annoyed.

262. It must not be boring to wait whether the wait is 5 minutes or 30 minutes.

264. Passengers carrying packages must be able to put them down while they're waiting.

275. People want to relax on the way home from work.

322. Passengers, especially women, should be able to enjoy the Fifth Avenue feeling of being looked at (a kind of Easter parade where people go to see and to be seen). Encourage the pleasure of flirtation which people thrive on - the flash of the eyes that pass between a man and a girl, even if it leads to nothing, can make the day for both of them.

SYSTEM 55

Long Dist

274. People want a chance to wake up on their way to work (breakfast, newspaper, fresh air, walking further) to make a successful transition from the relaxed quality of family to the bustle of city and office.

293. Passenger does not want to be forced to be near other passengers he finds undesirable. This requirement becomes most critical at rush hour.

296. System should encourage friendliness rather than fear, (smiles, nods, casual conversation). In present systems, people are usually on the defensive and basically mistrustful of each other.

300. Family groups (mother with child, parents with small children), couples, card playing commuters have need of a seating arrangement which allows them to maintain an inward privacy and in appropriate contact with each other.

301. Teenage kids and other special groups who move about 6 or 10 at a time must not be allowed to dominate a place to such an extent that everybody else feels uncomfortable.

321. Certain parts of the design should actively communicate to the passengers the fact that their needs are of primary importance and that the system is taking care of them.

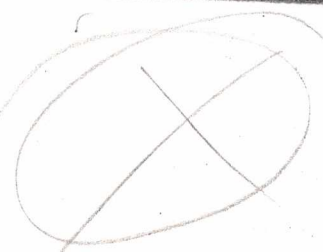
324. So that the ride makes positive use of the passenger's time and is therefore a worthwhile alternative to automobile commuting, provide facilities on the trains for letter writing, reading, shoeshines, coffee and donuts, telephones, etc.

351. The longer the distance a passenger is travelling, the more comfortable and accomodating the ride should be.

353. Allow each person his own peculiar way of sitting so that he is not regimented to sit in an identical fashion in one of a row of identical seats.

363. Prevent women being annoyed by staring passengers; many women prefer to sit in such a way that their legs are not exposed, and women do not like being forced to face a strange man full front for the duration of their ride.

324
321
351



SYSTEM 55

R₆ R₁ J₃ O₄ Q₁

275 293 296 300 301 321 324 351 353
274 362 363 322 325 327 386



55

SYSTEM 57

26. If people in the car have the sense that others are listening and can hear what they say, their conversation will be inhibited (c.f. the embarrassed silence in a crowded elevator).
147. Make it impossible for pickpockets or lousy workers to operate in the car, either on sitting, sleeping or drunken passengers; people must sit on their wallets; seat must not provide clear access to persons' side, no gap between seat and back.
221. Flexible operation demands that the car be able to travel in both directions: seating arrangement, driver's compartment, door positioning.
292. All signs in the cars must be placed in such a way that people, either standing or sitting, do not have to lean over others to read the signs.
296. System should encourage friendliness rather than fear, (smiles, nods, casual conversation). In present systems, people are usually on the defensive and basically mistrustful of each other.
301. Teenage kids and other special groups who move about 6 or 10 at a time must not be allowed to dominate a place to such an extent that everybody else feels uncomfortable.
302. Seat and car layout must not allow missionaries, exhibitionists, drunks, and other undesirable characters to isolate captive passengers.
319. System should encourage courtesy - young people for old, old people should feel they are going to be treated courteously, men giving up their seats to women, etc.
326. Prevent lechers, minor assaultants, etc. annoying women on crowded rush hour trains.
360. Some people prefer to stand even when there are vacant seats and want a place to stand so as not to be disturbed in conversation or while reading by people squeezing and walking past.
362. People may want to stand near seats so that they can move in and occupy them as they are emptied.
364. People sitting do not want a view of someone else's crotch, bottom, briefcase, etc.
369. Many passengers prefer to face direction of movement.

SYSTEM 58

Long Dist
Clery

- ✓ 25. If the acoustic characteristics of the car discourage conversations between people who got on together, and were already talking when they got on, they will feel the ride inhibiting, and will not take it again. Noise level in the car when train is going through tunnel (where noise is dissipated least efficiently), must be low enough for two people 2' apart to talk comfortably.
- 28. Do not allow loud transistor radios to disturb other passengers or dominate any part of the station. *on train*
- ✓ 147. Make it impossible for pickpockets or lurch workers to operate in the car, either on sitting, sleeping or drunken passengers; people must sit on their wallets; seat must not provide clear access to persons' side, no gap between seat and back.
- ✓ 270. Need for feeling of luxury associated with deep carpets, slow motion, measured pace, quiet, dark rich colors, acoustic absorption, muffle.
275. People want to relax on the way home from work.
293. Passenger does not want to be forced to be near other passengers he finds undesirable. This requirement becomes most critical at rush hour.
- ✓ 351. The longer the distance a passenger is travelling, the more comfortable and accomodating the ride should be.
358. Many passengers want to sleep while they travel; seat should provide head rest and hold drowsy passenger firmly enough so that he does not spill over into the next seat, get bumped from side to side or against the steel side of the car as the train accelerates, sways and decelerates.
368. Provide a way in which passengers can hang their coats, wet umbrellas, top coats, etc. without annoying or obstructing other passengers or having water drip onto seats, people, or walking surface.

+ 272 scenic quality

What about Advertisers and ads?

SYSTEM 59

9. Passengers who ride standing must be able to keep their balance without great effort even during maximum acceleration, deceleration, jerking and transverse motion.
10. Anybody who stumbles in the car must within a few inches fall against something resilient which will break his fall.
51. In accelerating and decelerating trains walking passengers will lose their balance unless they walk in the same direction as the dynamic forces acting on the train (forwards in an accelerating train, backwards in the decelerating train).
- 7 52. Passengers who want to stand as close to door as possible (because they are only going one station, and decide to remain standing) must not stop just after boarding in a way which holds up rest of boarding flow.
54. To speed up the alighting process, alighting passenger should be encouraged to get up, move to the door, etc., far enough in advance.
56. Alighting passenger should not be required to get up before the train has reached a standstill.
231. Prevent people from leaving parcels, clothes and belongings in the train by mistake.
355. Passengers walking in the car must not trip over the feet or legs of seated passengers.
- X 357. Reduce the danger, apparent danger, difficulty, and unpleasantness of passing from one car to the next.
359. Make it easy to get in and out of seats without bumping your head, tripping over another passenger's legs, having to excuse yourself as you push past him, disturbing his paper, having to bend your body as you slip sideways into the seat, etc.
361. In the car, particularly when it is moving, you need something to hang on to as you change direction. Thus getting up from your seat and going towards the door, you need some kind of pole to swing yourself up and round by.
366. Make certain large suitcases, packages, cannot be left in aisles where they will obstruct or trip people.
370. Passenger who reaches out for a grab bar to steady himself must not grab hold of someone else's ear, hair, coat, etc.

- 60
- SYSTEM
42. To cut down movement in the train, people must see enough of the train before they get on to get a general sense of which part of which car they want to be in.
 53. Passenger must know when his station is coming up, far enough in advance so that he can get ready.
 58. Standing and sitting passengers in the train, in the station must be able to identify that station even when the car is crowded (moving or stationary train).
 105. The maintenance crew must be able to clean and wash the cars without any special operations like closing windows, moving furniture, fooling with doors, etc. If possible the car should be hosed in one operation, inside and out.
 110. Passengers in cars should be protected from sun glare and glare caused by extreme contrast between window lights and surround.
 111. In hot weather people do not want to sit in direct sunlight, in cold weather they seek it.
 150. Protect passengers from rocks being thrown through the windows and resulting flying glass.
 189. A crowded hot train must be adequately ventilated.
 190. Any draft, whether from vents or windows, is irritating to passengers particularly when it blows on legs, disarranges hairdo, etc.
 208. The whole interior of the cars require a level of illumination which allows people to read comfortably.
 211. Since maintenance of mechanical and electrical gadgets such as window shades, door switches, etc., demand skilled labor and is therefore very expensive, eliminate all such fixtures wherever possible.
 216. Since train windows are constantly getting broken by vandals throwing rocks, these windows must be very easy and cheap to replace.
 274. People want a chance to wake up on their way to work (breakfast, newspaper, fresh air, walking further) to make a successful transition from the relaxed quality of family to the bustle of city and office.
 367. Any passenger must be able to see out of the transit car at all times unobstructed by columns outside, people inside, coats and umbrellas, condensation on the windows, angle of view, or the reflection on the glass.
 368. Provide a way in which passengers can hang their coats, wet umbrellas, top coats, etc. without annoying or obstructing other passengers or having water drip onto seats, people, or walking surface.
 372. All train windows must be fixed -- people stick their arms out of open windows and get hurt, operable windows need to be closed by maintenance crew every time car is washed, people don't open the windows even when it gets stuffy, people disagree about whether to open them or not if they are operable; also weight, cost and maintenance costs are less for fixed windows.

SYSTEM 61

(2)

in transit car

XXX

31. Advertisements must be visible to everybody, especially when the crowds are thickest, since from the advertiser's point of view this is the prime advertising opportunity.

33. Advertisers want their ads to be lit in such a way as to attract the attention of passers-by.

Stet

98.

~~Avoid fixtures whose cleaning~~

100. All signs must be easy to clean, and within easy reach of whatever means the janitor has for cleaning them (probably a rag in his hand).

109. Artificial lighting, wherever it occurs, must be free from glare.

198. People need information about constantly changing events, concerts, movies, sales, etc. - if it is always displayed in some characteristic way, people will be able to find it at once.

199. At certain points, particularly when leaving the train, passenger wants to know what time it is.

203. The lighting of signs, advertisements should coincide with the lighting of general spaces so that special lighting of signs and ads is not required.

205. To increase the legibility of the characters on a sign, the brightness contrast between the background surface of the sign and the surrounding illumination must be minimum.

262. It must not be boring to wait whether the wait is 5 minutes or 30 minutes.

287. **!!!** Total amount of visual information in sight (including visual clutter, handrails, light bulbs, knobs, stanchions) must be very restricted so that it does not fight the information in signs.

384. People need something to stare at vacantly while they daydream.

SYSTEM 62

X

64. "Distance" from parked car to train must be minimal.
116. Stores want to get customers both from station traffic and from other passing traffic.
223. There must be no way for a passenger to reach the trains without passing through a ticket control.
226. There must be no places where it might become difficult or ambiguous to assign responsibility for maintenance or liability for accidents (BART vs city or BART vs private owner).
253. Prevent non-users of the system from using parking spaces when the system users need them.
254. People who use the transit system require free parking; they consider this a privilege that goes along with the ride.
256. X Parking lots and structures must not create opportunities for night-time crime.
259. Provide light automotive service at stations so that people can leave their car all day for service.
266. The passenger must not encounter more than some maximum number of gates, turnstiles, fare-paying operations, transfers, holdups, delays, lines, and queues, on his passage through the system.
332. The high cost of ticket machines makes it necessary to justify investment by guaranteeing a minimum amount of business for each machine.

○ SYSTEM ○
63

X

74. Any section of flow that needs to be reversed during any part of the operating day must dovetail smoothly in both directions and while stationary with the remainder of the flow (passages, ticket gates, reversing or reversible escalators).
123. Passengers leaving trains need candy stores, flower shops, camera supplies. In addition, at suburban stations, they need cleaners, groceries, and larger stores.
246. Passengers coming home at night must be able to find the car waiting for them without trouble.
247. The wife picking her husband up at the station must be able to wait and have something to do for a few minutes in the uncertain interval before the train he is on arrives.
328. There is a need for rendezvous points. These must be easy to describe (so that people will actually use them for meeting), very easily accessible to the outside, and close to the tickets and trains.

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SYSTEM

63

49. Passengers want to use that car which will minimize the walking distance to an exit at the destination station after they alight.
64. "Distance" from parked car to train must be minimal.
115. Stores and concessions want to be on the most heavily travelled paths.
117. Neither stores nor concessions want to locate their displays or selling counters in an area which people pass through in a hurry. The best location is a place where potential customer has just completed something and is therefore open to suggestion, i.e., just after turnstile where he is still almost stationary.
125. There need to be places where a person can grab a snack or cup of coffee and still be within view of the mainstream of the crowd, either for the pleasure of watching, or to watch for some specific person.
191. At every point in the station and surrounding shops and parking lots a passenger must know how many minutes and seconds he has before his train.
237. Passengers must know which exit will get them onto the street where they want to be.
269. Since regular passengers need to rely on habit, allow them to get a complete feeling of certainty, reliability and familiarity with the pattern and sequence of operations (comparable to the feeling of reaching for a familiar light switch in the dark). For example, the position of exits in the car and the relation of entrances to ticket machines, etc. should always be the same.
381. People are prepared to wait longer getting into the system than they will wait to get out of the system: i.e., exiting ticket gate delays are more irritating than entering ticket gate delays.
383. People tend to buy when getting off the train rather than when getting on (so that they do not risk missing any trains).

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○ SYSTEM
64

MIKE
Howard

74. Any section of flow that needs to be reversed during any part of the operating day must dovetail smoothly in both directions and while stationary with the remainder of the flow (passages, ticket gates, reversing or reversible escalators).
177. Since entrances cannot be successfully distinguished from exits by an entering passenger, he must be able to enter through any opening in the exterior face of the station and still find his way smoothly and immediately to the train-bound flow.
220. System must be able to accommodate rush hour traffic without wasting capital investment on space and machines that are idle for 23 hours of the day.
246. Passengers coming home at night must be able to find the car waiting for them without trouble.
248. There must be a way for the kiss-and-ride commuter to be driven to within a few feet of the train.

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SYSTEM 64

60. Total effective cross section of flow channels must be large enough to take maximum required flows.
66. Passengers on their way to the train and passengers on their way away from the train must never get in each others way anywhere in the station.
69. Wherever possible avoid crossing flows of moving passengers.
113. Passage to and from automobiles and buses must be protected from rain (including shelter for waiting).
123. Passengers leaving trains need candy stores, flower shops, camera supplies. In addition, at suburban stations, they need cleaners, groceries, and larger stores.
124. Passengers about to board trains need newspapers, cigarettes, magazines, drinks, mailboxes, candybars.
172. People must not try to walk up a down-escalator, or down an up-escalator.
178. Sizes of various exits and entrances must be proportional to volumes of passengers going to and coming from different directions.
219. In view of uncertain information about expected and future volumes, it must be possible to add extra ticket machines, change machines and ticket gates.
223. There must be no way for a passenger to reach the trains without passing through a ticket control.
277. At any point in the system, a passenger must always be able to tell from his surroundings and from the signs visible to him at that point, just which point he needs to go to next.
314. Transition from outside of the station to the inside must be psychologically immediate: interior of the station, trains, boarding and alighting, etc., should be so visible and accessible from the outside that no one will think it too much trouble to use the system.
332. The high cost of ticket machines makes it necessary to justify investment by guaranteeing a minimum amount of business for each machine.
381. People are prepared to wait longer getting into the system than they will wait to get out of the system: i.e., exiting ticket gate delays are more irritating than entering ticket gate delays.

SYSTEM 65

42. To cut down movement in the train, people must see enough of the train before they get on to get a general sense of which part of which car they want to be in.
43. Since signs on trains are hard to read and not dependable, boarding passenger must get the right train without having to read any sign on the train itself. Ideally he should never be in contact with a train he does not want to ride.
46. Every passenger must be able to find a seat before the train starts without holding up the boarding flow because he stops at the door to look around.
108. At any point where a person may wait more than a few seconds (at the platform in line, at bus stop, change machines, ticketing) there must be an opportunity to sit, lean or rest.
328. There is a need for rendezvous points. These must be easy to describe (so that people will actually use them for meeting), very easily accessible to the outside, and close to the tickets and trains.
265. People waiting should feel certain that they will get on the train and get a seat without having anxiously to keep their place in line.
271. People have a need for the psychological support of something (like a column or wall) to stand by.
343. Structural columns must not obstruct any essential view of trains, people signs.

58 - Seeing station from inside train.

SYSTEM 66

New requirement.

391. Vehicle access to stations must not conflict with adjacent street traffic flows.

new SYSTEM 67

74. Any section of flow that needs to be reversed during any part of the operating day must dovetail smoothly in both directions and while stationary with the remainder of the flow (passages, ticket gates, reversing or reversible escalators).
168. If escalators are restricted in number, people who specially want to use them must know from the outset of their passage through the station where they must go so as to be in the escalator flow.
169. Since climbing up flights of stairs is actually impossible for some people (e.g., heart and asthma cases) there must be at least one escalator travelling up at all times.
170. People must always be able to choose a stair instead of an escalator if the escalator is crowded or they don't like escalators.
303. High cost of stairways and escalators makes it necessary to reduce their total number and get the maximum use from each.

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new

SYSTEM 67

165. Escalator should be located so that any accident is likely to have a witness. The shutoff must be in plain view so that the witness can stop the escalator even under stress conditions, yet placed so that kids will not abuse it.
16. Since stairs are a major source of accidents due to slipping and misteps, such accidents must be prevented, i.e. by reducing the total number of steps along any path through the station.
278. Wherever possible information should not be carried by signs, but by the architecture itself, which is both more potent, and less liable to confuse the reader by proliferated messages.
174. It is very annoying to encounter a shut down escalator during off hours, ~~especially since the variable riser heights make it dangerous to use as a stair~~ -- make it possible for a lone person to start the escalator for his own use.
237. Passengers must know which exit will get them onto the street where they want to be.
279. On any path whatever through the station, the signs a passenger encounters must form a properly coordinated sequence.
72. Ambiguous points where passenger can become unsure he is going the right way because he has had to make an arbitrary decision in order to continue, must be eliminated.
158. In any emergency, it must be possible to empty the station in a few seconds (supplemented by fire escapes, escape hatches).
280. Each sign of different operational type needs a distinctive graphic character (e.g., green triangle for the station name, blue and yellow stripes for the exit).
277. At any point in the system, a passenger must always be able to tell from his surroundings and from the signs visible to him at that point, just which point he needs to go to next.

4,14

SYSTEM 68

23. Anywhere where passengers are waiting, the noise of incoming trains must not be defening.
27.  Wherever a person wants a phone, there must be one placed in such a way that he may hear the person he is talking to but not be over heard by people around him. 
196. Everyone in the train or station must be able to hear the loud speaker messages in times of emergency of sudden schedule change or train delay.
273. Incoming train should not be frightening; people do not feel safe if they are too close to moving train as it comes into station.
345. Minimize the transmission of track-train vibration to station structure.

System 69

Functional Requirements Contained in System 69

167. In emergencies, a toilet, cot, hot water, quiet, warmth must be available - close to all potential accidents, with easy surface vehicle access, and under the control of the station.

311. A passenger caught without money, unable to work machines, needing rest rooms etc., must be able to find the attendant instantly.

334. Station agent must be watching entering ticket gates and in case of a malfunction or passenger difficulty be able to reach them.

380. If he has a choice the person will always go to a man rather than a machine.

218. To reduce payroll, use minimum number of personnel to run, clean, police, supervise, patrol, and maintain the stations and transit cars.

309. The station attendant should have a general overview of the station as a whole and must be able to investigate any one incident in detail without losing this general overview.

310. Station attendant and other system personnel who have to deal with the public should not be so pressed for time that they cannot be courteous and accomodating to passengers.

313. Station attendant, concessionaires and other system personnel require washroom, lavatory, and personal storage.

312. Attendant's booth must be large enough and pleasant enough so that he does not get cramped if he spends a long time there, and so that he can modify it with his own belongings. Materials he touches inside the booth should be comfortable (warm and soft instead of hard and shiny).

SYSTEM

70

369

include rest about facing forward

13. Make sure people do not fall forward or sideways off their seats when train stops or starts suddenly, lurches around a curve or jerks.

79. People with children, seeing eye-dogs, packages, coats, umbrellas, and briefcases must be able to move smoothly through the system without nuisance to themselves and others, through ticket gates, in and out of seats, in and out of train and station doors, and through crowds.

105. The maintenance crew must be able to clean and wash the cars without any special operations like closing windows, moving furniture, fooling with doors, etc. If possible the car should be hosed in one operation, inside and out.

229. It is wasteful, from the company's point of view, if there is any unused space in the car, under seats, between seats, in front of seats if they are widely spaced, in corners, on the steps where the doors open, and all such waste must be eradicated.

294. Nobody wants to sit touching a stranger; each person wants a clearly demarcated space around him which is "his".

300. Family groups (mother with child, parents with small children), couples, card playing commuters have need of a seating arrangement which allows them to maintain an inward privacy and in appropriate contact with each other.

353. Allow each person his own peculiar way of sitting so that he is not regimented to sit in an identical fashion in one of a row of identical seats.

354. Seating should provide room for feet and knees of the largest sitting passenger and should allow people of all sizes and ages to sit with their feet firmly on the ground.

356. The train car will be 10 feet by 70 feet and must hold at least 75 seated passengers.

359. Make it easy to get in and out of seats without bumping your head, tripping over another passenger's legs, having to excuse yourself as you push past him, disturbing his paper, having to bend your body as you slip sideways into the seat, etc.

363. Prevent women being annoyed by staring passengers; many women prefer to sit in such a way that their legs are not exposed, and women do not like being forced to face a strange man full front for the duration of their ride.

365. On the train, to feel secure, a person wants to maintain direct contact with his packages, either with his hand resting on them, his foot next to them, or with them in direct view on a rack.

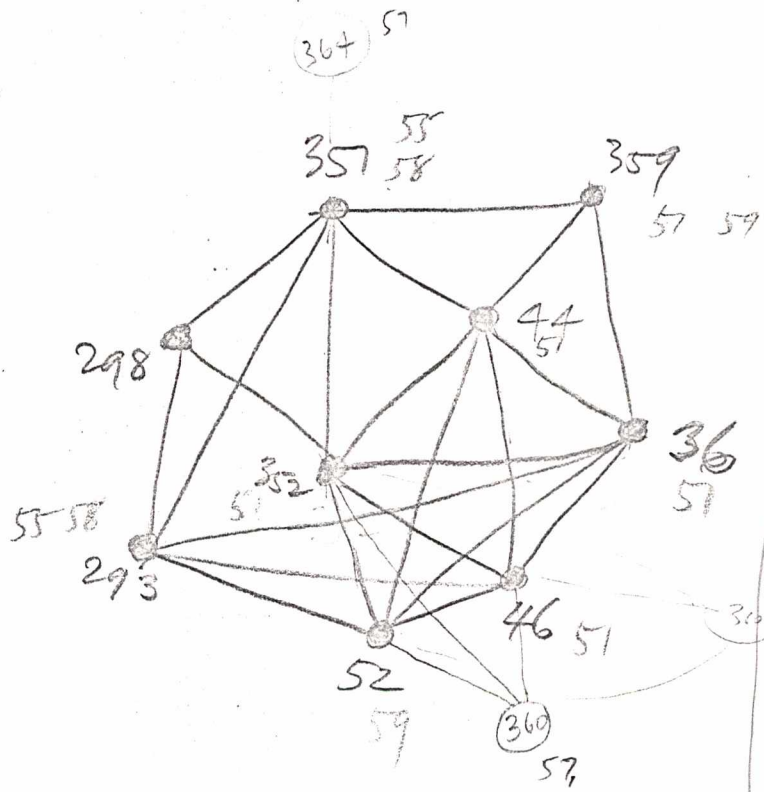
369
371. There needs to be a way to rest your elbows as you travel -- sitting or standing.

SYSTEM 72

351. The longer the distance a passenger is travelling, the more comfortable and accomodating the ride should be.
352. The shorter the distance a passenger is travelling, the closer he wants to sit to the door of the train.
44. Platform to car seat "distance" should be minimum.
298. Prevent any form of segregation or any situation where defacto segregation might become a practice.
36. Minimize dwell-time.
46. Every passenger must be able to find a seat before the train starts without holding up the boarding flow because he stops at the door to look around.
52. Passengers who want to stand as close to door as possible (because they are only going one station, and decide to remain standing) must not stop just after boarding in a way which holds up rest of boarding flow.
293. Passenger does not want to be forced to be near other passengers he finds undesirable. This requirement becomes most critical at rush hour.
359. Make it easy to get in and out of seats without bumping your head, tripping over another passenger's legs, having to excuse yourself as you push past him, disturbing his paper, having to bend your body as you slip sideways into the seat, etc.

SYSTEM 72

36 44 46 52 293 298 351 352 359



VA6344

This system deals with the ~~inhomogeneous~~ ^{inhomogeneous} distribution of passengers on trains. If excessive inhomogeneities arise, parts of the train will be overcrowded, with people unable to find seats, while other parts of the train ~~are~~ comparatively empty.

We shall discuss inbound and outbound trains separately. We shall also discuss separately, the effect of the entry pattern, caused by the fact that people tend to accumulate round the entrance which brings them to the platform (373), and the effect of the exit pattern which makes people move to that part of the train which will end up ^{at} closest to the exit in the station they are going to. (49).

Non homogeneous loading

(1) Inbound trains, entry pattern.

Inhomogeneity will arise here if all the suburban stations have their main entrance roughly half way along their length (i.e. opposite the central cars in a ten car train). Under these circumstances the center of the train is loaded up at station after station, while the end cars remain empty.

To solve this problem, the main entrances of different stations along a line must be staggered so that as the train moves down the line, different sections of it fill up at each station, but, over time the whole train gets a homogeneous loading.

→ In addition the platform ~~width~~ ^{width of each station platform should follow the contour of the passenger distribution curve, being widest opposite the entrance.}

(2) Outbound trains, exit pattern.

This is very similar to the inbound trains entry pattern. People will tend to distribute themselves evenly along outbound evening trains, only if there are an equal number of main exits in suburban stations for each position along the train. The strength of an exit, in this calculation, must be weighted by the volume of passengers passing through it in the rush hour. We therefore need sector analyses of suburban stations.

We can try to increase the effectiveness of the solution, by using signs in the downtown stations which identify the best position along a train, for the shortest exit distance on any given station. Thus, a passenger going to Orinda should not merely be led by signs to the Walnut Creek train; The signs should actually lead him to that specific part of the train which will end up nearest the exit in Orinda. This is connected strongly with the fact that trains should never be identified by the name of the line, or by the end station of the line but that instead each passenger should be able to find his train by following signs with the name of his specific destination station marked on them. (285)

Non homogeneous loading

(3) Inbound trains, exit pattern.

Inhomogeneity will arise here if the downtown stations have most of their important exits located in the same relative position along the train, since this would tend to make inbound travellers seek this position. The solution is to make sure that the exits leading to major destinations in downtown stations are evenly distributed with respect to the train length. We cannot be certain of achieving this without detailed information about relative volumes being to different sectors for each of the downtown stations.

(4) Outbound trains, entry pattern.

This leads to the same result as inbound trains exit pattern.

SYSTEM 73

39. Boarding passengers should know in advance exactly where the car door will stop, so that they can wait at the right place, and not waste precious time and energy running backwards and forwards during the train's very limited dwell time.
40. Before the train stops boarding passengers need to be waiting at those points along the platform where the incoming cars are emptiest.
41. People waiting for a second train on a particular track must not interfere with passengers boarding on a first train.
49. Passengers want to use that car which will minimize the walking distance to an exit at the destination station after they alight.
278. Wherever possible information should not be carried by signs, but by the architecture itself, which is both more potent, and less liable to confuse the reader by proliferated messages.
285. A passenger should not have to know more than the name of his destination station in order to reach that destination. The signs he follows should not require him to know its compass direction, the line it is on, the terminal station, etc.

+373 Emergency @ Lectures

System 74

357. Reduce the danger, apparent danger, difficulty, and unpleasantness of passing from one car to the next.
37. No one train door should hold up the train because it has more passengers going through it than the others. However a perfectly uniform distribution of boarding passengers along a train is not necessarily the best. Some cars may have more people getting off than others; some may have less available seats than others and empty cars fill faster.
40. Before the train stops boarding passengers need to be waiting at those points along the platform where the incoming cars are emptiest.
137. There must be at least two ways of getting away from every single point in the system, so that there are no dead end places where a woman can be trapped - unescorted women will not use the system at night if it appears unsafe in this respect.
159. In case of fire or major accident, people must not be caught in a constricted space, but must have ample space to expand out into. (A panicked crowd requires more space per person than an orderly crowd.)
42. To cut down movement in the train, people must see enough of the train before they get on to get a general sense of which part of which car they want to be in.
49. Passengers want to use that car which will minimize the walking distance to an exit at the destination station after they alight.
51. In accelerating and decelerating trains walking passengers will lose their balance unless they walk in the same direction as the dynamic forces acting on the train (forwards in an accelerating train, backwards in the decelerating train).
85. No passenger should encounter a closed door.
267. Eliminate the feeling of claustrophobia caused by being underground, in a packed transit car, crowded passageways, windowless rooms, etc.
324. So that the ride makes positive use of the passenger's time and is therefore a worthwhile alternative to automobile commuting, provide facilities on the trains for letter writing, reading, shoeshines, coffee and donuts, telephones, etc.

System 75

223. There must be no way for a passenger to reach the trains without passing through a ticket control.
314. Transition from outside of the station to the inside must be psychologically immediate: interior of the station, trains, boarding and alighting, etc., should be so visible and accessible from the outside that no one will think it too much trouble to use the system.
226. There must be no places where it might become difficult or ambiguous to assign responsibility for maintenance or liability for accidents (BART vs city or BART vs private owner).
266. The passenger must not encounter more than some maximum number of gates, turnstiles, fare-paying operations, transfers, holdups, delays, lines, and queues, on his passage through the system.
158. In any emergency, it must be possible to empty the station in a few seconds (supplemented by fire escapes, escape hatches).
12. Keep kids off the tracks.