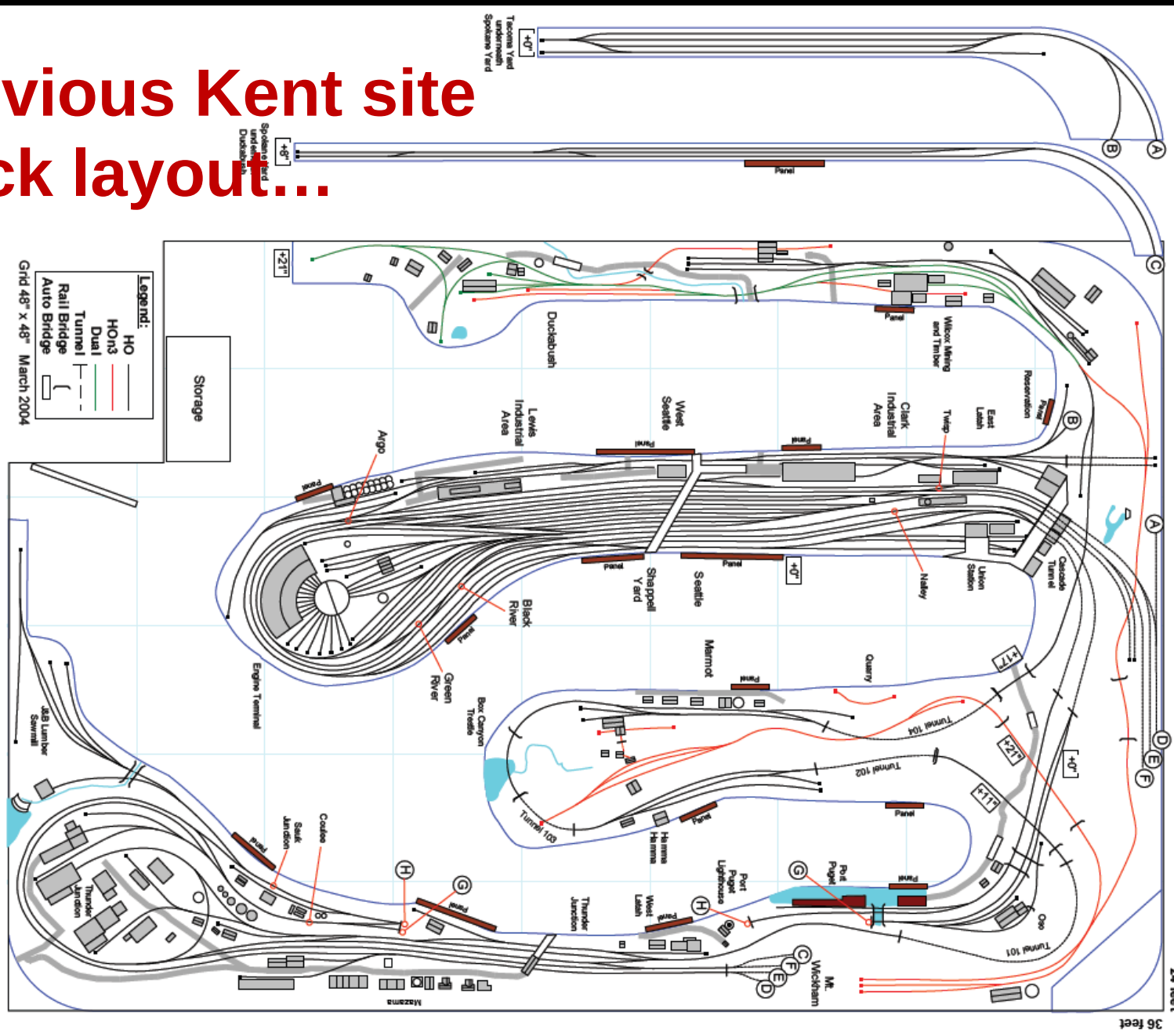
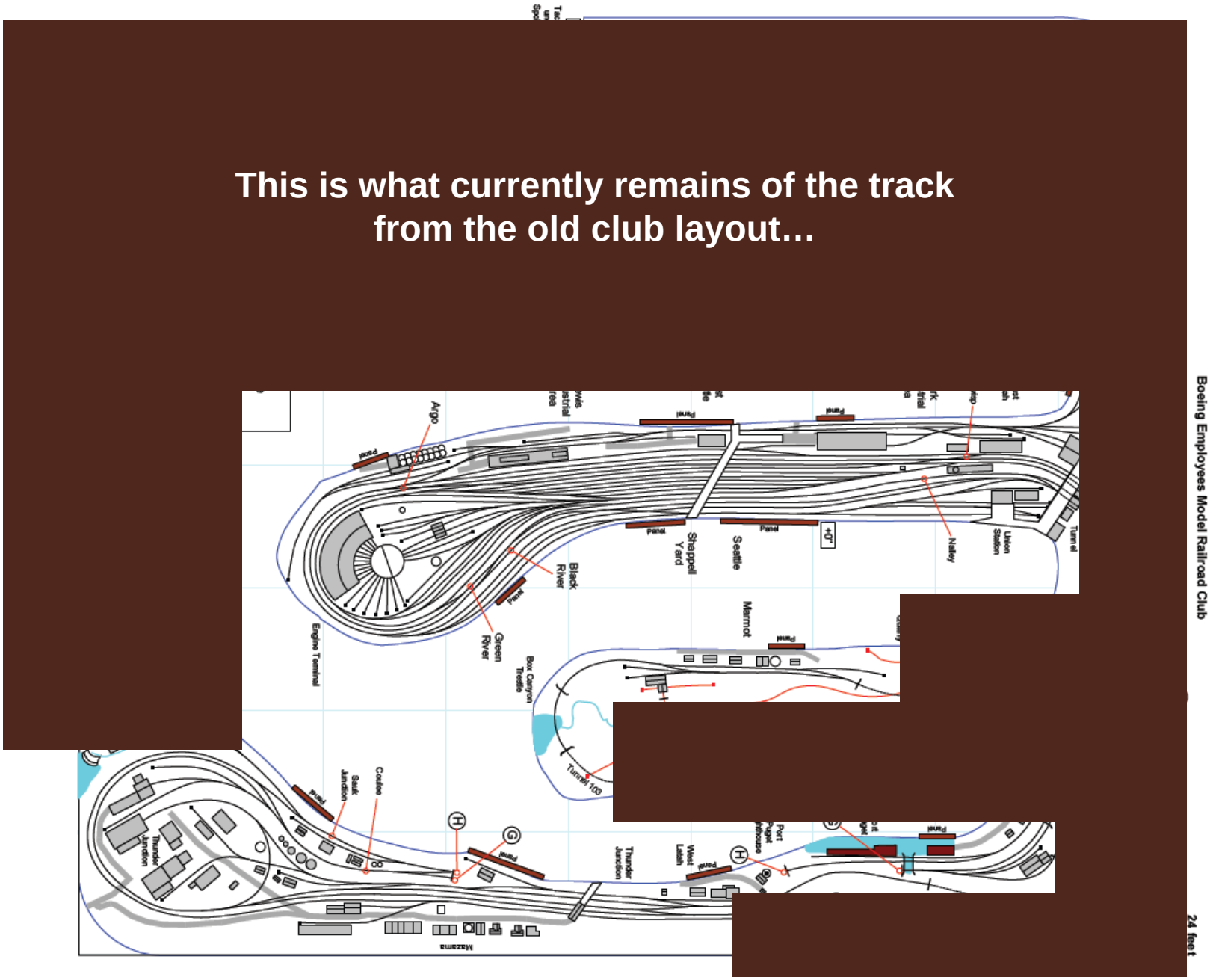
BEMRRC layout design considerations when combining new track with existing club layout sections

- So what club layout sections are left ?
- What are typical prototype yard and operational considerations that could influence our new design ?
- What ideas do we consider for updating or changing existing track on the remaining club sections ?
- What are the overall design constraints for construction of a new club layout…

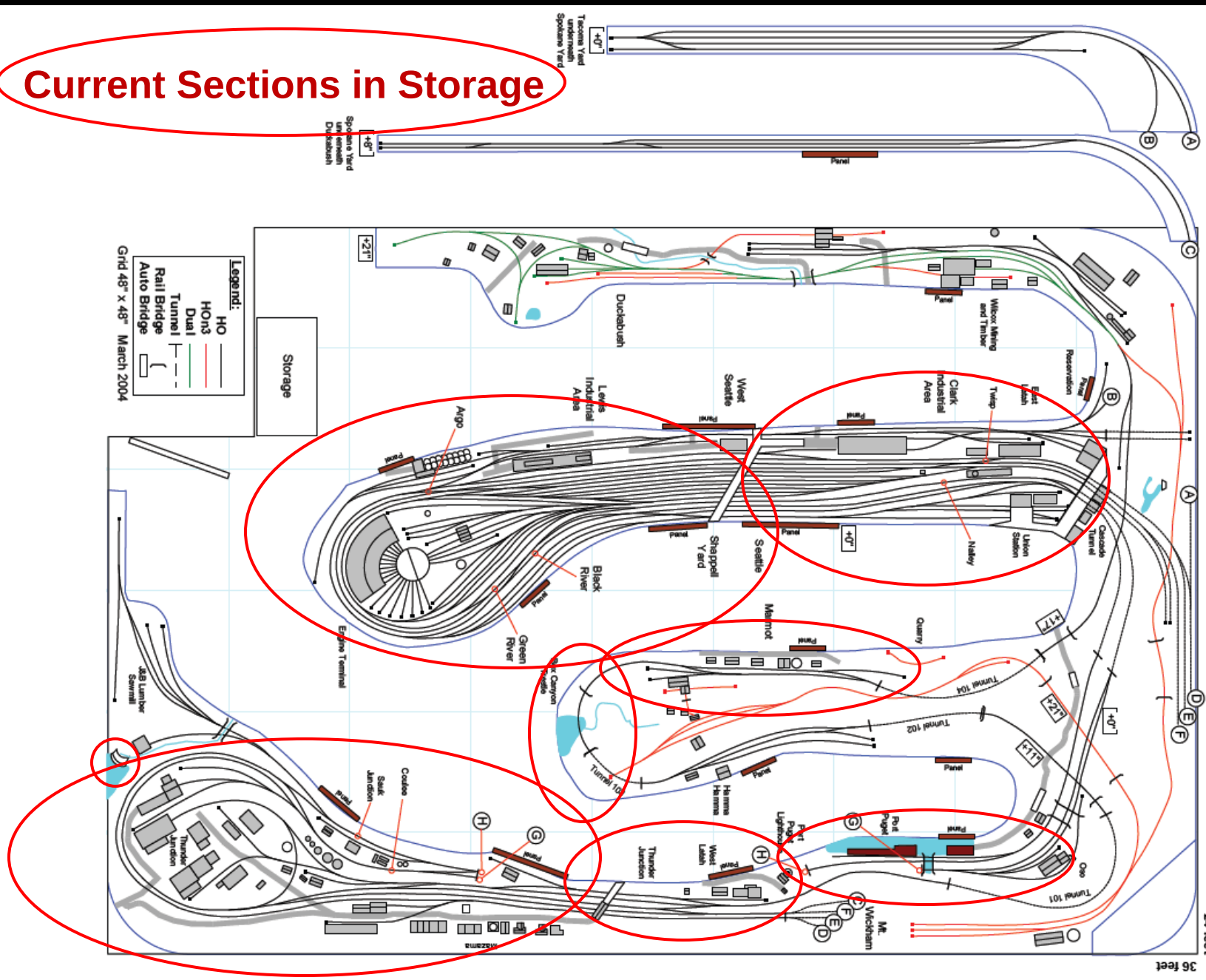
Previous Kent site track layout…



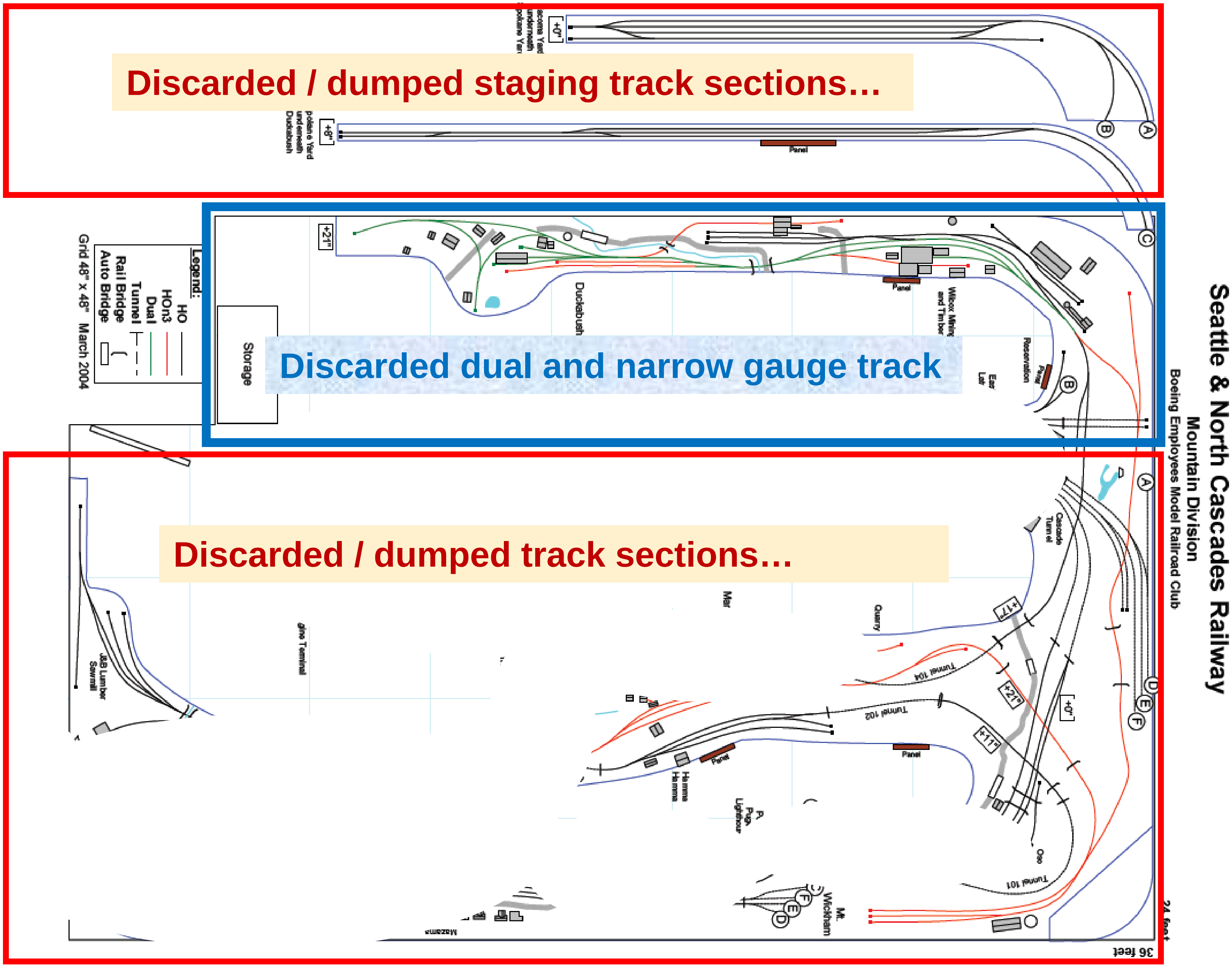
This is what currently remains of the track from the old club layout…



Current Sections in Storage



Remaining club sections being transported to storage…


Discarded / dumped staging track sections…
Discarded dual and narrow gauge track
Discarded / dumped track sections…
Seattle & North Cascades Railway
Mountain Division
Boeing Employees Model Railroad Club
Legend:
HO
HOn3
Dual
Tunnel
Rail Bridge
Auto Bridge
Grid 48" x 48" March 2004
Storage
Duckabush
Panel
Tunnel 101
Tunnel 102
Tunnel 104
36 feet
24 feet

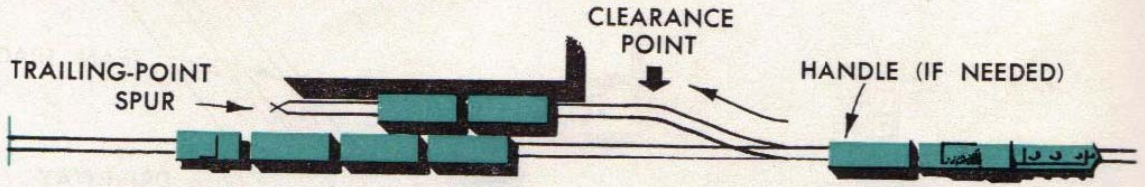
Discarded sections were carefully disassembled…

Dual and narrow gauge track sections were salvaged by myself and are currently being modified…

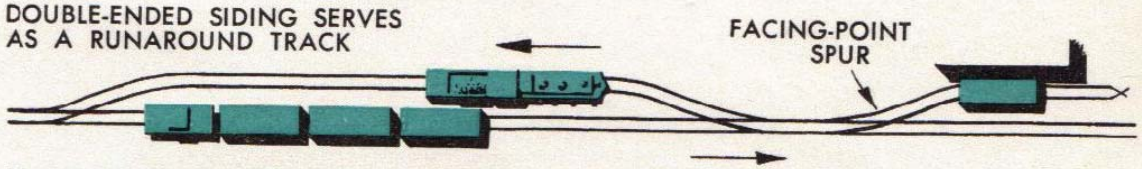
What are typical prototype operational goals that can influence layout design ?

- The primary goal in layout design is to create a railroad –
  - In a railroad, cars move to transport freight and passengers
- The layout should have the “feel” that the railroad is going somewhere
- In a layout single track is often more interesting than double track
  - However, designs to have continuously run trains for public shows are still highly desirable
- Large layouts can allow construction of true point-to-point
- Design will need passing sidings, branch lines, and yards, but should avoid impulse to design a “switching puzzle” into the layout
- Passing sidings at towns typically had a couple of industrial spurs and track design is easiest with approaches that are in a frog-to-point direction

Importance of trailing-point and facing- point spurs when off the mainline



PICKING UP OR SETTING OUT CARS AT AN INDUSTRY TRACK IS A SIMPLE MATTER IF SPUR IS CONNECTED TO MAIN TRACK BY A "TRAILING-POINT" TURNOUT — ONE WHICH THE LOCOMOTIVE APPROACHES IN A FROG-TO-POINTS DIRECTION. IF THERE IS LIGHT OR SHARPLY CURVED TRACKAGE BEYOND CLEARANCE POINT (NOT SHOWN HERE), THE SPUR MAY BE FORBIDDEN TO LOCOMOTIVES. IN THIS CASE ENOUGH CARS MUST REMAIN COUPLED TO LOCOMOTIVE DURING MOVE TO SERVE AS A "HANDLE" TO REACH INTO SPUR.



IF A CAR IS TO BE PICKED UP FROM A "FACING-POINT" SPUR, A MORE COMPLICATED OPERATION IS REQUIRED, STARTING WITH A "RUNAROUND" MOVEMENT BY THE LOCOMOTIVE AT THE NEAREST AVAILABLE DOUBLE-ENDED SIDING.

AFTER COUPLING TO THE REAR OF ITS TRAIN THE ENGINE SWITCHES THE SPUR IN NORMAL FASHION. A SECOND RUNAROUND MANEUVER GETS THE TRAIN BACK IN PROPER ORDER. (SOME RAILROADS OR CREWS WILL CUT OFF THE CABOOSE BEFORE MAKING THE RUNAROUND, THUS LEAVING IT OUT OF THE PULLING AND HAULING INVOLVED AND REDUCING THE RISK OF KNOCKING OVER THE STOVE. WEAK WOOD-FRAME CABOOSES MAY NOT WITHSTAND THE TORMENT OF CAR-PUSHING; CONDUCTOR MAY OBJECT TO JOSTLING.)

Typical prototype freight yard goals that will influence layout design ?

1 of 5

- Layout needs freight and passenger yards
  - Remember freight yards are supposed to be operated, not to act as storage
  - Passenger yards however, do store passenger cars
- Large yards can make up trains heading for other yards
- Small yards can sort cars for local industries
- Major yards can look confusing but generally have purpose behind each and every track within the yard limits
  - Identifying track purpose (needs) also helps determine layout location, yard access, and size for each track

Typical prototype freight yard goals that will influence layout design ?

2 of 5

- The first set of tracks to consider in designing a yard are the receiving tracks
  - They receive inbound freight trains, and there should be at lest two
    - One for Eastbound and one for Westbound

- Receiving tracks are located immediately adjacent to the main line with easy access from the main into the yard
  - If the main line is a double track, there have to be crossovers

- More tracks are needed if there is a failure to clear these tracks before the next train arrives on the main

- Receiving tracks should be long enough for the longest train you intend to operate, plus additional length to allow for engine movement

- Receiving tracks also need additional switches to a runaround track for engines and cabooses

Typical prototype freight yard goals that will influence layout design ?

3 of 5

- Next is the departure yard, a yard within a yard that also does classification and sorting

- This yard usually has tracks designated East and Westbound, but has many additional tracks needed to set out loads and empties for transfer to other roads, for repair, or for local industry sidings

- The number of tracks contained in this yard is dependent on the number of departing trains in an operating session, the size of the layout, the number of exchange loads, local deliveries, and space available on the layout, etc.

Typical prototype freight yard goals that will influence layout design ?

4 of 5

- Next is the transfer yard which usually had a dedicated switch crew (See next slide for typical switch crew)

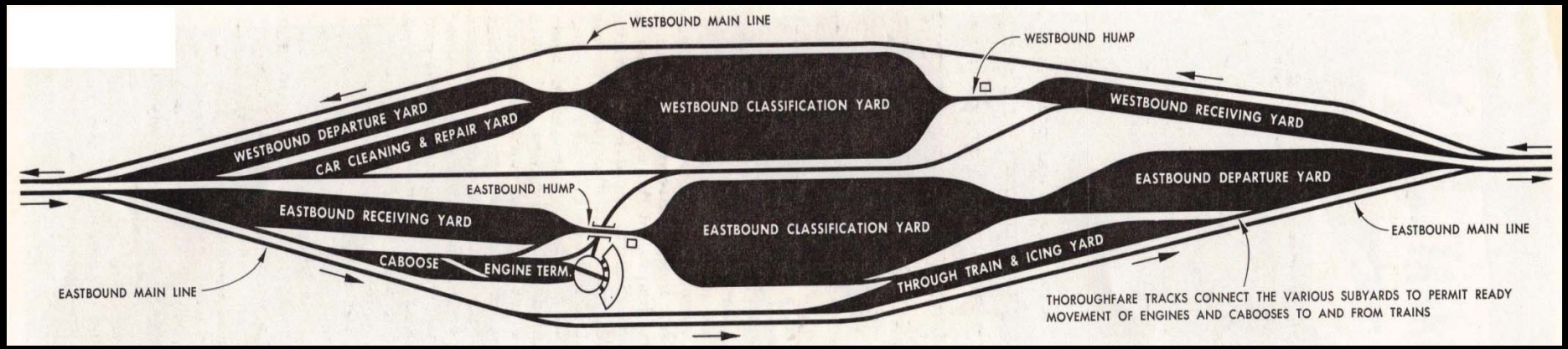
- Cars within the transfer yard are usually not going onward since additional sorting is still needed for delivery to other roads

- The longer you have these cars in the yard, the more it will cost you, and you have to determined whether these cars are local, way freight, or through freight deliveries

- Usually some transfer yard tracks are dedicated to a single railroad while other tracks are used for multiple roads

Typical dedicated switch crew on break…

Freight Yards: What Are All Those Tracks ?



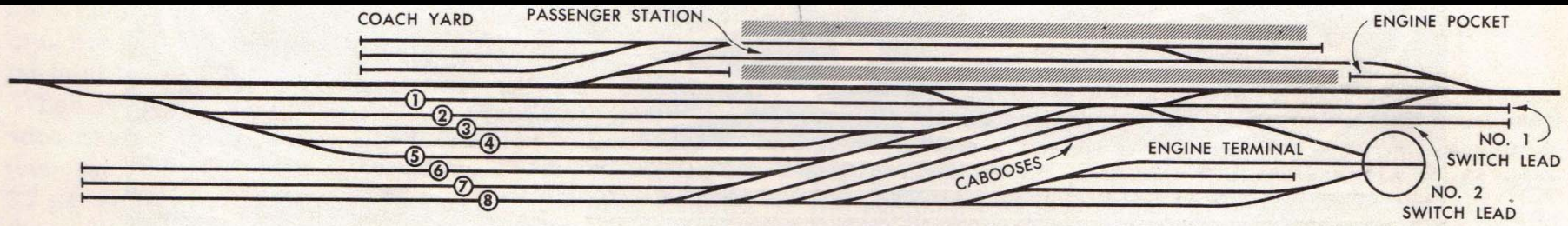
By the way… notice the icing yard at the bottom right…

The next slide shows a prototype, and actually one of our own track sections still has one…


NRC
19200
WABASH

This is an example of a combined freight and passenger yard for a club size layout

There can actually be three yard crews working this yard: one for each separate switch lead track and one for the passenger yard



THIS CLUB-SIZE DIVISION-POINT YARD ALSO ACHIEVES INCREASED CLASSIFICATION CAPACITY BY DIVIDING THE WORK BETWEEN TWO CREWS WORKING ON SEPARATE SWITCH LEAD TRACKS AT THE SAME END OF THE YARD. PROVIDING THE SECOND LEAD TRACK AT THE OTHER END OF THE YARD WOULD ACCOMPLISH THE SAME RESULT, BUT WOULD MAKE THE YARD SO LONG THAT THE LENGTH OF "OUT-IN-THE-COUNTRY" MAIN LINE WOULD BE SERIOUSLY REDUCED.

WHEN ONLY ONE CREW IS WORKING, NO. 1 LEAD SERVES ALL EIGHT TRACKS. NO. 2 LEAD SERVES TRACKS 5 THROUGH 8 AND ALSO PROVIDES AN ALTERNATE ROUTE TO THE TURNTABLE. TRACK 5 IS LEFT CLEAR WHEN POSSIBLE TO SERVE AS A THOROUGHFARE TRACK FOR ENGINES GOING TO AND COMING FROM THE FAR END OF THE YARD. SINGLE-ENDED TRACKS IN A YARD ARE RARE IN PROTOTYPE BUT DESIRABLE IN MODEL PRACTICE FOR REASONS GIVEN ABOVE.

PRESENCE OF PASSENGER STATION IS COINCIDENTAL, SINCE PASSENGER FACILITIES MAY OR MAY NOT BE ADJACENT IN PROTOTYPE DIVISION-POINT COMMUNITIES AND MANY SUCH TOWNS ARE OF SUCH LIMITED POPULATION AS TO REQUIRE NO TRACKAGE FOR TERMINATING OR SERVICING PASSENGER TRAINS. IF THEY ARE TOGETHER, HOWEVER, THERE IS SOME INCREASED FLEXIBILITY AND CAPACITY FROM THEIR COMMON USE OF THE MAIN LINE AND NEARBY TRACKAGE TO RELIEVE TEMPORARY CONGESTION.

What are typical prototype operational goals that will influence layout design ?

5 of 5

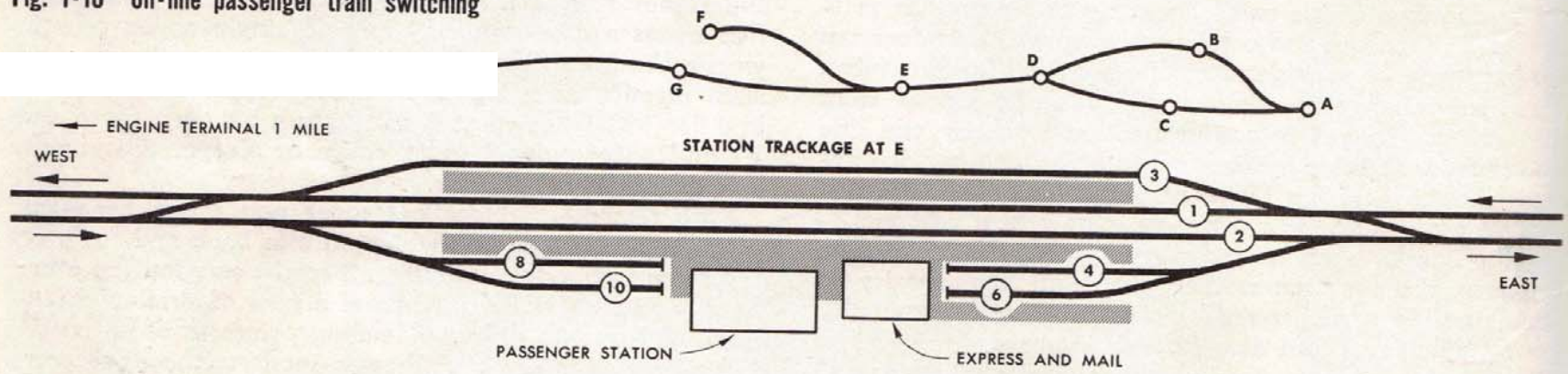
- Yard designs on a model railroad have the same factors that shape the prototype yards:
  - Frequency of trains
  - Number of interchange roads
  - How much motive power can the yard handle for switching
  - Length of yard verses length of incoming and outgoing trains
  - Temporary car storage, caboose, work train storage, service areas
  - Way freight builds for industries along the mainline

Typical prototype passenger yard goals that will influence layout design ?

- Passenger terminals:
  - Out and back – Train leaves, proceeds around a line that returns back to terminal
  - Division point – Trains stop and crews are changed, requires reasonable mainline run on each side of the yard
  - Main terminal – One end of terminal plunges into staging, the other end connects to mainline
  - Branchline – This connects to main at the terminal, and meanders off to countryside servicing local industries
- Challenging passenger stations:
  - Plan track for lounge, sleeper, and dining cars
  - Plan track for separate express and mail loading
  - Plan track for engine escape provisions and engine services

Great example showing passenger train and car movements

Fig. 1-10 On-line passenger train switching



STATION TRACKAGE AT "E"

NOTE: NO PASSENGER SWITCH CREW ON DUTY 12:01 A.M. TO 8:00 A.M.

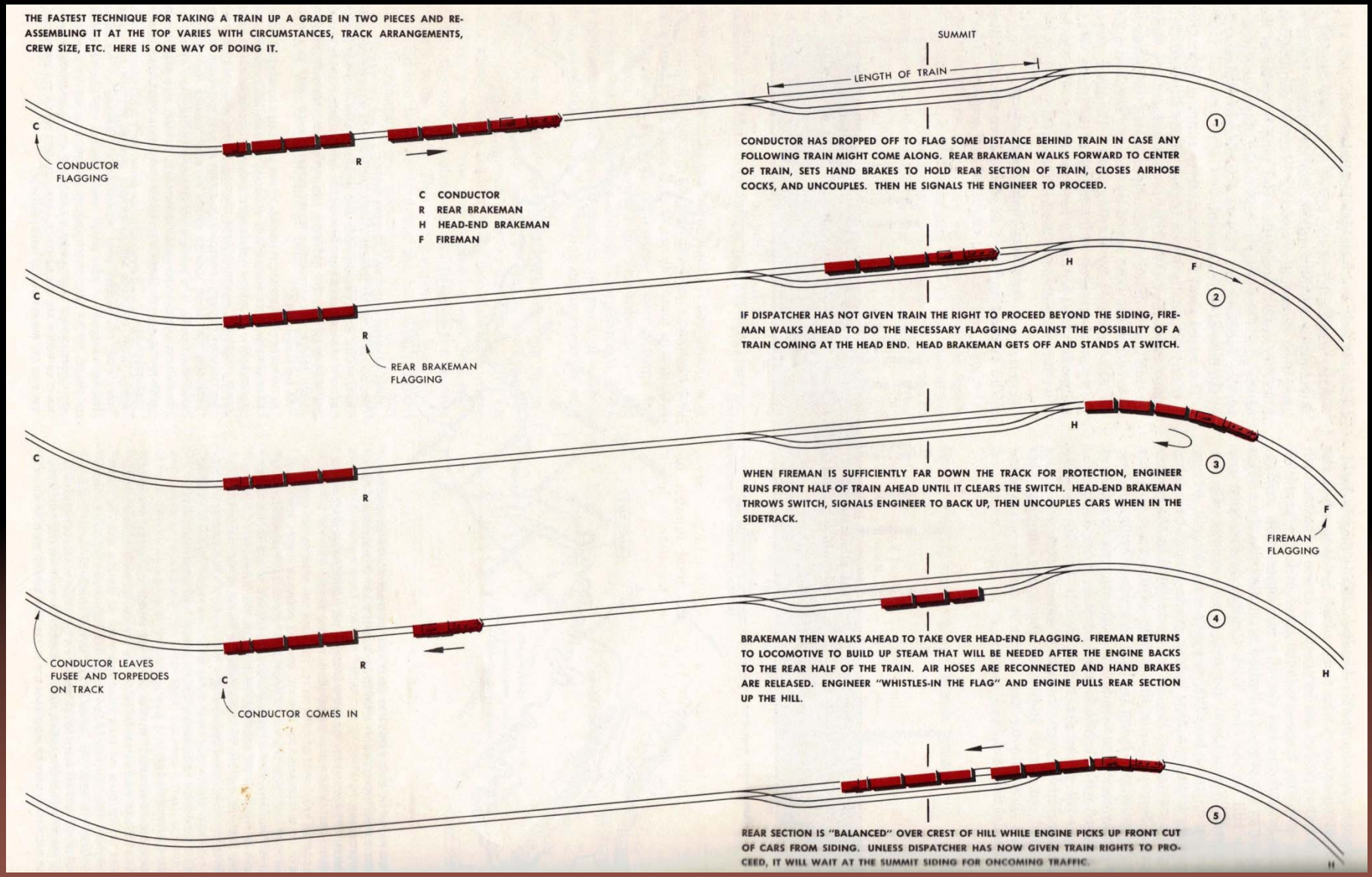
TRAIN NO.	DIRECTION	DESIGNATION	FROM	TO	VIA	ARRIVE "E"	LEAVE "E"	SWITCHING OPERATIONS AT "E"
41	WEST	"F" NIGHT EXP.	A	F	B	2:25 A.M.	2:40	ROAD ENGINE PICK UP EXPRESS AND STORAGE MAIL CARS FOR "F" FROM TRACK 8; SET OUT EXPRESS CAR FROM "A" ON 8.
26	EAST	NIGHT LIMITED	H	A	B	4:52 A.M.	5:15	ROAD ENGINE CUT OFF WHILE TRAIN REMAINS ON TRACK 2 AND HEAD-END TRAFFIC IS WORKED; RUN AROUND TRAIN VIA TRACK 1; PICK UP DINER FROM 3, SET ON REAR OF TRAIN. RETURN TO HEAD END VIA 1, SET OUT EXPRESS CAR FROM "H" ON TRACK 6.
27	WEST	"G" NIGHT EXP.	A	G	C	6:45 A.M.	6:59	ROAD ENGINE PICK UP DINER-LOUNGE FROM TRACK 3, PLACE IN TRAIN AHEAD OF COACHES & SLEEPER. (SLEEPER CONTINUES TO "G.")
102	EAST	LOCAL	E	A	B	—	7:30	ROAD ENGINE FROM TERMINAL VIA TRACK 2 PICKS UP EXPRESS CAR OFF NO. 26 FROM 6, R.P.O. FROM 4, AND MAKES UP TRAIN ON 3 BY PICKING UP COACH THERE.
52	EAST	DAY EXPRESS	F	E	—	9:38 A.M.	9:58	NO. 52 IN ON TRACK 2 WITH R.P.O., COACH, DINER-LOUNGE; SWITCHER PULLS DINER-LOUNGE, SETS OUT ON 8; PICKS UP PARLOR CAR FROM 10, SETS ON NO. 52'S THROUGH COACH ON 2, AND AWAITS ARRIVAL OF NO. 32 VIA CROSSOVER ONTO 1. SWITCHER PULLS REAR SLEEPERS OF NO. 32 THROUGH CROSSOVER TO 2, PICKS UP PARLOR AND COACH, AND SETS WHOLE CUT BACK ONTO NO. 32, WHICH LEAVES FOR "A" VIA EAST CROSSOVER.
32	EAST	DAY EXPRESS	G	A	C	9:44 A.M.		
31	WEST	DAY EXPRESS	A	G	C	2:46 P. M.	3:02	REVERSE OPERATIONS FROM THOSE CONSOLIDATING NOS. 52 AND 32; SWITCHER SETS PARLOR CAR ON 10 AFTER NO. 31 HAS CLEARED (RUNAROUND MOVE NECESSARY), ENGINE FROM NO. 52 MAY HAUL NO. 51.
51	WEST	DAY EXPRESS	E	F	—		3:06	
28	EAST	EVENING EXP.	G	A	C	5:45 P.M.	5:48	NO. 28 DROPS SLEEPER DEADHEADED FROM "G." SWITCHER PARKS THIS SLEEPER ON TRACK 8, READY FOR OCCUPANCY AT 10 P.M.
101	WEST	LOCAL	A	E	B	10:15 P.M.	—	TERMINATES. SWITCHER PLACES DEADHEAD DINER-LOUNGE FROM "D" OFF NO. 28 ON TRACK 8, COACH ON 3, R.P.O. ON 6, HEAD-END ON 3.
25	WEST	NIGHT LIMITED	A	H	C	10:46 P.M.	11:05	ROAD ENGINE CUTS OFF. SWITCHER SETS HEAD-END CARS OFF NO. 101 ONTO NO. 25, RUNS AROUND VIA TRACK 2, SETS OUT DINER ON 2. AFTER DEPARTURE OF NO. 25, SETS DINER ON TRACK 8, TAKES DINER AND DINER-LOUNGE FROM 8, SETS OUT AT WEST END OF TRACK 3.
40	EAST	NIGHT EXPRESS	F	A	C	11:40 P.M.	11:55	SWITCHER SETS SLEEPER FROM 8 ON REAR; PICKS UP HEAD-END CAR FROM 4 AND SETS ON NO. 40.

What about the prototype mainline for layout design?

1 of 2

- Mainline tracks generally follow as much of a water grade as possible
- Extended hilly regions always used heavy motive power
- Single un-crowded short grades can allow trains to be cut in two
  - See example next slide
- The most prevalent practice in conquering grades is to add helpers
- Most lines currently in the United States are single track
  - Single track requires many passing spurs
  - In modeling, spurs should be limited in length to emphasize the fact that the layout is basically single-track

Mainline grades can add additional fun maneuvers…



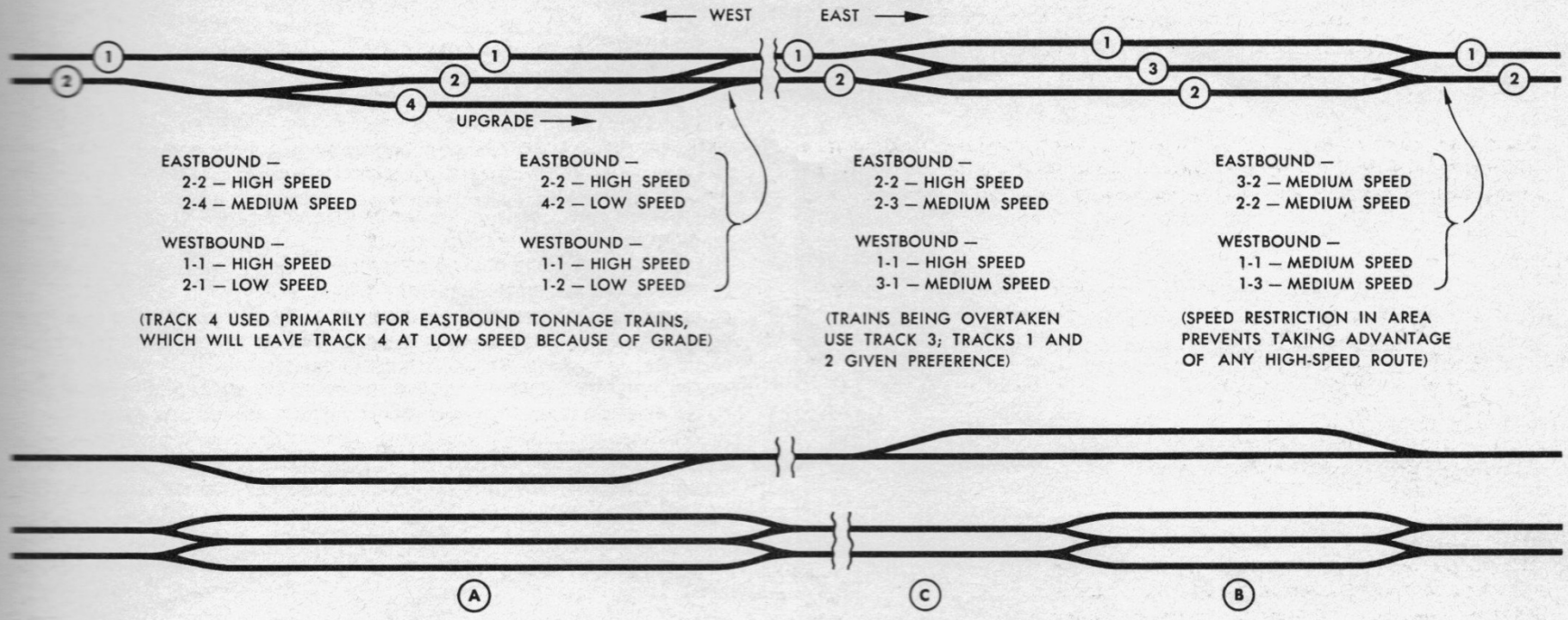
What about the mainline for layout design?

2 of 2

- A double track mainline can handle much more than twice the number of trains
- Double track mainlines allow greater use of crossovers, adding to additional variety in operation
- Double track mainlines also add complexity to junctions and crossings (could be desirable for modeling)
- For “matching industries” the mainline should have proper direction for moving loads-in / empties-out, and hidden track to allow these trains to return to the industry

Severely limited length restrictions on club layouts for two- and three-track mainlines can actually surpass single-track operation in variety

MOST RAILROADS WHOSE TRAFFIC DENSITY EXCEEDS THAT WHICH DOUBLE TRACK CAN HANDLE USE TRIPLE TRACK IN RELATIVELY SHORT SECTIONS WHERE GRADE OR OTHER CONDITIONS TEND TO CAUSE BOTTLENECKS. TRANSITIONS FROM TWO TO THREE TRACKS ARE DESIGNED TO SUIT THE PARTICULAR REQUIREMENTS AT EACH LOCATION, VARYING CONSIDERABLY IN ARRANGEMENTS DEPENDING UPON WHICH ROUTES REQUIRE HIGH-SPEED CAPABILITIES. IN THE EXAMPLES BELOW, FIGURES "2-2" INDICATE ROUTE OF TRACK 2 THROUGH THE TRANSITION; "2-4" INDICATE CROSSOVER FROM TRACK 2 TO TRACK 4, AND SO ON.



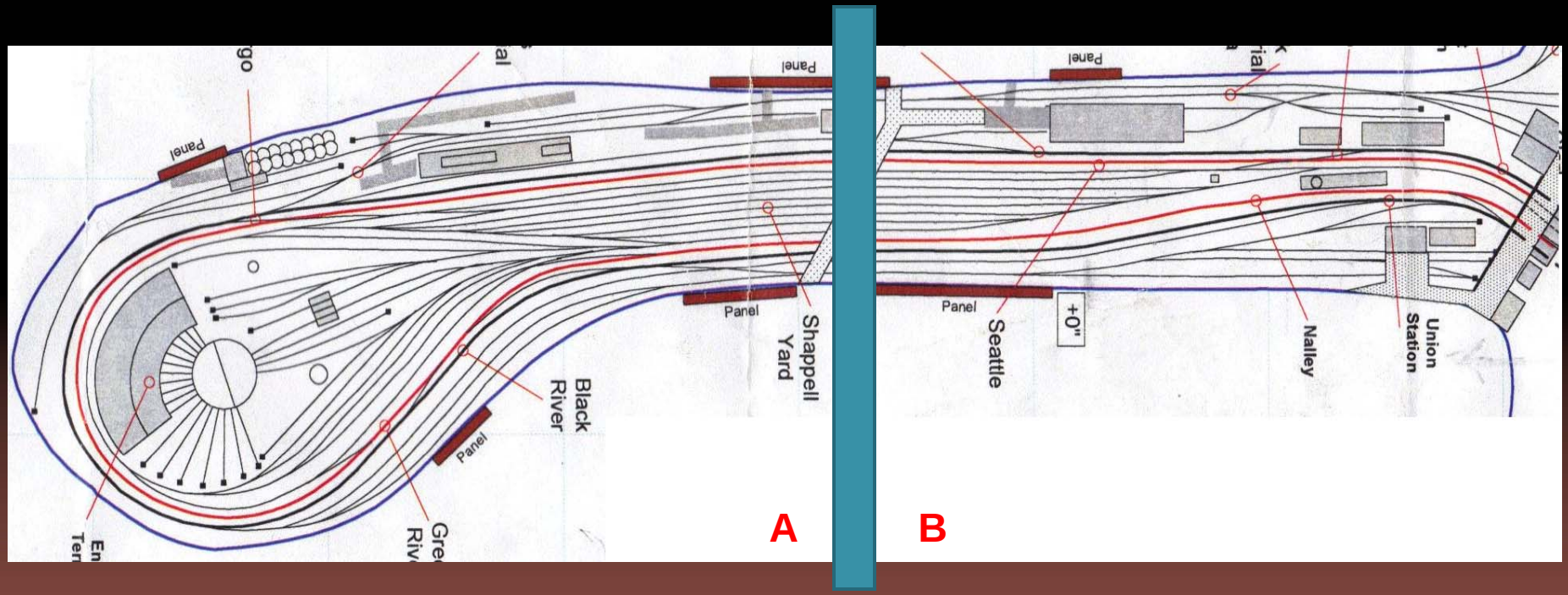
IN MODEL PRACTICE, WHERE MAINLINE LENGTH IS SEVERELY LIMITED, TWO- AND THREE-TRACK RAILROADING MAY ACTUALLY SURPASS SINGLE-TRACK OPERATION IN VARIETY. IN THIS SINGLE-TRACK EXAMPLE, BOTH PASSING TRACKS MUST BE LONG ENOUGH FOR MOST TRAINS IF THE LINE IS TO OPERATE WELL. OPERATIONS ARE MUCH MORE FLEXIBLE WHEN DOUBLE AND TRIPLE TRACK IS AVAILABLE. LONG SIDINGS AS AT "A" CAN ALLOW FOR NONSTOP PASSES AND OTHER CHALLENGING MANEUVERS. IF DOUBLE TRACK AS AT "C" IS RELATIVELY SHORT, TRAINS CAN USE WRONG MAIN IN MAKING PASSES. IN SUCH A CASE, SINCE TRAINS DON'T HAVE TO RELY ON TRIPLE TRACK FOR PASSES, SIDING AT "B" CAN BE MADE SHORTER THAN SOME TRAINS AND STILL BE EFFECTIVE IN TRAIN MANEUVERING ACTION.

What can we do with the track sections we still own from our previous layout ?

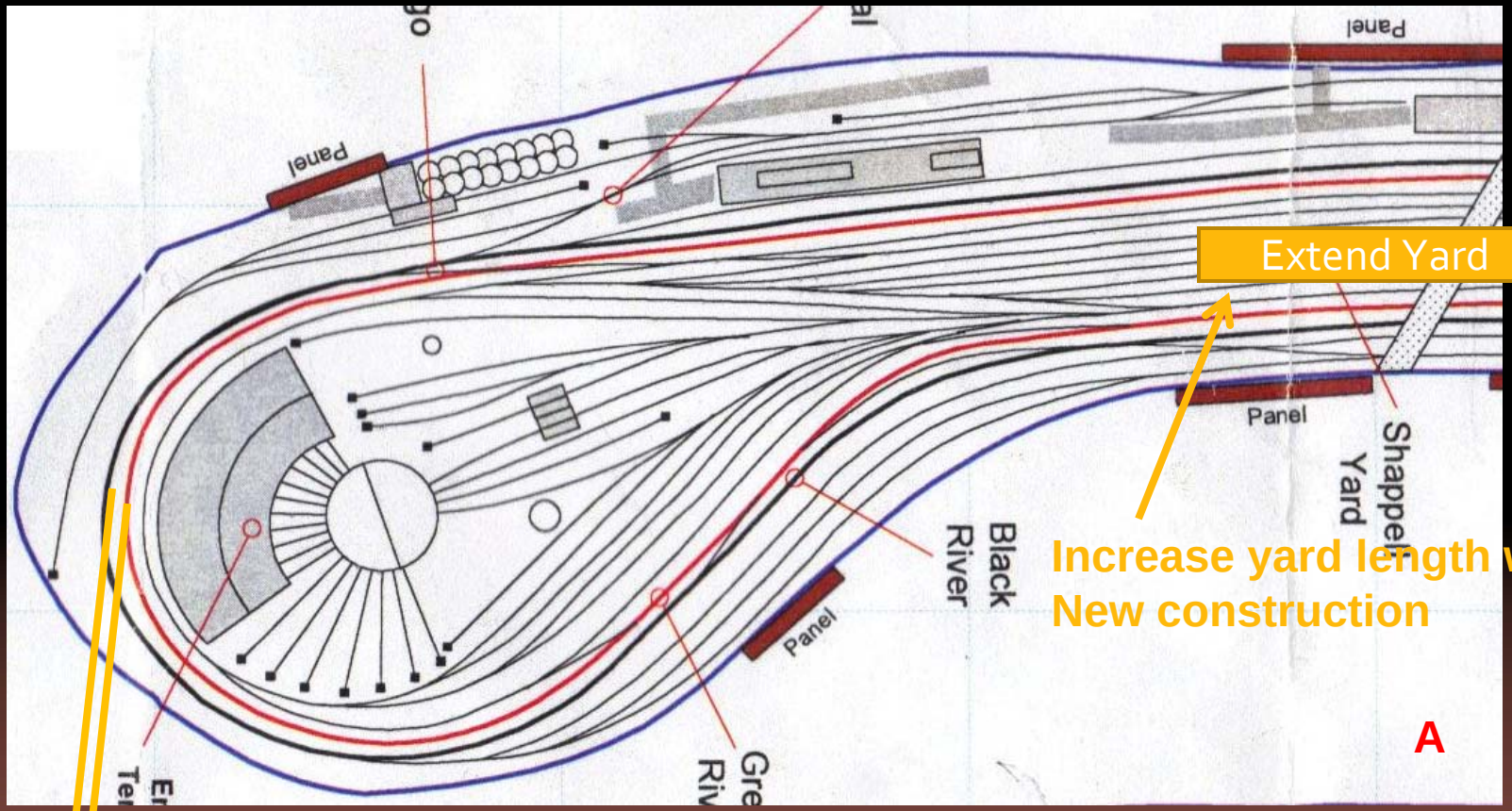
- We can further extend the distance between existing sections
- We can change the main passenger terminal to except East- and Westbound traffic
- We can re-route the mainline traffic in several different places
- We can increase the receiving and departing freight yards
- We can re-arrange industry track
- We can add ‘loads-in / empties-out’ for paired industries using self contained systems and hidden track

What can we do with the track sections we still own from our previous layout ?

- **Two main yard sections A and B:**

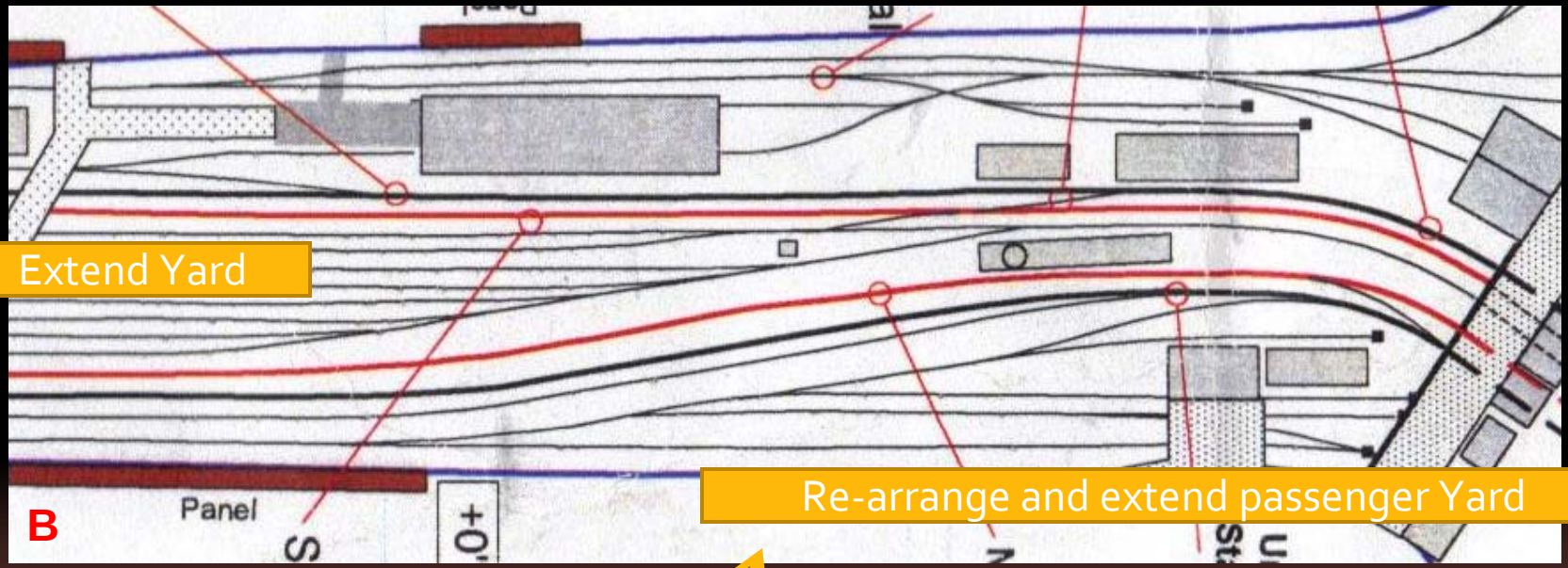


Examples of design change with new construction



New construction has possible mainline re-route

Some areas of design change with new construction

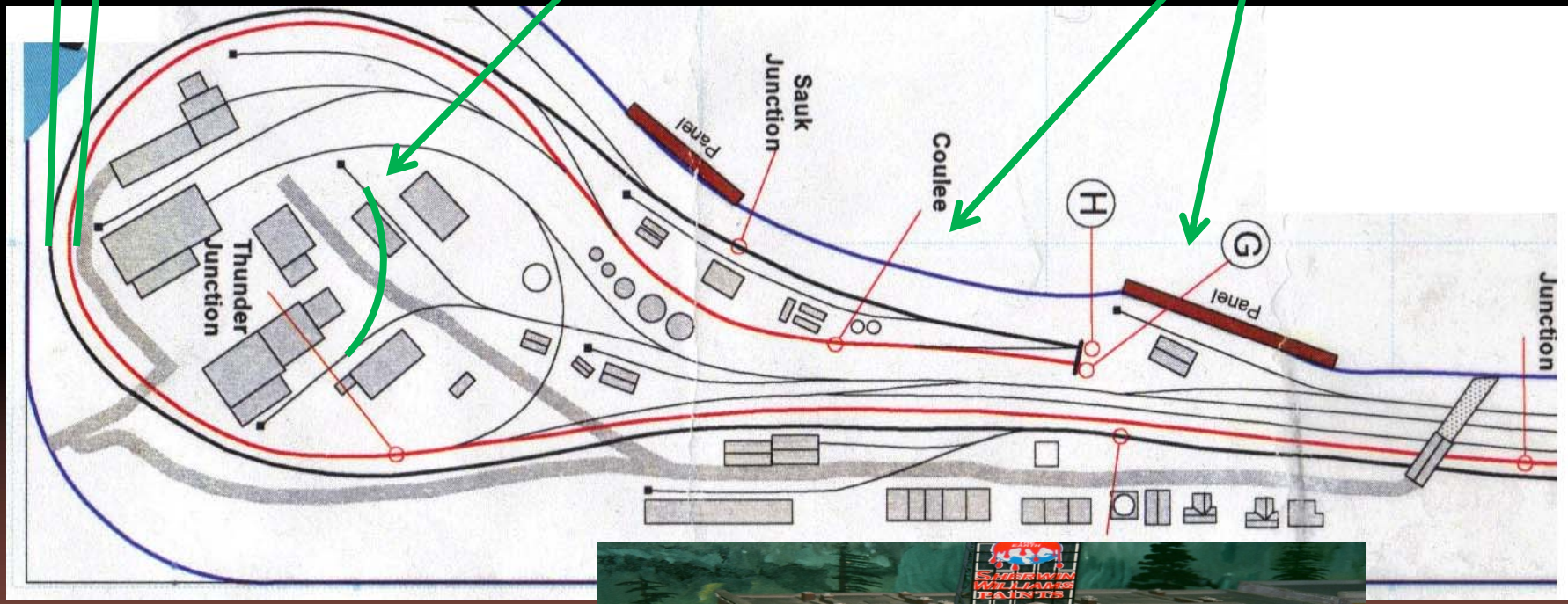


With new construction we can arrange passenger station tracks to allow for East- and Westbound service

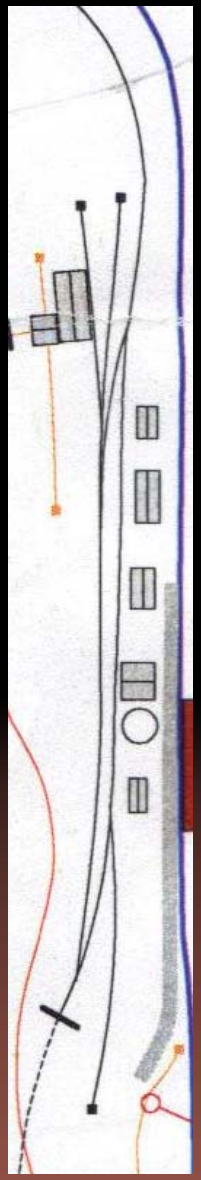
Possible mainline re-route
If new construction added ?

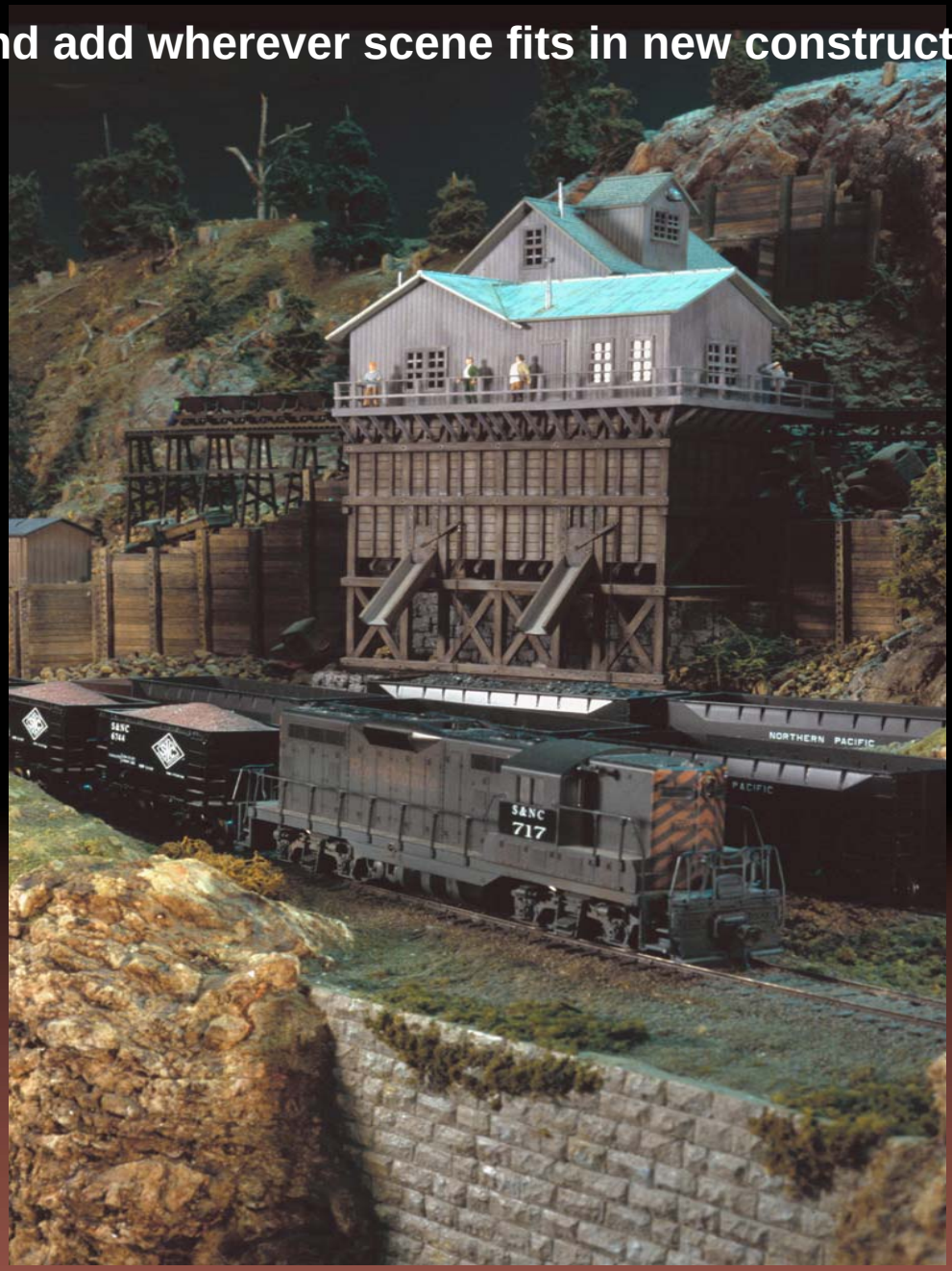
Design ‘Y’ to allow for
engine turn-around ?

Chance to redesign
and add track to area?

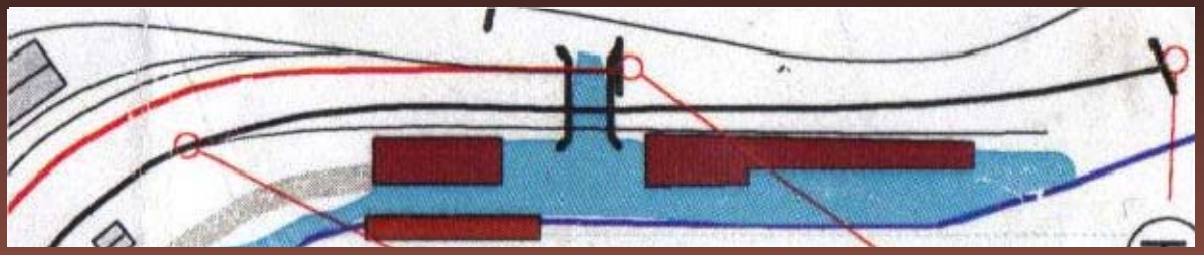


Keep mining siding and add wherever scene fits in new construction





Keep dock siding and add wherever scene fits in new construction



Keep trestle and add wherever scene fits in new construction

Design Goals and Constraints 1 of 3

- Freelance class 1 railroad
- Transition era (mid-1950's ?)
  - Steam and diesel
- Mainline running and numerous operation (switching) opportunities
- Specific scenes of interest - service yard, mining, logging, dockside
- Freight and passenger traffic

Design Goals and Constraints 2 of 3

- Raised mainline, superelevation
- 33” minimum mainline radius
- # 8 and # 6 mainline turnouts
- 24” minimum industrial radius
- # 6 and # 4 industrial turnouts
- Code 83 track – Manufacture ?

Design Goals and Constraints 3 of 3

- 14 ‘ trains (engine + 18 – 24 cars)
- Walk-around operation (DCC)
- Powered mainline and industry turnouts
- Reachable trackwork (3’ or less)
- Walk-in layout (no duckunders)
- Reasonable aisles (3-4 feet)
- Continuous staging

Construction

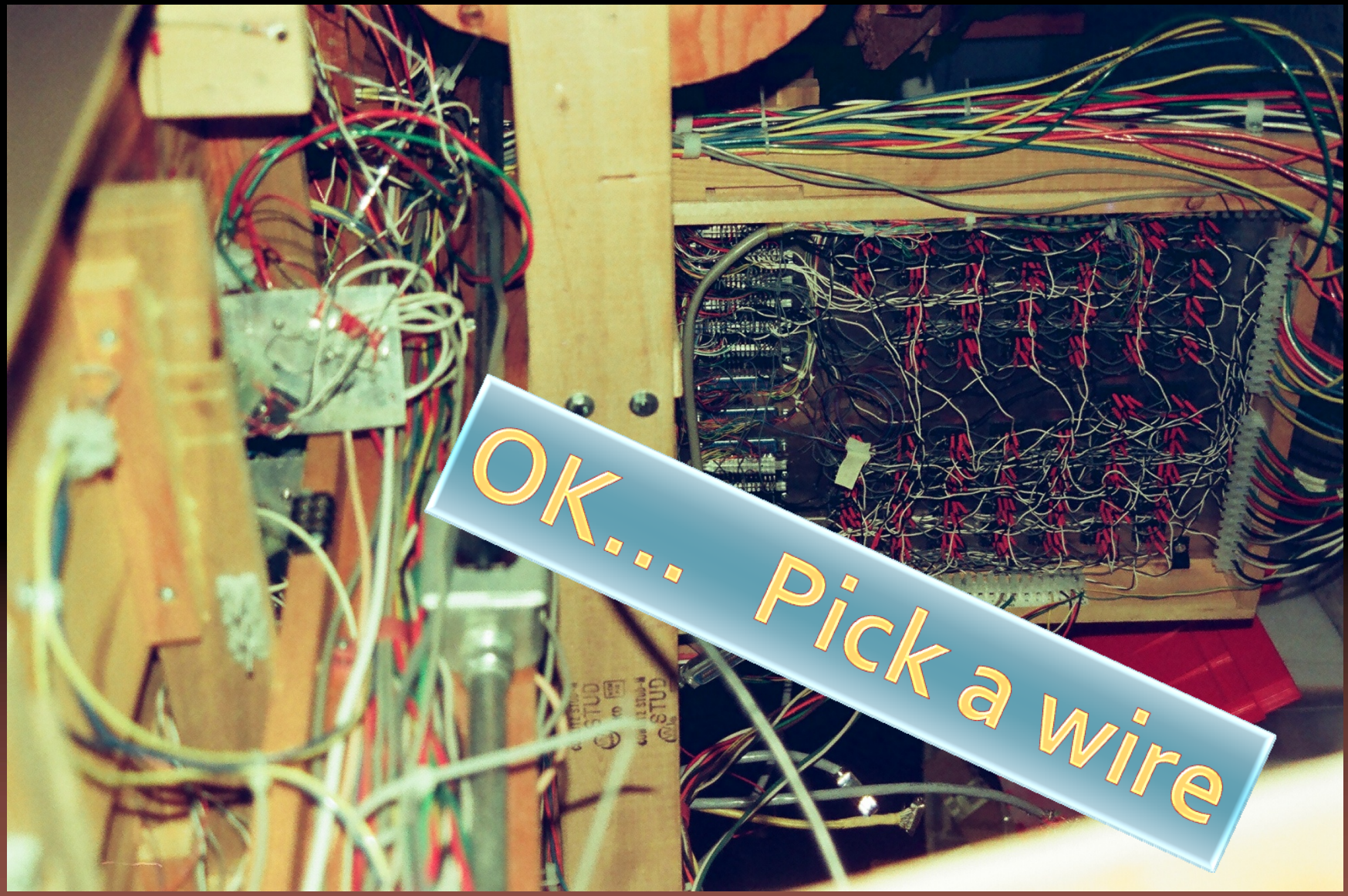
- Finish railroad room before construction
  - Frame walls, insulate, drywall, paint
  - Switched electrical outlets
  - Design-in lighting and controls
  - Good wall-to-wall carpet
  - Overall layout room lighting

Electrical

- Insulate joints for block detection
- Insulate joints around mainline turnouts
- Track power
  - 22 AWG pre-tinned solid drops
  - 12AWG standard power bus
- DCC throttle bus
  - Cat 5 network cable
- Except the clean-up challenge to our existing electrical work shown on following two charts

Current electrical ‘artwork’ on the remaining club layout sections

Current electrical ‘artwork’ on the remaining club layout sections



Operational

- Walk-around control, NCE DCC
- Use dispatcher
  - Wireless
  - Tethered
- Sequence timetable eventually
- Card cards

Layout Highlights 1 of 2

- X number of feet of mainline
- Trestles and bridges
- logging camps and mills
- mining operations
- Ice loading facilities
- Passenger stations, industry sites
- Etc…

Suggested online Industries

- Grain elevators
- Oil refinery
- Sawmill
- Produce loading
- paper mills
- Flour mill
- Breweries
- Power plant
- Steel fabrication
- Coal mine
- LCL and REA freight houses
- Logging camp
- Ore mine
- Ice plant
- Stock yard
- Meat packing
- Foundry
- Quarry
- Wharf
- Lumber mill
- Steel mill complex
- General factories

Miscellaneous Track Design Information

- Walk-around / wireless control, NCE DCC
- Use dispatcher
  - Wireless
  - Tethered
- Sequence timetable eventually
- Card cards

END