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"the major contributing factor to obesity is the excessive consumption of food."

Wall Mounted around the room Layout: 3' width bed 30" from floor (workstation height, kitchen cabinet height is 36"). 2nd level 24" width bed 24" higher : thus 54" from floor. First level is Chair height table and second level is to clear a monitor (No fascia there.. Reduce top benchwork edge at that area TOO?). I am 6' so it works for me (maybe, soldering and stuff could get dizzy)

Island layout, 48" from floor, using a full sheet 4x8 gives a 2' area from each side. Still allows a lower level at 30" (~18" clearance).

The wall and island do NOT connect so no need for them to be at same height. The only connection is across a train car barge on the lower 30" level.

There is one Helix at each end of wall and a 'double' helix at one end of island (or maybe the outsides of two lengths - the bends need to be 8' to allow the inner rails a wide turning radius) - the other island end is a loop. The island is several winding long lengths. (48" radius Double helix: Right top goes down to left bottom, Right bottom goes UP to left top) Wall to Island transfer of cargo is by Barges. The wall has shorter cars, the island has longer: 86' auto parts, 89' auto carrier, double stack container, and passenger cars. The wall helix(s) is 36" radius, goes down from wall at top and thus has to travel inward to the layout at the bottom... rather than having the top stick out above the bottom. The inside of the helix is the background and all around the outside is the layout. You can see the trains for at least half? Of the helix.

Wall top goes 1 direction and the bottom goes the other. A train on the main on top is on the secondary main on the bottom and then returns to the main on the top.

Island top and bottom go same direction, Other side goes the other direction. A train on the main on top Stays on the main all the time.

Wall has a helix on each end, the helix will Reverse the direction of travel of the trains and also switch the outside- inside trains... and back again.
It takes 125' (1507) to raise 24" at 1.6% grade.
Double main line - wired the same with crossovers ever so often. Rerailers before and after switches? The train direction is all in which way they are driven, not the wire positive-negative. The outside just keeps going (unless switched to the inside at a crossover), the inside has switches to the industries and sidings.

Roller near floor height chair to slide under Helix to get inside of Helix in Emergency... ugh and use for under benchwork.

3' width : use leftover foot for track work, braces from wall to support the layout plywood.
2' width : Split the plywood sheet.

not quite L benchwork as no 'trusses' used: Plywood top on 1x3 glued to a 1x2 makes a .75 + .75 + 2.5= 4" Edge... (internally braced like the edges) so maybe this is actually an open grid layout.

2x2 legs with 1x2 braces with plywood triangle braces, blind nut and bolt on leg bottom for height adjustment. Legs are 1' from each module end so a 2' shelf can connect the adjacent modules.

Wall has 1x4 glued and screwed flat side to the wall with the top at 14" and 54" The top will be above the support so the plywood is also glued against the wall 1x4. Supports are 53.25"tall 2x4 flat glued/screwed against the wall 1x4. Plywood brackets hold up the 2'x8' plywood sections (they actually 'determine' the height of the layout, the 2x4 is to support the bracket). Electrical wire is laid on the lower 1x4 and held in place by the 2x4. Outlets are then at 16..20" and the table is at 30"

Windows are 36" from floor... the place to put a lift out bridge on the upper level.. remove only in Emergency.

Fascia ? TBD, hinged lift up sections on lower edge?

Glue and screw 1x4 to wall horizontal, with the top at 14" and 54"
Paint sealer and then light blue background.. Maybe some clouds
Glue and screw 53.25 2x4 to the 1x4
Cut plywood 4x8 in half: 2x8; 4x8 : 3x8 and 1x8 :to get 1x8 for scraps
Glue and screw plywood (cut into triangles) at top of 2x4
Glue and screw plywood 2x8 onto the triangle braces and wall 1x4.. Add 1x2 and 1x3 stringer bracing...
Place electrical wire and boxes and connect, etc...

Do the bottom shelf

CURVES

NMRA has Standards available for download.

number 6..7 turnout with a [24 inch radius curve minimum] 32"..40" radius in HO Radius is measured at track centerline - midway between rails - of the inner of multiple tracks.
Track Centers 2 1/2 (Wider than required - seems too narrow to me.. We shall see)
Track is 1.3 wide, 1.2 between, 1.3+1.2+1.3 = 3.8, Cork is 2" wide,
40" Radius= 80" Diameter track centerline
42" 84"
44" 88"
46" would be 92"
4'=48" 8'=96"

copied from the net:
the sharper your curves are, the further apart your two tracks need to be depending upon the rolling stock that you wish to use. The fact is that the prototype (real 1:1) railroads do widen the distance between tracks on curves when they can, especially now when freight cars have grown in both length and height. The longer that the car is, the more it will overhang when going around sharp curves. Not only on the ends, but this also applies on the inside of the curve as much as to the outside. I have broken a hi-level switch stand on a turnout because I didn't allow for the clearance to the inside of a curve for a long car.

32" radius +2" easements =34" width of the incoming track : Bizarro thinking.
A very important point is how easements change your layout. If you have an oval with 24-in radius curves, then your tangent tracks will be 48 inches center-to-center without easements. With easements the distance between tangent tracks will be greater by twice your offset. In my case that is 50 inches. As an alternative, in case your tangent track alignments are fixed, you can reduce the radius of your curve by the amount of the offset. Therefore, you have to take the offsets into account in the early planning phases.
OR what it really says is the radius will be reduced no matter what by 2", 1" each side. Easement is having a slightly wider curve at the beginning .. Ease into the curve.

Super Elevation : Raise the Outside edge of the track a MAX of 1/16 Ease into and out of the curve ..1/32 ..0. see pdf by Michael Highsmith for using masking tape method, if using Cork, raise ITS outside Edge (not the middle), and when dry 'fill in' between raised edge and the slump in the middle crease.

WOW I need a really accurate level to do this.. To even know that the track is not tilted the other way.

[loudmusic from modelrailroadforums : at six thirtyseconds 6/32 of super elevation the load dumps on its own (boxcar falls over). 6/32 = 3/16". Yeah it's not much at all, but you're also only dealing with 0.650" between the rails, which is pretty close to 21/32. So the 'lateral grade' is 6/21. Or 28.57%. Kind of puts things into perspective. Every 1/32" is 3.12%.]
: It's as if the roadbed itself is sloped.

Making a Helix

Use threaded rod with washers and nuts to allow easy elevation adjustments. Make a SLOT in the road bed, rather than trying to make a hole in the right place and thread the nuts ALL the way down from the top... they can be pre-placed and spun with a rubber wheel on a drill.

-The approach and exit ramp are 'vertical curves' Vertical Easements are REQUIRED. This is true on any vertical change of the roadbed.

-Hint: simply place the track from the flat onto the raised portion and FILL IN underneath it : That is its 'easement'. Do NOT have the rail 'bent up' at a sharp angle when it enters the rise (which could easily happen if that is where 2 pieces join together).

-Super Elevate the outside rail on all tracks in the helix... OR NOT - that will increase the rolling resistance.?

Fastening track :

-Curves require it, straight track can get stuck enough during gravel gluing (fasten approaches to the curves).

-Nails get loose .. and can pull the track out of spec if pressed in too far; hard to fasten track W/O doing that. USE NAILS for TEMPORARY placement while the Silicon sets up : Do NOT press IN all the way.. positioning ONLY (better..easier is modern push pin thumbtacks), Weight down the track to get Good adhesion into the silicon... be careful the weighting is even so as Not to cause 'waves' or tilt in track elevation.

-Water glue will unglue when applying gravel and cleaning track. It will pop up someday.

-Rubber cement -?- Liquid track cleaner .. lacquer thinner?

-Caulk gets hard, brittle, and shrinks

-Silicon shrinks a little- i don't care what they say.

-Nail glue might melt the ties? Best hold, will get brittle and hard

Soldering Flextrak

[Alternative: Solder jumpers from 1 piece to the other, around the joint, rather than soldering the rail itself. This allow expansion contraction without breaking the solder joint.]

On curves, solder it Before fastening down the last little bit... Solder the track so it is Straight, then bend it into place and fasten down... see the videos

-Cut off the rail so they are ~straight across.. (some people WANT a displacement between the rail joints (but it is HARD to push the joiner through those tie plates)) [Cut using the Xuron Flat edge on what you Want, you do Not want an angled edge on the track].

-The sliding portion is on the INSIDE of the curve.. So the rail pushes out.. So there is not a rail pulled back into the plastic ties.

Hump Yard

At the top of the hump there are 4 Kadee magnets. As the cars are pushed, the couplers open up and as they start the downgrade, the cars will uncouple. on each of the four tracks, at multiple spots, there are small nozzles that blow air up at the car to slow it down. The air comes from a compressor. The operator has a small control panel that allows him to control the train speed, press a button for auto switching of tracks and activate? the air.

...Friction - push against the wheels to slow down the car.

NO Videos ever show a working functional hump yard... they all have the cars crashing at the base of the yard. Gravity and Physics do NOT scale into HO.

Electric Wiring
Green is protective ground or safety ground
Black is Hot
White is neutral
White wire, Neutral, should go to the taller receptacle of the outlet which is usually connected to the silver screws.
Black wire, Hot, should go to the hot side which is the shorter female receptacle of the outlet which is usually connected to the gold screws
You should always break the Hot wire with a switch so that when the switch is off there is no hot side to your outlet.

Track wiring
14GA wire with 18GA runners to the track. Use 12GA for Long-large layouts. 3M Splice Connectors are Easy, soldering has better connection

WIRING and Under track work
... Keep wires at near edge (just hanging in an open sided J hook), and run in to where needed. 3M Splice Connectors from Main to lead, solder lead to track. DCC commo to switches. Solder ALL track pieces and solder wire to track at junctions using a jumper between the two track pieces and the electric lead wire. ...Or lay Main wire alongside track and trim insulation where needed to solder a connection to track. (Due to Skin effect the wires need to be twisted together so they are always touching.. Makes it hard to get to the part to solder feeder... twist as you lay track ?)

DCC commo and controller wiring?
Booster spacing?
Auto reverse? Not required on my layout AFAIK

In new construction use 48" TTT (top to top) of switches, kitchen & garage receptacles.
18" TTT of standard receptacles.
42"-44" TTT of bathroom GFI receptacles.
24" for a gas range receptacle.
30"-36" for washer/dryer receptacles (this is due to newer "European" design machines).
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The NEC specifies the NECA-1 standard for general practices. NECA-1 lists typical mounting heights of different devices. This specification is not currently enforceable, but if you want standard heights, here you go:
Wall Switches: 48" / Receptacle Outlets (general): 18"
Receptacle Outlets (kitchen, utility room, etc) 42" or 6" above countertop
Telephone Outlets: 18" / Wall Intercom Stations: 48" / Wall Lighting Outlets: 84"
Thermostats: 48" / Bed Lights: 72"
There are more, but mostly used in commercial work.
All heights are from the top of the finish floor to center of box.
In America, the NEC requires outlets in kitchen counter tops, baths, garages, outside, and unfinished basements and crawlspaces to be GFCI protected.

here are the answers in order per 2005 NEC:
1). No...if this is going to be a "finished" basement, GFCI protection is NOT required in the finished areas - except for in any bathrooms, sink areas, or open areas that will not be finished. However - if any of the finished areas will be bedrooms - then the bedrooms WILL require AFI (arc fault) protection for the receptacles in the bedroom. We accomplish this be installing a AFI breaker sized for the bedroom circuit wiring at the panel. For GFCI protected circuits, we typically install a GFCI receptacle as first in-line...and then connect the rest of the circuit downstream to the "load" connections at that GFCI...thereby protecting the entire circuit...and keeping costs down.
//GFCI receptacle in the workshop, unfinished areas, bathroom, and within 6' of a laundry sink.
///The bathroom must have its own 20A circuit. There must be a GFCI outlet within 3-feet of the outside edge of the sink, on a wall that is adjacent to the sink or counter top. The circuit that serves this outlet cannot serve anything outside of this bathroom, but can serve other things within the same bathroom such as lights or an exhaust fan (w/o heater).

2). Like breaker size, GFCI size is determined by the wire size and expected load of that circuit - 20 amp for #12, 15 amp for #14. GFCI's can be on either 15 or 20 amp circuits...and are rated accordingly.

3). Because actual usage can vary, there is NO Code specified receptacle limit for a 20 amp circuit...again, the total number is dictated by the loads that will be used on those receptacles. For general guidelines, we use 1.5 amps (180 watts) for general purpose receptacle outlets. If it is known that larger loads (greater then 3 amps) will be used on those circuits....downsize the total count accordingly. Typically, we put no more then 8 on a 20 amp, and no more then 6 on a 15 amp..(we rarely ever use 15 amp circuits - too easily overloaded).....and this helps to avoid overloading. If large loads are to be used...we drop those number down...or run more then one 20 amp circuit to that area.

4). In order to help eliminate the use of extension cords, the Code dictates the 6/12' rule....on a long wall (or hallway) there must be a receptacle at least every 12 feet (as a minimum - you can go more outlets- just not less) When there is a break in the wall (such as a corner or door opening)...then you go every 6' from that break. Again, you can go more (we generally do)...but never less.

5). The Code does NOT spec a mounting height..so you may get a variety of mounting heights....but we generally use 18" on center for receptacles outlets and 48" on center for switches....we have found those heights convenient for the mass majority of people and have adopted them as "standard" here at RKO Electric....unless otherwise spec'd. (NOTE: If there will be any use or access to this area by handicapped personnel, then you will need to comply with ADA heights).
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The sump pump, or any stationary appliance in an unfinished basement, does not need GFI protection, ONLY if a single outlet is used.
This allows for critical equipment to operate without the fear of losing that function of that appliance due to nusiance GFI trips, and with the single outlet it is truly a dedicated circuit, with no fear of someone plugging in a portable appliance in a non-GFI outlet.