MAG-LEV

* FOR BUDGET PROPOSAL SAKE - PUT IN MORE THAN YOU EXPECT TO GET. THEY WILL CUT IT BACK.

MAG-LEV TRAIN

RE. CONVERSATION OF DEC 4TH 81 WITH TOM J. FITZGERALD;

- START FROM A TERMINAL, PERHAPS WITH A DISPLAY GRAPHIC SHOWING OUR DEPARTURE.
- HE AGREED TO GOING ONLY AS FAST AS WE HAD TO TO GET THE DESIRED SENSATION OF SPEED.
- HE WOULD LIKE TO HAVE SOME OLDER, RECOGNIZABLE BUILDING IN VIEW WHEN THE VEHICLE FINALLY COMES TO A STOP. PREFERABLY ~~AN~~ NORTH EASTERN.
- IF WE GET INTO BAD TROUBLE, (WITH THE TRACK COVERING TOO MUCH OR CAUSING TERRIBLE CAMERA PROBLEMS) WE MIGHT LOOSE THE GLASS TUBE.
- THE SUNRISE EFFECT ISN'T OF TERRIBLE CONCERN BUT WOULD BE NICE - HE AGREED THAT A DUSK SETTING WITH INTERIOR LIGHTS ON WOULD BE NICE.
- HE ASKED IF THE HOOPS OVER THE TRACK WOULD BE WIDER OR LIT I SAID THICKER & WIDER FOR SURE.
- HE WOULD LIKE TO SEE PEOPLE MOVING NEAR A STATIONARY TRAIN AT THE START IN A TERMINAL. (R.P.?)
- HE WANTS AT LEAST ONE HIGH SPEED RUN SECTION AT SOME POINT

CONVERSATION OF DEC 4 81 WITH TOM (CONT.)

- HE AGREES THAT GILS ILLUSTRATION OF THE CITY IS WHAT WE WANT DESIGN AND STYLE WISE.
- HE THOUGHT THAT AT 750 MPH WE WOULD HAVE GONE FROM ONE CITY TO ANOTHER BUT I SHOWED HIM THAT IT WOULD ONLY BE 6¼ MILES IN 30 SECONDS. AND HE CONFIRMED IT.

MORE MISC. INFO

DEC. 9, 81

- GREG JEIN - CONVERSATION OF 12-8-81

  20 TEMP 25 PREF

  MAGICAM - B1 FOOTAGE / ALEX FUNKY FINISH END OF JANUARY.

  "WINDS OF WAR" END BY (THRU) JUNE.

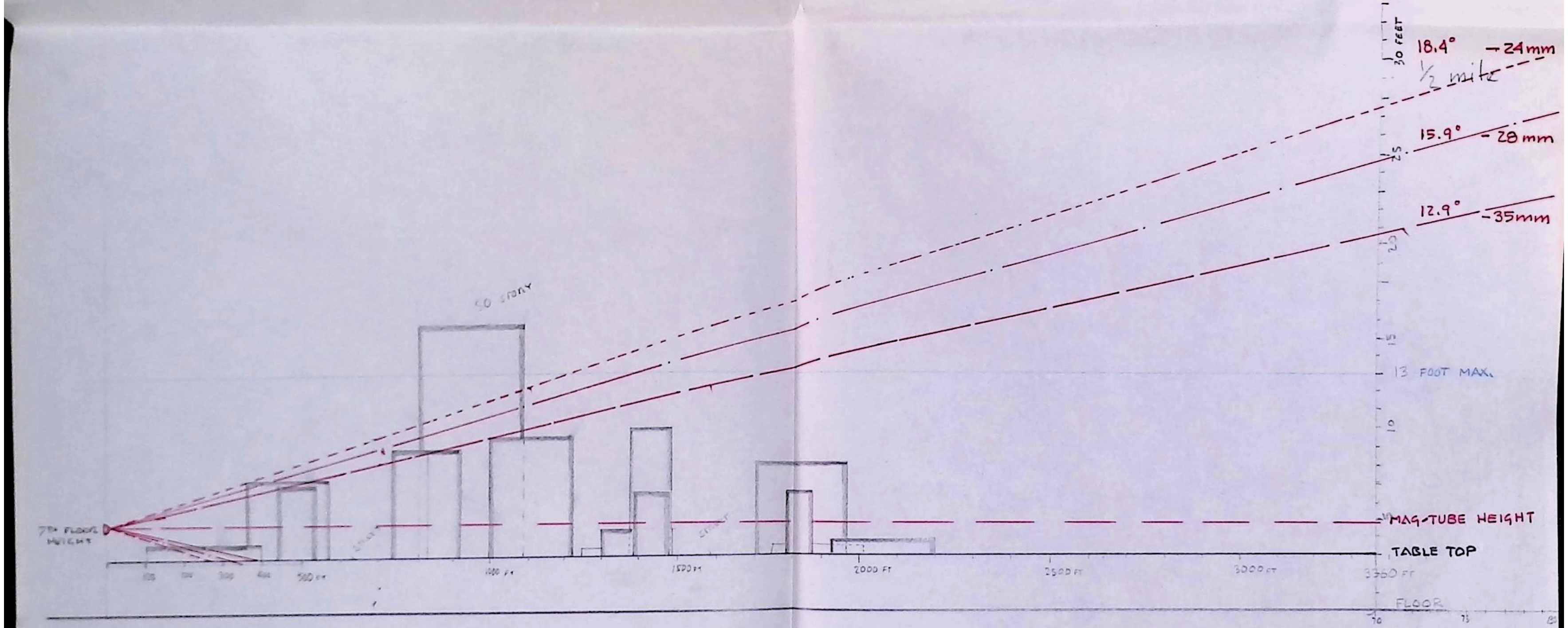
- GREG SAID "1941" HOLLYWOOD BLVD WAS 1½" TO FOOT WITH A RUN OF EITHER 90 OR 120 FEET. HE REMEMBERS 5 SEC. BEING THE LONGEST RUN. SHOT WITH A "LUMA CRAIN"

- HANGER 18 AT BURBANK AIRPORT (BURBANK AIRPORT INFO.)

- DOUG TRUMBUL - BRAINSTORM IS SCHEDUALED TO WRAP IN JULY BUT WILL BE MORE LIKE SEPTEMBER.

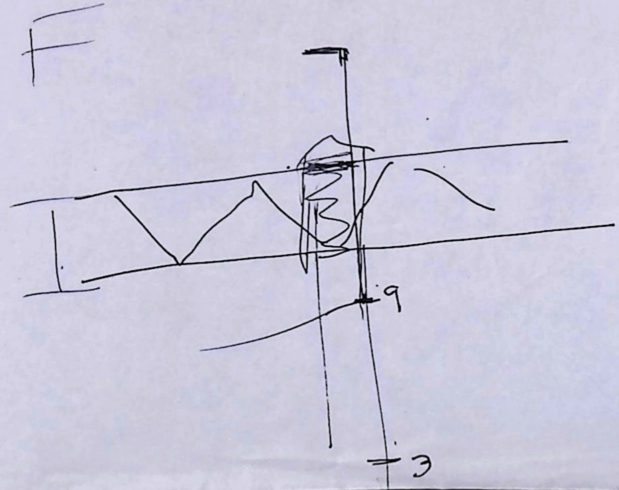
MARK STETSON

1 BLK = 900 FT



CENTURY CITY LAYOUT

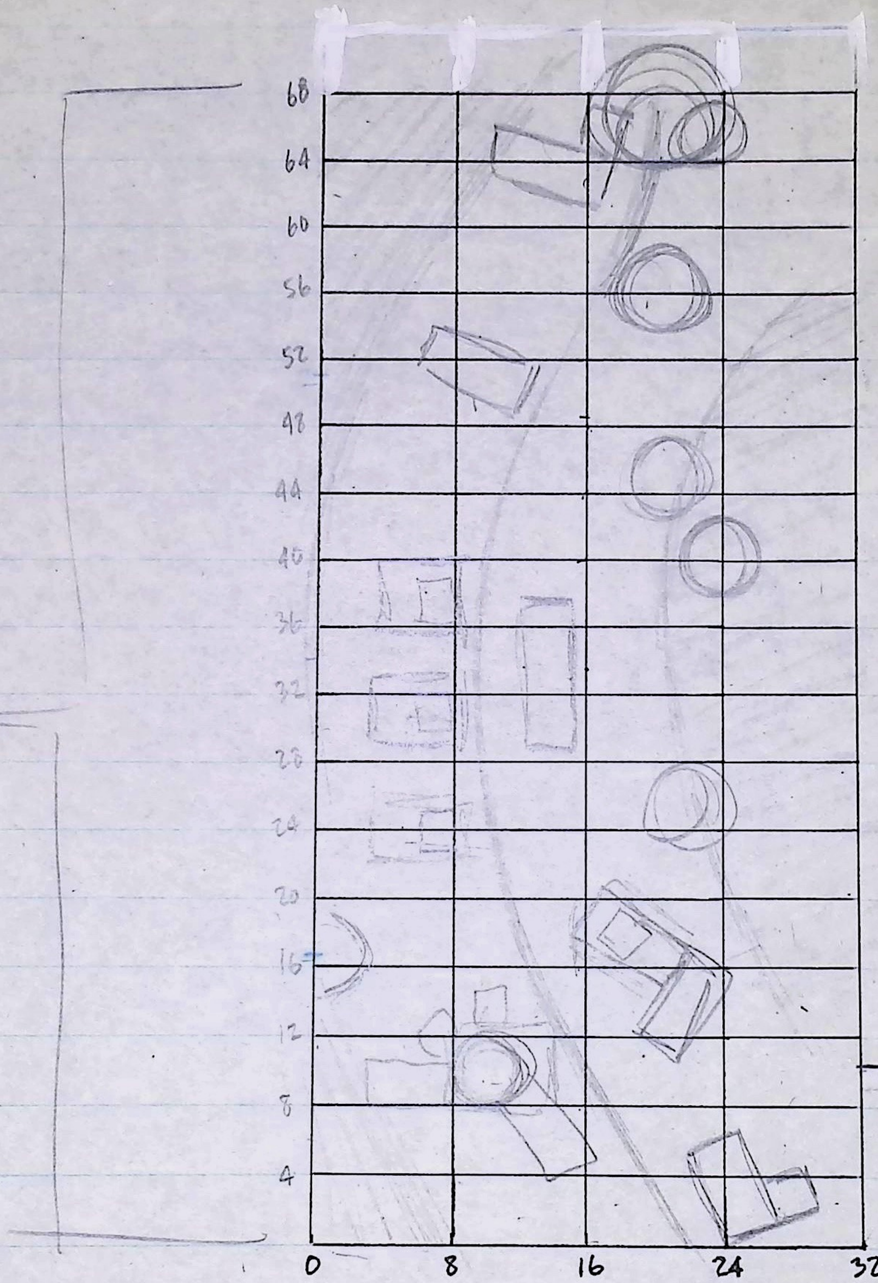
17 BUILDINGS OVER 4 STORIES
8 BUILDINGS 3 OR LESS STORIES



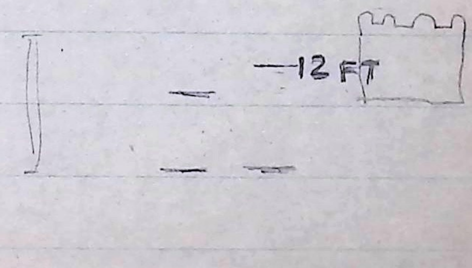
$17 \times 4 = 68$

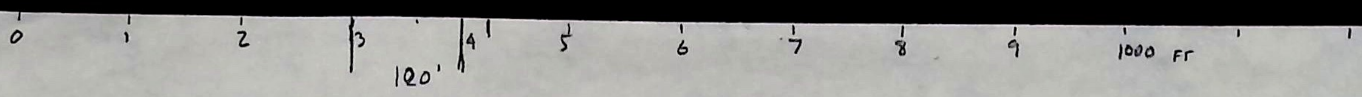
1/48th SCALE 110 FT = 1 MILE

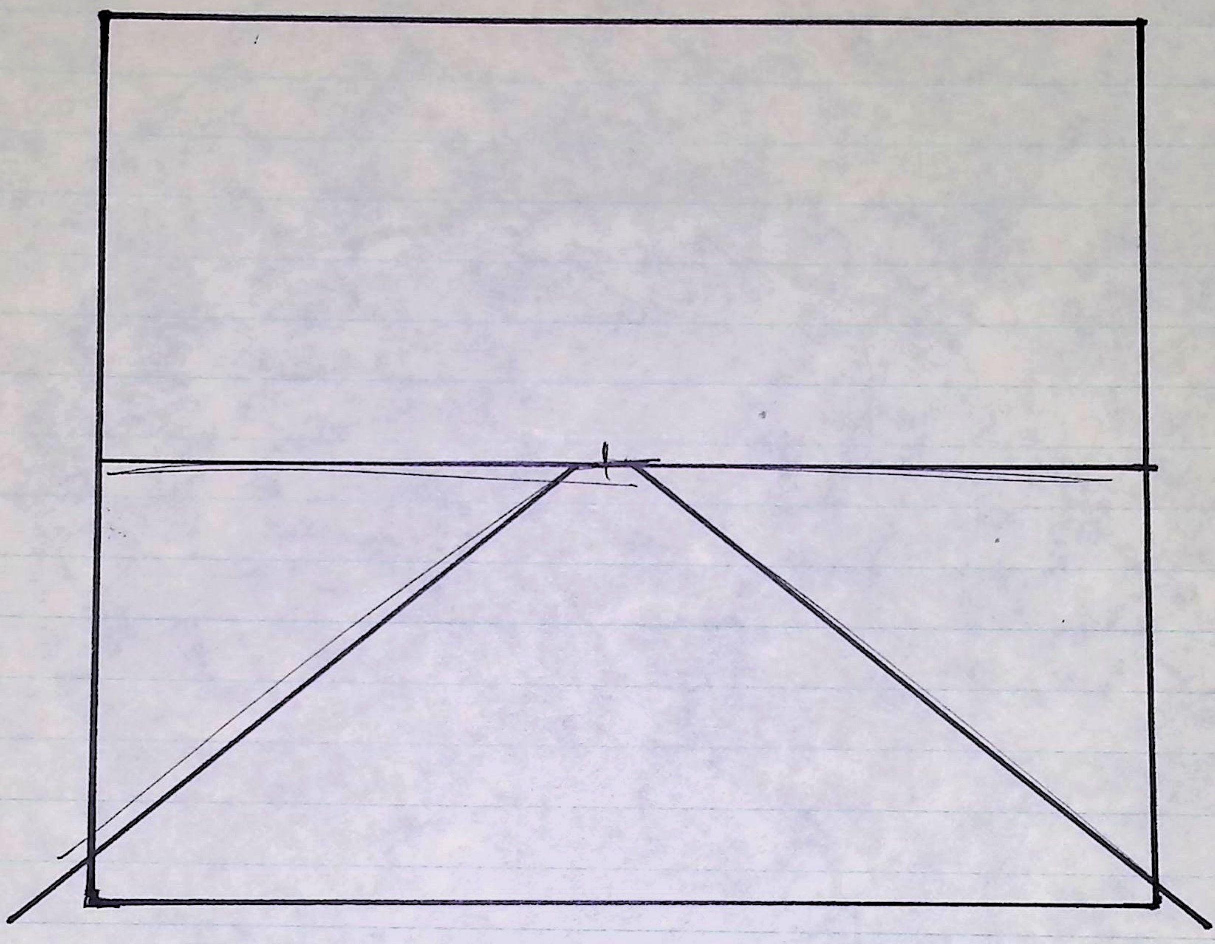
.64 MILES



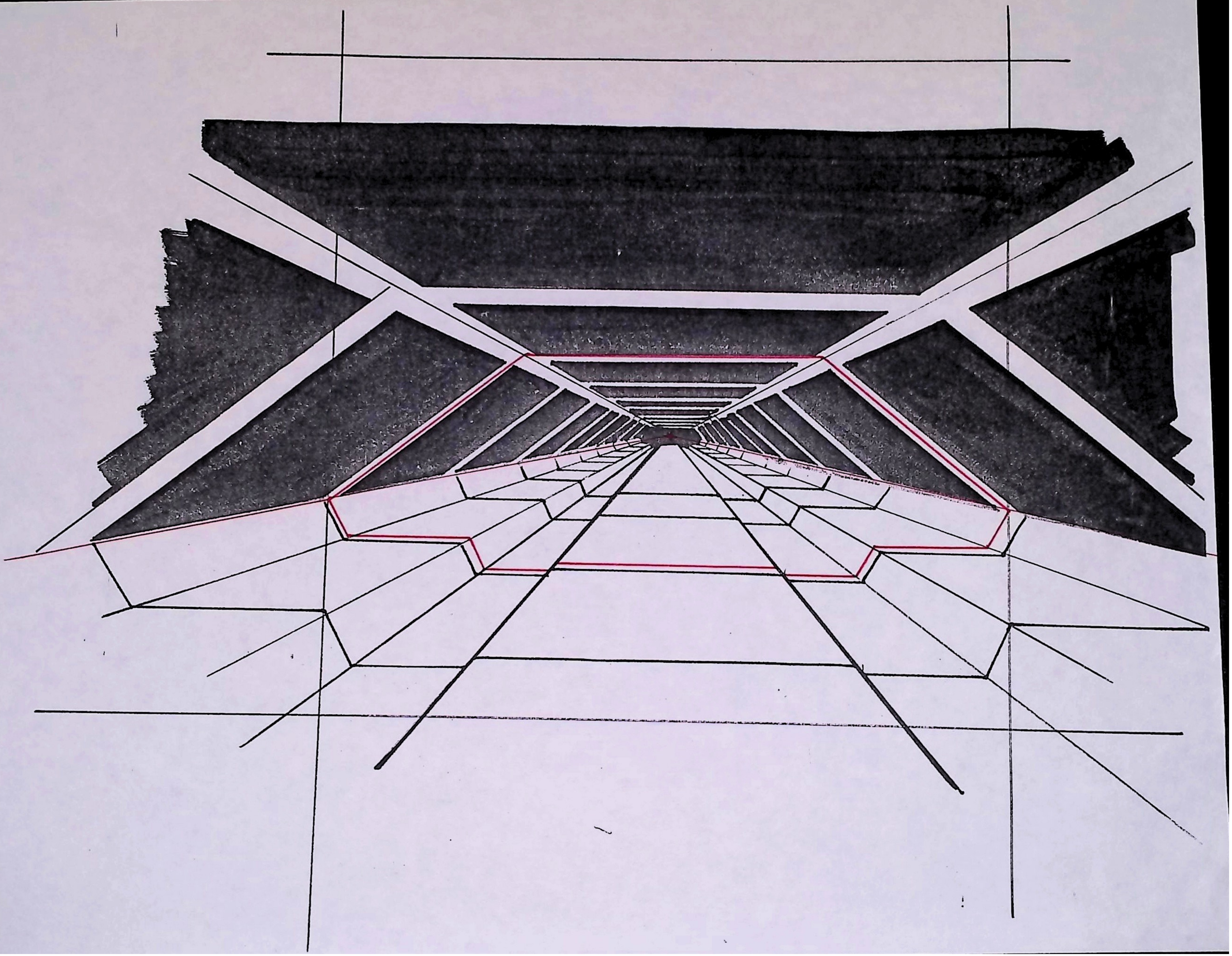
1/10th mile



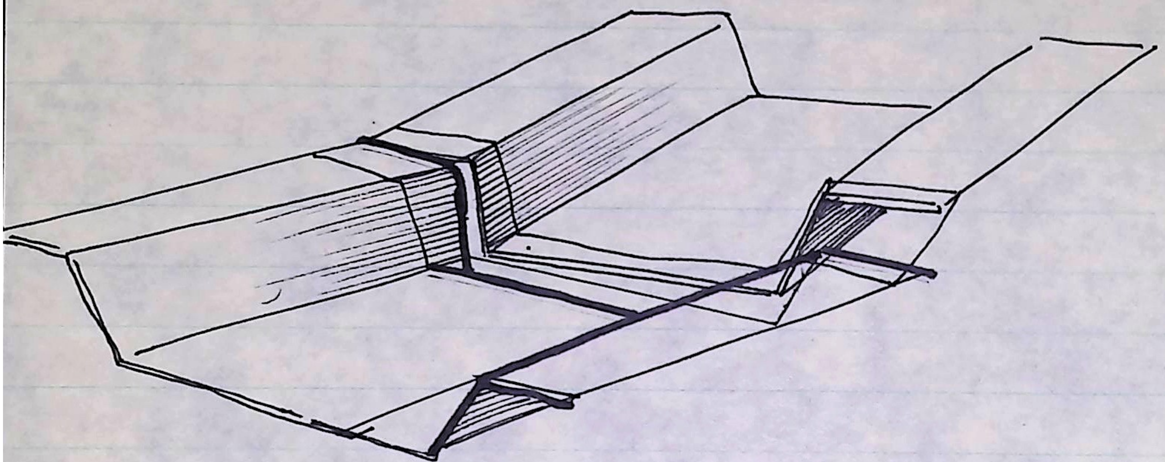




LONDON TO BRIGHTON VP



MAG/LEV TRACK SECTIONS - ADJUSTMENT



BRIDGE GAPS BETWEEN TRACK PIECES WITH THE WHITE CAMERA TAPE.

IT CAN BE PAINTED TO MATCH BEFORE ASSEMBLY BY PLACING ON GLASS OR PLEX AND AIRBRUSHING.

THIS WILL ALLOW FOR ADJUSTING TRACK TO CAMERA PROGRAM AND MORE IMPORTANTLY WILL ALLOW FOR PRODUCTION TOLERANCES

MAG / LEV CITY BUILDINGS

MARCH 1, 82

IF (1) 1/48 SCALE HI RISE = 160 HRS TO BUILD @ 583/WK
= 3 TO 4 WKS = #2332- / BUILDING

IF (1) 1/64 SCALE HIRISE = 100 HRS TO BUILD @ 583/WK
= 2 1/2 WKS = # 1457 50 - / BUILDING

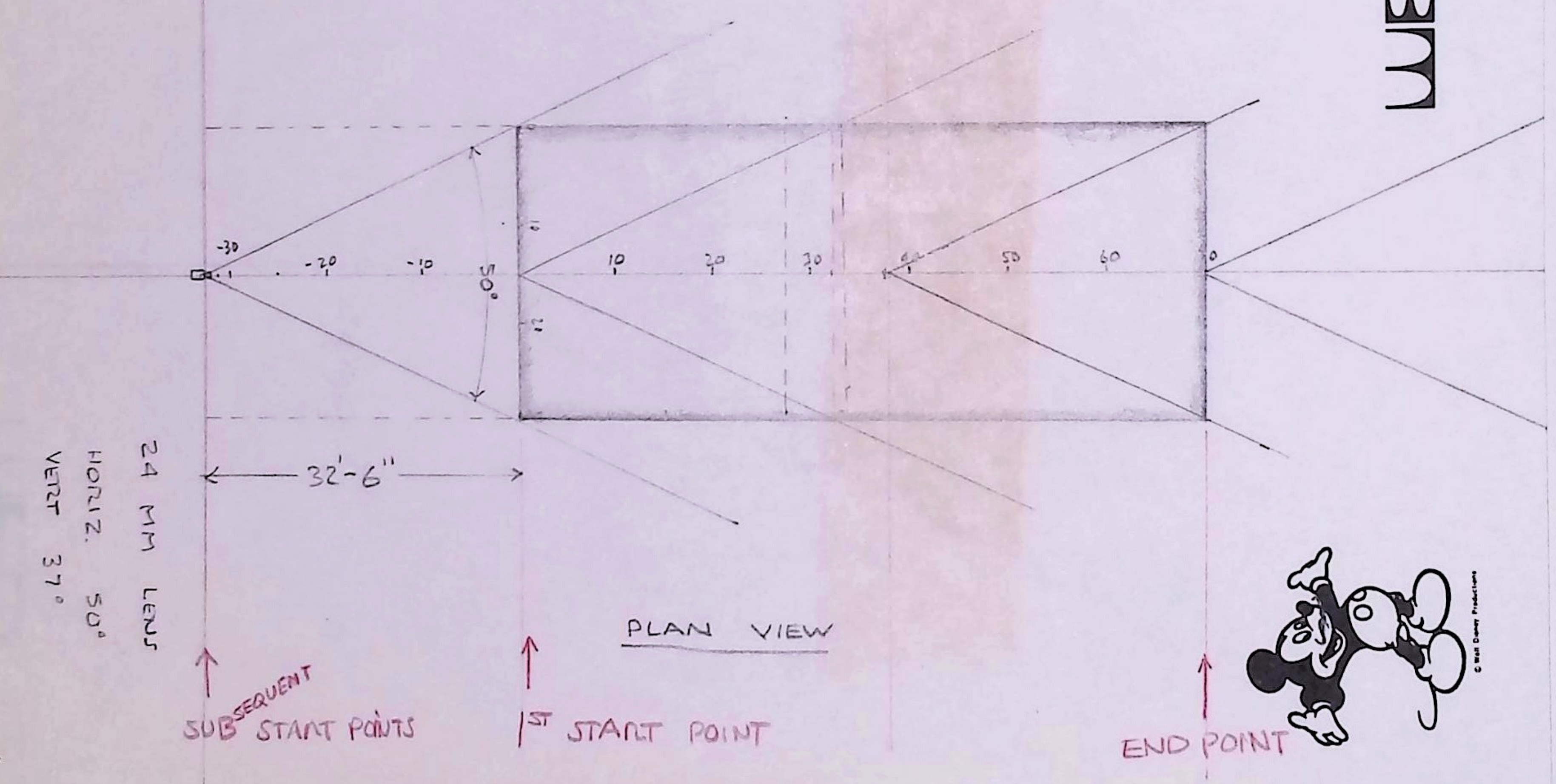
IF (1) 1/100 SCALE HI-RISE = 40 HRS TO BUILD @ 583/WK
= 1 WK = # 583- / BUILDING

160 HR × 25 BUILDINGS = 4,000 HRS
100 HR × 30 BUILDINGS = 3000 HRS
40 HR × 20 BUILDGS = 800 HRS
7,800 HRS = 195 MAN WKS

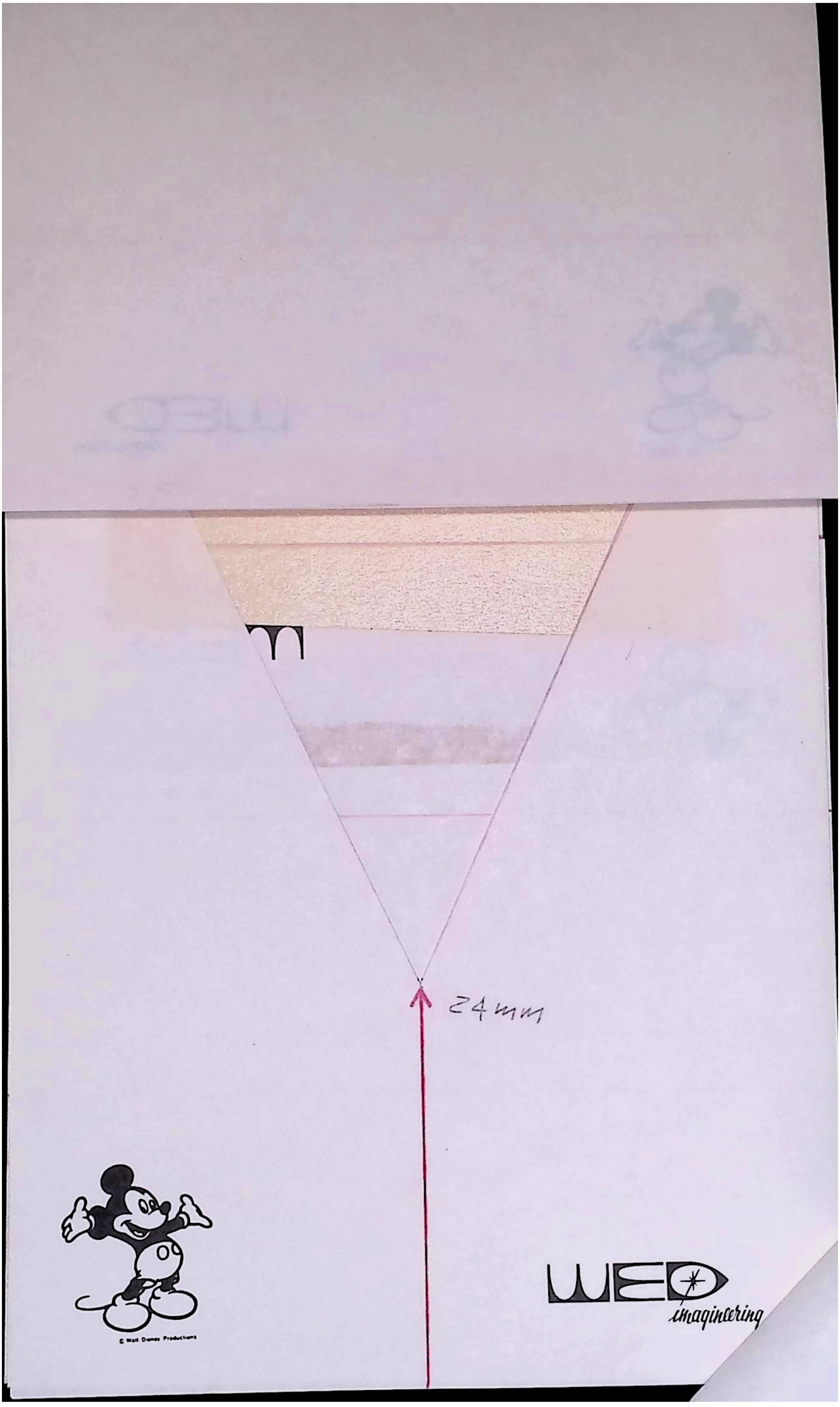
195 MAN WEEKS = 10 MEN @ 40 WK FOR 19 1/2 WKS

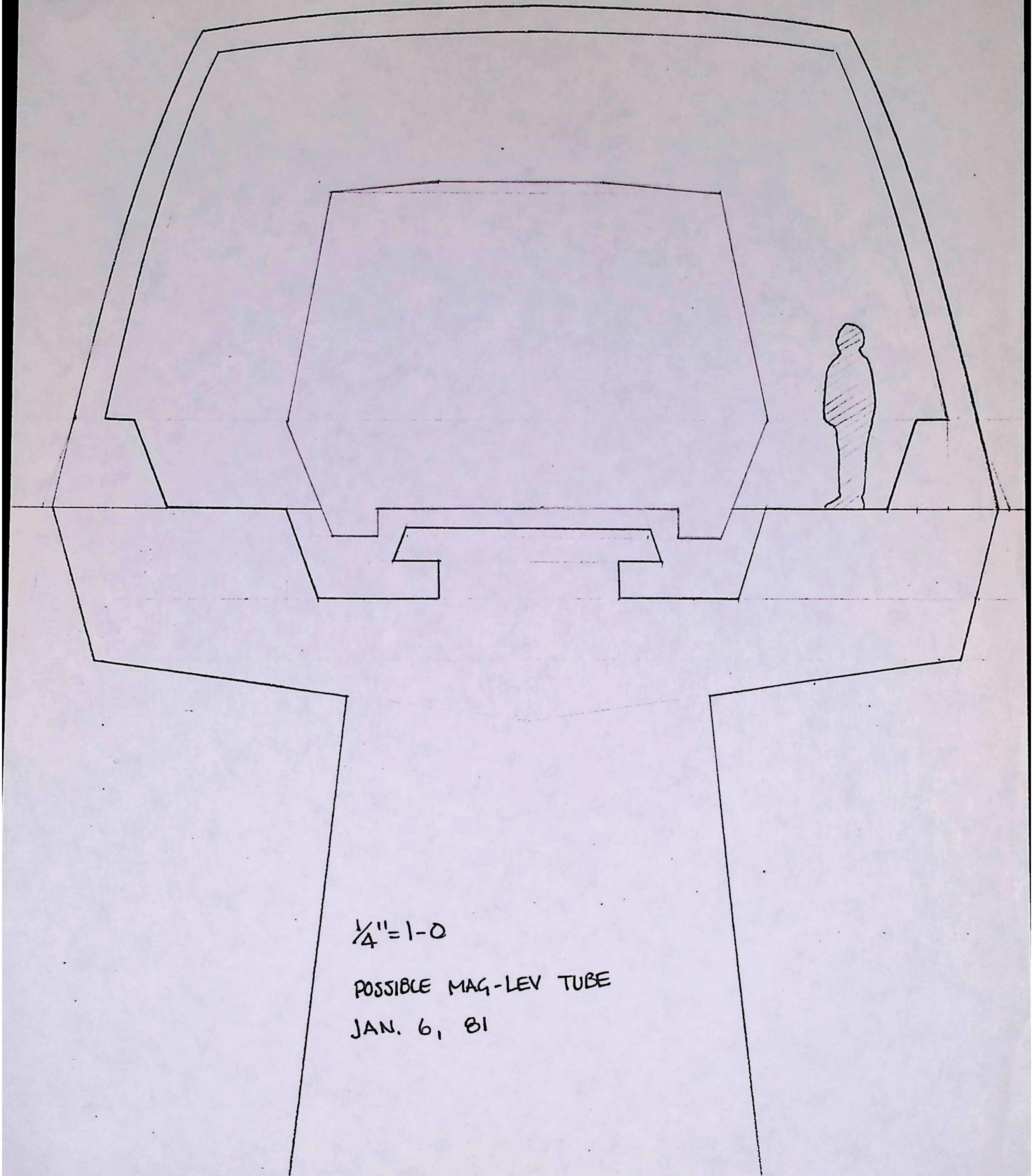
I MUST FIND A WAY(S) TO REDUCE THIS !

3



24 MM LENS
HORIZ. 50°
VERT 37°
32'-6"
50°
-30
-20
-10
10
20
30
40
50
60
0
PLAN VIEW
SUBSEQUENT START POINTS
1ST START POINT
END POINT


24mm
© Walt Disney Productions
WED imagineering


1/4"=1-0
POSSIBLE MAG-LEV TUBE
JAN. 6, 81

WED imagineering

MAG-LEV SEQUENCE STAGE ELEMENTS

☐ LARGE FORMAT TERRAIN POV — 750 MPH 9½ SECTIONS
450 MPH 6 SECTIONS

THIS CONSISTS OF PROGRAMING CAMERA & PITCHING LENS TO MOVE THROUGH A RAIL TYPE COVERED CAUSEWAY WITH ABOUT A 1/8" MOVE TOLERANCE. ANY MORE THAN THIS WILL TAKE AWAY FROM THE FEELING THAT WE ARE ON "TRACKS" (WHETHER REAL OR MAGNETIC).

IF WE ONLY NEED SHOOT 6 SECTIONS AT A TURN AROUND TIME OF 2 WEEKS EACH (MINIMUM) THAT WILL TIE-UP THE STAGE & CAMERA CREW FOR 12 WEEKS (3 MONTHS)

REMEMBER, THIS IS FOR ONLY 6 MINI SECTIONS. MY HOPE IS THAT WE DONT HAVE TO SHOOT 9½!

☐ MATTED HORIZON PSYCH.

THIS CONSISTS OF MODIFYING THE POV PROGRAM TO REDUCE CAMERA TRACK RATE AND POSIBLY NORTH-SOUTH MOTION AS WELL.

☐ MATTED SKY PSYCH.

SIMULAR TO HORIZON PSYCH (IT MAY EVEN BE SHOT CONCURRENTLY) BUT POSSIBLY WITH NO APPEARANT CAMERA TRACK MOTION.

MAG/LEV SEQUENCE STAGE ELEMENTS CONTINUED

☐ MAG/LEV STATION INTERIORS

THESE WOULD BE INTERIOR MINIATURES - USED BASICALLY AS START, STOP, AND CUT PIECES. I DONT BELIEVE IT WOULD BE PRACTICLE TO ACTUALLY HAVE THEM INSIDE THE MINIATURE BUILDING (LIGHTING, RP GAGS, ETC.)

☐ FLYING ELEMENTS

THESE WOULD POSSIBLY BE SHOT BY THE SUPPORT STAGE IF PROGRAMING PERMITTED. THEY WOULD BE HOVERCRAFT, HELICOPTERS, JET SCOOTERS, TAXIS, ETC. PROBABLY A MINIMUM OF 6 TO 12 SUCH VEHICLES.

☐ REAR PROJECTION ELEMENTS

LIVE ACTION R.P. INSERTS TO BE USED IN STATIONS. WOULD REQUIRE INSERT CREW AND STAGE AND SUBJECTS (WHICH UNION IF ANY?) THIS MUST BE DONE FAR ENOUGH IN ADVANCE OF STATION INTERIORS TO ALLOW FOR PRODUCTION.

☐ ROTOSCOPE ELEMENTS

MAG-LEV CITY SEQUENCE

- [ ] BASIC TABLE TOP TERRAIN
  BUILD 9.5 70 FT × 30 TERRAINS @ 750 MPH
  OR 5.5 " " " @ 450 MPH
- [ ] MAG-LEV TRACK SECTIONS APPROX 24 INCH SECTIONS (VACUFORMED PIECES)
  STRAIGHT SECTIONS
  LONG RADIUS CURVED SECTIONS
  MEDIUM " " "
  SHORT " " " 9½ FT RADIUS

TREVOR ESTIMATES 160 HRS. MINIMUM / BUILDING

- [ ] MAJOR BUILDINGS - W/ INTERIOR LIGHTING (NEON, INCANDESCENT)
  120 HR EACH
  ✓ LARGE "CLOSE-UP" SCALE 94080- - 25 DIFFERENT 58,800 1/48"
  MEDIUM SCALE - 30 DIFFERENT 43,725 1/64"
  FLATS - SMALL "DISTANT" SCALE - 20 DIFFERENT 11,660 1/100+
- [ ] LOW LYING BASE STRUCTURE BUILDINGS - W/ INT. LIGHTS 113,685-
  CONNECTING BUILDINGS
- [ ] CONNECTING TUBES, CAUSEWAYS, ETC.
- [ ] CROSS TRAFFIC MAG-LEV TUBES - W/ MOVING TRAINS
  SOME BUILT FORCED PERSPECTIVE
- [ ] MAG-LEV STATION INTERIORS - (CUT PIECES)
  DEPARTURE / ARRIVAL
  THROUGH STATIONS - SHOOT & REDRESS
- [ ] TREES, SHRUBS, GROUND COVER
- [ ] LAKES, PONDS, FOUNTAINS
- [ ] "FREEWAY" ELEMENTS (IN MOTION)

- [ ] HORIZON PSYCH
- [ ] SKY PSYCH , STARS IF APPROPRIATE
- [ ] FLYING ELEMENTS - SPINNERS, VTOL'S, TAXIS
- [ ] POSSIBLE REAR PROJECTION (R.P.) ELEMENTS FOR LIVE ACTION PEOPLE IN ARRIVAL & DEPARTURE STATIONS
- [ ] ROTOSCOPE FX - DISTANT MAG-LEV STREAKS

RE: MAG-LEV TEST TRACK

Dave -

As near as I can recall, this model was intended to represent a scale of 1/8" = 1'-0".

If the track is 50 ft long, and the simulated speed is to be 750 mph, the 50 ft. film run would be projected in 4.36 sec. At 24 frames/sec, that is approx. 105 frames over a distance of 600 inches, or 1 frame exposure every 5.71 inches.

I think that the loops are 5 inches apart.

-Bob Kurzweil
12-3-81

- STANDARD MAG LEV CAR IS 12 TO 15 FEET <u>WIDE</u>

THOUGHTS

THEREFORE, IF I SHOOT MY CITY MINIATURE SECTIONS AGAINST BLUE SCREEN (OR FRONT / BACK LIGHT), THEN GO BACK AND SHOOT EITHER A SKY/HORIZON SYKE OR REAL HORIZON / SKY TO MATCH AS FAR AS ROLL PITCH AND TILT, VIA MOTION CONTROL BUT MOVING ~~FORWARD~~ THROUGH IT ONLY SLIGHTY (IF AT ALL), THIS WOULD GIVE ME A PROPER SCALES OF MOTION.

[redacted] BUILD CLOSE-UP MINIATURES AND TRACK TO 1" = 1 FOOT, THEN STEP DOWN IN SCALE FOR STRUCTURES INCREASINGLY FARTHER AWAY.

BUT - I WONT HAVE THE FORCED PERSPECTIVE LATATUDE AVAILABLE FOR AN "OUT-THE-SIDE-WINDOW" SHOT, SUCH AS ONE FROM THE HEART.

LARGE SCALE MINIATURES – SHOOTING PARAMETERS.

POINTS TO REMEMBER.

WHEN MOVING (AT ANY SPEED) ACROSS A LANDSCAPE, THE HORIZON, SKY, AND ANY OBJECTS OR TERRAIN ~~FIGURES~~ FEATURES AT GREAT DISTANCE APPEAR TO ~~REMAIN~~ ~~CONSTANT~~ ALMOST IN SCALE (APPEARANT SIZE)

AND

WHEN MOVING (AT ANY SPEED) ACROSS A LANDSCAPE, ~~THE~~ ANY OBJECTS OR TERRAIN FEATURES (HORIZON, SKY) AT GREAT DISTANCE APPEAR TO ADVANCE OR RECEED AND MOVE THROUGH THE FIELD OF VIEW ~~AND~~ AT MUCH SLOWER SPEED THAT FORGROUND AND NEARBY OBJECTS, IN PROPORTION TO THEIR DISTANCE FROM THE VIEWER

3.5% MAX. GRADE

13,000 FT RADIUS – AVERAGE
THIS IS 270 FT IN 1:48 SCALE
BOBS IS ONLY 9'-6" OR 460 RADIUS

LRC TILTS UP TO 8°

JAPANS BULLET TRAIN IS 8" TOO WIDE TO FIT OUR CORRIDORS. APT IS TOO NARROW

☆ NEW SCIENTIST 17 SEPT. 1981

LOS ANGELES TIMES OCT 25 '81

? PART I THURSDAY LA TIMES? NOV 12 '81 BY DON COOK STAFF WRITER

NEW SCIENTIST MARCH 12, 81
PP 659

ENR

POP SCI.

RAILWAY AGE "THE SEARCH FOR TOMORROW" BY TOM KIZZIA PP 46.

WED imagineering

original bogies were of a novel type ... the corners. (These have now been ... f technical difficulties.)

... shape is also unusual, partly to minimise ... cause a tilted train must remain within ... e—an envelope above the track within ... nnot hit or "brush" against other trains ... ects alongside the track. Small wheels, ... pecially developed says BR) and an anti- ... keep the pantograph—the device that ... om the overhead wire—in contact with ... ther innovations. The pantograph is also ... ght, design. All in all, BR's enthusiasm ... -its publicity claimed it had the most ... the world—seemed to break the un-

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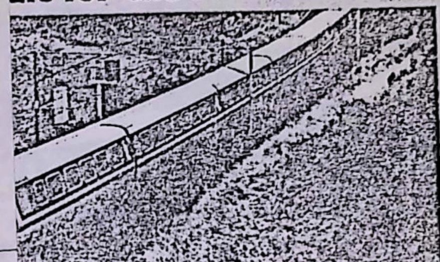
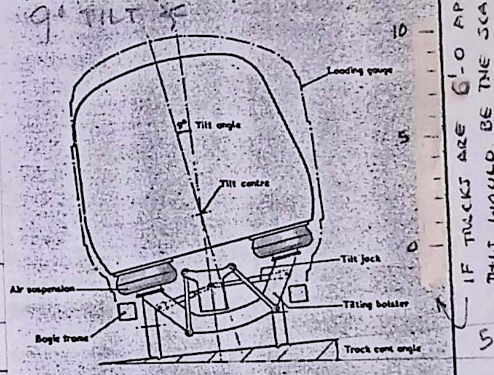
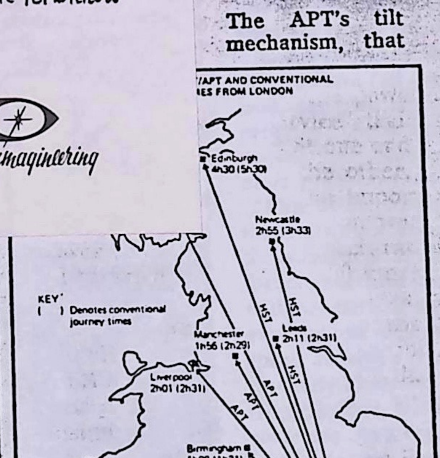
In addition to a tilt mechanism to increase its speed through curves, the APT-P has two sets of brakes: a hydrokinetic (or water turbine) brake for high speeds and conventional clasp or tread brakes for use at slow speeds and for parking the train. Its bogies (sets of wheels) are shared between coaches to save weight so there are a third fewer bogies than there are on a conventional train.

...ait for the APT train





The APT's tilt mechanism, that leans the train into corners, is its biggest and most troublesome innovation. When it works, it should allow BR to cut journey times, as shown on the diagram left. Although it has an unfortunate reputation, the APT has some outstanding engineering features, like its very light, one-piece passenger car design. But, although the train seemed way ahead of its time in 1967, it will look sadly dated when it starts service in 1987. □



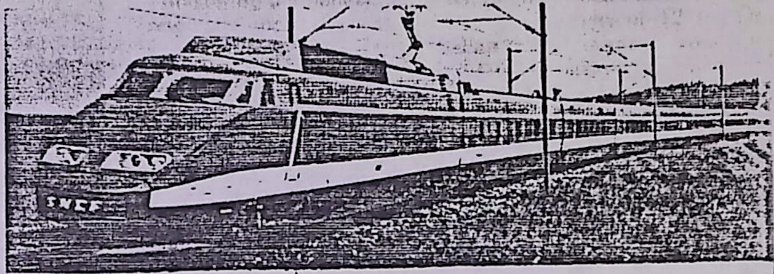
France builds 160-mph rail line

Design simplicity holds down construction costs

Construction of Europe's first high-speed passenger rail line—a 248-mile, $1.2-billion link between Paris and Lyon—is coming in on schedule and within budget, due to an emphasis on simplicity.

The twin-track route, nearly all above ground, will carry new technology trains at more than 160 mph over the natural contours of the land and across a minimum number of structures.

"Our objective was to design a line that would not demand any unique or complicated structures," says Etienne Chambron, project engineering director for the French government's Societe Nationale des Chemins de Fer (SNCF).



Light electric train may eventually serve in West Germany and the U.S.

SNCF expects the first two-thirds of the new line originating in Lyon to open next year. The specially designed Train de Grande Vitesse (TGV) will switch to existing track near Paris until the last section into the capital is completed in 1983. Eventually, France hopes to export the system technology to other countries.

Construction ease. The decision to restrict the line to passenger transport and use an extremely powerful electric engine enabled planners to lay a route that closely follows the natural contours of the land, and thereby avoid a good deal of earthmoving. Maximum grade on the new route will be 3.5%—four times greater than on normal French rail lines.

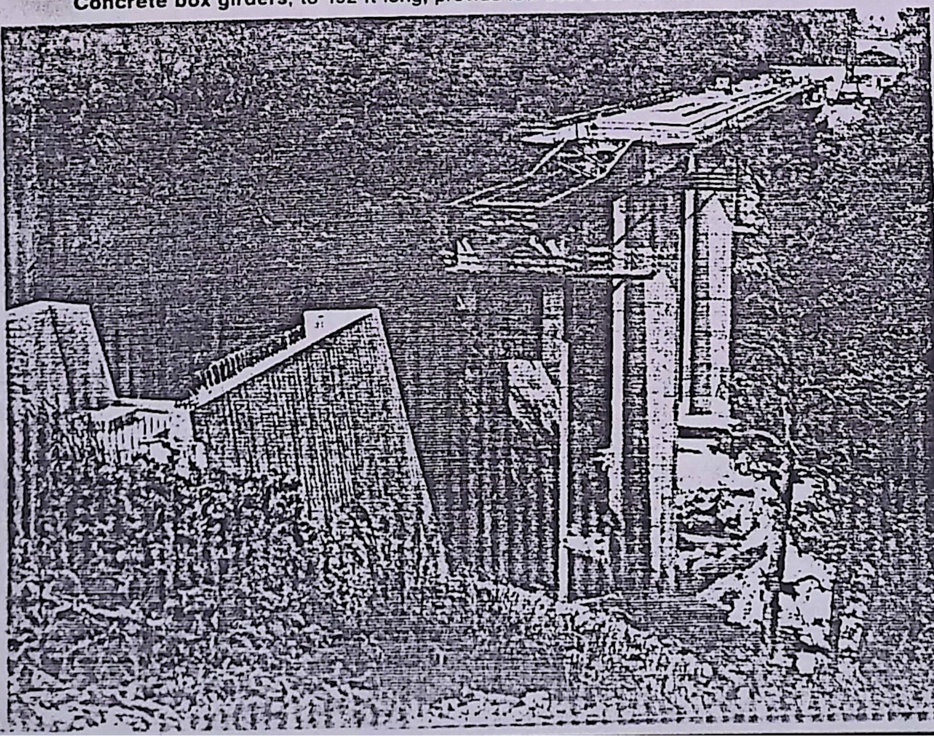
The train's speed precludes any sharp curves, since the resulting G-forces would plaster passengers to the walls. Average radius of curvature of the line is about 13,000 ft. "This presented some problems in planning the line," says Chambron, "but not in construction." SNCF laid a route across lush Burgundy wine country that required demolition of just 10 buildings along the entire route.

There are only 3.1 miles of viaducts and overpasses along the 248-mile line, accounting for about 15% of the cost. In contrast, Italy's "La Directissima" line between Florence and Rome has 18.6 miles of overpass structures on its 143-mile route, accounting for nearly 80% of that route's cost.

SNCF's construction phase—earthmoving, roadbed and overpass structures—is estimated at $682 million. This includes a total of 500 structures at $181 million. Major ones include nine viaducts, 22 rail overpasses and 176 highway overpasses.

"The key to keeping down the construction and maintenance costs for the new line was keeping the number of structures to a minimum," says Chambron. "In fact, the high-speed line would not have worked if there had been too many structures."

Concrete box girders, to 192 ft long, provide low cost and resistance to torsion.



Concrete takes the pounding. Most of the road and rail overpasses are standardized, designed straight from a computer program. According to SNCF, concrete proved both economical and structurally more practical than steel.

One of the major concerns in building the overpasses and viaducts was whether the structures could absorb the dynamic forces generated by the high-speed trains without causing serious deflections. SNCF experiments determined that the critical speed at which dynamic forces could not be safely absorbed is 372 mph for a steel trestle bridge, but 930 mph for a concrete structure. As a result, the route's highway overpasses are three-span bridges consisting of reinforced concrete slabs on slipformed piers. Railroad overpasses are generally single-span bridges with piers as wide as the deck. The overpasses range

...make the wheels smaller, to save weight, they can ...ome unacceptably hot while braking, as has happened ...h the APT.

Other problems are more mundane. The APT designers, for example, chose chemical toilets because their train could not afford to carry the weight of water needed for conventional flush types. There are many other constraints on the vehicles themselves, the solutions to which depend on the cash available, fashion, the technology within reach and so on.

But, however fast the locomotive can pull the coaches in theory, an unsuitable track will prevent the train reaching its maximum speed, especially on corners. This is a fundamental constraint, which has three possible answers. One is to design the train to go faster on the existing track, another is to lay a new track, and the third is to relay sections of existing lines to eliminate extreme curves and gradients.

British Rail's answer with the APT was to design the train to fit the track, a decision that was at once boldly imaginative and extremely risky. BR's view at the time was that it had inherited Victorian railway track, 50 per cent of which was excessively curvy or steep, so it had no choice. The well-publicised problems with the tilting mechanism of the APT, which enables the train to travel up to 40 per cent faster than conventional trains over the same track, without in theory reducing passengers' comfort, are not the only ones besetting BR, but they are certainly among the most important. Others are that the West Coast main line, for which the APT is designed, has long steep climbs and wet and snowy conditions. Consequently the designers need to spread out the driving wheels to prevent the wheels slipping. BR's current prototype—the APT-P—has the two power cars in the centre of the train for reasons that have nothing to do with wheel slip (and which we discuss later), but BR is planning to redesign the train to have a locomotive at one end in the production version. Both versions, according to some observers, will suffer from wheel slip because the proportion of the train's weight on the driving wheels is 16 per cent. This compares with 32 per cent for the HST and existing class 87 locomotives on the West Coast main line, and 100 per cent for Japan's 210 km/h Shinkansen, or "bullet" train.

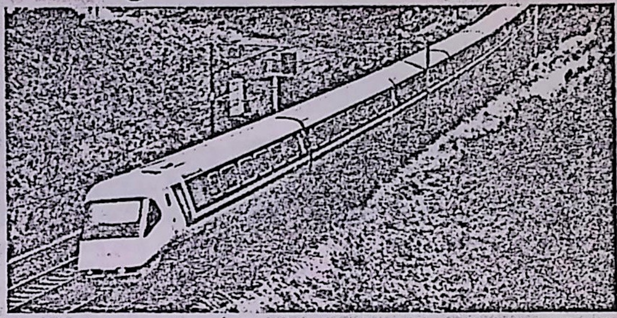
Meanwhile, in Canada, three firms have built a train called the LRC (standing for light, rapid, comfortable) that has a similar tilt mechanism to the APT. It has one power car, a conventional locomotive that can pull its coaches at up to 200 km/h. One train has been in experimental service earning revenue for a year with Amtrak in the US, and another started trials with a Canadian railway company last April. The LRC took 12 years to design and build, but it appears to have suffered none of the problems besetting British Rail. This is probably because, apart from the titling mechanism, it is a highly conventional train (see Box B).

The difference between the LRC and the APT could hardly be more startling. After "successful trials" with the gas-turbine powered, experimental APT-E in 1974, BR decided to go for a very advanced design in its APT-P (preproduction) trains. In press handouts and brochures that look ridiculously eulogistic now, BR crowed about its advanced approach. At the time, British Rail Engineering, which built the three APT-Ps, said it was "proud to unveil the latest in a long line of thoroughbreds, the Advanced Passenger Train".

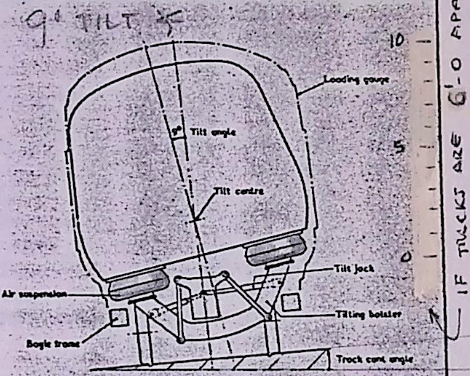
In addition to a tilt mechanism to increase its speed through curves, the APT-P has two sets of brakes: a hydrokinetic (or water turbine) brake for high speeds and conventional clasp or tread brakes for use at slow speeds and for parking the train. Its bogies (sets of wheels) are shared between coaches to save weight so there are a third fewer bogies than there are on a conventional train. In addition, the original bogies were of a novel type that steered into the corners. (These have now been dropped because of technical difficulties.)

The APT's body shape is also unusual, partly to minimise drag, but also because a tilted train must remain within the loading gauge—an envelope above the track within which the train cannot hit or "brush" against other trains or stationary objects alongside the track. Small wheels, chemical toilets (specially developed says BR) and an anti-tilt mechanism to keep the pantograph—the device that collects current from the overhead wire—in contact with the catenary are other innovations. The pantograph is also of a new, lightweight, design. All in all, BR's enthusiasm for being ahead—its publicity claimed it had the most advanced train in the world—seemed to break the un-

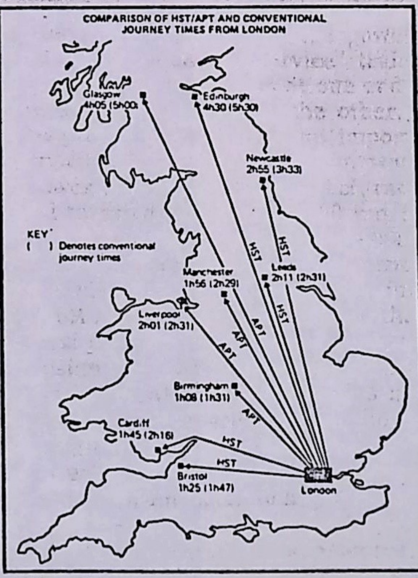
A. Long wait for the APT train

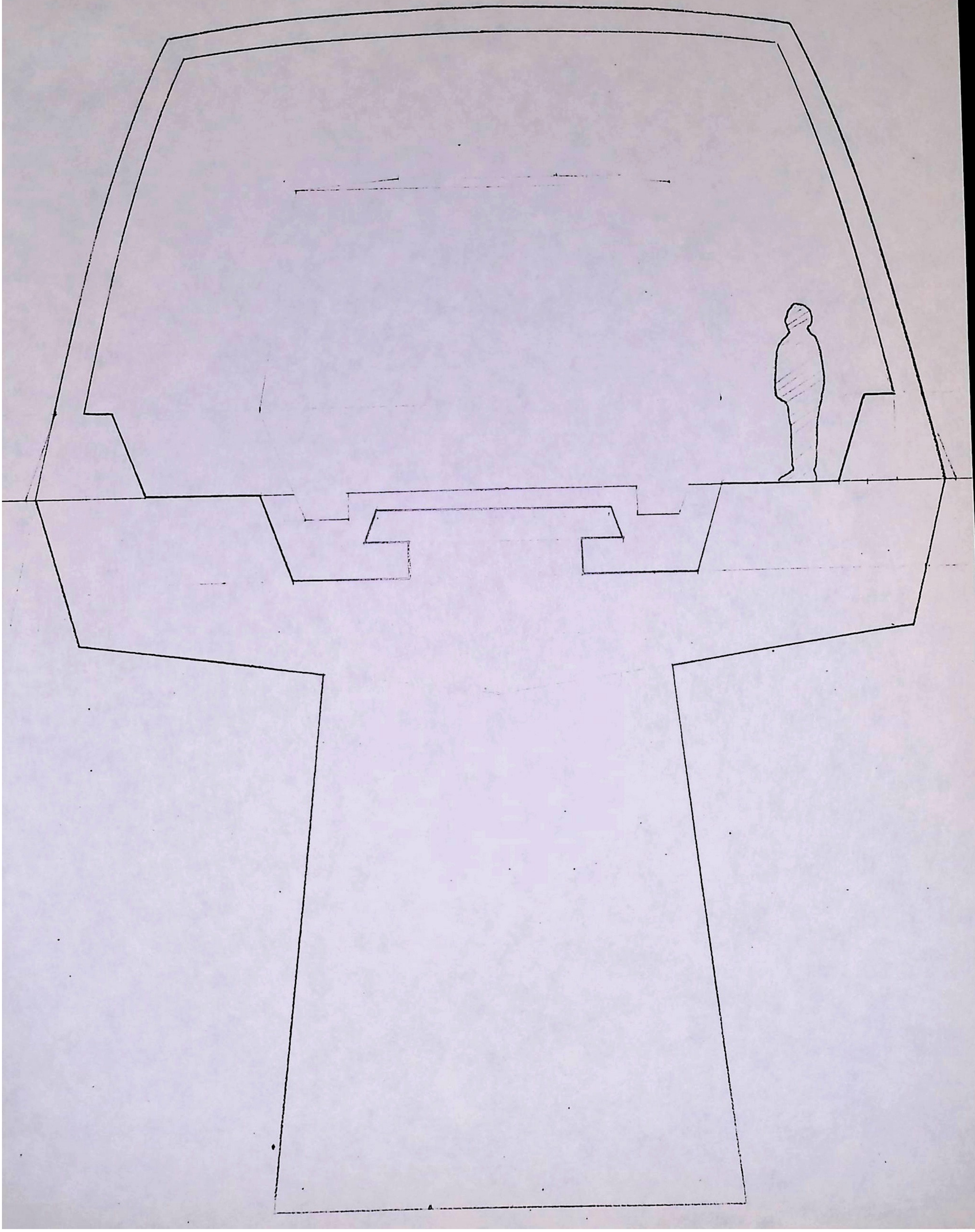


The origins of the APT project go back to 1964—the year that the Japanese "bullet" train started running. BR initially worked on making freight waggons go faster, but the concept obviously held promise for faster passenger trains. BR's development of concepts was good but the complete system still doesn't work.



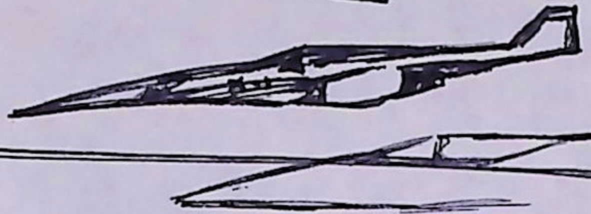
The APT's tilt mechanism, that leans the train into corners, is its biggest and most troublesome innovation. When it works, it should allow BR to cut journey times, as shown on the diagram left. Although it has an unfortunate reputation, the APT has some outstanding engineering features, like its very light, one-piece passenger car design. But, although the train seemed way ahead of its time in 1967, it will look sadly dated when it starts service in 1987. □





$ 260,000 —

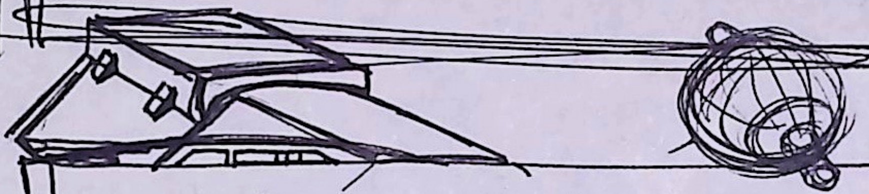
3/8" = 1'-0"



41 - 1½"

CALL KEN

LARSON



HO = 3½ mm = 1'-0"

HO = 1 : 87.1

CLOSEST TO ~~1/8TH INCH~~ = 1'-0"

10,400 HRS

3/8" = 1'-0"

728

136.50 EMA CATAL

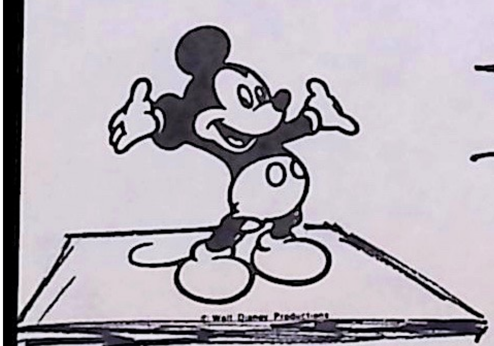
45 HR WK.

P-COLOR-1

P- ____ -12

— 50FT FORWARD POV

— 110 FT LONG - SIDE VIEW



WED imagineering

12 FT / STORY — 40 STORIES =

1 STORY

	1.5 IN	1/8
1 FLOOR = 12 FT =	2.25 INCH IN	3/16
	3 INCH IN	1/4

		40 STORY
1/4" = 1-0	1 STORY IS 3 inches	10 FT.
3/16 = 1-0	1 STORY IS 2 1/4 INCHES	7 1/2 FT
1/8 = 1-0	1 STORY IS 1 1/2 INCHES	5 FT

30 FT = 1,440 FT IN 1/4 SCALE

5280 FT / MILE

MAG-LEV-TRAIN

"ONLY 30 SECONDS" VS. "A LONG 30 SEC MOTION SHOT"

- [ ] HOW FAST
- [ ] HOW SHARP THE TURNS FOR A GIVEN SPEED (ABRUPT?
- [ ] HOW MUCH BANKING IN TURNS
- [ ] DO WE CLIMB OR DESCEND ? DURING
- [ ] BUILDING/ PROGRAM SEQUNCE
  - [ ] BUILD TRACK & PROGRAM TO MATCH, THEN ADJUST TRACK.
  - [ ] BUILD TERRAIN, PROGRAM, THEN BUILD TRACK TO MATCH
  - [ ] HAVE CAMERA ON TRACK CART. A LA "TRUMBLEFLEX"
- [ ] DETERMINE BEST SCALE
  - [ ] CONSIDER TRACK SIZE
  - [ ] " LARGE BUILDINGS - DETAILING THEREOF
  - [ ] PRACTICLE HORIZON
  - [ ] DEPTH OF FIELD
  - [ ] MINI-LIGHT REQUIREMENTS
  - [ ] * STAGE SIZE
  - [ ] TRACK LENGTH
  - [ ] CAMERA BOOM MOVEMENT
  - [ ] " " OVERHANG OR REACH
  - [ ] BLUE-SCREEN SIZE OR FRONT/BACK LITE

MAG LEV INFO

16mm FILM AVAILABLE FROM FRENCH NATIONAL RAILROAD IN BEVERLY HILLS.

From France: 160-mph train

Unique high-speed vehicle has swivel action, but no breaks, between cars

By WILLIAM SERTL

LYONS, FRANCE

I took a seat in France's new TGV *(très grande vitesse,* or very high speed) train for a test run. The car interior was comfortable but Spartan—more like a jet aircraft than a train designed to whisk passengers at 160 mph next fall between Paris and Lyons.

Then we started moving, accelerating smoothly and rapidly. Moments later, we were traveling at 100 mph; soon, at 125 mph, we were zipping past cars on the highway. Minutes later, the sensation of high speed was even stronger. "Ladies and gentlemen," came a public-address announcement, "we are now traveling at 160 mph." I didn't feel plastered to my seat as we accelerated. But when I stood up there was a strange sense of disequilibrium.

France has spent over $1.1 billion since 1970 on TGV, Europe's first high-speed passenger rail line. That cost includes a new roadbed with twin tracks for exclusive TGV use. Powered by electricity from overhead wires and running on standard French single-weld rails that banish clickety-clack sounds, TGV will chop two hours off the previous Paris-Lyons running time.

French engineers are planning additional routes. Italy, Germany, and the United Kingdom also have high-speed projects under way. A European railroad master plan, which could significantly reduce the use of fossil fuels for conventional travel between city centers, calls for high-speed trains across the continent. France and England are still negotiating over a tunnel under the English Channel.

As I boarded the TGV, its sleek appearance, with tapered snouts at either end, reminded me of a world's fair exhibit on futuristic travel. The TGV shape evolved during track and wind-tunnel tests for aerodynamic efficiency. The train rides about one foot closer to the track than do conventional trains.

But as I walked through the TGV, the absence of clanging and rattling between its eight cars emphasized a unique design feature: The 660-foot-long TGV is a single train set with swivel action, but no break, between cars. There are two engines (one at each end).

Instead of wheel mounts or bogies at both ends of the cars, a special four-wheel bogie carries the ends of two adjacent cars. Passengers need not sit over noisy, vibrating wheels. Long coil springs extend from the bogies high into the connecting part of each car. The cars do not separate except for special servicing, but two train sets may be hooked together, doubling passenger capacity to 600.

From the driver's seat

A visit to the engineer's cab was the most thrilling moment. Peering down the straight expanse of track ahead, the sensation of speed was exhilarating. At TGV speeds, semaphore types of signaling devices along the track would be unsafe. Instead, signals are received from electronic devices in the track that "read ahead" and display speeds to be observed by the engineer on digital readouts.

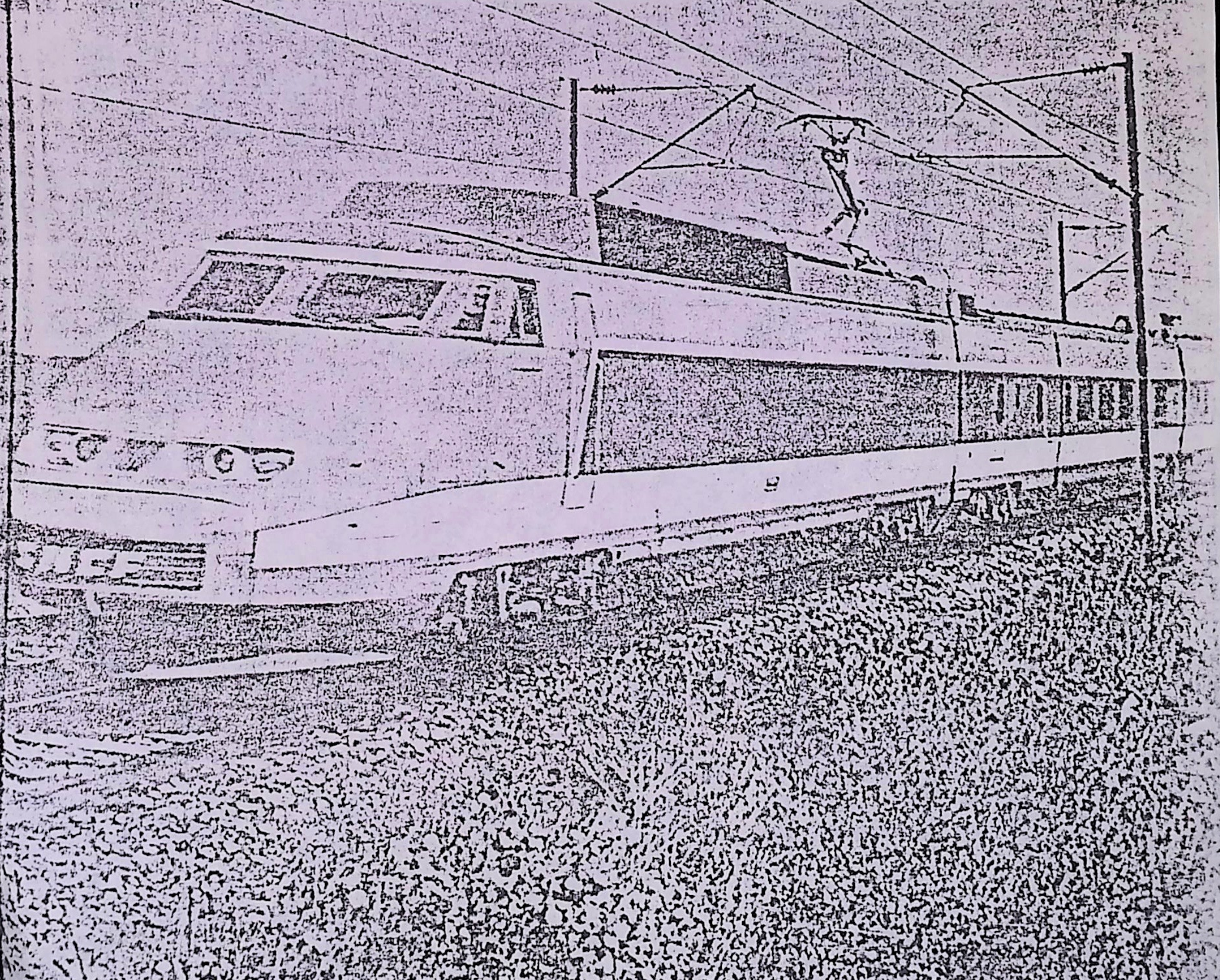
French National Railroads (FNR) chose to have driver-controlled trains with computer backup rather than computer-controlled trains with human supervision. An FNR spokesman said, "People don't feel comfortable with a computer running a train. As long as a human supervisor had to be present anyway, it made sense to have him drive the train."

The TGV computer system is more than a polite reminder to the driver: It will stop the train if unheeded, through a device that initiates automatic braking. Braking reverses driving axles and operates standard frictional discs on the carrying axles. FNR indicates that new dynamic-braking developments could eventually replace the frictional brake and help reduce maintenance costs.

An absence of level crossings along the track improves safety. Roads and highways were reconstructed either over or under the railway. Tunnels were not built, because of the expense. One small side benefit from high-speed travel was the ability to increase the steepness of track gradients at some locations.

FNR considered using existing track between Paris and Lyons but had to drop the idea. Heavy freight and passenger traffic on the line made frequent high-speed service impossible. Equally important, to compensate for the pull of centrifugal force on curves, French rails are inclined toward the inside of the curve. The inclination depends on the radius of the curves and train speeds. Since speeds would vary greatly with the introduction of TGV's, a compromise curve for both the slowest and fastest traffic was unfeasible. All curves on the new line have a large radius.

TGV's will begin commercial operation at 160 mph, gradually increasing speed to 190 mph after 1983. ■



[illegible] TGV [illegible] 200 mph. Passengers [illegible]