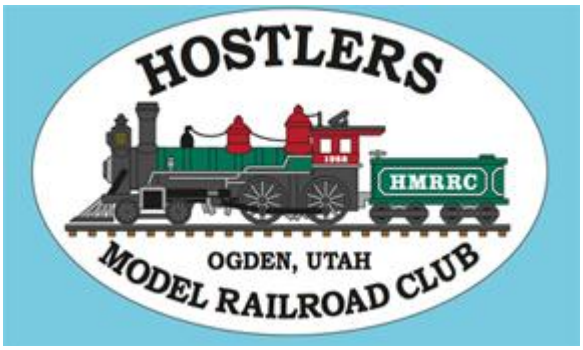


STANDARDS & RECOMMENDED PRACTICES FOR HO MODULES

updated February 2017

1. PURPOSE

To provide club members interested in building an HO model railroad module with bench work, track, and wiring standards and recommended practices necessary to ensure operating compatibility with other HO modules in a layout configuration. Uniformity of certain module characteristics is necessary to assure fit and function when joined with other modules. Standardization of other characteristics assures operating quality and pleasurable viewing for the public.

2. WHAT IS A MODULE?

A module is a portable section of table type structure which is but one part of a large group of like tables which when assembled together form a fully operating model railroad. Modules are built by individuals as part of a home layout and/or specifically for use with others in a layout. Modules are built to a set of standards that allow each unit to interface exactly with other units in the overall layout.

It is recognized that from time to time a module builder may wish to deviate from the recommended practices to achieve a particular effect. Such deviations must not compromise the purposes of the standards or result in sub-standard operation, construction, or appearance. The module coordinator is responsible for assuring compliance with all interface standards prior to use of the module or group of modules in a layout.

3. DEFINITIONS

a. STANDARD - A Standard (S) is a figure that is mandatory, "cut in stone" so to speak and must be followed to facilitate interchange or interface with other modules, smooth operation, and provide an overall esthetic appearance. The Standards provided herein were approved by the National Model Railroad Association (NMRA) membership in March 1990.

b. RECOMMENDED PRACTICE - Recommended Practices are those figures that are beneficial to operation and overall appearance. However, while recommended, the module builder is not required to adhere to them.

c. RUN-THROUGH MODULE, TYPE A - Includes trackage for Eastbound and Westbound mainlines; provides scenic mileage only; requires basic electrical wiring as specified, but it does not include mainline passing sidings or industrial spurs and does not require its own power supply.

d. RUN-THROUGH MODULE, TYPE B - In addition to the mainline tracks, a module may contain an optional branchline or operating siding with industrial tracks to provide local operating interest. It may include yellow line to blue line crossovers, and its own power supply for turnouts and accessories. Any siding or spur line from any main line or branchline must have both rails electrically insulated from the mainline or branchline. These sidings and spurs can be made operational by supplying power through a double pole single throw toggle switch. The power source for these tracks must be from the trackage where they originate.

e. CONVENTIONS - Clockwise direction is Westbound; counterclockwise direction is Eastbound; North is the operating side of the module; and South is the viewing side of the module. West is the left end of the module, and East is the right end of the module from the viewing side.

f. INTERFACE - The East and West exterior surfaces (ends) of the module which join with adjacent modules.

g. DIORAMA DIVIDERS - The end pieces of the module framework/skyboard used for separating one diorama scene from another and representing distance between scenes. Provides additional module and skyboard rigidity, and protects scenery while transporting the module. Diorama dividers, on each end, are required for each module or group of modules, yard modules excepted.

h. CONNECTING TRACKS - A nine (9) inch length of track for joining track sections together across the module-to-module interface.

4. STANDARDS & RECOMMENDED PRACTICES - HO MODULES

a. MODULE SIZE (S) - The builder has the option of building straight modules in standard 4', 6' and 8' lengths. Special two (2) foot long bridge modules are sometimes required in certain layout configurations. Inside and outside corner modules are four (4) or eight (8) foot squares with the interior & exterior corners removed. Standard and optional dimensions are given on data sheets included in this document.

b. MODULE HEIGHT (S) - Module height should be a nominal 40 inches from the floor to the top of the roadbed. Legs should be adjustable to provide a minimum of 1 ½” height adjustment.

c. MODULE FRAMING - (S) Only quality material, such as 1"x4" pine, or cabinet quality plywood should be used for strength and appearance. Avoid any dips across the module, such that the track is perfectly flat. Use standard framework as shown in data sheets 1 and 2. While particle board is cheaper than plywood, it is also heavier and does not hold screws as well. Therefore particle board and

chip board **WILL NOT BE USED IN MODULES**.

d. CONSTRUCTION (S) - Track work shall be securely attached to the roadbed for positive alignment. Ballasting is required. All track work must be accessible for maintenance purposes.

e. INTERFACES (S) - The ends (interface points) of modules need to be flat, smooth, and square with the sides to assure close joining with adjacent modules and overall square assembly of the layout.

f. ASSEMBLY (S) - Two clamping spots are required at each end of the module, located as per data sheets 1, 3, 5, 6, 10 and 14.. The module owner must provide two three (3) inch C-clamps per module.

g. SUB-ROADBED (S) - Rigid support is required for mainline trackage. Use 1/2 to 5/8 inch plywood for best results on standard or L girder framework. Atlas board over the plywood is acceptable. The maximum distance between sub-roadbed supports (risers) should not exceed 18 inches.

h. ROADBED - Roadbed providing ballast slope is to be used for mainlines except in yard or terminal areas. Cork, milled roadbed, or contoured homosote are recommended roadbed materials.

i. TRACK LOCATION (S) - Three mainline tracks shall be provided to form three continuous unbroken loops on a layout. Optional passing sidings may be located on either side of the mainlines where room permits and minimum track clearances can be maintained. Track locations are shown on data sheets 3, 5, 6, 9 10 and 15.

j. RAIL SIZE (S) - Hand laid or commercial code 100 nickel silver. Code 83 nickel silver track may be used, but if code 83 is used, module owner must provide means to transition from code 83 to code 100 for each end of the module or series of modules.

k. GRADES (S) - Mainlines and passing sidings - 0%. Industrial spurs - 3% or less.

l. TRACK CLEARANCES (S) - Horizontal = 1-1/32", measured from track centerline to any obstruction. Vertical = 3 1/4" from top of track to overhead obstructions.

m. TRACK CENTER LINES - MODULE INTERFACES (S) - Mainlines = 5", 7", and 9” from front of module to center line of each track. See data sheet 15.

n. TRACK SETBACK FROM END OF MODULE (S) - 4-1/2". This allows the use of 9" sectional track to join modules. Two **NEW** metallic and two insulated rail joiners must be provided for each mainline, on each module, by the owner.

o. TRACK CENTER LINES (S) - On curves = 2-1/2". For parallel straight tracks = 2".

p. MINIMUM PARALLEL TANGENT TRACK LENGTH (S) - 3". This is the distance from the end of the bridge track at the interface to the first deviation in the mainline, i.e., a switch, curve, crossover, etc.

q. MINIMUM MAINLINE TURNOUT (S) - #6.

r. MINIMUM BRANCHLINE TURNOUT (S) - #5.

s. MINIMUM RADIUS (S) - Industrial tracks = 24". Mainline = 32". On corner modules the recommended mainline radii at the top of the arc are: inner main - 33", outer main - 35-1/2".

t. BALLAST (S) - Mainlines – grey; passing sidings – grey; other tracks - black cinder or owner's choice.

u. INSULATED RAILS (S) - The rails of each module shall be insulated from adjacent modules by using insulated rail joiners at one end of the connecting track. Both rails of a crossover shall be insulated by either insulated rail joiners or rail cuts filled with epoxy. Any spur connected to a mainline track shall be insulated at both rails. Turnouts with live frogs shall have both frog rails insulated. Frog power shall be wired through switch machine contacts.

v. INSPECTION (S) - All new or modified modules are subject to inspection by the module coordinator or designated inspector prior to being placed into a layout.

w. PROTECTIVE PLEXI-GLASS (OPTIONAL) - Some module owners may want additional protection for their module contents. In that case, commercially available plexi-glass may be added to the front of the module. In the interest of uniformity the plexi-glass should be 10" tall and mounted 2" below the module deck with screws and finishing washers. This will provide 8" of protection for the module contents. Recommended thickness is 1/8". This keeps the amount of additional weight to the module at a minimum.

x. SKIRTING (s) - Each module must be equipped with dark green skirting material that will attach to the front facia of the module and hang smoothly down to within one inch of the floor.

y. MODULE FRAME WORK PAINT (S) – All exposed wood framing on the module will be painted. This includes the back of the skyboard and diorama dividers. In the interest of uniformity that color is designated to be CARAVEL BROWN. The paint number for this color in Olympic brand of paint is D22-5. This paint will have a low luster finish.

5. ELECTRICAL - MODULE WIRING STANDARDS

The electrical system is configured to be the minimum required for versatile operation. Continuous loop running of one train per mainline for small layouts is accommodated as is multi-train block control for large layouts. By disconnecting the Anderson Powerpole connectors at module interfaces, at pre-selected points around the layout, the red mainline can be divided into two or more control blocks. A conventional DC transformer then serves as the cab control in each block for the red line.

a. COMPONENTS

1. The Anderson Powerpole connectors used are PP30 colored housings of the following colors: black, red, yellow and blue. The connectors used are 30 amp powerpole connectors part number 1331. The powerpole connectors will be provided and installed by the Hostlers Club.

2. Red line - One red and one black Anderson Powerpole connector at each end.

3. Yellow line - one yellow and one black Anderson Powerpole connector at each end.

4. Blue line - One blue and one black Anderson Powerpole connector at each end.

5. Powerpole connectors are stacked side-to-side at each end with the colored connector on the right when viewed from the open end with the hole in the connector on top. See data sheet 12.

6. All buss wiring to be done using stranded 12 gauge wire. Drops from the tracks are to be at least 20 gauge wire.

b. ASSEMBLY - These conventions conform to NMRA standards where applicable.

1. The colored Anderson Powerpole connector connects to the rail closest to the front side of the module (outside rail).

2. A terminal block (barrier strip) under the module is required for track feeder connections.

3. The following color code shall be used: RED - outside mainline; YELLOW - middle mainline; BLUE - inside mainline.

4. Insulated rail joiners are to be used on both rails at one end of the bridge tracks used to join modules. (An exception may be made when two modules belonging to one owner are always together.)

5. One UP 5 Panel must be installed on the front of the module and one UP 5 panel must be placed on the rear. The module owner will provide one of the panels and upon approval of the module to standards the club will provide the other.

6. 120 VAC power must be available on each module. This may be achieved with a power strip with multiple female receptacle capacity on one end or may be achieved by hard wiring 12 gauge electrical wire using conventional methods. At least two female receptacles must be at the West end. The West is the right end of the module when viewed from the rear.

7. Feeder lines - Wire should be labeled or color coded to ensure that all circuits are readily identifiable.

6. CONSTRUCTION & SET-UP TIPS

The following tips are offered to club members interested in building a module based on the collective experience of club members who have built either N or HO scale modules. They are included to answer questions you may have and to make the building and set-up of your module easier and more enjoyable.

- Make sure your module is square! Corner modules are particularly difficult to build. Take your time, double check your measurements, and make sure your cuts and placement of parts are accurate to ensure your module comes out square.

- Use a combination square or something similar to correctly mark where your tracks are to end at the interface. Make sure your tracks end as close to the standard as possible so that a 9" piece of sectional track can be used to join modules each time. An error as little as 1/16" means that every time your module is placed in a new position in a layout, a new piece of track has to be cut to fit.

- Watch the weight of your module carefully. Remember, you have to move it around! Make it as light as possible, but sturdy enough to withstand the moving & transportation it will endure. Styrofoam is a good lightweight support material for mountains.

- Although a variety of screw sizes are called for in the framework data sheets, several members have found that 1-5/8" drywall screws work well and are an inexpensive alternative.

- Eight foot modules offer maximum scenic flexibility, but are heavier and more difficult to move & transport. If you build an 8' module you may wish to mount caster wheels on one end so that it can be rolled into a truck.

- Cut your clamp holes exactly as shown. Remember you have to insert your C-clamps through these to hold your module to the adjoining one! Consequently, it's important that these holes line up from module to module.

- T-Nuts are an excellent alternative to the nuts used to fasten legs to the module. They fasten to the leg piece which simplifies set-up and tear down since you don't have to keep track of extra nuts & washers. You can also use them in the base of the leg for height adjustment instead of the arrangement called for. Some module owners are now going to a leg arrangement utilizing ¾ inch electrical conduit (EMT) or ½ inch threaded pipe legs. This really speeds up set-up, but remember to allow for 1 1/2" height adjustment in each leg!

- When setting up the modules in a layout, remember to use insulated rail joiners on one end of each piece of connecting track. This is essential if the layout is to be broken up in two or more electrically isolated control blocks for operational purposes. More importantly, if there is an electrical problem, it greatly enhances our ability to trace the problem to a specific module through a process of isolation. With metal rail joiners, it can become a nightmare!

- Don't be tempted to build your benchwork out of sub-standard scraps. You'll find that it won't be sturdy enough for good track work and your scenery will not stand up as well due to the increased flexing it is subjected to. We have also found that there are normally problems interfacing with other modules when sub-standard materials are used, prolonging set-up time and detracting from reliable operation at public shows.

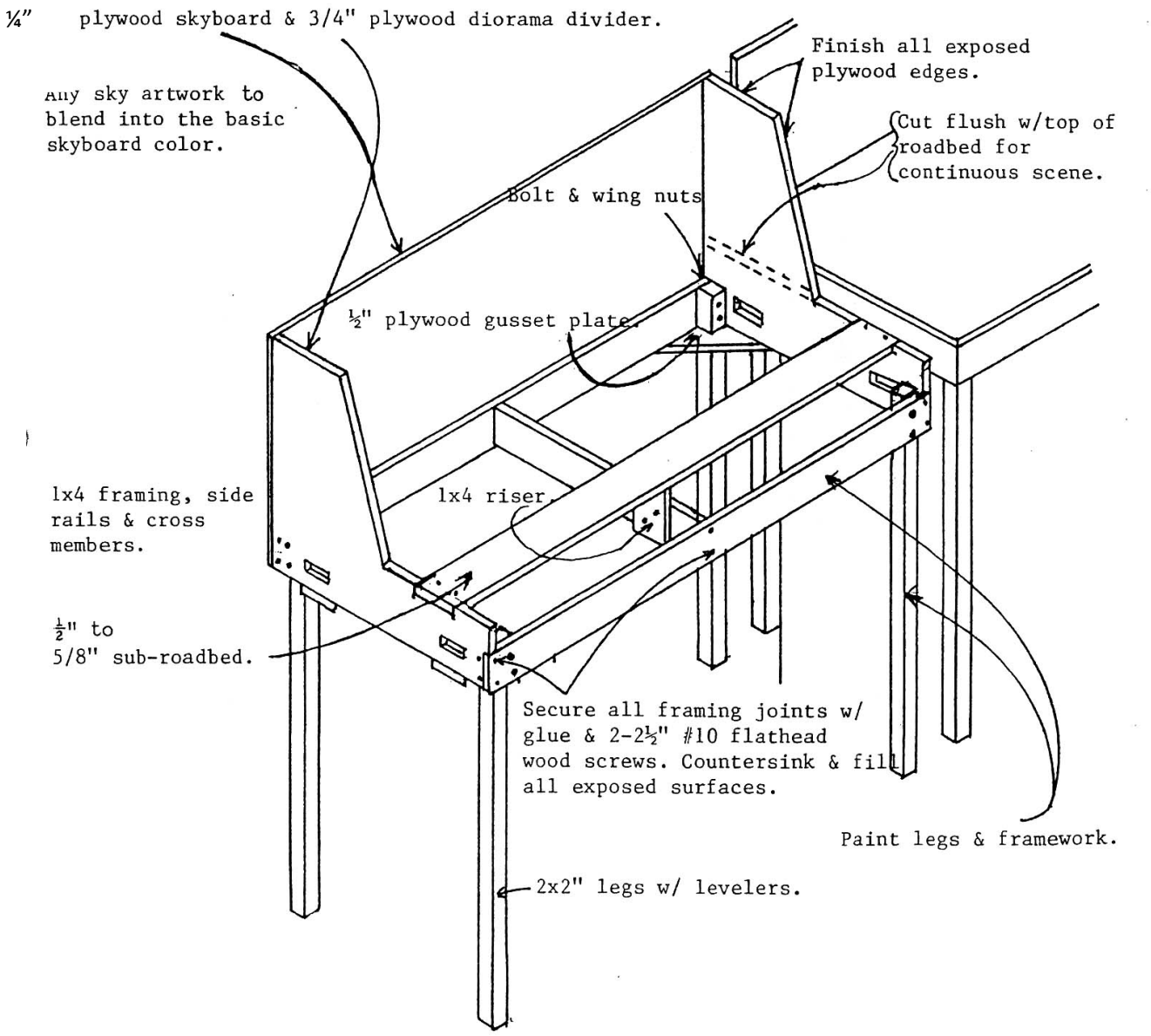
- Good trackwork is the key to reliable operation. Take time to ensure your track centerlines at the interface points are correct, parallel tracks are spaced correctly, you use smooth transitions in the corners, and that straight sections of track are straight

.

- Solder sections of flex track together before you lay them on curves. This gives you a smooth, trouble free joint in the curve. All rail joints should be soldered to enhance the flow of electricity through the rails.

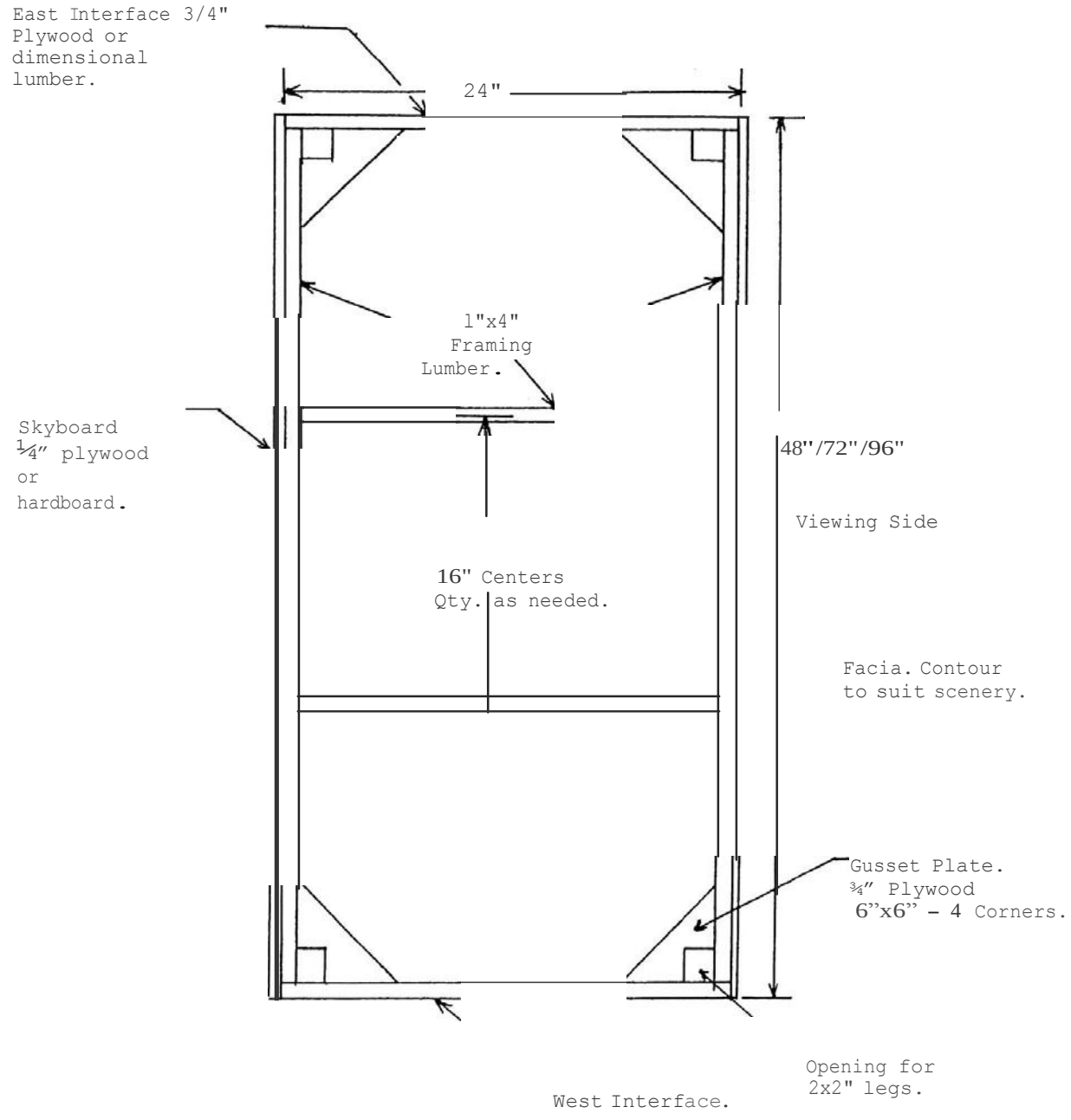
  Remember, if you have a problem, question, or don't understand the reason for a Standard or Recommended Practice, help is usually only a phone call away.

ISSUE DATE: OCTOBER 1990	**TYPICAL MODULE CONSTRUCTION**	DATA SHEET # 1



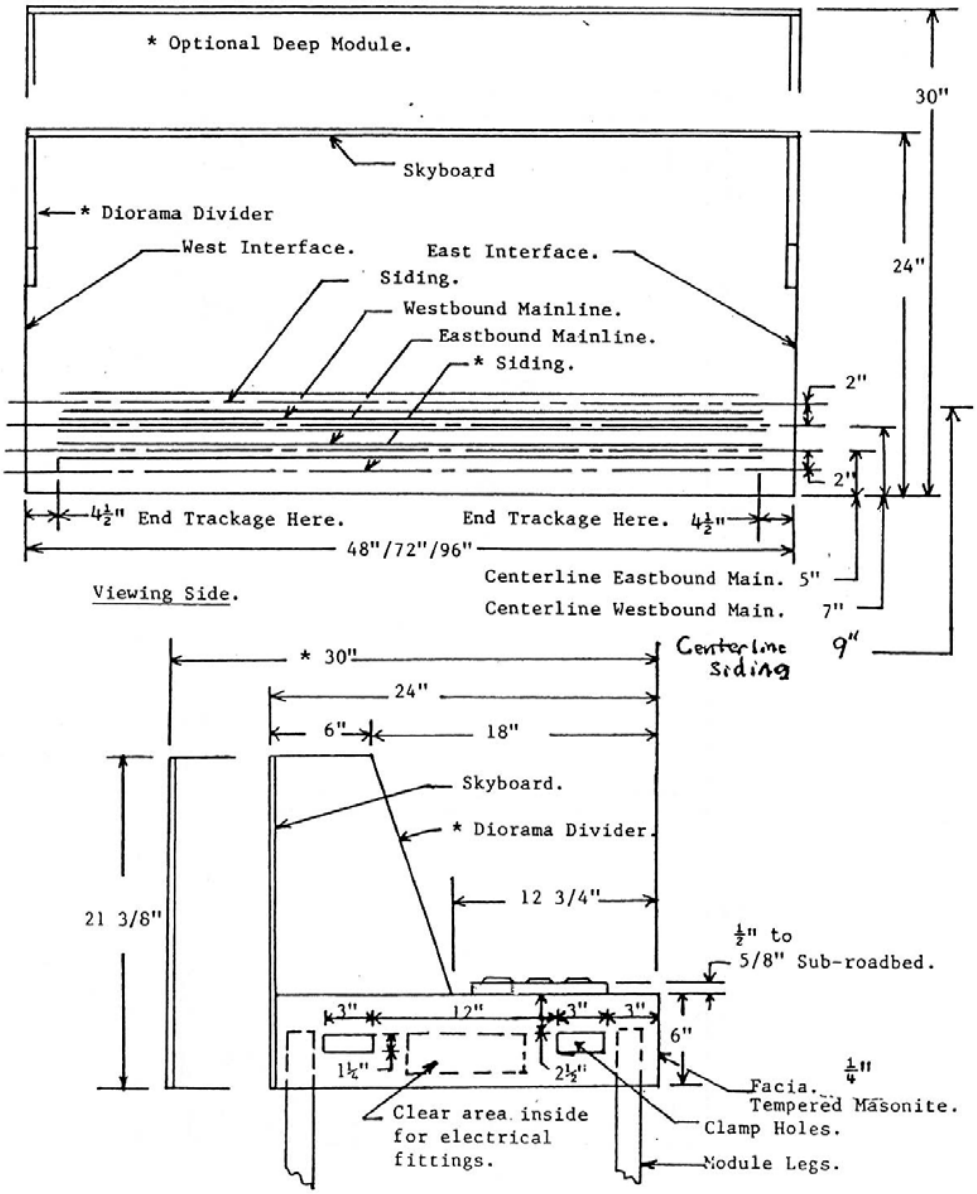
2”x2” wooden legs may be replaced with ¾” conduit or galvanized pipe with leveling adjusters if desired

ISSUE DATE: OCTOBER 1990	**FRAMEWORK - STRAIGHT MODULE**	DATA SHEET # 2



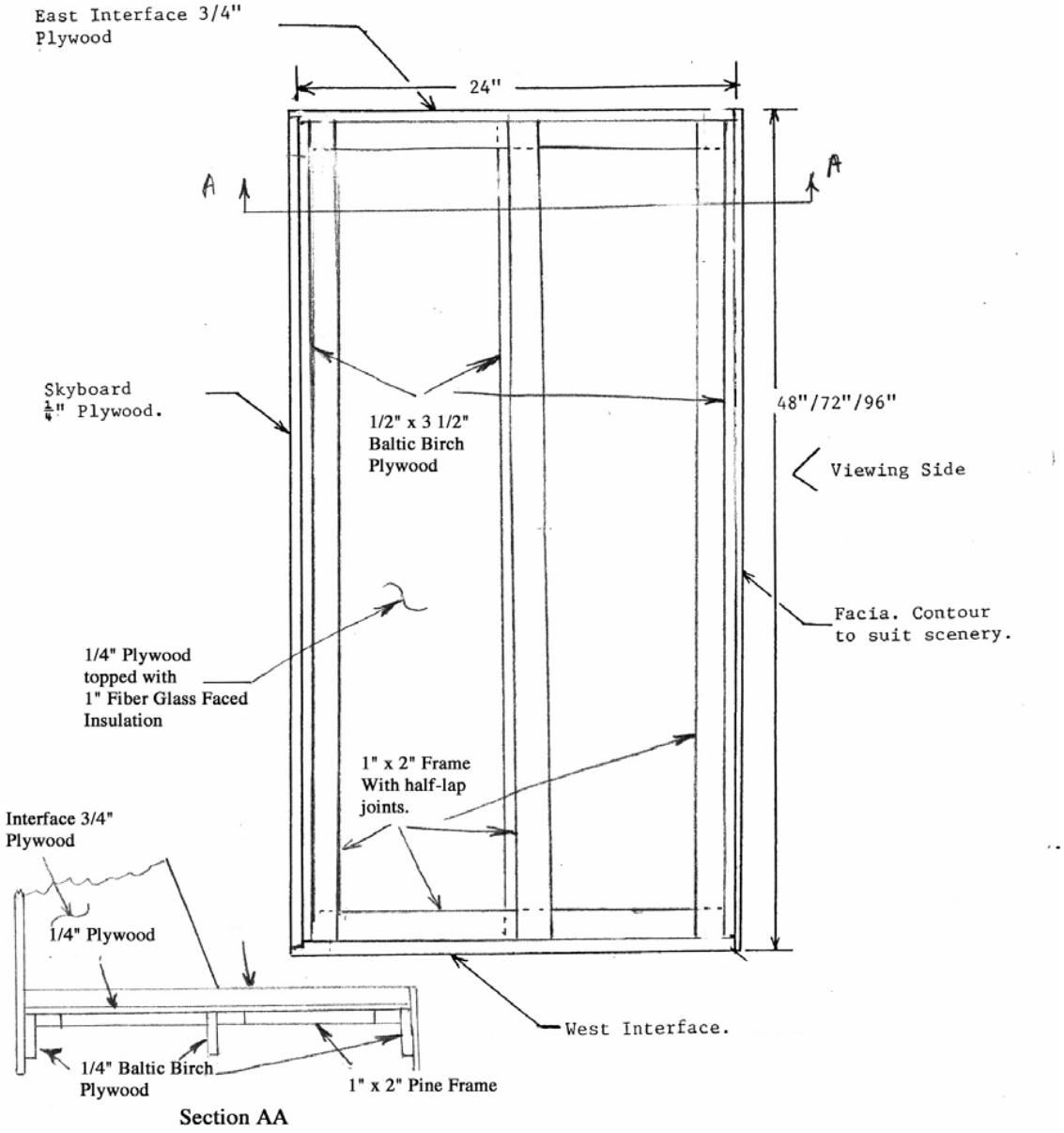
GLUE AND SCREW ALL JOINTS

ISSUE DATE: OCTOBER 1990	**DIMENSIONS – STRAIGHT MODULE**	DATA SHEET # 3



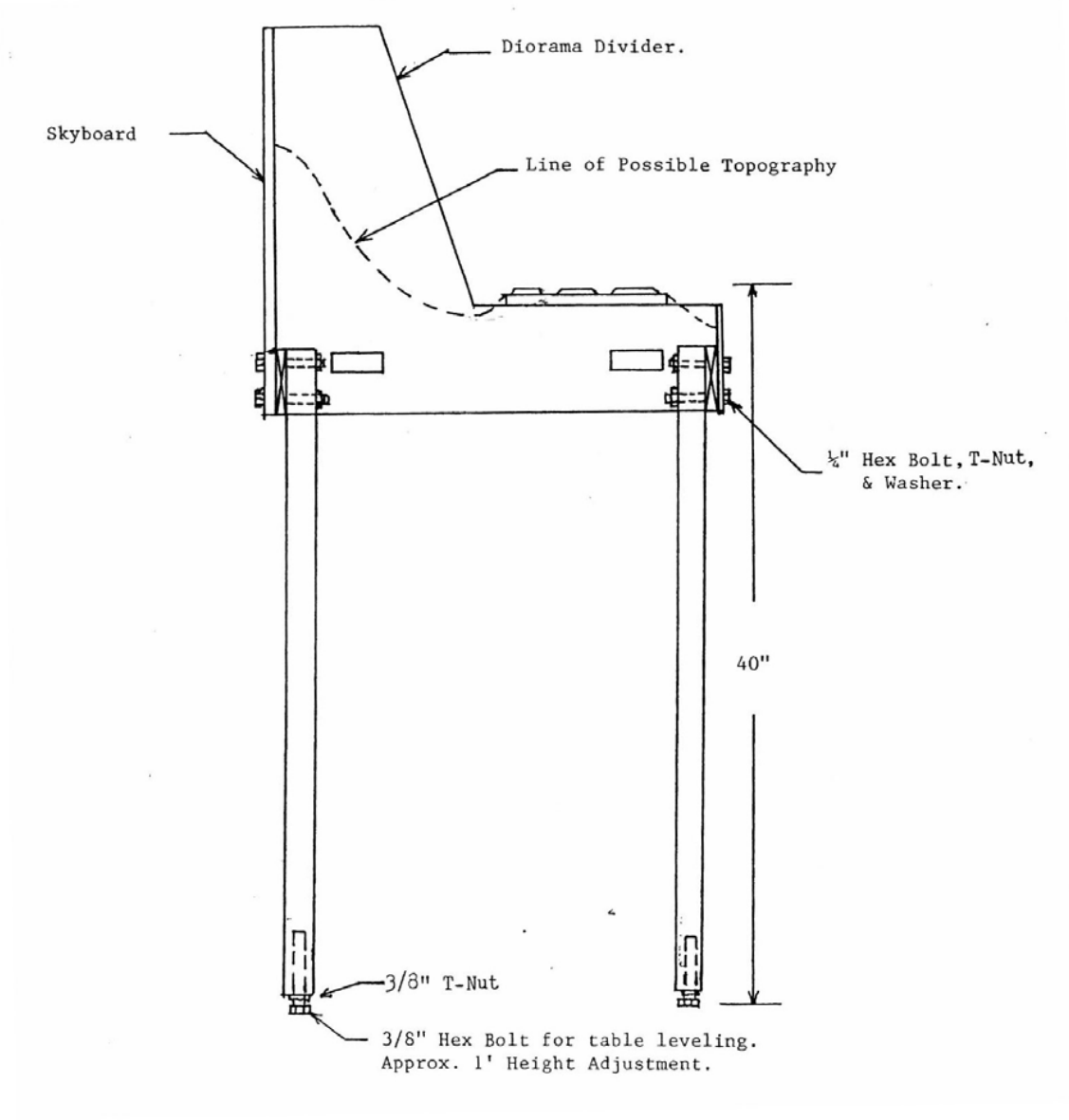
* OPTIONAL CHARACTERISTICS

ISSUE DATE: OCTOBER 2003	**FRAMEWORK ALTERNATE STRAIGHT MODULE**	DATA SHEET # 4

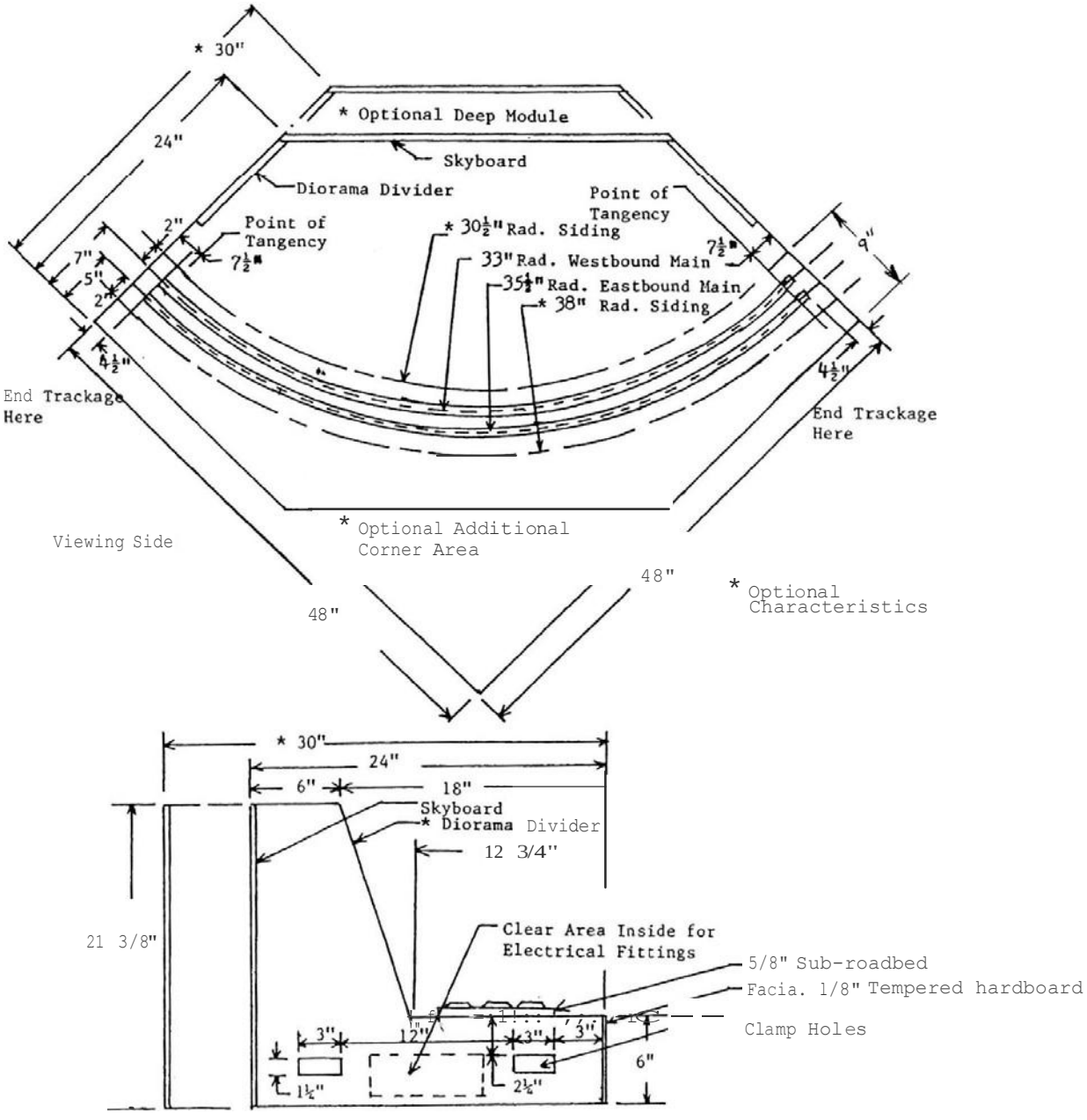


Section AA

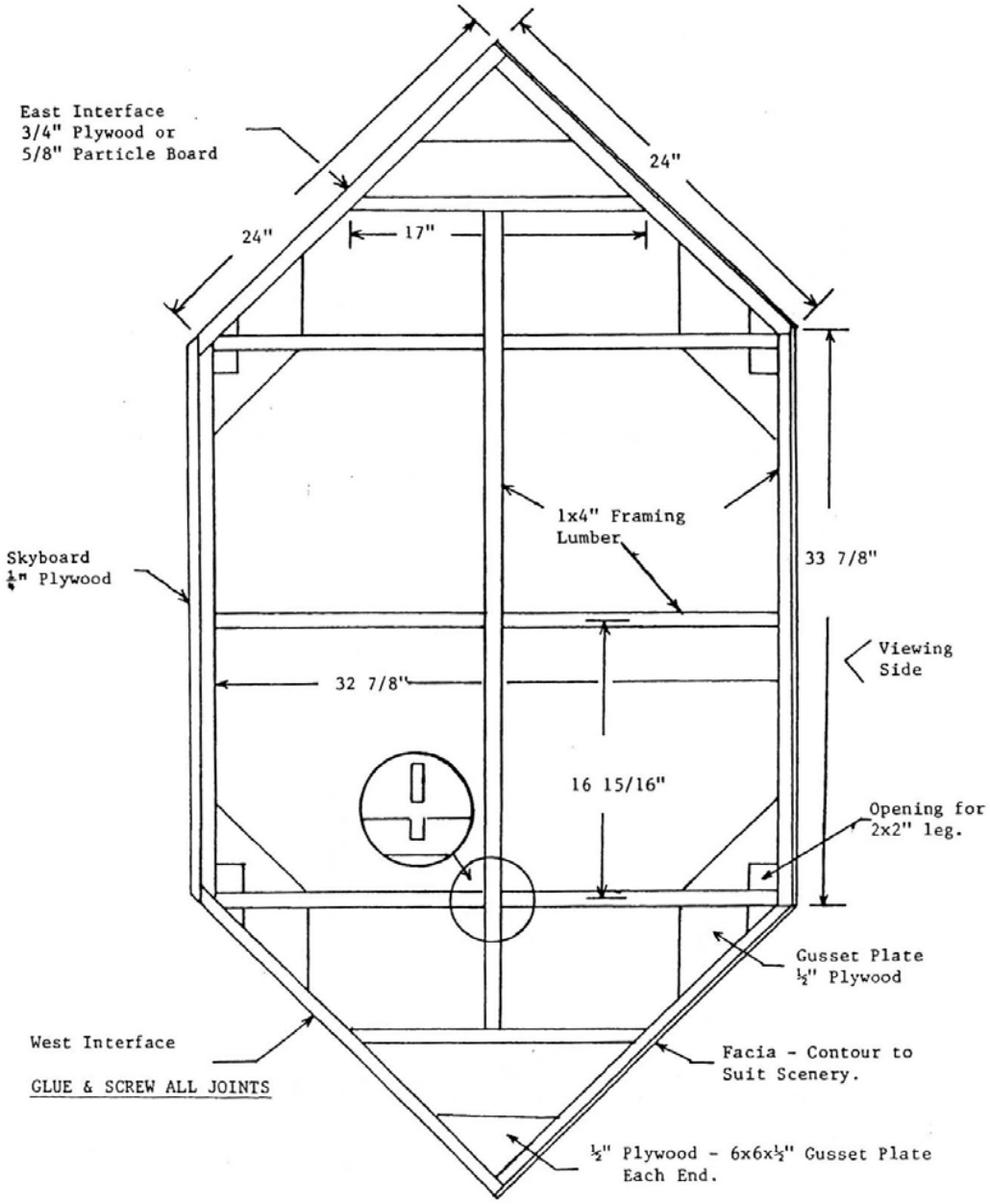
ISSUE DATE: OCTOBER 1990	**INSIDE VIEW OF STRAIGHT MODULE EAST INTERFACE**	DATA SHEET # 5



ISSUE DATE:	**DIMENSIONS – CORNER MODULE**	DATA SHEET SHEET
OCTOBER 1990		# 6



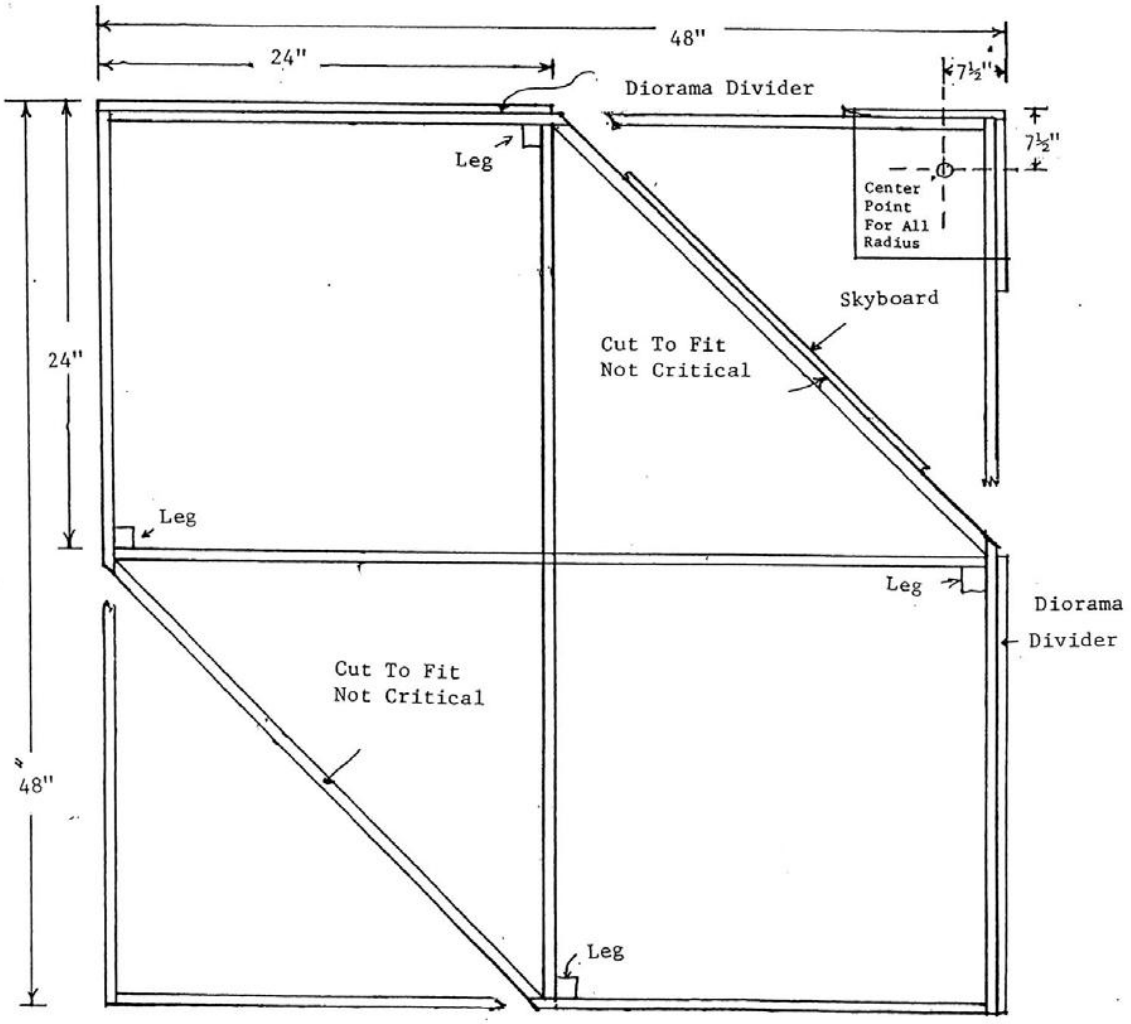
ISSUE DATE: OCTOBER 1990	**FRAMEWORK – CORNER MODULE**	DATA SHEET # 7



ISSUE DATE:
OCTOBER 1990

ALTERNATE METHOD
CORNER MODULE FRAMEWORK

DATA SHEET #8

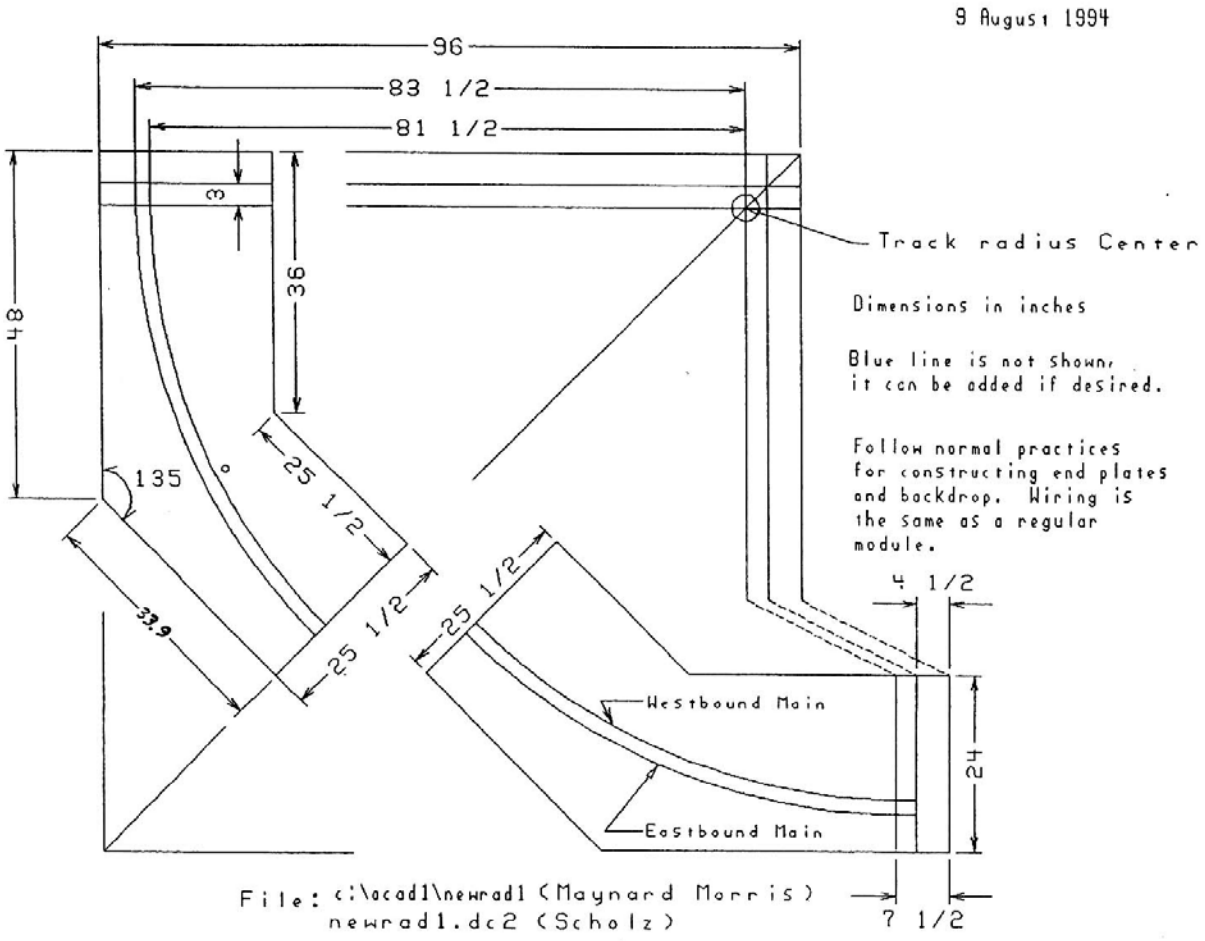


Use 1"x4" Pine/Fir Lumber For Framing.

ISSUE DATE:
APRIL 1996

OPTIONAL WIDE RADIUS CORNER
TWO MODULES REQUIRED

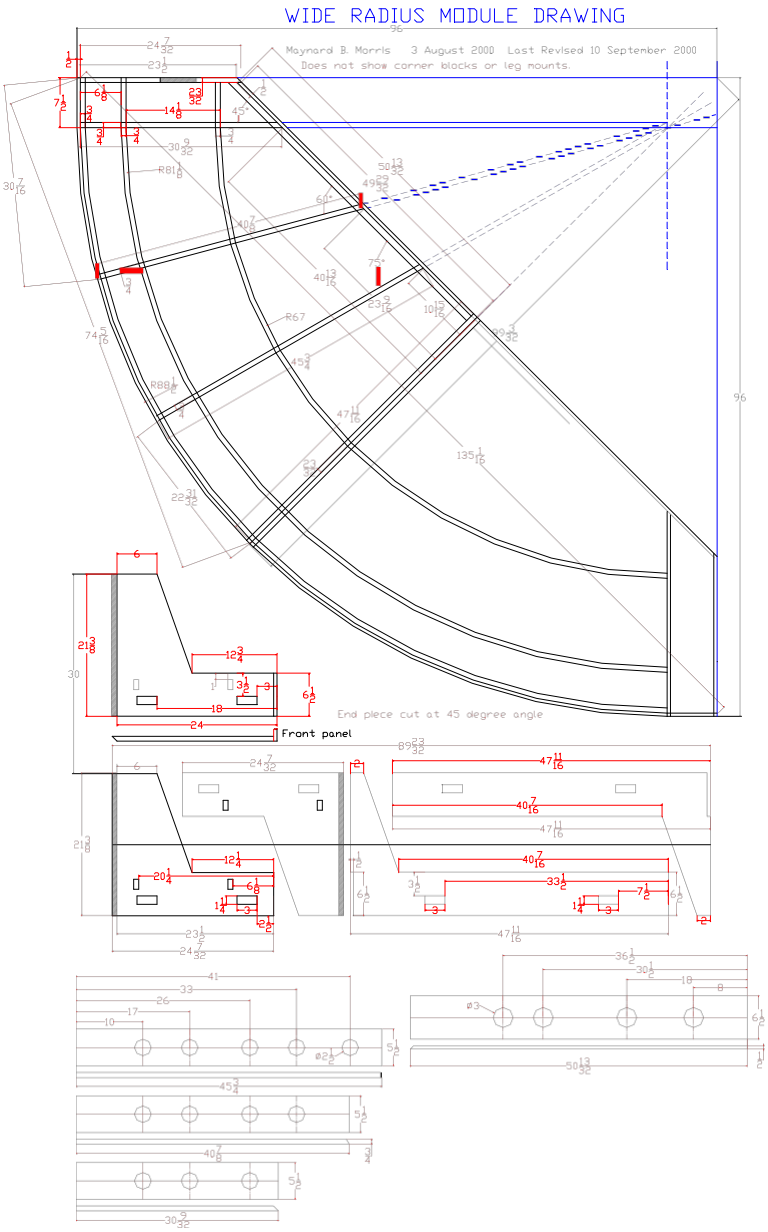
DATA SHEET
9

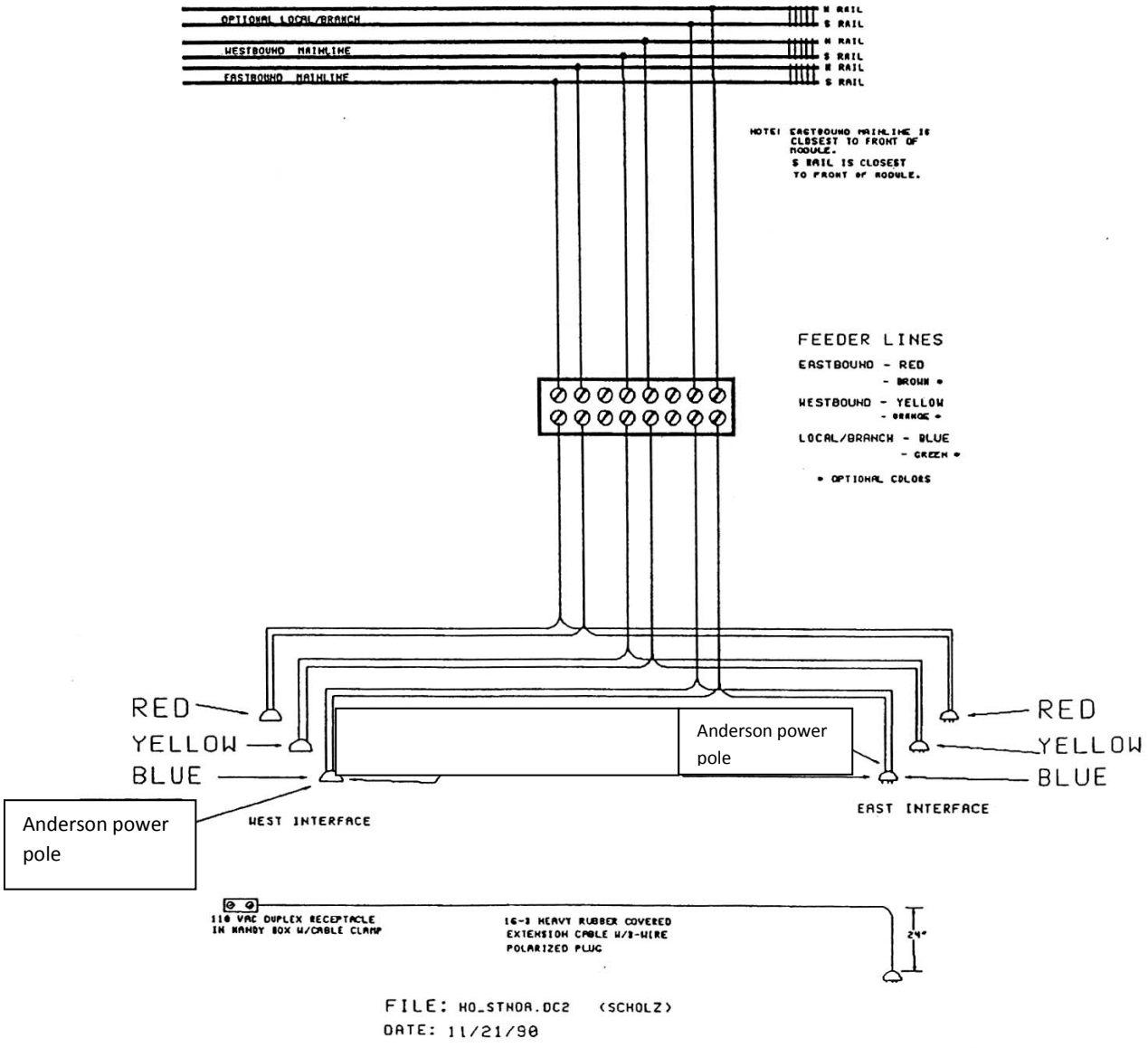


ISSUE DATE:
APRIL 1996

HOSTLER WIDE RADIUS CORNER
TWO MODULES REQUIRED

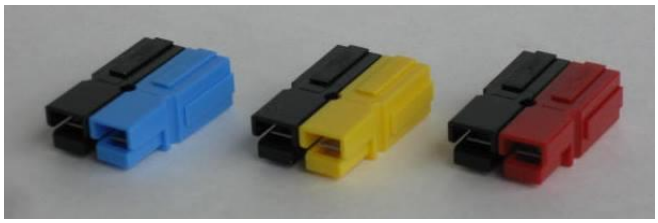
DATA SHEET
10

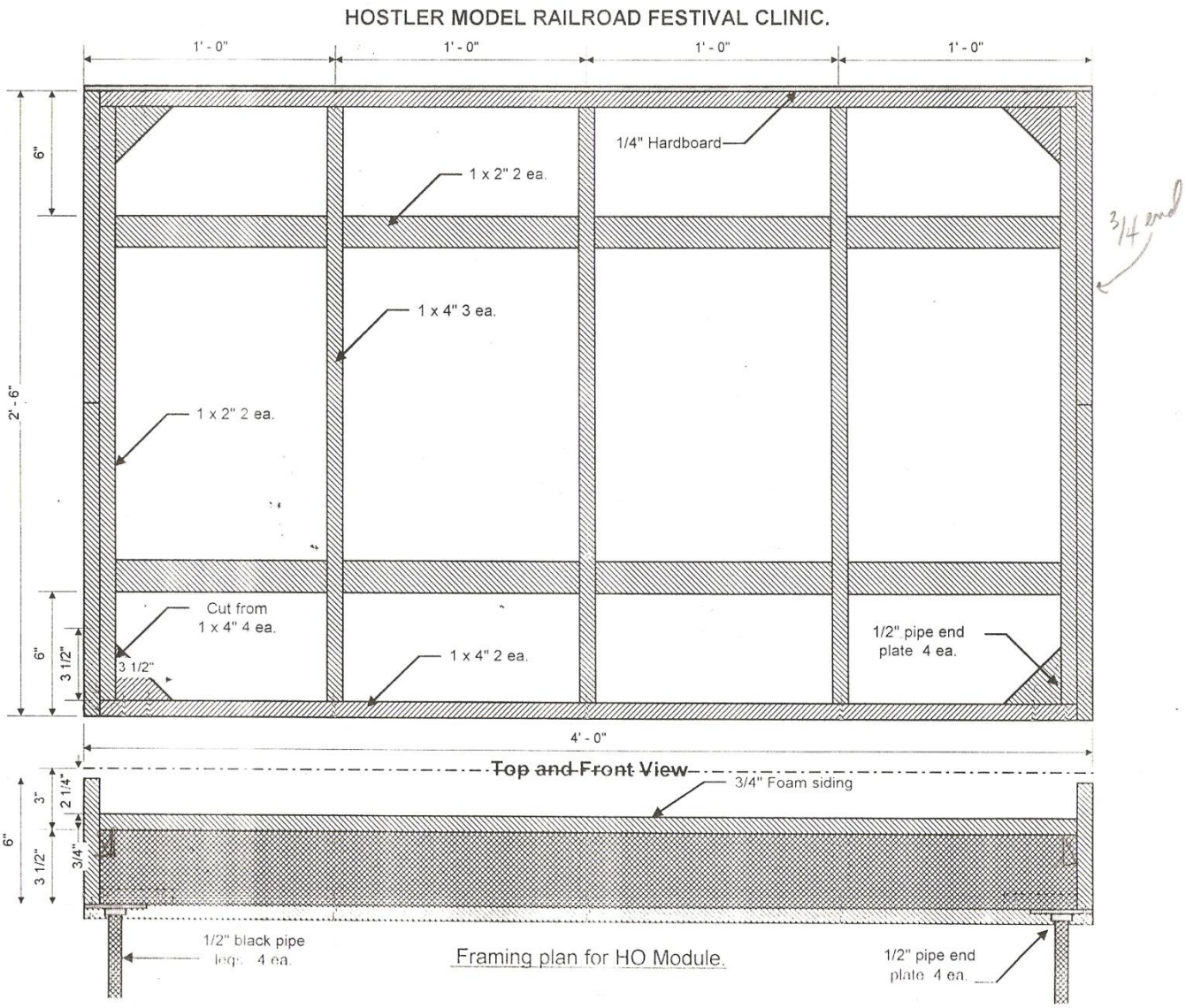


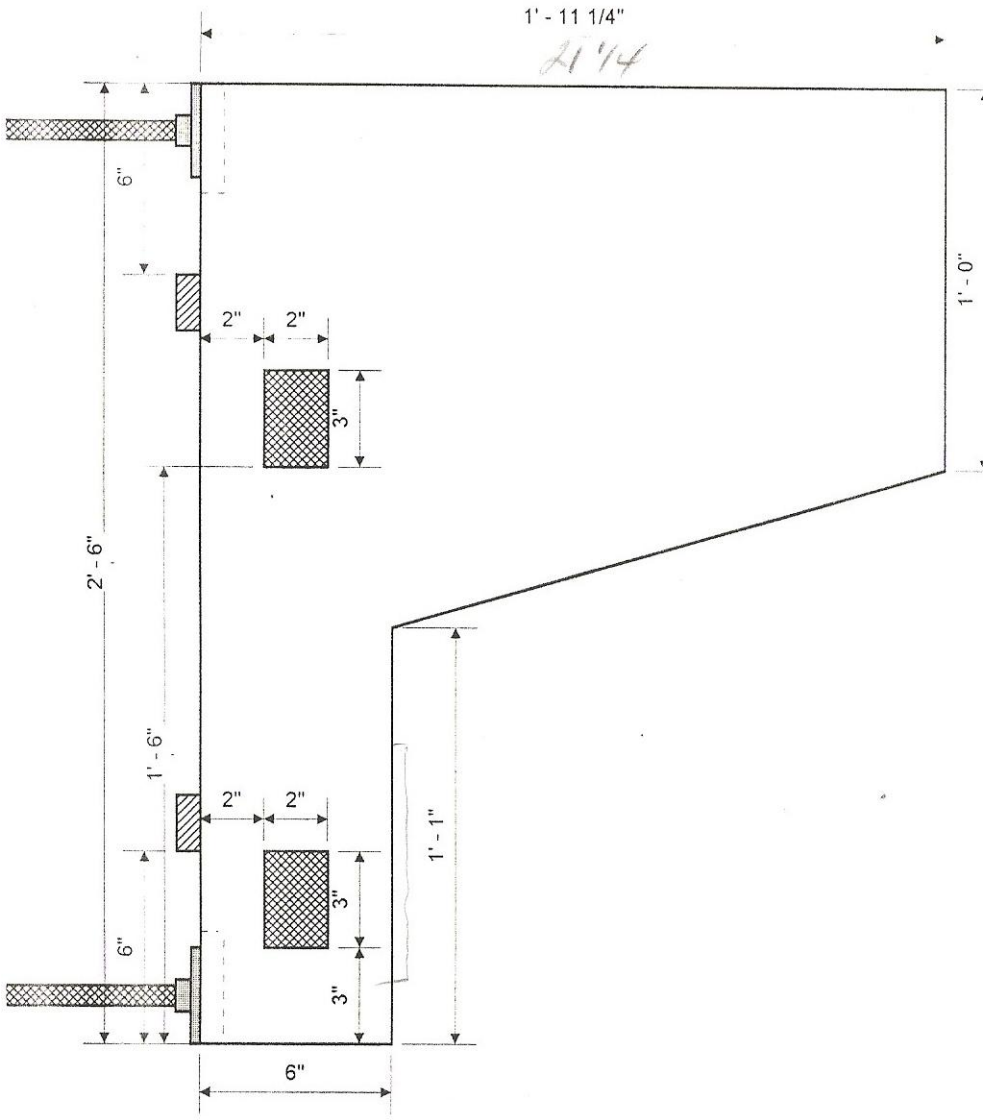

OPTIONAL LOCAL/BRANCH
WESTBOUND MAINLINE
EASTBOUND MAINLINE
N RAIL
S RAIL
NOTE: EASTBOUND MAINLINE IS CLOSEST TO FRONT OF MODULE.
S RAIL IS CLOSEST TO FRONT OF MODULE.
FEEDER LINES
EASTBOUND - RED
- BROWN *
WESTBOUND - YELLOW
- ORANGE *
LOCAL/BRANCH - BLUE
- GREEN *
* OPTIONAL COLORS
RED
YELLOW
BLUE
Anderson power pole
WEST INTERFACE
Anderson power pole
RED
YELLOW
BLUE
EAST INTERFACE
110 VAC DUPLEX RECEPTACLE IN HANDY BOX W/CABLE CLAMP
16-3 HEAVY RUBBER COVERED EXTENSION CABLE W/3-WIRE POLARIZED PLUG
24"
FILE: HO_STHOA.DC2 (SCHOLZ)
DATE: 11/21/90

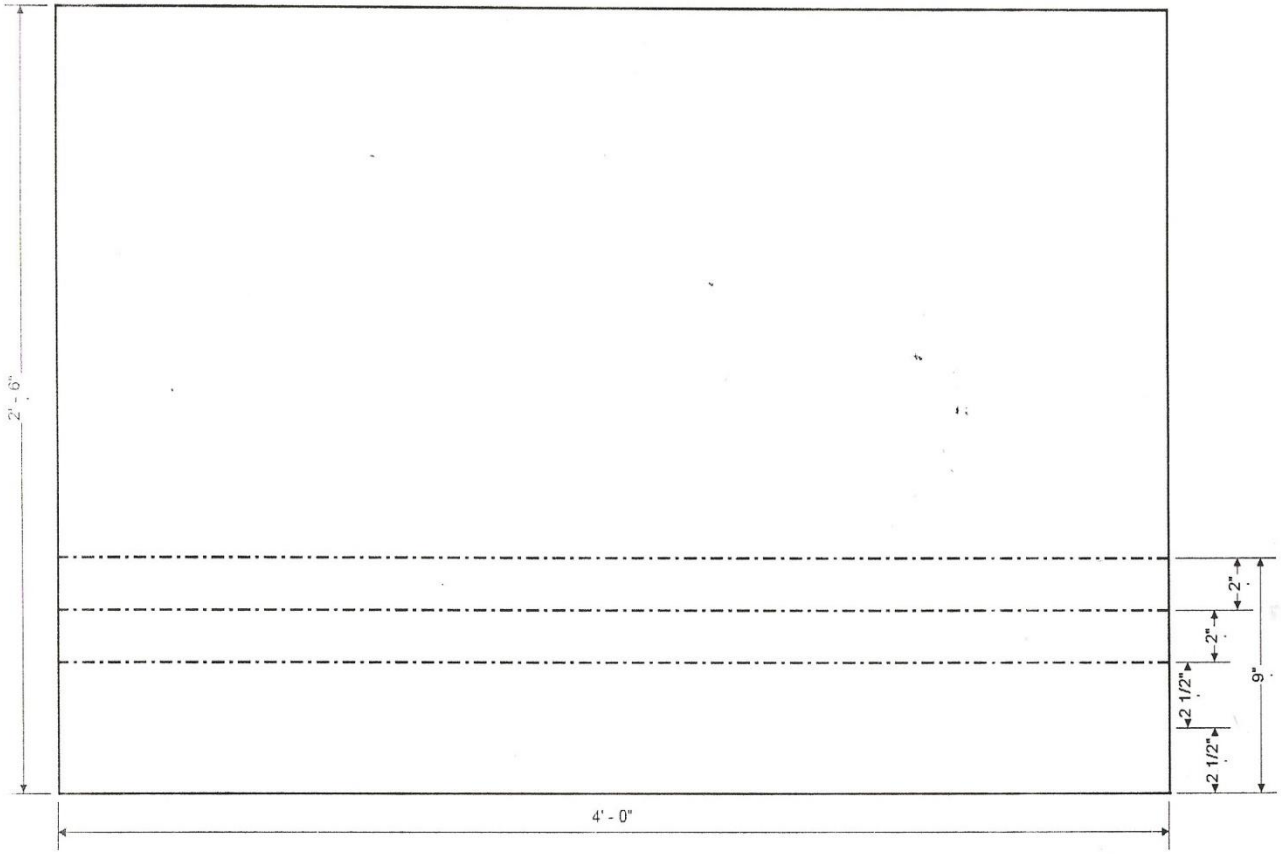
Issue Date: February 2017	Proper Stacking of Powerpoles at Each End of Each Module	Data Sheet # 12

AT THE END OF EACH MODULE, THE ANDERSON POWER POLE CONNECTORS ARE CONFIGURED AS SHOWN BELOW. THE BLACK CONNECTOR WILL BE ON THE LEFT AND THE COLORED CONNECTOR WILL BE ON THE RIGHT WHEN LOOKING AT THE OPEN END OF THE CONNECTOR. THE HOLE OF THE CONNECTOR WILL BE ON TOP.



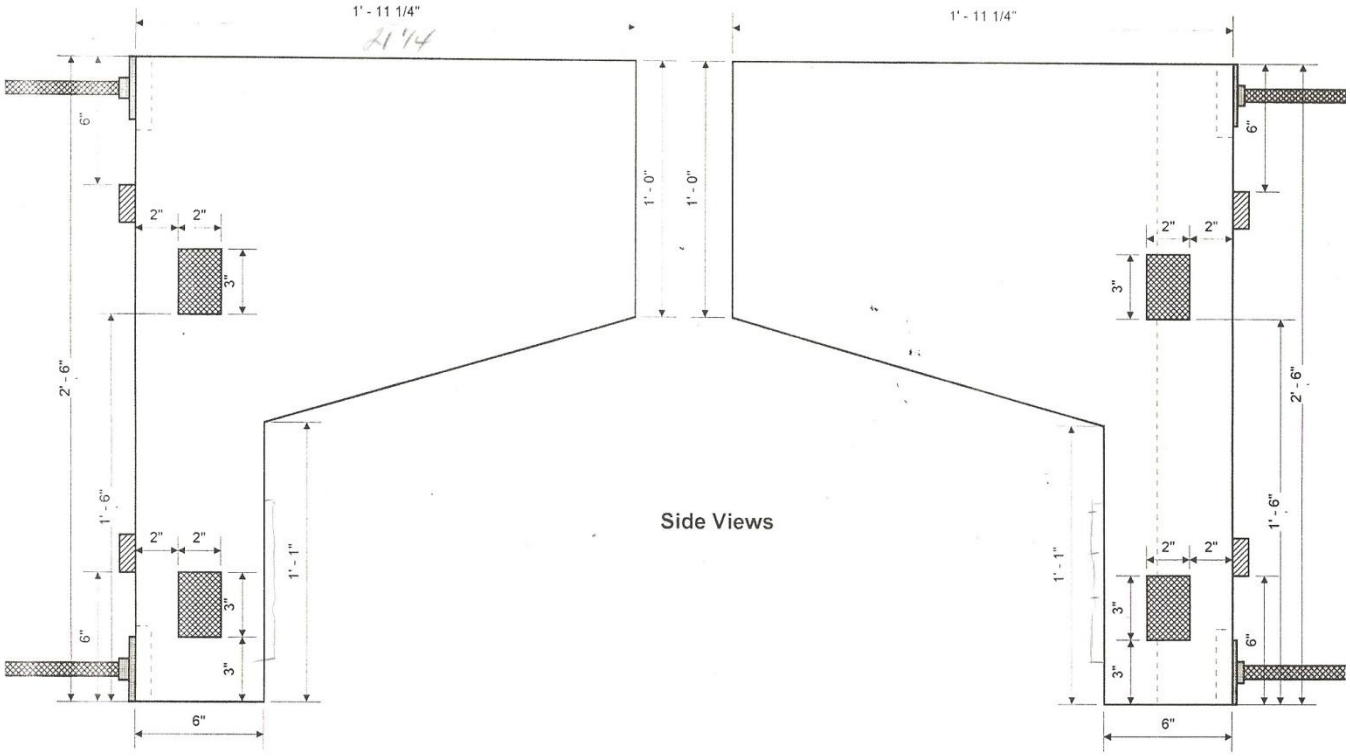

HOSTLER MODEL RAILROAD FESTIVAL CLINIC.
1' - 0"
1' - 0"
1' - 0"
1' - 0"
6"
2' - 6"
6"
3 1/2"
1/4" Hardboard
1 x 2" 2 ea.
1 x 4" 3 ea.
1 x 2" 2 ea.
Cut from
1 x 4" 4 ea.
3 1/2"
1 x 4" 2 ea.
1/2" pipe end
plate 4 ea.
3/4 end
4' - 0"
Top and Front View
3/4" Foam siding
3"
2 1/4"
6"
3 1/2"
3/4"
1/2" black pipe
legs 4 ea.
Framing plan for HO Module.
1/2" pipe end
plate 4 ea.


1' - 11 1/4"
21 1/4
6"
2"
2"
3"
1' - 0"
2' - 6"
1' - 6"
2"
2"
1' - 1"
3"
6"
3"
6"



TRACK SPACING IS 5”, 7” AND 9” FROM THE FRONT OF THE MODULE TO CENTERLINE OF THE TRACK

HOSTLER MODEL RAILROAD FESTIVAL CLINIC.



Framing plan for HO Module.