WESTERN HERITAGE DIVISION
HO MODULE LAYOUT SPECIFICATION

Current February 1, 1996

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SECTION AA. General Conditions

AA.1 Inspection and Approval

All Western Heritage Division modules will be inspected and approved by a duly appointed Module Group Inspector before any module will be allowed to be part of the layout assembly.

Any module may be brought up to standards by the Inspector, or designated assistants, if approval is given by the module owner.

Any module already approved must be re-approved if major structural changes have been made since the last approval.

The modules would not be complete without trains to run on the layout. Any member's rolling stock is welcome to be operated on the layout with the understanding that the NMRA Standards for loco/car weight, coupler height, and wheel flange spacing be met and also with the understanding that any unit not meeting the standard will not be operated until it is brought into compliance. Compliance will be the judgment of the Module Group Inspector. Non-compliant units can be corrected on the spot by either the member or by the inspector with approval of the member.

Diagrams are referred to at various points throughout this publication. The diagrams are in a section behind the text and are labeled according to the section/paragraph that pointed to the diagram and are in numerical sequence.

Grandfather clause: Modules constructed prior to the adoption of these standards will not require modification provided the basic construction and dimensional standards are met.

AA.2 References

The following organization's specifications provided assistance in designing the specifications we are using in our publication:

NMRA - Module Standards: MS-1.0, MS-1.3 and Recommended Practices: MRP-1.0, 1.3, 1.4, and RP-11.

MCOR Modulists of Omaha (1975 - 1988)

Manhattan Area Rail Joiners of Kansas

Northeast Nebraska Model Railroad Association of Norfolk

AA.3 All Modules

Members are encouraged to construct straight modules since the Division has constructed corner modules. (Corner dimensions are given later should a member desire to build a corner plus a filler.)

a. The scale is standard gauge HO. All rails are Code 100, Nickel-Silver.

b. Height of the module top from the floor is 40", including the sub-roadbed, adjustable plus/minus 2",

c. Track center spacing of the mainline on all straight modules will be 2".

d. The module owner will provide a front skirt and a back skyboard to dress the modules and present a pleasing appearance.

AA.4 Wider than Standard Straight Modules

a. Standard straight module outside dimensions are as follows:
24" wide by 48" long, and 24" x 72".

b. Wider modules may be constructed using these outside dimensions:
30" wide x 48" long, 30" x 72", 36" x 48", 36" x 72".

c. Wider modules require special considerations to provide scenic/visual continuity:

1. The projection to the front and/or rear of wider than standard modules is 6". Example: a 30" wide module will extend 6" beyond the front ***or*** 6" beyond the back of the adjoining standard modules. A 36" wide module will extend 6" beyond the front ***and*** 6" beyond the back. These projections will not require modification of any adjacent module.

2. The owner of a module with rear projection will provide extra skyboard that will follow the shape of the module and allow continuous enclosure of the back of the adjacent modules. If the module owner's track plan calls for a siding to extend to the rear and disappear *behind* the skyboard, the skyboard is not required to follow the rear projection but will be mounted as if the module had no rear projection thus providing a straight, unbroken enclosure. See diagram AA.4.c.2.

3. The owner of a module with front projection will provide two wedge shaped, clamped on pieces, to smooth the line along the front of the layout. These wedges will overlap the adjacent modules but will not interfere with operations or display. The skirt will be wide enough to cover the module and the wedges on each side. See diagram AA.4.c.3.

SECTION BB. Module Frame

BB.1 Frame Construction Requirements

a. The frame of all modules will be built of 1" x 4" standard lumber. A cross member of the same sized lumber will be placed inside the module at the center point (measured the long way of the module) to provide structural strength. The module will be sealed against moisture effects by use of shellac or other similar material that does not add thickness to the frame, particularly where the module will join adjacent modules. It is absolutely essential that all corners be 90 degrees or the layout will not form properly. A method for insuring squareness is to measure the length of the diagonal line between opposite corners making the two measurements exactly equal while the sub-roadbed is being attached to the frame with glue and screws. See diagram BB.1.

b. Each leg will be attached to the module using a 4" strap hinge to allow the leg to fold up against the bottom of the module during transportation. Legs are of 2" x 2" standard lumber and will have T-nut height adjustments built into the bottom. An alternative to using 2" x 2" standard lumber is to split a 2" x 4" which would prevent twisting that occurs from using green (so called "kiln dried") lumber. 1 x 4 inch cross bracing on the legs will be attached to add rigidity to the module when the legs are down and locked. See diagram BB.1.

c. The front of the module frame will be painted black.

BB.2 Roadbed Requirements

Roadbed will be 3/4" thick. This is achieved in one of the following manners:

a. 1/4" plywood, 1/4" Homosote, 1/4" HomoBed laminated together and laid over the full width and length of the module frame. This will be firmly attached to the frame by use of nails or screws and carpenters glue, diagram BB.2.a.

b. 1/2" plywood, 1/4" Homosote/HomoBed over the entire frame, diagram BB.2.b/c.

c. 1/2" plywood over the entire frame, 1/4" cork under the track, diagram BB.2.b/c.

BB.3 Module Interconnection Requirements

a. The layout is formed by joining individual modules together at the ends of the frames by use of a pair of member provided "C" clamps, 3" size being adequate. Frame ends, inside and outside, must be kept free of any details that would interfere with the connection. Clamps will join the ***right*** end of the member's module with the left end of the one next to it. (It is recommended that four clamps be purchased, two extra clamps be kept on hand for emergencies and please clearly mark them for identification.) If the member constructs two or more modules that will all be joined together, they may be joined using bolts and wing nuts 5/16" minimum diameter and 2 1/2" long. Only where his modules join with the module of another member will "C" clamps be required.

b. Track center line spacing at the interconnection is 2" for all tracks crossing from one member's module to another member's module. #1 main track center line will be either 4" or 10" from the front edge of the module frame. (10" for wider than standard modules - see AA.4.c.1.) See diagram BB.3.b.

c. Track center line spacing of tracks crossing from one module to another of the same member is determined by that member if the modules are always assembled in the same sequence. Techniques used must allow reliable operation of all rolling stock.

SECTION CC. Track Notes

CC.1 Spanning the GAP

a. Tracks on the modules will not extend to the edge of the module but will be cut back 4 17/32" from the joining edge to allow for insertion of member provided "bridge sections" of track that will span the gap where the modules are joined. See diagram CC.1.

b. The "bridge section" mentioned above is a rigid piece of 9" ATLAS SNAP track in Nickel-Silver. These commercial tracks are uniform in length reducing the need to custom cut the tracks each time the layout is set up for a show should the modules be joined in a different order than the last time. The member will provide a section for each track his module has that crosses to the adjoining module to the ***right*** of his own. See diagram CC.1.

c. The ties of the module track to the right and left of where the "bridge sections" are placed will have the ties removed or shaved so as to allow a rail joiner to slide back on the rail and release the "bridge section". The rail joiner will stay on the module track while not in use.

CC.2 Track in General

a. Track used on the modules will be of prefabricated type, ATLAS, PECO, Shinohara, ROCO, Micro Engineering, are some of the manufacturers of track. The controlling element in selection is whether the track remains in gauge as judged with the NMRA model Standards track gauge.

b. Track may be hand laid of Nickel-Silver, Code 100 rail and in gauge as judged with the NMRA model Standards track gauge.

c. For modules of the earlier groups, the third track is named a passing track or industrial switching track where mainline train running is not generally done. This is to introduce operational opportunities and visual interest to the public.

CC.3 Switches

a. Switches on the modules will have #6 frogs, minimum angle. #4 are judged too small to allow passage of long wheel base steam locomotives and cause derailments when switching movements are done through them. Prefabricated switches by ATLAS or PECO are excellent choices providing reliable operation over the long haul. Rails on switches will be of Nickel-Silver. Switches may be electrically powered or manual operation. If electrical, the power supply and controls will be provided by the module owner and be clearly marked for operation by others that will be running trains from time to time.

b. Hand laid switches will conform to the #6 or greater frog angle standard, Code 100 rail, and conform to the gauge standards as judged by the NMRA Standards gauge.

c. If the switch is used in a curve, the radius of the curved leg will not be less than 27.875" if in a mainline track, 25.5" if used in a passing siding.

d. Exception: smaller than #6 frog switches will be allowed in staging yards if the yard will be handling shorter cars and engines.

e. Mainline crossovers are allowed provided no "S" curves are introduced beyond what is created by the switches themselves. Example: two ATLAS Customline #6 right hand (or left hand) switches will fit on the 2" center line spacing without modification.

CC.4 Curves

a. Mainline curves will be minimum 30.25" radius on the #1 main, 27.875" radius on the #2 main, and 25.5" on the #3 passing track.

b. Mainline curves will eased from the straight track with a spiral curve easement based on one of these methods:

1. Bent stick.

2. Published easement template.

3. Cubic spiral using the formula $Y = S^3 / 6RL$.

c. Easement offsets are as follows:

1. #1 main track, easement curve length is 10", tangent offset is .25", radius of the circular curve is 30.25".

2. #2 main track, easement curve length is 12", tangent offset is .625", radius of the circular curve is 27.875".

3. #3 passing siding track, easement curve length is 14", tangent offset is 1", radius of the circular curve is 25.5".

d. Curve center lines are 2.375" for the entire length of the curve for radii down to 25.5", 2.5" for radii less than 25.5". Note that radius of less than 25.5" would be allowed only on trackage in yards or other layout scheme where mainline equipment would not normally operate.

SECTION DD. Visual Improvements

DD.1 Skyboard

a. A skyboard provided by the module owner will be made of 1/8" Masonite will extend 12" above the module top, smooth side toward the front, mounted to the rear of the

module frame by convenient means as determined by the module owner. The purpose of the skyboard is to limit the view of the public to the module and provide a pleasing backdrop for the scenic talent of the modeler. This skyboard will be, as a minimum, painted light blue over a smooth coat of White Gesso (an artist painting medium) on the front surface. See diagram DD.1.

b. Alternative - Instead of painting the backdrop, the skyboard may by be covered with a commercial scene, glued on.

DD.2 Skirt

a. A skirt of black material will be provided by the module owner that will hang from the front of the module and will be attached using velcro material sewn to the skirt and glued to the frame. It is recommended that the hook portion be attached to the skirt and the eye portion be attached to the module.

1. The skirt will be hemmed all around and the finished size will be 1/8" wider than the module length, and will hang to within 1" of the floor after being attached to the module. For corner modules, length is the two sides and filler added together.

2. A velcro attachment will be glued at bottom edge of the module frame at each end with three more attachments evenly spaced across the front of the module for a total of five attachments. See diagram DD.2.

SECTION EE. Public Barrier

A public barrier consisting of rope running through a tee at the end of a piece of plastic pipe mounted at the front of the module will be provided. The rope is provided by the Division. These are the requirements:

a. The pipe will be mounted on the module through a 7/8 inch hole drilled in the front frame member, to the right end of the module when looking at it from the front. See diagram EE.

b. The pipe is of PVC plastic, white in color, not CPVC, which is ivory.

c. Ask for 1/2 inch, CRESLINE, PVC, schedule 40 pipe. It will have an inside diameter of 5/8 inch and an outside diameter of 7/8 inch. A three foot length of pipe is required.

d. Also required is a 1/2 inch tee pressed on one end of the pipe which will have the rope running through it.

e. A pipe clamp will be screwed to the underside of the sub-roadbed along with a block of wood , for securing the end of the pipe.

SECTION FF. Electrical Considerations

FF.1 120 Volt AC power

a. Power may be required by the designer of a module for scenic attractions or for switches or for track features. Electrical codes do not allow permanently mounting any 120 volt electrical circuits on the modules where contact may be made by persons viewing or working around them. Power will thus be provided through a multioutlet "power strip", that incorporates a circuit breaker, available at hardware stores. (There is no requirement to use a "surge protector" power strip.) Power to this strip will be provided though an extension cord from the building the layout is set up in. We request that each module owner provide a power strip whether or not one is needed on his/her module, they can be daisy-chained allowing connection anywhere around the layout.

FF.2 Layout Track Power

a. A layout bus wire of #14 gauge copper wire for each mainline and passing siding rail will run the full length of the module, right side to left side, and will be attached to barrier type terminal strips at each end. See diagram FF.2.

b. Track feeders from the bus to the rail above will be provided through a #18 stranded, copper wire, soldered to the bus wire and to the rail. A feeder will be required to power each rail in each track section to eliminate the problems that come from relying on rail joiners to provide electrical continuity. See diagram FF.2.

c. Track power connection between modules will be through #18 stranded, copper wire, attached to the same terminal strips the bus is connected to, terminating in a two conductor disconnect for each track, male hanging on the right end, female hanging on the left (as viewed from the front of the module). See diagram FF.2.

d. Power pack connections for the mainline and passing siding from the throttle to the bus will be through #18 stranded, copper wire, connected to a barrier type terminal strip where the throttle will be operated from.

e. Yards and spurs on individual modules will not be powered from the mainline throttles but from their own throttles and must be insulated from the mains.

f. Gaps and blocks:

1. Using correct blocking procedures outlined in NMRA standards, the mainlines and passing siding tracks on each module will be electrically isolated from each other. Track crossovers will employ insulated rail joiners and sidings will be insulated from the mains also.

2. It is recommended that insulated rail joiners be used behind all switch frogs.

SECTION GG. Corners and Fillers

GG.1 Corners

a. The Division has built four outside corners for the sake of getting the layout minimum requirements fulfilled and to insure four corners will always be available for shows. The Division also owns an *inside* corner that has all three tracks on it. A fifth *outside* corner plus two 1 foot by 2 foot filler sections will be required to utilize it.

b . Individual members in good standing may adopt a corner plus a filler section or they may choose to build more corners to supplement those owned by the Division. Scenery applied to the adopted corners and filler sections is at the member's expense and if desired, may be removed by that member when his adoption period ends or that scenery may be passed to the new adoptor as mutually agreed. Division supplied drapes and track and roadbed will remain on the corner and filler section. A corner is a large piece of "furniture" and a member choosing to adopt one or build one should be able to transport it to the shows. If required, and with adequate notice, arrangements may be made to help with transportation.

c. Two of the corner sections have only #1 and #2 main, the other two sections have #1, #2 and the passing siding.

d. Power pack connection to the mainline tracks and the passing siding is provided at corner module "B" since it has all three tracks.

e. The corners and associated 2 x 2 filler sections will always be placed in A - B - C - D sequence as shown on the diagram. This is whether or not regular straight modules are used to construct the layout. Each corner has a bag containing the nuts and bolts and track sections required to make that corner fit in the layout. This bag will always accompany the corner to the shows. See diagram GG.1.e.

f. The Division supplied drapes are made of a cotton-polyester blend and cleaning and maintenance will be the responsibility of the adopting member. They should be washed in cold water, mild detergent, and dried in medium dryer as for permanent press material. Use of Scotchgard spray will help protect them and extend time between cleanings.

g. Corners are built of the same materials as the straight modules, the sub-roadbed/roadbed standards, the track and electrical standards, and appearance standards all apply. See diagram GG.1.g.

1. Corners are 48" square without corners cut off.

2. Legs are attached the same way as for straight modules.

3. Squareness is an absolute requirement for these pieces.

4. Track center line spacing where tracks cross interconnections is 2" for all tracks with #1 main center line 4" from the front edge of the module frame. (See CC.4 for radii standards.)

GG.2 Fillers

a. Filler sections owned by the Division have been built to go with the corners, and are designed to be used with a specific matching corner. It is recommended that minimum scenery be set up on the fillers since it is possible they may not be used when the exact arrangement of the layout for each show has been determined. The fillers are designed to make up for irregular module lengths that result from using 48" and 72" modules in combination. Every attempt will be made to keep the corner and matching filler together.

b. Filler sizes are 24" x 24" (four of these), and 24" x 48", (one of these).

c. One of the 24" x 24" fillers has a right hand #6 switch, another has a left hand #6 switch mounted to create the passing siding and to allow use of the modules built by the earlier group. One other 24" x 24" filler has only two mainline tracks, the other has two mainline

tracks plus the passing siding. All the switches are manually controlled. See diagram GG.1.g.

d. The 24" x 48" filler has the two main tracks plus two #6 switches mounted in the number 2 main, point to point for increased versatility.

SECTION HH. Parts List for Straight Modules

HH.1 Lumber

a. Frame - lengths must be exact so squareness is assured

1. Front and Back - 2 pieces of 1 x 4 lumber 4 or 6 feet long

2. Ends and Center Brace - 3 pieces of 1 x 4 lumber

a. Standard size module - 22 1/2 inches long

b. Wider than standard - 28 1/2 inches or 34 1/2 inches long

b. Leg assemblies

1. Legs - 4 pieces of 2 x 2 lumber (either bought that way or a 2 x 4 ripped lengthwise) 34 1/2 inches long

2. Stub legs - 4 pieces of 2 x 2 lumber 10 inches long

3. Hinge supports - 4 pieces of 2 x 4 lumber 6 inches long

4. Cross braces - 2 pieces of 1 x 4 lumber each cut to fit across the legs at each end – 1 - 19¼ inches and 1 - 22½ inches.

c. Subroadbed: Plywood - 1 piece 1/2 inch A-C grade plywood ***squarely*** cut to dimensions appropriate to the size of the module being constructed

HH.2 Hardware

a. Hinges - Four 4 inch strap hinges with screws - heavy duty hinges are not required. Stanley Light Duty Strap Hinges - PN 75-3510(CD900) are a good choice.

b. Nuts and bolts

1. Leg lock down bolts
    a. 4 carriage bolts 1/4 inch by 3 1/2 inch
    b. 4 wing nuts 1/4 inch
    c. 4 fender washers 1/4 inch

2. Leg adjustment bolts
    a. 4 carriage bolts 5/16 inch by 3 1/2 inches
    b. 4 Tee nuts 5/16 inch

c. 1 three inch Gate Hook and Eye with safety catch to lock legs in folded position

HH.3 Roadbed

4 strips of cork roadbed 36 inches long for the main lines. More may be required as determined by the particular track plan on the module

HH.4 Track

4 pieces of Nickel-Silver Code 100 flex track 36 inches long for the mainlines. More may be required by the particular track plan on the module

HH.5 Miscellaneous

a. Four 3 inch "C" clamps for locking adjacent module sections together
b. Glue, nails, screws, rail joiners and solder to attach the various parts together
c. Drape - black material dimensioned as in the instructions
d. Velcro fastener for drape material.
e. Electrical wire for the main feeders (14 gauge solid) and track drops (18 gauge stranded)
f. 1 piece 1/2 inch PVC pipe 36 inches long and a "T" for the crowd control barrier
g. One 3/4 inch pipe clamp. Ask for an EMT clamp in the electrical section of the hardware store.
h. Electrical power multi-strip for power requirements on the module
i. Barrier terminal strips

SECTION JJ. Parts List for Corner Modules

JJ.1 Lumber

a. Frame - lengths must be exact so squareness is assured

1. Front, back and sides - 4 pieces of 1 x 4 lumber 47 1/4 inches long

2. Cross braces - 2 pieces 1 x 4 lumber 46 1/2 inches long

b. Leg assemblies

1. Legs - 4 pieces of 2 x 2 lumber (either bought that way or a 2 x 4 ripped lengthwise) 34 1/2 inches long

2. Stub legs - 4 pieces of 2 x 2 lumber 10 inches long

3. Hinge supports - 4 pieces of 2 x 4 lumber 6 inches long

4. Cross braces - 2 pieces of 1 x 4 lumber each cut to fit across the legs at each end ~~- 11¾ and 9½ inches~~

c. Subroadbed: Plywood - 1 piece 1/2 inch A-C grade plywood ***squarely*** cut to 4 x 4 foot size

JJ.2 Hardware

a. Hinges - Four 4 inch strap hinges with screws - heavy duty hinges are not required. Stanley Light Duty Strap Hinges - PN 75-3510(CD900) are a good choice.

b. Nuts and bolts

1. Leg lock down bolts
    a. 4 carriage bolts 1/4 inch by 3 1/2 inches
    b. 4 wing nuts 1/4 inch
    c. 4 fender washers 1/4 inch

2. Leg adjustment bolts
    a. 4 carriage bolts 5/16 inch by 3 1/2 inches
    b. 4 Tee nuts 5/16 inch

3. Filler section bolts
    a. 2 carriage bolts 5/16 by 2 1/2 inches
    b. 2 wing nuts 5/16 inch
    c. 2 fender washers 5/16 inch

c. 1 three inch Gate Hook and Eye with safety catch to lock legs in folded position

JJ.3 Roadbed

4 strips of cork roadbed 36 inches long for the main lines. More may be required as determined by the particular track plan on the module

JJ.4 Track

4 pieces of Nickel-Silver Code 100 flex track 36 inches long for the mainlines. More may be required by the particular track plan on the module

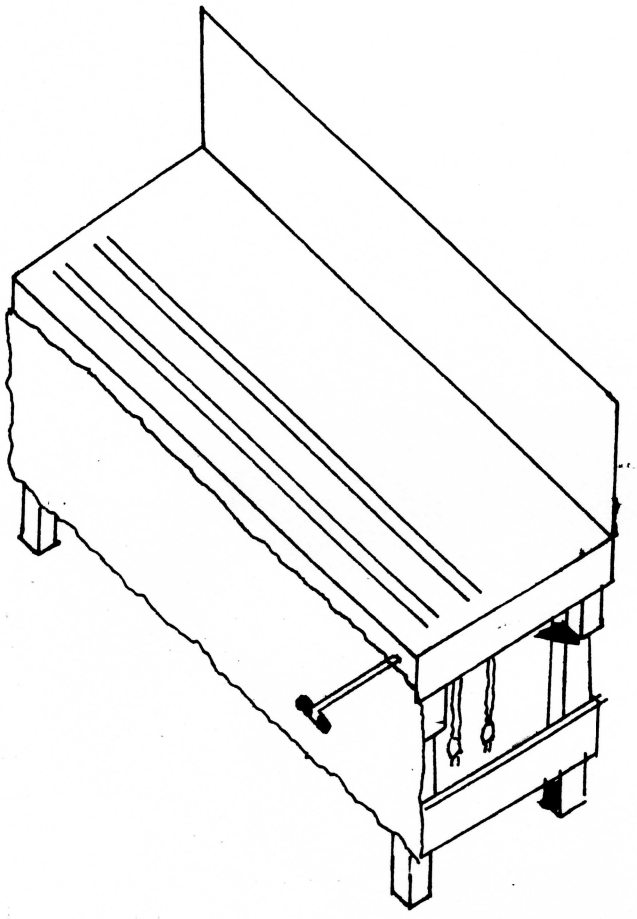
JJ.5 Miscellaneous

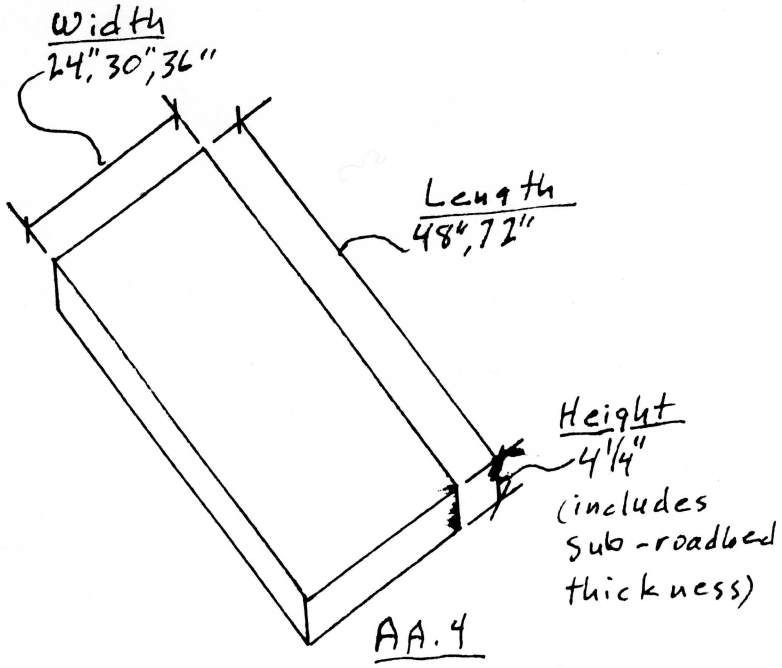
a. Four 3 inch "C" clamps for locking adjacent module sections together
b. Glue, nails, screws, rail joiners and solder to attach the various parts together
c. Drape - black material dimensioned as in the instructions
d. Velcro fastener for drape material.
e. Electrical wire for the main feeders (14 gauge solid) and track drops (18 gauge stranded)
f. 3 pieces 1/2 inch PVC pipe 36 inches long and "T"s for the crowd control barrier
g. Three 3/4 inch pipe clamps. Ask for EMT clamps in the electrical section of the hardware store.
h. Electrical power multi-strip for power requirements on the module
i. Barrier terminal strips

SECTION KK. Diagrams

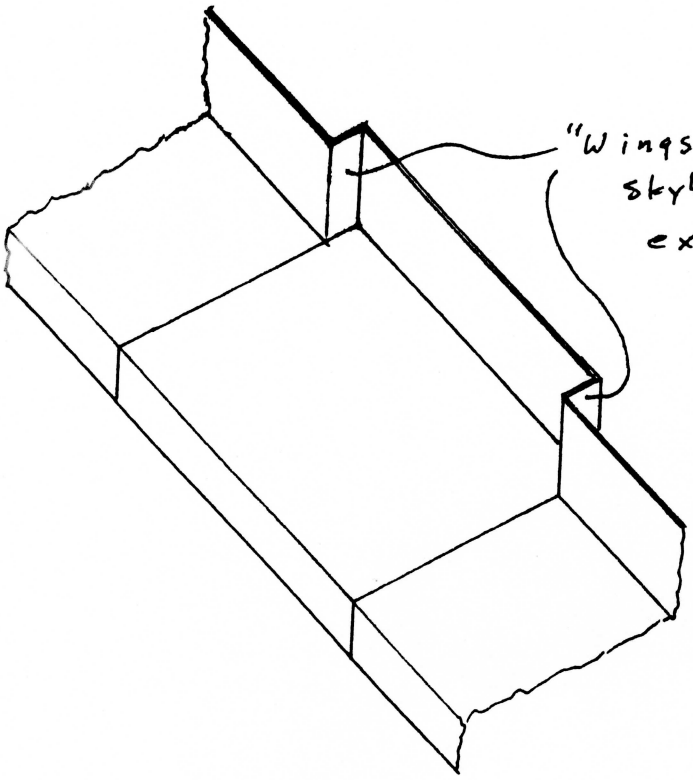
The diagrams are grouped behind this last page.

Questions and concerns will be addressed by:
Claude Lundquist
504 Pioneer Rd
Papillion, NE 68046 - 3778
(402) 597-3988



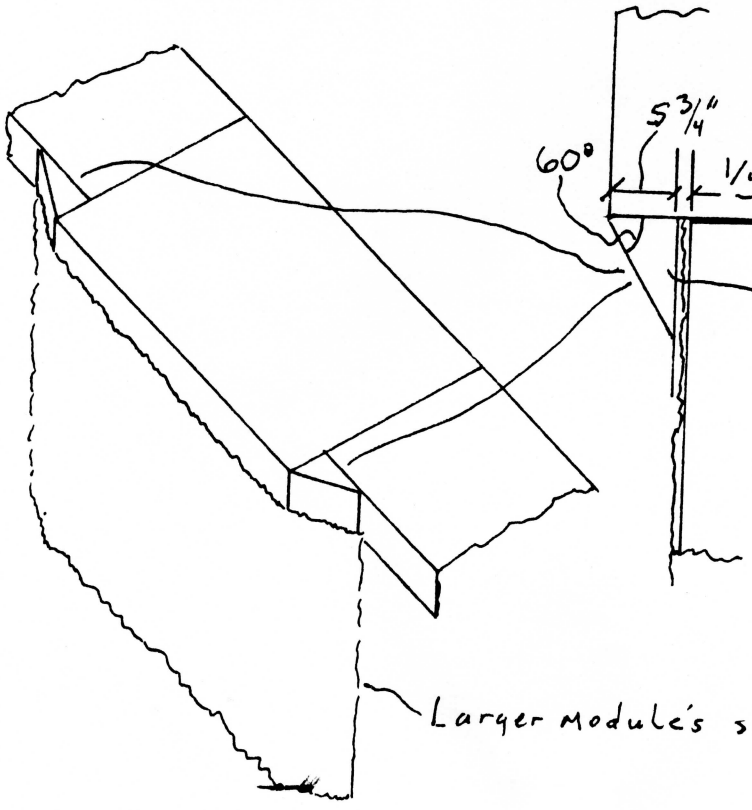

Width
24", 30", 36"
Length
48", 72"
Height
4 1/4"
(includes
sub-roadbed
thickness)

AA.4



"Wings" are used to make the skyboard line conform with rearward extension of the larger module. The exception is when a track plan leads track to a hidden spur behind the skyboard.

AA.4.C.2



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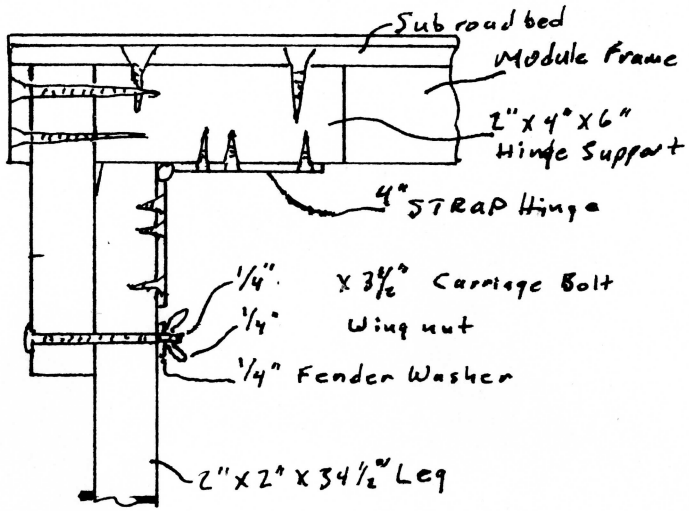
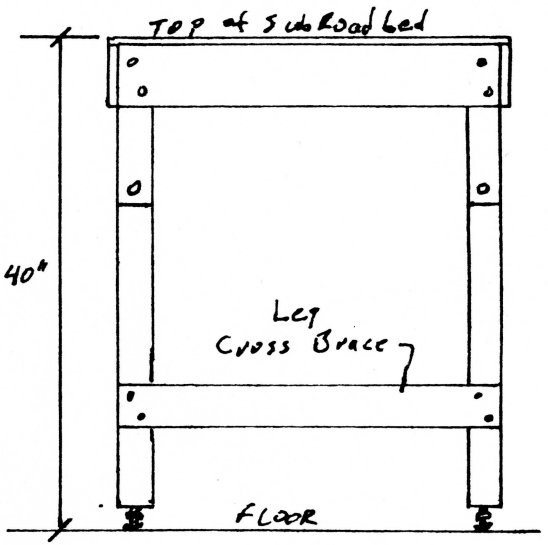
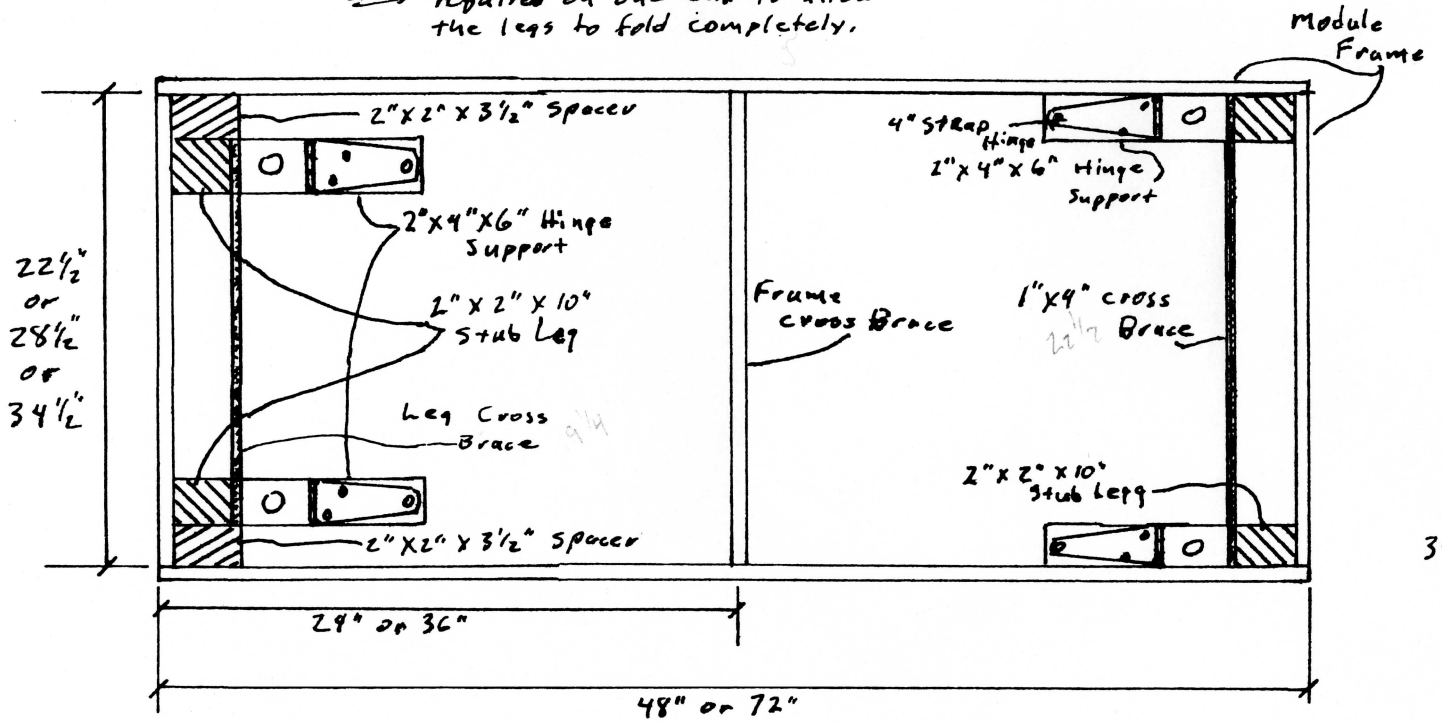
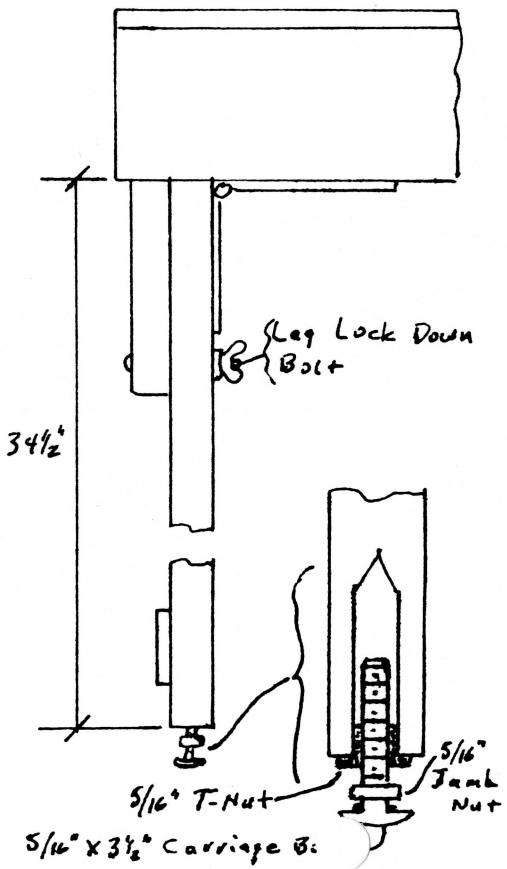




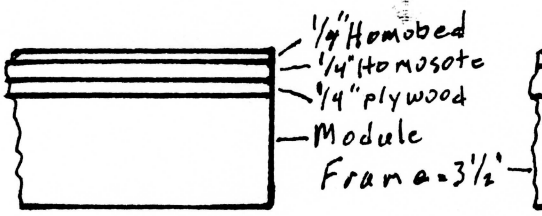
NOTE - On all Modules, Spacers are required on one end to allow the legs to fold completely.



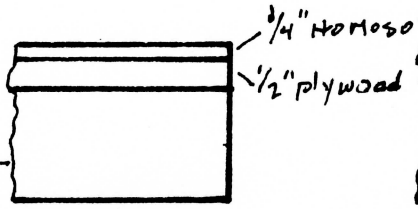


Legs in all views are shown down and locked. Drawing is not to scale.

BB.1



BB.2.a



BB.2.b

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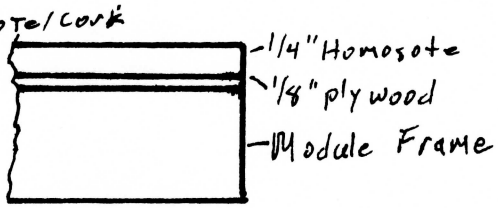

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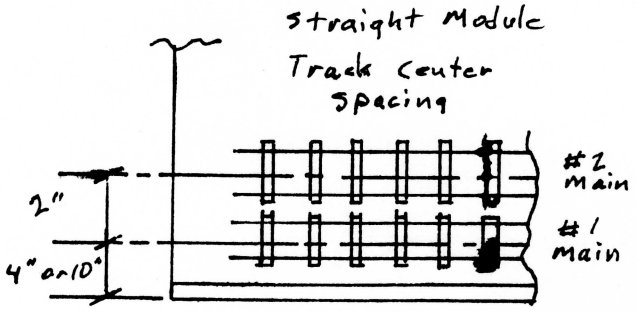
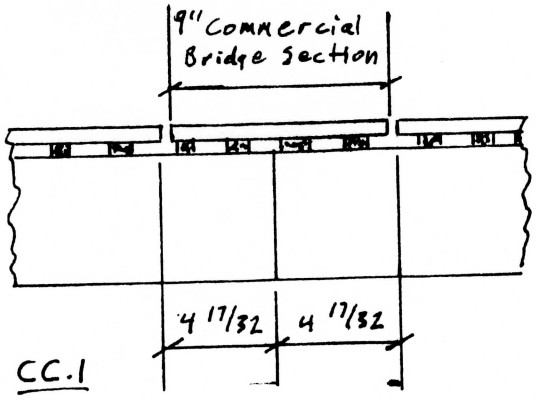
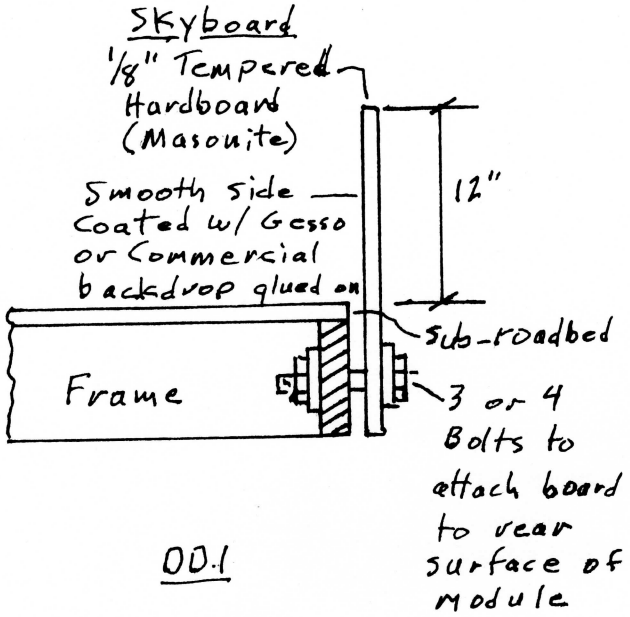


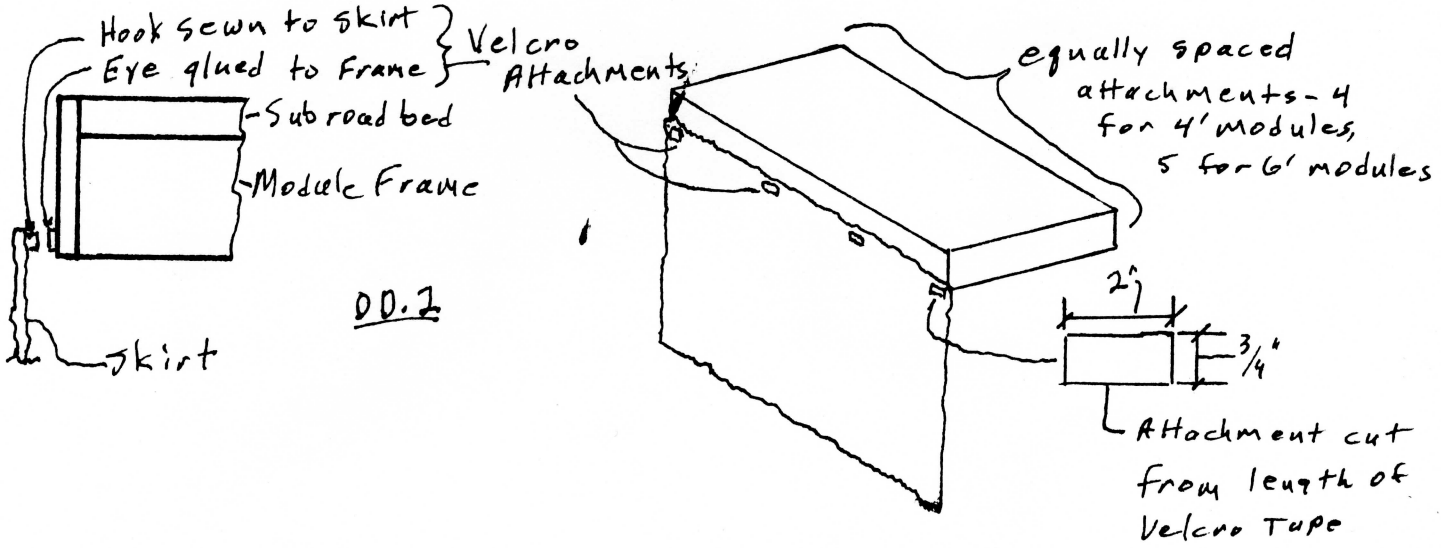
BB.3.b



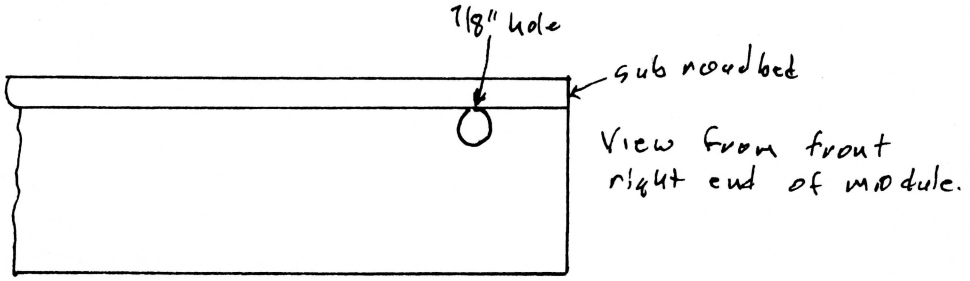
CC.1

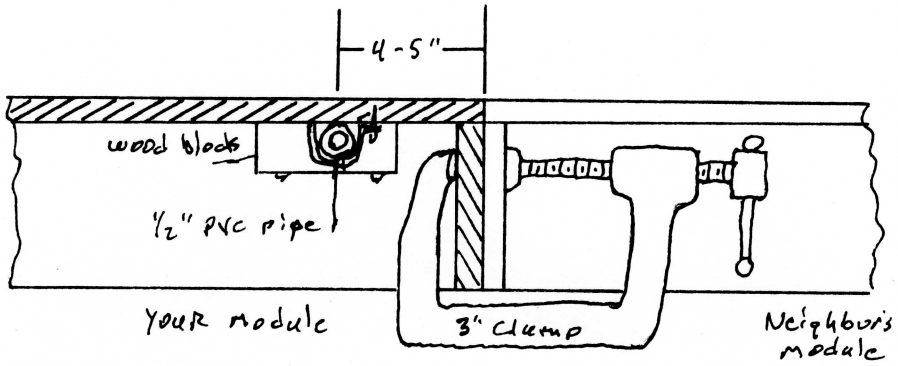

Skyboard
1/8" Tempered Hardboard (Masonite)
Smooth side Coated w/ Gesso or Commercial backdrop glued on
12"
Sub-roadbed
Frame
3 or 4 Bolts to attach board to rear surface of module

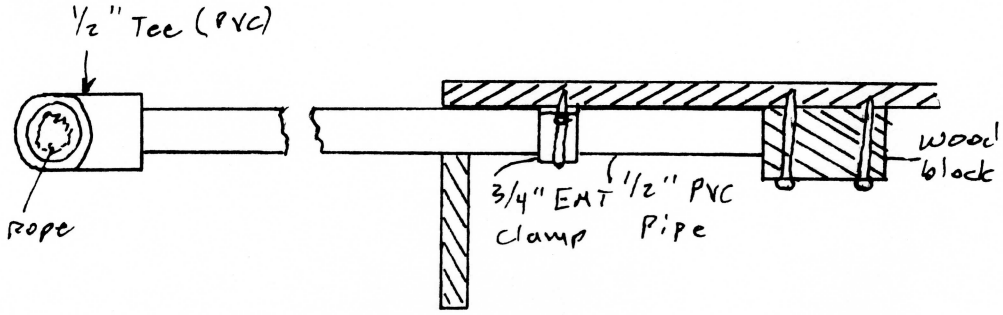
OD.1

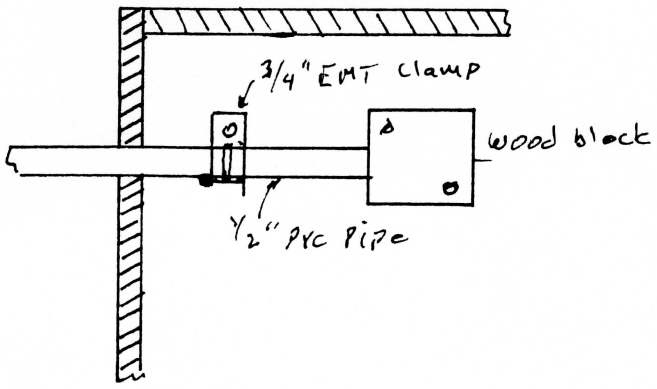

Hook sewn to skirt
Eye glued to Frame
Velcro Attachments
Sub road bed
Module Frame
Skirt
equally spaced attachments - 4 for 4' modules, 5 for 6' modules
2"
3/4"
Attachment cut from length of Velcro Tape

OD.2

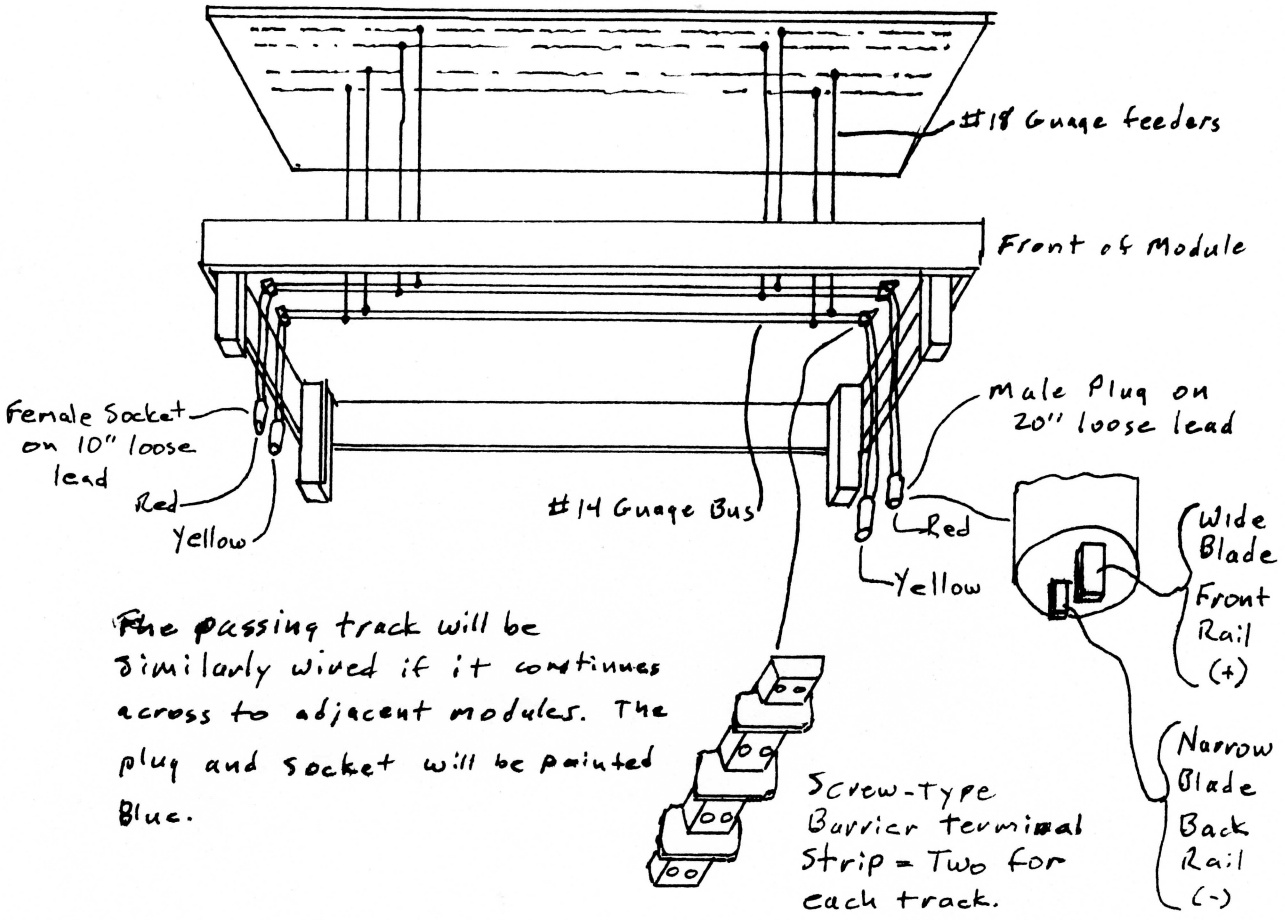

7/8" Hole
Sub roadbed
View from front right end of module.


4-5"
wood blocks
1/2" PVC pipe
Your module
3" clamp
Neighbor's module

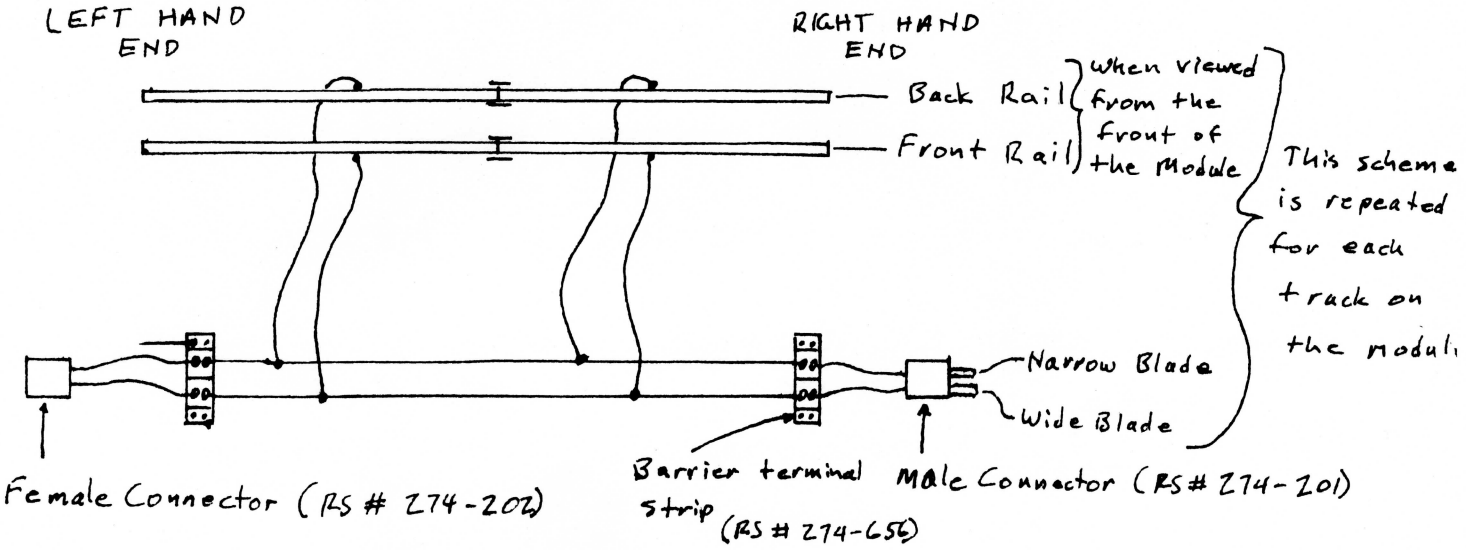

1/2" Tee (PVC)
Rope
3/4" EMT clamp
1/2" PVC Pipe
wood block


3/4" EMT clamp
wood block
1/2" PVC Pipe

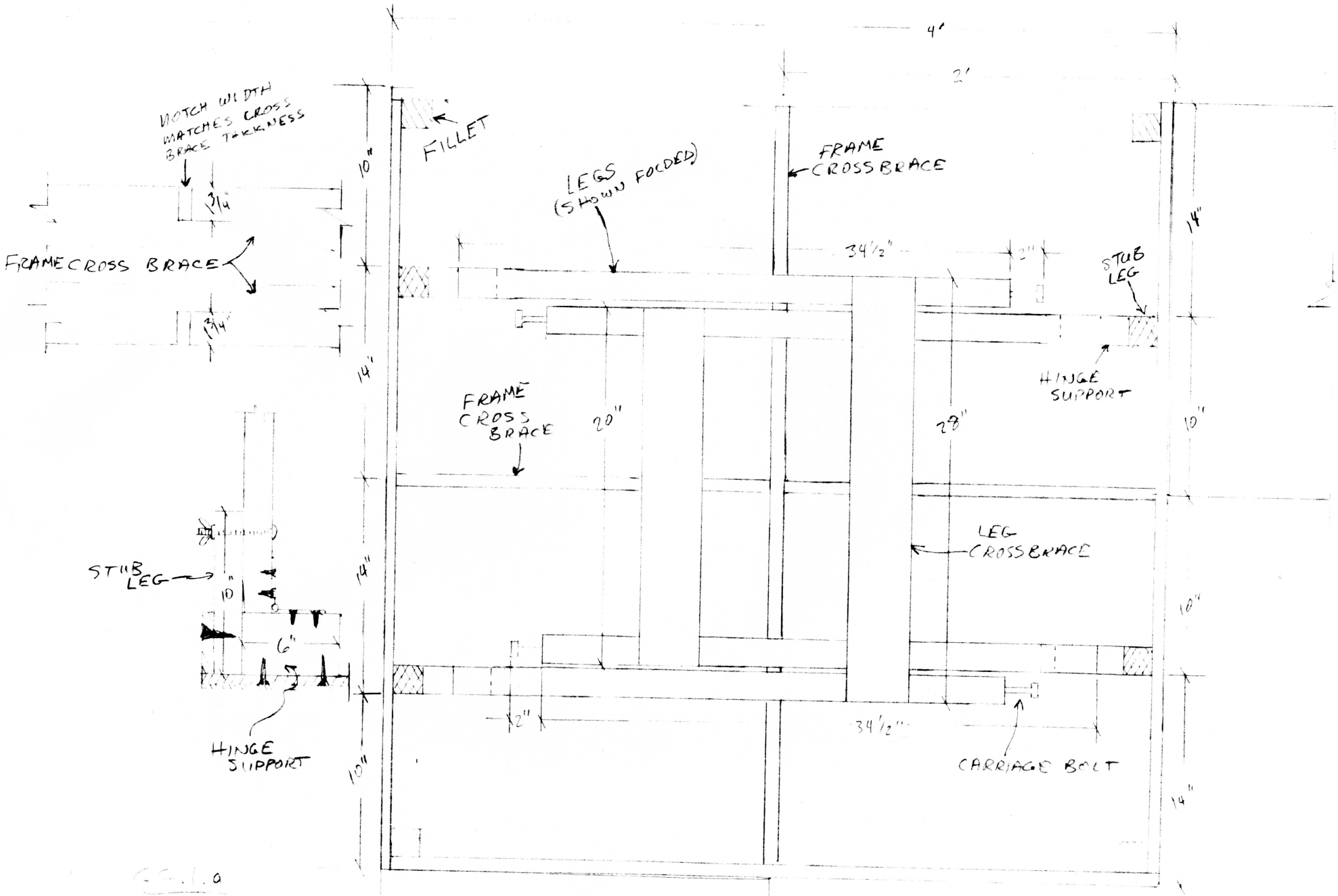
EE.


#18 Guage feeders
Front of Module
Female Socket on 10" loose lead
Red
Yellow
#14 Guage Bus
Male Plug on 20" loose lead
Red
Yellow
Wide Blade
Front Rail (+)
Narrow Blade
Back Rail (-)
The passing track will be similarly wired if it continues across to adjacent modules. The plug and socket will be painted Blue.
Screw-type Barrier terminal Strip = Two for each track.

FF.2

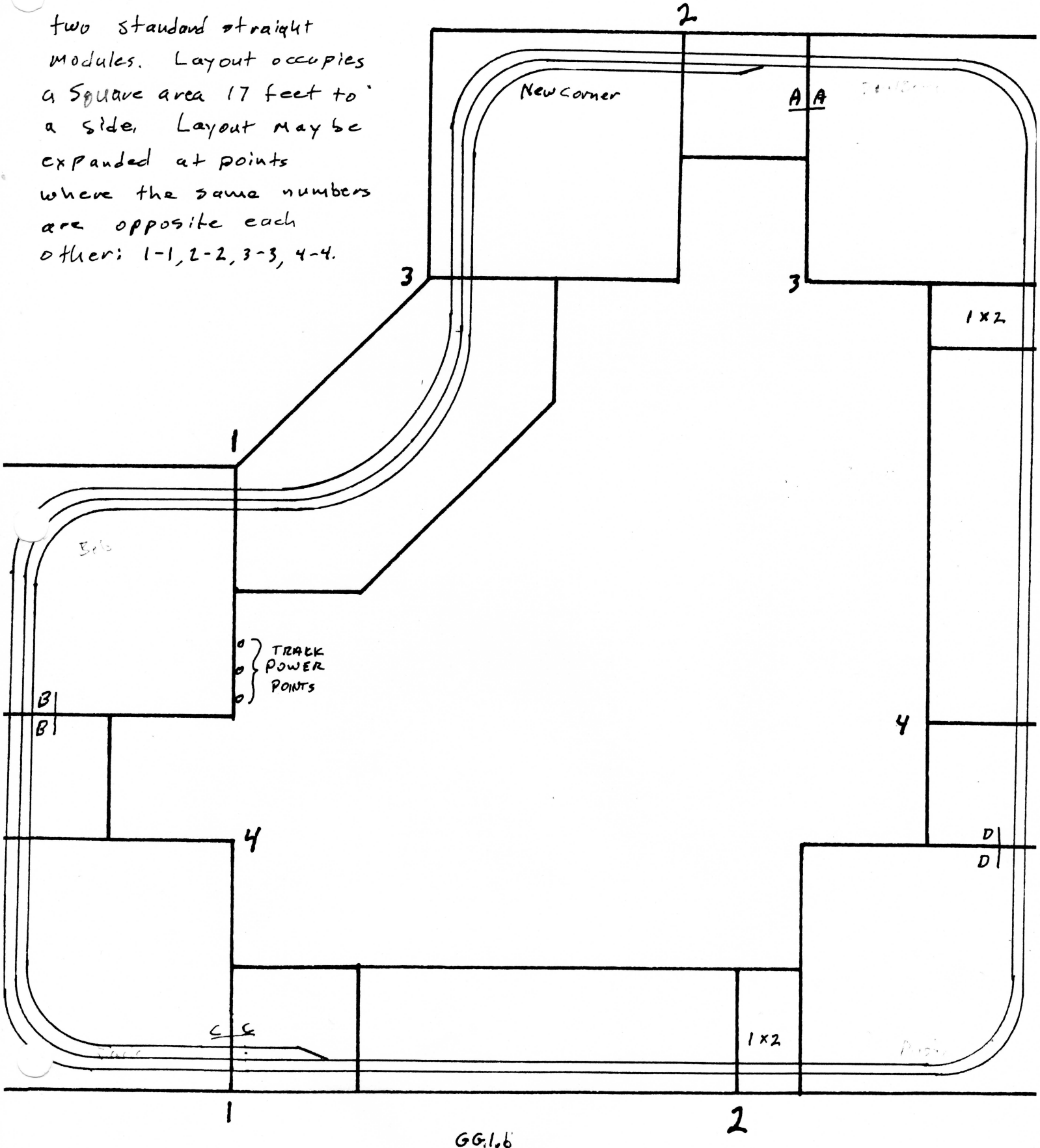

LEFT HAND END
RIGHT HAND END
Back Rail
Front Rail
When viewed from the front of the Module
This scheme is repeated for each track on the modul
Narrow Blade
Wide Blade
Female Connector (RS # 274-202)
Barrier terminal strip (RS # 274-656)
Male Connector (RS # 274-201)

DIMENSIONS FOR CORNER



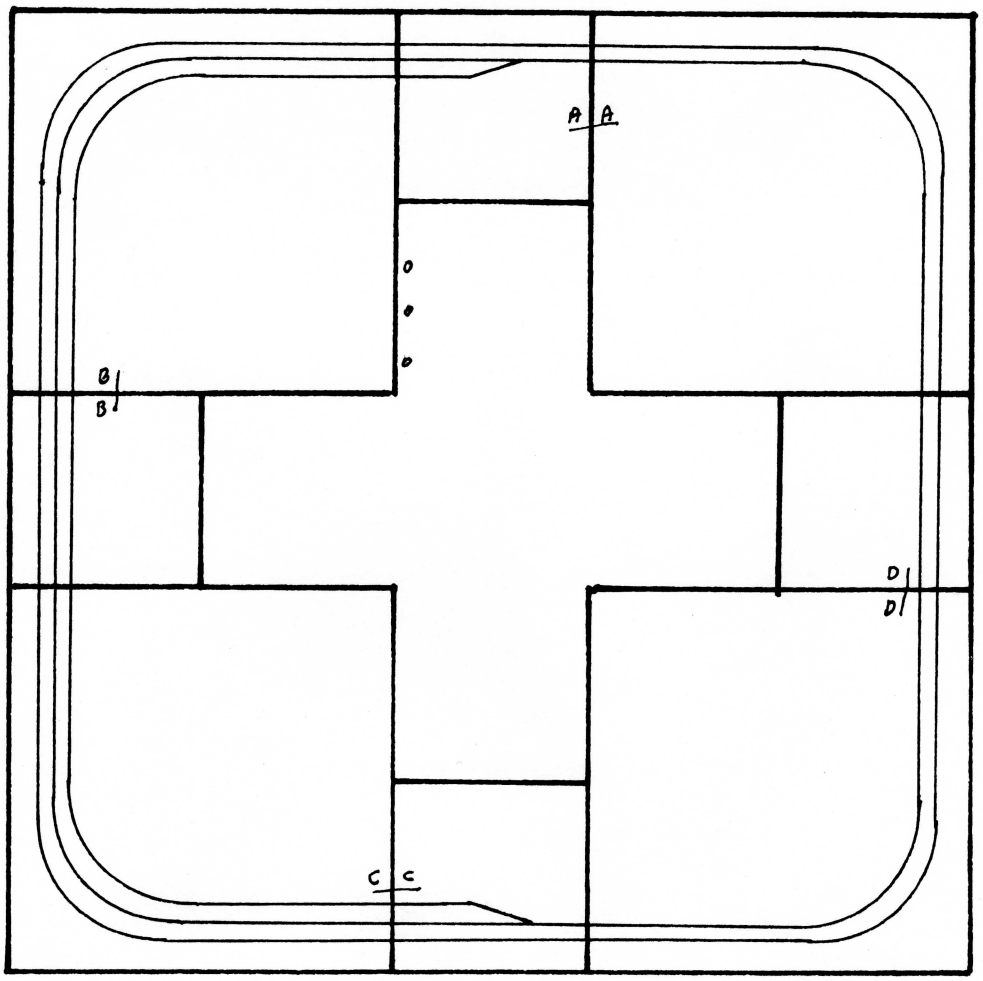
NOT TO SCALE

Modular layout using the existing inside corner and two standard straight modules. Layout occupies a square area 17 feet to a side. Layout may be expanded at points where the same numbers are opposite each other: 1-1, 2-2, 3-3, 4-4.



GG.1.b

Smallest layout possible
using only Corners and
2x2 Fillers



GG.1e