

LABORATORY WOOD CASEWORK AND WORK SURFACES - Section 123553

PART 1 - GENERAL

1.01 DESCRIPTION OF WORK

- A. Work includes, but is not limited to, furnishing and installing the following:
1. Wood laboratory casework manufacturer Kewaunee Scientific Corporation, Signature Series Laboratory Furniture, or approved equal. Base, wall and specialty cabinet units shall be wood only, unless explicitly stated otherwise in writing by the Owner.
 2. Vertical and horizontal service assemblies of plastic laminate or epoxy resin, including reagent shelving.
 3. Fixed and adjustable plastic laminate shelving units.
 4. Worksurfaces of epoxy resin, stainless steel, plastic laminate, or chemical resistant plastic laminate.
 5. Coated modular steel structural support systems.
 6. Unit sinks, service fittings, and electrical housings (not including wire-mold) mounted in or in conjunction with the laboratory furniture, are scheduled and specified in section 115343.
 7. Integral Sinks of the same material as worksurfaces, are included in the work of this section.
 8. Fume hood cabinet base supports are specified in Section 115300 Laboratory Equipment.
 9. Prepare the work for acceptance of sinks, fittings, fixtures, and electrical.
 10. Provide support strut assemblies where shown, called for, or required for a complete assembly.
 11. Provide end, side, and miscellaneous filler panels for a complete assembly and to close off inaccessible spaces. Provide rear panels at all knee spaces unless indicated otherwise.

1.02 RELATED DOCUMENTS

- A. General Bidding and Project Information
- B. Division One - General Requirements
- C. Section 064119 - Custom Casework
- D. Section 096513 - Resilient Base and Accessories
- E. Section 115343 - Laboratory Fittings and Fixtures
- F. Section 115300 - Laboratory Equipment
- G. Section 123553.29 – Steel Strut Frames and Accessories

- H. Division 20, 22, 23 - Mechanical Requirements
- I. Division 26 - Electrical Requirements

1.03 REFERENCE STANDARDS

- A. Architectural Woodwork Institute (AWI), Architectural Woodwork Quality Standards, Guide specifications, and Quality Certification Program, Seventh Edition.
- B. American Society for Testing and Materials (ASTM):
 - 1. A 240 Chromium and Chromium - Nickel Stainless Steel Plate, Sheet, and Strip for Pressure Vessels and for General Applications
 - 2. A 312 Seamless, Welded, and Heavily Cold Worked Austenitic Stainless Steel Pipes
 - 3. D 260 Boiled Linseed Oil
 - 4. D 570 Water Absorption of Plastics
 - 5. D 695 Compressive Properties of Rigid Plastics
 - 6. D 790 Fluctural properties of unreinforced and reinforced plastics and electrical insulating materials.
- C. Builders Hardware Manufacturers Association (BHMA).
- D. National Electrical Manufacturers Association (NEMA).
- E. American National Standards Institute (ANSI).
 - 1. A 135.4 Basic Hardboard
 - 2. A 208.1 Wood Products
- F. American Plywood Association (APA).

1.04 QUALITY ASSURANCE

- A. Laboratory casework and worksurfaces as well as fume hoods, sinks and service fittings and fixtures, shall be furnished by the same supplier for single responsibility.
- B. Laboratory Casework shall be the product of a single manufacturer.
- C. Manufacturer's catalogued model numbers indicated may be for convenience in identifying certain work and to establish standard for design, quality, and workmanship. The use of catalog numbers in the contract documents is not intended to preclude the use of other acceptable manufacturer's products or procedures which may be equivalent. In the case of the listing of manufacturer catalog model numbers, the design and standard of quality required is based upon manufacturer/model first listed. If other listed or non-listed items are accepted by the Owner and utilized, modifications to the design and quality may be necessary, at no additional cost to the Owner.
- D. Location for application of chemical resistant finish shall not be limited to the location, City and State, of the casework Manufacturer.

- E. Laboratory casework installation shall be performed under the continual supervision of a Foreman who is thoroughly trained in the manufacturer's recommended method of installation and who has a minimum of three year's experience in the successful completion of comparable work.

1.05 SUBMITTALS

- A. Refer to Division One, for general requirements.
- B. Submit complete materials list for all raw and manufactured items and indicate country of origin.
 - 1. Provide complete data on finish material. Include chemical resistance chart and application method to assure compliance with specified qualities.
- C. Provide complete manufacturer's full product line catalog for casework. Provide individual catalog cut sheets for hardware items, including manufacturer's name, address and phone number.
- D. Submit complete shop fabrication and installation drawings, including relationship to adjoining materials and construction, details, location of anchorages, location type and rough-ins of service fittings. Drawings shall be done at a scale of no smaller than three-eighths inch equals one foot. Each piece of cabinetry shall be shown fully dimensioned in plan and elevation views and sufficiently annotated to show materials, accessories, fabrication and installation information.
- E. Submit the following samples:
 - 1. Two - 6" x 6" samples of exposed and semi-exposed materials indicated in the drawings and specified herein. Include casework, finish, work-surfaces, service units and shelving.
 - 2. Two - each of locks, door pulls, hinges, and other casework hardware.
 - 3. Full cabinet door finished as per specifications to be used by the University of Washington to chemical-test the finish and will not be returned.
 - 4. Samples and Mock-ups will be retained by the Owner or Architect to ensure that material delivered to job site conforms in every respect to the accepted submittals.
- F. Mock-up
 - 1. When required in the project, provide a Mock-up made in accordance with the specifications, detail drawings, and approved shop drawings. Provide one full-size laboratory casework assembly, which contains a minimum of the following:
 - a. A combination base cabinet with doors and drawers.
 - 2. Mock-up shall include all materials, finishes, hardware and construction details required.
 - 3. The mock-up will be tested independently by the Owner for quality assurance and adherence to the specifications. IF THE MOCK-UP IS FOUND TO BE OF INFERIOR QUALITY OR NOT IN CONFORMANCE TO THE SPECIFICATIONS, OR CONTINUED FAILURE INDICATES NON-CONFORMANCE OF PROJECT DOCUMENTS, CASEWORK IS SUBJECT TO REJECTION FOR USE ON PROJECT.

- G. Submit written certification stating that work is installed per specifications, applicable codes, and standards.
 - 1. Structural calculations, as required, showing conformance to UBC 1997 Table 16-0, including seismic and shelf loading.
 - 2. Independent testing laboratory report on chemical resistance and physical requirements.
 - 3. Submit location, facility, owner, city and state where casework finish is being applied.
- H. Submit casework Foreman's qualifications.
- I. Submit for Owner's review and use, three complete operations and maintenance manuals that describe proper maintenance and replacement schedules, components and parts list. Provide point of contact for factory representative.

1.06 DELIVERY, STORAGE AND HANDLING

- A. Deliver laboratory casework and worksurfaces to job site only after wet operations in construction site are completed and proper facilities are available for handling, storage and protection. Use blanket wrap reusable packing for delivery.
- B. Proper precautions must be taken to minimize temperature, moisture, and impact issues during shipment to site.
- C. Store laboratory casework in a ventilated area, protected from the weather, with relative humidity of 50% or less, at 70 degrees F (22 degrees C).
- D. Replacements: In the event of damage immediately make repairs and replacement necessary for acceptance by the Owner at no change in contract amount.

1.07 PROJECT CONDITIONS

- A. The casework supplier is responsible for details and dimensions not controlled by other sections of the specifications. The laboratory casework installer shall coordinate the work of this section with all other affected trades in advance of installation. Shop drawings shall show field dimensions and conditions as required to successfully install the subsequent installation of other work into the casework.
 - 1. The Contractor, Casework Manufacturer and Installer shall establish and maintain these field dimensions and conditions through completion.

1.08 WARRANTY

- A. Furnish a written warranty covering the work of this section for a period of 2 years from the date of substantial completion against defects or non-conforming materials and/or workmanship. Defects include, but are not limited to:
 - 1. Ruptured, cracked, or stained coating.
 - 2. Weld or structural failure.
 - 3. Slippage, shifts, or failures of connected components, including attachments to wall, floor, ceiling, or building structure.

4. Warping or unloaded deflection of components.
5. Discoloration or lack of finish integrity.
6. Cracking or peeling of finish.
7. De-lamination of plastic laminate or edge banding.
8. Visible weld marks.
9. Sealant deterioration, shrinkage, or failure.

PART 2 - PRODUCTS

2.01 MANUFACTURERS

A. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated in the work include the following:

1. **Advanced Lab Concepts (ALC)**

15900 Bratton Lane
Austin, TX 78727
(Approved Finish: UW-702-01)

Distributor: Saxton, Bradley, Inc.
5701 6th Avenue South, Suite 466
Seattle, WA 98108

Contact: James McDowall
Phone: 206-762-7688

2. **Kewaunee Scientific Corp.**

P. O. Box 5400
Statesville, NC 28687-1842
(Approved Finish: HSF-UW)

Distributor: George Goddard, Inc.
P. O. Box 937
Kirkland, WA 98083

Contact: George Goddard or Luke Miller
Phone: 425-823-8070

3. **Thermo Fisher Scientific Inc.**

1316 18th St.
Two Rivers, WI 54241
(Approved Finishes: University of Washington Finish, #6093, **ONLY for Maple**; Oak is not an approved wood for Thermo Fisher Scientific, Inc)

Distributor: ISEC, Inc.
11807 N. Creek Parkway S., Suite 103
Bothell, WA 98011

Contact: Dave Herzel
Phone: 425-488-1333

2.02 DEFINITIONS

- A. The following definitions apply to casework units:
1. Exposed portions:
 - a. Surfaces visible when doors and drawers are closed, including cabinet sides; finish to match fronts.
 - b. Filler strips and panels.
 - c. Bottoms of cases more than 4'-0" above floor.
 - d. Tops of cases less than 6'-6" above floor.
 - e. Visible front edges of web frames, ends, divisions, tops, shelves, and hanging stiles.
 - f. Visible members in open cases or behind glazed doors.
 - g. Visible portions of bottoms, tops, and ends in front of sliding doors.
 - h. Visible portion of back panel in knees spaces.
 2. Semi-exposed portions:
 - a. Surfaces which become visible when opaque doors/drawers are extended.
 - b. Tops of cases 6'-6" or more above floor.
 - c. Underside of casework less than 4'-0" and more than 2'-6" above floor.
 - d. Interior face of ends, backs and bottoms.
 3. Concealed portions:
 - a. Sleepers, web frames, stretchers, and other surfaces not usually visible after installation.
 - b. Undersides of casework less than 2'-6" above floor.
 - c. Undersides of work-surfaces, knee-spaces, and drawer aprons.
 - d. Flat tops of cabinets 6'-6" or more above the finished floor, except visible from an upper building level.

2.03 WOOD LABORATORY CASEWORK

- A. Casework shall be manufactured in accordance with the latest edition of AWI section 01600 - Division A - Wood Cabinets, as modified on the drawings and the specifications. Manufacturer to note on shop drawings variances to specified requirements. In any case, variances shall be of equal or greater quality than specified requirements.
- B. Exposed Materials:
1. Solid hardwood lumber or hardwood plywood face veneer selected for compatibility of color and graining in conformance with AWI grade 1 rules. Grain pattern shall be vertical for doors and exposed sides/ends. Note: Grain direction on drawer fronts is specified per project, based on matching existing casework or architectural decision. The finished installation must provide an attractive and harmonious appearance.
 2. Provide the following for exposed and semi-exposed solid stock: [Insert Wood Type], plain sliced, clear and selected for color and grain match to contiguous pieces and veneer.

- a. Solid stock to closely match the color and appearance of adjoining materials. Rails to be solid stock. Provide solid stock facing on end panels.
 - 3. Provide the following for Hardwood Veneer: [Insert Wood Type], plain sliced, grade AA, random matched veneers. Provide a minimum 5" to a maximum 8" wide veneer flitch. Apply veneer to hardwood plywood or other specified substrate as required for transparent finish. **Particleboard and MDF are not permitted substrates.**
 - a. 5 or 7-ply veneer core plywood or solid core is permitted for doors and drawer front.
 - b. 5 or 7-ply veneer core plywood is required for main box construction. No particleboard or MDF substrate allowed in box.
 - 4. Do not use exposed faces of lighter-than-average color joined with exposed faces of darker-than-average color. Do not use two adjacent faces or filler strips, which are noticeably dissimilar in grain, figure, and natural character markings.
- C. Semi-Exposed Materials:
 - 1. Solid Lumber: Dry, sound per AWI grade II rules selected to eliminate appearance defects. Any species of hardwood, or softwood of similar color and grain, to exposed portions.
 - 2. Structural vertical rails are to be solid hardwood. Boxed frames to be hardwood.
 - 3. Plywood: Five or Seven ply veneer core plywood, per AWI grade II.
 - 4. **Particleboard/plywood composites will not be allowed.**
- D. Concealed Members and Veneer Substrate:
 - 1. Solid Lumber or hardwood Plywood: Any species, with no defects affecting strength or utility. Per AWI grade III.
 - 2. Medium Density Fiberboard: 60 LB, 3/4" minimum thickness.
 - 3. Hardboard: ANSI A135.4, Class I, tempered, 1/8" minimum thickness.
 - 4. Not permitted: Particle Board or composite particleboard/plywood is not permitted.
- E. Glass: Tempered float glass without imperfections and with unmarred surfaces. If any portion of glass is 5'-0" or more above finished floor it shall be laminated safety glass.

2.04 WOOD LABORATORY CASEWORK FINISH

- A. Work Surface Preparation:

Prior to application of the wood finish, case and cabinet surfaces shall be smoothly sanded to remove loose fibers, scratch marks and abrasions, with all dust thoroughly removed by compressed air.
- B. Wood Finish Application:

Finishes shall be applied under controlled atmospheric conditions, and shall be cured after application in a modern humidified oven at 140° F and 30% relative humidity.

 - 1. Exterior and interior finish to be applied after all holes and cutouts have been made, to ensure all surfaces, are covered.

2. Hardware to be installed after finish is applied, so that no unfinished surface exists on the casework.
- C. Interior Wood Casework Finish:
Interior surfaces and unexposed exteriors shall receive a double-pass coat of resinous wood sealer.
- D. Exterior Wood Casework Finish:
Case and cabinet exposed exterior surfaces, including interiors of glazed cases and open shelving, shall be provided with a smooth, semi-gloss acid, alkali, solvent, water and abrasion resistant finish. Surfaces shall be first double-coated with a non-fiber lifting stain, or toner to secure the desired color. The color coats shall be thoroughly dried. The first sealer coat shall be applied, thoroughly dried, sanded and carefully dusted. A second sealer coat shall be applied and thoroughly dried. A double pass coat of chemical resistant synthetic finish shall then be applied and thoroughly dried, providing a semi-gloss finish. The completed case and cabinet exterior finish shall meet the performance test requirements specified under PERFORMANCE TEST RESULTS. Factory finished casework and its test results shall be in accordance with AWI Quality Standard Section 1500-T-14 to the following finish designation: AWI Finish System – Catalyzed Polyurethane – Premium Grade. Color and degree of gloss as selected by Architect.
- E. Performance Test Rating:
Terms referred to in PERFORMANCE TEST RESULTS are as follows:
1. "A" (Excellent) - NO CHANGE TO CASEWORK FINISH.
 2. "B" (Good) - Indicates good to very good integrity of finish film. Allows change of gloss or discoloration. Any effect can be removed from the tested area by abrading with 325-mesh silica powder and water, indicating that the discoloration is only superficial and that the finish film is good below the surface.
- F. Performance Test Results (Chemical Spot Tests):
Chemical spot tests shall be made by applying 5 drops of each reagent to the surface to be tested. Each reagent (except those marked **) shall be covered with a 1-1/4" diameter inverted watch glass, (bubble side up) to totally confine the reagent. Spot tests of volatile solvents marked ** shall be tested as follows: A 1" ball of cotton shall be saturated with solvent and placed on the surface to be tested. The cotton ball shall then be covered by an inverted 2-ounce wide-mouth bottle to retard evaporation. All spot tests shall be conducted in such a manner that the test surface is kept wet throughout the entire test period, and at a temperature of 73° F +/- 3° F. At the end of the test period, the reagents shall be flushed from the surface with water, and the surface scrubbed with a soft bristle brush under running water, rinsed and dried. Volatile solvent test areas shall be cleaned with a cotton swab soaked in the solvent used on the test area.

	<u>REAGENT*</u>	<u>RATINGS</u>	<u>TEST TIME</u>
1.	Acetone**	Excellent	60 minutes
2.	Ammonium Hydroxide 28%	Excellent	60 minutes
3.	Benzene**	Excellent	60 minutes
4.	Carbon Tetrachloride**	Excellent	60 minutes
5.	Ethyl Acetate**	Excellent	60 minutes

6.	Ethyl Alcohol**	Excellent	60 minutes
7.	Ethyl Ether**	Excellent	60 minutes
8.	Glacial Acetic Acid, 99%	Excellent	60 minutes
9.	Hydrochloric Acid, 37%	Excellent	60 minutes
10.	Methanol**	Excellent	60 minutes
11.	Methyl Ethyl Keytone**	Excellent	60 minutes
12.	Naphtha**	Excellent	60 minutes
13.	Nitric Acid, 30%	Excellent	60 minutes
14.	Phosphoric Acid, 75%	Excellent	60 minutes
15.	Potassium Hydroxide, 40%	Excellent	60 minutes
16.	Sodium Hydroxide, 40%	Excellent	60 minutes
17.	Sodium Hydroxide, 10%	Excellent	60 minutes
18.	Sulfuric Acid, 70%	Excellent	60 minutes
19.	Toluene**	Excellent	60 minutes

* Where concentrations are indicated, percentages are by weight

** Indicates that these solvents are tested with cotton and jar method

- G. Performance Test Results (Heat Resistance):
Hot water (190° F - 205° F) shall be allowed to trickle on the finished surface, which shall be set at an angle of 45° from horizontal, for a period of ONE HOUR. After cooling and wiping dry, the finish shall show no visible effect from the hot water treatment.
- H. Performance Test Results (Moisture Resistance):
A cellulose sponge (2" x 3" x 1") shall be soaked with water and placed on the finished surface for a period of 100 hours. The sponge shall be maintained in a wet condition throughout the entire test period. At the end of the test period, the surface shall be dried and no visible effect shall be shown on the finish.
- I. Performance Test Results (Impact Resistance):
A 1-LB. Ball (approximately 2" diameter) shall be dropped from a distance of 1-ft. onto the finished surface of a 3/4" thick plywood panel supported underneath by a solid surface. There shall be no evidence of cracks or checks in the finish due to impact upon close examination.

2.05 WOOD CASEWORK HARDWARE AND ACCESSORIES

- A. Provide manufacturer's standard, modified as noted, satin finish hardware units.
- B. All hardware is installed **after** box, box drawer, or door has final chemical-resistant finish coats, to ensure a complete finish seal for all parts.
- C. Hinges: Institutional grade, 5 knuckle stainless steel, examples of manufacturers – A.L. Liebhan or Dortec. Provide one pair for doors less than 4 feet high and 1-1/2 pair for doors over 4 feet.
- D. Pulls: Chemical resistant (clear coating or anodizing of aluminum is acceptable) solid stainless steel or aluminum, surface mounted or recessed (not machined nor attached to the edge of drawers or doors) for drawers and swing doors, through-bolt from back face. For sliding doors, provide recessed flush pulls, harmonizing with other pulls.

Provide 2 pulls for drawers 24 inches and over in width. Use of plastic pulls or other types subject to breakage will not be accepted. Pulls shall meet State and Federal Handicapped Accessibility Regulations.

- E. Door Catches: Roller spring actuated or self-aligning magnet type, minimum seven pound pull, with metal strike plates. Provide 2 catches on doors over five feet high. Catches permitting rebound opening, not acceptable.
- F. Drawer Roller Slides: Provide a quiet smooth operation of corrosion-resistant 100 pound capacity, full-extension ball bearing roller slides on drawers, 150-pound capacity on drawers over 30 inches wide. Standard of quality to be Accuride No. 3832-SC (full extension and self-closing), Accuride No. 3640 for drawers over 36" wide at 100 LB. Rating. Use corresponding quality on other slide applications. Drawer shall self-close when opened a nominal 5 inches. Incorporate drawer stop to prevent drawer contact with back of cabinet. The slide shall permit easy removal of drawer without the use of tools and yet prevent inadvertent drawer removal. Hardwood keels and guides are not acceptable.
- G. Adjustable Shelf Supports: Stainless steel, mortise mounted or pin and socket type with four 1/4" diameter x 3/8" long pins in a shelf clip with shelf notched for clip, to provide horizontal and vertical restraint. Similar to TMI universal shelf clip #1990.
- H. Hasps: Chemical resistant coated steel or stainless steel. Surface mount with opening for insertion of owner supplied lock.
- I. Locks: Only where shown or specified, shall be Master Key System.
 - 1. 5-tumbler, heavy-duty cylinder type with 225 primary key changes in master keyed groups. Exposed nose shall be stain nickel-plated and stamped with identifying numbers. Two keys shall be furnished with each keyed different lock or lock series. Supply two master keys with each system. Key shall be 3/32 inch-thick minimum, stamped brass. Keys easily distorted or broken are not acceptable. Keys shall be available from manufacturer or registered locksmiths only. Coordinate with Owner's keying requirements.
- J. Cabinet Base Molding: Refer to Division 9.
- K. Leg Shoes: Provide on table legs, unless otherwise noted. To be extruded vinyl rubber, black to conceal leveling device.
- L. File Followers: Letter size, minimum mounted plate size of 7-1/2 " x 10-1/2 " track may be recessed. Plastic components not acceptable. Provide in drawers indicated as "file".
- M. Floor Glides: Movable legged tables shall have non-marking material at least 1-1/2 " diameter integral with a 5/8" leveling device. Metal buttons are not acceptable.
- N. Tracks: Tracks for sliding doors to be corrosion resistant. Hangers shall be adjustable. Bottom track to have clean out opening at each end. Nylon guides to be provided as necessary.
- O. Liner: Where noted, liner shall be chemically resistant, inorganic, and non-asbestos with high structural stability, non-combustible, and high impact resistance. Seal between all panels or provide a single piece insert.

2.06 FABRICATION OF LABORATORY WOOD CASEWORK

- A. Casework Style: *[If to match existing; list style number.]*
- B. Casework Type: Plant fabricate to dimension, profiles, and details in individual units of the widths indicated, as independent and removable units. Each unit shall be complete such that units can be relocated at any subsequent time without requiring field application of finished ends or other such parts.
- C. Joinery: All cabinet members shall be securely fastened together, by methods listed below. All joints shall be securely glued. Casework shall be assembled square and true, with a tolerance not to exceed 1/32" difference in measurement at top versus bottom, and 1/16" in diagonal measurement. For Laboratory Grades at option of the manufacturer, construction joinery shall be as follows:
 - 1. Dadoes, or lock joints, plows or rabbets.
 - 2. Doweled joints, a minimum of (2)-dowels per joint, 32MM on center. All dowel-construction shall be glued and clamped.
 - 3. "Confirmat" type screws: Maximum of 37MM from each end with subsequent screws being spaced 128MM on center. Glue is not required with this system.
 - 4. "Lamello" type jointing plates: The plate shall be a maximum of (2)-inches from the edge or end to the center of the plate. Subsequent plates shall be spaced a maximum of (6)-inches on center. All joints shall be glued and clamped.
 - 5. "Mod-eez" type fastening systems: The fasteners shall be a maximum of 16" on center and 4" from any edge or end. They shall be fastened with number 10 full thread sheet metal screws for cabinet body construction. Glue is not required with this system.
 - 6. No exposed fastening is permitted except for access panels.
 - 7. Edges of exposed Portions: Blind or stop dadoes are required.
 - 8. Ends, Divisions and Compartment Separations: Cabinet ends are required. Exposed ends shall be rabbeted or plowed to receive backs if used. Drawer compartments shall be separated from shelf or open compartments by a solid vertical division unless design or usage prevents. A solid division shall occur behind all vertical face frame members or hanging files.
- D. Standard Construction
 - 1. Base Cabinets:

All cabinet end panels shall be 3/4" thick, 7-ply [Insert Wood Type] plywood and 3/4" x 1/8" thick [Insert Wood Type] facing. End panels shall be multiple doweled, glued and/or screwed to top frame members, intermediate rails and bottoms. Cabinet backs shall be 1/4" thick tempered hardboard dadoed into end panels and bottoms and securely fastened. Cupboard bottoms shall be 3/4" thick, 7-ply [Insert Wood Type] plywood with 3/4" x 1/8" [Insert Wood Type] facing on front edge. All cupboard base units shall have full-width adjustable shelves, 3/4" thick, 7-ply [Insert Wood type] plywood with [Insert Wood Type] facing on exposed edge, use 1" thick shelves if over 36" in width. Integrally joined parts shall result in a totally enclosed cabinet. The following frame sizes and material shall be considered a basic construction:

 - a. Furnish security panels between all lockable doors and drawers as required.
 - b. All cabinet end panels to be finished for purpose of future relocation.

- c. Intermediate rails shall be 3-1/4" x 3/4", 7-ply [Insert Wood Type] with 3/4" x 1/8" thick [Insert Wood Type] facing on exposed edge. Rails shall be multiple doweled and glued to end panels. Intermediate rails will be mounted at the front between the drawers and between all drawers and doors.
 - d. Adjustable stainless steel leveling glides shall be provided on all corners of base cabinets. All glides to be easily accessible.
 - e. Top Horizontal Frame:
Front top rail shall be two pieces of hardwood grooved and glued together. The exposed member will be 1-1/4" x 7/16" [Insert Wood Type]. The unexposed member shall be 2-1/2" x 3/4" hardwood. Slide member shall be 1-3/4" x 3/4" hardwood and shall be mortised and glued into front and back rails and screwed into sides. Rear member shall be 2-1/2" x 3/4" hardwood.
 - f. Drawers:
Drawer sides shall be 1/2" thick, 7 or 9-ply [Insert Wood Type] plywood. Drawer heads shall be 3/4" thick, 5-ply solid core plywood. A glue and dovetailed joint shall be used to attach the drawer head to the sides on all drawers over 3" in depth. A mortise and tenon joint shall be used for shallow drawers. The drawer back shall be dadoed, glued and nailed into the sides. Drawer bottoms shall be 1/4" thick tempered hardboard, set and glued into 1/4" grooves, four sides.
2. Special Purpose Base Cabinets:
- a. Sliding Door Base Cabinet:
Construction and material shall be the same as for base cabinets except top frame and bottom shall be designed for sliding doors.
3. Full Height Sliding Door Cases:
- a. Cases shall be designed and integrally constructed for full enclosure to assure dust proofing of the case interior. All exposed woods shall be [Insert Wood Type]. All end panels shall be 3/4" thick [Insert Wood Type] with a 3/4" x 1/8" [Insert Wood Type] hardwood facing. Tops for open or glazed doors shall be 3/4" thick [Insert Wood Type] plywood, multiple doweled into end panels, secured with glue and countersunk screws. The top in solid door cases shall be 3/4" thick [Insert Wood Type]. A 2'1/4" x 3/4" [Insert Wood Type] hardwood fascia is applied to conceal the overhead sliding-door suspension system. A double extruded aluminum track shall be attached to the case top for the sliding door suspension system. All doors shall be suspended from an adjustable hanger and glide on nylon roller wheels. An aluminum U-channel is located on the case bottom to guide the bottom of the doors. Panel doors shall be 1" thick, solid hardwood core plywood. Glazed doors shall have 3-3'16" x 1" thick [Insert Wood Type] framing, mortised, tenoned, and glued. Glass shall be set into door frame and secured with a plastic retainer. Doors shall be removable without use of tools, and so designed to prevent by-passing. Shelves, exposed to view, shall be 3/4" thick [Insert Wood Type] plywood with an [Insert Wood Type] banding on exposed edge, use 1" thick over 36" in width; unexposed shelves shall be 3/4" thick [Insert Wood Type] plywood with an [Insert Wood Type] banding, use 1" thick over 36" in width. To assure a completely rigid case, the center shelf is structurally joined to

the end panels and glued. All other shelves are adjustable on 32MM centers utilizing support system described under 2.01 H.10.

- b. Case bottoms shall be 3/4" thick [Insert Wood Type] plywood, exposed to view, or 3/4" thick [Insert Wood Type] plywood, unexposed, multiple doweled and glued securely to end panels. Glue blocks, 3" long, shall further support and strengthen all joints. All cases 22" in depth shall have 3/4" thick [Insert Wood Type] plywood bottom with a 3/4" x 1/8" thick [Insert Wood Type] hardwood facing, and a 3/4" x 4" hardwood plywood toe space rail to form a 2-1/2 " deep x 4" high totally enclosed toe space. Twelve inch (12") and 16" deep cases will use a 1" x 4-3/4" solid [Insert Wood Type] base rail mounted flush with the face of the case. The backs in open and glazed door cases shall be 1/4" [Insert Wood Type] plywood while the back not exposed to view shall be 1/4" tempered hardboard. Case interior shall be flush. A 2-1/2 " x 4" high totally enclosed toe space shall be same as for base units.
4. Full Height Swinging Door Cases:
General construction features shall be the same as for sliding door cases except for the following: Doors shall either be solid hardwood core panel or glass framed, hung on 1-1/2 pair of 2-1/2 " long offset type institutional hinges. Swinging doors shall overlap opening four sides; astragal applied to left hand door shall provide further dust proofing.
5. Counter-Mounted or Wall-Hung Sliding Door Cases:
Construction and materials shall be the same as for full height type cases with the following exceptions. Panel doors shall be 3/4" thick, solid hardwood core, under 48" in height, and 1" solid hardwood core, hardwood framed for 48" high cases. Glass framed doors shall be 3/4" thick with 3-3/16" wide solid [Insert Wood Type] framing under 48" in height, and 1" thick by 3-3/16" solid [Insert Wood type] framing for 48" high cases. Solid glass doors shall be 1/4" thick float glass with polished edges and ground finger groove. Doors shall set in an aluminum bottom framing containing roller bearings and held in position with an aluminum guide at the top of the case.
6. Counter Mounted or Wall-Hung Swinging Door Cases:
Construction and materials shall be the same as for sliding door cases with the following exception: Panel or glass framed doors shall be hung on 1 pair of offset, institutional type hinges under 48" in height. Doors on cases 48" high shall have 1-1/2 pair of offset, institutional type hinges. All doors shall overlap opening four sides, with an astragal applied to left hand door providing additional dust proofing.

2.07 PLASTIC LAMINATE WORKSURFACES

- A. Definitions
 1. Work surfaces: Horizontal countertop panels supported by base cabinets or other separate support system and include built-up curbs and bridges, service pedestals, and back splashes. When specified, integral sinks shall form a continuous part of the worksurface.
- B. Standard of Quality: Conform with WIC Premium Laboratory Grade Section 17, and AWI Section 1600, as modified herein.

- C. Plastic laminate worksurfaces consist of panels of MDF or hardwood plywood material covered with chemical resistant high-pressure plastic laminate bonded to substrate uniformly plane and free of defects. Exposed edge and corners to be uniformly chamfered. Provide in continuous sheets, to the greatest length possible. If joints are necessary, provide at junction of casework units. Sheet sections shall be joined end to end without fasteners, forming a hairline seam. No joints will be allowed within 24" of sink edges.
- D. Panel Construction: Horizontal substrate shall be exterior grade 5 or 7-ply, hardwood, plywood or marine grade MDF or 60 LB medium density fiberboard, 1-1/8 inch thick for work surfaces and 3/4 inch thick for all other applications. Substrate must be sealed for waterproofing at all cutouts for sinks or other equipment. Panels shall be pre-edged with matching laminate, or polyvinylchloride (PVC) 3 MM thick solid color edge banding if indicated, typical for exposed and semi-exposed edges. Premium edge required: vertical edge-banding applied before horizontal plastic laminate. For worksurfaces provide front and end panel overhang of 1 inch relative to outer cabinet face (beyond face of doors or drawers in flush construction), formed with continuous 1/8 inch by 1/8 inch drip kerf, 3/8 inch in from panel front edge and coated with chemical resistant sealer. All tops to have a sealed drip groove added to the bottom front edge.
- E. Supports: Worksurfaces shall be supported by base cabinets, modular steel component support systems, separate end support panels or combinations of all types. Where base cabinet or workbench-jointing forms a "box" void, such as at wall junctions, provide additional floor supported panels the full end width or remaining length of unsupported sections. Where base cabinet unit terminates with knee space and apron, provide continuous full width end supports. Steel angle wall shelf-type supports attached to steel stud or concrete partitions are not acceptable unless indicated. In situations where the opening exceeds 48", provide leg supports.
- F. Back splashes, built-up curbs and bridges: Provide worksurfaces with continuous 4-inch high back splashes at all backs, and sides adjoining building walls unless indicated otherwise. Back splashes shall be butt-joined to worksurfaces unless indicated to be coved. Back splashes shall align with work surface below. Built-up curbs shall match back splash height. Horizontal bridge pieces spanning back-to-back curbs shall overhang curbs uniformly by at least 3 inches.
- G. Laminate color and pattern selection shall be by Architect. Architect shall have full discretion to make selection from either of manufacturer's full range of standard product lines complying with chemical resistance requirements.
- H. Provide flexible chemical resistant sealant and sealer per work surface manufacturer's recommendations.
- I. Chemical Resistant Plastic Laminate: Provide Wilsonart (Chemsurf), Formica, Laminart, or equal, meeting NEMA LD 3 requirements. Laminate will show essentially no effect when the following chemicals are left in contact for a period of 16-hours using the same testing methods as used on the Casework finish:

Chemical spot tests shall be made by applying 5 drops of each reagent to the surface to be tested. Each reagent (except those marked **) shall be covered with a 1-1/4" diameter inverted watch glass, (bubble side up) to totally confine the reagent. Spot tests of volatile solvents marked ** shall be tested as follows: A 1" ball of cotton shall

be saturated with solvent and placed on the surface to be tested. The cotton ball shall then be covered by an inverted 2-ounce wide mouth bottle to retard evaporation. All spot tests shall be conducted in such a manner that the test surface is kept wet throughout the entire test period, and at a temperature of 77° F +/- 3° F. At the end of the test period, the reagents shall be flushed from the surface with water, rinsed and dried. Volatile solvent test areas shall be cleaned with a cotton swab soaked in the solvent used on the test area. Immediately prior to evaluation, 16 hours after the reagents are removed, the test surface shall be scrubbed with a damp paper towel and dried with paper towels.

ACIDS

Acetic Acid	98%
Citric Acid	10%
Hydrochloric Acid	37%
Formic Acid	90%
Nitric Acid	30%
Sulfuric Acid	77%
Perchloric Acid	60%
Phosphoric Acid	85%
Phenol Acid	85%

SOLVENTS

- Acetone
- Amyl Alcohol
- Benzene
- Carbon Tetrachloride
- Chloroform
- Dioxane
- Ethyl Acetate
- Ethyl Alcohol
- Ethyl Ether
- Ethylacetoacetate
- Formaldehyde
- Furfural
- Gasoline
- Kerosene
- Naphtha
- Toluene
- Trichlorethylene
- Xylene

ALKALIES

Ammonium Hydroxide	28%
Sodium Carbonate, Saturated	

SALTS

Calcium Hypochlorite, Saturated	
Potassium Permanganate	
Sodium Bisulfate	
Sodium Chloride	
Zinc Chloride	
Silver Nitrate	1%

OTHER REAGENTS

Cresol
Chlorobenzene
Detergent
Hydrogen Peroxide
Iodine, 1% in Alcohol
Mercurochrome
Mineral Oil
Urea 6.6%

- J. Plastic Thickness and Grade: Meet requirements of NEMA LD3.
1. Typical Horizontal Surfaces: 0.050-inch, GP 50.
 2. Typical Vertical Surfaces: 0.030-inch, GP 28.
 3. Typical Post-forming Surfaces: 0.043-inch, PF 42.
 4. Edges: Same as Horizontal surface, or 3nr PVC Edge where indicated.
 5. Backing Sheets: 0.020-inch, BK 20.
- K. Adhesive for Plastic Laminate: As recommended by plastic laminate manufacture, chemical resistant.

2.08 STAINLESS STEEL WORKSURFACES

- A. Definitions
1. See PLASTIC LAMINATE WORKSURFACES, above, for definitions.
- B. Materials
1. Stainless steel shall be type 316L per ASTM A240.
 2. Exposed surfaces shall be a No. 4 satin finish. Stainless steel nuts, screws, bolts, and rivets, etc., shall be of equivalent stainless steel as in the sheet material and shall have a tumbled finish closely resembling that of the worksurface.
- C. Construction
1. Stainless steel welding material shall be of type similar to the sheet material or a richer quality. Joints in stainless steel tops shall be welded. Welds shall be made without discoloration and shall be ground, polished, and blended harmoniously with the worksurface finish.
 2. Worksurface shall be 16-gauge minimum. Stainless steel sides and back-splashes, where indicated, shall be integrally welded work-surface top and finished as indicated. Edges shall be flanged down the same dimension as adjacent non-stainless worksurface with 1 inch being minimum and returned minimum 72 inch over wood core to simplify securing top material to cabinet or structural frame. Under-surface shall be reinforced with 16-gauge steel channels as required to ensure rigidity and prevent bucking, warping, or oil canning. Underside of top shall have a heavy mastic agent coating and/or exterior grade plywood providing sound deadening. The backside of exposed backsplashes shall be finished to match front and sides.

3. Worksurface shall be fabricated with a marine edge at sink units and shall be pitched to sink bowl for proper drainage. Marine edges shall be seamless die-formed. Other work-surfaces shall have a plain edge, unless otherwise noted.
4. Sink bowls shall be integral within work-surface, minimum 16-gauge Stainless steel, unless otherwise noted. Sink units shall be designed and fabricated with sufficient reinforcement to prevent oil canning. Sink joints shall be butt-welded ground smooth, and polished to the same finish as work-surface. Inside radii shall be 1 inch. Bottoms shall be pitched to the drain indent. No soldering will be permitted in connection with sink construction. Sink bowl dimensions given are inside dimensions.

2.09 EPOXY RESIN WORKSURFACES

A. Definitions

1. See PLASTIC LAMINATE WORKSURFACES, above, for definitions.

B. General

1. Modified epoxy resin shall be a uniform mixture throughout, non-glaring and uniform in color. Worksurface shall be 1 inch thick with drip grooves provided on the underside at exposed edges. Exposed edges, except as indicated, shall be rounded to a 1/8 inch radius. Curbs may be one inch thickness or greater, epoxy bonded to the surface of the top to form a square joint, separate cove piece not acceptable. Sink cutouts shall be smooth and uniform without saw marks with the top and bottom edge having a uniform radius of approximately 1/8-inch. Corners of sink cutouts shall be radiused not less than 1 inch.
2. Marine Edges; unless indicated otherwise, provide marine edges for all worksurfaces containing sinks. Indented worksurfaces shall be 1 inch thick at outer edge, indented 1/8" inch to provide a raised rim 1-inch wide around exposed edges. The front top edge of the raised rim and exposed vertical corners of the top shall be rounded to a 1/8-inch radius. The juncture between the raised rim and the top surface shall be coved to a 1/4 inch radius.
3. Joints shall be made with fastening devices and cement having the same properties as the bench-top.
4. Integral epoxy resin sinks, where indicated, shall be fabricated of the same material and performance qualities as worksurface. Color shall be black or match worksurface, as indicated. Sinks shall be recessed into worksurface sink cutout by routing a rabbeted edge such that the sink edge is contiguous and smooth with worksurface. Liquids shall drain freely from worksurface into sink. Sink interior corners shall be coved and sink bottom shall be warped to positively drain to outlet. Support sinks by a minimum of two 11-gauge stainless steel channels 1" x 2", extending across width of cabinet and attached to 3/8" diameter threaded hanger rods. Supports shall have a chemical resistant finish.

C. Physical Properties

Flexural Strength (ASTM Method D790)	14,900 PSI
Compressive Strength (ASTM Method D695)	34,500 PSI
Hardness, Rockwell M (ASTM Method D78)	100
Water Absorption (ASTM Method D570) % by weight, 25 hours	0.03
Specific Gravity	1.97
Tensile Strength	8,500 PSI

- D. Submit an independent testing laboratory report certifying that the countertop is capable of meeting the performance and physical test criteria.
1. No Effect: No detectable change in working surface material.
 2. Excellent: Slight detectable change in color or gloss, but no change to the function or life of the working surface material.
 3. Good: A clearly discernible change in color or gloss, but no significant impairment of working surface function or life.
 4. Objectionable: Change in appearance due to surface discoloration or etch possibly resulting in deterioration of function over an extended period of time.
 5. Not Acceptable: Pitting, cratering or erosion of working surface material. Obvious and significant deterioration.
- E. Physical Test. A high form porcelain crucible, size 0, 15 ml capacity, shall be heated over a Bunsen burner until the crucible bottom attains an incipient red heat. Immediately, the hot crucible shall be transferred to the top surface and allowed to cool to room temperature. Upon removal of the cooled crucible, there shall be no blisters, cracks or any breakdown of the worksurface.
- F. Performance Test Procedure: Tests shall be made by applying 5 drops of each reagent to the surface to be tested. Each reagent shall be covered by an inverted watch glass (bubble side up) to totally cover the reagent, except volatile solvents shall have the reagent applied to a cotton ball, which in turn is covered by an inverted 2 ounce wide mouth bottle to retard evaporation. Reagents shall be allowed to remain on the surface for 24 hours, and the tests shall be conducted in such manner that the testing surface is kept wet throughout the entire test period. After the time allowed for the test has elapsed, the surface shall be washed with naphtha, detergent, and water, rinsed and dried before examination and evaluation. Do not mix reagents.

Chemical spot tests shall be made by applying 5 drops of each reagent to the surface to be tested. Each reagent (except those marked **) shall be covered with a 1-1/4" diameter inverted watch glass, (bubble side up) to totally confine the reagent. Spot tests of volatile solvents marked ** shall be tested as follows: A 1" ball of cotton shall be saturated with solvent and placed on the surface to be tested. The cotton ball shall then be covered by an inverted 2-ounce wide mouth bottle to retard evaporation. All spot tests shall be conducted in such a manner that the test surface is kept wet throughout the entire test period, and at a temperature of 77° F +/- 3° F. At the end of the test period, the reagents shall be flushed from the surface with water, rinsed and dried. Volatile solvent test areas shall be cleaned with a cotton swab soaked in the solvent used on the test area. Immediately prior to evaluation, 16 to 24 hours after the reagents are removed, the test surface shall be scrubbed with a damp paper towel and dried with paper towels.

G. Performance Test:

<u>REAGENT</u>		<u>RATING</u>
Hydrochloric Acid	37%	Excellent
Sulfuric Acid	33%	Excellent
Sulfuric Acid	77%	Excellent
Sulfuric Acid	96%	Non Acceptable
Formic Acid	90%	Excellent
Nitric Acid	20%	Excellent
Nitric Acid	30%	Excellent

Nitric Acid	70%	Good
Hydrofluoric Acid	48%	Objectionable
Phosphoric Acid	85%	No Effect
Chromic Acid	60%	Not Acceptable
Acetic Acid	98%	Excellent
Ammonium Hydroxide	28%	No Effect
Sodium Hydroxide	40%	Excellent
Sodium Sulfide		Excellent
Methylene Chloride		Excellent
Zinc Chloride		No Effect
Tincture of Iodine		Excellent
Silver Nitrate	10%	Good
Methyl Alcohol		No Effect
Ethyl Alcohol		No Effect
Butyl Alcohol		No Effect
Benzene		Excellent
Xylene		No Effect
Toluene		Excellent
Gasoline		No Effect
Dichlor Acetic Acid		Good
Dichlormethane		Good
Di Methyl Formamide		Excellent
Ethyl Acetate		Excellent
Amyl Acetate		Excellent
Acetone		Excellent
Chloroform		Excellent
Carbon Tetrachloride		No Effect
Phenol		Excellent
Cresol		Excellent
Formaldehyde		No Effect
Trichlorethylene		Excellent
Ethyl Ether		Excellent
Furfura		Good
Methylene Chloride		Excellent
Mono Chlor Benzene		Good
Dioxene		Excellent
Methyl Ethyl Ketone		Excellent
Acid Dichromate		Objectionable
Hydrogen Peroxide	3%	Excellent
Naphthalene		Excellent

2.10 SERVICE ASSEMBLIES

A. Definitions

1. Service Assemblies: Include vertical plumbing columns (also referred to as "umbilicals") and horizontal panel bulkheads. Service units generally occur above worksurfaces supported by wall cabinets or other separate support structure. Service units provide locations for plumbing and electrical fixtures and reagent shelving. Single sided at wall, or double-sided island/peninsula units as indicated.

B. General: Service assemblies shall be balanced construction.

- C. Service assemblies noted to be chemical resistant plastic laminate shall be, as per other portions of this section. Color and pattern, as selected by Architect, to be from manufacturer's standard color line, complying with chemical resistance requirements. Exposed sides shall be covered by chemical resistant plastic laminate. Semi-exposed edges and edges concealed by intersections of panels shall be covered in chemical resistant plastic laminate. Exposed edges shall be covered in color matched 3MM PVC edge-banding.
- D. Service assemblies noted to be epoxy shall be as described.
- E. Provide adjustable shelf supports of corrosion resistant or chemical resistant coated steel, mortise mounted or pin and socket type with a minimum of four 1/4" diameter x 3/8" long pins in a shelf clip with shelf notched for clip or fastened to shelf to provide horizontal and vertical restraint, similar to TMI Universal Shelf Clip #1990.
- F. Fasteners to be concealed prior to application of facing as much as possible. Where exposed use slotted, flat head zinc or stainless steel.
- G. Provide seismic restraining lip on open shelves and on top of assemblies that are 5'-0" or more above finished floor. Lip to be same as for SHELVING as specified elsewhere in this Section.
- H. Provide fasteners to secure to supporting structure to meet seismic requirements.

2.11 SHELVING, STANDARDS, AND BRACKETS

- A. Manufacturers: Knape-Vogt (KV), Spur, Republic, or approved equal. Product based on Knape-Vogt, for convenience purposes only.
- B. Product characteristics:
 1. Design Loads: System shall support a minimum of 100 pounds per square foot. Space supports to achieve design loads, with a maximum spacing of supports to be 32 inches.
 2. Standards: KV 85 Series (double slot). Spaced to achieve design loading.
 3. Brackets: KV 185, with KV 106 shelf rest. Where two shelves abut, use two brackets and standards. Do not splice on the bracket. Shelf side bracket, where noted to consist of 16 gauge, furniture steel, painted to match shelf with epoxy paint, unless otherwise noted. May be sized for shelf support in lieu of shelf bracket.
 4. Finish: Brackets and standards shall be pre-finished epoxy paint, color as selected by Architect.
 5. Shelves: Maximum shelf length without a separation joint shall be eight (8) feet unless otherwise noted.
 - a. Plastic Laminate: Both sides and all edges covered by chemical resistant plastic laminate, as per other portions of this section. Color and pattern as selected by Architect from manufacturer's standard color line.
 - b. Wood: Minimum 1-inch thick 7-ply hardwood, with APA rated Grade B face veneers, both faces and edges to be edge banded. Chemical resistant finish as per other portions of this section.

6. Provide seismic restraining lip on open shelves and on top of assemblies that are 5'-0" or more above finished floor. Restraining lip shall consist of a continuous strip of 1/4" solid clear acrylic sheet material with all edges polished smooth. Height shall be as necessary to extend 1/8" below shelf bottom and 1-1/2 " above shelf top. Fasteners shall be flat head stainless steel screws countersunk flush into surface of acrylic
OR
A 1/4" OD aluminum rod and post design, with the bottom of the horizontal rod running 1-1/2 " above the shelf top. Vertical posts located in shelf corners and every 18" to support rod.
7. Provide Fasteners to meet seismic requirements.

2.12 UNISTRUT (See Section 123553.29 – Steel Strut Frames and Accessories)

- A. Approved Manufacturer's: Unistrut, Power Strut, or approved equal.
- B. Design Loads: System shall support a minimum of 100 pounds per square foot and be sufficiently anchored to floor and ceiling structure to resist seismic forces. Space supports to achieve design loads, with a maximum spacing of supports to be 32".
- C. Standards: Unistrut P 1000 or approved equal, unless otherwise noted.
- D. Brackets: Unistrut P 2491 through P 2503, or approved equal, as required, unless otherwise noted.
- E. Finish: Brackets and standards shall be pre-finished epoxy paint, color as selected by Architect.
- F. Configuration of support members: Unless indicated otherwise, freestanding support structures for peninsula assemblies shall extend from floor structure to floor structure (above) and anchored at both ends. Back-to-back Unistrut P 5501 (2-1/2 inch depth) for primary vertical supports and single P 1000 for secondary supports. Vertical supports shall be a minimum of six feet on center.
- G. Shelves: Maximum shelf length without a separation joint shall be eight (8) feet, unless otherwise noted.
 1. Plastic Laminate: Shall have both sides and all edges covered by chemical resistant plastic laminate, as per other portions of this section. Color and pattern as selected by Architect from manufacturer's standard color line.
 2. Epoxy resin: Shall be a uniform mixture throughout, non-glaring, color selected by Architect, per other portions of this Section. Supplier to verify thickness with spans of support.
 3. Support spacing for open shelving shall be not less than 32" o.c. the lateral spacing of the primary countertop support system.
- H. Provide seismic restraining lip on open shelves and on top of assemblies that are 5'-0" or more above finished floor. Restraining lip shall be consisting of a continuous strip of 1/4" solid clear acrylic sheet material with all edges polished smooth. Height shall be as necessary to extend 1/8" below shelf bottom and 1-1/2 " above shelf top. Fasteners shall be flat head stainless screws countersunk flush into surface of acrylic
OR

A 1/4" OD aluminum rod and post design, with the bottom of the horizontal rod running 1-1/2 " above the shelf top. Vertical posts located in shelf corners and every 18" to support rod.

- I. Provide fasteners to comply with seismic requirements.
- J. Provide end-caps on both ends of all vertical tube supports.

2.13 PEGBOARDS

- A. Pegboards shall be of size noted, or if not noted shall be at least 2 feet by 2 feet. Board shall be of epoxy resin or stainless steel coated with chemical resistant finish, color to match worksurface, on all faces and edges. Pegs shall be of coated stainless steel or polypropylene, protruding 6 inches at 45° angle. Base of peg shall be inserted into pegboard. Pegs shall not be bonded into the board but shall be held in by mechanical design with easy removal and replacement by hand. Pegs shall be in pattern as accepted in mock-up and/or submittal, but no less than six pegs per square foot.
- B. Drip Trough shall be fastened to pegboard with stainless steel fasteners and be 20-gauge type 304 stainless steel. The design shall provide for pitch to the front to assure full drainage. A 3/8-inch stainless steel tube outlet and flexible drain tube extending to the sink shall be provided.
- C. Where noted, Peg Extenders shall be same material as pegs and shall slip over the end of a peg to extend the length by 2-3/4 inches.
- D. Where noted, Support Pegs shall be same material as pegs and shall protrude at 90 degrees for 4 inches and the upward for 1 inch.
- E. Graduated and funnel rack shall be 20-gauge stainless steel, same length as pegboard, by 12" deep with an integral shelf above rack.

2.14 ACCESSORIES

- A. Towel Dispenser: Bobrick #B-262 (surface mounted), #B-3190 (recessed) or approved equal.
- B. Soap Dispenser: Bobrick #B-111 or approved equal.

2.15 FABRICATION

- A. General:
 - 1. Coordinate countertops with laboratory frames and casework. Provide all mounting fasteners and accessories.
 - 2. Fabricate laboratory tops to sizes, shapes, profile, and details as shown on Drawings. Make all seams tight and "invisible" and finish all exposed edges and cutout holes to match the color and appearance of the top. The countertops shall appear to be monolithic.
 - 3. Assemble units in the shop in as large components as practical to minimize field jointing.

4. All countertops shall have 1" overhang at front and 2" overhang on the underside of the front edge.
 5. Provide all cutouts for sinks, fittings, and utilities as shown on drawings.
- B. Epoxy Countertops:
1. Comply with manufacturers requirements.
 2. Fabricate epoxy tops to sizes and profiles required. Fabricate with drip groove as shown on the Drawings. Finish exposed edges of cutouts to match the appearance of the top.
 3. Provide dished tops at sinks, as shown.
 4. Provide cup sink cut out and chemically adhere cup sink flush with the countertop.

PART 3 - EXECUTION

3.01 SURFACE CONDITIONS

- A. Prior to installation of the work of this section, carefully examine the installed work of others and verify that such work is complete to the point where this installation may properly commence.
- B. Proceed with work when conditions will permit work to be installed in complete accordance with the original design, accepted submittals, and the manufacturer's printed instruction.
- C. In the event of discrepancy, immediately notify the Architect in writing. Do not proceed with installation in areas of discrepancy until such discrepancies have been resolved.

3.02 INSTALLATION

- A. Install, plumb, level, true and straight with no distortions. Shim as required, using non-corrosive concealed shims. Scribe work as necessary for close and accurate fit. Provide closure strips where necessary of same material and finish as casework, hem or ease edges. Utilize concealed fasteners, unless other fastening is acceptable to Architect in writing. Install wood casework per AWI requirements and WIC Section 26 as modified herein.
- B. Where required, assemble units into one integral unit with joints flush, tight, and uniform. Align similar adjoining units to a tolerance of 1/16 inch.
- C. Installation to meet seismic requirements.
- D. Set base cabinets straight, plumb, and level. Adjust sub-tops within 1/16 inch of a single plane. DO NOT screw continuous cabinets together.
- E. Wall Units:
 1. Verify that required backing and reinforcement necessary to support wall-mounted units is in place, secure and accurately located.
 2. Securely fasten to solid supporting material, not plaster, lath, or wallboard. Anchor, adjust, and align wall cabinets as specified for base cabinets.

- F. Adjust units and hardware so that doors and drawers operate smoothly without warp or bind. Lubricate operating hardware as recommended by manufacturer.

3.03 WORKSURFACE INSTALLATION

- A. Where applicable, make field joining in same manner as factory jointing using dowels, splines, adhesives, and fasteners recommended by manufacturer. Locate field joints as shown on accepted drawings, factory prepared so that there is no job-site processing of top and edge surfaces.
- B. Abut top and edge surface in one true plane, with internal supports placed to prevent any deflection. Provide flush hairline joints in top units using clamping devices. Where worksurface is intended to be movable use a clamping device that is removable.
- C. Secure tops to support with concealed "Z" type, angel-type or equal fastening devices spaced no more than 2 feet on center, with one located within 5" of front and back edge.
- D. Countersink exposed heads, approximately 1/8 inch and plug flush with material equal in chemical resistance, color, hardness, and texture to adjoining surface.
- E. Provide holes and cutouts as required for equipment and mechanical and electric service fittings and fixtures. Verify size of opening with actual size of item to be used, prior to making openings. Form inside corners to a radius of not less than 1/8 inch. After cutting rout and file cutouts to ensure smooth, crack-free edges. Seal exposed edges after cutting with a chemical resistant sealer recommended by the manufacturer.

3.04 INSTALLATION OF ACCESSORIES

- A. Install in a precise manner in accordance with manufacturer's directions. Turn screws to a flat seat; do not drive. Adjust moving parts to operate freely without excessive bind.

3.05 CLEANING

- A. Repair or remove and replace defective or damaged work as acceptable to the Architect at no change in contract amount.
- B. Clean finished units, including wiping out of drawers and cabinets shelves.
- C. Clean counter tops with diluted dishwashing liquid and water, leaving tops free of grease and streaks. Use no wax or oils.

3.06 PROTECTION

- A. Protect against soiling and deterioration during remainder of construction period.

- B. Protect work-surfaces throughout construction period with corrugated cardboard or equal completely covering the top and securely taped to edges. Mark cardboard in large lettering "No Standing or Loading".
- C. Advise Contractor of Procedures and precautions for protection of materials and installed laboratory casework from damage by work of other trades.

END OF SECTION