

SECTION 12 31 00
MANUFACTURED METAL CASEWORK

PART 1 - GENERAL

1.1 DESCRIPTION

- A. This section specifies manufactured, modular metal casework including related components and accessories, including fixed and moveable base cabinets, wall cabinets, full height cabinets, shelves integral with metal casework, and independent shelves.
1. Includes, but is not limited to, the following stainless steel casework:
 - a. Base and wall cabinets in Glass Wash 2P163, ~~RAD Lab 3P165~~, Diag 4P302C, Necropsy 4P307, Enviro Proc 4P313A, X-Ray 4P318A, Gown/Prep 4P318B, OR Sup 4P318D, Iso Holding 4P320B, and Treat 4P321, 4P322, 4P329, and 4P333.
 - b. All metal countertops.
 - c. Independent Shelves: Designated by Drawing Coded Note 225.
 - d. Other:
 - 1) Free-Standing, adjustable height laboratory tables including:
 - a) Laboratory areas on 2nd, 3rd, and 4th Floors levels.
 - 2) Elsewhere metal casework indicated.
 - e. Provide Flammables and Acid Storage Cabinets beneath laboratory fume hoods. See Section 11 53 13, Laboratory Fume Hoods, including unit types, sizes, and locations.
 2. Include Pans for Acid Neutralization Tanks.
 3. Countertops specified elsewhere but provided herein:
 - a. Include countertops supported by bases provided under this Section.
 - b. Include baseless countertops in proximity with work of this Section.
 4. Work shall meet the physical compliance requirements and intent of the following:
 - a. AAALAC Handbook of Facilities Planning - Volume 2 Laboratory Animal Facilities.
 - 1) Work shall facilitate the Government's pursuit of AAALAC compliance certification.
 - b. NRC Guide for the Care and Use of Laboratory Animals.
- B. Work designated on the Drawings with a boxed, alpha-numeric Casework Type Tag (see Interior Elevations Legends such as on Sheet 1AI200) is included in the following Sections:
1. Section 12 31 00, Manufactured Metal Casework. Tag example: A3030.
 2. Section 12 32 00, Manufactured Wood Casework. Tag example: A3030.
 3. Section 12 35 53, Manufactured Laboratory Casework. Tag example: La3030.

1.2 RELATED WORK

- A. Steel studs 1.2 mm (0.047 inch, 18 gage) and heavier: Section 05 40 00, Cold-Formed Metal Framing.
- B. Wood furring, blocking, shims, and hanging strips required for installing woodwork and concealed within other construction before woodwork installation: Section 06 10 00, Rough Carpentry.

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- C. Architectural Woodwork Casework: Section 06 40 00, Architectural Woodwork.
 - D. Appearance of Finishes: Section 09 06 00, Schedule for Finishes.
 - E. Steel studs less than 1.2 mm (0.047 inch, 18 gage) and backing plates for wall mounted items: Section 09 22 16, Non-Structural Metal Framing.
 - F. Metal Shelves related to Toilet Accessories: Section 10 28 00.
 - G. Laboratory Fume Hoods: Section 11 53 13.
 - H. Other Manufactured Casework:
 - 1. Manufactured Wood Casework: Section 12 32 00.
 - 2. Manufactured Laboratory Casework: Section 12 35 53.
 - I. Countertops for Manufactured Metal Casework are specified in Section 12 36 00 but provided under Section 12 31 00.
 - J. Pegboards in proximity with Manufactured Metal Casework are specified in Section 12 36 00 but provided under Section 12 31 00.
 - K. Plumbing components and requirements not specified in Section 12 31 00: Division 22, PLUMBING.
 - L. Electrical components and requirements not specified in Section 12 31 00: Division 26, ELECTRICAL.
- 1.3 SUBMITTALS
- A. Submit in accordance with Section 01 33 23, Shop Drawings, Product Data, and Samples.
 - B. Certificates:
 - 1. Manufacturer's Certificate of qualifications specified and finish on casework.
 - 2. Contractor's Certificate of installer's qualifications specified.
 - 3. Safety glass meets requirements of ANSI Standard Z97.1.
 - C. Manufacturer's Literature and Data: For each type of product including:
 - 1. Brochures showing name and address of manufacturer, and catalog or model number of each item incorporated into the work.
 - 2. Manufacturer's illustration and detailed description.
 - 3. List of deviations from Contract specifications.
 - 4. Locks.
 - D. Shop Drawings:
 - 1. Half Scale: Show the following:
 - a. Details of casework construction, including kinds of materials and finish, hardware, accessories and relation to finish of adjacent construction, including specially fabricated items or components.
 - b. Fastenings and method of installation.
 - c. Location of service connections and access.

- d. Pans provided under this Section for Acid Neutralization Tanks provided under Division 22. Obtain necessary information from Division 22 trade contractor to coordinate pan sizes and locations; include evidence of coordination with Division 22 work.
 2. Quarter Scale: Show casework locations and relation to other materials.
- E. Samples:
1. Metal plate, 150 mm (six inch) square, showing chemical resistant finish, in each color.
 2. One complete casework assembly, including cabinet(s) with drawers and cupboard.
 3. One glazed sliding door with track and pertinent hardware. A complete cabinet may be submitted to fulfill this requirement.
 4. Cabinets for subsequent installation may be submitted for above requirements.

1.4 QUALITY ASSURANCE

- A. Approval by Contracting Officer is required of manufacturer and installer based upon certification of qualifications specified.
- B. Manufacturer's Qualifications:
1. Manufacturer is regularly engaged in design and manufacture of modular casework, casework components and accessories of scope and type similar to requirements of this project for a period of not less than 5 years.
 2. Manufacturer has successfully completed at least 3 projects of scope and type similar to requirements of this project.
- C. Installer Qualifications:
1. Installer is approved by the casework manufacturer.
 2. Installer has completed at least 3 projects in last 5 years in which these products were installed.
 3. Installer has technical qualifications, experience, trained personnel, and facilities to install specified items.
 4. Furnish supervision of installation at construction site by a qualified technician regularly employed by casework installer.
- D. Preinstallation Conference: Conduct conference at Project site to comply with requirements in Division 01 Section "Project Management and Coordination."

1.5 PROJECT CONDITIONS

- A. Environmental Limitations: Do not deliver or install casework until building is enclosed, wet work is complete, and HVAC system is operating and maintaining temperature and relative humidity at occupancy levels during the remainder of the construction period.
- B. Field Measurements: Where casework is indicated to fit to other construction, verify dimensions of other construction by field measurements before fabrication, and indicate measurements on Shop Drawings. Coordinate fabrication schedule with construction progress to avoid delaying the Work.
1. Locate concealed framing, blocking, and reinforcements that support work of this Section by field measurements before being enclosed, and indicate measurements on Shop Drawings.

2. Established Dimensions: Where field measurements cannot be made without delaying the Work, establish dimensions and proceed with fabrication without field measurements. Provide allowance for trimming at site, and coordinate construction to ensure that actual dimensions correspond to established dimensions.

1.6 COORDINATION

- A. Coordinate sizes and locations of framing, blocking, furring, reinforcements, and other related units of Work specified in other Sections to ensure that interior casework can be supported and installed as indicated.

1.7 APPLICABLE PUBLICATIONS

- A. Publications listed below form a part of this specification to extent referenced. Publications may be referenced in the text by basic designation only. Comply with latest editions unless otherwise indicated.
- A. American National Standard Institute (ANSI):
 1. Z97.1 Safety Glazing Material used In Buildings
- B. American Society for Testing and Materials (ASTM):
 1. A36 Carbon Structural Steel
 2. A240 Standard Specification for Chromium and Chromium-Nickel Stainless Steel Plate, Sheet, and Strip for Pressure Vessels and for General Applications
 3. A283 Low and Intermediate Tensile Strength Carbon Steel Plates
 4. A366 Commercial Steel (CS), Carbon, Cold-Rolled-Replaced by ASTM A1008/A1008M
 5. A568 Steel, Sheet, Carbon and High-Strength, Low-Alloy Hot-Rolled and Cold-Rolled, General Requirements
 6. B456 Electrodeposited Coatings of Copper Plus Nickel Plus Chromium and Nickel Plus Chromium
 7. C1036 Flat Glass
- C. Builders Hardware Manufacturers Association (ANSI/BHMA):
 1. A156.1 Butts and Hinges
 2. A156.9 Cabinet Hardware
 3. A156.5 Auxiliary Locks and Associated Products
 4. A156.11 Cabinet Locks
 5. A156.16 Auxiliary Hardware
- D. American Welding Society (AWS):
 1. D1.1 Structural Welding Code Steel
 2. D1.3 Structural Welding Code Sheet Steel
- E. Association for Accreditation of Laboratory Animal Care International (AAALAC):
 1. Handbook of Facilities Planning - Volume 2 Laboratory Animal Facilities
- F. Federal Specifications (Fed. Spec.; FS):

1. FF-N-836D Nut, Square, Hexagon Cap, Slotted, Castle Knurled, Welding and Single Ball Seat
 2. A-A-55615 Shield, Expansion; Nail Expansion (Wood Screw and Lag Bolt Self-Threading Anchors)
- G. National Association of Architectural Metal Manufacturers (NAAMM):
1. AMP 500-505 Series Metal Finishes Manual
- H. National Research Council (NRC):
1. Guide for the Care and Use of Laboratory Animals
- I. National Sanitation Foundation (NSF):
1. 30 Cabinetry and Laboratory Furniture for Hospitals

PART 2 - PRODUCTS

2.1 MATERIALS

- A. Sheet Steel:
1. ASTM A366, cold rolled, Class 1 finish, stretcher leveled.
 2. Other types of cold rolled steel meeting requirements of ASTM A568 may be used for concealed parts.
- B. Structural Steel: ASTM A283 or ASTM A36.
- C. Stainless Steel: ASTM A240, Type 316 alloy.
- D. Glass:
1. ASTM C1036 Type I, Class 1, Quality q3,
 2. For shelves: Either 6 mm (1/4 inch) or 9 mm (3/8 inch) thick as appropriate for the conditions.
 3. For Doors and Elsewhere Laminated Glass Indicated: Fabricate of two sheets of 3 mm (1/8 inch) thick clear glass, laminated together with a 1.5 mm (0.060 inch) thick vinyl interlayer, to a total overall thickness of 8 mm (5/16 inch).
 4. Glazing Cushions:
 - a. Channel shaped, of rubber, vinyl or polyethylene plastic, with vertical flanges not less than 2 mm (3/32 inch) thick and horizontal web 3 mm (1/8 inch) thick.
 - b. Flanges may have bulbous terminals above the glazing heads or terminate flush with top of beads.
- E. Fasteners:
1. Exposed to view, chrome plated steel or stainless steel, or finished to match adjacent surface.
 2. Use round head or countersunk fasteners where exposed in cabinets.
 3. Expansion Bolts: Fed Spec. A-A-55615. Do not use lead or plastic shields.
 4. Nuts: Fed Spec FF-N-836. Type III, Style 15 where exposed.
 5. Sex Bolts: Capable of supporting twice the load.

2.2 MANUFACTURED UNITS & SYSTEMS

A. General:

1. When two or more units are required, use products of one manufacturer.
2. Manufacturer of equipment assemblies, which include components made by another, shall assume complete responsibility for the final assembled unit.
3. Constituent parts which are alike, use products of a single manufacturer.

B. Manufacturers/Models: Subject to compliance with the requirements, manufacturers offering Manufactured Metal Casework systems include, but are not limited to, the following:

1. Primary Systems:
 - a. Basis of Design: Thermo Scientific Hamilton (MAX/Lab, MAX/Lab Mobile, and Inset Steel).
 - b. Kewaunee (Research Collection Steel Laboratory Furniture).
 - c. Mott Manufacturing (Inset Design Painted Steel Casework).
 - d. Others: Manufacturers offering similar products meeting the requirements are not excluded.
2. Freestanding, Adjustable Height Tables:
 - a. Basis of Design: Fisher Scientific "Discovery Tables": #S67145MF Base with #S67147MF (grey) epoxy top; powder coat finish.
3. Secondary Units:
 - a. Basis of Design: Bobrick; www.bobrick.com.
 - b. Bradley.
 - c. ASI.
 - d. Others: Manufacturers offering similar products meeting the requirements are not excluded.

C. Independent Shelves:

1. General:
 - a. Wall mounted.
 - b. Stainless steel; meet or exceed Bobrick Models B-298 (8 inches deep) and B-2915 (15 inches deep).
 - c. Shelves to be capable of supporting a uniform load of 50 lbs/sq. ft. plus a concentrated load of 200 lbs applied at any point in any direction.
2. Metal Thickness (minimum): 1.2 mm shelf and 1.6 mm brackets. Increase as necessary to support required loads and to ensure welds neat, uniform, smooth, flush with parent metal, and blended to be invisible in completed work exposed to view.
3. Fabricate to sizes and configurations indicated in one piece lengths; 3/4 inch hemmed return edges.
4. Round and finish smooth projecting corners of shelves and edge corners of brackets. Drill brackets for 6 mm (1/4-inch) anchor bolts.
5. Brackets welded to shelves.

2.3 ACCESSORIES

A. Card or Label Holders for Shelves:

1. Fabricate of 0.6 mm (0.0239 inch) thick steel approximately 125 mm (five inches) long, or continuous where shown, having top and bottom edges bent over on face and welded to shelf.
2. Finish exposed surfaces in same color as shelf.

B. Labels Holders for Doors and Drawers:

1. Cast or wrought brass or aluminum, 50 mm (2 inch) by 88 mm (3-1/2 inch).
2. Fasten to casework as recommended by manufacturer.

2.4 HARDWARE

A. Factory installed.

B. Exposed hardware, except as specified otherwise, satin finished chromium plated brass or nickel plated brass or anodized aluminum.

C. Cabinet Locks:

1. Lock Quantity and Locations: Provide for 50 percent of storage units and at locations directed by Resident Engineer.
2. Locked pair of hinged door over 900 mm (36 inches) high:
 - a. ANSI/BHMA A156.5, similar to E0261, Key one side.
 - b. On active leaf use three-point locking device, consisting of two steel rods and lever controlled cam at lock, to operate by lever having lock cylinder housed therein.
 - c. On inactive leaf use dummy lever of same design.
 - d. Provide keeper holes for locking device rods and cam.
 - e. Use two point locking device both doors of cabinet 6D similar to ANSI/BHAMA E0251, Key one side.
3. Door and Drawer: ANSI/BHMA A156.11 cam locks.
 - a. Drawer and Hinged Door up to 900 mm (36 inches) high: E07261.
 - b. Pin-tumbler, cylinder type lock with not less than four pins. Disc tumbler lock "duo A" with brass working parts and case, as manufactured by Illinois Lock Company are acceptable.
 - c. Sliding Door: E07161.
4. Key locks differently for each type casework and master key for each service.
 - a. Key drug locker inner door different from outer door.
 - b. Provide two keys per lock.
 - c. Provide six master keys per service or Nursing Unit.
5. Marking of Locks and Keys:
 - a. Name of manufacturer, or trademark which can readily be identified legibly marked on each lock and key change number marked on exposed face of lock.
 - b. Key change numbers stamped on keys.
 - c. Key change numbers to provide sufficient information for manufacturer to replace key.

D. Cabinet Hardware: ANSI/BHMA A156.9.

1. Door/Drawer Pulls: B02011.
 - a. One for drawers up to 575 mm (23 inches) wide.
 - b. Two for drawers over 575 mm (23 inches) wide.

- c. Sliding door flush pull, each door: B02201.
2. Door in seismic zones: B03352.
 - a. Do not provide thumb latch on doors equipped with three point locking device.
 - b. Use lever operated two point latching device on paired doors over 900 mm (36 inches) high if three point locking or latching device is not used.
3. Cabinet Door Catch:
 - a. Install at bottom of wall cabinets, top of base cabinets and top and bottom of full height cabinet doors over 1200 mm (48 inches).
 - b. Omit on doors with locks.
4. Drawer Slides:
 - a. B05051 for drawers over 150 mm (6 inches) deep.
 - b. B05052 for drawers 75 to 150 mm (3 to 6 inches) deep.
 - c. B05053 for drawers less than 75 mm (3 inches) deep.
5. Butt Hinges:
 - a. B01351, minimum 1.8 mm (0.072 inch) thick chrome plated steel leaves.
 - b. Minimum 3.5 mm (0.139 inch) diameter stainless steel pins.
 - c. Full mortise type, five knuckle design with 63 mm (2-1/2 inch) high leaves and hospital type tips.
 - d. Two hinges per door except use three hinges on doors 1200 mm (48 inches) and more in height. Use stainless steel leaves for tilting bin doors.
 - e. Do not weld hinges to doors or cabinets.
6. Pivot hinges: ANSI/BHMA A156.1 A875B.
7. Shelf Supports:
 - a. Install in casework where adjustable shelves are noted.
 - b. Adjustable Shelf Standards: B04061 with shelf rest B04081.
 - c. Vertical Slotted Shelf Standard: B04102 with shelf brackets B04112 sized for shelf depth.
8. Sliding Doors:
 - a. Doors supported by two ball bearing bronze or nylon rollers or sheaves riding on a stainless steel track.
 - b. Sliding Door Tracks: B07093. Plastic tracks not acceptable.
 - c. Doors restrained by a nylon, polyvinylchloride, or stainless steel guide at opposite end.
9. Auxiliary Hardware: ANSI/BHMA A156.16.
10. Door silencers: LO3011 or LO3031.
 - a. Install two rubber bumpers each door.
 - b. Silencers set near top and bottom of jamb.
11. Closet Bar: L03131 chrome finish of required length.

2.5 FABRICATION

A. General:

1. Welding: Comply with AWS Standards.
2. Reinforce with angles, channels, and gussets to support intended loads, notch tightly, fit and weld joints.

3. Constructed of sheet steel, except where reinforcing required.

B. Minimum Steel Thickness:

1. 0.89 mm (0.035 inch) (20 gage): Drawer fronts, backs, bodies, closure plates or scribe and filler strips less than 75 mm (three inches) wide, sloping top, shelf reinforcement channel and shelves. Toe space or casework soffits and ceilings under sloping tops.
2. 1.20 mm (0.047 inch) (18 gage): Base pedestals, casework top sides, back, and bottom panels, closure scribe and filler strips 75 mm (three inches) or more. Reinforcement for drawers with locks. Tables legs, spreaders and stretchers, when fabricated of cold rolled tubing. Metal for desks; except legs and aprons. Door exterior and interior panels, flush or glazed. Cross rails of base units. Front bottom rails, back bottom rails; rails may be 1.49 mm (0.059 inch) (16 gage) thick. Uprights or posts. Top corner gussets.
3. 1.49 mm (0.059 inch) (16 gage): Aprons, apron division, reinforcing gussets, table legs, desk legs and aprons, spreaders and stretchers when formed without welding. Toe base gussets, drawer slides, and other metal work. Front top rails and back rails except top back rails may be 1.2 mm (0.047 inch) (18 gage) thick.
4. 1.88 mm (0.074 inch) (14 gage): Drawer runners door tracks.
5. 2.64 mm (0.104 inch) (12 gage): Base unit bottom corner gussets and leg sockets.
6. 3 mm (0.12 inch) (11 gage): Reinforcement for hinge reinforcement inside doors and cabinets.

C. Casework Construction:

1. Welded assembly.
2. Fabricate with enclosed uprights or posts full height or width at front, include sides, backs, bottoms, soffits, ceilings under sloping tops, headers and rail, assembled to form an integral unit.
3. Form sides to make rabbeted stile 19 to 28 mm (3/4 to 1-1/8 inch) wide, closed by channel containing shelf adjustment slots.
4. Make bottom of walls units flush, double panel construction.
5. Make top and cross rails of "U" shaped channel.
6. Provide enclosed backs and bottoms in cabinets, including drawer units.
7. Provide finish panel on exposed cabinet backs.
8. Do not use screws and bolts in construction or assembly of casework, except to secure hardware, applied door stops, accessories, removable panels, and where casework is required to be fastened end-to-end or back-to-back.
9. Fabricate casework, except benches, and desks with finished end panels.
10. Close flush exposed soffits of wall hung shelving, knee spaces in counters, and toe spaces at bases.
11. In base units with sinks provide one piece, lowered backs.
12. In base units with doors provide removable backs.
13. Provide built-in raceways or tubular or channel shaped members of casework for installation of wiring and electric work. Mount junction boxes on rear of cabinets, Electric work is specified in electrical sections of specifications.
14. Provide reinforcing for hardware.
15. Size Dimensions:
 - a. Used dimensions shown or specified within tolerances specified.
 - b. Tolerance:
 - 1) Depth: 325 mm (13 inches) in lieu of 300 mm (12 inches), 450 mm (18 inches) in lieu of 400 mm (16 inches), except wall hung units above counter. 525 mm (21 inches) to 600 mm (24 inches) in lieu of 550 mm (22 inches).
 - 2) Width: Minus 25 mm (one inch).

- 3) Height: 25 mm (one inch) plus or minus for wall hung cabinets and counter mounted cabinets, excluding sloping tops. 25 mm (one inch) plus for floor standing cabinets, excluding base and sloping tops. Full height cabinets shown back to back same height.
- 4) Manufacturer's tolerance for the same length, depth or height: Not to exceed 1.58 mm (0.0625 inches).

D. Floor Supported Base Pedestals:

1. Provide adjustable leveling bolts accessible through stainless steel plugs, or notch in the base concealed when resilient base is applied.
2. Except where flush metal base is shown, provide toe space at front recessed 75 mm (3 inches).

E. Suspended Base Pedestals:

1. Same construction as floor supported pedestal except without toe kick.
2. Provide structural support anchorage that secures pedestal to table frame or work surface at corners but facilitates removal and relocation.

F. Doors:

1. Hollow metal type, flush and glazed doors not less than 16 mm (5/8 inch) thick.
2. Fabricate flush metal doors of two panels formed into pans with corners welded and ground smooth. Provide flush doors with a sound deadening core.
3. Fabricate glazed metal doors with reinforced frame and construct either from one piece of steel, or have separate stiles and rails mitered and welded at corners, and welds ground smooth.
 - a. Secure removable glazing members with screws to back of doors.
 - b. Install glass in rubber or plastic glazing channels.
4. Provide sheet steel hinge reinforcement inside doors.
5. Sliding doors: Provide stops to prevent bypass.
6. Doors removable without use of tools except where equipped with locks.

G. Drawers:

1. Drawer fronts flush hollow metal type not less than 16 mm (5/8 inch) thick with sound deadening core. Fabricate of two panels formed into pans. Weld and grind smooth corners of drawer fronts.
2. Form bodies from one piece of steel, weld to drawer front.
3. Provide reinforcement for locks and provide rubber bumpers at both sides of drawer head to cushion closing.
4. Equip with roller suspension guides.

H. Sloping Tops:

1. Provide sloping tops for casework where shown.
2. Where ceilings interfere with installation of sloping tops. Provide filler plates as specified.
3. Omit sloping tops or filler plates whenever ceiling material is turned down and furred-in at face of casework.
4. Provide exposed ends of sloping tops with flush closures.
5. Fasten sloping tops with sheet metal screws inserted from cabinet interior; space fastener as recommended by manufacturer.

I. Casework Shelves:

1. Capable of supporting an evenly distributed minimum load of 122 kg/m² (twenty-five pounds per square foot) without visible distortion.
 2. Flange shelves down 19 mm (3/4 inch) on edges, with front and bearing edges flanged back 13 mm (1/2 inch).
 3. For shelves over 1050 mm (42 inches) in length and over 300 mm (12 inches) in depth install 38 mm by 13 mm by 0.9 mm (1-1/2 x 1/2 x 0.0359 inch) thick sheet steel hat channel reinforcement welded to underside midway between front and back and extending full length of shelf.
 4. Weld shelves to metal back and ends unless shown adjustable.
 5. Provide means of positive locking shelf in position, and to permit adjustment without use of tools.
- J. Free Standing Adjustable Height Table Frames:
1. Use welded construction.
 2. Open frame type with aprons and legs when required.
 3. Aprons:
 - a. 1-1/2 inch deep front rail and 7 inch deep side and rear rails; channels shapes welded at corners to legs with reinforcing triangular corner gussets welded in corners.
 - b. Fabricate metal components from sheet steel; powder coat finish.
 - 1) Use 1.5 mm (0.0598 inch) thick sheet for gussets and channel aprons.
 - 2) Use 1.2 mm (0.0478 inch) thick sheet for other items.
 - c. Provide intermediate reinforcement members attached to front and rear apron channels at third points.
 4. Legs:
 - a. Cold rolled steel tubing or 0.125 inch thick formed steel outer leg and telescoping cold rolled steel tubing inner leg.
 - b. Leveling-foot/glide device at floor.
 - c. Pin and socket height adjustment on 1 inch (2.5 mm) increments to provide from 30 inch minimum and 38 inch maximum height adjustment.
 - d. Stud bolt at top for attachment to leg socket.
 5. Table Size (Nominal); frame 2 inches less (work surfaces provided elsewhere):
 - a. 36" W x 30" D x 38" H.
 - b. 48" W x 30" D x 38" H.
 - c. 60" W x 30" D x 38" H.
 - d. 72" W x 30" D x 38" H.
- K. Table and Bench Frames:
1. Use welded construction.
 2. Open frame type with aprons and legs when required.
 3. Aprons:
 - a. Channels shaped welded at corners, with leg sockets and reinforcing triangular corner gussets welded in corners.
 - b. Pierce sockets to receive leg bolts and notch gussets to receive legs.
 - c. Upper flange perforated or slotted to receive screws at 200 mm (8 inch) centers, and back channels when installed against wall. Size slots for 6 mm (1/4 inch) anchor bolts.

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- d. Pierce aprons to receive drawer formation, rail at top of drawer opening. Install channel shaped apron division welded at ends, 762 mm 30 inches apart to front and back aprons, or at each side of drawer.
 - e. Fabricate metal components from sheet steel.
 - 1) Use 1.5 mm (0.0598 inch) thick sheet for gussets and channel aprons.
 - 2) Use 1.2 mm (0.0478 inch) thick sheet for other items.
 - f. At knee space, provide exposed metal sides and metal closure plate for soffit. Where shown at knee space, provide exposed metal back secured with continuous angle closures at both side.
- 4. Legs:
 - a. Cold rolled tubing or 1.5 mm (0.0598 inch) formed steel.
 - b. Leveling-anchoring device at floor.
 - c. Stud bolt at top for attachment to leg socket.
 - 5. Leg Braces:
 - a. Tables and benches not anchored to walls.
 - b. Brace back against front legs near bottom with steel angle, channel or tubular braces.
 - c. Fasten braces together with steel straps.
 - 6. Leg Shoes:
 - a. Fit laboratory casework legs at bottom with either stainless steel, aluminum, or chromium plated brass shoes, not less than 25 mm (one inch) in height.
 - b. Fit other legs with a movable molded vinyl shoe 100 mm (four inches) high and coved at bottom.
- L. Acid and Chemical Storage Units:
- 1. Basic construction: Cabinets to be constructed in accordance with the requirements of steel construction to match remaining laboratory furniture elements.
 - 2. Acid and chemical resistant liner: Provide 3/16" thick molded polyethylene lining with coved corners at top, sides and bottom with 1" lip at front cabinet opening on bottom. Doors are to have 1/8" thick liner panels. Include one interior shelf of molded polyethylene with raised edges.
 - 3. Venting: Provide vent access and polyolefin vent pipe at upper rear of cabinet. Extend piping into rear of fume hood enclosure.
- M. Flammable Storage Cabinets: Conform to National Fire Protection Association (NFPA) 30 Standards - "Flammable and Combustible Liquids Code" including construction, details and dimensions.
- 1. Constructed and tested in accordance with FMRC Approval 6050; units shall bear FMRC label.
 - 2. Constructed, tested and UL (Underwriters Laboratories) #1275 listed under "Standards for Flammable Liquid Storage Cabinets"; units shall bear UL 1275 label.
 - 3. Materials and Fabrication:
 - a. Bottom, top, door and sides of the cabinet shall be at least 18-gauge thick, cold rolled sheet metal.
 - b. Construction shall be double walled with a 1-1/2" air space.
 - c. Joints riveted, welded, or of an equally effective construction.
 - d. Doors provided with a three-point locking arrangement and door located at least 2 inches above bottom of cabinet.

- e. Cabinets equipped with optional self-closing doors and fusible link. Auto-latch and door synchronizer incorporated as an integral function of cabinet.
 - f. Means for attaching separate grounding wire at base of cabinet on outside.
 - g. Cabinets may be equipped with upper and lower side vents. Vents shall be arranged so they can be plugged externally but also arranged so that they can be opened for connection to ventilating means.
 - h. If cabinet is vented for whatever reasons, cabinet shall be vented outdoors in such a manner that will not compromise the specified performance of cabinet, as acceptable to the authority having jurisdiction. Ventilation shall provide approximately 10 air changes per hour (3-5 cfm).
 - i. If cabinet not vented, vent openings shall be sealed with plugs supplied with cabinet or with plugs specified by manufacturer of cabinet.
 - j. Mobile cabinets to have vent holes factory plugged with solid back panel. Unit volume shall hold minimal of 18 gallons. Height and width limitations shall be ADA complaint (34" wide x 29-1/4" high x 22" deep). Total dead load of unit shall be 190 lbs. plus a maximum of 100 lbs. live load or 300 lbs. Unit shall be supplied with option of manual or self-closing doors.
4. Fire Endurance Test:
- a. Cabinets shall be subjected to a 10-minute fire test using the standard time-temperature curve specified in the Standards for Fire Tests on Door Assemblies, UL 10B (ASTM E152-81a, NFPA 251) "Standard Methods of Fire Tests of Building Construction and Materials", to not more than 325 degrees F during the fire test. The cabinet shall limit the internal-measured at the center, 1 inch from the top. Joints and seams shall remain tightly closed during this test. No condition shall develop that indicates disintegration of parts or materials likely to affect tightness of closure.
 - b. Production sample of cabinet shall pass loading test in accordance with manufacturer's rated liquid capacity. Loading to be maintained for at least 72 hours. There shall be no (1) opening of seams or joints, (2) permanent distortion or deformation, or (3) interference of door opening, closing or locking as result of test.
5. Markings:
- a. Cabinets marked with company name or identification, model or number designation, and cabinet capacity.
 - b. Cabinets marked "FLAMMABLES – KEEP FIRE AWAY" in letters not less than 2 high and in color contrasting to background.
 - c. Markings shall be legible and durable. Markings shall be provided by stamping, metal name plate, stenciling or painting, or equivalent.
 - d. If cabinets produced at more than one factory, each cabinet shall have distinctive marking to identify it as a product of a particular factory.
 - e. FMRC Approval Sticker and UL Listing Sticker shall be clearly visible upon top interior door panel. Sticker shall be a color contrasting to background.
- N. Closures and Filler Strips at Pipe Spaces:
- 1. Flat steel strips or plates.
 - 2. Openings less than 200 mm (8 inches) wide: 1.2 mm (0.047 inch) thick.
 - 3. Openings more than 200 mm (8 inches wide 0.9 mm (0.359 inches) wide.
- O. Pans for Acid Neutralization Tanks (ANT): Provide seamless pans of same material and finish as bottom of base units. Provide pan openings in the bottom of base units receiving ANTs and recess the pans into the bottom with a 3/4 inch wide integral pan lip overlapping and sealed to

base unit bottom. Provide sizes and locations coordinated under SUBMITTALS in PART 1. Size and locate openings and pans to optimize the following:

1. Base unit strength.
2. Residual base storage space.
3. Clearance above ANT.
4. Base unit leveling and height adjustment capability.
5. Ease of ANT installation, removal, and maintenance.

2.6 METAL FINISHES

- A. Comply with NAAMM AMP 500 series and as specified.
- B. Steel Cabinets including Closures and Filler Strips:
1. Typical: Stainless Steel: Mechanical finish No. 4 on sheet except No. 7 on tubing.
 2. Where Indicated Painted: Acid resisting finish except hardware and stainless steel.
 - a. After fabrication of cabinet submerge in a degreasing bath, and thoroughly rinse to remove dirt and grease, and other foreign matter.
 - b. Apply non-metallic phosphate coating, then finish with baked-on acid resisting enamel not less than one mil thick.
 - c. Finish resistant to action of the following reagents when 10 drops (0.5 cm³) are applied to the surface and left open to the atmosphere for period of one hour.
 - 1) Acetone.
 - 2) Ammonia Hydroxide (concentrated).
 - 3) Carbon Tetrachloride.
 - 4) Ethyl Acetate.
 - 5) Ethyl Alcohol.
 - 6) Ethyl Ether.
 - 7) Formaldehyde 37 percent.
 - 8) Glacial Acetic Acid.
 - 9) Hydrochloric Acid 37 percent.
 - 10) Hydrogen Peroxide 5 percent.
 - 11) Methylene Keytone.
 - 12) Phenol 85 Percent.
 - 13) Phosphoric Acid 75 percent.
 - 14) Sodium Hydroxide (concentrated).
 - 15) Sodium Hydroxide 10 percent.
 - 16) Sulfuric Acid 25 percent.
 - 17) Xylene.
 - d. Surface Appearance (including color of finishes): See Finish Legend in the Drawings and Section 09 06 00, Schedule for Finishes.
- C. Brass:
1. U.S. Standard Finish No. 26 for hardware items.
 2. Other brass items: ASTM B456, chromium plated finish meeting requirements for Service Condition SCI.
- D. Aluminum: Chemically etched medium matte, clear anodic coating, Class II, Architectural, 0.4 mils thick.

2.7 ELECTRICAL FIXTURES

- A. Comply with requirements of Division 26 – ELECTRICAL specifications for fixtures, receptacles, wiring and junction boxes required for fixtures and receptacles, included with casework.
- B. Suitable for use with electrical system specified and shown.
- C. Factory install in casework.

PART 3 - EXECUTION

3.1 COORDINATION

- A. Before installing casework, verify wall and floor surfaces covered by casework have been finished.
- B. Verify location and size of mechanical and electrical services as required.
- C. Verify reinforcement of walls and partitions for support and anchorage of casework.

3.2 FASTENINGS AND ANCHORAGE

- A. Do not anchor to wood ground strips.
- B. Provide hat shape metal spacers where fasteners span gaps or spaces.
- C. Use 6 mm (1/4 inch) diameter toggle or expansion bolts, or other appropriate size and type fastening device for securing casework to walls or floor. Use expansion bolts shields having holding power beyond tensile and shear strength of bolt and breaking strength of bolt head.
- D. Use 6 mm (1/4 inch) diameter hex bolts for securing cabinets together.
- E. Use 6 mm (1/4 inch) by minimum 38 mm (1-1/2 inch) length lag bolt anchorage to wood blocking for concealed fasteners.
- F. Use not less than No. 12 or 14 wood screws with not less than 38 mm (1-1/2 inch) penetration into wood blocking.
- G. Space fastening devices 300 mm (12 inches) on center with minimum of three fasteners in 900 or 1200 mm (three or four foot) unit width.
- H. Anchor floor mounted cabinets with a minimum of four bolts through corner gussets. Anchor bolts may be combined with or separate from leveling device.
- I. Secure cabinets in alignment with hex bolts or other internal fastener devices removable from interior of cabinets without special tools. Do not use fastener devices which require removal of tops for access.
- J. Where units abut end to end anchor together at top and bottom of sides at front and back. Where units are back to back anchor backs together at corners with hex bolts placed inconspicuously inside casework.

- K. Where type, size, or spacing of fastenings is not shown or specified, show on shop drawings proposed fastenings and method of installation.

3.3 CLOSURES AND FILLER PLATES

- A. Close openings larger than 6 mm (1/4 inch) wide between cabinets and adjacent walls with flat, steel closure strips, scribed to required contours, or machined formed steel fillers with returns, and secured with sheet metal screws to tubular or channel members of units, or bolts where exposed on inside.
- B. Where ceilings interfere with installation of sloping tops, omit sloping tops and provide flat steel filler plates.
1. Secure filler plates to casework top members, unless shown otherwise.
 2. Secure filler plates more than 150 mm (six inches) in width top edge to a continuous 25 by 25 mm (one by one inch) 0.889 mm thick steel formed steel angle with screws.
 3. Anchor angle to ceiling with toggle bolts.
- C. Install closure strips at exposed ends of pipe space and offset opening into concealed space.
- D. Paint closure strips and fillers with same finishes as cabinets.
- E. Following Section 07 92 00, JOINT SEALANTS, seal all joints and penetrations to abutting construction to preclude dirt, air, and liquids including, but not limited to, vivarium and laboratory casework, work surfaces, fixed equipment (such as fume hoods), and independent shelves and brackets.

3.4 CABINETS

- A. Install in available space; arranged for safe and convenient operation and maintenance.
- B. Align cabinets for flush joints except where shown otherwise.
- C. Install cabinets level with bottom of wall cabinets in alignment and tops of base cabinets aligned.
- D. Install corner cabinets with hinges on corner side with filler or spacers sufficient to allow opening of drawers.
- E. Plug Buttons:
1. Install plug buttons in predrilled or prepunched perforations not used.
 2. Use chromium plate plug buttons or buttons finish to match adjacent surfaces.

3.5 PROTECTION TO FIXTURES, MATERIALS, AND EQUIPMENT

- A. Tightly cover and protect cabinets against dirt, water, chemical, or mechanical injury.
- B. Thoroughly clean interior and exterior of cabinets at completion of all work.

--- E N D ---

SECTION 12 32 00
MANUFACTURED WOOD CASEWORK

PART 1 - GENERAL

1.1 DESCRIPTION

- A. This section specifies manufactured, modular wood-based casework including related components and accessories required to form integral units. Manufactured wood casework items shown on the drawings, but not specified below shall be included as part of the work under this section, and applicable portions of the specification shall apply to these items. Each like item of casework shall be of the same design and by one manufacturer.
1. Manufactured Wood Casework where indicated.
 2. Included closures at ends of chases.
 3. Plastic laminate-faced soffits.
 4. Countertops specified elsewhere but provided herein:
 - a. Include countertops supported by bases provided under this Section.
 - b. Include baseless countertops in proximity with work of this Section.
 - c. Include risers, curbs, ledges, reagent shelves, and similar components.
 5. Primary finish material of exposed faces includes the following:
 - a. Casework Panels:
 - 1) Typical: Plastic Laminate.
 - 2) Transparent Finished Wood Veneer: Where indicated.
 - b. Countertops:
 - 1) Typical: Epoxy Resin.
 - 2) Other: As indicated.
 6. Include Pans for Acid Neutralization Tanks.
 7. Accessories: Include the following:
 - a. Installation of Owner-Furnished Glove Box Dispensers.
 - b. Other: As specified.
 8. Delegated Design: Design casework on castors to preclude tipping under the following conditions. Engineer the counterweight, including weight, size, shape, and location.
 - a. Door: Any door fully extended (opened 90 degrees) with a 200 pound vertical point load on top of door and ½ inch from edge of door farthest from the cabinet.
 - b. Drawer: Any drawer fully extended and uniformly loaded with 300 pounds.
 9. any drawer or door is in the fully extended position
- B. Work designated on the Drawings with a boxed, alpha-numeric Casework Type Tag (see Interior Elevations Legends in the Drawings) is included in the following Sections:
1. Section 12 31 00, Manufactured Metal Casework. Tag example: A3030.
 2. Section 12 32 00, Manufactured Wood Casework. Tag example: A3030.
 3. Section 12 35 53, Manufactured Laboratory Casework. Tag example: La3030.

1.2 RELATED WORK

- A. Steel studs 1.2 mm (0.047 inch, 18 gage) and heavier: Section 05 40 00, Cold-Formed Metal Framing.
- B. Miscellaneous metal supports including framing, brackets, braces, legs, and similar devices, related to Manufactured Wood Casework:
1. Fabricated: Section 05 50 00, Metal Fabrications.

-
2. Manufactured: Section 12 36 00, Countertops.
 - C. Wood furring, blocking, shims, and hanging strips required for installing woodwork and concealed within other construction before woodwork installation: Section 06 10 00, Rough Carpentry.
 - D. Custom, Architectural Woodwork Casework: Section 06 40 00, Architectural Woodwork.
 - E. Appearance of Finishes: Section 09 06 00, Schedule for Finishes.
 - F. Steel studs less than 1.2 mm (0.047 inch, 18 gage) and backing plates for wall mounted items: Section 09 22 16, Non-Structural Metal Framing.
 - G. Other Manufactured Casework:
 1. Manufactured Metal Casework: Section 12 31 00.
 2. Manufactured Laboratory Casework: Section 12 35 53.
 - H. Countertops for Manufactured Wood Casework are specified in Section 12 36 00 but provided under Section 12 32 00.
 - I. Plumbing components and requirements not specified in Section 12 32 00: Division 22, PLUMBING.
 1. Lavatories and Plumbing in Casework: Section 22 40 00, Plumbing Fixtures.
 - J. Electrical components and requirements not specified in Section 12 32 00: Division 26, ELECTRICAL.

1.3 SUBMITTALS

- A. Submit in accordance with Section 01 33 23, Shop Drawings, Product Data, and Samples.
- B. Manufacturer's Literature and Data: For each type of product including:
 1. Sinks, trim, and fittings.
 2. Locks for doors and drawers.
 3. Adhesive cements.
- C. LEED Submittals:
 1. Product Data for Credit MR 4: For products having recycled content, documentation indicating percentages by weight of postconsumer and preconsumer recycled content. Include statement indicating cost for each product having recycled content.
 2. Certificates for Credit MR 7: Chain-of-custody certificates indicating that work of this Section complies with forest certification requirements. Include documentation, including certified custody number, that manufacturer is certified for chain of custody by an FSC-accredited certification body. Include statement indicating cost for each certified wood product.
- D. Samples: Submit the following samples prior to cabinet fabrication:
 1. Sample Cabinets: Each type; for Architect's review. Show proposed top, door, drawer, shelf, and access panel construction with every type of hardware, access panel, and accessory required. Show proposed construction methods, joinery, materials, and panel thicknesses. Sample shall be reduced overall size (such as 3/2 scale) but with full size components and details.

2. Plywood or Veneer with Transparent Finish: Four sets of two samples each (total of 8), 24 inch x 48 inch, for the specified cuts. Bookmatch veneers on 3/4 inch thick particle board and finish as specified. Each sample within sets to be finished with progressively higher degree of gloss as follows:
 - a. 10 to 20 degree gloss.
 - b. 20 to 30 degree gloss.
 - c. 30 to 40 degree gloss.
 3. Solid Wood with Transparent Finish: After degree of gloss finish is approved, furnish one set of two pieces, solid wood of specified species and cut, 6 inches x 3/4 inches x 18 inches, finished on one side and one edge with the approved transparent finish. Four sets of two samples each (total of 8). Each sample within sets to be finished with progressively higher degree of gloss as follows:
 - a. 10 to 20 degree gloss.
 - b. 20 to 30 degree gloss.
 - c. 30 to 40 degree gloss.
 4. Plastic Laminate: For Architect's selection(s) of appearance and approval of type. Each type proposed; at least 5 inches by 4 inches.
 5. Edgebanding: Each type proposed.
 6. Other Finishes: Furnish samples of all shop finishes required for selection and approval by Architect.
- E. Shop Drawings (1/2 full size):
1. All casework, showing details of construction, including materials, hardware and accessories.
 2. Cabinets and counters showing faucets in connection with sink bowls, and electrical fixtures and receptacles which are mounted on cabinets and counters.
 3. Fastenings and method of installation.
 4. Pans provided under this Section for Acid Neutralization Tanks provided under Division 22. Obtain necessary information from Division 22 trade contractor to coordinate pan sizes and locations; include evidence of coordination with Division 22 work.
- F. Mock-Up: Where required for special casework and where four or more similar units are involved, submit a mock-up of a typical unit for approval by resident engineer.

1.4 QUALITY ASSURANCE

- A. Approval by Contracting Officer is required of manufacturer and installer based upon certification of qualifications specified.
- B. Manufacturer's Qualifications:
1. Manufacturer is regularly engaged in design and manufacture of modular wood-based casework, casework components and accessories of scope and type similar to requirements of this project for a period of not less than 5 years.
 2. Manufacturer has successfully completed at least 3 projects of scope and type similar to requirements of this project.
- C. Installer Qualifications:
1. Installer is approved by the casework manufacturer.
 2. Installer has completed at least 3 projects in last 5 years in which these products were installed.
 3. Installer has technical qualifications, experience, trained personnel, and facilities to install specified items.

4. Furnish supervision of installation at construction site by a qualified technician regularly employed by casework installer.

- D. Fire-Test-Response Characteristics: Where fire-retardant materials or products are indicated, provide materials and products with specified fire-test-response characteristics as determined by testing identical products per test method indicated by UL, ITS, or another testing and inspecting agency acceptable to authorities having jurisdiction. Identify with appropriate markings of applicable testing and inspecting agency in the form of separable paper label or, where required by authorities having jurisdiction, imprint on surfaces of materials that will be concealed from view after installation.
- E. Preinstallation Conference: Conduct conference at Project site to comply with requirements in Division 01 Section "Project Management and Coordination."

1.5 PROJECT CONDITIONS

- A. Environmental Limitations: Do not deliver or install casework until building is enclosed, wet work is complete, and HVAC system is operating and maintaining temperature and relative humidity at occupancy levels during the remainder of the construction period.
- B. Field Measurements: Where casework is indicated to fit to other construction, verify dimensions of other construction by field measurements before fabrication, and indicate measurements on Shop Drawings. Coordinate fabrication schedule with construction progress to avoid delaying the Work.
 1. Locate concealed framing, blocking, and reinforcements that support work of this Section by field measurements before being enclosed, and indicate measurements on Shop Drawings.
 2. Established Dimensions: Where field measurements cannot be made without delaying the Work, establish dimensions and proceed with fabrication without field measurements. Provide allowance for trimming at site, and coordinate construction to ensure that actual dimensions correspond to established dimensions.

1.6 COORDINATION

- A. Coordinate sizes and locations of framing, blocking, furring, reinforcements, and other related units of Work specified in other Sections to ensure that interior casework can be supported and installed as indicated.

1.7 APPLICABLE PUBLICATIONS

- A. Publications listed below form a part of this specification to extent referenced. Publications may be referenced in the text by basic designation only. Comply with latest editions unless otherwise indicated.
- B. American Society of Mechanical Engineers (ASME):
 1. A112.18.1 Plumbing Fixture Fittings.
- C. American Society for Testing and Materials (ASTM):
 1. A240 Standard Specification for Chromium and Chromium-Nickel Stainless Steel Plate, Sheet, and Strip for Pressure Vessels and for General Applications
 2. A1008 Steel, Sheet, Cold-Rolled, Carbon, Structural, High Strength Low Alloy

- D. Architectural Woodwork Institute (AWI):
1. AWS Architectural Woodwork Standards.
- E. Builders Hardware Manufacturers Association (ANSI/BHMA):
1. A156.1-06 Butts and Hinges
 2. A156.9-03 Cabinet Hardware
 3. A156.5-02 Auxiliary Locks and Associated Products
 4. A156.11-04 Cabinet Locks
 5. A156.16-02 Auxiliary Hardware
- F. Composite Panel Association (CPA):
1. A208.1 Particleboard.
- G. Hardwood, Plywood and Veneer Association (HPVA):
1. HP.1 Hardwood and Decorative Plywood
- H. National Electrical Manufacturers Association (NEMA):
1. LD3 High Pressure Decorative Laminates.
 2. Performance, Application Fabrication and Installations of High-Pressure Decorative Laminates.
- I. Uniform Federal Accessibility Standards (UASF).
- J. US Department of Commerce, National Bureau of Standards, Product Standards (DOC, NBS, PS):
1. PS 1 Construction and Industrial Plywood.

PART 2 - PRODUCTS

2.1 PERFORMANCE/DESIGN CRITERIA

- A. Comply with UASF including the following:
1. The force required to activate controls shall be no greater than 5 lbf (22.2 N); see UASF 4.27.4 OPERATION.

2.2 MATERIALS

- A. Plywood, Hardwood Face Veneer:
1. HPVA HP-1, Premium Grade, species and cut to match approved samples of the following:
 - a. Typical: See Section 09 06 00, Schedule for Finishes.
 - b. Other: As indicated on the Drawings; see Section 09 06 00, Schedule for Finishes, and Finish Legend in the Drawings.
- B. Plastic Laminate: Comply with High-Pressure Decorative Laminate specified in Section 06 40 00, Architectural Woodwork, and the following:
1. Exposed decorative surfaces including countertops, both sides of cabinet doors, and for items having plastic laminate finish. General purpose Type HGL.
 2. Cabinet Interiors Including Shelving: Both of following options to comply with NEMA, LD3.1 as a minimum.
 - a. Plastic laminate clad plywood or particle board.

- b. Resin impregnated decorative paper thermally fused to particle board.
 3. Backing sheet on bottom of plastic laminate covered wood tops. Backer Type BKL.
 4. Post Forming Fabrication, Decorative Surface: Post forming Type HGP.
- C. Edgebanding for Doors and Drawers: PVC edgebanding, 0.12 inch (3 mm) thick.
1. Physical Characteristics:
 - a. Lightfastness; Indoor Applications (DIN 53 384 c/DIN 53 388): 7-8 on wool color scale.
 - b. Indentation Hardness (DIN 53 456): 110 - 130 (N/mm²).
 - c. Shore Hardness D (DIN 53 505/ISO 868): 81 (± 3).
 - d. Linear Thermal Expansion coefficient (DIN 52 328): 80 (1/K x 10⁻⁶).
 - a. Resistance to Warping Under Heat (Vicat B 50; DIN 53 460/ISO 306): 80 (± 2) °C.
 - a. Shrinkage (factory standard): < 0.3 %.
 - b. Chemical Resistance (DIN 68 861): 1B.
 2. Appearance (including color, pattern, and finish) as follows:
 - a. Typical: As indicated; see Section 09 06 00, Schedule for Finishes, and the Finish Legend in the Drawings.
 - b. Other: Match adjacent laminate.
- D. Plywood, Softwood: Prod. Std. PS1, five ply construction from 13 mm to 28 mm (1/2 inch to 1-1/8 inch) thickness, and seven ply for 31 mm (1 1/4 inch) thickness.
- E. Particleboard: CPA A208.1, Type 1, Grade 1-M-3.
- F. Base: Comply with Section 09 65 13, Resilient Base and Accessories.
- G. Plumbing Fixtures: ASME A112.18.1, except die-cast zinc-alloy material is not acceptable.
- H. Solid Wood: Wood required for edgebanding shall be of same species as wood face veneer.
- I. Sheet Steel: ASTM A1008.
- J. Stainless Steel: ASTM A240 Type 304 with No. 4 finish.
- ~~K. Solid Wood Panels: For construction of Behavioral Health Patient Room Open Storage Units (Cubbies).~~
- ~~1. Wood: White oak.~~
 - ~~2. Fabricate panels of solid, continuous length, wood strips of uniform width of between 3/4 and 1 inch, glued (laminated) under pressure with concealed dowels or fasteners.~~
 - ~~3. Panel Thickness: 1-1/4 inches minimum; 1-1/2 inches maximum.~~
 - ~~4. Panel Width and Length: As necessary to avoid edge and end joints in the completed work.~~
 - ~~5. Round exposed edges to approximate 1/8 inch radius.~~
 - ~~6. Sand exposed surfaces smooth and even.~~
 - ~~7. Finish: Comply with transparent finish specified under Section 06 40 00, Architectural Woodwork. Match Architect's sample; for bidding purposes D-WD-1 on the Finish Legend; see Section 09 06 00, Schedule for Finishes.~~

2.3 CASEWORK HARDWARE & ACCESSORIES

- A. Locking: Where pin tumbler locks are specified, disc tumbler lock "Duo A", with brass working parts and case, as manufactured by the Illinois Lock Company will be an acceptable substitute. Locks for each type casework, shall be keyed differently and shall be master-keyed for each

type service. Provide two keys for each lock. Exposed hardware, except as otherwise specified, shall be satin finished stainless steel, chromium-plated brass, or nickel-plated brass.

1. Marking of Locks and Keys:
 - a. The name of the manufacturer, or trademark by which manufacturer can readily be identified, legibly marked on each lock.
 - b. The key change number marked on the exposed face of lock, and also stamped on each key.
 - c. Key change numbers shall provide sufficient information for replacement of the key by the manufacturer.
2. Locks: Equip doors and drawers with locks.
 - a. Cylinder type pin tumbler.
 - b. Quantity: The greater of the following:
 - 1) As indicated on the Drawings.
 - 2) Ten percent of all doors and drawers.
 - c. Locations: Where indicated and elsewhere directed by Architect.

B. Doors and Access Panels:

1. Hinged Doors:
 - a. Hinge Quantity: As recommended by the hinge manufacturer for the conditions or as follows, whichever is the greater quantity:
 - 1) Doors 35 inches high or less:
 - a) At Base Units: Three.
 - b) Elsewhere: Two.
 - 2) Doors more than 35 and up to 63 inches high: Three.
 - 3) Doors more than 63 and up to 78 inches high: Four.
 - 4) Doors more than 78 and up to 94 inches high: Five.
 - 5) As indicated.
 - b. Bumpers: Each door shall close against at least two rubber bumpers.
 - c. Hinge Type:
 - 1) Type: Semi-concealed, European style, self-closing, institutional hinge, with small exposed barrel approximately 3/16 inch diameter x 1-1/2 high; type as required by construction.
 - 2) ANSI/BHMA A156.9 Grade 1.
 - 3) Basis of Design: Grass MB 8310 Series, Hettich Selecta Pro 2000, Hafele Aximat 300, or equal by Blum, Prameta, or other meeting the requirements.
 - d. Fasteners: Provide full thread wood screws to fasten hinge leaves to door and cabinet frame. Finish screws to match finish of hinges.
2. Catches:
 - a. For Hinged Doors:
 - 1) Friction or Magnetic type, fabricated with metal housing, **at doors without self-closing hinges..**
 - 2) Provide one catch for cabinet doors 1200 mm (48 inches) high and under, and two for doors over 1200 mm (48 inches) high.
 - b. For Access Panels: Provide access panels at Sink Base Cabinets, knee space at casework chases, and elsewhere indicated or necessary.
 - 1) Concealed, friction type (such as roller or spring).
 - 2) Capable of holding panel securely to prevent unintentional removal but facilitate intentional detachment and reattachment.
 - 3) Four per access panel, minimum.
3. Sliding Doors:
 - a. Each door shall be supported by two ball bearing bronze or nylon rollers, or sheaves riding on a stainless steel track at top or bottom, and shall be restrained by a nylon or stainless steel guide at the opposite end.
 - b. Plastic guides are not acceptable.
 - c. Each door shall have rubber silencers set near top and bottom of each jamb.

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4. Door Pulls: "H-*" series; See Section 09 06 00, Schedule for Finishes, and Finish Legend in the Drawings. Material and sizes as follows:
- a. Bar Pulls: Stainless steel.
 - 1) Short Units (H-1): 96 mm center-to-center by 33 mm projection by 12 mm diameter by 90 degree corners.
 - 2) Medium Units (H-1A): 256 mm center-to-center by 33 mm projection by 12 mm diameter by 90 degree corners.
 - 3) Long Units (H-3): 544 mm center-to-center (between 10 mm diameter legs) by 624 mm overall length by 35 mm projection by 12 mm bar diameter.
 - b. Wire Pulls: Aluminum with satin clear anodized coating. 5/16 inch diameter by 3/4 inch radius at bar centerline.
 - 1) Short Units (H-2): 3 inches center-to-center by 1-5/16 inch projection.
 - 2) Long Units (H-2A): 8 inches center-to-center by 1-13/32 inch projection.
 - c. Recessed Pulls: Stainless steel.
 - 1) Small Units (H-4): 36 mm high by 85 mm long face; 30 mm by 76 mm by 9 mm mounting pocket.
 - 2) Large Units (H-4A): 42 mm high by 115 mm long face; 34 mm by 93 mm by 14 mm mounting pocket.
- C. Drawers:
- 1. Drawer Pulls: Same as Door Pulls, above.
 - 2. Drawer Slides:
 - a. ANSI/BHMA A156.9 "Heavy Duty" construction.
 - b. Full or overtravel extension steel slides with nylon ball-bearing rollers.
 - c. Positive stop.
 - d. Positive disconnect to prevent accidental removal.
 - e. Equip drawers with rubber bumpers.
 - f. Load Capacity (minimum):
 - 1) Drawers up to 3-1/2" deep and up to 16" wide: 75 pounds.
 - 2) Drawers up to 8" deep and up to 24" wide: 100 pounds.
 - 3) Drawers up to 12" deep and up to 42" wide: 150 pounds.
 - 3. Shelf Standards (Except For Fixed Shelves):
 - a. Bright zinc-plated steel for recessed mounting with screws, 16 mm (5/8 inch) wide by 5 mm (3/16 inch) high providing 13 mm (1/2 inch) adjustment, complete with shelf supports.
 - 4. Lock-out Device: Allows only one drawer within a unit to be open at a time; concealed; unable to be over-ridden without special tools and knowledge.
- D. Pans for Acid Neutralization Tanks (ANT): Provide seamless pans of same material and finish as bottom of base units. Provide pan openings in the bottom of base units receiving ANTs and recess the pans into the bottom with a 3/4 inch wide integral pan lip overlapping and sealed to base unit bottom. Provide sizes and locations coordinated under SUBMITTALS in PART 1. Size and locate openings and pans to optimize the following:
- 1. Base unit strength.
 - 2. Residual base storage space.
 - 3. Clearance above ANT.
 - 4. Base unit leveling and height adjustment capability.
 - 5. Ease of ANT installation, removal, and maintenance.
- E. Accessories:
- 1. Glove Box Dispensers (Holders):
 - a. Basis of Design: Subject to compliance with the requirements, products acceptable include, but are not necessarily limited to, the following:

- 1) "Quadruple Side Load Acrylic Glove Box Holder" No. CGT4061004 by Unimed-Midwest, Inc.
 - 2) Other products meeting the requirements.
 - b. Material: Clear acrylic.
 - c. Size: 11.25 inches long by 21.75 inches high by 3.75 inches deep.
 - d. Front and side notches to facilitate box removal.
 2. Casters:
 - a. Basis of Design: Doug Mockett Twin Wheel CA31-32 Series.
 - 1) Size: 4 inches high by 1-3/4 inches wide with 3-3/16 inch wheel diameter.
 - 2) Mounting: Plate or stem; Contractor's option.
 - 3) Swivel: 360 degrees.
 - 4) Tire: Nylon; black.
 - 5) Capacity: 100 pounds.
 - 6) Hub: Plastic.
 - 7) Finish, Body and Wheel Insert: Chrome.
 - 8) Brake and No-Brake units as indicated elsewhere.
 3. Counterweights: Steel plate; powder coat paint finish; see "Delegated Design" under DESCRIPTION in PART 1.
- F. Other: Provide items as necessary for complete installation, complying with section 06 40 00, Architectural Woodwork.

2.4 MANUFACTURED SYSTEMS

- A. General:
1. When two or more units are required, use products of one manufacturer.
 2. Manufacturer of equipment assemblies, which include components made by another, shall assume complete responsibility for the final assembled unit.
 3. Constituent parts which are alike: Use products of a single manufacturer.
- B. Manufacturer: Subject to compliance with the requirements, manufacturers offering Manufactured Wood Casework systems include, but are not limited to, the following:
1. Basis of Design: Fisher-Thermo Scientific (Wood Laboratory Casework).
 2. Kewaunee Scientific Corporation (Signature Series Wood Laboratory Furniture).
 3. LSI.
 4. Mott Manufacturing (Wood Laboratory Casework).
 5. TMI.

2.5 FABRICATION

- A. Casework shall be of the flush overlay design and, except as otherwise specified, be of premium grade construction and of component thickness in conformance with AWI AWS.
1. Manufactured Wood Casework Soffits: Provide where indicated; construction similar to adjacent casework.
 2. Manufactured Wood Casework Fillers: Provide where necessary and elsewhere indicated; construction similar to adjacent casework.
- B. Fabricate casework of plastic laminated covered plywood or particleboard as follows:
1. Exposed exterior, exposed interior, and semi-exposed surfaces including doors, drawers, shelves, shall be plastic laminate covered unless specifically indicated otherwise.
 - a. See "Edgebanding for Doors and Drawers" under MATERIALS Article above.

2. Horizontal and vertical reveals between doors and drawer for reveal overlay design shall be 19 mm (3/4 inch) unless otherwise shown.
 3. Sliding doors shall have stops to prohibit bypass and be removable without use of tools.
- C. Electrical Fixtures, Receptacles, Wiring, and Junction Boxes required for Fixtures and Receptacles:
1. Factory installed in casework.
 2. For electrical lighting fixtures, see drawings.
 3. For electric receptacles and lighting fixtures installed below or adjacent to wall cabinets or above counter tops, see electrical sections or specifications.
 4. Install wiring in built-in raceways and terminate at junction box mounted on rear of cabinet and counter.
 5. For final hook-up at junction box see electrical sections of specifications.
- D. Base: Comply with Section 09 65 13, Resilient Base and Accessories, and the following:
1. Provide with close, flush joints; set with adhesive.
 2. Materials: As indicated on the Drawings; rubber where not indicated; see Finish Legend in the Drawings.
 3. Remove adhesive from exposed surfaces.
 4. Install base at floor line after casework has been accurately leveled.
- E. Countertops: Comply with Section 12 36 00, Casework Countertops.
1. Types: As indicated on the Drawings; plastic laminate-faced where not indicated; see Finish Legend in the Drawings.
 2. Countertops, splashbacks and reagent type shelves shall be plastic laminate factory glued to either a plywood (PS1), or particleboard (CPA A208.1) core.
 3. Splashbacks and reagent type shelves shall be finished 3/4 inch thick and be secured to countertops with concealed metal fastenings and with contact surfaces set in waterproof adhesive.
 4. Provide cut-outs for plumbing trim where shown.
 5. Cover exposed edges of countertops, splashbacks and reagent type shelves with plastic.
- F. Bowls and plumbing fixtures and trim for sinks drop-in or undermount sinks: Specified in Division 22, Plumbing.
- G. Support Members for Tops of Tables:
1. Construct as detailed.
 2. Provide miscellaneous steel members and anchor as shown.
- H. Legs for Counters: Coordinate with Section 12 36 00, Countertops.
1. Fabricate legs for counters of 1.6 mm (0.0635 inch) thick, 38 mm (1-1/2 inch) square tubular stainless steel where shown.
 2. Secure legs to counter tops and provide legs at bottom with shoes not less than 25 mm (one inch) in height.
 3. Fabricate shoes of either stainless steel, aluminum, or chromium plated brass.
- I. Casters: Provide at mobile pedestal units; at least two casters at each unit shall have brake.
- J. Counterweights: Provide at units with casters; see "Delegated Design" under DESCRIPTION in PART 1.
- K. Lock-out Device: Provide at all Drawer Units with casters.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Set casework in place; level, plumb and accurately scribe and secure to walls and floors.
- B. The installation shall be complete including all trim and hardware. Leave the casework clean and free from defects.

3.2 FASTENINGS

- A. Fastenings for securing casework to adjoining construction shall be as detailed on the drawings or approved shop drawings.
- B. See Section 05 50 00, METAL FABRICATIONS, for reinforcement of walls and partitions for casework anchorage.
- C. Mount glove box holders with countersunk screws to avoid impediments to glove box insertion.

--- E N D ---

SECTION 12 35 53
MANUFACTURED LABORATORY CASEWORK**PART 1 - GENERAL****1.1 DESCRIPTION**

- A. This Section specifies manufactured, structural support framing systems including related components and accessories required to form integral units. Work of this Section includes, but is not necessarily limited to, the following:
1. Structural support framing units at island/peninsula benches and tables in the following areas:
 - a. Lab 1-15 2P138, 2P142, 2P148, 2P152, 2P162, 2P167, 3P138, 3P142, 3P148, 3P152, 3P162, and 3P168, and Mass SP 3P151.
- B. Systems include support components, adjustable shelving units, accessories, electrical wiring chases, service lines/piping chases, and laboratory service fixture supports adjacent-to-wall and island arrangements.
1. Support components are floor supported typically; wall hung where indicated.
- C. Work designated on the Drawings with a boxed, alpha-numeric Casework Type Tag (see Interior Elevations Legend such as on Sheet 1A1200) is included in the following Sections:
1. Section 12 31 00, Manufactured Metal Casework. Tag example: A3030.
 2. Section 12 32 00, Manufactured Wood Casework. Tag example: A3030.
 3. Section 12 35 53, Manufactured Laboratory Casework. Tag example: La3030.

1.2 RELATED WORK

- A. Steel studs 1.2 mm (0.047 inch, 18 gage) and heavier: Section 05 40 00, Cold-Formed Metal Framing.
- B. Wood furring, blocking, shims, and hanging strips required for installing woodwork and concealed within other construction before woodwork installation: Section 06 10 00, Rough Carpentry.
- C. Custom Architectural Woodwork Casework: Section 06 40 00, Architectural Woodwork.
- D. Appearance of Finishes: Section 09 06 00, Schedule for Finishes.
- E. Steel studs less than 1.2 mm (0.047 inch, 18 gage) and backing plates for wall mounted items: Section 09 22 16, Non-Structural Metal Framing.
- F. Other Manufactured Casework:
1. Manufactured Metal Casework (including flexible extractor arm assemblies to be mounted on support frame units): Section 12 31 00.
 2. Manufactured Wood Casework: Section 12 32 00.

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- G. Countertops and adjustable height table frames adjacent to Manufactured Laboratory Casework are specified in Sections 12 36 00 and provided under Section 12 31 00.
 - H. Plumbing components and requirements not specified in Section 12 35 53: See Division 22, PLUMBING.
 - I. HVAC components and requirements not specified in Section 12 35 53: See Division 23, HVAC, including but not limited to, the following:
 - 1. Coordinate with exhaust duct above finish ceiling space in Labs 1-15 for ductwork and connections to fume extractor arm assemblies indicated on Drawings.
 - J. Electrical components and requirements not specified in Section 12 35 53: See Division 26, ELECTRICAL.

1.3 PERFORMANCE REQUIREMENTS

- A. Structural Performance: Provide laboratory support framing and adjustable face shelves capable of withstanding effects of the following gravity loads and stresses per support framing module without permanent deformation or excessive deflection.
 - 1. Top of Support Framing System: 500 pounds.
 - 2. Shelves (up to 15 inches deep): 200 pounds.
 - 3. Total for Wall Unit: 2600 pounds.

1.4 SUBMITTALS

- A. Submit in accordance with Section 01 33 23, Shop Drawings, Product Data, and Samples.
- B. Manufacturer's Literature and data: For each type of product including:
 - 1. Manufacturer's literature and other data showing compliance with the specification.
 - 2. List of 3 similar projects completed within last 5 years with names and addresses.
- C. Certification:
 - 1. Manufacturer's qualifications specified.
 - 2. Installer's qualifications specified.
- D. Shop drawings:
 - 1. Drawings complete, accurate and to scale.
 - 2. Show:
 - a. Location of each component.
 - b. Dimensions and clearance as required.
 - c. Identify each component with both drawing identification and manufacturer's product number.
 - d. Details including cuts, holes, scribes, attachments and specialized construction requirements.
 - 3. Installation procedures: Show dimensions, methods of assembly, anchorage, installation and conditions relating to adjoining work.
 - 4. Placement Listing: Itemized listing by room number of components provided.
 - 5. Complete listing of each component used.

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6. Include the weight of each component.
- E. Samples:
1. Adjustable Face Shelf Unit, open; 12 inches and 15 inches deep.
 2. Typical service module.
- F. Mock-up:
1. Laboratory Casework Manufacturer shall erect a laboratory support frame module at location directed by Resident Engineer. Construct and assemble in accordance with Construction Documents. Modifications required to meet the requirements shall be incorporated into overall design of project without change in Contract Sum.
 2. Maintain approved mock-up undisturbed at project site during construction as minimum standard for judging acceptance of the completed work.
- G. Operational and Maintenance Manual.

1.5 QUALITY ASSURANCE

- A. Approval by Contracting Officer is required of manufacturer and installer based upon certification of qualifications specified.
- B. Manufacturer's Qualifications:
1. Manufacturer is regularly engaged in design and manufacture of modular casework, casework components and accessories of scope and type similar to requirements of this project for a period of not less than 5 years.
 2. Manufacturer has successfully completed at least 3 projects of scope and type similar to requirements of this project.
- C. Installer Qualifications:
1. Installer is approved by the casework manufacturer.
 2. Installer has completed at least 3 projects in last 5 years in which these products were installed.
 3. Installer has technical qualifications, experience, trained personnel, and facilities to install specified items.
 4. Furnish supervision of installation at construction site by a qualified technician regularly employed by casework installer.
- D. Fire-Test-Response Characteristics: Where fire-retardant materials or products are indicated, provide materials and products with specified fire-test-response characteristics as determined by testing identical products per test method indicated by UL, ITS, or another testing and inspecting agency acceptable to authorities having jurisdiction. Identify with appropriate markings of applicable testing and inspecting agency in the form of separable paper label or, where required by authorities having jurisdiction, imprint on surfaces of materials that will be concealed from view after installation.
- E. Pre-installation Conference: Conduct conference at Project site to comply with requirements in Division 01 Section "General Requirements."
- F. Mock-up: Approved mock-up is standard of acceptance as described under SUBMITTALS above

1.6 DELIVERY, STORAGE AND HANDLING

- A. Deliver, store and handle to prevent damage and deterioration until final acceptance of project.
- B. Deliver and store materials in manufacturer's original, labeled containers after building is enclosed and wet work is complete and dry.
- C. Store materials in a secure, locked area.
- D. Repair or replace damaged items due to storage or handling.

1.7 WARRANTY

- A. Warranty casework system components against structural failure of components, disassembly of cabinets, shelves and countertops subject to terms of "Warranty of Construction" article specified in FAR clause 52.246-21, except that warranty period shall be 5 years.

1.8 PROJECT CONDITIONS

- A. Environmental Limitations: Do not deliver or install casework until building is enclosed, wet work is complete, and HVAC system is operating and maintaining temperature and relative humidity at occupancy levels during the remainder of the construction period.
- B. Field Measurements: Where casework is indicated to fit to other construction, verify dimensions of other construction by field measurements before fabrication, and indicate measurements on Shop Drawings. Coordinate fabrication schedule with construction progress to avoid delaying the Work.
 - 1. Locate concealed framing, blocking, and reinforcements that support work of this Section by field measurements before being enclosed, and indicate measurements on Shop Drawings.
 - 2. Established Dimensions: Where field measurements cannot be made without delaying the Work, establish dimensions and proceed with fabrication without field measurements. Provide allowance for trimming at site, and coordinate construction to ensure that actual dimensions correspond to established dimensions.

1.9 COORDINATION

- A. Coordinate sizes and locations of framing, blocking, furring, reinforcements, and other related units of Work specified in other Sections to ensure that interior casework can be supported and installed as indicated.

1.10 APPLICABLE PUBLICATIONS

- A. Publications listed below form a part of this specification to extent referenced. Publications may be referenced in the text by basic designation. Comply with latest editions unless otherwise indicated.
- B. American Hardwood Association (AHA):
 - 1. A135.4 Basic Hardwood

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- C. American National Standards Institute (ANSI):
1. A208.1 Particleboard
- D. American Society for Testing and Materials (ASTM):
1. A36 Carbon Structural Steel
 2. A240 Standard Specification for Chromium and Chromium-Nickel Stainless Steel Plate, Sheet, and Strip for Pressure Vessels and for General Applications
 3. A283 Low and Intermediate Tensile Strength Carbon Steel Plates
 4. A366 Steel Sheet, Carbon Cold-Rolled, Commercial Quality
 5. A423 Seamless and Electric-Welded Low-Alloy Steel Tubes
 6. A568 Steel, Sheet, Carbon, Structural and High-Strength, Low-Alloy Hot-Rolled and Cold-Rolled, General Requirements
 7. B221 Aluminum and Aluminum-Alloy Extruded Bars, Rods Wire, Profiles and Tubes
 8. B456 Electrodeposited Coatings of Copper Plus, Nickel Plus Chromium and Nickel Plus Chromium
 9. D4673 Acrylonitrile-Butadiene-Styrene (ABS) Molding and Extrusion Materials
 10. E84 Surface Burning Characteristics of Plastics and Alloys Building Materials
- E. American Welding Society (AWS):
1. D1.1 Structural Welding Code Steel
 2. D9.1 Sheet Metal Welding Code
- F. National Association of Architectural Metal Manufacturers (NAAMM):
1. AMP 500-505 Metal Finishes Manual
- G. National Electrical Manufacturers Association (NEMA):
1. LD3 High Pressure Decorative Laminates
 2. LD3.1 Performance, Application, Fabrication and Installation of High Pressure Decorative Laminates
- H. National Fire Protection Association (NFPA):
1. 70 National Electric Code (NEC)
- I. National Sanitation Foundation (NSF):
1. 30 Cabinetry and Laboratory Furniture for Hospitals
- J. Scientific Equipment and Furniture Association (SEFA):
1. 2 Installation of Scientific Laboratory Furniture and Equipment
 2. 7 Laboratory and Hospital Fixtures.
 3. 8 Laboratory Furniture - Casework - Shelving and Tables - Recommended Practices.
- K. Underwriters Laboratories (UL):

1. Annual Fire Resistance Directories.
- L. US Department of Commerce, National Bureau of Standards, Product Standard (DOC, NBS, PS):
 1. PS 1 Construction and Industrial Plywood

PART 2 - PRODUCTS

2.1 DESIGN REQUIREMENTS

- A. General: Comply with Section 12 32 00, Manufactured Wood Casework, and the following.
- B. Components provided by one manufacturer. Products of other manufacturers used meet specified flexibility and interchangeability requirements.
 1. Provide engineered design for all floor supported structural support frames' systems and components including wall-mounted frames for adjustable shelving units.
- C. Components to be interchangeable and relocatable:
 1. Dimensions of products are nominal and shown on drawings and schedules.
 2. Selectively removable and replaceable without disturbing adjacent components.
- D. Combustible components: Maximum flame spread rating of 25 and smoke development of 450 when tested in accordance with ASTM E84.
- E. Basic Units: As indicated including, but not limited to, floor-supported structural support frames and wall-supported support frames and adjustable shelf assemblies.
- F. Basic Support Components: Provide where indicated.
 1. Floor-Supported Structural Support Frames:
 - a. Designed and fabricated as a rigid structural frame to provide support for overhead storage assemblies, enclose plumbing and electrical lines, and hold laboratory service fixtures. Provide a complete installation complying with all other requirements Drawn and specified:
 - 1) Fully exposed, fully welded, double-sided, twin-tracked, slotted steel channel support framing system; floor-anchored and top braced; minimum 14 gage cold rolled steel tube with powder coat finish.
 - b. Equip frames with adjustable floor anchors to compensate for uneven floors.
 - c. Frames equipped with stability accessories such as floor anchors and wall attachment brackets as required. Show details on shop drawings.
 - d. Provide access cover plates for easy access to interior of vertical risers for installation of piping and cabling. Access plates to be supported individually and not tied into each other.
 - e. Horizontal cross members to be provided with cover plates to secure laboratory services including, but not limited to, piping and service fixtures and electrical outlets. Detail on shop drawing.
 - f. Modules shipped completely pre-finished preassembled, ready for installation.
 2. Wall-Mounted Support Frames:

-
- a. Steel frame system designed to support overhead storage assemblies. Include fully-welded, fully exposed, twin tracked slotted support struts matching island frames.
3. Vertical Wall Strips:
 - a. Fabricated of steel with powder coat finish complying with BHMA A156.9 Types B04102 with minimum nominal cross section of 1/12/ inch x 1-1/2 inch; minimum 1 inch suspension increments.
 - b. Wall-mounted designed to suspend selected components.
 - c. Only one wall strip required between side by side suspended components.
 - d. Wall strips mounted to walls or service modules by mechanical fasteners. Wall strips maybe an integral part of service modules.
 - e. Basis of Design Manufactures: Reeve, Fixture Hardware Manufacturing Corporation, and Knappe & Vogt.
 - f. Standards and slotted studs shall have fully compatible slot arrangements.
- G. Adjustable Face Shelves: Provide on island and wall benches.
1. Plastic laminate faced wood core construction with 3mm PVC edge banding; match construction in Section 12 32 00; minimum 25.4 mm (1 inch) thick; 305 mm (12 inches) deep and 380 mm (15 inches deep).
 2. Cold rolled steel adjustable shelf brackets with powder coated finish complying with BHMA A156.9, Types B04102 and B04112. Fasten to shelf with two stainless steel screws per bracket.
 3. Provide continuous 2 inch high cold rolled steel rear shelf lip with powder coat finish. Fasten lip to shelf with eight stainless steel screws.
 4. Front mounted wire lip at each unit.
 5. Capability to easily accept snap-on labels.
- H. Miscellaneous Components:
1. Electrical components:
 - a. UL listed and approved in UL Fire Resistance Directories.
 - b. Comply with NFPA 70 and DIVISION 26, ELECTRICAL.
 - c. Provide general circuits for power not less than four, of 20-amp maximum rated load routed within structural support frames vertical risers and horizontal cross members to surface mounted divided raceways.
 - d. Electrical channels divided with shielding plate for not less than 35 pair cables for communication systems in panel support system.
 - e. Lay in cable channel design metal raceways.
 2. Plumbing Components:
 - a. Comply with DIVISION 22, PLUMBING.
 - b. Pipe and service fittings as specified in SECTION 12 36 00, Countertops. Piping routed within structural support frames vertical risers and horizontal cross members to fixtures mounted on removable closure plate.
 3. Fume Extractor Arm Assembly: Provide a non-powered, flexible, self-supportive, point-of-use fume exhaust removal device for collection of heat, chemical fumes, and light powders generated by laboratory, manufacturing, and medical processes. Units consist of a 4" diameter fire-retardant, semi-self-supportive, flex arm with 7" diameter (outside) round source capture hood at bottom end and two, rigid-metal swivel elbows attached to a heavy-duty metal wall-mounting bracket, and a 4" diameter exhaust collar at top for connection to the building exhaust system.

- a. Basis of Design (see Section 01 60 00, Product Requirements): Sentry Air Systems, Inc., Model #SS-000-EA4. RFI 06078
- b. Exhaust Hose: 4" diameter, 42" long fire-retardant polypropylene.
- c. Swivel Elbows: 4" diameter, 6" center radius, rigid metal.
- d. Wall-Mount Bracket: 8" w x 8" d x 13" h nominal, 1/8" thick cold rolled steel, powder-coated. RFI 06078
- e. Hose Fasteners: 5" diameter, screw compression bands.
- f. Using anchor bolts, attach wall bracket to slotted stud tubing comprising laboratory island bench overhead support frames at locations indicated on the drawings.

I. Assembly and Disassembly:

1. Use of standard hand tools where fasteners used, no special designed tools permitted.
2. Components of such size and weight that can easily be lifted or moved by one person or with transportation designed for such purpose.

J. Finish:

1. Selected from manufacturer's standard colors, specification Section 09 06 00, Schedule for Finishes.
2. More than one color may be selected for units.
3. Steel components finished with chemical resistant paint.

2.2 MATERIALS

- A. Carbon Structural Steel: ASTM A36.
- B. Stainless Steel: ASTM A240, Type 316 alloy.
- C. Steel plates: ASTM A283.
- D. Sheet Steel: ASTM A366 or A568.
- E. Steel Tubes: ASTM A423.
- F. Aluminum: ASTM B221.
- G. ABS compounds: ASTM D4673.
- H. Plastic Laminate: NEMA LD3.
- I. Particleboard: ANSI A208.1.
- J. Other: Comply with Sections 12 31 00, Manufactured Metal Casework, and 12 32 00, Manufactured Wood Casework.

2.3 MANUFACTURERS SYSTEMS

A. General:

1. When two or more units are required, use products of one manufacturer.

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2. Manufacturer of equipment assemblies, which include components made by another, shall assume complete responsibility for the final assembled unit.
 3. Constituent parts which are alike; use products of a single manufacturer.
- B. Manufacturer: Subject to compliance with the requirements, manufacturers offering Manufactured Laboratory Casework systems include, but are not limited to, the following:
1. Basis of Design: Thermo Scientific Hamilton ("Plastic Laminate Laboratory Furniture & Equipment" line; "Custom Assembly").
 2. Kewaunee (Spectrum).
 3. Laboratory Design & Supply (LDS 300).
 4. New England Lab (Arlington Series).
 5. HermanMiller.

2.4 FABRICATION

- A. General: Manufacturer's standard design of modular casework system meeting design requirements and the following:
1. See Section 09 06 00, Schedule for Finishes.
 2. Casework requirements specified are intended to establish essential minimum requirements.
 3. Dimensions of components shown are nominal to represent module requirements.
 4. Provide components compatible with each other as to color, finish, and hardware.
- B. Comply with NSF 30.
- C. Fabricate frames and rails of steel or aluminum as standard with modular casework manufacturer's system.
- D. Fabricate electrical components to comply with NEC 70 and with modular casework manufacturer's system.
- E. Finish metals in accordance with NAAMM AMP 500-505 and plated steel in accordance with ASTM B456 as standard with modular casework manufacturer's system.
- F. Fabricate steel components of ASTM A36, A283, A366 or A568 as standard with casework system manufacturer.
- G. Weld In accordance with ANSI D1.1 or D9.1 Finish welds smooth and free of sharp edges where exposed.
- H. Plated Metal: Finish in accordance with ASTM B456 for steel products and NAAMM AMP 500-505.
- I. Painted Steel: Finish in accordance with NAAMM AMP 500-505.
- J. Anodized Aluminum: Finish as standard with modular cabinet manufacturer's system.

PART 3 - EXECUTION**3.1 EXAMINATION**

- A. Examine substrates and adjoining construction and conditions under which work is to be installed.
- B. Do not proceed with the work until unsatisfactory conditions detrimental to proper and timely completion of the work have been corrected.

3.2 SEQUENCING AND SCHEDULE

- A. Begin only after work of other trades is complete, i.e., wall and floor finish completed, ceilings installed, light fixtures and diffusers installed and connected and area is free of trash and debris.
- B. Fixed components may be installed in areas which cannot be secured.
- C. Install non-fixed components and accessories just prior to final inspection, unless areas where installation is complete is locked against entry.
- D. Coordinate with work of the following trades to avoid interference and facilitate completion of service connections:
 - 1. DIVISION 22, PLUMBING.
 - 2. DIVISION 23, HEATING, VENTILATING, AND AIR CONDITIONING.
 - 3. DIVISION 26, ELECTRICAL.
 - 4. DIVISION 27, COMMUNICATIONS.
 - 5. Other: As appropriate.

3.3 INSTALLATION

- A. Assemble and install components in accordance with manufacturer's written instructions and recommendation and SEFA 2.3
- B. Anchor fixed components firmly in position; square, level, plumb and properly connected using mechanical fasteners, wood or sheet metal screws are not permitted.
- C. Perform cutting of components to receive work installed by others.
- D. Wall Strips:
 - 1. Install true to vertical and spaced as shown on installation drawing.
 - 2. Align slots to assure that hanging units will be level.

3.4 ADJUSTMENTS

- A. Adjust equipment to insure proper alignment and operation.
- B. Replace or repair damaged or improperly installed materials, components, or equipment.

3.5 CLEANING

- A. Immediately following installation, clean each item, removing finger marks, soil and foreign matter resulting from work of this section.
- B. Remove from job site trash, debris and packing materials resulting from work of this section.
- C. Leave installed areas clean of dust and debris resulting from work of this section.

3.6 INSTRUCTIONS

- A. Provide operational and cleaning manuals and verbal instructions in accordance with Article INSTRUCTIONS, SECTION 01 00 00, General Requirements.

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**SECTION 12 36 00
COUNTERTOPS****PART 1 - GENERAL****1.1 DESCRIPTION**

- A. This Section specifies countertops (also called work surfaces, ledges, reagent racks, decks, etc.) and similar components either considered casework or associated with casework, and sills, including integral accessories. Countertop work is specified herein but provided under work of other Sections; see RELATED WORK below.
1. Integral accessories.
 2. All glassware drying Pegboards whether or not integral with countertops.
 3. Manufactured Support Brackets. L-shaped; provide either surface-mounted or flush-mounted (concealed vertical leg) brackets, Contractor's option, except provide only flush-mounted type at the following locations:
 - a. Public Toilets.
 - b. Reception Desk.
 - c. Elsewhere indicated.
 4. Include openings for items provided under other sections; coordinate with applicable trade for sizes and locations.
 5. Sinks integral with countertops; support legs.
 6. Fire-retardant work where noted on drawings or specified; all casework in corridors to be fire-retardant construction.

1.2 RELATED WORK

- A. Metal Support Brackets not included in this Section: Section 05 50 00, Metal Fabrications.
- B. Rough Carpentry (including fire retardant treated wood): Section 06 10 00.
- C. Solid Surface Countertops: Section 06 61 16.
- D. Architectural Woodwork Casework: Section 06 40 00.
- E. Color and patterns of exposed surfaces: Section 09 06 00, Schedule for Finishes.
- F. Manufactured Metal Casework: Section 12 31 00.
- G. Manufactured Wood-based Casework (including plastic-faced casework): Section 12 32 00.
- H. Manufactured Laboratory Casework: Section 12 35 53.
- I. Plumbing (including sinks in, but not integral with, countertops): Division 22.
- J. Electrical: Division 26.

1.3 SUBMITTALS

- A. Submit in accordance with Section 01 33 23, Shop Drawings, Product Data, and Samples.

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- B. Shop Drawings:
1. Show dimensions of section and method of assembly.
 2. Show details of construction at 1/2 scale.
 3. Bracket Spacing: Show spacing of brackets. Spacing not to exceed the lesser of: 48 inches, manufacturer's recommendations, or spacing based on design loads and bracket capacities. See required design load herein.
- C. Samples for Selection: Proposed finishes including, but not limited to, each type of the following; 8 inch by 10 inch minimum face size except edging 10 inches long by proposed width:
1. Plastic Laminate.
 2. Metal.
 3. Wood.
 4. Solid Surfacing.
 5. Epoxy Resin (molded resin).
 6. Solid Phenolic.
 7. Edging.
- D. Samples for Verification:
1. 150 mm (6 inch) square samples each top.
 2. Front edge, back splash, end splash and core with surface material and booking.
 3. Manufactured Support Bracket; each type (such as surface- and flush-mounted).

1.4 PROJECT CONDITIONS

- A. Environmental Limitations: Deliver or install work of this Section only after building is enclosed, wet work is complete, and HVAC system is operating and maintaining temperature and relative humidity at occupancy levels during the remainder of the construction period.
- B. Field Measurements: Where work of this Section is indicated to fit to other construction, verify dimensions of other construction by field measurements before fabrication, and indicate measurements on Shop Drawings. Coordinate fabrication schedule with construction progress to avoid delaying the Work.
1. Locate concealed framing, blocking, and reinforcements that support work of this Section by field measurements before being enclosed, and indicate measurements on Shop Drawings.
 2. Established Dimensions: Where field measurements cannot be made without delaying the Work, establish dimensions and proceed with fabrication without field measurements. Provide allowance for trimming at site, and coordinate construction to ensure that actual dimensions correspond to established dimensions.

1.5 COORDINATION

- A. Coordinate sizes and locations of framing, blocking, furring, reinforcements, and other related units of Work specified in other Sections to ensure that work of this Section can be supported and installed as indicated.

1.6 APPLICABLE PUBLICATIONS

- A. Publications listed below form a part of this specification to the extent referenced. Publications may be referenced in the text by the basic designation only. Follow latest editions unless otherwise indicated.

-
- B. American Hardboard Association (AHA):
 - 1. A135.4 Basic Hardboard
 - C. Composite Panel Association (CPA):
 - 1. A208.1 Particleboard
 - D. American Society of Mechanical Engineers (ASME):
 - 1. A112.18.1 Plumbing Fixture Fittings
 - 2. A112.1.2 Air Gaps in Plumbing System
 - 3. A112.19.3 Stainless Steel Plumbing Fixtures (Designed for Residential Use)
 - E. American Society for Testing and Materials (ASTM):
 - 1. A167 Stainless and Heat-Resisting Chromium-Nickel Steel Plate, Sheet and Strip
 - 2. A1008 Steel, Sheet, Cold-Rolled, Carbon, Structural, High Strength, Low Alloy
 - 3. D256 Pendulum Impact Resistance of Plastic
 - 4. D570 Water Absorption of Plastics
 - 5. D638 Tensile Properties of Plastics
 - 6. D785 Rockwell Hardness of Plastics and Electrical Insulating Materials
 - 7. D790 Flexural Properties of Unreinforced and Reinforced Plastics and Electrical Insulating Materials
 - 8. D4690 Urea-Formaldehyde Resin Adhesives
 - 9. G21 Determining Resistance of Synthetic Polymeric Materials to Fungi
 - F. American Wood Institute (AWI):
 - 1. Architectural Woodwork Standards (AWS).
 - G. Federal Specifications (FS):
 - 1. A-A-1936 Adhesive, Contact, Neoprene Rubber
 - H. U.S. Department of Commerce, Product Standards (PS):
 - 1. PS 1 Construction and Industrial Plywood
 - I. National Electrical Manufacturers Association (NEMA):
 - 1. LD 3 High Pressure Decorative Laminates
 - 2. LD 3.1 Performance, Application, Fabrication, and Installation of High Pressure Decorative Laminates

1.7 QUALITY ASSURANCE

- A. The configuration of countertops is shown on drawings. Manufacturer's standard units fitting these requirements will be accepted. Where manufacturer cannot furnish standard units meeting requirements, custom units must be provided.
- B. The detailing and design required to provide rigid, solid and structurally adequate countertop which is level, flat, and free of warp or distortion is the responsibility of the fabricator; all within parameters of AWI AWS and as approved by Architect.
 - 1. Countertops and supporting legs or bases to be capable of supporting the following loads:
 - a. Typical: Uniform load of 50 lbs/sq. ft. plus a concentrated load of 200 lbs applied at any point on countertop.
 - b. In Rad Lab 3P165: Uniform load of 200 lbs/sq. ft.
- C. The following conditions require special attention:

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1. Casework exceeding 42" in width between supports.
 2. Sink and/or equipment cut-outs or supports.
 3. Countertops exceeding 24" unsupported.
 4. Where higher loads indicated (such as equipment).
- D. Metal Countertops: Fabricate by manufacturer specializing in laboratory casework or food service casework/equipment of the type required and in conformance with applicable NSF standards.
1. Metal Thickness: Increase metal thickness as needed to ensure welds neat, uniform, smooth, flush with parent metal, and blended to be essentially not visible in completed work on exposed to view side.
- E. Solid Surface Products: Installer to be specialist with minimum three years experience in work of similar nature and scope. Approved by manufacturer.

1.8 DESIGN REQUIREMENTS

- A. Countertop Support Brackets: General intent including bracket locations and spacing in indicated on the Drawings. Whether or not shown, provide support brackets for countertops as necessary so unsupported spans do not exceed the stronger of the following conditions, but in no case more than 48 inches:
1. 42 inches.
 2. Load limits of brackets.
 3. Spacing recommended by bracket manufacturer.
 4. As specifically dimensioned on the Drawings.

PART 2 - PRODUCTS

2.1 MATERIALS

- A. General: See Section 09 06 00, Schedule for Finishes, and Finish Legend in the Drawings for countertop finishes including, but not necessarily limited to, the following Finish Codes:
1. EXR (Epoxy Resin).
 2. PLAM (Plastic Laminate).
 3. PR (Phenolic Resin).
 4. S (Solid Surfacing).
 5. ST (Stone).
 6. SWC (Solid Wood).
- B. Plastic Laminate: NEMA LD 3.
1. Concealed backing sheet: Type BKL.
 2. Decorative surfaces:
 - a. Flat components: Type GP-HGL.
 - b. Post forming: Type PF-HGP.
 3. Chemical Resistant Surfaces:
 - a. Flat components: Type GP-HGL.
 - b. Post forming: Type PF-HGP.
 - c. Resistance to Reagents:
 - 1) Test with five 0.25 mil drops remaining on surface for 16 hours followed by washing off with tap water, then cleaned with liquid soap and water, dried with soft cotton cloth and then cleaned with naphtha.

- 2) No change in color, surface texture, and original protectability remaining from test results of following reagents:

98% Acetic Acid	Butyl Alcohol	Acetone
90% Formic Acid	Benzine	Chloroform
28% Ammonium Hydroxide	Xylene	Carbon Tetrachloride
Zinc Chloride (Sat.)	Toluene	Cresol
Sodium Carbonate (Sat.)	Gasoline	Ether
Calcium Hypochlorite (Sat.)	Kerosene	Cottonseed Oil
Sodium Chloride (Sat.)	Mineral Oil	40% Formaldehyde
Methyl Alcohol	Ethyl Acetate	Trichloroethylene
Ethyl Alcohol	Amyl Acetate	Monochlorobenzene

- 3) Superficial effects only: Slight color change, spot, or residue only with original protectability remaining from test results of following reagents:

77% Sulfuric Acid	37% Hydrochloric Acid	85% Phenol
33% Sulfuric Acid	20% Nitric Acid	Furfural
85% Phosphoric Acid	30% Nitric Acid	Dioxane

- 4) Minimum height of impact resistance: 300 mm (12 inches).

C. Epoxy Resin (molded resin):

1. Non-glare epoxy resin or furan resin compounded and cured for minimum physical properties specified:

Flexural Strength	70 MPa (10,000 psi)	ASTM D790
Rockwell Hardness	105	ASTM D785
Water Absorption 14 hours (weight)	0.01 percent	ASTM D570
Recycled Content (post-consumer; by weight; minimum)	10 percent	Manufacturer's Certification

2. Material of uniform mixture throughout.
 3. Manufacturer: Subject to compliance with the requirements, manufacturers offering epoxy resin products include, but are not limited to, the following:
 a. Basis of Design Product: Durcon Incorporated, Taylor, TX; www.durcon.com.
 b. ChemTops, Austin, TX; www.epoxyresintops.com.
 c. Total Lab Solutions (Duratop), Scottsdale, AZ; www.duratop-epoxy.com.
 d. Epoxyn Products, LLC, Mountain Home, AK.

RFI 7151 CONFIRMED THE USE OF BLACK EPOXY TOPS AT THE RESEARCH BUILDING

- D. Stainless Steel: ASTM A167; hardest workable temper; Type 304; #4 directional satin finish on all exposed surfaces.

- E. Sheet Steel: ASTM A1008, cold rolled, Class 1 finish, stretcher leveled.

F. Particleboard:

1. Typical Construction for Dry Areas:
 a. ANSI A208.1, Type M-3:
 1) Modulus of Rupture: 2,400 psi.
 2) Modulus of Elasticity: 400,000 psi.
 3) Internal Bond: 80 psi.
 4) Screw Holding, Face: 250 pounds.
 2. Construction Involving Sinks and Wet Areas: Water Resistant.
 a. ANSI A208.1, Type M-2 or M-3; Exterior Glue.
 3. Fire-Retardant Construction: "Duraflake FR", Class I fire-rated material by Weyerhaeuser, or similar meeting the requirements.
 a. ANSI A208.1, Type M-1:

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- 1) Modulus of Rupture: 1,600 psi.
 - 2) Modulus of Elasticity: 300,000 psi.
 - 3) Internal Bond: 80 psi. 80 psi.
 - 4) Screw Holding, Face: 250 pounds. 247 lbs.
 - b. Fire Characteristics: ASTM E 84.
 - 1) Flame Spread: 20 maximum.
 - 2) Smoke Developed: 25 maximum.
 4. Maximum moisture content, 8 percent.
 5. Thickness as specified unless otherwise noted on drawings.
- G. Plywood: Birch hardwood plywood conforming to Section 06 40 00, AWS Section 4 for veneer core material, and PS 1, Exterior type (waterproof glue), veneer grade AC or better; not less than five ply construction; fire-retardant treated where required.
- H. Hardwood Countertop: Solid maple, clear grade except where otherwise indicated.
- I. Hardboard: AHA A135.4, Type I, tempered, fire retardant treated, smooth surface one side.
- J. Adhesive:
 1. For plastic laminate: FS A-A-1936.
 2. For wood products: ASTM D4690, unextended urea resin or unextended melamine resin, phenol resin, or resorcinol resin.
 3. For Field Joints:
 - a. Epoxy type, resistant to chemicals as specified for plastic laminate laboratory surfaces.
 - b. Fungi resistant: ASTM G21, rating of 0.
- K. Fasteners:
 1. Metals used for welding same metal as materials joined.
 2. Use studs, bolts, spaces, threaded rods with nuts or screws suitable for materials being joined with metal splice plates, channels or other supporting shape.
 3. Panel Fasteners: #516 "Joint-Tite" by Knappe & Vogt or equal by others; threaded device, concealed on one side after installation.
- L. Solid Polymer Material: As specified in Section 06 61 16, Solid Surface.
- M. Stone (ST): As specified in Section 06 61 16, Solid Surface.
- N. Solid Phenolic Panels:
 1. Modulus of Elasticity (ISO 178): $\geq 1,305,000$ psi (9,000 N/sqmm).
 2. Tensile Strength (ISO 527-2): $\geq 10,100$ psi (70 N/sqmm).
 3. Flexural Strength (ISO 178): $\geq 14,500$ psi (100 N/sqmm).
 4. Density (ISO 1183): ≥ 84.24 lbs/ft³.
 5. Weight (1 inch thick): 7.2 lbs/ft³.
 6. Resistance to Dry Heat at 356 Degrees F (EN 438): ≥ 4 .
 7. Resistance to Wet Heat at 212 Degrees F (EN 12721): ≥ 4 .
 8. Resistance to Crazeing (EN 438): ≥ 4 .
 9. Resistance to Color Change (UV-A; ASTM G53): ≥ 6 Wool scale (315-400 nm).
 10. Resistance to Impact by Large Diameter Ball; 71 inch drop height (EN 438): ≤ 0.4 inch indentation diameter.
 11. Wear Resistance (EN 438): ≥ 150 revolutions initial point; ≥ 350 revolutions wear value.
 12. Porosity: Nonporous surface and edges.
 13. Microbial Characteristics: Will not support microorganic growth.

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14. Chemical Resistance: Provide solid phenolic panel providing minimum performance when tested for chemical resistance in accordance with SEFA 8 (Laboratory Casework).
 15. Panel Thickness: 1 inch (25 mm).
- O. Sealant: As recommended by primary countertop material manufacturer for sealing joints in their products.
- P. Adhesive: As recommended by primary countertop material manufacturer for installing their products.
- Q. Other: Provide items as necessary for complete installation, complying with section 06 40 00, Architectural Woodwork, including, but not limited to, the following:
1. Grommets.
- ## 2.2 SINKS
- A. Sinks integral with Countertops:
1. Epoxy Resin (molded resin):
 - a. Cast or molded in one piece with interior corners 25 mm (one inch) minimum radius.
 - b. Minimum thickness of sides and ends 13 mm (1/2 inch), bottom 16 mm (5/8 inch).
 - c. Molded resin outlet for drain and standpipe overflow.
 - d. Provide clamping collar permitting connection to 38 mm (1-1/2 inch) or 50 mm (2 inch) waste outlet and trap, making sealed but not permanent connection.
 2. Stainless Steel:
 - a. ANSI/ASME A112.19.3, Type 304.
 - b. Flat rim for seamless weld into stainless steel tops; see COUNTERTOP FABRICATION below.
 - c. Ledge back or ledge sides with holes to receive required fixtures when mounted on countertop.
 - d. Apply fire resistant sound deadening material to underside.
 3. Sinks of Solid Surfacing Material: As specified in Section 06 61 16, Solid Surface.
- B. Sinks in, but not integral with, Countertops: Specified in DIVISION 22, PLUMBING.
- ## 2.3 TRAPS AND FITTINGS
- A. Material/products as specified in DIVISION 22, PLUMBING.
- ## 2.4 WATER FAUCETS
- A. Material/products as specified in DIVISION 22, PLUMBING.
- ## 2.5 MANUFACTURED SUPPORT BRACKETS
- A. Manufacturer: Subject to compliance with the requirements, manufacturers offering support brackets include, but are not necessarily limited to, the following:
1. Basis of Design: Rangine Corporation, Needham, MA, www.rakks.com ("Rakks" Counter Support Bracket).

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2. Short Run Pro, LLC DBA Federal Brace, Belmont, NC, www.federalbrace.com.
 3. Others: Complying with the requirements.
- B. Material: One of the following:
1. Extruded aluminum, 6063 T-6 alloy and temper.
 2. Stainless steel, AISI Type 304.
- C. Construction: Overall configuration: L-shaped.
1. Overall Unit Sizes: As appropriate for countertop depth and construction; provide standard or custom, shop-fabricated horizontal legs as necessary so that end of bracket is not more than 6 inches from farthest edge of countertop; 18 inches by 18 inches minimum for 24 inch countertops; 18 inches by 24 inches minimum and custom, shop-fabricated sizes where indicated or otherwise necessary for the conditions including 30 inch deep countertops.
 2. Surface Mounted Units:
 - a. Section Profile: T shape; size appropriate for countertop depth; ¼ inch thick by 2 inches by 2 inches minimum; 3/16 inches thick by 2 inches by 3 inches where necessary.
 - b. Forming: T stem V-notched, flange formed to create L shape, and stem miter welded both sides.
 3. Flush Mounted Units: Vertical leg concealed in wall construction.
 - a. Section Profiles:
 - 1) Vertical Leg: L shape; size appropriate for countertop depth; ¼ inches thick by 2 inches by 2 inches minimum.
 - 2) Horizontal Leg: T shape; size appropriate for countertop depth; ¼ inches thick by 2 inches by 2 inches minimum; 3/16 inches thick by 2 inches by 3 inches where necessary.
 - 3) Forming: T welded to L along all contact lines (one weld along T flange and at least three welds along T stem).
 4. Face Plates: 3 inches square nominal; self-stick adhesive backing.
 5. Predrilled holes for fasteners.
 6. Finish: Manufacturer's standard shop-applied prime coating for finish painting in field; see Section 09 06 00, Schedule for Finishes.

2.6 COUNTERTOP FABRICATION

- A. General:
1. Fabricate in largest sections practicable.
 2. Fabricate with joints flush on top surface.
 3. Fabricate countertops to overhang front of cabinets and end of assemblies 25 mm (one inch) except where against walls or cabinets.
 4. Provide 1 mm (0.039 inch) thick metal plate connectors or fastening devices (except epoxy resin tops).
 5. Join edges in a chemical resistant waterproof cement or epoxy cement, except weld metal tops.
 6. Fabricate with end splashes at the following locations:
 - a. Where against walls or cabinets in tops with sinks.
 - b. Elsewhere indicated.
 7. Splash Backs and End Splashes:
 - a. Not less than 19 mm (3/4 inch) thick.
 - b. Height 100 mm (4 inches) unless noted otherwise.
 - c. Laboratories and pharmacy heights or where fixtures or outlets occur: Not less than 150 mm (6 inches) unless noted otherwise.
 - d. Fabricate epoxy splash back in maximum lengths practical of the same material.

8. Drill or cutout for sinks and penetrations.
 - a. Accurately cut for size of penetration.
9. Follow additional requirements in related Casework Sections; see RELATED WORK in PART 1 above.

B. Plastic Laminate Countertops:

1. All work to conform to AWS, Section 400 for "Premium Grade" quality.
2. Core: Construct tops of minimum 3/4" thick particle board with edge built up as indicated below except edge thickness must be uniform within each room.
 - a. Types:
 - 1) Sinks: Exterior type particle board; use for portions of countertop within 6 feet of sink.
 - 2) Elsewhere: Typical particle board may be used.
 - b. Single layer acceptable for unsupported spans up to 36 inches.
 - c. Double layer required where indicated and for unsupported spans over 36 inches; glue together to form monolithic 1-1/4" thick panel.
 - d. Where double layer required, single layer of 1-1/8" thick particle board acceptable.
3. Splashes: Provide with minimum 1/4" scribe typical.
 - a. Integral coved back splash typical with permanently attached straight side splash coped into backsplash.
 - b. Straight splashes where specifically shown for dry areas only; permanently attached to top.
 - c. Seal: Prior to permanent attachment of straight splashes to top, seal all joints by setting in continuous bead of clear silicone sealant.
4. Exposed Edges: Except as specifically detailed otherwise, build exposed edges to 1-1/2" thick at overhang by attaching continuous strip of core material to bottom side of top.
 - a. Profiles as follows: AWS Appendix B, Section 11:
 - 1) Typical: Post-formed similar to "Full Round Edge" except 3/8 inch (9 mm) radius.
 - 2) Tops with sinks and elsewhere indicated: Same as Typical except add "No-Drip" feature.
5. Joints in core, if required, to be fitted with mechanical panel fasteners; spacing not to exceed 12" apart or more than 3" from outside corners.
6. Finishes: Finish surfaces with laminate plastic as follows:
 - a. Tops, Splashes, & Edges: Finish exposed surfaces with general purpose grade, 0.050" thick; balance underside of tops and concealed surfaces of splashes with backing sheet, 0.020" thick; provide 1 mm PVC on rear edge of top and seal resulting joint between top and backsplash as specified under "Seal" above; finish bottom of all overhangs with laminate.
 - b. PVC Edge: Provide 3 mm PVC edge after all laminate work completed. Make full contact waterproof bond with hairline joint. Trim flush with top and ease edge minimum 1/16 inch. All as approved by Architect.
7. Provide cut-outs for sinks, fittings, and fixtures where indicated; smooth cut edges and coat with waterproof coating.
8. Work Station Mounting Substrate: For work stations without base cabinet, provide full coverage mounting substrate on countertop bottom with two layers of 5/8" thick veneer plywood for attachment of items such as pencil drawers, keyboards trays, and CPU holders. Laminate plywood layers with glue and screws for total substrate thickness 1-1/4 inches.
 - a. Extend mounting substrate not less than 1 inch beyond adjacent casework for support. Block remainder of countertop flush with work station and as needed for support.
 - b. Laminate to bottom of countertop, with B face exposed, as required to support a uniform tension load of at least 25 psf plus 50-pound concentrated load applied at any location.

- c. Exposed to view fasteners not permitted on top of deck.
- d. Provide additional apron depth as needed to conceal mounting substrate thickness; ADA compliant where necessary.
- e. Stencil warning messages at two foot intervals on bottom of mounting substrate in 1-inch high, high-contrasting, uppercase font as follows: "Mounting Screw Depth 1-1/8" Maximum".

C. Stainless Steel Countertops:

1. Fabricate up to 3600 mm (12 feet) long in one piece, including nosing, backs, and ends.
 - a. When countertops exceed 3600 mm (12 feet) in length accurately fitted field joints are acceptable.
2. Reinforced with minimum 1.5 mm (0.0598 inch) thick hat channel stiffeners, minimum of two stiffeners for units without sinks and three stiffeners for units with sinks welded or soldered to underside of top full length, except at sink openings.
3. Apply sound deadening material on underside.
4. Flange edges of tops down 32 mm (1-1/4 inch) and reinforce with steel framing.
5. Grind welds smooth and finished on exposed surfaces to match finish specified.
6. Sink Tops:
 - a. Depth of splash backs and splash ends 25 mm (one inch) and turned down at least 13 mm (1/2 inch) at wall. Where faucets are located in splash backs, fabricate depth of splash backs 50 mm (2 inches) with provision made to receive required fixture.
 - b. Where sinks occur fabricate top with 5 mm (3/16 inch) marine (or curb) edge and fit flush with adjacent tops of other materials. Marine edge is to extend entire length of counter top
 - c. Weld sink flush to countertop and finish to appear seamless. RFI 05856
 - d. Pitch drainboards to drain.
 - e. Provide tubular stainless steel legs where necessary for support such as where no base cabinet or support brackets indicated; welded to sink top unit; four per Sink Top minimum.
 - f. Sizes and configurations: Room Name and Number plus sink Drawing designation (Family and Type) in parenthesis:
 - 1) Glass Wash 2P163 (P-524): 30" deep stainless steel counter with Double-bowl integral sink; each bowl 16" L (front to back) x 22" W x 11" D.
 - a) Drainboards: 136 inches on right side.
 - b) End Curbs (End Splash): Left ends; provide finished back side where exposed (right end).
 - 2) Cold Rooms 2P149A and 3P149A (R-2 or R-2A): 30" Deep stainless steel countertop with Single-bowl integral sink, 18" L (front to back) x 18" W x 16" D.
 - a) Drainboards: None.
 - b) End Curbs (End Splash): Right and left end.
 - c) Legs: Legs at four corners.
 - d) Backsplash: 6 inches high.
 - 3) Rad Lab 3P165, Diag 4P302C, Necropsy 4P307, Enviro Proc 4P313A, X-Ray 4P318, Gown/Prep 4P318B, OR Sup 4P318D, ISO Holding 4P320A, Treatment 4P321, 4P322, 4P329, and 4P333 (R-2 or R-2A): 30" Deep stainless steel countertop with Single-bowl integral sink, 18" L (front to back) x 18" W x 16" D.
 - a) Drainboards: None.
 - b) End Curbs (End Splash): Right and left ends as indicated on Drawings.
 - c) Finished Ends on right and left; as indicated on Drawings.
7. Gages: See "Metal Thickness" under QUALITY ASSURANCE in Part 1 above.
 - a. Tops: Minimum 16 gauge (0.059") except provide not less than 14 gage (0.075") for tops requiring field welding.

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- b. Sinks: Minimum 18 gauge.
 8. Fabrication and design as required for NSF Seal of Approval.
 - a. Weld intersecting joints solid and remove excess metal by grinding flush and smooth.
 - b. Polish to match adjacent surfaces.
 - c. Fabricate surfaces without sharp edges, overlapping joints, or open crevices.
 - d. Welding: Use neutral gas shielded arc method appropriate for metal thickness and to retain mechanical and corrosion properties of the base metal.
 - e. Fabricate metal top by forming and welding to provide seamless construction, using welding rods matching sheet metal, grinding and polishing. Where necessary for disassembly, provide waterproof gasketed draw type joints with concealed bolting.
 - 1) Reinforce tops 24" o.c. both ways with stainless concealed structural members (minimum 1.5 mm (0.0598 inch) thick hat channel stiffeners). Reinforce edges which are not self-reinforced by forming.
 - 2) Sound deaden underside of metal tops, including sinks and similar units, with a coating of sound deadening material. Hold coating back 3" from sanitary edges which are open for cleaning.
 - f. Fabricate with die-formed marine (or curb) edge 5 mm (3/16 inch) high with integral back and side splashes; extend top down over steel perimeter edges furnishing a thickness of 1-1/4 inch with a return flange of 1/2" under the frame reinforced with 14 gauge steel channels.
- D. Stainless Steel Shelves:
1. Minimum 16 gauge, fabrication to meet requirements of "Metal Countertops" above except sound deadening not required.
 2. Support brackets: "Channel" shaped members, minimum 1" x 1/2" x 16 gauge.
- E. Epoxy Resin (molded resin) Tops:
1. Molded resin with drip groove cut on underside of overhanging edge.
 2. Finish thickness of top minimum 25 mm (1 inch).
 3. Joints: Epoxy type.
 4. Round exposed edges to approximate 3/8 inch (9 mm) radius.
 5. Secure reagent shelves to countertops with fasteners from underside and seal seam.
 6. Sink Tops:
 - a. Back and End Splash Depths: 1 inch (25 mm).
 - b. Sizes and Configurations: Room Name and Number plus Sink Drawing designation (Family and Type) in parenthesis:
 - 1) Labs 1-15: 2P138, 2P142, 2P148, 2P152, 2P162, 2P167, 3P138, 3P142, 3P148, 3P152, 3P162, 3P168 (S-3): 30" deep EXR countertop with single bowl integral sink, 15" L (front to back) x 25" W x 10" D.
 - a) Drainboards: None.
 - b) End Curbs (End Splash): Right or left as indicated on Drawings.
 - c) Drip Trough: Continuous 304 stainless steel drip trough at back wall below pegboards.
 - 2) TC Rooms: 2P135B, 2P139, 2P141, 2P145, 2P147, 2P151, 2P153C, 2P155, 2P157, 3P135B, 3P139, 3P141, 3P145, 3P147, 3P153, 2P155B, 3P155C, 3P157, 3P167 (S-3): 30" deep EXR countertop with single bowl integral sink, 15" L (front to back) x 18" W x 11" D.
 - a) Drainboards: None.
 - b) End Curbs (End Splash): Right or left as indicated on Drawings; provide finished side where exposed.
 - 3) Mass Spec 3P151 (S-3): 30" deep EXR countertop with single bowl integral sink, 15" L (front to back) x 25" W x 10" D.
 - a) Drainboards: None.

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- b) End Curbs (End Splash): Right and left as indicated on Drawings; provide finished side where exposed.
 - 4) HPLC 2P153B, IM Hist 2P159, 3P161 (S-3A): 30" deep EXR countertop with single bowl integral sink, 15" L (front to back) x 18" W x 11" D.
 - a) Drainboards: None.
 - b) End Curbs (End Splash): Right or left as indicated on Drawings; provide finished side where exposed.
 - F. Pegboards: Provide pegboards as follows. Include item PEG0803 on the Activation Report.
 - 1. Materials:
 - a. At Level 2 and 3 Labs: Clear polycarbonate board and pegs.
 - b. Elsewhere: Stainless steel board and high density polypropylene pegs.
 - 2. Sizes: As indicated.
 - 3. Drip Troughs and Drain Tubes: Width to match pegboard width; sloped to drain 1/8 inch per foot.
 - a. Integral with Pegboard: Pegboard manufacturer's standard to match pegboard material.
 - b. Integral with Countertop: Stainless steel; details as indicated.
 - G. Solid Surfacing Tops: As specified in Section 06 61 16, Solid Surfacing.
 - H. Stone Tops (ST): As specified in Section 06 61 16, Solid Surfacing.
At sink base cabinets where there is no adjacent co-planar top (such as at end or side panels or where adjacent top is at a lower elevation) extend top to overhang 1 inch.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Installation of tops is included in installation of casework specified elsewhere.
- B. Countertop Support Brackets:
 - 1. Provide support brackets for countertops as required so unsupported spans do not exceed the stronger of the following conditions, but in no case more than 48 inches:
 - a. 42 inches.
 - b. Load limits of brackets.
 - c. Spacing recommended by bracket manufacturer.
 - d. As specifically dimensioned on the Drawings.
 - 2. Anchoring: Attach to wall with minimum ¼ inch diameter fasteners for each hole in device as follows:
 - a. Concrete Masonry Units: Sleeve type steel expansion anchors.
 - b. Concrete: One-piece type steel expansion anchors.
 - c. Metal Studs and Gypsum Board or Plaster: Attach to blocking which is secured to metal studs.
 - 1) Metal Blocking: Toggle bolts.
 - 2) Wood Blocking: Wood screws.
 - d. Length of Fasteners: As recommended by manufacturer and suitable for substrate.
 - 1) Wood Screws: Engage full thickness of plywood and minimum 1-1/4" in solid wood.
- C. Countertops: Level; anchor securely.

1. Align adjacent solid surface material countertops and form seams to comply with manufacturer's written recommendations using adhesive in color to match countertop. Carefully dress joints smooth, remove surface scratches, and clean entire surface.
 2. Install countertops with no more than 1/8 inch in 96-inch (3 mm in 2400-mm) sag, bow, or other variation from a straight line.
 3. Secure non-integral backsplashes to tops with concealed metal brackets at 16 inches (400 mm) o.c. and to walls with adhesive.
 4. Seal joint between backsplash and wall with sealant specified in Division 07 Section "Joint Sealants."
- D. Solid Surfacing (S) and Stone (ST): As specified elsewhere.
- E. Installation of non-integral bowls/sinks, including drain connections and plumbing trim and accessories, provided under DIVISION 22, PLUMBING.

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SECTION 12 48 16
INTERIOR FOOT GRILLES

PART 1 - GENERAL

1.1 SUMMARY

- A. Related Sections (Items not included in this Project Manual are available through Construction Manager upon request):
1. Concrete: Section 03 30 09.
 2. Cast Underlayment: Section 03 54 00.
 3. Pedestrian Traffic Coating: Section 07 18 15.
 4. Aluminum Entrances: Section 08 41 13.
 5. Floor finishes: Division 9.
 6. Color, pattern and texture: Section 09 06 00, SCHEDULE FOR FINISHES and FINISH LEGEND in drawings.

1.2 PERFORMANCE REQUIREMENTS

- A. Load: System to support uniform load of 100 psf plus point load of 200 lbs at any location at without damage to components.

1.3 SUBMITTALS

- A. Submit in accordance with Section 01 33 23, SHOP DRAWINGS, PRODUCT DATA, AND SAMPLES.
- B. Product Data Submit manufacturer's catalog cuts and other information showing sizes, materials, finishes, and anchorages/fastenings to adjacent materials and construction.
- C. Submittals Submit the following:
1. Grille: Minimum 12" x 12", showing treads, lock bars, and support cushions.
 2. Frame: Minimum 12 inches long.

1.4 APPLICABLE PUBLICATIONS.

- A. Publications listed below form a part of this specification to extent referenced. Publications are referenced in text by basic designation only. Latest edition unless otherwise noted
- B. American Society for Testing and Materials (ASTM):
1. B221 Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Shapes, and Tubes.

PART 2 - PRODUCTS**2.1 MANUFACTURERS**

- A. Aluminum Grille: Subject to compliance with the requirements, manufacturers offering aluminum foot grille products include, but are not necessarily limited to, the following:
1. Construction Specialties, Inc., Base Specification.
 2. Arden Architectural Specialties, Inc., St. Paul, MN.
 3. Balco Inc., Wichita, KA.
 4. J.L. Industries, Bloomington, MN.
 5. MM Systems, Tucker, GA.

2.2 MATERIALS

- A. Aluminum, ASTM B 221:
1. Rail Extrusions: Alloy 6105-T5.
 2. Key Lock Bars: Alloy 6061-T6.
 3. Frame: Alloy 6063-T5.

2.3 MANUFACTURED UNITS

- A. System: Aluminum grille, recess mounted with extruded aluminum frame.
1. Nominal 1-3/4" deep assembly.
 2. Recess is flat with no slope, no waterproofing, and no drain.
 3. Finish: Clear anodized.
 4. Fabricate grilles in sizes that one person can remove and replace units for maintenance cleaning. Units not exceed nominal 3 feet x 4 feet. Fabricate in uniform sizes as practical at each location.
- B. Grille: Serrated tread rails are one piece extrusions and joined mechanically by aluminum key lock bars.
1. Tread Rails: 1-1/2" wide "T" profile spaced to provide uniform open joints of approximately 1/8 inch.
 2. Serrations: Approximately 15 ribs per tread; approximately 1/32" deep.
 3. Support Cushions: 1/4" thick x 1" long EDPM rubber mounted to foot of tread rails at 20-inch centers or as recommended by grill manufacturer.
 4. Key Bars: 1/8" x nominal 1/1/4" machined to engage tread rail foot.
- C. Frame: Manufacturer's standard extrusion with 1/2" wide top surface and depth to match system depth.

PART 3 - EXECUTION**3.1 INSTALLATION**

- A. Examination: Examine work of other trades prior to commencing installation, and notify Architect of defects which may be detrimental to successful installation of work under this Section.

- B. Install grilles in accordance with manufacturer's instructions.
- C. Set frames for recessed work to be flush with finish floor surface.

END OF SECTION