

Simple Seating Components

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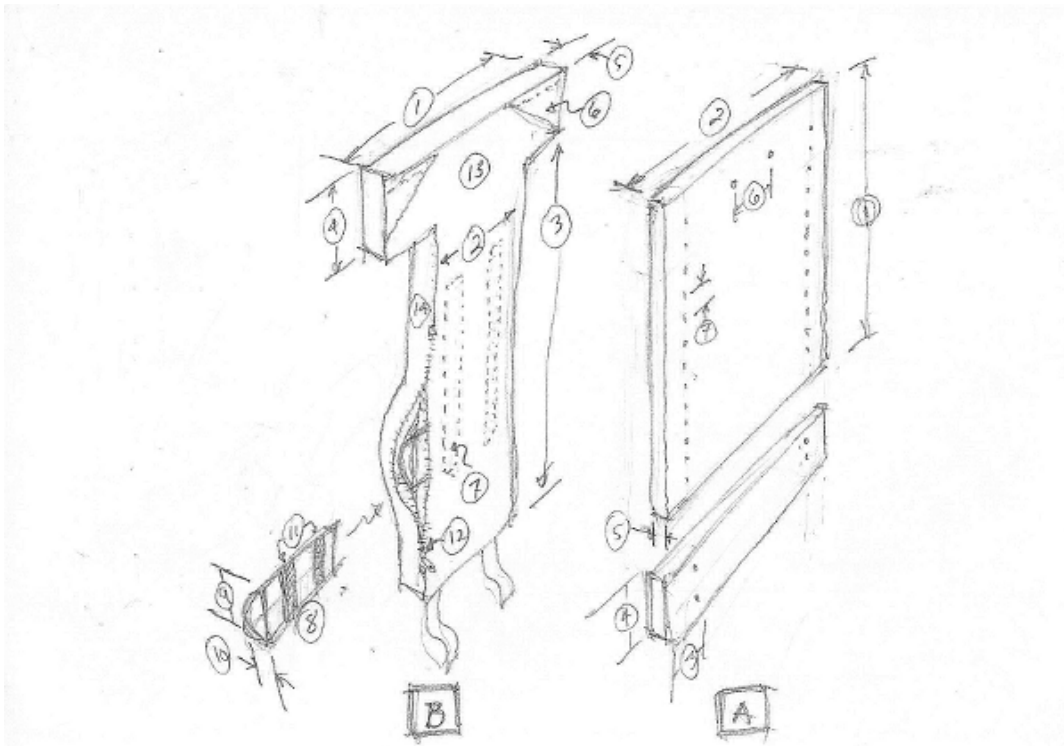
Many thanks for design contribution by Noon Design, Handicap International, Philippines, Whirlwind Wheelchair International, and Motivation Charitable Trust.

The drawings and dimensions below are meant to give a new wheelchair and seating service the basic tools to begin providing seating products pending final product solutions. These components support the clinical techniques covered in Intermediate / Advanced wheelchair and seating provision training. Correct use and adjustment of these components can only be safely performed with training and experience (see WHO guidelines for wheelchair provision in developing countries).

Guidance from a technician or clinician experienced in providing seating services is required in order to successfully interpret, produce and use these designs. It's best to produce these components in batches. For streamlined distribution, complete units can be assembled or flat-packed, including all common parts within standard size ranges (i.e., 12, 14 and 16 in. wide units). A trained clinician can keep a stock of extra parts, materials, and basic tools to provide a custom service from a center or in the field.

These designs are the result of ongoing, multi-organizational design development. This document can be edited to record local changes, their rationale and results. Further improvements should be fed back for the benefit of prior and future developers.

Temporary illustrations will be replaced when time and resources allow.



A Back board

The backboard is made of 3/8 or 1/2 in. thick, high quality ply wood. It can be batch produced in the sizes of wheelchair which are used in the service (usually 12, 14 and 16 in. wide). Holes or slots can be made added before sanding and finishing with high quality primer and paint. An extension piece is used at the end of the adjustment range for each size so that the pelvis is always supported from behind. Headrest mounting holes may vary depending on local headrest hardware design.

A1 = 300, 400, 500 mm

A2 = 300, 360, 420

A3 = 40

A4 = 100

A5 = 10 to 12

A6 = 80

A7 = 25

B Back pad and cover

The back pad consists of 1 inch thick, soft to medium polyurethane foam or equivalent. The T shape allows for the mounting of lateral trunk supports near the trunk. The front and sides of the cover is made with stretch fabric to allow for changes to the location and size of the sacral pad (B8) and for other minor shape changes to the back pad without requiring re-upholstery. The back section of the cover can be made of a more durable fabric such as is used in folding wheelchair sling upholstery. The inside of the back section of the cover has Velcro (B7) sewn in to allow easy adjustment of the sacral pad location. The top corners have pockets to catch on the corners of the back board (A). The pockets are stitched down 1/2 inch from the seam in order to hold the pad higher than the back board. Two Velcro strips hanging from the bottom of the pad cover correspond to Velcro fixed to the lower back of the back board or extension piece (not shown). One side of the back pad cover has a zipper (B12) or other closure to allow easy access to the foam for adjustments. The Sacral pad (B8) is made of a firm foam and can be cut down to size per each users measurements and needs.

B1 = 300, 360, 420

B2 = 150, 180, 210

B3 = 360, 410, 460

B4 = 100, 130, 160

B5 = 25

B6 = Corner pocket

B7 = 250, 300, 350. Velcro strips

B8 = Sacral pad

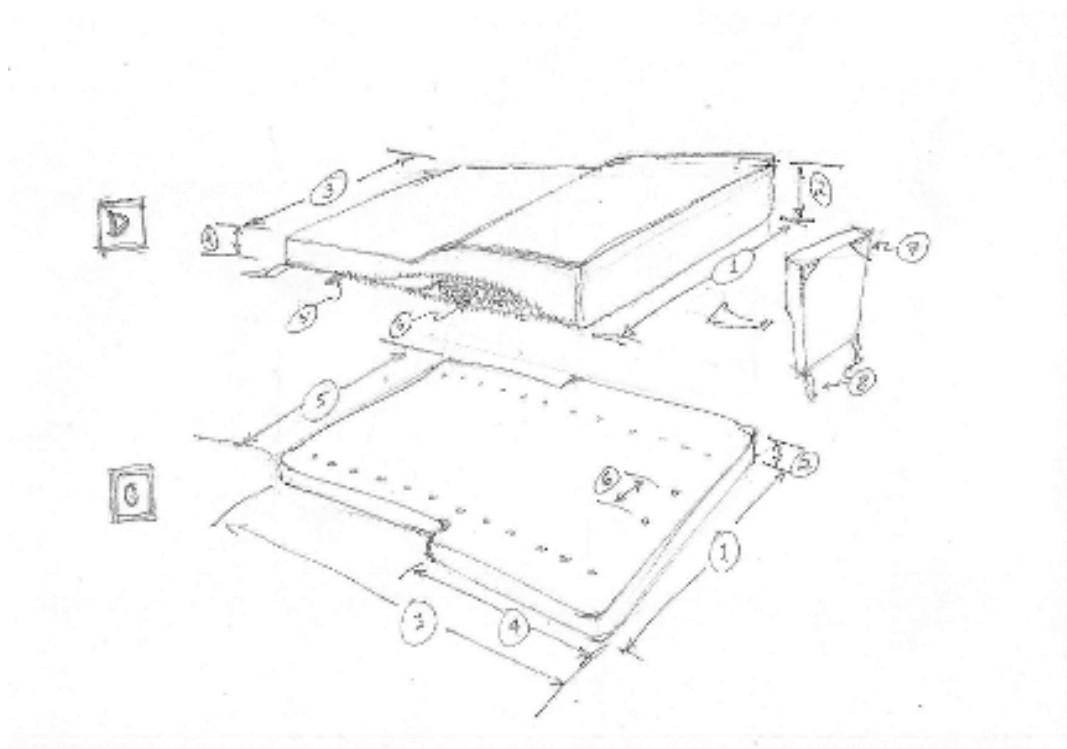
B9 = 50, 75, 100

B10 = 50

B11 = Velcro glued to match B7

B12 = Zipper or other closure

B13 = Back pad and cover



C Seat board

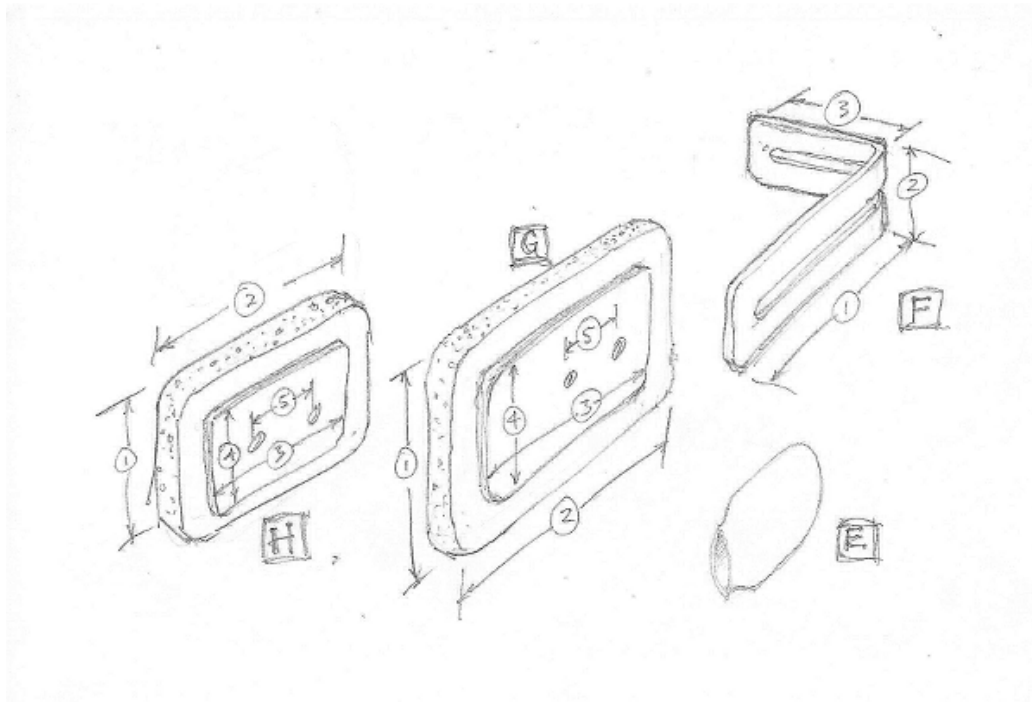
The seat board is made the same as the back board. Abductor holes may vary depending on local abductor hardware design.

- C1 = 300, 360, 420
- C2 = 10 to 12 mm
- C3 = 360, 400, 460
- C4 = 200, 250, 300
- C5 = 240, 300, 360
- C6 = 60

D Seat pad and cover

The seat pad consists of 1 ½ in thick medium to firm polyurethane foam or equivalent. A pre-ischial shelf is accessible through a zipper at the side of the cover. Adjustment of the length of the pre-ischial shelf is required for each user and is often adjusted during fittings. Glue is used sparingly in the area requiring frequent adjustments. The pre-ischial shelf is made of 1 to 1 ½ in of firm chip foam. The sides of the cover are made from a stretch fabric to maintain a close fit regardless of the adjustment of the pre-ischial shelf. The top, bottom, and front of the cover is made of a durable fabric. The cover has corner pockets and Velcro strips similar to the back pad cover to secure it to the seat board.

- D1 = 300, 360, 420
- D2 = 75, 90
- D3 = 240, 300, 360
- D4 = 30
- D5 = Zipper
- D6 = 25 or 30 mm chip foam pre-ischial shelf
- D7 = Corner pockets (as in back pad cover)
- D8 = Velcro strips (as in back pad cover)



E Lateral support pad cover.

Stretchy fabric. Can be placed and removed after pad is attached to the bracket. Tapered opening helps to hold the cover on. Neoprene (wet suite fabric is best but any durable stretch fabric will work. Black is less noticeable

F “L” bracket

Can be used for lateral trunk supports, lateral pelvic supports, lateral thigh supports, head support, foot supports and seat to back connector. The slot can be made by welding two parallel flat bars together with a space between, then bending. Flat bar stock should be of high strength (difficult to bend by hand). Brackets should be made in large batches and finished well (powder coating is best). As many as 20 may be used in an individual seating system.

F1 = 125

F2 = 40

F3 = 80

Slot = slightly larger than machine screws used in service (6mm, #10 or ¼”)

G, H Lateral support pad

The small and medium size pads shown can be used for lateral trunk support, lateral pelvic support, lateral thigh support and other lateral support applications (arms, feet, lower legs, head). The pad consists of a thin (¼ to 3/8 in.) high quality plywood, plastic, or aluminum base and a 3/8 to ½ in. firm foam pad.

G1 = 100

G2 = 150

G3 = 120

G4 = 70

G5 = 40

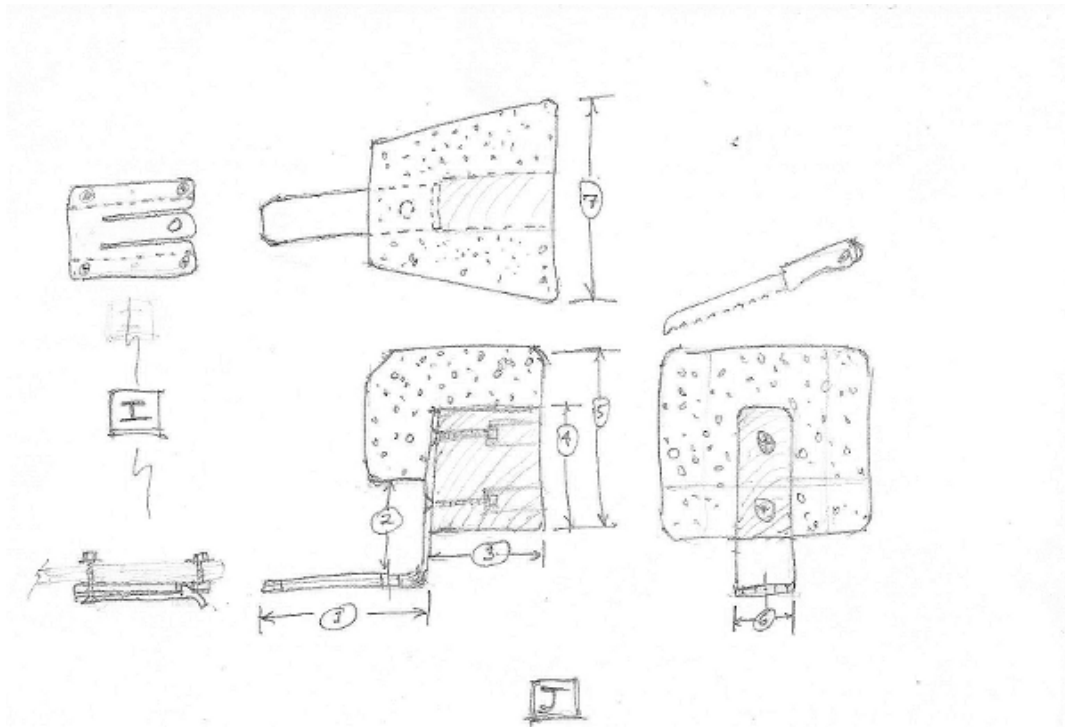
H1 = 80

H2 = 120

H3 = 100

H4 = 50

H5 = 40



I, J Abductor (medial thigh support)

Made of a wooden core covered in firm foam. The cover can be made of stretch fabric and easily removable for easy customizing of the shape. Can be batch produced in two sizes and cut to size before or during fitting. Mounting hardware can vary. It is best if the abductor can be removed for transfers without leaving sharp receptacles exposed. Some cases may require the receptacle to be removed and re-mounted to one side.

I = Spring lock receptacle

J1 = 120

J2 = 80 (thickness of front of seat including foam and wood)

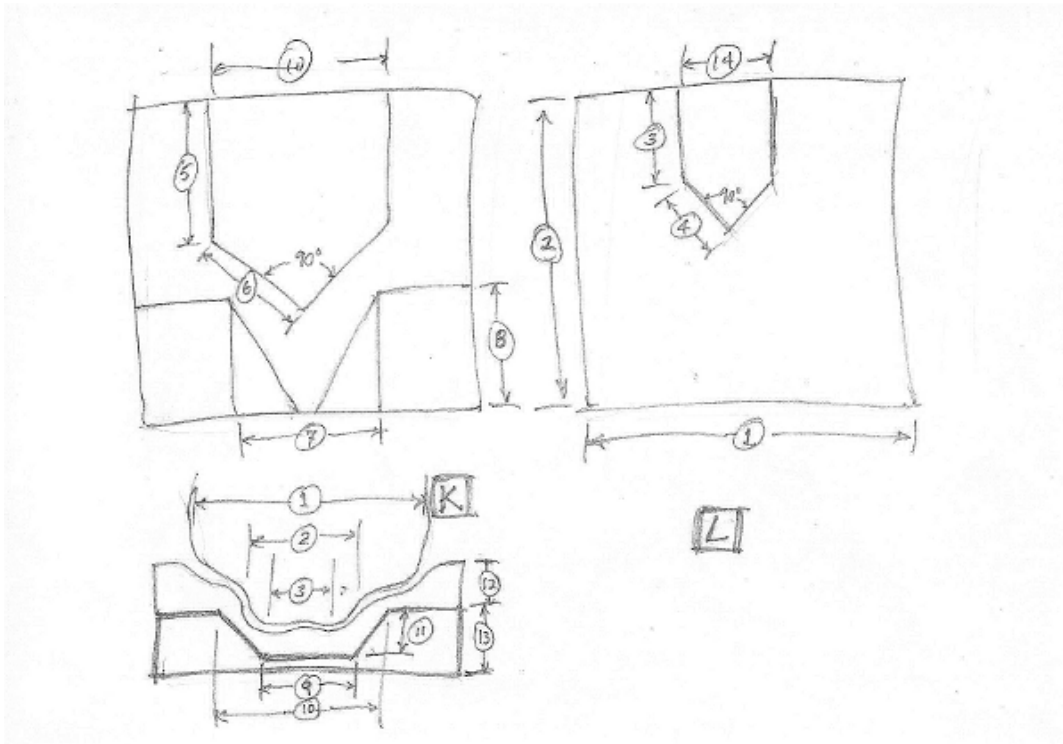
J3 = 80

J4 = 80

J5 = 125, 150

J6 = 25

J7 = 100, 150



K Anthropometric data

Use local measurements to adjust the cushion according to the average sizes of wheelchair users in your area. A summary of data collected has been used to calculate the dimensions of the cushion base shown.

K1 = 300 to 450 Hip width

K2 = 150 to 165 outside of IT's

K3 = 100 to 115 center to center of IT's

L Pressure relief cushion

These dimensions are for a generic, chip foam base pressure relief cushion for adults without sensation at the seat surface.

L1 = 360 to 460 wide

L2 = 400 to 460 deep

L3 = 130

L4 = 105

L4a = 150 (Width of bottom cut out. Not shown)

L5 = 175

L6 = 200

L7 = 160

L8 = 180

L9 = 150

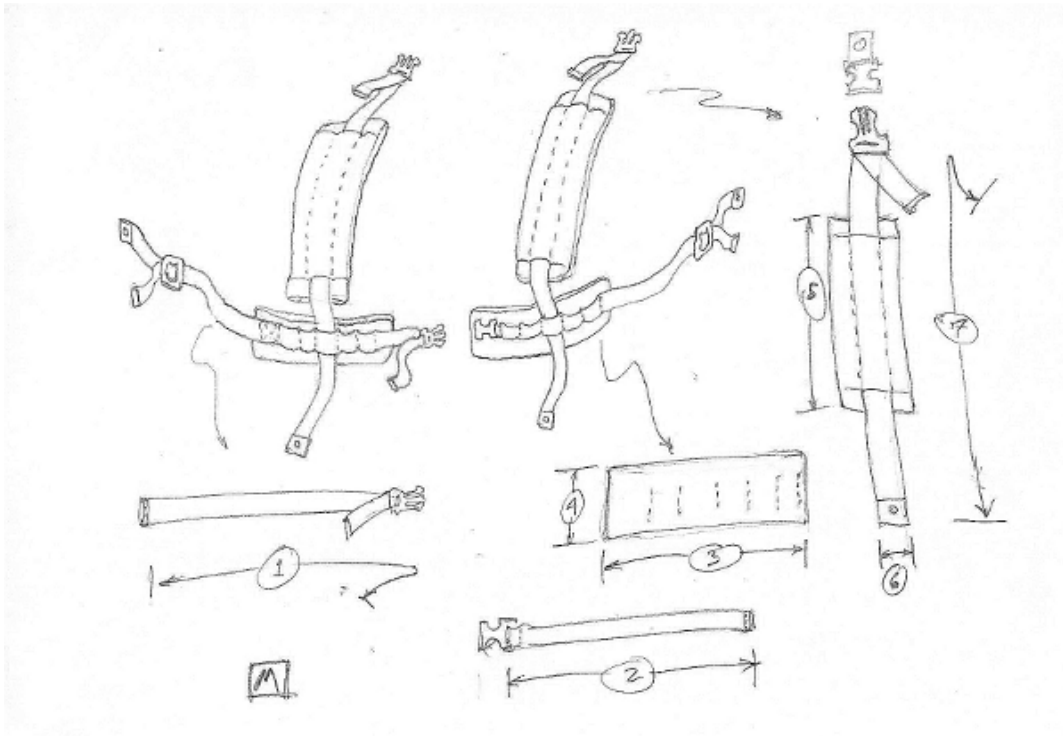
L10 = 250

L11 = 38

L12 = 38 to 50

L13 = 50

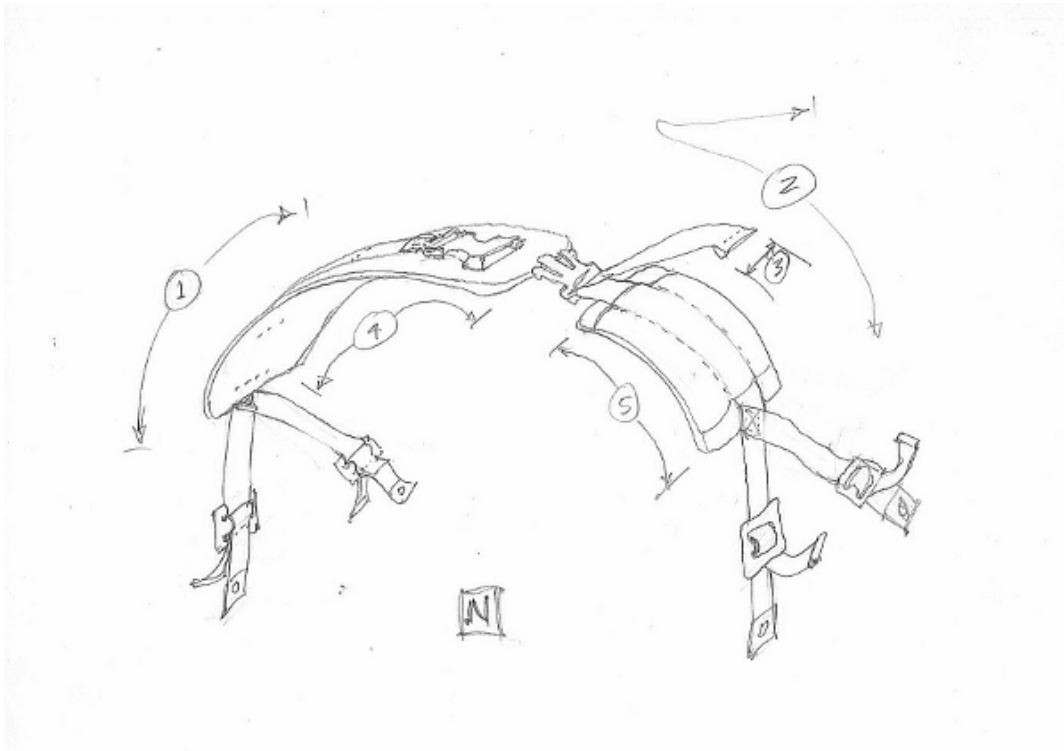
L14 = 130



M Shoulder strap / chest strap combination

The chest strap can be used without the shoulder straps. Shoulder straps can be threaded to be closer together or further apart at the center and receptacle buckles (not shown) can be placed at different locations at the top of the back support depending on the users needs. Dimensions for two sizes are shown.

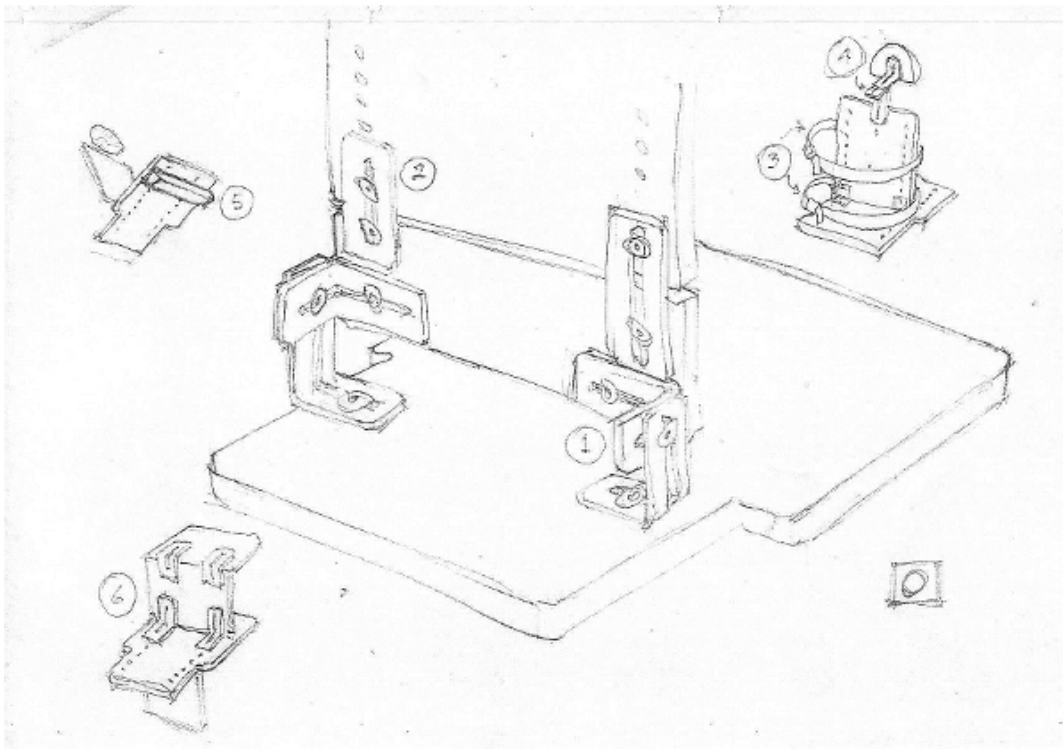
- M1 = 500, 650
- M2 = 400, 500
- M3 = 150, 200
- M4 = 50, 75
- M5 = 250, 330
- M6 = 25
- M7 = 760, 900



N Pelvic strap

The pelvic strap can be used with or without the secondary straps (4 point) depending on the support needs of the user. 1 or 1 ½ in. straps and quality plastic buckles can be used. Low quality buckles present a serious safety risk. Dimensions for two sizes are given.

- N1 = 500, 660
- N2 = 660, 760
- N3 = 25, 35
- N4 = 250, 300
- N5 = 200, 250



O Connecting and mounting

Two simple brackets can be used in different combinations to connect supports to each other. In many cases the seat can be placed on top of the existing wheelchair upholstery and secured using two strong 2 inch straps (O3). The seat and back boards can be connected using the holes or slots provided and 4 "L" brackets. Changes to the seat depth can be made easily. A stronger bolting system than the one shown (O1) may be needed. The angle of the seat system within wheelchair can be set with the use of a tilt block, secured to the bottom of the seat board (O5). Footrests can be attached to the bottom of the seat using brackets or a special, adjustable footrest mount can be designed. An adjustable headrest mount can be made with two "L" brackets (O4). The back extension can be secured using a flat bracket (O2). The flat bracket can also be used in other custom solutions (ie, asymmetrical seat depth)