

FACILITIES MANAGEMENT DESIGN GUIDELINES – VOLUME 2 - DESIGN REQUIREMENTS

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DIVISION 00 00 00 – PROCUREMENT & CONTRACTING REQUIREMENTS

I. General Information

- A. The following Division 0 Sections have been developed by the University of Texas Southwestern Medical Center (UTSW) and are to be utilized on all UTSW FM capital projects.
- B. The UTSW PM will provide the Design Professional with a final copy of all Division 0 Sections for insertion into the project specifications.
- C. If the Design Professional has additional sections or changes to these sections, these items shall be brought to the attention of the UTSW PM.
 - 1. The UTSW PM will coordinate with VP of FM and with the Office of Supply Chain Management for a resolution.
 - 2. If the additions or changes are agreed upon then the final copy supplied by the UTSW PM will reflect the agreed upon items.
- D. In no event will the Design Professional modify the final Division 0 Sections approved by UTSW.
- E. The following is a listing of the standard Division 0 Sections for Construction Manager at Risk (CM-R) and Design-Build delivery methods:
 - 1. Request for Qualifications.
 - 2. Request for Competitive Sealed Proposals from Shortlisted Firms.
 - 3. Presentations by Shortlisted Firm.
 - 4. Guaranteed Maximum Price Proposal.
 - 5. Performance Bond, Form C-6A.
 - 6. Payment Bond, Form C-6B.
 - 7. Uniform General and Supplemental Conditions, Form C-8.
 - 8. Special Conditions and Wage Rates.
 - 9. Soil Investigation Data.
- F. The following is a list of the standard Division 0 Sections for Competitive Sealed Proposal (CSP) delivery method:
 - 1. Request for Competitive Sealed Proposal (CSP).
 - 2. Instructions for Competitive Sealed Proposal, Form C-3 CSP.
 - 3. Supplemental Instructions for Competitive Sealed Proposal.
 - 4. Bid/Proposal Bond, Form C-2.
 - 5. Part 1, Competitive Sealed Proposal.
 - 6. Part 2, Proposer's Qualifications.
 - 7. Part 3, HUB Subcontracting Plan.
 - 8. Post Proposal Amendment.
 - 9. Addenda.
 - 10. Contract, Form C-5a.
 - 11. Performance Bond, Form C-6A.
 - 12. Payment Bond, Form C-6B.
 - 13. Uniform General and Supplemental Conditions, Form C-8.
 - 14. Special Conditions and Wage Rates.
 - 15. Soil Investigation Data.

DIVISION 01 00 00 – GENERAL INFORMATION

I. General Information

- A. The following Division 1 Specifications have been developed to work with the University of Texas System Uniform General and Supplemental Conditions and the Special Conditions and are to be utilized on all UT Southwestern Medical Center (UTSW) projects. The UTSW Project Manager (UTSW PM) will work with the Office of Supply Chain Management to complete Section 01 11 00 “Summary of Work” and Section 01 23 00 “Alternates.” The UTSW PM will provide the Design Professional with a final copy of all Division 1 Sections for insertion into the project specifications.
- B. If the Design Professional has additional sections or changes to these sections, these items shall be brought to the attention of the UTSW PM. The UTSW PM will work with Procurement for revisions to Section 01 11 00 and 01 23 00, but Procurement is the final authority on these documents. If additions or changes are agreed upon, then the final copy supplied by UTSW PM will reflect the agreed items.
- A. In no event will the Design Professional modify the final sections unless approved by the UTSW PM.
- B. The following is a listing of the standard Division 1 Sections:

01 10 00 - Summary

01 21 00 - Allowances

01 22 00 - Unit Prices

01 23 00 - Alternates (CSP Only) – Alternates for CM-R projects may be developed.

01 25 00 - Substitution Procedures

01 25 00 - Contract Modification Procedures

01 29 00 - Payment Procedures

01 31 00 - Project Management and Coordination

01 31 26 - Electronic Communications

01 31 50 - Project Meetings

01 32 00 - Project Planning Scheduling

01 35 23 - Project Safety Requirements

01 33 00 - Submittal Procedures

01 41 00 - Regulatory Requirements

01 42 00 - References

01 43 00 - Quality Assurance

01 45 00 - Project Quality Control

01 50 00 - Temporary Facilities and Controls

01 57 23 - Temporary Storm Water Pollution Control

01 60 00 - Product Requirements

01 71 23 - Field Engineering

01 73 00 - Execution

01 73 29 - Cutting and Patching

01 74 19 - Construction Waste Management

01 77 00 - Closeout Procedures and Submittals

01 79 00 - Demonstration and Training

01 81 13 - Sustainable Design Requirements

01 91 00 - General Commissioning Requirements

II. Acronyms

- A. The following is a list of standard acronyms within these documents.
- | | |
|--------|---|
| ANSI | American National Standards Institute |
| ASHRAE | American Society of Heating, Refrigeration and Air Conditioning Engineers |
| ASME | American Society of Mechanical Engineers |
| ADA | Americans with Disabilities Act |
| AHJ | Authority Having Jurisdiction |
| A.R.C. | Animal Resource Center |
| CD | Construction Documents |
| CIP | UTSW Facilities Management Capital Improvement Program |
| CM-R | Construction Manager at Risk |
| CMR | Construction Manager at Risk |
| CSP | Competitive Sealed Proposal |
| D-B | Design Build |
| DD | Design Development |
| FPD&C | UTSW – Facilities Planning, Design, and Construction |
| FM | UTSW Facilities Management |
| FML | Factory Mutual Laboratories (Normally FM) |
| FSC | Forestry Stewardship Council |
| GFCI | Ground Fault Circuit Interrupter Receptacle |
| GMP | Guaranteed Maximum Price |
| HUB | Historically Underutilized Business |
| IESNA | Illuminating Engineering Society North America |
| IDIQ | Indefinite Delivery-Indefinite Quantity |
| IR | UTSW Information Resources |
| IDBC | Institutional Design and Branding Committee |

IDF	Intermediate Distribution Frame (aka TR)
IBC	International Building Code
IECC	International Energy Conservation Code
IFC	Issue for Bid Construction Documents
MDF	Main Distribution Frame
NFPA	National Fire Protection Association
NRTL	National Recognized Testing Laboratory
NRCA	National Roofing Contractors Association
OFM	Office of Facilities Management
OSBC	Office of Safety and Business Continuity, Safety
RID	Texas Registered Interior Designer
RFP	Request for Proposals
RFQ	Request for Qualifications
PE	Texas Licensed Professional Engineer
PM	UTSW Facilities Management Project Manager
POC	Point of Contact
RAS	Texas Registered Accessibility Specialist
RA	Texas Registered Architect
RPLS	Texas Registered Professional Land Surveyor
S.E.C.O.	Texas State Energy Conservation Office
TR	Technology Room / IDF
TAS	Texas Accessibility Standards
TDLR	Texas Department of Licensing and Regulation
UL	Underwriters Laboratories
UTSW	University of Texas Southwestern Medical Center Dallas, Texas
UTS	University of Texas System Austin, Texas

DIVISION 02 00 00 – EXISTING CONDITIONS

I. General Information

- A. UTSW has many buildings constructed in a variety of material types and from many different eras. Each existing building will pose unique design challenges and opportunities for the Design Professional to understand while providing appropriate project solutions.

II. Design Review Submittal Requirements

- A. Refer to Volume 3 – Deliverable Requirements.

III. Section 02 21 00 Survey

- A. A topographic survey will be performed for each project involving new construction and for FM capital projects, where necessary, by a surveyor licensed in the State of Texas.
- B. The survey shall include information for, but not limited to, topography, existing construction (buildings, roads, sidewalks, etc.), existing utilities on site including closest point of connection if not on site, significant vegetation, easements, etc.
- C. Refer to Volume 3 for specific deliverable information in the UTSW Design Guidelines.

IV. Section 02 26 00 Hazardous Materials Assessment

- A. UTSW PM shall inform Design Professional of any hazardous items and provide a copy of all reports for the project area.
- B. Should unforeseen hazardous materials be discovered, work shall stop, and the affected area be properly sealed off.
 - 1. The UTSW PM and Office of Safety and Business Continuity (OSBC) shall be immediately informed.
 - 2. Design Professional and UTSW PM shall confirm required drawing updates.

V. Section 02 32 00 Geotechnical Investigations

- A. If included as a reimbursable service in the Design Professional Services Agreement, the Design Professional shall include the services of a qualified Geotechnical firm.
- B. The proposal for Geotechnical Services may include the following but additional services may be needed as discussed with UTSW PM.
 - 1. Subsurface Drilling and Sampling.
 - a. Borings proposed by the geotechnical engineer are to be indicated on a map with depths.
 - b. Where drilled piers are involved, provide a separate hourly rate and not to exceed cost (based upon 1 trip and 8 hours of time) to be onsite during the first day of pier drilling to verify bearing stratum and other field conditions.
 - c. Schedule of rates shall be available for review.

- d. Drilling and sampling in accordance with current applicable ASTM standards.
 - e. Samples taken at ground surface, at two feet below existing grade and at each change in soil stratification or soil consistency, but not further apart than five feet in each of the borings unless specified.
 - f. Rock cores, if applicable, are not to be less than 1 3/8-inch in diameter.
 - g. Samples shall be preserved and filed logs prepared by an experienced soil technician.
 - h. Make any necessary pavement repairs of like material and repair areas of soil disturbed from the process.
- 2. Field & Laboratory Reports.
 - a. Refer to Volume 3 for specific deliverable information.
- 3. Foundation Evaluation & Recommendations
 - a. Foundation support of the structure and slab, including soil bearing pressures, bearing elevations foundation design recommendations, including drilled piers/auger cast piles, potential vertical rise, and anticipated settlement.
 - b. PE to recommend native soil types that facilitate positive drainage.
 - c. Anticipation and management of groundwater.
 - d. Lateral earth pressures for design of walls below grade, including backfill, compaction and sub drainage and associated requirements.
 - e. Soil material and compaction requirements for site fill, construction backfill and for the support of structures and pavements.
- 4. Pavement Design.
 - a. Design criteria for temporary excavation, temporary protection such as sheet piling, underpinning and temporary dewatering system.
- 5. Stability of Slopes.
 - a. Analysis of soils to ascertain presence of potentially expansive soils, deleterious soils, chemically active or corrosive materials in soils, or the presence of gas in soils.

VI. Section 02 41 00 Demolition

- A. All site demolition shall be indicated on a separate demolition plan indicating all items to be turned over to the UTSW FM and all trees and vegetation that shall remain and be protected during construction.
- B. Perform all demolition of existing surface and underground facilities/improvements as required to construct the project.
- C. Demolition plans and/or details shall be included in the design drawings.
- D. Provide adequate tree protection around all trees in the project site that are to remain. Refer to Division 01 00 00 for additional information.
- E. Underground facilities shall be removed as required to clear construction in accordance with good, prudent practice and considering potential future construction.

1. At a minimum, all structures shall be removed to a point 3-feet below natural ground. All cavities left below ground shall be filled with compacted native material or a flowable fill material.
 2. PE shall identify any underground drainpipes to remain and/or repair affected by the demolition.
 3. The portions of piping systems remaining in place shall be neatly cut and capped and/or plugged. Where partial demolition occurs, the remaining portions shall be left in a finished functional condition.
 4. Civil Engineer shall make recommendations of backfill materials.
- F. Fill all voids left by clearing and demolition operations with native material compacted in maximum 8-inch lifts to a density equal to that of the surrounding undisturbed soil.

VII. Section 02 80 00 Facility Remediation

- A. While the Design Professional will not be involved in remediation processes, the UTSW provided hazardous material report will identify known hazards expected during construction.
- B. Should unforeseen hazardous materials be discovered, work shall stop, and the affected area be properly sealed off. The UTSW PM and Office of Safety and Business Continuity (OSBC) shall be immediately informed. Design Professional and UTSW PM shall confirm required drawing updates.
- C. Post-remediation project plans shall be provided to OSBC through the Chemical Safety Program.

DIVISION 03 00 00 – CONCRETE

I. General Information

- A. All concrete shall be designed, transported, placed, finished, and cured in accordance with American Concrete Institute (ACI) requirements. All components of the concrete mix shall meet applicable ANSI/ASTM requirements.
 - 1. Mix requirements and strength shall be specified by the Design Professional for each item of construction.
 - 2. Design Professional shall limit the number of mix strengths specified as much as practical.
- B. Refer to Volume 1, Section A1 for A.R.C. requirements.
- C. General Floor Loading - Design floor live loads on all institutional buildings to carry a minimum of 100 pounds per square foot unless greater is required by Code and/or use for a particular use. This allows flexibility of future design when the building is renovated.
 - 1. Floor design must be sufficiently rigid to prevent objectionable vibration.
 - 2. For all other buildings, the design live loads shall be by the building code.
 - 3. Where mobile lifts are expected for maintenance inside buildings, the Design Professional team shall coordinate expected weights for machines in the space as well as provide a pathway with sufficient floor loading from an entry location.
- D. Reinforcement shall be engineered and specified for project requirements.
- E. Crawl space:
 - 1. Within buildings and crawl spaces, all penetrations shall be sealed to prevent the movement of water and pests.
 - 2. Provide a 2-inch-thick, 2500 psi unreinforced mud slab, properly sloped and drained, when a crawl space is included.
- F. Any exposed concrete columns shall be sealed to prevent stains and shall be protected during construction to maintain intended finish.
 - 1. Base shall be installed up to 4-inch minimum on all sides of columns.
- G. UTSW prefers that precast panels or brick do not extend below grade due to long-term waterproofing issues. If any material or structure extends below grade, it shall be completely waterproof. Refer to specifications for warranty requirements.
- H. Concrete Flooring:
 - 1. All flooring surfaces must provide slip resistance at wet and dry conditions of .5 or better with tribometer testing.
 - a. OSBC shall be contacted to confirm coefficient of friction requirements have been achieved for new sidewalks, pavement, and broom finish levels.
 - b. Exposed concrete floors in mechanical or service bays shall provide slip-free surfaces for employees such as broom finish.
 - 2. Refer to specification Section 03 30 00 "Cast-In-Place Concrete" for finish requirements.
 - 3. While polished and stained concrete are not UTSW preferences, due to the creation of slip hazards, any exposed concrete finished work shall be accomplished in two pours or as recommended by the structural engineer.

- a. The first pour shall be structural, and the second shall be a two-inch minimum finish topping slab poured near completion of project.
- I. Sidewalks and Site Features:
 - 1. UTSW prefers sidewalks to be sized wide enough for the variety of visitors and users to the campus. Walkway widths shall be 4-foot minimum and wider dependent on code requirements and user discussion.
 - a. Installation of poles within sidewalks shall not encroach into the width of pedestrian walkway.
 - b. Sidewalks shall be designed to provide easy, continuous traffic flows.
 - c. Entry sidewalks shall be doveled to building foundation.
 - 2. Concrete sidewalks shall be completely enclosed by formwork at all edges and to the full depth during pouring and curing.
 - 3. Sidewalks near buildings shall be designed with positive slopes.
 - 4. Sidewalks shall be finished and sloped to prevent ponding of water and comply with TAS.
 - 5. Concrete or gravel/rock mow strips are acceptable on campus.
 - a. Where concrete mow strips are planned, provide a 1-foot-wide x 4-inch-thick continuous reinforced concrete mow strips around a building adjacent to areas expected for mowing.
 - b. The mow strip shall be doveled to the building foundation near all door locations. At all other locations the mow strip shall not be doveled to the building foundation unless approved otherwise by the UTSW PM.
 - c. Include mow strips along the backs of curbs for head-in parking areas adjoining grass areas with expected overhanging by car bumpers. These shall be doveled to the back of the curbs and sloped in the direction of positive drainage. Joints shall align with the adjoining curb.
 - 6. Landscape Edges:
 - a. In pedestrian areas, landscape edges are preferred to be poured in place concrete. Metal landscaping strips are not preferred in pedestrian areas.
 - b. Metal landscaping strips are acceptable in landscaping areas located away from pedestrian traffic.
 - 7. Concrete planters or raised beds shall have waterproofing membranes and seals to prevent damage and mold. These elements shall not be located on top of structural components that could cause waterproofing issues or rust in the long term.

II. Design Review Submittal Requirements

- A. Refer to Volume 3 – Deliverable Requirements.

III. Section 03 10 00 Concrete Forming and Accessories

- A. Concrete formwork shall meet applicable ACI requirements.
 - 1. Use materials suitable for exterior exposure and which have the strength to produce required tolerances.
 - 2. Materials in contact with concrete shall not react with fresh concrete to cause loss of strength or durability.
 - 3. Form materials shall not stain concrete surfaces that are exposed to view.
- B. All forms and pieces of wood shall be removed once construction processes no longer require them.
 - 1. No wood shall be left behind as it attracts pests and moisture in the long term.
- C. Void space below grade beams shall have soil retainers located at the face of grade beams to form a void of sufficient depth to prevent pressure on the bottom of beams from earth expansion.
- D. Form ties may be snap off metal ties of fixed length with plastic cones, designed to prevent spalling of concrete upon removal. Provide units that will leave no metal within 1-inch of concrete surface.
- E. Locations of utility lines, sleeves and pipes underneath sidewalks, driveways, parking, or other paving shall be permanently marked with utility identification.
 - 1. Utility markers shall be made of brass, stainless steel, or other rugged metal construction that is drilled and adhered into the pathway near the perimeter or edge.
 - 2. Markers shall have wording on the top with a general description of items buried as well as arrows indicating direction.

IV. Section 03 20 00 Concrete Reinforcing

- A. Concrete reinforcement material, design, and placement shall meet the applicable requirements of ACI and the Concrete Reinforcing Steel Institute (CRSI) along with associated ASTM requirements.
- B. Reinforcing bars shall typically be Grade 60.
- C. No welded wire fabric reinforcing is allowed except in topping slabs or unique situations as approved by the UTSW PM.
- D. Main reinforcing bars to be minimum No. 4 in size.
- E. Limit No. 3 bars (Grade 40) to ties and dowels.

V. Section 03 30 00 Cast-in-Place Concrete

- A. Admixtures to the concrete mix meeting applicable ANSI/ASTM specifications may be used as recommended by the Structural Engineer to improve concrete workability, for wear/weather resistance, and to better meet project conditions.
 - 1. Pozzolan Admixtures should only be used within the limits recommended by the Structural Engineer and shall be approved by the UTSW PM and FM.
- B. Expansion and control joints:
 - 1. Locations of expansion and control joints shall be indicated on structural, architectural, and finish plans.

2. Design locations of expansion and control joints to minimize the number of times control joints cross traffic paths, such as hallways.
- C. All concrete shall be properly vibrated to remove air pockets and provide smooth finish surfaces.
- D. Any concrete for stair treads with embedded nosing must specify a mix with small aggregate such as 3/8-inch or chipped rock to ensure proper installation of nosing.
- E. Any thin layers or skim coats added to resurface new concrete shall include waterproofing component, primer, and must be an epoxy-based product.

VI. Section 03 35 00 Concrete Finishing

- A. The project specifications shall clearly establish finish measurement tolerances, suitable standards, exposure qualities, and provide quality control requirements to ensure a suitable installation.
- B. Generally, cement finished floors are to receive hardener and sealant.
- C. Any concrete sealant shall provide additional grip topping to prevent slippery surfaces and meet Safety requirements.
- D. Flooring protection is to be provided in areas with exposed concrete to prevent staining and chipping during construction work.
- E. Slick finishes are not allowed.
- F. For any special finished concrete in the project, the Specification shall require a sample panel or other area constructed as specified for approval consideration for UTSW PM.

VII. Section 03 39 00 Concrete Curing

- A. The curing compound manufacturer shall provide certification that their product is compatible with the finish flooring scheduled for the space.

VIII. Section 03 40 00 Precast Concrete

- A. Design Professional may determine additional consultants, such as precast consultants, are needed depending on project scope.
- B. On projects designed for precast, tilt-up and/or special finished concrete panels, the Specification shall require a sample panel, constructed as specified, or at least 42 square feet to be erected at the jobsite for approval consideration by the UTSW PM.
 1. The approved panel shall remain on the jobsite as a visual criterion that the final construction must match.
 2. The mock-up shall include samples of standard conduit constructed within panels and any other special conditions present in the project.
- C. Expansion and control joints shall be indicated on building elevations.
- D. Conduit locations within precast panels shall be permanently marked with metal utility markers located within the panel surface.

IX. Section 03 50 00 Cast Decks and Underlayment

- A. Concrete is the preferred material for flat roof decks.
 - 1. Shaped rigid board insulation is not permitted.
 - 2. Where the roof is supported by a combination of structural steel, steel joists and steel deck, the topping shall be normal weight concrete.
- B. The main slope for the roof shall be accomplished by the structural system. Only secondary slopes can be accomplished by the roof system and any tapered insulation component.

DIVISION 04 00 00 – MASONRY

I. General Information

- A. Materials and processes for Masonry construction shall comply with the ICC Chapter 21 Masonry section and follow current best practice guidelines to provide masonry surfaces that will require minimal maintenance over time while maintaining positive aesthetics.
 - 1. Important considerations include design, installation techniques and location of drip edge flashings to protect the building infrastructure while providing appealing aesthetics.
 - 2. Design shall effectively use weep holes and stepping brick ledges at differing slope levels.
 - 3. Use of brick within buildings should not prevent access to items that need periodic maintenance, such as plumbing devices.
- B. Brick and stones as building walls are not currently standard for campus new construction.
 - 1. Existing building renovations, which modify areas of existing brick, will be reviewed by UTSW FM.
- C. Pavers or bricks as flooring surface at primary entry floors or heavy patient traffic areas are not preferred.
- D. For landscaping, poured edging or gabions are preferred. Dry stack installations are not preferred for use in landscaping.

II. Design Review Submittal Requirements

- A. Refer to Volume 3 – Deliverable Requirements.

III. Section 04 20 00 Unit Masonry

- A. Concrete Masonry Units (CMU)
 - 1. Concrete masonry units shall be used wherever feasible as substrate for exterior face brick.
 - 2. Use as an interior wall includes areas such as high traffic service areas, service and wet areas, Animal Resource Center (A.R.C.) large animal spaces or as further indicated by project requirements.
 - 3. Refer to Volume 1, Section A1 for A.R.C. requirements.
 - 4. Design Professional shall confirm appropriate block filling products are used on new construction. A minimum of two coats of block filler with a high-performance coating system is a minimum requirement.
 - 5. Concrete masonry units shall comply with ASTM C90 as a minimum.
 - 6. Use concrete masonry unit shapes as required for reinforcing and openings.
 - 7. Expansion joints and control joints shall be appropriately detailed and shown in drawings.

B. Brick

1. Exterior brick is not currently a standard across the entire UTSW campus. Brick masonry is to be designed and constructed per the standards of the Brick Industry Association.
2. Brick will be selected during project design and presented to the IBDC for review and approval.
3. Face Brick shall be ASTM C216; Type FBS grade SW.
4. For masonry veneer, Mortar Type N with concave tooled joints shall be used.
5. Brick coursing shall stop above grade to ensure positive drainage with consideration given to stain prevention. Use of mow strips, stone landscaping and other techniques shall be considered to ensure longevity of the installation.
6. Joints:
 - a. Horizontal control joints with corresponding masonry support shelf angle shall be located at each elevated level but is not needed between the top floor and roof parapet.
 - b. Control joints shall be located at each side of masonry openings. Vertical control joints shall be located at a maximum of approximately 30 feet on center in planer exterior walls.
 - c. Expansion joints and control joints in masonry veneer walls shall be appropriately detailed and shown on building elevations.
 - d. Architect and Structural Engineer shall coordinate locations of these joints.
7. Shelf angles and lintels shall be designed by the Structural Engineer to support the full weight of masonry which it holds including lintels above all wall openings. The design of these supports shall follow best practice, be protected from corrosion and a schedule of angles and shelves shall be provided in the documents.
8. For large projects or as indicated by the UTSW PM, the Design Professional shall provide drawings and details that indicates the size of the brick mock-up panel that will also contain all exterior materials such as stone, cast stone, curtain wall, glazing, sealants, flashings etc. for final approval of brick color as well as all exterior colors for the project.
9. The Design Professional shall ensure the specification requires the Contractor erects a 300-brick sample panel in mortar, placed in full sunlight at the jobsite for UTSW review prior to the final brick order.
 - a. The approved panel shall remain on the jobsite as a visual criterion which the final construction must match.

C. Masonry Accessories

1. Mortar net or a comparable mortar collection product shall be utilized in brick or concrete masonry walls to prevent clogging of weep holes.
2. Weep holes shall be spaced at 24-inches O.C. maximum at flashing and 16-feet O.C. with wicks located above flashing.
3. Use hot dipped galvanized brick ties.

IV. Section 04 40 00 Stone Assemblies

- A. Stone as a building wall finish is not currently standard or preferred on campus.
- B. If allowed in a project, marble and granite shall be domestic.
- C. Surfaces shall be sealed according to best practice recommendations.
- D. All stone shall be presented in early design for review and approval by the IBDC.
- E. Use of stone as flooring in or near high-traffic entry vestibules and lobbies shall be done thoughtfully in ways to prevent slick surfaces and address long-term maintenance concerns.
- F. Anchors, dowels, and other accessories used in setting stone shall be stainless steel.

DIVISION 05 00 00 – METALS

I. General Information

- A. Materials and processes shall comply with applicable codes including ICC Chapter 16 and 22 as well as current best practices, including the American Institute of Steel Construction (AISC), American Welding Society (AWS) and American Society for Testing and Materials (ASTM).
- B. UTSW preferred structural systems include composite structural steel and concrete structures. Avoid the use of touching dissimilar metals conditions in all structural situations. Use compatible metals or provide isolation materials.
- C. Ensure lightning protection system is designed to prevent galvanic corrosion between dissimilar metals. Do not use a combination of materials that form an electrolytic couple. Refer to Division 26 00 00.
- D. The Engineer shall include the following language in the notes and specifications for Structural Steel and Concrete Reinforcing:
 - 1. Domestic Iron and Steel Certification. Pursuant to Sections 2252.201 – 2252.205 of the Texas Government Code, the Contractor certifies that it complies with the requirement that any iron or steel product produced through a manufacturing process and used in the Project is produced in the United States.

II. Design Review Submittal Requirements

- A. Refer to Volume 3 – Deliverable Requirements.

III. Section 05 10 00 Structural Metal Framing

- A. The Contractor shall be required to provide an affidavit, at the completion of the project, that the structural steel framing is plumb and level within the normal tolerances specified in the AISC Code of Standard Practice.
- B. The main slope for the roof shall be accomplished by the structural system. Secondary slopes can be accomplished by the roof system.
- C. Any exposed column baseplates shall be designed to prevent trip hazards and not unduly collect dirt. Flooring shall be installed to butt cleanly against any exposed steel.

IV. Section 05 12 13 Architecturally-Exposed Structural Steel Framing

- A. Any Architecturally-Exposed Structural Steel (AESS) shall be clearly identified on the construction documents. Show on plan with shading, labels, or other means to indicate AESS. Provide appropriate specifications and details. To the extent possible, fabricate and assemble AESS in the shop.
- B. Fabricate AESS with exposed surfaces smooth, square and of surface quality consistent with the approved mock-up. Grind exposed edges of sheared, punched or flame-cut steel to remove burrs and marks to match approved mock-up. Requirements for a potential

mock-up shall be determined with UTSW PM and Design Professional. Mock-ups shall be minimized due to the potential for additional costs associated with its usage.

V. Section 05 30 00 Metal Decking

- A. The metal deck shall be recommended by the Structural Engineer as the best product for the application.

VI. Section 05 40 00 Cold-Formed Metal Framing

- A. Cold-formed metal wall framing shall be spaced 16-inches on center, maximum or as determined by code requirements.

VII. Section 05 50 00 Metal Fabrications

- A. All exterior exposed ferrous metals shall be hot dip galvanized unless they are exterior grade painted.
- B. Wherever dissimilar metals come into physical contact, they must be separated with an approved layer of bituminous coating or with other best practice solutions.

VIII. Section 05 51 00 Metal Stairs

- A. Treads and Landings:
 - 1. Metal stairs with concrete, terrazzo, or other similar treads that provide code required slip resistance are acceptable.
 - a. Refer to specification Section 03 30 00 "Cast-In-Place Concrete" for "slip-resistive finish" requirements.
 - 2. Treads:
 - a. Embedded abrasive nosings may be installed where recommended for safety and longevity. Refer to specification Section 05 51 00 "Metal Stairs" for requirements.
 - b. Rubber stair treads may be used as approved by IDBC where advantageous to the project.
 - c. Grated treads are permissible with approval from PM and BMO.
- B. Metal Structure:
 - 1. All metal stairs shall have components, including welds, properly cleaned and primed for long-term finish system application.
 - 2. Construction of stairs shall include a support/brace at the middle of risers to provide long-term support.
 - 3. End caps shall be used to prevent water intrusion and minimize rust.
 - 4. Concrete pan treads shall have seams fully sealed to prevent water intrusion into the pan.

- C. Metal Finishes:
 - 1. Refer to Sections 09 91 13 "Exterior Painting" and 09 91 23 "Interior Painting." Finishes shall be rust-inhibiting epoxy systems.
 - 2. Galvanized finishes may be used in exterior or back-of-house conditions.

IX. Section 05 52 00 Metal Railings

- A. Design of metal railings shall comply with applicable codes including Chapter 7, Means of Egress of NFPA 101 and TAS.
- B. Design of guards and rails shall follow code requirements, maximize safety, and minimize long-term maintenance.
- C. Rail Types:
 - 1. Metal type and finish chosen per stair type and location shall provide a low maintenance solution.
 - 2. Exterior rail finishes shall be electrostatic epoxy painted or galvanized unless approved by IDBC and BMO.

DIVISION 06 00 00 – WOOD, PLASTIC, AND COMPOSITES

I. General Information

- A. Consider specifying products from sustainable sources such as FSC (Forestry Stewardship Council) Certified Wood or regionally available from abundant sources. Avoid use of imported or exotic species of wood.
- B. Contractors shall provide certifications of wood types, including UL labeling for fire retardant materials, certifications for preservative treatment and any inspections.
- C. All products shall be free of arsenic and chromium.
- D. All interior installations shall match campus preferences for no or low-VOC content for products and adhesives.

II. Design Review Submittal Requirements

- A. Refer to Volume 3 – Deliverable Requirements.

III. Section 06 10 00 Rough Carpentry

- A. Wood used in conjunction with roofing installations and wood which is installed in contact with concrete or masonry shall be pressure treated with an approved preservative to meet AWPS Standards.
- B. UTSW preference is to minimize the use of wood that could create issues with insects and rot. Wood installations shall receive prime coats suitable for finishes specified as soon as installation is complete. Back prime wood where dampness or warping is anticipated.
- C. Blocking shall be indicated on drawings where extra support is required for items such as toilet accessories, handrails, door stops, millwork, equipment, mounting devices, etc.
 - 1. Blocking shall be documented to extend beyond the size of the item to be installed to account for construction tolerances.
 - 2. Blocking shall comply with NFPA and regulatory requirements.
 - 3. Where fire-rated plywood is utilized, the stamp shall remain visible and not be painted.

IV. Section 06 16 00 Sheathing

- A. Exterior walls with cold form stud construction shall have glass-mat sheathing material. Sheathing shall provide added shear strength, resist water, and resist air infiltration, such as glass-mat or glass-faced gypsum sheathing.
- B. All installations shall follow manufacturer recommendations including nailing schedule and sealing joints.
- C. All panels shall butt fully together.
- D. Sheathing layer does not negate the need for waterproofing layer dependent on system indicated for design.

V. Section 06 20 23 Interior Finish Carpentry

- A. Materials and fabrication for Millwork shall conform to Architectural Woodwork Institute “Quality Standards” specification. Use “Custom Grade” for standard millwork and “Premium Grade” for unique and special features.
- B. The design of the upper cabinetry shall prevent dust accumulation.
- C. Design Professional shall identify locations for under cabinet light with UTSW PM and coordinate within architecture and electrical drawings.

VI. Section 06 40 23 Interior Architectural Woodwork

- A. Materials and fabrication shall conform to Architectural Woodwork Institute specification. Use “Custom Grade” for standard casework and “Premium Grade” for unique and special features.
- B. UTSW preference is for plywood construction for casework and millwork.
 - 1. MDF or particleboard only to be used if approved in writing by UTSW.
 - 2. Products used for panels or doors shall have good screw holding face to hold up over time. Refer to Table 4-007 – Characteristics of Core Performance in AWI’s standards.
- C. For stained natural wood finish, plywood shall be veneer core, A-1 grade. Standard stained wood finish is Red Oak plain slice (R. Oak VC A1 PL SL). Drawer boxes shall be 1/2-inch or 9-ply Baltic Birch Plywood.
- D. Restrooms and Breakrooms:
 - 1. No particleboard is allowed.
 - 2. In wet areas, including breakroom sinks, UTSW preference is the use of high-grade plywood to construct lower cabinets with finished interiors such as plastic laminate for protection.
 - 3. Solid surface countertops and front panels are preferred for longevity and lower maintenance.
 - 4. Front panels shall be designed with clip-system attachment for maintenance.
 - 5. Stainless steel is the preferred finish for any visible hardware.
- E. Casework hardware standards include:
 - 1. Drawer glides – ball bearing with minimum 100-pound capacity.
 - 2. Wire pulls – 3-1/2-inch or 4-inch with brush chrome finish or to match existing.
 - 3. Cam Lock 1-3/16-inch, bright nickel or to match existing. Refer to Design Guideline Section 08 70 00 “Hardware” for additional lock information.
 - 4. Shelf Standards, extra heavy duty in an anochrome finish.
 - 5. Shelf Brackets, extra heavy duty in an anochrome finish.
 - 6. Hinges, 120 degree opening angle, full overlay, concealed with wing plate.

VII. Section 06 80 13 Resin Composite Paneling

- A. Resin composite panels are acceptable to be used on campus.
- B. Typical installations include space dividers or dividers at reception/check-out areas.
- C. Any proposed product shall be submitted with a minimum 12-inch square sample to the UTSW PM and UTSW Design Team.

VIII. Section 06 83 16 Fiberglass Reinforced Paneling

- A. Fiberglass Reinforced Paneling (FRP) may be used at approved locations including labs, kitchens, janitor closets, A.R.C. renovation spaces, and back-of-house areas.
- B. All panels shall be moisture-, chemical-, and abuse-resistant panel systems. Seams and fasteners shall be fully gasketed, sealed and designed to adequately prevent sagging or delamination when rooms are pressurized.
- C. The system shall include heavy-duty corrosion resistant clips. Installation techniques, such as glue, shall be determined to maximize the lifespan of the installation.
- D. Heights of installations, textures, colors, and surface options shall be approved by UTSW Design Team. Accessories including trim and moldings shall match FRP color.
- E. All components shall be sealed firmly with continuous sealant behind all components, caps and trims.
- F. Design documents shall show panel layout with dimensions indicated. Installations shall limit the number of cut panels used per applied surface.

DIVISION 07 00 00 – THERMAL AND MOISTURE PROTECTION

I. General Information

- A. Building Envelope shall comply with State Energy Conservation Office codes and ASHRAE 90.1. Refer to Volume 3 current editions of codes and standards.
- B. A method to clean all exterior glazing must be incorporated into the project. Verify method with Project Manager.
- C. The roof systems for new and existing facilities shall meet International Building Code (IBC) and National Roofing Contractors Association (NRCA) to address the specific design requirements of each building considering the following criteria:
 - 1. Life Cycle Cost.
 - 2. Sustainability.
 - 3. Roof Penetrations.
 - 4. Roof Traffic to access and repair/maintain roof-mounted equipment.
 - 5. Maintainability of Roof System.
 - 6. Differential movement.
 - 7. Historical Requirements.
 - 8. Visibility from Adjacent Facilities/Aesthetics.
- D. Specified roof systems shall carry a manufacturer's 20-year warranty.
- E. Roof systems shall be designed to protect the roof from chemicals, grease, and other contaminants that are detrimental to the life of the roof.

II. Design Review Submittal Requirements

- A. Refer to Volume 3 – Deliverable Requirements.

III. Section 07 10 00 Damp Proofing and Waterproofing

- A. Use of damp proofing and waterproofing systems from a single manufacturer in lieu of components from multiple manufacturers are required.
- B. For each project with elevator pits as part of project scope, either new construction or elevator renovation, confirm the waterproofing of pit is acceptable. Include remediation discussions with UTSW FM if waterproofing has failed.

IV. Section 07 18 00 Traffic Coatings

- A. The use of traffic coatings on campus shall consider long-term maintenance requirements including reapplication as part of the overall analysis. Any installation shall follow best practices including priming and sealing per manufacturer's recommendations.

V. Section 07 21 00 Thermal Insulation

- A. Maximize insulation value of the building envelope to conserve energy and incorporate an air barrier. Do not provide insulation materials containing formaldehyde. Consider insulation types with recycled content.
- B. Non-combustible or Factory Mutual (FM) Approved insulation is recommended in place of foam-based products (polyurethane, polystyrene, etc.), and is especially important in unprotected, concealed spaces, such as attics and crawl spaces, or in hollow-core walls that will be penetrated by electrically rated equipment.
- C. Performance requirements coordinated with specifications.

VI. Section 07 25 00 Weather Barriers

- A. Use of weather barrier systems from a single manufacturer in lieu of components from multiple manufacturers is required.

VII. Section 07 42 00 Wall Panels

- A. Wall panels shall be a system from a single manufacturer.

VIII. Section 07 50 00 Membrane Roofing

- A. UTSW requires Nuclear Scanning, Core Sampling, and Thermal Imaging to ensure roofing systems are installed correctly.
- B. The roofing system shall be determined by Facilities Management or as indicated in this Division.
- C. Roof Components:
 - 1. Specify service walkways (minimum 24-inches in width) appropriately located to service all roof top equipment from the roof access. Walk-paths and lay-down areas for equipment replacement shall be provided at a minimum.
 - 2. Carefully detail roof expansion joints and flashing to conform to SMACNA detailing.
 - 3. Completely detail all parapet walls, caps, coping and scuppers. Top of coping should slope toward roofs.
 - 4. Detail roof edges sufficiently high to prevent water from spilling over and spotting walls and fascia where roof drains are used.
 - 5. Provide drips on overhangs, ledges, window stools and coping to prevent discolorations of fascia, soffits, and walls.
 - 6. Ensure that sealants specified are to be used within their limitations. When pre-cast concrete wall panels are used, ensure proper compatibility between the surface sealant and the concrete panel when caulking a joint.
 - 7. Flashing materials for permanent type buildings to be aluminum, stainless, or copper (not galvanized metal).
- D. Slope roof adequately to drain (minimum 1/4-inch/foot. slope).
 - 1. Design primary roof slopes for new buildings into the structural frame and not by roof insulation.
 - 2. Crickets to roof drains may be sloped with insulation.

3. All roofs shall be designed with sufficient slope or camber to assure adequate drainage after long-time deflection from dead load or shall be designed to support maximum loads including possible ponding due to deflection.
- E. Lightweight concrete insulating fill roof decks will not be used in conjunction with urethane roof system. Lightweight structural concrete is allowed.

IX. Section 07 60 00 Flashing and Sheet Metal

- A. Provide complete flashing and trim details for all thermal and moisture protection systems to include assemblies, system transitions, and termination points.

X. Section 07 70 00 Roof and Wall Specialties and Accessories

- A. All roof areas shall be designed with safe access such as ladders or hatches in initial designs. Rappelling shall not be utilized for normal maintenance or service of a roof area or roof-mounted equipment.
- B. Walkways shall be provided for roof-mounted machinery so that equipment may be serviced without traffic directly on the roof surface.
- C. Roof-mounted equipment shall be accessible by a stair or ladder.
 1. Hatches without stairs or requirements for use of external ladders are not acceptable.
- D. Roof mounted conduit and piping shall be minimized wherever possible to prevent tripping hazards as well as maintenance difficulties.
 1. Where other structural elements are present, such as AHU framing, run conduits overhead instead of along the roof surface.

XI. Section 07 80 00 Fire and Smoke Protection

- A. Fire and smoke protection components shall be in compliance with UTSW code requirements and the AHJ.
 1. Joint commission projects do not allow scab patches. Repairs shall comply with regulatory requirements.
- B. Refer to Division 27 00 00 for all penetration fire stopping requirements for communications and its associated components.
- C. Suggested fire stopping and penetration fire stopping elements shall match UTSW preferences as much as possible. This preference includes solutions that minimize long-term maintenance while allowing for modifications.
 1. UTSW preference for non-communications cables is the use of a pre-formed firestop sleeve.

XII. Section 07 90 00 Joint Protection

- A. Joint protection shall be chosen to ensure protection from the passage of air, water and other elements and be compatible with surface and material conditions.
- B. Interior sealants shall be easily cleaned and decontaminated.

XIII. Section 07 95 00 Expansion Control

- A. Expansion joints shall be indicated on drawings for interior and exterior conditions at vertical and horizontal locations.
 - 1. Expansion joint covers shall be sized to meet the differentials as determined by the structural engineer.
 - 2. Exterior locations shall be designed to maintain a waterproof envelope using appropriate materials to interface with envelope construction.
 - 3. Interior expansion joint covers shall be easily cleaned and provide hygienic surfaces.
- B. Floor Expansion Control:
 - 1. All expansion joints at the floor shall comply with ADA and TAS.
 - 2. Recessed assemblies that provide a smooth or no-bump installation are preferred in new construction.
 - 3. Expansion joint covers in floors shall be determined according to project specific needs including providing a clean aesthetic, minimizing maintenance, preventing safety hazards, providing a minimal height difference, and minimizing loud sounds from cart movement.
 - 4. Location of expansion joints shall minimize the number of times these cross areas of traffic, such as hallways.
- C. Expansion joint cover assemblies shall include appropriate insulation and/or fire protective insulation to meet code requirements.

DIVISION 08 00 00 – OPENINGS

I. General Information

- A. Building fenestration shall comply with Texas State Energy Conservation Office (SECO) code, ASHRAE 90.1, including assembly U values, assembly Solar Heat Gain Coefficient (SHGC), and percentage of glass. Refer to Volume 3 for current editions.
- B. Design Professional shall design openings to minimize long-term maintenance, assuring long-term operability of doors, windows, and frames.
 - 1. A method to clean all exterior glazing must be incorporated into the project. Verify method with Project Manager.
 - 2. Ensure that windows, doors, and louvers are designed for adequate wind loading and velocity pressures per International Building Code (IBC) and Texas Windstorm requirements as applicable.
 - 3. Wind loads and air pressure issues, including site wind pressures, shall be reviewed, and utilized in the design of entries, closures, and hardware to ensure that components stand up to site conditions.
- C. All general use-building entrances shall have a vestibule sized to apply with applicable code requirements with a design to minimize air pressure differentials.
 - 1. Doors shall meet the maximum opening force as required in current campus Codes and Standards.
 - 2. UTSW prefers the design of vestibules to having automatic sliders.
 - 3. In new construction, vestibules shall be located inside the main building envelope with an awning or covering at the exterior door to minimize waterproofing issues.
 - 4. Vestibules shall have sufficient lighting.
- D. Building Entries:
 - 1. At least one door at primary building entrances shall be power operated with a visible and easily accessible automatic door operator.
 - 2. Primary entrances shall be designated through the UTSW PM and shall comply with TAS, ADA, and building code requirements.
 - 3. Provide visible safety indicators or cross mullions at locations with full height glazing at entries or along corridors. Refer to Section 08 80 00 “Glazing” for additional information.
 - 4. Refer to Volume 1, A2 for Clinical entry requirements.
- E. Daylighting in the building design is strongly encouraged.
 - 1. The use of skylights is only allowed with written approval by the Facilities Management Department or as required per code.
 - 2. Use of protected clerestory glazing is allowed.
- F. Specialty Doors and Entries:
 - 1. Doors to spaces with magnetic resonance equipment shall be electromagnetically shielded and swing outward to allow operability in case of overpressure.
 - 2. Spaces with radiation-emitting equipment may require radiation shielded doors to be approved by qualified medical physicist.
 - 3. Refer to Volume 1, Section A1 for A.R.C. requirements.

II. Design Review Submittal Requirements

- A. Refer to Volume 3 – Deliverable Requirements.

III. Section 08 10 00 Doors and Frames

- A. UTSW preference is for entries to provide easy access for patients and staff with varying health and mobility issues.
 - 1. No locks shall be located at floor level or outside the accessible reach ranges per ADA and TAS.
 - 2. Design issues to be considered in design of doors shall include usage groups, traffic amounts, traffic types, automatic entry considerations, security considerations, finish, door weight, and long-term maintenance.
- B. UTSW preference is to design the building around standard height and width doors and openings.
 - 1. Exterior and interior personnel doors shall not be taller than 7-feet high unless approved by the UTSW FM and UTSW PM.
- C. Design of Door Layouts:
 - 1. Doors swinging into hallways is not preferred.
 - 2. Doors may be sliding or swinging, as appropriate to the building use and design, with safeguards and handicapped accessibility as necessary.
 - 3. One-way or two-way door types may be used, depending upon traffic.
- D. Doors:
 - 1. All doors shall accept standard UTSW door hardware.
 - 2. Door types, materials, hardware, and sensors shall be established designs with proven field experience under similar usage.
 - a. Consideration shall be given to local availability of trained service technicians and spare parts.
 - 3. Interior swinging doors are preferred to be wood, stainless steel, or metal depending on best type for the conditions.
 - 4. Patient room and corridor pathway doors including patient toilet room doors shall be a minimum of 42-inch wide by 84-inch tall.
 - 5. Laboratory spaces shall include at least one door that provides a 42-inch wide by 84-inch-tall door for the movement of equipment.
 - 6. All UL rated doors and frames shall be permanently identified with the UL assembly number, fire-resistance rating in hours and maximum temperature rise.
 - a. UL information shall not be painted over, obscured, or removed.
- E. Door Frames:
 - 1. One or more entrance doors may require card reader access. The door frames shall be prepared as a part of the design and construction of the building.
 - 2. Door frames shall be fully welded; knock-down frames are not allowed.
- F. Restrooms:
 - 1. Restroom entrances, doors, and hardware for restrooms in patient areas need to allow easy access for patients with reduced mobility and strength.
 - 2. All patient restroom openings shall be 42-inch in width.

- G. Doorstops: Confirm with user representative, UTSW FM, and UTSW PM the appropriate doorstops for the project.
 - 1. The use of back check on closers should be considered to lessen the potential of wall damage.
 - 2. Clinical areas prefer wall-mounted stops with strong in-wall blocking to prevent wall damage or overhead stops.
 - 3. In non-clinical and non-laboratory areas, floor dome stops are preferred.
- H. At a minimum, the following information shall be part of the parametric data associated with door frames and doors:
 - 1. Room number (Refer to Volume 1, Section A for the Assignment of Room Numbers).
 - 2. Room name.
 - 3. Frame material.
 - 4. Frame finish.
 - 5. Frame gauge.
 - 6. Door type.
 - 7. Door material.
 - 8. Door finish.
 - 9. Door gauge.
 - 10. Door swing.
 - 11. Door hand.
 - 12. Hardware listed individually not by set.
 - 13. Threshold.
 - 14. Fire rating and UL listing.
 - 15. Power requirement.

IV. Section 08 11 13 Hollow Metal Doors and Frames

- A. Exterior doors shall be “Extra Heavy Duty” with interior doors as “Heavy Duty” unless otherwise directed.
- B. Doors shall have hardware reinforcements for hinges, closures, locks, and exit devise at a minimum.

V. Section 08 11 14 Interior Hollow Metal Doors

- A. Doors shall have hardware reinforcements for hinges, closures, locks, and exit devise at a minimum.
- B. For A.R.C. special requirements refer to Volume 1, Section A1 and UTSW Master Specifications.

VI. Section 08 14 16 Flush Wood Doors

- A. Interior wood doors shall be at least 1-3/4-inch thick to accommodate hardware and locks.
- B. Interior wood doors are generally flush type, solid core, hardwood with lifetime warranty. The campus standard is typically plain sliced red oak.

1. Renovation projects may require matching existing conditions such as other wood grains and plastic laminate. UTSW Design Team shall approve all proposed Design Professional selections.
- C. Exotic wood veneers are prohibited.

VII. Section 08 30 00 Specialty Doors and Frames

- A. High-speed doors (8 feet per second) are not preferred since they do not hold up overtime and require extensive maintenance.

VIII. Section 08 31 13 Access Doors and Frames

- A. Access doors shall be provided for fire-related partitions, wet conditions and standard wall partition types as needed to efficiently maintain building services.
 1. All panels shall be designed and installed in a manner to allow for panel removal and reinstallation without damaging components of the system.
 2. Access panels shall be located and sized to provide access to equipment and fixtures above the ceiling. UTSW preference is a minimum of 2- by 2-foot but not greater than 4- by 4-foot. Smaller sizes must be approved by UTSW FM.
 3. UTSW preference is for access panels to have latching mechanisms in lieu of screws to secure panels except where greater security or control is needed.
 4. Panels shall be labeled.
 5. Any pressurized spaces shall have fully gasketed access doors with hold-down clips to compress the gasket.
- B. Stainless steel or painted metal access doors and frames shall be provided at laboratory and A.R.C. locations. Wet conditions shall utilize stainless steel.

IX. Section 08 33 23 Overhead Coiling Doors and Grilles

- A. Design of dock area openings shall provide adequate clearance for delivery and semi-trucks expected to enter the building envelope.
 1. Doors with high frequency use shall have electric operation with manual override and safety sensors.
- B. Coiling overhead doors shall be steel construction for vehicle access and all components shall be fully integrated and/or welded to building steel structural system.
- C. Vehicle Door Types:
 1. UTSW preference for vehicle entrance areas that are locked down after hours and require badge access is a medium speed door (4-foot per second). These locations may require badge access or ground loop activation for entry/exit.
 2. Vehicle entrances that are left open during standard business hours are preferred to be standard speed overhead doors.
- D. Mount electric disconnects and operators to be accessible from the floor level to avoid use of a ladder and to maintain operator safety.
- E. Dock doors shall have mechanically activated air curtains.

X. Section 08 34 00 Special Function Doors

- A. UTSW preference in clinical spaces is the use of interior aluminum-framed top-hung sliding doors when sliding or barn doors are desired. Refer to specification Section 08 34 00 "Special Function Doors" and Volume 1 for Clinical design requirements.
- B. Refer to specification section for directional signage or indicators to be provided.

XI. Section 08 40 00 Entrances, Storefronts, and Curtainwalls

- A. Select aluminum entrances, storefronts, and curtainwalls to meet project requirements and finishes to meet campus standard. Wherever possible utilize storefront systems instead of curtainwall systems.
 - 1. UTSW preference is to consider the following during selection of systems: life safety, durability, serviceability, finish, thermal consideration, and accessibility.
 - 2. Door locksets shall be located within TAS and ADA accessible reach ranges. **Locks are not permitted at floor levels.**
- B. Exterior:
 - 1. Curtain walls shall be designed using a delegated-design submittal by a qualified professional structural engineer.
 - 2. Main exterior entrances for patient areas are preferred to be automatic aluminum sliding doors.
 - 3. Metal framed glazed entrance assemblies shall have stiles of sufficient width and structural support to receive locksets and/or panic hardware.
 - 4. Sliding and folding glass doors shall be top hung, thermally broken with insulating glazing in an aluminum framed folding panel system.
 - 5. Provide visible safety indicators or cross mullions at locations with full height glazing at entries or along corridors. Refer to Section 08 80 00 "Glazing" for additional information.
- C. Interior:
 - 1. Usage of storefront or aluminum frames within clinical or research areas shall not preclude achievement of minimum acoustical and/or privacy requirements. Refer to Volume 3 for Acoustical Design requirements.
 - 2. Swinging doors are preferred for offices, meeting rooms, and other spaces requiring acoustic controls. Refer to UTSW Space Design Guidelines for office spaces and the Private Office Storefront System.
 - 3. Provide visible safety indicators or cross mullions at locations with full height glazing at entries or along corridors. Refer to Section 08 80 00 "Glazing" for additional information.
- D. Doors, Mullions and Rails:
 - 1. Bottom rail shall be a minimum of 10-inches, complying with TAS requirements, and top rail shall be a minimum of 6-inches.
 - 2. Custom styled doors with vision panels may be used.
 - 3. Specifications shall include steel reinforcing inserts in the hinge jamb section of doors in aluminum storefront systems.

E. Frameless Systems:

1. UTSW preferences for frameless glass doors and entrances:
 - a. Locations include Suite entrances but not acceptable for office, conference room, or huddle room locations.
 - b. Doors to have full bottom rails.
 - c. Locks to be located on handles with top locking/latching bolt. Center patch may be considered with sign-off by UTSW FM. In-floor locking bolts not allowed.
 - d. Closers shall be top, top concealed, or floor concealed types.
 - e. Acoustical properties of system proposed by Design Professional shall be discussed with UTSW User to ensure the system will meet User needs and expectations.
 - f. Provide visible safety indicators or cross mullions at locations with full height glazing at entries or along corridors. Refer to Section 08 80 00 "Glazing" for additional information.

XII. Section 08 50 00 Windows

- A. Design windows with maintenance, waterproofing, and pest control in mind and include provisions for cleaning windows above third floor level.
- B. Heads, jambs, and sills of windows in walls shall be flashed and shall be caulked or sealed during the window installation, prior to the placement of snap-on moldings or covers, to ensure that concealed surfaces are properly sealed against the penetration of wind and water.
 1. Flashing shall include pre-molded end dams.
 2. All windows should have drips at heads and sills.
- C. Projected and casement type windows, and flush mounted windows are difficult to maintain watertight and their use is discouraged.

XIII. Section 08 71 00 Door Hardware

- A. The hardware schedule shall be included in the project specifications.
- B. Architect/Engineer shall verify hardware specifications with UTSW Key Control and Building Maintenance Team during each project design phase. Building Maintenance participants shall be confirmed through Assistant Director of Building Maintenance per project but could include Construction and Maintenance Shop, Clinical Facilities Team, and others as identified.
 1. Design Professional shall request approval in writing for hardware prior to issue for construction documentation.
 2. The finish of door hardware shall comply with specifications as approved by UTSW Key Control.
 3. Do not specify pivot hinges, concealed closers, concealed rods, concealed pulls, offset door pulls, offset door hinges or pivot doors.
- C. Hardware shall provide openings that comply with codes as noted in Section B in the UTSW Design Guidelines, including Texas Accessibility Standard (TAS) .
- D. Locks and Keys:

1. Mortise locks shall not be used on any new installations.
 2. Any existing mortise locks in a project that must be maintained shall provide Sargent or Best per the specifications.
 3. Hardware for furniture, casework, millwork and other shall provide single bitted keys and non-restricted keyways for all locks.
- E. Exterior:
1. A minimum of one pair of exterior double doors per building shall have a keyed, removable mullion for equipment access.
 2. Use of thresholds and weather stripping at all exterior doors is required to prevent air, water and pest infiltration while complying with accessibility requirements.
 3. All entrance doors and frames shall be hinge and strike reinforced for "High Frequency" use.
- F. Door Protection:
1. All protective plates shall be attached to doors with countersunk screws and shall comply with the requirements of TAS 404.2.10 regardless of type or height of protective plate on the push sides of doors.
 2. Areas with high cart traffic shall have armor plates up to 48-inches high, continuous across the width of door surface.
 - a. Design Professional shall discuss the potential for power-assist doors located in high cart areas, to prevent damage to panic hardware.
 3. All doors having closers shall be protected from the wear of wheelchairs with a minimum of 10-inch high, smooth finish, kick plates, continuous across width of door surface.
 4. Edge guards are preferred to be U-shaped.
 5. Mop plates shall be located on doors facing hard-surfaced floors where mopping will occur.
- G. Barn door type hardware shall be recommended only after thorough review of specific hardware components for usability, safety, and longevity. Hardware sets shall be adequate for frequent and long term use due to panel weight and fastener failure.
- H. Electronic Access:
1. Doors, where electronic access is required and magnetic locks are going to be used, shall include an internal signal switch to break lock power.
 2. Only Sargent 88 series or Von Duprin QUE-99 series electric panics are acceptable wherever electric panics are specified.
- I. Acoustics:
1. Door seal kits shall be specified for door assemblies installed in clinical areas to achieve the required STC. Refer to Volume 3 for Room Adjacency and Sound Transmission Class STC Minimums.
 2. Doors to MEP or equipment spaces shall provide the required acoustical seals and elements to prevent sound transmission into adjacent spaces.
- J. Key Control Cabinets:
1. Provide Key Control Cabinets as indicated by UTSW FM and Access Control.
 2. Special requirements for security and access shall be discussed with User Representatives and UTSW FM. Pharmacy locations and other spaces, as identified, will have independent cabinets due to licensing requirements.

XIV. Section 08 71 13 Automatic Door Operators

- A. Automatic openers may be located at restrooms and in clinical areas. Other locations shall be reviewed with UTSW PM.
- B. Doors with automatic closures shall have electrified trim or electrified strike.

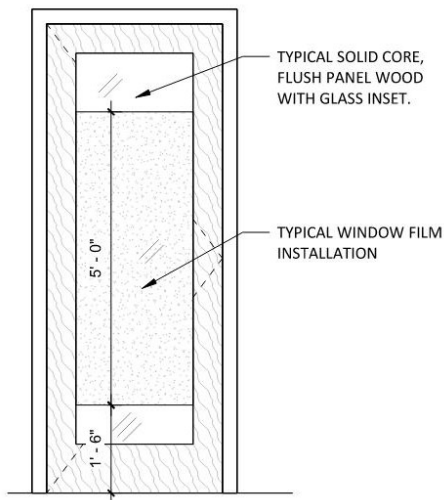
XV. Section 08 80 00 Glazing

- A. Provide visible safety indicators or cross mullions across all full height glazing at entries and adjacent to circulation.
 - 1. Meet requirements of "Model Safety Glazing Code" and "Consumer Product Safety Commission."
 - 2. Visible safety indicators using glazing film shall start with the lowest point at 36-inches, plus or minus three inches, and the highest point at 58-inches, plus or minus three inches.
 - 3. The contrast from the film shall make the glazing location apparent from the background as well as from both sides of the panel in all lighting conditions.
 - 4. The film shall not provide light transmission greater than 85 percent. Refer to approved film in UTSW Specification Section 08 80 00 "Glazing," within the Decorative Plastic Film article.
 - 5. If the Design Professional proposes a design pattern, this must be approved by the UTSW PM and, where required, the IDBC.
 - a. Any repeated patterns, signs, or graphics shall not have portions shorter than 6-inches in height.
 - b. Bands or lines may not be shorter than 2-inches in height.
- B. High performance glazing is strongly encouraged with a tint to match surrounding buildings.
 - 1. Highly reflective (mirror) glass and dark tinted glass are not allowed.
 - 2. Choice of glazing systems and components shall meet project requirements which include durability, architectural appearance, serviceability, and insulating R-values.
 - 3. Glazing tint shall be approved by UTSW.
- C. Design of glazing shall indicate IBC required locations for safety glazing, including but not limited to glazing in doors, adjacent to doors, in windows, etc.
- D. Partial shading of insulating glass can cause stress breakage. Manufacturers consider this a design error and will not replace glass broken by temperature differential stresses. Avoid partial shading of large panes.
- E. Warranty Requirements:
 - 1. Provide manufacturer's written guarantee that for ten (10) years from date of Substantial Completion a replacement will be provided for any insulated glass unit which develops edge separation or other defects which materially obstruct vision through the glass or safety or affects the insulating qualities. The guarantee shall not cover glass breakage from physical abuse, storm, or similar causes.
 - 2. Unit sizes shall comply with manufacturer's warranty requirements. All designs shall comply with IBC requirements.

F. Glazing Film:

1. Confirm current basis of design film and manufacturer in UTSW master specifications, within Section 08 80 00 "Glazing."
2. Film heights for standard privacy in office, education, and other types as indicated in **Figure 08 80 00-01 Standard Film Design.**

Figure 08 80 00-01 – Standard Film Design: This elevation drawing shows a typical solid core, flush panel wood door with glass panel inset. A window film is installed on the glass starting at 18 inches above the floor and is 5 feet in height from the starting point.



XVI. Section 08 90 00 Louvers and Vents

- A. Steel or aluminum louvers and vents shall provide required air performance as determined by Design Professional team. Components shall be considered for durability, architectural appearance, serviceability and insulating R-values.
- B. Insect and/or bird screens shall be indicated as needed and shall comply with The International Mechanical Code.
- C. Design consideration shall be given to draining any water out of the installation including drain pans.

DIVISION 09 00 00 – FINISHES

I. General Information

- A. Design reviews by the UTSW PM and UTSW Design Team are required for finish selections.
 - 1. All specified materials must have a demonstrated history in a similar institutional setting for at least five years while complying with jurisdiction, code, licensing, and regulatory requirements as well as best practices.
 - 2. Refer to Volume 1, Section A for “Environmental Practices” including recommendations for sustainable products and VOC requirements in the UTSW Design Guidelines and specification Section 01 81 13 “Sustainable Design Requirements.”
- B. Considerations of standard UTSW cleaning methodology and maintenance shall be made with all product recommendations as well as considering safety and infection prevention. This information shall be confirmed with users for each project.
 - 1. Materials shall not require routine sealing or other significant specialized maintenance for general upkeep.
 - 2. Avoid custom-designed colors and finish materials.
- C. Flooring:
 - 1. All flooring surfaces must provide slip resistance at wet and dry conditions of 0.5 or better with tribometer testing. OSBC is to be contacted to confirm requirements for coefficient of friction for sidewalks, pavements including broom finish levels, and flooring surfaces.
 - a. Flooring products that require waxing are not preferred as they decrease the slip resistance of the product.
 - 2. Flooring shall be extended under equipment and casework to be wall-to-wall. Where spaces have hose stations, the floor shall slope to drains at a minimum of 1-percent. Greater slopes shall be considered at large animal holding areas but cannot create unsafe conditions. In all cases, floor slopes and threshold conditions shall be coordinated to prevent uneven conditions.
 - 3. Special consideration should be given to the design of floors in areas with high temperatures and steam, such as cage wash spaces, to prevent thermal shock and damage at drain locations.
- D. Flooring transitions shall be designed with minimal profiles for compliance with current codes, ADA, and TAS.
 - 1. Patient rooms with toilet rooms shall have smooth flooring transitions without lip or raised strips.
 - 2. The transitions strips shall prevent trip hazards, protect the ends of flooring surfaces, and minimize maintenance repairs while providing a long service life.
 - 3. Materials used shall hold up to the anticipated mechanical and/or chemical stresses expected at each location.
 - 4. Material transitions at doors shall be located underneath the door panel, in closed position.

- E. For expansion joint control, refer to Section 07 95 00 “Expansion Control” in the UTSW Design Guidelines.

II. Design Review Submittal Requirements

- A. Refer to Volume 3 – Deliverable Requirements.
- B. Drawings shall clearly identify partition types to show required fire ratings, acoustic levels, and other specialty board types.
 - 1. UL designs for fire resistance ratings shall be indicated for all partition, floor, and ceiling constructions as well as appropriate joint designs.
- C. Drawings shall include details for items such as corner guards, specialty trims and reveals, showing coordination with other elements such as base, expansion joints, soffits, etc. to prevent gaps and holes.

III. Section 09 22 16 Non-Structural Metal Framing

- A. Refer to UTSW Master Specification Section 09 22 16 “Non-Structural Metal Framing” under “Performance Requirements” for minimum gauges, sizes, and spacing.
 - 1. Partition thickness and construction shall be additionally determined using acoustical requirements, as noted in Section B, Codes and Standards in “Acoustical Design” in the UTSW Design Guidelines.
 - 2. Minimum thickness of furring strips shall be 1-1/2-inch to allow for electrical devices.
 - 3. Furring on columns may be 7/8-inch thickness on two sides with alternate sides providing 1-1/2-inch thickness.
- B. UTSW preference is to use metal for blocking in lieu of wood. Design Professional shall confirm and document mounting heights of blocking required for each project.
 - 1. Refer to Section 09 22 16 “Non-Structural Metal Framing” for “Flat Strap and Backing Plate.”
 - 2. Typical lab blocking to consider is the use of 4-inch wide, 1/16-inch minimum gauge sheet metal straps. Top of strap heights include 6-inch, 12-inch, 30-inch, 36-inch, 66-inch, and 90-inch.
 - 3. Steel blocking shall be 18-gauge minimum in areas with partition-mounted items or where they may be expected in the future.
 - 4. Blocking shall be located wherever wall-mounted equipment or casework is expected including tracks for medical equipment.
 - 5. Wall blocking for toilet areas shall address potentiality of patients of size and provide additional blocking capacities for grab bars.
 - 6. Provide blocking behind locations for any wall-mounted doorstop.
- C. Lateral bracing shall follow ASTM C754, Standard Specification for Installation of Steel Framing Members to Receive Screw-Attached Gypsum Panel Products with bracing and reinforcing designed to support wall-mounted objects.

**IV. Section 09 24 22 Gypsum Plaster Repair / Section 09 24 23 Portland Cement Plaster /
Section 09 24 24 Cement Plaster Repair**

- A. The use of plaster in new wall assemblies is prohibited.
 - 1. FM capital projects involving any existing plaster assemblies shall be discussed with UTSW PM if existing plaster is a component of the project.
 - 2. This includes the use in exterior conditions for soffits, planters, and wall surfaces.

V. Section 09 29 00 Gypsum Board

- A. Reference NFPA 101 and Specification Section 09 29 00 "Gypsum Board" for required "Partition Identification" labels and locations as well as requirements for construction, fire-resistance ratings, and fire protection of existing and new fire-rated walls, partitions, compartments, assemblies, and smoke partition assemblies.
 - 1. Joint commission projects do not allow scab patches.
 - 2. Renovation and remodel projects shall include revisions to existing partition identification when the wall conditions are modified.
 - 3. Renovation and remodel projects shall include partition identification be added where missing and as indicated by OSBC.
- B. Wallboard Types:
 - 1. Type-X, fire-resistant, gypsum board shall be used at any locations requiring greater than 1/2-inch thickness.
 - 2. Use cement backer board for tile and wet installations.
 - 3. Refer to Volume 1, Section A1 for A.R.C. special requirements.
 - 4. Abuse resistant panels to be used in high traffic areas as confirmed by UTSW PM.
- C. Wallboard Finish Levels:
 - 1. Level of finish on walls in public areas shall be level 4 as standard.
 - 2. Level 5 finish is recommended for public areas with a significant amount of natural light, dark paint or paints with sheen or gloss, and walls that receive graphics.
 - a. Design Professional shall document level 5 and specialty finish locations in finish schedules at each drawing issuance.
 - 3. Refer to the Gypsum Associations' GA-210-10e "Recommended Levels of Gypsum Board Finish" document for guidelines for non-public and service areas.
- D. Wall Textures:
 - 1. Walls in public areas shall have a light texture applied only after sample/mock-up approval from Design Professional.
- E. Refer to Volume 3 for required acoustic Sound Transmission Class (STC) ratings.
 - 1. Where walls intersect with mullions, sound barrier mullion cap products, to isolate sound, are preferred solutions. STC rating of product shall match requirements of wall.

VI. Section 09 30 00 Tiling

- A. Restroom wall finish shall be tile at wet walls and adjacent walls to at least 6-foot aff.
 - 1. Tile pattern shall consist of whole tiles with a minimum of 12-inches painted gypsum board remaining below the ceiling.
 - 2. Porcelain and ceramic tiles are acceptable with approval by UTSW Design Team.
 - 3. In toilet rooms, tiles shall be sized at least 12- by 12-inches in size but not greater than 12- by 24-inches.
 - 4. In existing toilet rooms, matching existing conditions may not be applicable. Design Professional to discuss with UTSW Design Team to confirm building standards and best solutions.
- B. Accessories: Design Professional shall identify metal trim and edging profiles in the finish schedule.
- C. Grout:
 - 1. For tile installations on floors and walls in restrooms of healthcare and heavy use spaces, utilize water-cleanable epoxy grout complying with ANSI A118.3.
 - a. Design considerations in these spaces include infection prevention, chemical resistance, stain resistance, color consistency, lower maintenance requirements, and durability.
 - 2. For other restrooms that are not heavily trafficked or not utilized by patients, the cost of epoxy grout may not be feasible. In such cases, a polymer-modified grout complying with ANSI A118.7 shall be utilized. The design considerations include better stain resistance, lower maintenance, and durability.
 - 3. If tile is utilized in food service areas, the grout shall be epoxy grout complying with ANSI A118.5 with higher chemical and temperature resistance.
 - 4. All new tile installations shall be sealed according to the manufacturer's recommendations if required.
 - 5. Grout colors to be approved by the UTSW Design Team.

VII. Section 09 50 00 Ceiling

- A. Acoustical ceiling tiles products are recommended to be two-foot square or two-foot by four-foot with the exception of feature areas. Panels that are large, unique, or difficult to lift cause long-term maintenance issues for UTSW and are not preferred but would be considered for feature areas.
 - 1. Grids shall be laid out symmetrically.
 - 2. Suspended ceilings shall be supported by the building structure. Hangers shall be located to completely support light fixtures while not interfering with HVAC maintenance areas.
 - 3. Lay-in ceiling systems in exterior locations or near entries shall use stainless steel hanger wires and hold-down clips. Areas near entries, in vestibules and other spaces that experience pressure differentials shall have hold-down clips installed.
- B. All ceilings shall be designed to be easily accessible for above ceiling maintenance and other access requirements, such as future installations. Additionally, the size and layout shall be considered for longevity to minimize sagging as well as other typical maintenance issues.

1. Follow industry standard to ensure STC and NRC ratings as required per space.
 2. Lighting design in restrooms shall allow for easy maintenance for repair and replacement of fixtures.
 3. Ceiling tiles with heavy textures are not preferred, as they are difficult to maintain over time.
- C. Refer to Volume 1, Section A2 for Clinical requirements.
- D. Restroom ceilings are required to be gypsum board with access panels located for maintenance.
- E. Food service areas to have cleanable ceiling tiles in standard sizes.
- F. Acoustical Fabric-Faced Panel Ceilings and Acoustical Wood Ceilings are approved products, where applicable.

VIII. Section 09 60 00 Flooring

- A. All flooring shall comply with requirements for moisture vapor emissions in concrete and be installed per manufacturer's recommendations.
- B. Building entry doors shall have walk-off areas protected from weather. This can include surface walk-off carpet or owner provided walk-off mats. Design Professional to review entry suggestions with UTSW Design Team.
- C. Space Requirements:
1. Elevator cabs shall be designed with low-maintenance resilient flooring.
 2. Laboratories are required to use chemical resistant flooring. The thickness of seamless floors shall be 1/8-inches or 3-mm minimum in general.
 3. Spaces with large equipment and heavy traffic shall be resinous flooring to meet project requirements.
 4. Non-animal laboratory spaces shall have non-waxed, low-maintenance flooring in lieu of VCT.
 5. For A.R.C. requirements, refer to Volume 1, Section A1.
- D. Prohibited Materials:
1. New masonry flooring is not permitted as it has significant maintenance requirements.
 2. Bamboo or cork flooring materials are not permitted by UTSW.
 3. Real wood is not permitted by UTSW.
- E. Typical base types used on campus include rubber base, stainless steel base or other coved bases dependent on flooring. All vertical surfaces that intersect with a floor shall have a base applied including concrete columns.

IX. Section 09 65 00 Resilient Flooring

- A. Resilient sheet and tile flooring are commonly used on campus.
- B. Refer to Volume 1, Section A2 for Clinical Design Requirements.
- C. Static-dissipative resilient flooring shall be used in IR closets or other spaces where static control is required.
- D. Rubber and resilient base are typically used across campus. All vertical surfaces that intersect with a floor shall have a base applied.

- E. Any resilient flooring used in food service areas shall be highly durable to stand up to the high temperatures, chemicals, and heavy traffic of these spaces.
- F. Flooring that requires top-coatings or additional processes to achieve a final wear surface shall be specified with all required procedures and materials to provide the finished surface.

X. Section 09 66 23 Terrazzo Flooring

- A. Terrazzo flooring shall have all metal edging.
 - 1. Plastic edging or divider strips are not permitted.
- B. Control joints shall have backer rods to match the color of the flooring around it.

XI. Section 09 67 23 Resinous Flooring

- A. Resinous flooring shall be used where seamless floors are required to hold up to traffic, maintenance, infection prevention, and provide chemical resistance. All installation shall follow the manufacturer's guidelines to assure warranty, including moisture vapor emission control testing and remediation if required.
- B. Resinous Flooring shall be anti-microbial, chemical resistant, puncture resistant, slip resistant, and thermal shock resistant.
- C. All products shall be approved by UTSW Design Team and UTSW PM.
- D. Spaces with resinous flooring includes A.R.C. spaces, laboratories, equipment galleys, operating rooms, and spaces with needs for infection prevention control.

XII. Section 09 68 00 Carpeting

- A. Tile and Broadloom carpeting are utilized at UTSW in areas approved for carpet such as business office areas. The type of carpet and sizes shall be determined by design intent.
 - 1. UTSW preference is for 24- by 24-inch modular ashlar pattern, which provides an easy replacement for maintenance staff.
 - 2. The use of broadloom carpet shall be used sparingly and to be approved by the UTSW Design Team.
 - 3. Carpet shall not be used in food service office areas.
- B. Carpet can be easily contaminated with infectious materials present in blood and bodily fluid. It can also harbor dust, debris, insects, and fungal spores. In such cases, these products cannot be effectively decontaminated to inactivate viable microorganisms present in infectious materials or be adequately cleaned to remove stains.
- C. Carpet shall not be used in the following spaces:
 - 1. Exam Rooms.
 - 2. Procedure Rooms.
 - 3. Lab Rooms and Spaces.
 - 4. Dirty and Clean Utility Rooms.
 - 5. Storage Rooms (for patient supplies).
 - 6. Soiled utility rooms or other types of waste storage rooms.
 - 7. Hallways within clinical space that connect patient care areas.

- 8. Wellness rooms (nursing mother's rooms).
- D. Waiting rooms should avoid carpet if the clinical staff express concerns over cleanability or infection control. In waiting rooms, carpet will be considered in limited use with approval from the IDBC.
- E. In clinical areas, carpet may be used in private offices and approved patient areas such as therapeutic counseling rooms.
- F. Questions about the appropriateness of carpet for a particular usage shall be directed to Infection Prevention, Facilities / UTSW Design Team, and Office of Safety & Business Continuity.
- G. Products shall have proven success in similar installations and UTSW prefers a minimum 10-year manufacturer's warranty and stain-resistant products.

XIII. Section 09 70 00 Wall Finishes

- A. Wall finishes shall have a proven track record in similar installations for longevity, appearance, and ease of maintenance.
 - 1. Venetian plaster and similar finishes are not permitted.
- B. No porous products shall be installed that would cause infection control, maintenance concerns, or other health issues.
- C. Products used shall comply with all Life Safety, Health Code Regulations, and Building Codes requirements for wall installations.
- D. Wall finishes in food service areas shall consider durability as well as aesthetics between back and front of house areas.

XIV. Section 09 72 00 Wall Coverings

- A. Wall covering selections should be able to withstand heavy duty, commercial grade traffic.
 - 1. UTSW requires Type II or III minimum.
- B. Wall and corner protection must be provided in public areas and any areas where carts, gurneys, or wheelchairs shall be regularly used.
 - 1. Additional protection shall be determined and documented per project requirements.
- C. Medium density fiberboard (MDF) is not permitted as a wall finish.

XV. Section 09 73 00 Wall Carpeting

- A. Wall carpeting used as acoustic wall treatments may be utilized as required for project requirements. All products and finishes shall be approved by UTSW Design Team with consideration for infection control and potential future space reallocation.
- B. Acoustic wall coverings such as wall carpet complying with ASTM E84 as Class A or Class 1 may be considered.

XVI. Section 09 90 00 Painting and Coating

- A. UTSW preference is for finishes to have no volatile organic compounds (VOC). Where the required finish is not available without VOC content, a low VOC product shall be used. Air quality shall be of prime importance especially in occupied spaces and those near healthcare areas.
- B. CMU surfaces minimum finish shall have block filler applied according to manufacturer's recommendations.
- C. Any temporary coatings shall be removed according to manufacturer's instructions with new finishes applied with specified primers and surface preparation.
- D. Repainting of existing spaces shall include jobsite inspection and evaluation of the existing surface prior to issuing construction documents. Project documentation shall ensure entire walls, surfaces, planes, etc. have a consistent surface texture, finish, and clean aesthetic upon completion.

XVII. Section 09 91 13 Exterior Painting

- A. Considerations:
 - 1. Preparation of surfaces is critical to ensure longevity of finish and minimize maintenance between new coating applications.
 - 2. Coordination shall take place between applications of water repellent sealers or concrete stains and any additional paint finishes ensuring proper adhesion.
 - 3. All exterior paint products specified shall take into consideration level of traffic, level of exposure, long-term maintenance, aesthetics and expected life span.

XVIII. Section 09 91 23 Interior Painting

- A. Paint Sheen:
 - 1. Wall surfaces in public spaces may be eggshell or satin in finish.
 - 2. Metal frames, metal trims, doors, and door frames shall be semi-gloss finish.
 - 3. Private spaces such as offices shall have eggshell finish.
 - 4. Accent walls shall have satin finish.
 - 5. Gypsum ceilings shall be flat.
 - 6. Dark rooms and reading rooms shall have flat paint but, otherwise, flat paints are prohibited at UTSW.
 - 7. Epoxy paint shall be utilized within restrooms, A.R.C. spaces, and laundry rooms.

XIX. Section 09 96 00 High-Performance Coatings

- A. Installation of any abrasion-resistant coatings or other high-performance coatings shall follow or exceed manufacturer recommendations to ensure proper installation.

XX. Section 09 97 00 Special Coatings

- A. Dry erase coatings are not preferred on campus, but any application will require a level 5 finish wall.

DIVISION 10 00 00 - SPECIALTIES

I. General Information

- A. Design reviews by the UTSW PM and UTSW Design Team are required for finish selections.
 - 1. All specified materials must have a demonstrated history in a similar institutional setting for at least five years.
 - 2. Refer to Volume 1 for “Environmental Practices” including recommendations for sustainable products and VOC requirements in Section 01 81 13 “Sustainable Design Requirements.”
- B. Considerations of standard UTSW cleaning methodology and maintenance shall be made with all product recommendations as well as considering safety and infection prevention. This information shall be confirmed with users for each project.
- C. Avoid custom-designed colors and finish materials.

II. Design Review Submittal Requirements

- A. Refer to Volume 3 – Deliverable Requirements.

III. Section 10 10 00 Information Specialties

- A. Installation of all information specialties shall follow the ADA and Texas Accessibility Standards (TAS) .
- B. Coordinate requirements for extra materials (attic stock) with UTSW PM.

IV. Section 10 11 00 Visual Display Units

- A. Glassboards are the campus standard for wall-mounted writing surfaces. Refer to UTSW master specifications for acceptable manufacturers.
 - 1. Other types of markerboards and glassboards require approval by the UTSW Design Team.
- B. Provide blocking in wall where possible in renovation. Blocking shall be coordinated in new construction.
- C. Glassboards shall be wall-mounted using stand-offs.
- D. For installations, a marker tray in satin anodized finish is required. Detachable or integrated units are acceptable, but trays shall not be built into the wall.
- E. For mobile glassboards, refer to specifications for acceptable manufacturers. Design consideration for use of mobile glassboards shall include ease of transport and storage requirements for mobile units.

V. Section 10 11 23 Tackboards

- A. Tackboards are acceptable in spaces where bulletin boards are needed. Refer to UTSW master specifications for acceptable manufacturers.
- B. Boards may be frameless or have aluminum frame. All corners shall be eased or have a radius. No sharp edges are allowed.
- C. Installation preference is the z-clip type installation to prevent destruction of wall surface from adhesives.
- D. Coordinate locations with room signage, donor plaques, artwork, thermostats, life safety elements, and other graphics scheduled to be in the same location.
- E. Finishes chosen shall not create infection control issues.

VI. Section 10 12 00 Display Cases

- A. Freestanding display cases may be used, refer to UTSW master specifications for acceptable manufacturers.
- B. Cases shall be compliant with ADA and TAS.
- C. Finishes chosen shall not create infection control issues.

VII. Section 10 13 00 Directories

- A. Building Directories shall be provided, Design Professional to confirm locations such as near elevators and the main entrance(s) of each building.
- B. Appearance shall be coordinated with the building signage standards and the UTSW Comprehensive Interior Signage Manual.

VIII. Section 10 14 00 Signs and Graphic Elements

- A. UTSW has a standardized signage system for all spaces including room numbering, wayfinding, safety, and other signage needs.
 - 1. The project Design Professional is responsible for documenting signage requirements through collaboration with UTSW Sign Shop. The Sign Shop will coordinate with OSBC on required signage to be included during the submittal process.
 - 2. Design Professional will provide the signage schedule using the UTSW format in Volume 3, B3-7 Room Sign Schedule and a signage plan with each sign location identified.
 - a. Project signage will typically be a Contractor provided item and the UTSW PM will communicate when variation is expected.
 - 3. Resources:
 - a. Guides include the UTSW Comprehensive Interior Signage Manual and UTSW Comprehensive Garage Signage Manual.
 - b. Projects located within leased buildings will typically follow the building's standard in public spaces and adhere to the UTSW standards within lease spaces upon confirmation with UTSW PM.
 - c. Special plaques, memorial information, and donor recognition shall be developed and approved by the Institutional Design and Branding Committee.

- B. Signage: Types:
1. Orientation - Includes building directory, floor directory, and maps.
 2. Directional – Includes overhead, bulkhead, wall mounted and floor mounted locations.
 3. Primary Identification Signs – Includes logos, clinic identification, and other types.
 4. Room Identification – Includes room/space types as well as workstation identification.
 5. Regulatory and Informational - Stairwell signage, elevator egress, regulatory, and other messaging.
 - a. Due to the varied space types required by UTSW, additional regulatory signs may include fire safety, lab safety, biological and chemical safety information, access limitations, MRI and magnet safety, AED locations, Stop the Bleed locations, audiology booth messaging, and others as determined by project requirements. These types and locations will be coordinated by the UTSW Signage Shop with OSBC.
 6. Donor Recognition Signage – Locations will be identified by the UTSW Signage Shop.
- C. Room Numbering:
1. Room numbering by Design Professional shall follow the system as seen in Volume 1, Assignment of Room Numbers.
 2. Room numbers shall be sent to the UTSW Planning/Masterbooks Team prior to the DD meeting for review and approval.
 3. Projects under development shall only have one numbering system, which follows the UTSW system. Coordination with Facilities Management early in the design phase shall be done by the Design Professional.

IX. Section 10 21 13 Stainless Steel Toilet Compartments

- A. UTSW campus standard is for ceiling mounted, stainless steel toilet compartments. Any other types must be approved by UTSW Design Team and the IDBC.
1. Mounting hardware shall be stainless steel to prevent rust. Any stainless steel shall be Type 304 minimum.
 2. Design of stalls shall provide privacy to occupants with minimal gaps or openings into the units. Refer to Volume 1, Section A, Design Philosophy.
 3. Urinals shall have wall-mounted privacy panels.
 4. Coordinate the location of toilet partitions and floor drains. Avoid locating drains in accessible stalls.
- B. Accessories:
1. Latches with color occupancy/privacy indicators are preferred for single use toilet rooms and stalls in clinical or hospital spaces. Design Professional to confirm per project.
 2. All accessible compartments shall provide required handles and other accessories for ADA and TAS compliance.
 3. Provide coat hook on back of each toilet partition door. Refer to UTSW master specification for basis-of-design products.
 4. Additional coordination shall occur to locate accessories in a manner that will not diminish the usability of the stalls.

X. Section 10 21 23 Cubicle Curtain and Track

- A. Curtain:
- B. Curtains shall be washable and anti-microbial. Provide a continuous seam where applicable.
 - 1. Provide a 12- by 12-inch sample for review to UTSW Design Team prior to final approval.
 - 2. Cubicle curtains shall be 12-inches above the ground with mesh height variable per project.
 - 3. Shower curtains shall be 1-inch above the ground.
- C. Track:
 - 1. The aluminum track shall have a proven track record in health care environments.
 - 2. Coordinate track locations with the UTSW PM and user representative. Refer to UTSW Specification 10 21 23 "Cubicle Curtains and Track" for preferred products.
 - 3. Accessories: Discuss additional requirements with users including tiebacks, snaps/connectors, and rehanging tools.

XI. Section 10 22 19 Demountable Partitions

- A. Demountable partitions are not preferred on campus. If desired, the Design Professional must first present a comparison study to the UTSW PM for review and approval including cost implications.

XII. Section 10 22 23.23 Movable Panel Systems

- A. For conference or classroom areas, movable panels systems shall be designed with delegated design services of a licensed structural engineer.
- B. Panels shall provide indicated acoustical performance per project requirements and have steel welded frame for strength.
- C. Considerations to include durability, safe exiting, signage (follow ADA, TAS, NFPA and IBC), ease of operation, pleasant aesthetics, and easy maintenance.
- D. Panels and doors shall have sound seals to ensure acoustic performance.
- E. Acceptable finishes include vinyl and fabric as confirmed by the UTSW Design Team.

XIII. Section 10 22 39 Folding Panel Partitions

- A. Includes Folding Glass-Panel Partitions and Sliding Partitions.
- B. All systems shall be designed with the delegated design services of a licensed structural engineer.
- C. Panels shall provide indicated acoustical performance per project requirements.
- D. Considerations to include durability, safe exiting, signage (follow ADA, TAS, NFPA and IBC), ease of operation, pleasant aesthetics, and easy maintenance.
- E. Panels and doors shall have sound seals to ensure acoustic performance as needed for project.
- F. Acceptable finishes include glass and aluminum as confirmed by the UTSW Design Team.

XIV. Section 10 25 13 Patient Bed Service Walls

- A. Patient bed service walls will delegate design services of a licensed architect, structural engineer, and MEP engineer.
 - 1. Surface or flush mounting options are acceptable.
- B. Service wall colors and finishes shall coordinate with room finishes as determined by the UTSW Design Team.
 - 1. Provide color and finish samples to UTSW Design Team for final approval.

XV. Section 10 26 00 Wall and Door Protection

- A. All products, colors, styles, and manufacturers shall be approved by UTSW Design Team and UTSW PM.
 - 1. Custom colors of wall protection are not preferred due to increased costs and lead times.
- B. Plastic, aluminum, and stainless-steel wall and door protection which are scratch and stain resistant are acceptable according to project requirements.
- C. Corner Guards:
 - 1. The top height of corner guards is 4-foot A.F.F. unless additional requirements are determined and reviewed with the UTSW PM.
 - 2. Install corner guards on corners of corridor walls with heavy pedestrian traffic.
 - 3. Set a consistent datum line so the top heights of all guards align.
 - a. Plastic corner guards shall begin 1/2-inch to 1-inch above the top of base and extend up to 6-foot aff minimum.
 - b. Stainless steel corner guards shall be installed at the floor level, extending up to 6-foot aff minimum.
- D. Wall protection and rails:
 - 1. Install wall protection and rails where carts, gurneys, or wheelchairs shall be regularly used including within equipment storage areas.
 - 2. Design and location of wall and door protection shall include protection for wall-mounted accessories.
 - 3. Where possible, blocking shall be installed within wall construction to support weights and forces from use.
- E. Protective Corridor Handrails:
 - 1. Install in areas with high pedestrian traffic for clinical and hospital areas.
 - 2. Blocking shall be installed within wall construction to support weights and forces from use. Consideration shall be made for areas where patients of size are expected.
 - 3. Corridor handrails must be ADA complaint.
- F. For A.R.C. requirements, refer to Volume 1, Section A1.
- G. In food service areas, specify metal wall, corner, and door protection.

XVI. Section 10 28 00 Toilet and Bath Accessories

- A. Standard toilet and bath accessories will be specified in projects.
 - 1. Refer to Volume 3, Equipment Schedules and Coordination for UTSW preferences.
 - 2. Refer to the UTSW Master Specification for standard toilet accessories.
- B. Design Professional shall locate toilet accessories to comply with ADA and TAS.
 - 1. Design Professional shall coordinate locations of accessories within stalls to ensure all stalls are equally functional.
- C. Accessories typically provided by the Contractor (CFCI) from various manufacturers include but not limited to the following. Refer to UTSW master specifications for approved manufacturers and basis of design types.
 - 1. Glass mirror with stainless steel frame.
 - 2. Grab bars.
 - 3. Robe/Coat hook.
 - 4. Sanitary napkin disposal.
 - 5. Sanitary napkin vending unit.
 - 6. Specimen pass through cabinet (recessed) for a clinic or laboratory restroom.
 - 7. Loose and built-in waste cans.
 - 8. Paper towel dispenser:
 - 9. Roll-paper with touch free or automatic units with stadium setting shall be lockable.
 - 10. Consider installation within a semi-recessed unit partnered with a waste receptacle that ensures no protruding objects.
 - 11. Soap Dispenser.
 - 12. Hand Sanitizer.
- D. Under lavatory Guards:
 - 1. Design Professional to confirm the look of lavatory counter/casework desired for each project with project leadership champion. In all instances, lavatories shall meet all TAS/ADA requirements for safety and access.
 - a. Non-clinical areas will typically utilize wall-mounted lavatories with pipe insulation.
 - b. Clinical areas may utilize casework or aprons.
- E. Baby Changing Stations:
 - 1. Baby changing stations must be installed in a place where they will not become a protruding object, not project into required clearances or walkways, will not hinder door usage, and will not restrict the use of an accessible toilet.
 - a. Baby changing tables within a restroom or single person toilet room cannot be located within the required clear floor space of other objects in the toilet room including the door, toilet, and sink.
 - b. Baby changing tables may be installed inside an accessible stall but it's open and closed condition cannot restrict the function of the toilet stall and must have the forward approach for the changing table. The clear floor space of the changing table may overlap the toilet clear floor space.
 - i. This is not an ideal location because it limits both the use of the accessible toilet stall and the changing station.
 - 2. Baby changing station locations may be installed as a built-in element or as a manufactured unit.

- a. Manufactured units with an opening and closing function shall be located in manner so a malfunctioning unit shall not prevent access and function of the toilet room.
3. Confirm per project requirements the requirement for special needs changing stations.

XVII. Section 10 43 00 Emergency Aid Specialties

- A. Emergency aid specialties including Automated External Defibrillators (AED), Stop the Bleed (STB) Kit and evacuation chairs are required by UTSW OSBC, Emergency Management.
 1. Each element shall be located and/or installed in a manner that follows the ADA and Texas Accessibility Standards (TAS) as well as life safety requirements in NFPA and IBC.
 2. Project Requirements:
 - a. The Design Professional and UTSW PM shall confirm and coordinate requirements with Emergency Management for each project using **Figure 10 43 00.1 – UTSW Requirements for Emergency Aid Specialties** for minimum campus requirements.
 - b. The Design Professional shall propose locations and quantities for OSBC approval.
 - c. Installation locations shall not be in high-profile or highly visible spots such as wall space where artwork or signage would be expected.
 3. Refer to UTSW master specification Section 10 43 00 “Emergency Aid Specialties” for specific campus requirements.
 - a. The coordination of Emergency Aid Specialties within healthcare projects shall be confirmed and finalized with UTSW Medical Equipment Planning. Within MEQ scope these will typically be documented as “Owner Furnished, Contractor Installed” (OFCI).
 - b. In non-healthcare projects, Project AE shall coordinate and document these items as “Contractor Furnished, Contractor Installed” (CFCI), confirming specification requirements with OSBC.
- B. Cabinets and elements shall not create protruding objects and not restrict required exit widths.
 1. Fully recessed or semi-recessed cabinets are preferred.
 2. Each AED shall be located within its own cabinet.
 3. Each large STB kit shall be located within its own cabinet.
 4. Each small STB kit shall be planned to be within the AED cabinet.
 5. Per project requirements, other cabinet types or styles will be considered with approval from Emergency Management.
- C. Design Professional to coordinate any exterior locations of specialty items to include cabinets or other means of protection from the elements.
- D. Signage requirements to identify emergency aid specialties shall include signs at each location in buildings and in parking garages. Refer to Section 10 14 00 “Signs and Graphic Elements” in the UTSW Design Guidelines and Master Specifications.

Figure 10 43 00.1 – UTSW Requirements for Emergency Aid Specialties

This chart indicates the quantity and locations of AED, STB Kits, and Evacuation Chairs in UTSW buildings.

Building Type	UTSW Space and Level Description	AED	STB Kit	Evac Chair
Single Story Building	1 Floor	Minimum of 1	1 Large Kit	N/A
Multi-Story Building	2 – 5 Floors	Minimum of 2 with 1 AED on 2nd to Top Floor	1 Large Kit on First Floor with 1 Small Kit in Each AED Cabinet	Minimum of 1
High Rise Building	More Than 5 Floors	Minimum of 2 with 1 AED on 2nd to Top Floor	1 Large Kit on First Floor with 1 Small Kit in Each AED Cabinet	Minimum of 2
Leased Whole Floor	UTSW is Sole Occupant of Whole Floor(s) Within a Leased Building	1 Per Floor	1 Small Kit in AED Cabinet	Minimum of 1 if Space is Used for Patient Care
Leased Partial Floor/Suite	UTSW Occupies Part of a Floor(s) Within a Leased Building	1 in Occupied Space Per Floor	1 Small Kit in AED Cabinet	Minimum of 1 if Space is Used for Patient Care

XVIII. Section 10 44 00 Fire Protection Specialties

- A. Provide a building design that provides for Life Safety and complies with NFPA 101 as adopted by Texas State Fire Marshal.
- B. Emergency lighting and exit signage shall be on a separate circuit and on emergency generator power, where a generator is provided.
- C. Provide an Emergency Command Center in High-Rise buildings, refer to Volume 1.
- D. Fire extinguishers and recessed or semi-recessed cabinets shall be incorporated into the design as required by the code.
 1. Fire extinguisher cabinets shall be uniformly sized in buildings on campus and shall not create protruding objects according to ADA and Texas Accessibility Standards (TAS) requirements.
 2. Fire extinguishers selection and installation shall conform to the requirements of NFPA 10 Standard for Portable Fire Extinguishers or other codes as applicable and approved by OSBC.

- a. Design Professional to confirm that any special use fire extinguishers will fit inside the cabinets for each location as these units may be larger than standard extinguishers used elsewhere.
 - b. Layout of fire extinguishers shall be approved by OSBC.
- 3. Installation of Fire Extinguisher Preferences:
 - a. In all public spaces, UTSW prefers installation with a cabinet.
 - b. In A.R.C. spaces, provide recessed or semi-recessed cabinets.
 - c. In parking garages and on roof areas, fire extinguisher cabinets shall be used to protect extinguishers from the weather.
 - d. In maintenance and back-of-house areas, including IR rooms, electrical rooms, etc., installation with a bracket is preferred.
 - e. Signage requirements to identify fire extinguishers shall include signs at each location within buildings and parking garages. Refer to Section 10 14 00 "Signs and Graphic Elements" in the UTSW Design Guidelines and Master Specifications.
- 4. Fire extinguishers located in or near the MRI room shall comply with the UTSW Master Specifications, be of all nonferrous construction, and have "MRI Safe," MRI CONDITIONAL," or similar logo printed on the extinguisher by the fire extinguisher manufacturer. These shall be equivalent to a ten-pound nominal capacity extinguisher.
- 5. Refer to UTSW master specification Sections 10 44 13 "Fire Extinguisher Cabinets" and 10 44 16 "Fire Extinguisher."

XIX. Section 10 50 00 Storage Specialties

- A. Lockers are typically provided for employees without assigned offices or guests undergoing procedures. Confirm sizes, type, and quantity per project requirements.
 - 1. Patient locker areas are typically plastic laminate construction or metal.
 - a. Areas where locks are required may include digital lock options. Confirm requirements with User Representatives and UTSW PM.
 - 2. Employee areas could be metal or plastic laminate with metal in any wet areas.
 - a. Provide hasps for these locker areas.
- B. Locker Construction:
 - 1. All lockers must be wall anchored, positioned on a base, and provide a toe kick.
 - 2. Recessed and flush handles are acceptable if they comply with ADA and TAS
 - 3. Identification numbers shall be permanently affixed to the surface of the lockers. Standard numerical sequences are preferred.
 - a. If a project had central lockers on multiple floors, consider differentiating the numbers to include a floor number proceeding the locker number.
 - 4. Lockers shall have hangers inside each unit, including ADA accessible units, to meet TAS requirements.

XX. Section 10 56 00 Storage Shelving

- A. Storage shelving may be required in some areas, including janitor closets. Type and material construction for storage shelving is based on project requirements.
- B. Design Professional shall confirm chemicals to be stored in storage areas to coordinate correct finish and coordinate safety signage needs with campus OSBC and Signage Manager. Refer to Section 10 14 00 "Signs and Graphic Elements" in the UTSW Design Guidelines and Master Specifications.
- C. MDF is prohibited as a component of storage shelving.
- D. Coordinate life safety clearances for sprinkler heads with all installations and planned storage areas so no component is located within 18-inches of a sprinkler head.

XXI. Section 10 81 00 Pest Control Devices

- A. Refer to Volume 3 for code and regulatory requirements.
- B. UTSW utilizes several types of pest control devices on campus.
 - 1. Designing structures without recesses, gaps, or flat parapets is the best way to deter pests on campus.
 - a. Sloped edges or parapets will help prevent birds from sitting and overhangs shall not provide roosting spots.
 - b. Electronic or sonic bird deterrents have not been effective on campus and are not preferred.
 - 2. Vents and openings into buildings shall have covers or screens of gauges appropriate to prevent entrance of pests. Heavier gauge screens are required closer to the ground for mammals.
 - 3. Weep holes shall have screens or devices to prevent the entrance of pests while allowing the movement of water. The minimum height above finished grade shall be 6-inches unless Design Professional recommends otherwise to UTSW PM.
 - 4. Exterior doors shall have solid sweeps and closures.
 - 5. Dock doors shall have mechanically activated air curtains.

XXII. Section 10 81 01 Knox Boxes / Emergency Key Boxes

- A. Fire Department Emergency Key Boxes (Knox Boxes) shall be installed on all new buildings and buildings being renovated that do not currently have a key box.
- B. The key box shall be located as indicated in the UTSW master specifications or as directed by OSBC.
- C. Color to be confirmed with UTSW and size of key boxes confirmed with UTSW Key Control.

DIVISION 11 00 00 – EQUIPMENT

I. General Information

- A. Project equipment requirements should be assessed with user representatives early in the scope development process. The elements noted below are not exhaustive.
- B. Critical considerations include regulation requirements, compliance, project needs, manufacturer recommended layouts, as well as longevity and maintenance.
 - 1. Assessments of current infrastructure shall take place to support new technology.
 - 2. Equipment shall comply with UTSW Sustainability goals, including Energy Star equipment, where possible.
 - 3. Design Professional shall confirm equipment with emergency power requirements as well as data connection to the Central data Acquisition System (CDAS) for monitor of critical items.
- C. Design and Layouts:
 - 1. Equipment layouts shall provide manufacturer recommended clearances, safe conditions, and best practice considerations.
 - 2. Layouts and planned traffic patterns shall minimize disruption of air curtains, including HVAC supply and return design.
 - 3. Layouts shall provide access for the replacement of filters, repairs, and maintenance.
 - 4. Where equipment requires cooling water, Design Professional shall discuss existing building systems, and each process equipment cooling requirement with UTSW Utilities team to determine the project solution. Any connection to existing systems shall be approved in writing by UTSW Utilities.
 - a. A plate and frame heat exchanger may be required in the process chilled water loop to avoid circulation of house chilled water through process equipment.
 - 5. UTSW preference is to provide disconnecting means for individual hard-wired equipment at readily accessible or accessible locations per code.
 - 6. For A.R.C. special requirements, refer to Volume 1, Section A1.

II. Design Review Submittal Requirements

- A. Refer to Volume 3 – Deliverable Requirements.

III. Section 11 12 00 Parking Control Equipment

- A. Standard equipment in parking areas includes parking gates, entrance control terminals, and exit control terminals. Coordination is required to provide required data, power, and grounding per manufacturer requirements.

IV. Section 11 13 00 Loading Dock Equipment

- A. Equipment for a new or remodeled loading dock area shall include discussion with Facilities Management to determine appropriate equipment including dock levelers or dock lifts.
- B. Coordinate with UTSW FM mounting location of electric disconnects and operators accessible from the floor level to avoid use of a ladder to maintain operator safety.
- C. At A.R.C. facilities, loading docks shall have at least one lift that will accommodate sizes and weights associated with feed pallets, animal caging racks and/or large animal transport carts, and bulk trucks.
 - 1. The weight capacity shall be 3,000 pounds minimum with platform size 6-foot wide by 8-foot-long minimum.

V. Section 11 24 23 Roof Safety Systems

- A. UTSW preference is to have anchors and functional davits for safety and maintenance at roofing areas of buildings.
 - 1. These items shall be fully coordinated with structural requirements as well as envelope requirements.
 - 2. All components of facility fall protection shall be fully waterproofed with the roofing system.
- B. A minimum of 42-inch barriers around roof edges or openings including guard rails or signage to indicate fall hazards is preferred.
- C. Roof safety systems shall provide the ability to access, maintain, and clean the envelope of the building. These designs shall ensure easy, safe, and cost-effective maintenance and repair.
 - 1. For non-standard envelope design with deep overhangs, design of a suspended access anchorage system or similar system is preferred. The design shall ensure ease of access under overhang.

VI. Section 11 30 00 Residential Equipment

- A. Breakrooms and equipment layouts documented by Design Professional shall ensure compliance for all users. All appliances used on campus shall be ADA/TAS compliant.
- B. Breakrooms may have refrigerators with icemakers, utilities for coffee service, water filtration, and microwaves as standard. These shall be approved by the user representative and UTSW PM.
- C. UTSW policy prohibits the addition of garbage disposals, ice machines, and dishwashers in coffee or break areas according to Policy FSS-310 "Academic, Research, and Clinical Space."
 - 1. Garbage disposal units are prohibited outside of food service kitchens. Any variance within a project must be approved in writing by UTSW FM, Infection Prevention, and Department Leadership, Director or above.

VII. Section 11 40 00 Food Service Equipment

- A. UTSW purchases large equipment for food service locations on campus.
 - 1. A one-year warranty is preferred with the start at substantial completion to be confirmed with Food Service.
 - 2. UTSW PM shall confirm the purchasing strategy per project.
 - 3. The equipment shall be National Sanitation Foundation (NSF) certified for all kitchens.
- B. Equipment can include walk-in coolers, walk-in freezers, ice machines, 3-compartment sinks, garbage disposals, dishwashers, grease traps, ovens, bulk sterilizers, rack washers, tunnel washers, etc.
- C. Gas and steam are utilized in food service areas. All utilities need to be confirmed and coordinated.
- D. Natural gas fueled cooking equipment shall have a wire tether restraint in place which is less than the length of the natural gas line to prevent unintended damage to or disconnection of the gas line while equipment is being moved.
- E. All wheeled cooking equipment shall have metal wheel stops and / or locks permanently secured to the floor. The intention of this is so that kitchen hood equipment can be properly realigned under the fire suppression system after it is removed for cleaning.
- F. Floor drains with trap seals shall be located at large ice machine locations.

VIII. Section 11 52 00 Projection Screens

- A. Where project scope requires recessed projection screens, they shall be motorized and controlled by a non-keyed switch.
- B. UTSW preference is owner furnished and owner installed with Design Professional and GC coordination

IX. Section 11 53 13 Laboratory Fume Hoods

- A. OSBC shall review laboratory equipment such as fume hoods and special hoods. The OSBC's Chemical Safety Program shall review manufacturer information and installation plans.
 - 1. Fume hood testing and certification shall be done by the fume hood manufacturer or by an independent certifying firm and be done after the installation of the fume hood in coordination with OSBC.
 - 2. A list of approved certification companies is available from the Office of Safety and Business Continuity (OSBC).
- B. Codes:
 - 1. All laboratory hoods shall meet the National Fire Codes, NFPA 45, "Fire Protection for Laboratories Using Chemicals."
 - 2. Hoods handling radioactive material shall meet NFPA 801, "Recommended Fire Protection Practice for Facilities Handling Radioactive Materials."
 - 3. Fume hood systems shall also meet the current requirements of ANSI Z9.5 Standard/ASHRAE 110 Test.
 - a. If the requirements below conflict with those of the most recent versions of these national standards, the national standards shall prevail.

- C. Design Professional shall coordinate with OSBC for any laboratory hood installation and follow the minimum design requirements:
 - 1. Fume hoods must not be in high traffic areas, located near supply air grills, and must be at least 10 feet away from a primary entrance door.
 - 2. Hood construction materials should be selected to meet the requirements of hood use. Finish materials may include stainless steel and epoxy coated material.
 - 3. Hood design shall incorporate airfoil jamb and airfoil sill to reduce airflow turbulence.
- D. A variable volume or constant volume hood system design is preferred, depending upon the HVAC system design.
- E. For constant air volume hoods, bypass or balanced air feature should be considered to provide an inlet for air to be drawn into the top of the hood as the sash is lowered, still maintaining the velocity through the face opening at 100 FPM. Hoods will be an integral part of the HVAC system.
- F. Auxiliary Air Make-Up Hoods with make-up air externally supplied above and on the outside of the hood face are not permitted.
- G. Utilities:
 - 1. Utility valves and switches shall be external and shall be in conformance with applicable codes and standards. All service valves shall be easily accessible for maintenance personnel and clearly marked. Fixture outlets inside the hood shall be corrosion resistant or have a corrosion resistant finish.
 - 2. Hood lighting shall be vapor or explosion proof, depending upon the intended purpose of the hood.
 - 3. Lighting elements shall be changeable from outside of the hood.
- H. The hood sash shall be transparent, easily removable, horizontal sliding, or vertical rising panel that will close off the hood face.
 - 1. All parts and counterbalance mechanisms shall be of corrosion-resistant material and finish.
 - 2. The sash panel shall be safety glass or plastic that has a flammability rating of 25 or less.
 - 3. Fume hoods with vertical sashes shall have stops at 18-inches. Whenever the sash is beyond 18-inches a visual alarm shall be activated.
- I. Face Velocity Requirements:
 - 1. For hood selection, establish the maximum degree of hazard anticipated for present and future use.
 - 2. National standards recognize that the acceptable face velocity requirement for toxic materials used in research laboratories is an average face velocity of 100 fpm with the hood sash fully open (100-percent) and a minimum at any point of 80 fpm. These performance parameters shall be met.
 - 3. Fume hood testing shall be accordance with ANSI/ASHRAE 110.
- J. Airflow Measuring Device:
 - 1. An airflow measuring device shall be permanently installed on each fume hood. The device shall continuously monitor airflow face velocity, shall give a digital readout of face velocity, and shall sound an alarm for low-flow conditions or whenever the face velocity drops below 80 fpm.

K. Exhaust Duct:

1. Fume hoods may be designed with either an independent exhaust duct system or a manifold system.
2. Hood exhaust system design should provide for 10-percent minimum flow through exhaust duct when hood is not in service. The hood exhaust may be used as part of or as all the required exhaust from the laboratory room.
3. Exhaust fans are to be located to the exterior of the building envelope and the pressure in the duct shall always be negative relative to the building.
4. A high transport velocity of at least 2000 fpm is needed so that dust and aerosol-size materials are not deposited in the joints, cracks, or corners in the duct system.
5. Stainless steel duct systems shall only be used where required by OSBC.
6. Normally all exhaust ducts will be constructed of Type 316L Stainless Steel, except where hydrofluoric acid or fluorides in general are used, with all TIG welded or mechanically fastened joints sealed with mineral impregnated woven fiber taper which is further impregnated with an activator/adhesive of the polyvinyl acetate type as manufactured by Hardcast, Inc. or equal.
7. Ducts should be routed vertically with a minimum number of turns. Alternate duct materials will be considered in some applications.

L. Special Hoods:

1. Perchloric acid hoods:
 - a. Perchloric acid hoods require a “wash down” feature for the exhaust fan, ductwork, and hood plenum after each use.
 - i. Only one manual valve will control the wash down water.
 - ii. The valve handle shall be outside of the hood enclosure.
 - iii. Each Perchloric Acid hood shall have an automatic five-minute wash down cycle activated when the fume hood fan is de-energized.
 - b. Perchloric acid hoods shall have a completely welded exhaust duct system. Duct shall be routed by the shortest and straightest path to the roof.
 - i. Horizontal runs are not permitted.
 - ii. Flange joints and acid-resistant gaskets may be used when required for construction and shall be approved by UTSW PM.
 - iii. Do not manifold Perchloric hoods.
 - iv. Perchloric acid hood exhaust outlets shall be flanged and furnished with a companion flange for welding to the exhaust duct.
2. Radioisotope requires special construction to permit easy cleaning.
 - a. Filtration requirements of the exhaust air and fume hood construction shall be determined on a case-by-case basis in consultation with the System Member Environmental Health and Safety Department’s Radiological Safety Officer.

M. Biological Hoods:

1. Meet NIH 03-112C Performance Specifications and shall be in accordance with National Sanitation Foundation Standard, NSF 49, and be listed by NSF.
2. Hood shall be listed by UL and CSA for electrical safety Use HHS Publication No. (CDC) 93-8395, “Biosafety in Microbiological and Biomedical Laboratories.” for guidelines and filtration requirements.

3. Hoods shall be of steel or stainless-steel construction with stainless steel interior and coved corners.
 - a. All seams and welds to be ground smooth and polished.
 - b. Sliding view window shall be 1/4-inch safety or tempered glass.
 4. Supply and exhaust HEPA filters shall be front loading and shall be 99.99-percent efficient for 0.3-micron sized particles.
 5. Utilities:
 - a. Minimum of one petcock.
 - b. Minimum of one GFI duplex outlet.
 - c. LED light fixture shall be changeable from outside the hood.
 - d. Additional utilities may be identified per project.
- N. Certification of unit after installation is required and must be performed by an approved certification company in coordination with OSBC.

X. Section 11 53 19 Laboratory Specialty Equipment

- A. Refer to Volume 1, Section A3 for standard lab equipment found on UTSW Campus.
- B. Safety Showers and Eyewash – These are required where bulk hazardous chemicals are handled or as indicated by UTSW OSBC Chemical Safety. Refer to UTSW Specifications and Design Guideline Division 22 00 00, Section 22 40 00 “Plumbing Fixtures.”

XI. Section 11 53 53 Biological Safety Cabinets

- A. Biological Safety Cabinet (BSC) shall comply with NSF / ANSI 49 and be reviewed and approved by OSBC Biological Safety Team.
 1. The layout of a laboratory including BSC units shall follow the NIH DRM Appendix A: Biological Safety Cabinet (BSC) Placement Requirements for New Buildings and Renovations and ANSI Z9.14, Section 8.3.7.
 2. Refer to UTSW Specification Section 11 53 53 “Biological Safety Cabinets.”
- B. Within BSC units the electrical outlets shall be supplied by independent circuits and have ground fault circuit interrupters.
- C. Typical utilities include vacuum lines on the right side.

XII. Section 11 70 00 Healthcare Equipment

- A. Refer to Volume 1, Section A2 for Clinical Design Requirements and 11 70 00 “Healthcare Equipment.”

XIII. Section 11 97 00 Security Equipment

- A. Security cameras, panic/duress buttons, and other security requirements shall be confirmed for project scopes including retail, executive level suites, psychiatric wards, or other areas of safety concerns.
- B. Security cameras are required in retail and food service areas including cash locations and access points.
 - 1. Locations at products shall be reviewed with retail and food service representative and UTSW Police Department.
- C. Panic/duress buttons are required at all food service cash areas, including cashier locations, and shall be reviewed with food service representative and UTSW Police Department.
- D. Panic Button/Duress Buttons are required at all cash registers and cash handling locations.
 - 1. Locations shall be reviewed by the area owner and UTSW Police Department.
 - 2. All other requested panic/duress buttons will be assessed on a case-by-case basis.
- E. IP Security cameras with licenses shall be installed to view all Panic Button/Duress Buttons.
- F. The OSBC Biological Safety / Chemical Safety Director must be consulted to discuss security for locations that will store extremely hazardous materials.

DIVISION 12 00 00 – FURNISHINGS

I. General Information

- A. Furniture layouts shall be proposed by the UTSW furniture vendor for use in the Design Professional drawings.
 - 1. The furniture vendor will schedule Customer meetings for initial understanding and for presenting options.
 - 2. The furniture vendor will provide Design Professional with an initial layout in CAD with cut sheets for products planned.
 - 3. For construction documentation, the furniture vendor will provide final layout drawings with power requirements in CAD.
- B. For each project, Design Professional shall have access to UTSW “Furniture: Standards and Layouts” from UTSW PM to understand campus standards.
 - 1. Design considerations for each project shall include employee personal storage, coat hooks, and other operational requirements. Propose coat hook installations for use by employees, patients, and visitors to align with best practice solutions.
 - 2. Within offices, a coat hook is typically installed on the wall behind the door. In employee work areas, confirm locations with users.
- C. Furnishings shall:
 - 1. Have standard maintenance requirements. Significant specialized maintenance is not allowed.
 - 2. Have a demonstrated history in a similar UTSW setting or be approved by the Institutional Design and Branding Committee (IDBC).
 - 3. Shall be contract grade with a minimum warranty of 10 years.
 - 4. Have standard sizes and finishes. Any exceptions must be approved by UTSW Design Team.
 - 5. Systems type furniture must have minimum of one cable entry access point for the furniture located near a wall or post.
 - 6. Power and data requirements shall be coordinated with the appropriate consultants to ensure successful layouts.
 - a. Communications cables must be home run directly to the furniture jacks.
 - b. Patch cords will not be allowed to connect furniture to the walls.

II. Design Review Submittal Requirements

- A. Refer to Volume 3 – Deliverable Requirements.

III. Section 12 05 13 Fabrics

- A. Use of fabric in patient areas shall be in approved areas only, such as therapeutic counseling rooms, by UTSW Design Team, OSBC, and Infection Prevention.
 - 1. Upholstery shall withstand and be warrantied against specific cleaning solvents used by UTSW EVS teams. A list of cleaners can be provided by UTSW EVS.

2. As part of closeout requirements, a cleaning manual shall be provided which includes information for each fabric.
3. High-density foam is required.
- B. Preferred Characteristics:
 1. Avoid fabrics in white or cream tones for seats or surfaces.
 2. Avoid fabrics with large and/or loose weaving that could easily snag.
 3. All fabrics must include a stain-resistant finish/coating for cleanability and be bleach cleanable in high-traffic and clinical areas.
 4. Any exceptions must be approved by UTSW Design team.
 5. All upholstery shall have abrasion requirements with a minimum of 100,000 double rubs Wyzenbeek and minimum 45 Martindale cycles.
- C. Lightfastness Requirements:
 1. Lightfastness must meet ACT minimum of 200 hours and/or Grade 5 for any furnishings placed directly by or within close vicinity to exterior windows.
 2. For all polyurethanes, lightfastness must meet ACT minimum of Grade 5 and/or 200 hours.
- D. Polyurethane Physical Characteristics:
 1. Meets a minimum Hydrolysis Testing of 5 weeks without evidence of cracking, peeling or delamination.
 2. Never railroad polyurethanes.
- E. Prior to ordering, coordinate and specify upholstery techniques between the furniture manufacturer and textile manufacturer, to prevent issues with puddling, puckering and seam slippage. These include but aren't limited to:
 1. Top stitching is not allowed.
 2. Double-stitch seams.
 3. Requirements in this section.

IV. Section 12 10 00 Art

- A. All art shall be approved by the UTSW Art Curator and IDBC.
- B. Materials shall be appropriate for each unique setting (i.e., Behavioral Health, Pediatrics).
- C. Design Professional coordination drawings shall identify installation location and any required structural support.
- D. Confirm additional requirements with the UTSW Art Curator.
- E. Locations:
 1. All art shall be coordinated with other space requirements, including but not limited to thermostat locations, switches, life safety elements, and outlets.
 2. Art shall not cover up any utility elements.

V. Section 12 20 00 Window Treatments

- A. Window treatments shall be in harmony with the building exterior and interior.
- B. Power requirements shall be coordinated where motorized treatments are used.
- C. Motorized window shades may be considered for larger public spaces, large conference spaces, and taller space installations.

- D. Locations, control plan, and controller locations(s) to be reviewed and approved by UTSW PM and User Representative.
- E. Horizontal blinds and roller shades are preferred.
- F. Horizontal blinds shall be aluminum.
- G. Black-out shades shall be provided as required for space utilization.
- H. All fabric selections shall be coordinated with UTSW Building Finish Standards. Where questions arise, they shall be reviewed with the UTSW Design Team.

VI. Section 12 30 00 Casework

- A. Project specific requirements shall drive the finish, style, and manufacture of casework.
- B. All casework units shall be designed for ease of installation, reuse, longevity, and ease of cleaning.
- C. Installation:
 - 1. All casework shall have appropriate fillers to conceal mounting hardware and/or gaps.
 - 2. All joints shall be properly caulked and sealed.
 - 3. Levelers to have 2-inch minimum adjustability, where provided.
- D. Design:
 - 1. Casework design and installation shall not create a “shelf” for storage within 18-inches of the ceiling to comply with OSBC requirements.
 - 2. Casework design and installation in healthcare and laboratory areas shall comply with best practices to minimize dust and germ spread.
 - 3. No recessed pulls allowed.
- E. Refer to Design Guideline Section 08 71 00 “Door Hardware.”

VII. Section 12 35 53 Laboratory Casework

- A. General Requirements for high-quality steel cabinet specifically designed for the laboratory environment, meeting the performance requirements described in SEFA 8-M Class 1, Fixed casework. All metal casework shall be self-supporting.
 - 1. UTSW utilizes a laboratory casework contract on campus for standardization.
 - a. Design Professional to confirm contract requirements with UTSW PM.
 - 2. Design Professional shall plan labs to be in conformance with UTSW standards, project requirements, SEFA recommendations, and other regulations as required. Refer to Volume 1, Section A3 for Laboratory Design Requirements.
 - a. The campus standard layout shall be 5-foot lengths for mobile benching/workspace units.
 - i. Lengths of 4- or 6- foot units may be indicated for certain project or equipment requirements.
 - ii. Designs utilizing a majority of 4- or 6- lengths shall be approved by UTSW Design Team and Project User Representative.
- B. Finishes to be confirmed with UTSW PM and UTSW Building Finish Standards.
- C. Casework Types
 - 1. Base cabinets shall have a minimum of 500-pounds loading per lineal foot.
 - 2. Mobile cabinets shall not have hard connections.

3. Suspended and wall hung cabinets units shall have a minimum 300-pounds loading.
 - a. Wall cases shall be able to mount to frame supports (uprights) of benching or be wall hung.
 4. Full height, wall-hung units shall have a minimum 40-pounds up to 200-pounds loading.
- D. Requirements:
1. Cabinet types shall fit under standard lab bench countertops.
 2. Installation of casework shall not create recesses, cracks, or other openings. Enclosures, joint sealant, and trim pieces shall be used to close all openings.
 3. Steel shall be 12-gauge maximum and 20-gauge minimum U.S. Standard.
 - a. Cold rolled steel shall be prime grade; roller leveled and shall be treated at the mill to be free of scale, ragged edges, deep scratches, or other injurious effects.
 - b. Stainless steel shall be type 304. Stainless steel shall be supplied with a #4 finish free of burrs, weld marks, or other imperfections.
 4. Countertop surfaces include stainless steel and epoxy resin. Use of phenolic to be approved by UTSW Design Team.
 - a. Campus finish standards to be confirmed per project.
 5. Minimum Gauges:
 - a. Drawer and Doors outer and inner pan – 20-gauge.
 - b. Aprons – 18-gauge.
 - c. Bottom Panels – 18-gauge.
 - d. Drawer bodies – 20-gauge.
 - e. Back Panel – 18-gauge.
 - f. Shelving – 18-gauge.
 - g. Shelf Support Brackets – 14-gauge.
 - h. Side Panels – 18-gauge.
 - i. Legs – 18-gauge, 2-inch tube.
 - j. Table Frames – 18-gauge.
 - k. Front and Back rails – 18-gauge.
 - l. Gusset Plates – 14-gauge (welded construction).
 6. Composition core plywood composition core plywood shall be 3-ply and compliant with ANSI A208.1-199 and/or ANSI A208.2-1994.
- E. Standard Element Requirements:
1. Sink units shall include both ADA/TAS accessible units and non-accessible units.
 2. Drawer glides shall have a minimum 100-pound loading and be full extension.
 3. Drawers shall be anti-tipping, allowing only one drawer to open at a time, and shall provide the option for dust covers as well as waterproofed drawers.
 4. Under counter lights shall be LED with an easily accessible driver, separate from any wire mold. Switch for lights shall be located for easy use.
 5. Hardware shall be manufacturer's standard pulls in chrome plated or stainless steel, dependent on project requirements.
 6. Locks shall be single-bitted (one-sided) with no restricted keyways and be manufacturers' standard lock cylinders.

VIII. Section 12 35 70 Healthcare Casework

- A. Refer to Volume 1, Section A2 for Clinical Design Requirements.

IX. Section 12 36 00 Countertops

- A. General requirements
 - 1. UTSW PM to provide building finish standards.
 - a. No custom finishes allowed.
 - 2. Countertops shall be designed for full support over the entire length and depth of surface with a minimum load of 50-pounds per linear foot.
 - 3. For wall-mounted counters, UTSW prefers metal support brackets securely fastened to the wall structure and spaced at manufacturer recommended distances but not greater than 4-feet. Visible brackets shall be finished to match wall paint.
 - a. Finishes include shop finished baked enamel or powder coated finish.
- B. Countertop materials:
 - 1. Countertops and backsplashes must be a continuous surface with minimal seams whenever possible. If a continuous surface is not possible, follow best practice guidelines for minimizing seams.
 - 2. For clinical sink locations, refer to Volume 1, Section A2 for splashguard requirements.
 - 3. Patient areas, including but not limited to check-in, receptions, exam rooms, procedure rooms, and utility rooms shall have countertops that allow for effective cleaning and decontamination.
 - a. Solid surface or manufactured products are preferred over natural products, which require regular sealant applications.
 - b. Products shall not require specialty maintenance.
 - 4. Laboratories – Refer to Section 12 56 53 "Laboratory Furniture."
 - 5. Wet areas shall have non-porous solid surface countertops and backsplashes.
 - 6. Plastic laminate counters are acceptable in non-wet work areas.
 - 7. Installation of countertops shall not create recesses, cracks, or other openings. Joint sealant shall be used to seal corners and intersections with other surfaces.
- C. Standard Element Requirements:
 - 1. Grommet locations shall be documented in drawings for wire management and trash disposal.
 - a. No custom colors permitted.
 - 2. Workstation Grommets:
 - a. Standard grommets shall be 2 1/2-inch diameter in metallic silver or plastic finish.
 - b. Specialty units shall be coordinated with IR requirements.
 - 3. Trash Grommets:
 - a. Minimum diameter of 10-inches with finish per project requirement.

X. Section 12 46 00 Furnishing Accessories

- A. Refer to UTSW Master Specification Section 12 46 00 "Furnishing Accessories" for interior basis of design products.
- B. Refer to Section 32 33 00 "Site Furnishings" for exterior accessories.

- C. Waste and Recycling Container Placement Guidelines:
 - 1. Ideal planning will result in side-by-side waste and recycling in prominent, convenient, and visible locations. Locations near entry points or determined based on traffic flow, transition points, expected work types, and space utilization are preferred.
 - a. Spaces to consider include public spaces, lobbies, hallways, office areas, break rooms, printing areas, and eating areas.
 - 2. Where side-by-side locations are not possible, place recycling containers so they are visible from waste containers.
- D. In new construction, waste and recycling shall be matching units with labeling to identify recycling with text and/or the white triangular arrow symbol for recycling.
- E. In existing construction, identify existing building standard receptacles to be reused or identify additional units for purchase in the project scope. Ensure recycling units are identified for the addition of white recycling messaging.

XI. Section 12 46 19 Clocks

- A. Refer to Design Guideline Section 27 53 13 "Clocks."
- B. Where clocks are required, the final decisions shall be evaluated and confirmed with UTSW User, PM, and UTSW Design Team.

XII. Section 12 48 00 Rugs and Mats

- A. In some seating areas, the appearance of rugs may be desired for patient comfort. These installations shall utilize standards carpets with metal trims and / or transitions pieces to prevent tripping. Refer to design guideline Section 09 68 00 "Carpeting."
- B. Open area rugs shall be avoided due to trip hazards.
- C. Walk-off mats may be utilized at entries to minimize moisture and contaminants entry into a building.

XIII. Section 12 50 00 Furniture

- A. UTSW has furniture standards per building. Design Professional shall receive Building Finish Standards from UTSW PM for each project.
 - 1. Non-Standard furniture shall be reviewed by the Institutional Design and Branding Committee (IDBC) before final consideration.
- B. Preferred Characteristics:
 - 1. Work surfaces to be high-pressure laminate (HPL) with matching edge banding in PVC/urethane. Do not specify low-pressure laminate (LPL), thermally fused laminate (TFL) or self-edges.
 - 2. Work surface laminates to be non-textured unless requested otherwise.
 - 3. Work surfaces to have appropriate grommet holes/wire management to access power/data locations.
 - 4. Office furniture should always be coordinated by Design Professional to address switch and thermostat locations.

- C. Lockable storage to be keyed alike by office. Refer to design guideline Section 08 71 00 “Door Hardware” for standard lock information.

XIV. Section 12 56 53 Laboratory Furniture

- A. General requirements:
 - 1. Refer to design guideline Section 12 35 53 “Laboratory Casework” for steel requirements and cabinet requirements.
 - 2. Adaptable table systems (lab benching) shall meet SEFA 8-M Class 7, Free-Standing Workstation, and performance requirements.
 - 3. Movable furniture elements shall meet SEFA 8-M Class 8, Mobile Workstation performance requirements.
- B. Finishes to be confirmed with the UTSW PM and UTSW Building Finish Standards.
 - 1. Approved materials must be heat resistant and stand up to chemicals including bleach. These include manufacturer’s standard finish options in powder coated cold rolled steel, stainless steel, phenolic, and Epoxy Resin.
 - 2. Composition Core Plywood Composition core plywood shall be 3-ply and shall be compliant with ANSI A208.1-199, and/or ANSI A208.2-1994.
- C. Performance Requirements:
 - 1. Loading:
 - a. All tables, including tables attached to rear framing structure, free-standing, and perimeter supported tables shall have a uniform load of 1,500 pounds.
 - b. Shelves supported by uprights (columns) or horizontal cross supports shall have loading of 40-pounds per square foot up to 200-pounds.
 - 2. Minimum Gauges:
 - a. Leg structure supports, where required, 2 1/2-inch tubing, 12-gauge hot rolled steel.
 - b. Front and side aprons: 14-gauge.
 - c. Back Panel/ Modesty Panel: 16-gauge.
 - d. Support Brackets, Apron Rails, and support rails: 12-gauge.
 - e. Steel weldments: 14-gauge.
 - f. Frame Uprights (Columns): single and double sides, 12-gauge square tubing with 14-gauge steel weldments.
 - g. Horizontal cross supports: 11-gauge.
 - h. Shelving supports, shelves: 12-gauge.
 - 3. System Components:
 - a. Systems shall be available in single-sided and double side (shared frame assembly) structures and shall be universally flexible to the system without handing.
 - i. Attached table back panels shall be installed between upright framing to allow support for the rear of the work surface and prevent side to side racking of the frame.
 - ii. Frame supports (uprights) shall allow for plumbing, electrical and data connections installed in a manner allowing onsite and post installation modifications to these services.

- iii. Frames (uprights) shall have holes machined on 1-inch increments for mechanical fastening of shelves, overhead cabinets and accessories starting at nominal 53-inch A.F.F. to within 2 1/2-inch of the top of the upright.
 - b. Self-supporting workstation tables with provisions for shelving uprights shall work with other components of the system.
 - c. Shelving:
 - i. Each standard bench shall include 2 levels of shelving across the width of the bench. Additional shelving needs shall be confirmed per project.
 - ii. Shelving options shall include a 1-inch curb between shelves at double bench locations and the ability to divide shelving above individual benches.
 - iii. Shelving may be mounted to frame supports (uprights) of benching or wall mounted.
- 4. Overall Dimensions:
 - a. Table:
 - i. Height: 29-inches to 36-inches and adjustable in 1-inch increments.
 - ii. Depth: 30-inches per single side, 60-inches per double sided unit.
 - iii. Width: 48-inches, 60-inches, or 72-inches standard.
 - b. Shelving shall be standard sizes offered by manufacturers with UTSW approved shelf depths of 12-inches, 16-inches, and 18-inches and adjust in 1-inch increments.
 - c. Overall system height: Height options of 77-inch and 84-inch including options for feet, casters, etc.)
- 5. Hardware and Accessories:
 - a. Provide backstop under main table surface for under counter cabinets.
 - b. Specify glides, casters, or heavy-duty leveling casters as project flooring and use dictate.
 - c. Grommets shall be easy to clean, adjust and maintain. Preferred material shall be natural rubber, nitrile rubber, EPDM, silicone, neoprene and FKM in fit in standard oval hole sizes.
 - d. Under counter light shall be LED with easily accessible driver that is separate from the wire mold. Shall provide method for turning lights on/off easily.
- D. Utilities:
 - 1. Provide a maximum for three plumbing services per side, housed in integral raceway to top of frame (upright).
 - 2. Electrical and data shall be hosted vertically within frame and allow horizontal modules and re-configuration throughout the life of the product.
 - 3. Provide a minimum of three electrical circuits with two above the work surface and one below. Carry a minimum of two circuits in horizontal modules.

XV. Section 12 59 00 Systems Furniture

- A. Preferred Specifications:
 - 1. Hardwired power/data to be in the base of the panel, unless requested otherwise, and shall be capable of pass-through data.
 - 2. Workstations to have a minimum of three (3) duplex power receptacles and two (2) data cutouts.
 - 3. Six to eight standard workstations may connect to one circuit with a 20-amp circuit breaker.
 - 4. Workstations with special equipment that require more power must be coordinated with electrical engineer/electrician to ensure proper distribution of circuits.
 - 5. Coordinate building power and data locations with the final design of workstation layouts.

XVI. Section 12 61 00 Fixed Audience Seating

- A. Fixed audience seating must meet all applicable codes and specifications shall be reviewed by the UTSW Design Team and finishes to be approved by the IDBC.
- B. Design:
 - 1. Floor mount only.
 - 2. Stagger seating to aid with sightlines.
 - 3. Structure for seat construction shall be steel or cast iron, plastic is not permitted.
- C. Finishes:
 - 1. Outer back of chairs shall be a hard surface in darker, neutral colors.
 - 2. Arms shall be non-upholstered.
 - 3. Seats shall be upholstered with vents required for breathability. Refer to Design Guidelines Section 12 05 13 "Fabrics."
 - 4. Tablet Arms: Refer to Design Guidelines Section 12 68 00 "Tablet Arm Seating."

XVII. Section 12 64 00 Booths

- A. Design booths to include a non-upholstered crumb catcher element.
- B. All textile and finish design shall be approved by the UTSW Design Team.
- C. Dimensions:
 - 1. Allow for the table edge to align vertically with the outer edge of the booth seat.
 - 2. Allow for minimum clearance of 16-inches from the seat back to the front edge of the table.
 - 3. In a split booth configuration, allow 22-inch between tables.
 - 4. Seat height shall be between 16-inch and 18-inch.
 - 5. Seat depth not to exceed 23-inch.

XVIII. Section 12 93 00 Public Space Furnishings

- A. Site/Outdoor Furnishings:
 - 1. Materials used should be weather resistant, with low thermal conductivity.
 - 2. Exposed metals should have powder coat finish.

3. Specify perforated seat/back and furniture must have adequate means of draining water.
 4. No umbrellas permitted.
 5. Individual furniture pieces shall have a minimum weight of 25 pounds.
- B. Do not bolt furniture down unless specifically directed by UTSW Design Team.

DIVISION 13 00 00 – SPECIAL CONSTRUCTION

I. General Information

- A. For the design of specialty spaces, the Design Professional shall provide the UTSW PM and users with recommendations for solutions that will meet the needs required while minimizing long-term maintenance requirements.
- B. Solutions that offer standardization are preferred to one-of-a-kind solutions.
- C. Confirm requirements for backup power as well as a connection to the Building Automation System (BAS) for all special construction.

II. Design Review Submittal Requirements

- A. Refer to Volume 3 – Deliverable Requirements.

III. Section 13 21 01 Controlled Environmental Rooms

- A. Rooms defined as clean rooms, cold room, warm rooms, environmental rooms, insectary rooms, plant growth chambers, etc. shall be specified as complete units with controls from a single manufacturer.
 - 1. All products and designs shall provide ADA/TAS/TAS accessible solutions.
- B. The design of refrigeration systems for environmental rooms and growth chambers shall be reviewed by the Mechanical Professional Engineer for coordination with the building mechanical systems.
 - 1. System design shall provide 100 percent redundant refrigeration. Components shall include condensing unit, evaporative coil(s), controller, and emergency power.
 - 2. Remote condensers located within mechanical rooms are preferred. Alternate locations must be approved in writing by UTSW Utilities.
 - 3. The refrigerant type shall be R448A or latest EPA approved version.
 - 4. System design and installation shall comply with code requirements including clearances and access around all equipment.
- C. Design Professional shall specify that the equipment manufacturer shall submit a detailed test procedure.
- D. Safety signage shall be posted in a visible area outside of the room and as directed by OSBC.
 - 1. Sign shall indicate that hazardous chemicals cannot be stored in a controlled environmental room. Hazardous chemicals are defined in the UT Southwestern Chemical Safety Manual.
 - 2. Refer to Section 10 14 00 “Signs and Graphic Elements” in the UTSW Design Guidelines and Master Specifications.
- E. Special Considerations:
 - 1. Biocontainment laboratories (BSL1 through BSL3).
 - 2. Gas cylinder rooms.
 - 3. 90-days hazardous storage rooms.
 - 4. Medical Waste Rooms.

5. Chemical storage areas within chemistry laboratories.
6. Dehumidification requirements: Where requested by User as required for research, dehumidification shall be provided. Design shall include a vestibule sized to maintain humidity requirements.

IV. Section 13 21 66 Audiology Booths

- A. Audiology booths on campus includes manufactured single- or double-wall audiology booths for testing hearing sensitivity, speech understanding, and other conditions.
 1. Models utilized and sizes shall be determined per project requirements and with guidance from UTSW Audiology for determining acoustic criteria.
 2. Models must meet ANSI standards for permissible ambient noise levels (ANSI 1986).
- B. General Design Considerations:
 1. Installations shall be compliant with ADA and TAS requirements to provide a wheelchair accessible solution. New construction is preferred to include structural slab recesses, so the floor of the booth is level with the floor level.
 2. Design Professional shall use UTSW preferences from this section and the Space Design Guidelines to advise UTSW on the best layout per project including design considerations for access into the booth from either the control room or the corridor.
 3. Locations per project shall consider adjacencies and traffic patterns to provide “quieter” installations.
 - a. Locate booths away from main pedestrian areas, hallways, elevators, heating, ventilating, and air conditioning systems, and other noise producing spaces.
 - b. Locate booths away from transformers, X-ray equipment, magnetic field generating equipment, etc.
 - c. Space created for the booth and associated control area shall be confirmed with and approved by UTSW Audiology. Elements include partition construction, ceiling, and slab considerations, as well as any shielding considerations.
 4. Confirm sound attenuation requirements in the HVAC system to ensure vent noise is minimized.
 5. Lighting and lighting controls shall ensure that testing and user group requirements are met.
 - a. UTSW preference is for both sound booths and technician areas to have dimming functions without timers. Ensure vendor provided controls are confirmed by UTSW User Group.
 6. Manufacturer shall design ventilation to meet comfort and code requirements. Vent ducts shall be designed, sized, and placed to minimize vent noise.
 7. An audio-vestibular diagnostic room shall be electrically shielded, free of 60 cycle interference with an isolated ground. Shall be shielded from electromagnetic interference including cell phones and Wi-Fi.
- C. Construction Considerations:
 1. Design shall have a minimum STC of 40 for all walls. All penetrations shall be sealed to maintain the acoustical performance of the designed partition.
 2. Doors, hardware, and other openings shall be designed to provide a minimum STC of 34. Where greater control is needed, Design Professional shall provide specialty

acoustic doors to review with UTSW PM and user. Confirm all requirements with UTSW Audiology.

3. Design Professional design shall address all utility requirements as required by the BOD manufacturer's requirements. Careful documentation is needed to assist the general contractor and manufacturer's installer to provide a coordinated installation.
4. Fit-out of the control area shall be timed after construction of audio booth is complete.

D. OSBC Recommendations:

1. Sprinkler Types:
 - a. Flexible fire sprinkler pipe shall be required at the entry penetration to the booth. A mounting bracket shall be utilized to allow the pipe to move with the booth for physical and acoustic isolation. If unavailable from the booth manufacturer, the sprinkler pipe manufacturer shall provide.
 - b. Specify concealed fire sprinkler heads.
 - c. Ferrous fire sprinkler pipe for audiometry is permitted.
 - d. Utilize non-ferrous fire sprinkler pipe to minimize radio frequency disturbance for auditory brainstem response (ABR) testing or electroencephalogram (EEG) testing.
2. Specify the booth with a knockout in the ceiling panel(s) for fire sprinkler pipe, sprinkler heads, and fire alarm devices.
 - a. For single wall construction, the knockout would be in the single panel of the ceiling.
 - b. For double wall construction, the knockouts would be in both exterior and interior ceiling panels.
 - c. If booth manufacturer does not provide knockouts, ensure the booth manufacturer specifies the location for drilling the hole(s) for fire sprinkler pipe during manufacture of the booth so the location is clearly marked upon delivery to the Owner.
 - d. Request stabilization bracket from the manufacturer for sprinkler pipe to be attached to the booth, if available.
3. Request a rubber coated pipe sleeve from the manufacturer to isolate sprinkler pipe from the booth.
 - a. If a pipe sleeve is unavailable, utilize acoustic caulk to seal the exterior booth ceiling penetration.
 - b. The sprinkler pipe shall be centered in the hole and not touching the booth prior to caulking.
 - c. The sprinkler pipe shall not be permitted to move in the hole or be permitted to touch the booth after caulk is applied.
4. Installation of strobe devices on the ceiling of a booth is preferred to a wall installation.
5. Confirm additional signage requirements with OSBC for audiology booths. Refer to Section 10 14 00 "Signs and Graphic Elements" in the UTSW Design Guidelines and Master Specifications.

E. Space Considerations:

1. Booth size will be determined per project, but an inside width of 9-foot and length of 10-foot should be a minimum consideration.
 - a. Booth will contain a chair for the patient and a guest chair at a minimum.

2. Control area shall include workspace centered on booth and window into booth.
 - a. Provide access from work area to jack panel for booth.
 - b. Work area shall include work surface, chair, telephone, multiple computer stations, and storage for needs of technicians.

V. Section 13 49 00 Radiation Protection

- A. All projects with radiation components must strictly adhere to State regulations as well as local policy and procedures.
- B. The Radiation Safety Advisory Committee (RSAC) is the official institutional standing committee charged with the control and safe use of sources of radiation in facilities under the authority of UTSW Broad Scope License issued by the Texas Department of State Health Services.
- C. Requirements for radiation protection shall be determined on a case-by-case basis by the Medical Physics Department. Design Professional shall work with UTSW PM to obtain shielding design and coordinate into the design documents.
- D. The Radiation Safety Officer (RSO), UTSW Medical Physicist, and OSBC must review and approve all projects to ensure they comply with the campus license and regulations.
 1. Refer to Volume 1 for design criteria and Volume 3 for code information in the UTSW Design Guidelines.
 2. Physicist / Shielding Report shall be included in project manual as reference for the construction team.

VI. Section 13 49 46 MRI Radio Frequency Enclosure

- A. All MRI installations shall include thorough discussions and implementations of a complete Radio Frequency (RF) enclosure system. This shall include all components, not limited to shielding, delegated design shielding design and support, window with frame, door, door hardware, and ferromagnetic detection.

DIVISION 14 00 00 – CONVEYING EQUIPMENT

I. General Information

- A. A strong elevator solution starts with early communication between the Design Professional, UTSW, Facilities Management and other user groups. Design assist in early stages can lead to stronger coordination and understanding, minimizing costly issues during construction.
- B. The vertical transportation system equipment for new facilities and modernizations shall be included in the general contract with specification sections prepared for each elevator system.
- C. Codes and Requirements:
 - 1. Refer to UTSW Design Guidelines Volume 3 for additional requirements.
 - 2. Elevators shall be designed and built to have a minimum component service life of 30 years.
 - 3. All components of an elevator system shall provide the required clearances to meet or exceed Texas Elevator Safety and Licensing Administrative Rules.
 - 4. Design of elevators for braille signage, wheelchair access, gurney access or other requirements shall follow requirements of TAS.
 - 5. The size and quantity of elevators shall comply with campus codes and regulations.
 - 6. Vertical transportation systems shall be provided in all facilities having two or more floors and shall be designed for the pedestrian and cargo traffic anticipated.
 - 7. Where groups of elevators serving identical floors are required in two or more locations, the elevators shall provide a minimum carrying capacity to allow for migration between the groups of elevators.
- D. Elevator Types:
 - 1. Elevators shall be traction or hydraulic type depending on facility requirements. Electric operated elevators are required.
 - 2. Machine-Room-Less Elevators are not allowed without approval from UTSW PM and Facilities Management.
 - 3. Elevators for limited special use are economically undesirable and shall not be specified unless they can be fully justified to UTSW PM.
- E. Design Considerations:
 - 1. The location of passenger elevators shall promote clear circulation patterns, be easy for visitors to navigate, provide shorter travel distances to reach elevators, and provide open site lines for safety and security.
 - a. UTSW preference is to avoid placing elevators over occupied spaces.
 - b. Freight elevators shall be near the building loading dock or delivery entrance with clear access to the main corridor.
 - i. Access to the main corridor through usable or rentable spaces is not allowed.
 - 2. Elevator machine rooms without access to an elevator shall have an equipment hatch open to the floor below. Hoist beam within the machine room shall allow for equipment passage without the use of cranes or similar methods.

3. Elevators shall serve all floors that require service, including basement, sub-basement(s), interstitial spaces(s), roof, and overhead mechanical space(s).
 - a. Provide access control to prevent unauthorized access to ancillary locations.
4. Refer to Volume 1, Section A1 for A.R.C. requirements.

II. Design Review Submittal Requirements

- A. Refer to Volume 3 – Deliverable Requirements.

III. General Requirements

- A. A building's elevator quantity, size, and types shall be determined per project to address the building population, waiting time, and other specific issues.
- B. Lobbies:
 1. Elevator lobbies shall be well lit and be acoustically designed to provide a comfortable waiting area.
 2. Ventilated and conditioned vestibules are preferred in unconditioned spaces, such as a parking garage, to protect the elevator.
 3. Elevators shall be grouped in banks of adjacent elevators or banks of elevators facing each other:
 - a. Do not exceed three (3) service elevators in-line, three (3) passenger elevators in-line, and not more than six (6) cars in a group of three (3) facing three (3).
 - b. The lobby width between two banks of passenger elevators shall not be less than 12-feet for passenger elevators and 14-feet for service elevators.
 - c. Elevators not serving most of the same floors shall be in another lobby, away from the main group of elevators.
- C. Elevator Components:
 1. In clinical and high-traffic areas, Design Professional shall consider the use of 3D area sensors at the door to minimize door strikes.
 2. Door restrictors shall be used per specification.
 3. Elevator shall be specified to receive an electronic door safety device that extends the full height of the cab. The electronic door safety device shall be a 3D type to allow operation prior to crossing the threshold.
 - a. Mechanical safety edge or traditional two-beam photo-electric eyes are not acceptable.
- D. Cab Sizes:
 1. Wherever elevators are provided, ensure a minimum of one elevator cab will accommodate, at a minimum, a stretcher that is 24 by 84-inches with not less than 5-inch radius corners.
 2. Design Professional shall discuss with UTSW PM and user representative potential requirements for higher weight capacities for patients of size, larger cab sizes, and larger door sizes to handle oversized gurneys and/or wheelchairs in both clinical and public spaces.
 3. If special service elevators for patients of size are required, these shall be located so patients are not taken into back-of-house areas.

- E. Elevator Speed:
 - 1. Rated speeds are dependent upon elevator type and usage and shall be verified with the end user of the facility.
 - 2. Unless specific requirements are provided, the rated speed for elevators shall be a minimum of:
 - a. 125 feet per minute (fpm) for travel distances of less than 15 feet.
 - b. 200 fpm for travel distances from 15 to 40 feet.
 - c. 350 fpm for travel distances from 40 to 100 feet.
 - d. 500 fpm or greater for travel distances greater than 100 feet.
- F. Loads:
 - 1. Maximum size and weight of equipment representative of the building use shall be determined before selecting elevator size and capacity. Any known future usage plans that could impact elevator design criteria, should be discussed in early planning.
 - 2. The minimum elevator capacity shall be 3,500 pounds.
 - 3. Passenger and service elevators shall be sized to accommodate transport equipment in accordance with Texas Department of Licensing and Regulation (TDLR) Texas Accessibility Standards (TAS) .
 - a. Passenger elevators shall be ASME A17.1 Class A loading as a minimum requirement for transportation of visitors, employees, and students.
 - b. Service elevators shall be ASME A17.1 Class C3 loading as a minimum requirement for transportation of employees and equipment.
 - c. Freight elevators shall be ASME A17.1 Class C1 loading for transportation of freight with minimal passengers.
 - d. All elevators with capacities and load carrying requirements greater than ASME A17.1 Class A general freight loading shall be provided with a load weighing device which prevents overloading of the elevator. This automated system will detect an overweight condition and indicate with a visible or audible alarm within the cab.
 - 4. The use of slow speed elevators for the transport of animals, the transport of hazardous materials, or mortuary use shall be considered on a case-by-case basis.
 - a. Specialized traffic as described above shall be separated from other traffic.

IV. Traction Elevators

- A. Traction elevators shall use gearless machines unless prior approval is obtained from UTSW Facilities Management.
- B. If a geared machine is used, the transmission shall not reduce the efficiency of the combined motor-transmission below that for the gearless system.
- C. Use minimum 1/2-inch x 8-inch x 19-inch or 1/2-inch x 8-inch x 25-inch preformed traction steel hoist ropes.

V. Hydraulic Elevators

- A. Hydraulic elevators shall be supplied with a petroleum-based oil that includes an additive package to prevent oxidation, corrosion, and wear.
 - 1. Vegetable-based or blended oils are not acceptable without prior approval from UTSW Facilities Management.
 - 2. Oil hydraulic elevators are not acceptable unless written permission has been obtained from UTSW PM and Facilities Management.
- B. Components:
 - 1. Electronic motor starters are required and shall use a solid-state drive to regulate the speed with either closed or open loop feedback.
 - 2. Hydraulic elevators shall be equipped with viscosity control and oil coolers with the down over-speed shut-off valve located next to the cylinder head.
 - 3. Oil line manual shut-off valves shall be in the pit and machine room.
 - 4. Rupture valves shall be installed per code.
 - 5. An oil return scavenger pump shall be in the elevator pit and power units shall be provided with secondary containment for the full capacity of the oil tank.
 - 6. Piston packing shall be replaced at closeout, after completion of construction or modernization project.
 - 7. Locate the elevator machine room as close as feasible to the elevators.
 - a. Areas where hydraulic lines are located above a finished ceiling shall be verified with UTSW PM, OSBC and Facilities Management for noise abatement and leakage prevention.

VI. Elevator Components

- A. Elevators shall use non-proprietary controls for operational, motion, and motor controls; any ancillary equipment shall also be non-proprietary.
 - 1. Controller manufacturer shall provide factory training, engineering, and technical support to the Owner's Elevator Maintenance Service Provider including all manuals, wiring diagrams, and tools necessary for adjusting, maintaining, repairing, or testing of equipment.
 - 2. The design of elevator systems shall give preference to parts that will minimize the cost of future replacement parts.
- B. Elevator Controls:
 - 1. Provide a microprocessor system with absolute position and speed feedback to control dispatching, signal functions, door operation, hoist motor, and pump motor control.
 - a. Complete details of the components, together with a complete operational description, shall be submitted for approval.
 - b. Microprocessor system shall evaluate building traffic demand including number of elevators in service, hall calls, car calls, elevator position, direction of travel, load in elevator, door status, and select an elevator to answer hall calls for least possible passenger wait times.
 - 2. The elevator controller shall interface with the existing remote monitoring systems and card-reader security systems that may be present on site.

3. The driving machine brake, emergency brake, rope gripper, or a combination thereof shall have a provision to seal the means of adjusting the holding capacity to prevent changing the adjustment without breaking the seal.
- C. Elevator Motors:
1. Elevator motors shall have Class IE2 or higher efficiency rating. Motors shall be rated for elevator duty, 120 starts per hour, and have class H or better insulation of the windings.
- D. Elevator Hoistway and Construction:
1. Hoistways and machine rooms shall be plumb with concrete and steel works required for fire rated and hoistways shall use tolerances of +/- 1/2-inch in 50-foot rise.
 2. Structure:
 - a. Supports to carry all structural reaction, impact and uplift loads imposed by the elevator equipment including guide rail supports, machine beam supports, buffer supports.
 - b. For car weights greater than 11,000 pounds, hoisting points capable of supporting the weight of the car plus 1 ton shall be installed centerline of the car guide rails and 12 inches towards the center from each car guide rail face.
 - c. Intermediate guide rail supports shall be provided between floors to that maximum spacing between supports does not exceed 14 feet.
 - d. All guide rails (car and counterweight) for traction and hydraulic elevators shall be machined or planed.
 - e. Should the structural drawings not provide adequate support points for guide rails or other components, the elevator manufacturer shall bring this to the attention of the UTSW PM immediately.
 - f. All welding for hoistway components shall be considered structural and shall conform to welding requirements of ASME A17.1 Section 8.8, welding of parts, except for tack welds later incorporated into finished welds, shall be undertaken by welders qualified in accordance with the requirements of AWS D1.1.
 3. Hoistway walls shall be flush on all sides and the interior faces of the hoistway walls shall have a smooth, flush, and non-dust producing surface.
 - a. Any projections over 4-inches shall be provided with a beveled angle not less than 75 degrees with the horizontal.
 - b. All screws or other items projecting into the elevator shaft shall be made flush with the inside hoistway walls.
 - c. Cutouts in hoistway walls to accommodate elevator entrances, cabs and fixtures shall be plumb and coordinated.
 4. Fire Protection:
 - a. Elevator hoistways and machine rooms shall provide required fire resistance ratings per UTSW accepted code standards with all penetrations sealed.
 - b. Fire alarm initiating devices shall be installed in elevator lobbies, tops of hoistways, and elevator machine rooms as well as other code required locations.
 - c. Heat detectors and sprinklers shall meet the requirements of NFPA 13, ASME A17.1, and IBC.

- d. If the hoistway is required to be sprinkled, a means to remove power to the elevator before the application of water from the sprinkler shall be provided and a smoke detector shall be installed in the hoistway.
 - i. Provide a heat detector beside each sprinkler head.
 - e. Exposed spray-on fireproofing shall not be used in the elevator hoistway without prior approval by UTSW PM and OSBC.
 - f. Hoistway shall have all holes and penetrations, including at the top of the hoistway, fire caulked, or have an approved fire stop system installed to meet fire rating of the hoistway.
 - g. Doors into machine room shall be fire-resistive, self-closing, self-locking while allowing the door to be opened from inside without a key.
 - h. Machine rooms shall have a smoke detector, and a class "ABC" fire extinguisher located on the strike side of the access door.
 - i. Hoistway shall be vented to prevent accumulation of smoke and hot gasses according to requirements of the Building Code.
 - 5. Only equipment that serves or is associated with the elevator may be installed in any elevator hoistway including electrical conduit, plumbing, drain lines, communications equipment, ductwork, etc. per the requirements of ASME A17.1.
- E. Elevator Pits:
- 1. A pit shall be provided for every elevator, each with a permanent lighting fixture, pit ladder, and ground fault interrupter (GFI) receptacle.
 - 2. Provide at least minimum light level at floor of each pit of each elevator.
 - 3. Access to all pits by means of the lowest hoistway door or separate pit access door shall be provided.
 - a. A fixed vertical ladder made of noncombustible material shall be installed when the pit is more than 35-inches deep.
 - b. The ladder shall extend not less than 48-inches above the floor-level access point.
 - 4. Provide two stop switches in the pit: above the landing at the top of the pit ladder and above the pit floor adjacent to the pit ladder when the pit depth exceeds 67-inches.
 - 5. Permanent provisions shall be made to prevent accumulation of water in the pit
 - a. Sump pumps shall be capable of removing 3,000 gallons per hour per elevator. Flush mounted steel grating shall be mounted over each sump pit.
 - b. Drains or sumps shall not be directly connected to the sewer line.

VII. Elevator Electrical Requirements

- A. Each elevator shall be provided with a surge suppressor and separate fused or circuit breaker electrical disconnect within sight of the Motor Controller in the respective machine room.
 - 1. The supply shall terminate at the respective elevator controller.
 - 2. The elevator power supply shall be a dedicated main feeder using the shortest practicable run and a continuous ground conductor.

- B. Specify that each elevator shall be provided with one set of "as built" electrical wiring diagrams laminated on both sides of each sheet with heat applied clear plastic and one electronic copy of the "as built" wiring diagrams.
- C. The emergency power supply shall have the capacity to operate a minimum of one elevator per group. Nonoperational elevators within a group shall return to the floor as designated by UTSW PM and OSBC and the doors shall open.
 - 1. Provide two dry contacts in each machine room to indicate loss of formal power and change in source of power in either direction at least 20 seconds prior to change in power source (i.e., normal to stand by or standby to normal).
- D. Provide a circuit breaker panel or disconnect switches lockable in the "off" position in each machine room for emergency power circuit for car lights, fan and alarm, circuit for the machine room GFI receptacles, circuit for the hoistway lights, circuit for hoistway GFI receptacles, and circuit for the scavenger pump in the pit for hydraulic elevator.
 - 1. Provide supplementary disconnect switches at remote locations.
 - 2. Provide necessary outlets or feeder wires to controllers as necessary for signal circuit, car lights, fans and, in pit, for pit light in accordance with NEC.
- E. Provide power through a failsafe relay that is energized to turn off lights and fan.
- F. Car lights and fan in the elevator shall shut-off when elevator is idle and unoccupied.
- G. Arrange circuits so that power to the lights and outlets on top and bottom of elevator shall not be interrupted.
- H. Each elevator shall be provided with a listed demarcation box with optional back panel and standard coin latch (or equivalent approved by OSBC). The box shall include:
 - 1. Terminals for connecting fire alarm inputs.
 - 2. A separate branch circuit supplying two (2) 110VAC duplex receptacles.
 - 3. Terminals for connection to card reader security.
 - 4. Terminals for connection to car telephone.
 - 5. Terminations of data cables required for card reader security, and for remote monitoring of elevator controls.
- I. Conduit:
 - 1. Electrical conduit connections related to the elevator systems shall be made with compression fittings.
 - 2. Conduit outside of hoistways and machine rooms shall be a minimum of 2-inches in diameter that are run to the Fire Command Center and shall be routed from the Fire Command Center to pit of one elevator in each group.
- J. Lighting:
 - 1. Provide manual light controls located adjacent to access doors.
 - 2. Occupancy sensors and timers shall not be used.
 - 3. Light levels shall be verified with elevator equipment in place to ensure code minimums are provided, including in front of each controller.
 - 4. Hoistway lights shall be stacked vertically in the rear of the hoistway near the corner for a single elevator or on the back wall between the divider beams of a duplex or triplex installation.
 - a. The extreme top and bottom fixtures shall be mounted to illuminate the pit area when the car is at the bottom landing and the car top when the car is at the top landing.

- b. Hatch three-way light switches shall be located such that every elevator in the bank shall have access to a light switch at the top of shaft access points and overhead equipment spaces.
- c. Hatch three-way light switches shall be located such that every elevator in the bank shall have access to a light switch at the bottom shaft access points, located next to each ladder and at walk in pits, if so designed.
- d. Hatch lighting system shall illuminate all adjacent shafts, pits, and overhead areas simultaneously.

VIII. Machine Room Design

- A. Machine rooms shall be provided for each individual elevator or group of elevators.
 - 1. Groups of elevators shall be in the same machine room.
 - 2. Designs with multiple elevators in shared machine rooms shall allow for removal of major equipment components of each elevator for repair without dismantling components of other elevators.
 - 3. At all times, designs for machines and components shall provide all clearances to follow minimum code requirements. Design drawings shall indicate these clearances from the Design Development phases.
- B. Elevator machine rooms shall have an independent climate control system to meet manufacturer specifications and remain between 50 degrees F and 90 degrees F with no more than 90-percent relative humidity.
- C. Machine rooms shall be aligned with the hoistway and include hoist beam(s) to allow for safe maintenance.
 - 1. The machine room for traction elevators shall align with the top of the hoistway and extend beyond the hoistway to allow for safe maintenance.
 - 2. Elevator machine rooms without access to an elevator shall have an equipment hatch open to the floor below. Hoist beam within the machine room shall allow for equipment passage without the use of cranes or similar methods.
 - 3. The machine room for hydraulic elevators should be located adjacent to and at the lowest possible landing.
 - 4. Design Professional shall provide greater than minimum clearances above cabs for maintenance staff to access all equipment.
 - 5. Structural beams should not be arranged above elevator equipment unless additional clearance is added.
 - 6. Each machine room shall include a hoist beam(s) above each traction machine. Traction overhead machine hoisting beams shall be installed between four and six feet above the center of the machine drive sheave.
 - 7. Elevators that are cabled in a 2:1 ratio shall have their hitch plates raised a minimum of eight inches above the floor for enabling access to the underside of the hitch plates from the motor room or secondary level floor where they are installed.
- D. In the machine room, the disconnecting means shall be in the line of sight of the motor controller.

- E. Design Professional shall provide greater than minimum clearances above each piece of equipment in the machine room ensuring adequate clearance for maintenance staff to access all equipment.
 - 1. Design railings to be located around elevated machine room spaces where the elevation difference is 16-inches or greater.
- F. Acoustics and Vibration:
 - 1. Machine rooms shall provide soundproofing to surrounding space, preventing the passage of audible sound to 65 dBA or less when measured outside of the room.
 - 2. The acoustic output of any equipment in the machine room shall not be greater than 80 dBA, measured at any point within the room.
 - 3. Equipment shall be installed with vibration breaks to prevent unwanted vibration especially in critical areas including hospitals and A.R.C. spaces.
- G. For buildings over two-stories with substantial equipment located on or above the rooftop, the design professional shall consult UTSW PM to verify requirements for elevator access to the roof, mechanical penthouses, or both for maintenance purposes.
 - 1. If the elevator is to extend to the roof or mechanical penthouses, an exit path to a stair shall be required at the roof level.
- H. Due to the sensitivity of the electronics, elevators located in unconditioned areas, such as garages, must still be weatherproofed and have conditioned hoistways.

IX. Elevator Enclosure

- A. Elevator cabs shall have a clear minimum interior height of 8 feet or greater with minimum door opening height of 7 feet.
- B. Provide an elevator with a quiet ride and with little machine or operation noise. Where possible, provide acoustical backer panels or other items to reduce noise levels within the cab.
- C. Doors:
 - 1. Elevator cars shall be front entrance or front and rear entrance.
 - 2. Doors for passenger elevators shall be center opening with entrance width a minimum of 42-inches.
 - 3. Service elevators shall have center or side-open doors with a minimum width of 48-inches.
 - 4. In all cases, larger openings, heights, or dimensions may be required dependent upon facility function, expected users, and future considerations.
- D. Door Operators:
 - 1. Door operator systems shall provide power door operation and be closed loop.
 - 2. Freight elevators shall have automatic power operated doors.
 - 3. Entrance jambs and sills shall be grouted solid while door frames shall be sealed.
- E. Elevator Finishes
 - 1. Finishes shall comply with IBC with a flame spread and smoke development of Class B or better.
 - 2. All finishes shall be approved by the IDBC.
 - 3. The cab shall have stainless steel rails on three sides with panels consisting of finishes that will stand up to heavy usage.

4. Specify each elevator to have a set of protective elevator panels with hooks or clamps for secure installation.
5. Panel finishes shall stand up to expected traffic, scratches, damage, and meet maintenance requirements while maintaining a finished look.
 - a. Design Professional shall confirm all finishes with Elevator Manufacturer or Elevator Designer to ensure weights do not adversely impact elevator capacity.
 - b. Glass used in or around elevators must be laminated, marked, and meet applicable UTSW standards. Additional requirements for fire resistive or fire protective glass shall be reviewed with UTSW PM and OSBC.
 - c. In freight elevators, all surfaces, including flooring and rails, shall be heavy duty materials, such as diamond plate, and be easy to clean. Provide rails on 3 sides.
6. Flooring Finishes:
 - a. In high traffic areas, high-quality luxury vinyl tile (LVT) is a preferred option.
 - b. Carpet may be utilized in some non-clinical spaces with approval from UTSW PM and UTSW Design Team.
 - c. Tile and similar flooring must be approved by the UTSW PM and UTSW Design Team. Product weight must be included in weight calculations for the cab design.
- F. Car subfloors shall be marine grade plywood with the final flooring material to be specified by the architect.
 1. Alternative subfloors may be suggested based on project specific requirements such as flooring type or extreme loading but must be approved by UTSW FM.
 2. Flooring thickness shall be coordinated to ensure correct finished floor elevation.
- G. Cab Lighting:
 1. Elevators shall be well lit.
 2. Light fixtures shall be serviced from within the cab, be vandal proof, and shall not allow for trash or dust accumulation.

X. Signaling

- A. Elevators shall use both visual and audible indicators.
- B. Each elevator car shall have public address speaker on top of the car.
- C. Visual Signaling:
 1. Visual indicators shall be located so persons of different demographics and health levels can clearly receive status updates from various locations around the elevator doors.
 2. Call buttons shall contain integral registration white LED lights, which shall illuminate upon registration of a call and shall extinguish when the call is answered.
 3. Provide each terminal landing with "UP" or "DOWN" indicators, lanterns a minimum height of 2 1/2-inches, and each intermediate landing with "UP" and "DOWN" digital arrow lanterns.
 - a. Each lens shall be LED illuminated of proper intensity, so shielded to illuminate individual lens only.
 - b. Lanterns shall signal in advance of car arrival at the landing indicating the direction of travel.

- c. Corridor lanterns shall not be illuminated when a car passes a floor without stopping.
 - d. Car riding lanterns are not acceptable.
- D. Operating Devices:
 - 1. All instructions and pictographs shall be engraved and sized to follow ASME 17.1.
 - 2. Corridor push buttons shall be installed with the centerline at 42-inches above the finished corridor floor.
 - a. The direction of each button shall be legibly and indelibly identified by arrows not less than 1/2-inch high.
 - b. Provide a corresponding Braille plate beside each button.
 - 3. Provide emergency power indicator light, medical emergency card reader/key switch and indicator light, fire service recall key switch, indicator light, and fire recall instruction, communication failure light, audible enunciator, and reset key switch in a fixture at the designated main floor.
- E. Audible Signaling:
 - 1. The audible indicators shall be at tones and volumes to ensure hearing users of all ages are receiving status updates.
 - 2. An audible signal shall be provided at each hoistway entrance to indicate which car is answering a call.
 - a. Audible signals shall sound once for the up direction and twice for the down direction or shall have verbal annunciators that say “up” or “down.”
 - b. Audible signals shall not sound when a car passes the floor without stopping. Provide adjustable sound level on the audible signal.

XI. Safety

- A. Provide a TAS-compliant telephone or intercom, which connects to a 24-hour maintained location, in each elevator cab.
 - 1. Telephones shall operate for a minimum of 4 hours when normal power is lost.
 - 2. Provide the ability to verify the operability of the telephone line.
 - 3. Confirm with elevator manufacture if phone line is to be analog or digital prior to installation of phone line.
- B. Elevators shall be provided with an audible signaling device, operable from a switch marked “ALARM” located adjacent to the button to activate the phone.
 - 1. The audible device shall have a sound pressure rating of not less than 80 dBA and not greater than 90 dBA at 10-feet and shall be located to be audible inside the car and outside the hoistway.
 - 2. For elevators with travel greater than 100-foot, provide an audible device, mounted on the car with a duplicate device mounted at the designated level. The device shall be capable of operating for a minimum of 4 hours if normal power fails.
- C. For buildings where the occupied floors are more than 120-feet above the lowest level of fire department vehicle access, fire service elevators shall be provided per requirements of IBC.

- D. In buildings where an occupied floor is more than four stories above or below a level of exit discharge, at least one elevator shall comply with the emergency operation and signaling device requirements of ASTM 17.1.
- E. In the event of an emergency:
 - 1. Non-emergency elevators shall return to the designated egress floor, the doors shall open, and the elevators shall deactivate.
 - 2. Emergency elevators are to remain available for emergency or fire fighter use.
- F. Ensure smoke detectors are located in each elevator lobby.
- G. Signage shall be located beside hall button fixtures with "IN CASE OF FIRE" directives.

XII. Escalators

- A. Escalators are not allowed.

DIVISION 21 00 00 – FIRE SUPPRESSION

I. General Information

- A. Automatic fire sprinklers are provided in most of the buildings owned or leased by UT Southwestern Medical Center.
- B. In buildings where automatic fire sprinklers are installed, they shall remain in service and be renovated or updated as part of any construction project to maintain the appropriate level of life safety in the building.
- C. The Design Professional shall identify on all drawings, based upon the users' requirements; any area that may be classified as hazardous in accordance with the Life Safety Code. These areas shall be communicated as necessary to the project design teams to ensure the appropriate level of fire protection as required by NFPA 1: The Uniform Fire Code or NFPA 101: The Life Safety Code.

II. Design Review Submittal Requirements

- A. Refer to Volume 3 – Deliverable Requirements.

III. Section 21 13 13 Automatic Fire Sprinkler Systems

- A. The automatic fire sprinkler system shall be designed in accordance with NFPA 13: The Standard for Installation of Sprinkler Systems by an individual appropriately licensed in accordance with the requirements of the Texas State Fire Marshal.
 - 1. The Contract Documents developed by the AE shall be further developed and submitted for approval by a licensed fire sprinkler company in accordance with NFPA13 to the UTSW Fire Marshal.
 - 2. All equipment and materials shall be installed in accordance with NFPA 13 and UTSW fire suppression design specifications Section 21 13 00 "Fire-Suppression Sprinkler System."
- B. The Design Professional shall document proposed locations of the fire sprinkler room, riser, and standpipe locations for coordination with other design disciplines removal of fire sprinkler heads per demolition scope of work.
- C. UTSW prefers concealed sprinkler heads in offices, exam rooms, workrooms, and common areas to prevent the accumulation of dust.
- D. Fire Sprinkler Design:
 - 1. The layout of sprinkler heads shall be in symmetrical patterns that related to ceiling features such as grid, beams, light fixtures, diffusers, etc. Where applicable, heads shall be located symmetrically and centered in two directions.
 - 2. Imaging projects:
 - a. Imaging projects may have ceiling obstructions including gantries, overhead tracks, shielding, or other specialty systems which require greater coordination for fire sprinkler systems. Sidewall mounted sprinkler designs and preaction systems may be discussed.

- b. MRI projects shall have non-ferrous systems, including all components and materials.
 - c. Design Professional shall schedule discussions for imaging projects which include UTSW OSBC Fire Safety, Imaging Users, UTSW PM, UTSW Medical Equipment Team, and imaging vendor(s).
- 3. All piping shall be routed in an orderly manner, plumb and parallel to the building structure.
- 4. Piping shall be graded for proper flow and located to conserve building space while not interfering with other work.
- 5. All piping shall have sleeves when it passes through flooring, walls, footings, or other building components.
- 6. Locations of fire sprinkler system drains to the exterior of buildings shall be located so they do not drain onto sidewalks, paving, or pedestrian pathways. All care should be taken to ensure no slip hazards are created.
- 7. Final termination shall be approved by OSBC.

IV. Section 21 31 13 Fire Pumps

- A. Design Professional shall design the discharge system of the fire pump's circulation relief line to be free from splash creation at the discharge point.
- B. The splash free design must be based on the maximum flow of the relief valve during the fire pump test.

V. Section 21 31 15 Clean Agent Fire Extinguishing System

- A. The clean agent fire suppression system shall be designed in accordance with NFPA 2001: The Standard for Clean Agent Fire Extinguishing Systems by an individual appropriately licensed in accordance with the requirements of the Texas State Fire Marshal.
 - 1. All equipment and materials shall be installed in accordance with NFPA 2001 and UTSW fire suppression design specifications.
- B. All clean agent fire suppression system plan designs and project questions shall be submitted to UTSW Office of Safety and Business Continuity – Fire Safety program for review and permitting.
 - 1. The Design Professional shall document locations of the clean agent fire suppression system room for coordination with other contractors and submit these for approval by a licensed company in accordance with the Texas State Fire Marshal.
 - a. Three (3) copies of the signed drawings, manufacture specifications, and calculations (where applicable) shall be submitted for review.
 - b. Design review can take up to two (2) weeks to complete and no work shall begin until a permit has been issued.
 - c. Inspections require a minimum of three (3) days' notice and must include a copy of the approved designs onsite.

VI. Section 21 31 16 Installation of Kitchen Extinguishing System (Dry/ Wet Chemical)

- A. The dry/wet fire suppression system shall be designed in accordance with NFPA 17 – The Standard for Dry Chemical Systems, NFPA 17a – The Standard for Wet Chemical Systems, and NFPA 96- The Standard for Ventilation Control and Fire Protection of Commercial Cooking Operations by an individual appropriately licensed in accordance with the requirements of the Texas State Fire Marshal.
 - 1. All equipment and materials shall be installed in accordance with the fire codes listed above and the UTSW fire suppression design specifications.
- B. The Design Professional shall document locations of the Wet/ Dry Chemical fire suppression system room for coordination with other contractors submit documents to UTSW Office of Safety and Business Continuity – Fire Safety program for review and permitting.
 - 1. Three (3) copies of the signed drawings, manufacturer specifications, and calculations (where applicable) shall be submitted for review.
 - 2. Design review can take up to two (2) weeks to complete and no work shall begin until a permit has been issued.
 - 3. Inspections require a minimum of three (3) days' notice and must include a copy of the approved designs onsite.
 - 4. Appropriate design documents shall be developed and submitted for approval by a licensed company in accordance with the Texas State Fire Marshal.

DIVISION 22 00 00 – PLUMBING

I. General Information

- A. Where provisions for future equipment, fixtures, or building expansion are required, the design of systems equipment capacity, pipe sizing, and arrangement shall accommodate proposed demand.
- B. Easy access shall be provided to all working parts of all plumbing devices.
 - 1. Items requiring periodic maintenance or repair shall not be permanently sealed in masonry partitions.
- C. Hose Bibs:
 - a. Provide frost proof hose bibs on the exterior of all buildings.
 - b. Major buildings shall have a minimum of one hose bib on each face of building.
- D. For all plumbing work, rebar locations shall be determined prior to coring any holes.
- E. Confirm access requirements for WIFI access for all MEP spaces.
- F. Natural gas piping shall not be added within new construction projects. During renovation projects of spaces with existing natural gas piping, the Design Professional shall confirm with UTSW PM, users, and OSBC if existing piping shall be removed during construction. Refer to Volume 1 for Environmental Safety Design.
 - 1. Removal of natural gas piping shall go back to the source.
- G. Pressure Reducing Valves (PRVs) shall be located in the system to allow for repair and maintenance. Design strategies shall include providing bypass piping, isolation valves, and PRV (if needed) to maintain the required system pressure.

II. Design Review Submittal Requirements

- A. Refer to Volume 3 – Deliverable Requirements.
- B. Additional Plumbing Requirements:
 - 1. Flow diagrams shall be drawn for each piping system including but not limited to steam, heating water, chilled water, hot and cold water, distilled water, fire standpipe, oxygen, compressed air, condensing water, gas, vacuum, and refrigerant systems.
 - a. Mains and major branches shall show quantities of flow with size.
 - b. All valve sizes shall be indicated.
 - c. Architectural room names and numbers shall be used to indicate locations.
 - 2. When developing floor plans, the Design Professional shall coordinate location of plumbing fixtures with the lower floor levels to avoid the need to route drainage, waste, or sanitary vent piping within the ceilings of or exposed above sensitive equipment or areas where water leakage could cause contamination or major property loss.
 - 3. Plumbing and air conditioning systems shall be drawn as separate drawings. These systems may be combined on common drawings only by written permission of UTSW.
 - 4. Where piping systems are to be installed underfloor, these shall be shown on an underfloor plan and not on the plan prepared for the space above. Plumbing riser diagrams must be drawn with one for each riser on the project. The riser diagram shall include plumbing from all levels, including underfloor, roof and any unique levels. Clean-outs shall be shown on plans and on riser diagrams.

5. All construction details shall be shown on the drawings.
6. All equipment and material specifications shall be bound in the specifications and shall not be shown on the drawings.
7. Performance data schedules for all equipment shall be shown in schedules on the drawings.

III. Section 22 05 19 Meters and Gauges

- A. All meters and gauges shall be located with indicators facing the main traffic pathway.
- B. Domestic Cold Water:
 1. The meter shall be exactly like the type manufactured by Rosemount under the product umbrella "Rosemount 8705 magnetic flow meter."
 2. All meters should be equipped with a Rosemount remote transmitter model 8712.
 3. Meter should be installed per the manufactures specifications and should be field verified by physical plant – utilities personnel.
- C. Domestic Hot Water:
 1. The meter shall be exactly like the type manufactured by Rosemount under the product umbrella "Rosemount 8705 Magnetic Flow Meter."
 2. All meters should be equipped with a Rosemount remote transmitter model 8712.
 3. The meter should be installed per the manufactures specifications and should be field verified by Physical Plant – Utilities personnel.
- D. Irrigation Water:
 1. The meter shall be exactly like the type manufactured by Rosemount under the product umbrella "Rosemount 8705 Magnetic Flow Meter."
 2. All meters should be equipped with a Rosemount remote transmitter model 8712. The meter should be installed per the manufacture's specifications and should be field verified by Physical Plant – Utilities personnel.
- E. Locate irrigation deduct water meters near streets for ease of reading by City of Dallas or jurisdictions in which a project is located.

IV. Section 22 05 53 Plumbing Identification

- A. Plumbing identification is a critical part of all piping work. The Design Professional shall utilize UTSW master specifications including 22 05 53 "Plumbing Identification" when discussing labeling strategies.
- B. Equipment Labeling:
 1. Each major component of equipment shall have the manufacturer's name, address, and catalog number on a plate securely attached to the item of equipment.
 2. Secondary labeling shall identify the equipment per system name, for example Boiler 1, Boiler 2, etc.
 - a. This labeling may utilize mounted plate or stenciling.
- C. Pipe Markers:
 1. Visibility:
 - a. Markers shall be located so that they are readily visible to personnel from the point of normal approach.

- b. Pipe markers shall instantly tell you all you need to know about pipe contents, direction of flow, pipe size, and whether hazardous or safe.
 - 2. Pipes shall be marked:
 - a. Markers shall be located on the two lower quarters of the pipe where the view is unobstructed.
 - b. Install labels close to and on both sides of valves and flanges.
 - c. Install labels before and after all wall, floor, and ceiling penetrations.
 - d. Install labels adjacent to changes in direction and branches.
 - e. Withing Building Concealed Spaces, locate pipe markers at 10-foot maximum intervals.
 - f. Within mechanical rooms and plants, locate pipe markers at 20-to-25-foot maximum intervals.
- D. Natural Gas Pipe Identification:
 - 1. Natural gas pipe identification shall be as per A13.1-2015 standard. According to the standard, pipe markers should be positioned so that they are readily visible from the point of normal approach.
 - 2. The abbreviation for Natural Gas is “NG” and the label colors are yellow and black.
 - 3. The A13.1 standard makes recommendations for the size of letter height and length of color field for various pipe diameters. These recommendations are shown in the table below.

Figure 22-1 Natural Gas Pipe Identification: The table below identifies the pipe outer dimension, in inches, to the length of the color label, in inches, and the required height of the label letters, in inches.

Pipe Outer Diameter (Inches)	Length of Label Color Field	Height of Letters (Inches)
3/4 to 1-1/4	8	1/2
1-1/2 to 2	8	3/4
2-1/2 to 6	12	1-1/4
8 to 10	24	2-1/2
Over 10	32	3-1/2

- 4. Exception to Label Colors:
 - a. Where natural gas pipes are visible to the public, pipe paint color shall match wall or ceiling color adjacent to piping and shall be approved by UTSW.

V. Section 22 07 19 Plumbing Insulation

- A. For under lavatory guards, refer to Design Guideline and Section 10 28 00 “Toilet and Bath Accessories.”

VI. Section 22 11 16 Plumbing Piping

- A. Piping Types
 - 1. General:
 - a. Press Fittings:
 - i. Press fittings for copper piping are allowed in locations and methods that comply with manufacturer's requirements for installation.
 - ii. Press fittings for carbon steel piping are allowed in locations and methods that comply with manufacturer's requirements for installation.
 - iii. During the design process, the Design Professional shall confirm with UTSW Plumbing and Utilities, the use of press fittings.
 - iv. Any proposed locations of press fittings that are out of standard applications shall be approved by UTSW FM in writing.
- B. Domestic Water:
 - 1. All interior water piping shall be type L copper with soft solder joints and/or press fittings.
 - 2. Exterior water piping, where copper tube is specified, it shall be Type K.
 - a. Use Type K copper in tunnels and underground.
- C. Heating Water – Press fittings may be allowed when following manufacturer's instructions. Copper press fittings up to 4 inches diameter can be used.
- D. Condensate drain piping – Press fittings may be allowed when following manufacturer's instructions. Refer to Division 23 00 00 for steam condensate return.
- E. Lab Water
 - 1. Non-drinkable.
 - 2. Follow the press fitting requirements for domestic water piping noted above.
- F. Deionized Water
 - 1. Per UTSW Specification.
- G. Groove Coupling Piping:
 - 1. Groove coupling piping systems may be used on domestic water systems for piping 2-inches and larger only.
 - 2. Groove type couplings may be used for galvanized steel and copper piping in mechanical rooms only.
- H. Gas Piping Types:
 - 1. Gas lines shall be of all welded black steel piping or Viega mega press fittings inside of the building to emergency shut-off valves. Gas lines from valve to lab table or appliances may be screwed black steel with M.I. fittings for 3/4-inch and smaller.
 - 2. Service of gas into labs has traditionally utilized manifolds, which create issues as they age. Local tank switchers may be preferred for service to minimize cost and leaks.
- I. Natural Gas
 - 1. All building gas piping shall be designed and installed in accordance with National Fuel Gas Code, NFPA 54, and latest edition. Refer to Division 22 00 00, General Information for campus information.
- J. Valves:
 - 1. For domestic water supplied to a building, a reduced principle zone (RPZ) backflow preventer assembly is required.

2. Reduced pressure zone backflow preventers shall be used on any domestic water connection to the fire protection water system and shall have reduced pressure double check valves.
 3. All control valves shall be listed in a schedule on the drawing showing identification number, body size, port size, if applicable, whether normally open or closed, spring range, and CV.
 4. All control valves in the domestic water system shall be of non-ferrous, epoxy coated or stainless-steel construction.
- K. Construction and Installation:
1. Provide insulation on all roof drain lines and overflow lines and pipes that accept condensate.
 2. Provide threaded wall stops at all lavatories and sink water supply piping.
 3. Deionized water piping shall be completely drainable. All low points and traps in the system shall have the capability to drain the system completely prior to starting the system.
 4. Piping removed during construction shall be removed back to main line still in use and capped.
 5. No piping should be run in concrete floors.
 6. Pipes penetrating exterior walls below grade must be installed so as to prevent breakage due to building settlement and to maintain a watertight seal.
- L. For sanitary sewage, refer to Section 33 31 00. For additional requirements Section 22 11 16 should be referred to.
1. Underground sanitary sewer to be cast iron, hub, and spigot or DWV PVC.
 - a. No-hub cast iron may be used in the interior of the building.
 2. In general, sanitary distribution systems outside the building are civil engineering projects. If distribution is complex, such a consultant shall be retained to do this work.
 3. Sanitary sewers shall show invert elevations at manholes and other critical points.
 4. Buildings shall be designed to permit gravity drainage of sanitary sewage.
 - a. The pumping of sanitary sewage is prohibited unless there is absolutely no other alternative.
 - b. Where sewage ejector or sump pumps are to be provided, these shall be so located that there is sufficient head room to pull the pump shafts straight up through the floor plate. Lifting eyes shall be included in or near the ceiling to facilitate this operation. Rail mounted pumps should be considered.
 5. Vent pipes shall be carried up adjoining soil and waste pipe, and they shall be connected into the main stack at top and bottom.
 - a. Vents may be one size smaller than the traps they serve, except that no vent shall be less than 2-inches.
 - b. The size of vent lines accommodating more than one fixture shall be sized in accordance with the International Plumbing Code.
 6. General Requirements:
 - a. All floor drains and floor sinks shall be furnished with trap guards .
 - b. All janitors' closets shall be arranged with the sink near the door and a floor drain in the room.

- c. All mechanical room floor sinks shall be a minimum 4-inch diameter, with acid resisting interior, and shall be connected with trap guards . Floor drains in areas above grade and over crawl spaces shall have mechanical joints for easy access. Coordinate with architect to provide minimum 1-inch in a 10-foot slope to room and area drains. Do not locate floor drains under machinery.
- 7. Drains serving as indirect receptors for other drain piping shall be floor sink style.
- M. Toilet Room Requirements:
 - 1. Sanitary waste cleanouts shall be located at 24-inches AFF in every toilet room. Install upstream from all fixtures to enable cleaning of entire waste line to sanitary vertical stack.
 - 2. Each restroom should have at least one 4-inch floor drain when serving 80 or more square feet and 3-inches minimum for less area. Locate under toilet stall partition or where one is not likely to walk.
- N. For A.R.C. special requirements, refer to Volume 1, Section A1.
- O. Domestic water lines shall not be run to coffee makers, unless a drain is provided, and the coffee maker is immediately adjacent to a sink.
- P. For storm drainage utilities, refer to Section 33 41 00 for additional requirements.
 - 1. Storm shall show invert elevations at manholes and other critical points.
 - 2. In general, storm distribution systems outside the building are civil engineering projects. If distribution is complex, such a consultant shall be retained to do this work.
 - 3. Roof drain piping shall be sized in accordance with the current International Plumbing Code.
 - 4. Roof drains shall be run separately from all other storm water sources to a manhole outside the building.
 - a. Downstream from this manhole, the piping shall be sized sufficiently large to prevent roof drain water from impeding the proper flow from area drains.
 - b. All piping 50 feet or more below the roof shall be welded construction.
 - 5. Buildings shall be designed to permit gravity drainage of storm water.
 - a. The pumping of rainwater is discouraged and, where it becomes necessary, an assignable area could be flooded on pump failure.
 - b. An emergency generator shall be provided with adequate room for ventilation, a fuel supply, exhaust to roof, and radiator cooling duct.
 - c. Submersible type heavy duty pumps with extraction rails shall be used in lieu of vertical type sump pumps.

VII. Section 22 11 19 Plumbing Specialties

- A. For A.R.C. specific requirements including backflow preventor locations, refer to UTSW Design Guideline Section A1
 - 1. Water supply services within containment facilities shall have back flow prevention devices including housekeeping hose bibs.
 - 2. Drainpipes:
 - a. Drainpipes shall be sized appropriately for expected usage but no smaller than 4-inches.

- b. Some large animal areas may require drainpipes greater than 6-inches in diameter.
- 3. Floor and sink drains:
 - a. Each shall have traps filled with water or disinfectant to prevent movement of vermin or gases.
 - b. All floor drains shall have traps and cleanouts with the means of flushing readily available due to food or bedding becoming clogged in pipes.
 - c. Floor drain traps shall be a minimum of 5-inches deep with cleanout plugs located within the containment area.

VIII. Section 22 40 00 Plumbing Fixtures

- A. Toilet Rooms:
 - 1. Lavatories located in public and staff washrooms shall be provided with electronic sensor activated faucets.
 - 2. All electronic flush valve sensors shall be provided with a manual override button.
- B. Specimen Collecting Toilet Rooms:
 - 1. Lavatory faucets shall be provided with AC powered electronic sensors that are controlled by a wall switch located outside of the toilet room.
 - 2. Flush valves shall not have manual override buttons and shall have AC powered electronic sensors that are controlled by a wall switch located outside of the toilet room.
 - 3. Coordinate with Owner's staff for exact location of wall switches.
- C. Patient Areas:
 - 1. All lavatories and sinks within patient care areas shall be provided with a spout having an outlet a minimum of five inches above the flood level rim of the fixture.
 - 2. Gooseneck spout outlets shall terminate 5-inches minimum and 6-1/2-inches maximum above top of rim of lavatory sink. Horizontal dimension from spout inlet to spout outlet shall be a minimum 5-1/2-inches.
 - 3. EXCEPTION: All lavatory faucets within public toilets shall have low-profile (non-gooseneck) spouts.
- D. Healthcare Areas:
 - 1. Refer to Volume 1, Section A2 for these spaces.
 - 2. For clinical sink locations, refer to included splash guard requirements.
 - 3. Hospital toilets shall include plumbing protection systems as noted in the UTSW Master Specifications.
 - 4. Design Professional shall confirm requirements for patients of size to ensure toilet models are correct for the need.
- E. For A.R.C. requirements, refer to Volume 1, Section A1.
- F. Lab Requirements:
 - 1. Lab sinks used for general research shall be provided with manually operated faucets served with hot and cold water.
 - 2. Sinks located in BL-2 or higher tissue culture rooms shall be provided with foot pedal or electronic sensor activated faucets.

- G. Electric Water Coolers (Drinking fountains):
 - 1. Wall-mounted, stand-alone units are preferred for ease of maintenance and repair.
 - 2. Water bottle filling units shall be provided on one of the two water coolers units at one location per floor with approval from FM.
 - 3. Adherence to ADA and TAS is critical, and layouts shall prevent the creation of protruding objects on the “high” unit.
 - 4. Models shall include a filter status indicator.
- H. Shower and Bath:
 - 1. Showers shall be provided with code compliant drain pans attached to floor drain in accordance with the latest edition of the Uniform Plumbing Code.
 - 2. Shower finished floor and bathtub bottom shall be slip resistant.
 - 3. Bathtubs shall be enameled cast iron or high strength composite material with porcelain finish.
- I. Emergency Fixtures:
 - 1. Emergency showers and eyewash are required where bulk hazardous chemicals are handled or as indicated by UTSW OSBC Chemical Safety. All labs shall be within code-required distance of an emergency shower.
 - a. Floor drains at safety showers are not required. Where drains are proposed, the design discussion must include initial and long-term costs, the need for trap primers or similar technology, and must ensure wastewater requiring treatment doesn't enter the sanitary sewer system. Design discussions shall include facility users, UTSW Building Maintenance Teams, OSBC, and other UTSW groups as required.
 - b. Floor sinks with grate are preferred to drains, where possible, beneath safety showers.
 - 2. Emergency fixtures are required to comply with project codes, regulations, and ANSI. Refer to UTSW Master Specifications.
 - 3. Emergency fixtures may include emergency showers, eyewash, and combination units.
- J. Refer to Section 12 36 00 Countertops for integral, epoxy, and solid surface sink bowls.

IX. Section 22 61 10 Laboratory Compressed Air Systems

- A. Compressed Air Piping
 - 1. The piping for vacuum and gases shall be Type L, hard drawn, seamless copper tubing with wrought copper solder fittings.
 - 2. Piping to pitch back so that it drains to the drain points shown on drawings.
 - 3. Piping shall be cleaned in accordance with CGA recommendations for oxygen piping service.
- B. Valves
 - 1. Compressed air valves shall be stainless steel ball valves, with screwed joints and Teflon seats.
- C. Pressure System
 - 1. Air compressor shall be scroll and oil less type. Unit to be protected by temperature switches.

- D. Desiccant Air Dryer
 - 1. To deliver -60-degree Fahrenheit pressure dew point each rated to handle capacity of two compressors.
 - 2. Dual air-line filtration system for removal of particulate matter and liquids.

X. Section 22 62 19 Medical Gas and Vacuum Systems

- A. Piping
 - 1. The piping for vacuum and gases shall be Type L, hard drawn, seamless copper tubing with wrought copper solder fittings.
 - 2. All vacuum piping shall be purged with dry nitrogen while being soldered.
 - 3. Piping to pitch back so that it drains to the drain points shown on drawings.
 - 4. Branch takeoffs shall be made from the top of main pipe.
 - 5. Before erection all piping shall be thoroughly cleaned in hot solution of sodium carbonate mixed in equal proportions of one pound to three gallons of water.
- B. Service Outlets
 - 1. Wall type service outlets – shall be quick release type installed approx. 50 inches above finished floor housed in back box with stainless steel cover.
 - 2. Ceiling type recessed service outlets – shall be complete with pin indexing between fascia and matching, keyed slot in channel slot box saddle. Hose coupler shall be threaded type and hose shall be plastic, conductive and color coded. Connect all ceiling outlets to a common ground.
- C. Medical Gas Valves
 - 1. Valves shall be bronze bodied, double seal, full flow ball valve with Teflon seat seals and O-ring packing designed for 300 psi with a chrome plated brass ball which seals in both directions. The valves require only a quarter turn of the handle to completely open or close.
- D. Medical Gas Hard Piped Manifold
 - 1. The medical gas system supplied from multiple gas storage tanks shall be provided with a pipe manifold to connect to the gas tanks. It should be equipped with a monitoring and switching device like Thermo Scientific Gas Guard model 3050/3052 or approved equal. When the active supply tank is depleted, an audible alarm sounds, and it automatically switches to the second tank.
- E. Vacuum Pump and Accessories
 - 1. The vacuum pumping unit shall be arranged for triplex operation as scheduled on the Drawings.
 - 2. Provide vacuum relief valve, silencer and water seal solenoid valve.
 - 3. Pipe air and water discharge to the nearest floor drain.
 - 4. Install vacuum exhaust line to exhaust vapors and odors to outside.

XI. Section 22 66 00 Lab Waste System

- A. Acid waste piping will be Borosilicate glass system and Polypropylene Acid Waste Pipe manufactured from resin meeting ASTM D4101 and Socket Fusion Fittings.
 - 1. No-Hub fittings are allowed.

2. No acid waste or vent pipe shall be sized smaller than 2-inches diameter.
- B. Acid waste exposed to the potential for damage shall be constructed of high silicone cast iron protected with uni-strut guards.

XII. Section 22 64 00 Medical Gases Startup and Certification Procedure

- A. The certification shall be performed by a party other than the installation contractor.
- B. The certification of medical gas pipeline system must be performed by a Certifier, licensed to ASSE Series number 6030.
- C. The Contractor is responsible to fill the system with the appropriate gases before the certification process. The gases are to be filled as per manufacturer's instructions.
- D. The Contractor shall complete all system tests listed in specs section 22 64 00 and prepare test reports to be submitted to UTSW PM, Owner (UTSW Facilities & Hospital Facilities) and Certifier.
- E. After certification the system should be leak free and continuously fed. The manifold should not fluctuate in pressure, indicating a possible leak.

XIII. Section 22 67 06 Deionized Water System

- A. All deionized water fixtures shall be designed for recirculation, regardless of existing de-ionized water design or availability.
 1. If a return line is not available, the fitting will be capped for future.
- B. All fixtures serving laboratory Millipore filtration systems shall be equipped with a positive connection, such as a compression fitting.
 1. "Tube-and-turret-barb" configurations are not allowed.
- C. The standard procedure is to provide a Hayward 1/2-inch PVC Needle valve with double female connections, stock # NV10050T.
- D. Piping:
 1. Piping utilized includes Poly Propylene, PVDF, Schedule 80 PVC, Schedule 80 CPVC, and PTEF for tubing.
 - a. Poly Propylene may be used with use and locations to be confirmed in writing by UTSW FM.
 2. All connections between dissimilar materials in the piping system shall be made with couplings.
- E. At every point where piping penetrates a floor slab, except slabs on grade, a cast-in sleeve or other waterproof curbing at least 4-inches high shall be provided.

DIVISION 23 00 00 - HEATING, VENTILATING, AND AIR CONDITIONING

I. General Information

- A. This design guideline is intended to provide useful information to the Design Professional to establish a basis of design. The responsibility of the engineer is to apply the principles of this section and the ones that follow so that UTSW may achieve a level of quality and consistency in the design of their facilities.
 - 1. Deviations from these guidelines must be submitted to the UTSW PM for approval.
- B. Design - System:
 - 1. Mechanical systems in all buildings should be designed to exceed the minimum performance requirements of ASHRAE 90.1 and incorporate cost effective energy conservation measures that do not compromise building performance or occupant comfort.
 - 2. The design of the mechanical system and other building components in all buildings shall be integrated together to produce a building that meets the project programmed functional, sustainable and energy requirements.
 - 3. Provide N+1 redundancy for critical building utility service equipment, typically including chilled water pumps, hot water pumps, and heat exchangers.
 - 4. Mechanical systems must be coordinated with all other building systems and features.
 - 5. Mechanical systems must be maintainable and all components reliable. The mechanical design and installation of all components and equipment shall allow for eventual removal and replacement.
 - 6. All mechanical system components shall be manufacturers' standard commercial product. A standard commercial product is a product that has been sold for a period of at least five years on the commercial market, is listed in the manufacturers' catalogs and brochures and represents the latest production models.
 - 7. HVAC systems shall be designed to allow systems to be scheduled off or set-back during unoccupied hours, weekends, and holidays. Allow a small AHU with OUTSIDE AIR to be scheduled on to maintain positive building pressure.
 - 8. Variable Frequency Drives (VFD's): Shall be provided on all air moving fans and pumps of two horsepower and above. This does not apply to constant volume fans and pumps. The designer shall use care in the provision of VFD's and shall not arbitrarily provide for VFD's where not appropriate.
 - 9. No more than 3 rooms of similar size, orientation, and function should be on the same zone.
 - a. Director offices, corner rooms, conference rooms, and other special purpose rooms should be on an individual zone.
 - b. Small corridor areas or storerooms may be added to almost any small zone.
 - c. Zones requiring large amounts of air (such as auditoriums or laboratories) may require more than one terminal unit and may be controlled by a single thermostat.
 - d. Terminal units are limited to 2,000 cfm maximum.

10. Locate thermostats near light switches in every room in a standard configuration and coordinate locations before IFC with furniture, artwork, equipment, and other elements.
 11. Consultant to include a summary schedule to list all humidification systems. The list shall include as minimum:
 - a. AHU/humidification system identification, number, or tag.
 - b. Sheet number.
 - c. Room number where the system is installed.
 - d. Fire alarm device location.
 12. The Design Professional shall communicate concerns for any proposed system design, if they believe it cannot comply, to the UTSW PM in writing. This shall occur during the design phase to ensure there is sufficient time to meet Contract schedule obligations.
- C. Design – Layout:
1. Design Professional shall design all systems with required service and maintenance clearance space following campus codes and manufacturer's recommendations. Refer to Volume 1, "Building Core Elements" for design requirements.
 2. The design shall include a plan for the removal of all demolished equipment.
 - a. Indicate the sizes of major pieces of equipment and clearly marked paths of removal and egress for the equipment.
 - b. UT Southwest's preference is to remove all equipment through elevators to ground level but egress paths of equipment through removable louvers or roof cupolas are acceptable only if the elements are crane accessible.
 - c. Coordinate with the structural designers to add lifting beams as required to remove or replace heavy equipment.
 3. Coordinate with the architect to ensure elevator access to all levels, including basement, attic mechanical spaces, roof, or mechanical penthouses.
 - a. An exit path to a stair shall be required at the roof level.
 - b. The elevators shall be sized and designed for equipment removal and replacement.
 4. Provide unions or flanges to permit easy removal of equipment.
 5. The design of rooftop equipment shall include the incorporation of mechanical penthouse design. Rooftop sheds or doghouses shall not be utilized on new projects.
- D. Design – Controls:
1. Plans and specifications must include a detailed system process and instrumentation diagram which includes all control points and control sequences of operation.
- E. Design – Identification:
1. Safety signage and symbols shall be reviewed and approved by OSBC. Refer to Section 10 14 00 "Signs and Graphic Elements" in the UTSW Design Guidelines and Master Specifications.
 2. Label major mechanical equipment with a permanently affixed label containing equipment identification number or bar code as assigned by the facility management software.

F. Design – OSBC

1. Design Professional shall provide OSBC with drawings indicating where life safety elements interface with HVAC components for review and approval at each design phase.
 - a. Design Professional must obtain written approval from OSBC on location and type of life safety devices installed with humidification systems.
 - b. Design Professional shall follow NFPA 90A for the design and locations of fire dampers. Refer to section 23 33 00 “Ductwork Accessories” for additional requirements.
 2. Smoke detectors in an HVAC system that includes the use of humidification shall be located in a manner such that they will not activate during the process of water vapor generation. The smoke detectors used shall be listed for use in an HVAC system and installed in accordance with the Texas State Fire Marshal currently adopted edition of NFPA 72: The Fire Alarm and Signaling Code, NFPA 90A: Standard for the Installation of Air Conditioning and Ventilating Systems, and 90B: Standard for the installation of Warm Air Heating and Air Conditioning Systems.
 3. Smoke detectors in HVAC system shall not be used to modulate vanes to control airflow.
 4. Fire dampers only shall be used to provide protection in 2 hour or above fire rated barriers. Fire/ Smoke dampers or smoke dampers shall be installed only where specifically required by NFPA 90A.
 5. Fire dampers shall be positioned so that the links are immediately accessible to maintain and service them.
 6. The contractor shall provide a Code compliant method of testing the function of the fire dampers. An initial testing report documenting the operation of the dampers shall be provided upon approval and acceptance of the dampers.
- G. Provide complete flashing and trim details for all thermal and moisture protection systems to include assemblies, system transitions, and termination points.
- H. Coordinate with UTSW Utilities for the contractor to be used on each building.
- I. Confirm access requirements for WIFI access for all HVAC spaces.

II. Design Review Submittal Requirements

- A. Refer to Volume 3 – Deliverable Requirements.
- B. Additional HVAC Requirements:
1. Floor plans for mechanical systems shall be drawn to show pipes, ducts, etc. on the floor in which they are installed.
 2. Floor plans for mechanical systems shall be drawn to show pipes, ducts, etc., on the floor in which they are installed.
 3. A complete roof plan shall be included both for air conditioning plans and plumbing plans; one plan may serve for both.
 4. All construction details shall be shown on the drawings.
 5. All equipment and material specifications shall be bound in the specifications and shall not be shown on the drawings.

6. Performance data schedules for all equipment shall be shown in schedules on the drawings.

III. HVAC – Renovation General Design Guidelines

A. Predesign Requirements:

1. The Design Professional is responsible for understanding and documenting existing building conditions in their project scope.
2. Refer to Volume 3 for Renovation deliverables.
3. Early in the design phase, the Design Professional shall make advance arrangements with the UTSW PM for access above ceilings.
 - a. Design Professional shall determine the above noted field conditions and to locate existing HVAC components and utility services.
4. Contact the UTSW PM to coordinate with OSBC to identify existing fire, smoke, and fire/smoke dampers within the Project Boundary and to determine acceptable actions to be taken.
 - a. Clearly communicate this scope of Work within the Construction Documents.
5. The following table represents typical conditions and actions regarding existing dampers.
 - a. Verify actual scope of Work required with OSBC prior to finalizing Construction Documents:

Figure 23-1 Typical Existing Damper Conditions and Actions: The table below identifies the existing conditions of dampers with the typical action expected.

Condition of Damper	Criteria (Requirements)	Action
Compliant	Needed	Maintain
Compliant	Not Needed	Remove Completely
Deficient	Needed	Replace with New or Repair
Deficient	Not Needed	Remove Completely
Access Issue	Needed	Repair
Access Issue	Not Needed	Remove and Document

B. Planning:

1. When zoning and selecting air handling systems, consideration must be given to the following:
 - a. Space availability for equipment, piping, equipment floor drains, and ductwork.
 - b. Construction phasing requirements.
 - c. Present capacity and condition of the existing HVAC systems, and components if any, serving areas to be renovated.

- d. Determine current HVAC load requirements prior to calculating the revised HVAC loads for the renovated Project area.
 - e. Impact of renovation activities on adjoining areas not included in the Project.
- C. Documentation:
 - 1. For all stainless-steel ductwork to be altered in a renovation, the Design Professional shall note in a general note and coordinate with the Mechanical PE the following:
 - a. General Contractor shall have all ignitable debris removed from all ductwork and ductwork risers from the section of removal all the way through the roof. This may include horizontal ductwork sections serving other areas. The removal of debris must be done prior to plasma cutting, grinding, cutting, and welding any ductwork as part of the renovation. The supply or exhaust will also need to be shut down prior to Hot work being started and inspected by OSBC before work starts.
 - b. General Contractor will need to make provision to investigate condition of the ductwork prior to cutting any ductwork that may or may not contain ignitable debris.
 - c. General Contractor shall verify conditions are safe for welding new stainless-steel sections to other sections or HVAC equipment.

IV. HVAC – General Planning Criteria

- A. Each component of an air handling system shall be spaced in the unit so that there is room as per code/manufacturers recommendations on all sides for inspection, maintenance, and location of man-sized hinged access doors.
- B. The equipment shall be large enough to provide access to all equipment for maintenance and a means to remove and replace equipment. Adequate “pull spaces” shall be provided for coils, shafts, filters, etc.
- C. Mechanical Rooms:
 - 1. Do not use mechanical rooms or air handling unit equipment rooms as return air plenums. No pumps, panel boxes, etc. can be installed in a plenum.
 - 2. Ventilate mechanical rooms.
 - 3. All mechanical rooms shall have locks and a common key system not accessible to building personnel. Coordinate with the key shop for locks hardware requirements.
 - 4. Access shall be provided to mechanical room spaces without going through any assigned area such as a janitor closet.
 - 5. Combinations of mechanical rooms and janitor closets, or mechanical room with storage spaces, are not acceptable.
- D. Provide lifting eyes or trolley rails for heavy equipment.
- E. Roof Areas:
 - 1. Walkways shall be provided for roof-mounted machinery so that equipment may be serviced without traffic directly on roof.
 - 2. Roof-mounted equipment shall be accessible by a stair.
 - 3. Hatches without stairs or use of external ladders are not acceptable.

V. Cooling And Heating Load Calculations

- A. Heating and cooling system design loads must be determined in accordance with the calculation procedures described in the ASHRAE 183 unless otherwise specified herein.
- B. Heating and cooling system design loads for the purpose of sizing systems, appliances and equipment must be determined in accordance with the following requirements.
 - 1. The HVAC design analysis for new facilities or renovation of existing facilities must include a psychometric analysis documenting that the system meets design criteria.
 - a. The analysis must provide calculations of system cooling load, energy/mass transfer through conditioning equipment and fans, and a system schematic indicating state point dry bulb and wet bulb temperatures (or humidity ratios) of outside air, mixed air, supply air, and return air flow streams.
 - b. The system must provide the capability to condition ventilation air and maintain space relative humidity over the full range of cooling load.

VI. Outdoor Design Conditions

- A. Use the ASHRAE Fundamentals Handbook.
- B. Comfort cooling: 0.4 percent dry bulb and the corresponding mean coincident wet bulb (MCWB) temperature and 0.4 percent humidity ratio and corresponding mean coincident dry bulb (MCDB) temperature.
- C. Comfort Heating 99.6 percent dry bulb temperature.
- D. Indoor Design Conditions for Various Occupancies: Refer to Figure 23-2 Indoor Design Conditions and the listed conditions below for general design conditions to be used for occupancies at UTSW:

Figure 23-2 Indoor Design Conditions: The table below identifies general design conditions for the listed occupancies at UTSW.

Room Type	Temperature (Fahrenheit)	Humidity (Percent)	Air Changes per Hour	Room Pressure
Office	72 +/- 3	10 to 60	6 to 10	Neutral
Wet Lab	72 +/- 3	10 to 60	10 to 15	Negative
Dry Lab	72 +/- 3	10 to 60	6 to 10	Neutral
Equipment Galley	72 +/- 3	10 to 60	6 to 10	Neutral
Animal Room	72 +/- 3	10 to 60	10 to 15	Negative
Fly Room	63 +/- 3	30 to 70	1 to 5	Negative
Tissue Culture	72 +/- 3	10 to 60	6 to 10	See Below

- 1. Most buildings on the UTSW campus are designed for 100 percent outside air.
- 2. Air from wet labs, animal rooms, fly rooms, tissue culture labs, and other similar spaces shall be 100 percent exhausted.

3. Tissue culture rooms shall have negative pressure with respect to the corridor in order to prevent contamination of adjacent labs. Tissue culture labs require that the room be positive with respect to the hood in order to prevent migration of contamination into the experiment.
4. Standard practice has been to locate the exhaust grill between the hood(s) and the room exit to provide a relative negative pressure zone with respect to the hood and the adjacent laboratories.
5. Where cleanliness requirements are needed, an air shower should be used.
6. Special consideration must be used in the location of supply air diffusers in a tissue culture room. As a rule, diffusers are not located within six feet of a hood, and the airflow is directed away from the hood face.
7. In lieu of location, directional diffusers must be used. The velocity of the supply air discharge shall not exceed 50 FPM for any diffuser within six feet of a tissue culture hood.
8. Dehumidification process:
 - a. Greater than 40 percent RH – Refrigeration or chilled water
 - b. Less than 40 percent RH – Refrigeration or chilled water supplemented by desiccant wheel type dehumidification

VII. Research Lab Spaces HVAC System

- A. Research labs shall be 100 percent outside air, single duct, variable air volume, central air-handling units with hot water reheat coils.
- B. For A.R.C. special requirements, refer to Volume 1, Section A1.
- C. Building ventilation shall be provided by dedicated outside air pre-treatment unit(s).
- D. Lab Exhaust Header system connecting all chemical fume hoods, ducted bio-safety cabinets, and general lab exhaust to common lab exhaust fan system shall be located on a roof.
- E. Lab exhaust shall terminate with stack to exhaust contaminants to provide acceptable dilution and prevent recirculation of containments into building ventilation.
- F. Exhaust energy recovery laboratory facilities with total exhaust greater than 15,000 CFM shall include heat energy recovery systems to precondition outside air.
 1. Energy recovery systems will be designed for zero cross-contamination.
- G. Equipment and freezer galley spaces, which hold many heat producing pieces of laboratory equipment, are typical in UTSW buildings. The Design Professional shall offer solutions for review to assist with the efficient exhaust of heat. Potential solutions include low-level exhaust grilles in lieu of ceiling level exhaust.

VIII. Office Spaces HVAC System

- A. The office space HVAC system shall be single duct, variable air volume, central air-handling units with VAV boxes and hot water reheat coils.
- B. Building ventilation shall be provided by dedicated outside air pre-treatment unit(s).

IX. Clinic Spaces HVAC System

- A. The clinic space HVAC system shall be single duct, variable air volume, central air-handling units with VAV boxes and hot water reheat coils.
- B. Building ventilation shall be provided by dedicated outside air pre-treatment unit(s).

X. Support Spaces

- A. All storage spaces shall be ventilated and should preferably be served with building exhaust air
- B. Toilet rooms shall have a supply and a mechanical exhaust system. Janitor's closets shall have a mechanical exhaust system.
- C. Exhausts from adjacent toilet rooms shall be arranged to prevent sound transmission between men and women's areas.
- D. Transformer vaults shall have separate ventilating fan or fans connected to emergency power supply. Vaults shall be vented to outside in accordance with the National Electric Code.

XI. Automatic Temperature Controls

- A. Provide a temperature control/energy management system and control function for the entire building.
- B. The system shall include a standalone Siemens Direct Digital Control (DDC) System. That communicates with the Central EMS at the Facilities Services Department through an Ethernet card and the campus instrumentation control distribution wiring system.
- C. The EMS/Automatic Temperature Control (ATC) system must be compatible with the existing Siemens campus system while monitoring and/or controlling the central campus systems including, but are not limited to, the following:
- D. Temperature control.
- E. Fire alarm.
- F. The start and stop of major equipment.
- G. Monitoring of specific mechanical equipment and systems will be dependent on the recommendations of Facilities Management.
- H. Provide metering of utilities with indication and totalization capabilities.

XII. Energy Management System

- A. Provide a stand-alone direct digital control (DDC) system for space conditioning in campus buildings connected to the central campus EMS system.
- B. During the Design Development and Construction Documents phase, consult with the respective controls firm to determine the number of DDC Panels required and the location for each panel.
- C. Design Professional shall document the panel locations in the drawings.

XIII. Section 23 05 19 Meters and Gauges

- A. All meters and gauges shall be located with indicators facing the main traffic pathway.
- B. All buildings shall be designed for metering campus thermal utilities.
- C. All auxiliary areas in a building shall be piped in a manner to allow sub-metering including flow and temperature sensors on supply and return chilled water piping.
- D. Calculations shall be based on flow and temperature differential.
- E. Provide a lockable bypass valve around the building meter(s) if uninterruptable service is critical.
- F. The Make-up water meters:
 - 1. The make-up water connections for hot water, chilled water and condenser water services shall be provided with water meters.
 - 2. The meter shall have the capability of sending output of totalizer in gallons and flow rate in gpm to Siemens BAS.

XIV. Section 23 05 23 Valves for HVAC Piping

- A. All steam and condensate valves shall be 300# forged carbon steel. Brass valves are not acceptable.
- B. Butterfly valve hand wheels shall be positioned to allow access and ease of operation.
- C. If a valve is more than 6 feet above the floor, a chain fall shall be provided.
- D. The orientation of butterfly valves shall be installed per manufacturer recommendations to increase valve longevity and avoid flow turbulence.

XV. Section 23 05 48 Vibration and Seismic Controls for HVAC:

- A. Design of HVAC systems to maintain noise levels below those recommended for the proposed occupancy in accordance with the ASHRAE Handbook and SMACNA guidelines.
- B. Use ASHRAE Applications Handbook Chapter "Selection Guide for Vibration Isolation" or manufacturers recommendations for vibration isolation design requirements.
- C. Locate sound sensitive rooms away from air handlers and mechanical equipment.
- D. Acoustical duct liner is not allowed.
- E. Use double wall acoustic duct where sound attenuation cannot be accomplished by other methods and the duct is not serving occupancies that are sensitive to particulates.
- F. Increase the outside duct dimensions as required to maintain adequate internal cross sections. Design Professional to notify UTSW PM of this approach for cost validation.

XVI. Section 23 07 13 Ductwork Insulation

- A. Duct wrap, rigid, and semi rigid insulation are listed in the Specifications.
- B. Rigid/semi rigid duct insulation is highly preferable to blanket insulation/duct wrap as the installations tend to last longer.
 - 1. Duct wrap insulation is frequently proposed as a value engineering option in lieu of rigid/semi rigid duct insulation.

XVII. Section 23 09 00 Instrumentation and Control for HVAC

- A. This section is for the control equipment for HVAC systems, components, and other systems shown to be controlled by the Building Automation Systems (BAS) including, but not limited to all computer software and hardware, controllers, sensors, transmission equipment, and related components.
- B. Refer to UTSW Master Specification for additional requirements for DDC points list and additional software programming points. Alternatively, this information could be added to the drawings.
- C. Standard monitoring on UTSW campus includes:
 - 1. Carbon Monoxide.
 - 2. Carbon Dioxide.
 - 3. Oxygen.
- D. Safety: Additional monitoring may be required per project, and it shall be confirmed with UTSW Utilities and OSBC.
 - 1. CDAS Equipment Monitoring:
 - a. Central Data Acquisition System (CDAS) is a campus-wide, central monitoring station. This is physically located in the Facilities Management Office Building.
 - b. Equipment monitored by CDAS includes low-flow alarms at hoods, refrigerators, freezers, blanket warmers (could require 1 or 2), and other equipment as indicated per project.
 - c. Provide the following for each CDAS monitoring location:
 - i. In-wall box and faceplate shall be connected to the conduct that is stubbed out above the ceiling.
 - ii. The cabling type shall be confirmed according to the project. Typical cables include multi-conductor twisted pair 22 or 18AWG plenum rated or vendor proprietary types.
 - iii. The controls contractor will provide items identified for CDAS.
 - 2. Dry Ice Storage:
 - a. Storage space shall be ventilated to always maintain ambient carbon dioxide (CO₂) concentrations below 5,000 parts per million (ppm) and ambient oxygen (O₂) levels above 19.5 percent.
 - b. The Project Engineer shall determine the quantity of air changes per hour to maintain concentrations below 5,000 ppm.
 - c. Provide both visual and audible alarms for gas monitoring to indicate when either concentration is outside of range.
 - i. Visual alarm shall be strobe on both the interior and exterior of the space.
 - ii. Audible alarm shall be located on both the interior and exterior of the space.
 - iii. Issue a remote alarm to BAS.

XVIII. Section 23 20 00 HVAC Piping and Pumps

- A. Chilled Water System: For North and South Campus, the chilled water system for the facilities is comprised of a pair of CHS/CHR pipes from the central plant. Typically, the water is provided with a 14°F temperature difference, but Design Professional shall coordinate with facility management and use the highest possible temperature difference (Delta T) between CHS/CHR. Loads will have two-way modulating control valves to control chilled water flow to the equipment. Differential pressure transmitters between the chilled water supply and return mains at various locations will be utilized to inform the campus facilities engineering group information about the health of the system. The cooling coil farthest from the system connection will be equipped with an automatic 3-way control valve to maintain a minimum flow rate in the piping system. A secondary process chilled water piping loop with plate frame heat exchanger may be added to meet the process chilled water requirements of microscopes and other lab equipment.
- B. Steam System: For North and South Campus, a two pipes steam system for the facilities will be provided from the central plant. Design Professional shall get the steam system conveying pressure from UTSW PM. The primary users of steam will be Hot water Heat exchangers, autoclaves, cage washer, and humidifiers.
- C. Heating Hot Water System:
 - 1. The heating hot water system for the facilities will consist of a pair of steam to hot water heat exchangers with associated heating hot water pumps with make-up water connections, and all support equipment including expansion tank and water treatment for a 20°F delta distribution loop.
 - 2. The Design Professional shall coordinate with UTSW PM and use the highest possible temperature difference (Delta T) between CHS/CHR. The primary users of heating hot water in the facility will be air handling and fan coil units and reheat coils serving the laboratory spaces.
 - 3. Loads will have two-way modulating control valves to control heating hot water flow to the equipment. Differential pressure transmitters between the heating hot water supply and return mains at various locations will be utilized to inform the campus facilities engineering group about the health of the system. The heating coil farthest from the system connection will be equipped with an automatic 3-way control valve to maintain a minimum flow rate in the piping system.

XIX. Section 23 21 13 Hydronic Piping

- A. Design:
 - 1. Groove coupling piping is not acceptable for use in utilities or chilled water applications unless written approval received from UTSW PM and UTSW Utilities.
 - 2. Design for and specify standard pipe sizes only.
 - 3. Water piping systems shall be sized using standard engineering formulas and coefficients based on pipe condition and roughness. Refer to the maximum flow rates allowed by ASHRAE 90.1 and recommended by ASHRAE Fundamental.
 - 4. Route groups of pipes parallel to each other.
 - 5. Piping shall not be buried beneath the lowest floor level except for soil pipe.
 - a. Piping will not be run in concrete floors.

- b. If pressure piping placement under slabs is unavoidable then the piping must be run in a steel pipe sleeve so leakage can be channeled off.
 - 6. Space pipes to allow the pipes to be completely insulated and to allow valves to be serviced.
 - a. Provide a minimum 2-inch clearance between insulated piping and other piping, walls, structural members, or other obstructions.
- B. Control water flow through equipment with 2-way valves.
 - 1. Use one 3-way control valve per loop only if the loop recirculating pump is a constant speed pump.
- C. For closed-loop hydronic systems in a building provide effective chemical water treatment to minimize effects of corrosion, scale, and other typical contaminants.
 - 1. Ion exchange softeners are not required for average makeup water tap hardness below 100 parts per million (ppm), or 5.8 grains per gallon.
- D. Pumps:
 - 1. Pumps shall be located in easily accessible areas for service.
 - 2. Do not locate pumps above the ceiling.
 - 3. Consolidate secondary loads into a minimum number of separate water circulating loops. Aggregation of equipment on such loops shall be approved in advance by the UTSW PM.
- E. Drains:
 - 1. All condensate drain lines shall be insulated to the vertical main. In exposed areas insulation shall be pre-molded. In unexposed areas the insulation can be foil wrapped.
 - 2. Provide drain valves at the low points and automatic air vents at the high points in each piping system. Use eccentric reducers in horizontal piping to maintain the top of the pipe level.
 - 3. The buried chilled water and condenser water piping shall have drain connection between a set isolation valves at its lowest point.
 - 4. Condensate drain piping – Press fittings may be allowed. Installation shall follow manufacturer instructions.
- F. Make-up water piping – Press fittings are not allowed.
- G. Accessories:
 - 1. Insulation:
 - a. Specify pre-molded fitting insulation.
 - b. Provide metal jacket on all crawl space piping, exterior insulate piping and mechanical room piping (up to 8-foot AFF) insulation.
 - c. Provide cellular glass insulation for steam and steam condensate piping.
 - d. Loose fill insulation is not allowed.
 - 2. Specify flange kits to join dissimilar metal piping.
 - 3. All manual air vents shall be plugged.
 - 4. Specify EPDM or hard Garlock gaskets.
 - a. Use EPDM gaskets in "push on" joints.
 - b. Do not specify red rubber gaskets on hot water lines and heat exchangers.

XX. Section 23 21 23 HVAC Pumps

- A. Select pumps on the ascending side of the efficiency curve. All pump motors shall be non-overloading to the end of the pump curve.
- B. Evaluate the pump system conditions to select the optimum pump type and configuration based on efficiency and pump characteristics. Where feasible, provide pumps as follows:
 - 1. Up to 50 GPM - in-line circulating pumps or close-coupled end suction pumps.
 - 2. Between 50 and 500 GPM - base-mounted end suction pumps.
 - 3. More than 500 GPM - horizontal split case, double-suction pumps.
 - 4. Larger in-line pumps may be considered for specific situations where floor space is limited. Larger vertical in-line pumps shall require approval.
- C. Pump Design:
 - 1. Select pumps that are designed to operate to 1,750 RPM unless directed otherwise.
 - 2. Select pumps that are sized for a critical speed of at least 115 percent operating speed at 60 Hz.
 - 3. Modulate water pumps 5 HP or greater with variable frequency drives.
 - 4. Select pumps that are free of flashing and cavitation at all flow rates between 25 and 125 percent of design flow under the suction conditions of the pump installation.
 - 5. Size pumps at middle of pump curve to allow for future load.
 - 6. Suction diffusers are only allowed if space constraints require their use. Provide a line size isolation valve and strainer on the pump suction piping.
 - 7. Provide a line sized, spring-loaded silent check valve and isolation valve on the pump discharge piping.
 - 8. To prevent leaks, minimize the use of flexible connectors. If needed, provide pump suction and discharge pipe flex connectors. Flex connectors shall be constructed with 304 stainless steel protective wire braided covers with flanged tie rods.
 - 9. If the pump is not redundant and the service is critical, provide a means to bypass the pump VFD.
- D. Pump Layout:
 - 1. Design pump rooms with the manufacturer's recommended clearances around the pumps. Provide clearance to enable the pump to be easily removed. Indicate the required access space around pumps for service on the drawings.
- E. Documentation:
 - 1. Detail the pipe changes off pumps using long radius reducing elbows or eccentric reducers to reduce and minimize turbulence.
 - 2. For base mounted pumps, detail the piping supports such that piping weight is not transferred to pump flanges or casing.
 - 3. Provide inline pump support details according to the pump manufacturer's instructions, with minimum supports on both sides of the pump.
 - 4. Provide straight pipe diameters at pump inlet and discharge connections according to the manufacturer's instructions.

XXI. Section 23 22 13 Steam and Steam Condensate Return Piping

- A. High and Medium pressure steam piping shall be Schedule 80 black steel piping.
- B. Low pressure steam piping shall be Schedule 80 black steel piping.
- C. Steam Condensate return piping shall be Schedule 80 black steel piping.
- D. Press fittings are not allowed on Steam and Steam Condensate return piping.
- E. All high pressure steam valves 4 inches and larger shall be piped with 1-inch equalizing line/bypass valve assembly. The equalizing bypass line shall have a line size bypass valve.
- F. The buried steam and steam condensate return lines shall have a drain connection between a set of isolation valves at its lowest point.

XXII. Section 23 23 00 Refrigerant Piping

- A. Copper Tube: ASTM B280, H58 hard drawn or O60 soft annealed.
 - 1. Fittings: ASME B16 22 wrought copper.
 - 2. Joints: Braze, AWS A5.8M/A5.8 BCuP silver/phosphorus/copper alloy.
- B. Press fittings are not allowed on refrigerant piping.

XXIII. Section 23 31 00 HVAC Ducts and Casings

- A. Design:
 - 1. Verify ALL return air paths.
 - 2. All exposed ductwork to have internal insulation and metal liner and be fabricated from paint grip metal. The use of fiberglass internal duct liner is prohibited.
 - 3. Provide hangers for all slot diffusers and insulated plenum boxes. Provide detail on drawings.
 - 4. Provide required upstream straight duct for all air flow measuring station.
 - 5. Provide air foil turning vanes in square 90° elbows.
 - 6. All large round duct to be hung with half-round saddles and rods. Cable hangers are NOT acceptable.
 - 7. Transition duct sizes gradually, not exceeding 20 degrees divergence and 30 degrees convergence.
 - 8. Connections to air devices shall be made with hard elbows. Connections between the elbow and the low-pressure branch duct shall be made with a maximum five-foot length of flexible duct with no elbows.
 - 9. Exception - where structural conditions and interference's prevent connections with hard elbows, Flex-Flow elbow supports attached to flexible duct may be used with prior approval from UTSW FM.
 - 10. Provide flexible duct connection on all rotating equipment.
 - 11. Duct sizes shown on drawings represent the inside air stream clear area. Pressure class, as defined by SMACNA, shall be clearly indicated on drawings with appropriate symbols.
 - 12. For noise-prone and/or noise-sensitive applications, provide double-wall ductwork with a perforated inner liner for a minimum of ten feet after the first elbow from both supply and return plenums of the air handling unit(s). Liner shall be 2-inch thick, tested against erosion to at least 110 percent of scheduled duct velocity, and treated with an

anti-microbial surface coating. Return air transfer ducts shall be internally lined sheet metal constructed ductwork.

13. All volume dampers shall be shown in the plans.
14. Use short radius elbows in lieu of square 90° fittings with turning vanes. It is preferred that long radius sweeps be employed where space permits.
15. There must be a minimum of three diameters of straight rigid ductwork entering terminal units. A detail will be required to emphasize this requirement to the Contractor.

B. Exhaust:

1. Exhaust branch ducts shall be sized for a velocity not to exceed 1500 Feet/Minute
2. Exhaust Grilles shall be sized for a Noise Criteria (NC) level less than 25.
3. Exhaust ducts from equipment operating with steam shall be sloped back to the equipment and drain provided for condensate return. Such ducts shall be constructed of stainless steel to avoid corrosion.
4. The general exhaust system duct shall be negative while inside the building.
5. Lab general and fume hood exhaust requirements: The UTSW OSBC and lab manager should be contacted/consulted to establish various chemicals used in the lab with emphasis on chemicals causing corrosive fumes. The use of stainless-steel ductwork for fume hood exhaust should be discussed/agreed with OSBC.
6. Laboratory fume hood exhaust duct shall be minimum 18-gauge 304 stainless steel made airtight with continuous external weld for all seams and joints. All exposed ductwork and fittings below ceiling shall be 316 stainless-steel.
7. Dishwasher and Autoclave wet exhaust duct shall be minimum 18-gauge 304 stainless steel made liquid tight with continuous external weld for all seams and joints. Provide low point drain pocket with 1 inch drain connection and provide access door for inspection and cleaning. All exposed ductwork and fittings below ceiling shall be 316 stainless-steel.
8. Grease exhaust duct shall be carbon steel not less than 0.054 inch (18 gauge) thick fabricated as required by NFPA 96. All joints shall have liquid tight continuous external welds. Install cleanout doors at each change of direction and in straight sections every 20 feet. Paint exterior ductwork with paint and primer in accordance with NFPA 96 paragraph 4-6.2.
9. In-line exhaust fans are prohibited in the general exhaust system inside the building. However, under certain circumstances exhaust fans mounted directly under the roof are permitted provided that the total discharge duct length does not exceed 5 feet inside the building, and the duct connections are welded.

C. Accessories:

1. All spin-ins shall be of the conical type with damper shaft mounted horizontally.
2. All grilles shall be regulated by a volume damper, when possible, in lieu of an OBD.
3. All metal components on galvanized sheet metal ducts shall be galvanized materials such as angle stiffeners. Trapeze hangers, rods, straps, etc.
4. Provide hinged access doors for duct access.
5. Provide cover plates with appropriate finish for all recessed damper operators.
6. Use fiberglass and Benjamin Foster sealant with fiberglass mat embedded in sealant.
7. Foil backed tape on ducts is not permitted.

8. All exterior duct insulation shall have a vapor seal and metal jacket applied with fiberglass mesh installed and resealed with vapor barrier sealer.

XXIV. Section 23 33 00 Ductwork Accessories

- A. Design Professional shall specify accessories appropriate to the design pressures for long-term performance.
- B. Medium- to high-pressure duct access doors with 2-part systems shall be specified for medium- to high-pressure installations. Design Professional to confirm correct products are submitted and installed.
 1. Refer to specifications for acceptable units.
 2. Design Professional to ensure submittals for all accessory types are reviewed for compliance.
 3. Design Professional to review installed accessories to ensure compliance during construction.
- C. Access panels for fire dampers shall be located next to the fire damper collar, not to exceed 10-inches for required access and maintenance.
- D. Design Professional shall follow NFPA 90A for the design and locations of fire dampers.

XXV. Section 23 35 00 Special Exhaust Systems

- A. Lab Exhaust Design
 1. Chemical fume hood exhaust ducts shall be sized for a velocity not to exceed 1500 Feet/Minute
 2. Low flow alarms required for each hood shall be remotely monitored at CDAS.
 3. All efforts shall be made to select direct drive fans as opposed to belt driven.
 4. Provide scaffolding and means to lift sections of the fans off to allow servicing.
 5. For establishing room balance, the hood exhaust shall be calculated based on a face velocity of 110 feet/minute at a sash position of 16 inches. However, the exhaust ducting shall be sized based on 110 feet/minute with the sash wide open.
 6. General area exhaust shall be provided in those cases where the room exhaust requirements exceed fume hood exhaust.
 7. The area exhaust grilles shall be placed to provide a uniform exhaust flow rather than bias the flow to one area of the room.
 8. Makeup air for exhaust hoods shall be located so as not direct air into face of the hood.
- B. Biological Safety Cabinets:
 1. Biological Safety Cabinets (BSC) shall not exhaust into the general exhaust system.
 2. If exhaust is required, a dedicated exhaust system shall be constructed. Ducts shall be sized for a velocity not to exceed 1500 Feet/Minute
 3. The BSC exhaust duct shall be negative while inside the building.
- C. Quench Vent Exhaust Systems:
 1. MRI Quench vent exhaust shall be coordinated with MRI equipment manufacturer's requirements.

XXVI. Section 23 36 00 Air Terminal Devices

- A. Clearly document on the drawings for all dual and single duct boxes used in laboratories or medical service to meet UTSW Specification requirements.
- B. Mixing Box Vendors: UTSW has developed a specification for medical grade mixing boxes, and has qualified the following suppliers through testing:
 - 1. Titus
 - 2. Metalaire
 - 3. Greenheck
- C. Refer to specification Section 23 36 00 "Air Terminal Devices" for mixing box construction.
- D. VAV Mixing Box Controls:
 - 1. All terminal boxes shall have a control transformer and be powered by individual electrical supply.
 - a. Central control transformers with 24V runs to terminal boxes is unacceptable.
 - 2. UTSW dual duct mixing boxes are normally set to constant volume with the mixed air temperature varied to maintain space temperature.
 - 3. When a constant volume double duct box is required, it will be specifically called out on the schedules.
 - 4. All dual or single duct boxes that are to be re-used shall be retrofitted with DDC Controls.
 - 5. Dual duct boxes require factory installed flow crosses on the hot and cold inlets and no flow cross on the discharge.
 - a. UTSW personnel normally install mixing box controls in the field. Therefore, factory controls are not normally specified.
 - b. Controls shall be confirmed for each project and have appropriate specifications to ensure the project meets design criteria.
- E. The VAV Terminals with hot water reheat coils serving Animal Resource Center (A.R.C.) should maintain the Entering Water Temperature (EWT) of 120°F min/150°F max to avoid nuisance high temperature alarm from the AMWS Controls when hot terminal air hits the AMWS room sensors located at higher wall elevation.
- F. The VAV terminals for reheat service would be equipped with either hot water or electric heating coils.
 - 1. The electric heating coil shall be open-coil design, 80/20 nickel-chrome heating element, magnetic contactor step controller, SCR controller and airflow switch
- G. Locations
 - 1. VAV dual duct boxes shall be centered over the lab peninsulas with the control box readily accessible without having to move lab equipment off the countertop.
 - 2. Mixing boxes shall be situated in offices so that they are readily accessible without having to move heavy furniture. Corridors and doorways are preferred locations.
 - 3. A minimum of 24-inches of clear space is needed in order to access the controls.
 - 4. For dual duct boxes, 24-inches clearance is needed on both sides.
 - 5. The design engineer shall coordinate the HVAC, plumbing, electrical, and fire protection drawings to ensure that the control access to the VAV box is not hampered.

H. VAV Box Sizing:

1. UTSW does a considerable amount of renovation and subsequent relocation of VAV boxes and diffusers. This requires us to implement a standardized VAV sizing system, which has the benefits of capacity, flexibility, controllability, and simplified installation.
2. UTSW uses 8-inch, 10-inch, and 12-inch single and dual duct boxes for all new construction and renovation work. Any larger capacity requirements shall use two boxes slaved together or independent zone control. A 6-inch box is used in some circumstances but is generally not desired.
3. VAV mixing boxes in sizes 14-inch or 16-inch are acceptable only under special circumstances and must be submitted to UTSW PM for review with UTSW FM for approval prior to incorporation in the design.
4. The minimum CFM guidelines noted in **Figure 23-3 Mixing Box Size – Minimum CFM Guidelines** shall be used for selection of mixing box size.
5. Each lab (wet, dry, or tissue culture shall have dedicated VAV mixing box(s).

Figure 23-3 Mixing Box Size - Minimum CFM Guidelines: This table identifies the mixing box size in inches with the air volume in CFM.

Mixing Box Size (in inches)	Minimum Air Volume (in CFM)
6	400
8	700
10	1,100
12	1,600

XXVII. Section 23 37 13 Diffusers and Dampers

- A. Diffusers shall be selected based on a Noise Criteria (NC) level less than 25.
- B. Standard diffuser throat sizes are 8-inch, 10-inch, 12-inch, and 14-inch diameter.
 1. Diffuser throat sizes smaller than 8-inches are unacceptable.
 2. Any proposed conditions must be documented then proposed to UTSW PM for review with UTSW FM for approval.
- C. Dampers:
 1. Balancing dampers shall be located in each branch duct and located no closer than 3 feet from the diffuser throat.
 2. All dampers shall be shown in the plans.
 3. Power-actuated dampers (including smoke dampers) are normally equipped with a 24-volt electric actuator.
 4. Damper actuators for make-up air and/or exhaust (general and hood) serving variable volume labs, shall be pneumatic for acceptable room pressure control recovery time with volume change.

XXVIII. Section 23 41 00 Air Filters

- A. All air conditioner intakes shall have 2-inch-thick Merv 11 pre-filter and a bag type Merv 15 final filters for the building air handlers.
 - 1. HEPA filters are also used downstream of the air conditioner fan for all animal research facilities.
- B. Pre-Filters:
 - 1. Indicate a 1-inch-thick pre-filter in all animal room exhaust grilles to contain animal hair.
 - 2. Indicate a 1-inch-thick pre-filter in fly room exhaust grilles to prevent inadvertent release of species.
 - 3. Indicate a Merv 11 pre-filter on all heat recovery coils.
- C. HEPA filters are used on exhaust for all experiments using radioactive isotope. HEPA filters to be tested every six months as required by OSBC.

XXIX. Section 23 50 00 Central Heating Equipment

- A. Refer to Volume 3 for Codes and Standards
- B. For any projects that add or modify boilers, the UTSW emissions consultant must review the plans to determine additional requirements. Refer to **EXHIBIT 23.4 Boiler Emission Requirements** for guidelines.
- C. UTSW utilizes multiply types of boilers on campus.
 - 1. Condensing boilers shall have stainless steel heat exchangers.

XXX. Section 23 60 00 Central Cooling Equipment

- A. Requirements for new cooling towers shall be directed and approved by the UTSW Utilities Team.
 - 1. Replacement or renovation projects shall match the characteristics of the existing unit.
 - 2. New unit requirements shall consider initial cost, lead times, and replacement cost.
 - 3. All metal components to be a minimum of 304 stainless steel for outdoor units.
- B. Follow City requirements for deduct meter processes.

XXXI. Section 23 73 00 Indoor Air-Handling Units

- A. General Design:
 - 1. Mechanical rooms must be large enough to allow for air handling unit coil pull space and full space service clearance around the unit for filter replacement and to accommodate both major and minor repairs.
 - a. A minimum clearance of 3 feet must be planned around the unit with additional space at the heating and cooling coil pull locations.
 - b. Indicate the designated coil pull and maintenance clearance space on the Drawings.
 - 2. Schedule the minimum and maximum water, air flow rates, fan horsepower, entering and leaving coil water, and air temperatures, MBTUs, water and air pressure drops, and physical parameters of the coils for each air handling unit.

3. When one or more AHU are connected, controlled isolation dampers shall be provided to allow repairs while other fans remain in operation.
- B. Fans:
1. Implement supply fan static pressure set point reset per ASHRAE 90.1 (latest state adopted version).
 2. Each air handling unit fan equipped with a fan motor size 2-horsepower and above shall be provided with a variable frequency drive (VFD). The high efficiency fan motor shall be compatible with VFD applications, which is controlled by the supply duct static design pressure set point.
 3. Air handling units shall not contain individual motors larger than 10 HP.
 4. Air handling unit fans shall have an efficiency rating where the ratio of the fan system power to the supply fan airflow rate (main fan) of each HVAC system at design conditions shall not exceed the allowable fan system power indicated in the latest state adopted version of ASHRAE Standard 90.1.
 5. Fan arrays are acceptable to use on air handling units and energy recovery units (ERU's) unless noted otherwise by Owner.
 - a. UTSW preference is to provide a fan array with at least one redundant fan. The ideal case would be 100 percent redundant fan cubes served by two independent VFDs.
 - b. Each fan cube shall have a gravity backdraft damper.
 6. Provide factory installed motor removal rail system.
- C. Access doors (or panels) on air handling unit sections:
1. Access doors shall always open against the positive side of the door and shall not be blocked by internal filter casings or internal equipment components.
 2. Design Professional shall specify access doors that will provide long-term performance according to the pressures designed. Refer to section 23 33 00 "Ductwork Accessories."
 3. Micro switches or safety switch interlocks need to be provided at access doors or panels to protect maintenance personnel from possible injuries from rotating or electrical equipment components inside the air handlers.
- D. The use of permanent affixed ladders, stairs, guard rails, and walkways shall be evaluated on all air handling units to provide safe access to components, filters, instruments, damper actuators, and switches.
1. All access shall include OSHA compliant, non-skid treads from the exit of the accessible compartment to the general walkway.
 - a. Design of access shall take into account utility piping directly in the path of maintenance and operations personnel as well as elevation changes between the base floor height of the AHU and the surface directly outside the entry doors of the AHU.
- E. Design Professional shall coordinate the locations of wall-mounted room temperature sensors with furniture and equipment so that sensor locations do not conflict with tall items of furniture or equipment.
- F. Coils:
1. If chilled water is used as the cooling medium, the Design Professional needs to acquire the supply water temperature at the site where the coil will be used. Similarly,

- if hot water is used as the heating medium, the Design Professional needs to acquire system temperature at the site where the coil will be used. Confirm with UTSW PM.
2. Maximum differential pressure across the air side of the cooling coil shall not exceed 0.7-inch w.g.
 3. Maximum cooling coil discharge face velocity shall not exceed 425 fpm in variable air volume (VAV) applications and 375 fpm in constant air volume (CAV) applications. Heating coil discharge face velocity shall not exceed 700 fpm.
 4. Pipe spool connections at the coils must be bolted flange connections to allow the coils to be pulled and installed without having to remove the control valves.

XXXII. Section 23 82 19 Fan Coil Units

- A. The limitations of fan-coil units with regards to latent loads associated with simply providing adequate ventilation for occupancies make them unsuitable as the only means of cooling and dehumidification in most locations and for most occupancies, unless a dedicated, 100 percent outdoor air handling unit is provided when fan coil units are used. The dedicated outdoor air handling unit shall supply conditioned air to occupied spaces by fully ducted air distribution system.
- B. Where fan coil units are the only option, the system design shall be based on 4-pipe configuration, capable of providing on-demand heating or cooling. Fan coil units can be used in vertical, floor-mounted or in horizontal, ceiling-suspended (recessed or concealed) configuration with supply and return air ductwork as required. Vertical units are generally located under windows to control cold drafts and solar radiation.
- C. Generally, the use of 4-pipe fan coil systems shall be limited to serve perimeter spaces only. Use of fan coil units for interior spaces shall be carefully evaluated on a case-by-case basis.
- D. Design the cooling coil condensate piping to remove condensate without clogging the drain pan and drain lines. Provide insulated drain pans and condensate drain piping. Minimize the extent of horizontal runs and provide cleanouts at each turn in the direction of flow. Pitch the drain line in the direction of flow to facilitate flow by gravity.
- E. Unit filters must be accessible to allow for required filter changes. Filters may be located in return grilles, if applicable.
 1. Unit filtration shall meet the minimum filtration requirements listed in the room data sheets for spaces being served.
- F. Select fan coil units to deliver the required capacity at mid-speed. Provide sound attenuation as required to achieve desired space noise level. Special attention should be paid to ceiling- suspended fan coils. Refer to Volume 3 for acoustical requirements.
- G. 4-pipe fan coil units shall be equipped with separate cooling and heating coils. Provide a modulating control valve for each coil to operate the cooling and heating modes in sequence. The use of two- or three-way control valves shall be coordinated with the facility to match their existing system DDC controls shall be used, where proven cost-effective. For new construction and major renovation, 2-way control valves with a modulating pump speed shall be utilized. All hangers shall be hot dipped galvanized in the crawl space and wet areas and cad plated otherwise.
- H. All ball valves shall be two-piece threaded 600 with stainless steel ball and stem.

- I. All gate valves to be rising stem.

XXXIII. Exhibit 23.4 Boiler Emission Requirements.

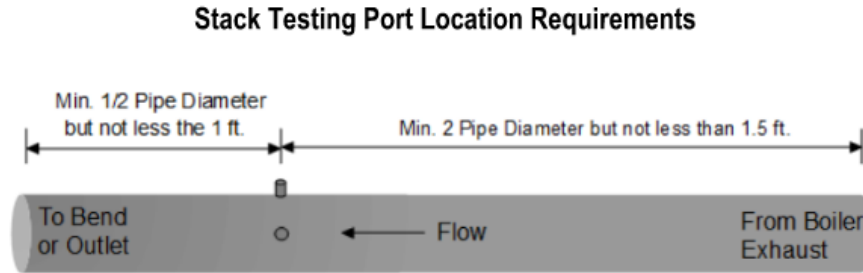
- A. The information in this exhibit is intended to serve as a guideline for Design Professionals.
 - 1. Regulatory References:
 - a. DFW Chapter 117 applicability, exemptions and emission limits - 30 TAC §117.400 - §117.410
 - b. Initial demonstration of compliance - 30 TAC §117.435
 - c. Continuous demonstration of compliance - 30 TAC §117.440
 - d. Reporting, recordkeeping and notifications - 30 TAC §117.445
 - e. Compliance stack testing and report requirements - 30 TAC §117.8000 and §117.8010
 - f. Emissions monitoring – 30 TAC §117.8100, §117.8120, and §117.8130
 - g. Federal NSPS Boilers - 40 CFR Part 60, Subparts A and Dc
 - h. New Source Review Authorizations – PBR: 30 TAC §106.183, Standard permit: 30 TAC Chapter 116, Nonattainment NSR Authorization: 30 TAC §§116.150–152, 30 TAC §116.615
 - i. Title V Authorization – 30 TAC Chapter 122; 40 CFR 70
- B. Natural Gas-Fired Hot Water and Steam Boiler Design Phase – Air Quality Compliance
 - 1. ≤ 2.0 MMBtu/hour Maximum Design/Rated Heat Input Capacity.
 - a. Federal Air Quality Regulations – Not Applicable, presumes no diesel fuel/fuel oil used as backup-fuel. Reference: 40 CFR, 60.40c(a)
 - b. State Emission Limits – Not Applicable, Less than or equal to 2.0 MMBtu/hr. Reference: 30 TAC, 117.403(a)(1)(A)
 - c. Meters – Not Required, Less than or equal to 2.0 MMBtu/hr. Reference: 30 TAS 117.403(a)(1)(A)
 - d. Emissions Monitoring – Not Required, Less than or equal to 2.0 MMBtu/hr. Reference: 30 TAS 117.403(a)(1)(A)
 - e. Stack Testing – Not Required, Less than or equal to 2.0 MMBtu/hr. Reference: 30 TAS 117.403(a)(1)(A)
 - f. New Source Review (NSR) Authorization – Permit by Rule; No registration required, Greater than or equal to 2.1 MMBtu/hr. Reference: 30 TAC 106.183
 - g. Nonattainment NSR (NNSR) Authorization – Case-by-case assessment; Project NOx emissions must be < 5 TPY; May require APD-CERT, Less than 10 MMBtu/hr. Reference 30 TAC 116.150 – 152, 30 TAC 116.615
 - h. Title V Authorization – Case-by-case assessment. May warrant off-permit notification, especially if not included within currently permitted boiler groups, Less than 10 MMBtu/hr. Reference: 30 TAC 122, 40 CFR Part 70
 - 2. 2.1 to < 10 MMBtu/hour Maximum Design/Rated Heat Input Capacity
 - a. Federal Regulatory Applicability – Not Applicable, presumes no diesel fuel/fuel oil used as backup-fuel. Reference: 40 CFR, 60.40c(a)
 - b. State Emissions Limits – NOx Limit = 0.036 lb/MMBtu (30 ppmvd at 3 percent O₂); CO Limit = 400 ppmvd at 3 percent O₂. Less than or equal to 2.0 MMBtu/hr. Reference: 30 TAC, 117.410(c)(1)

- c. Meters – Fuel Use, totalizing flow meter (monthly records). Less than or equal to 2.0 MMBtu/hr. Reference: 30 TAC 117.440 (a)
 - d. Emissions Monitoring – Nox and CO, quarterly, portable analyzer. Less than or equal to 2.0 MMBtu/hr. Reference: Periodic Monitoring option 30 TAC, 117.430 (b)
 - e. Stack Testing – Required within 60 days of first fire, Notification due 15 days before testing, Report due within 60 days of testing. Greater than or equal to 2.1 MMBtu/hr. Reference: 30 TAC 117.435 (a) (30 TAC (c)(1))
 - f. NSR Authorization – Permit by Rule; No registration required. Less than 10 MMBtu/hr. Reference: 30 TAC 106.183
 - g. NNSR Authorization – Project NOx emissions must be < 5 TPY; May require APD-CERT. 100 MMBtu/hr or less, but greater than or equal to 10 MMBtu/hr. Reference 30 TAC 116.150 – 152, 30 TAC 116.615
 - h. Title V Authorization – Case-by-case, may warrant off-permit notification. 100 MMBtu/hr or less, but greater than or equal to 10 MMBtu/hr. Reference: 30 TAC 122, 40 CFR Part 70
3. ≥ 10 to 40 MMBtu /hour Maximum Design/Rated Heat Input Capacity
- a. Federal Regulatory Applicability – Requires Notifications, for less than 10 MMBtu/hr. at:
 - i. Date construction is commenced (initial + 45-day interruptions), postmarked ≤ 15 days after.
 - ii. Date construction complete postmarked within 15 days after.
 - iii. Date of initial startup submitted prior to, with time that allows regional rep to be present.
 - iv. Reference: Federal: 40 CFR 60.7 (a)(1)-(3), 60.48c(a); State: If standard permit, 30 TAC 116.615(4)
 - b. State Emissions Limits - NOx Limit = 0.036 lb/MMBtu (30 ppmvd at 3 percent O₂); CO Limit = 400 ppm at 3 percent O₂, greater than or equal to 2.1 to less than 40 MMBtu/hr. Reference: 30 TAC, 117.410(c)(1)
 - c. Meters – Meter required to measure fuel use totalizing flow meter; monthly records required, greater than or equal to 2.1 to less than 40 MMBtu/hr. Reference: 30 TAC 117.440 (a)
 - d. Emissions Monitoring – Nox and CO (quarterly, portable analyzer), greater than or equal to 2.1 to less than 40 MMBtu/hr. Reference: Periodic Monitoring option 30 TAC, 117.430 (b)
 - e. Stack Testing – Required within 60 days of first fire, greater than or equal to 2.1 MMBtu/hr. Reference: 30 TAC 117.435 (a) (30 TAC (c)(1))
 - i. Notification due 15 days before testing.
 - ii. Report due within 60 days of testing.
 - f. NSR Authorization – Permit by Rule; No registration required, less than or equal to 40 MMBtu/hr. Reference: 30 TAC 106.183
 - g. NNSR Authorization – Project NOx emissions must be < 5 TPY; May require APD-CERT, potentially applicable to all heat input capacities. Reference 30 TAC 116.150 – 152, 30 TAC 116.615

- h. Title V Authorization – Case-by-case; may warrant off-permit notification.
Reference: 30 TAC 122, 40 CFR Part 70
- 4. 40 to 100 MMBtu /hour Maximum Design/Rated Heat Input Capacity
 - a. Federal Regulatory Applicability – Requires Notifications a
 - i. Date construction commenced (initial + 45-day interruptions) postmarked within ≤ 15 days after.
 - ii. Date of construction complete postmarked 15 days after.
 - iii. Date of initial startup submitted prior to, with time that allows regional rep to be present.
 - iv. Reference: Federal: 40 CFR 60.7 (a)(1)-(3), 60.48c(a); State: If standard permit, 30 TAC 116.615(4)
 - b. State Emissions Limits – NO_x Limit = 0.01 lb/MMBtu (9 ppmvd at 3 percent O₂); CO Limit = 50 ppmvd at 3 percent O₂, greater than or equal to 2.1 to less than 40 MMBtu/hr. Reference: TCEQ BACT / Standard permit for boilers (30 TAC 116.111 and related NSR requirements)
 - c. Meters – Meter required to measure the following, greater than or equal to 2.1 to less than 40 MMBtu/hr. Reference: 30 TAC 117.440(a), 30 TAC 117.445(f)(2)(A)
 - i. Fuel use, totalizing flow meter, hourly records required.
 - ii. Hours of operation.
 - d. Emissions Monitoring – Monitors required to measure the following, Greater than or equal to 2.1 to less than 40 MMBtu/hr. Reference 30 TAC 117.440, with related requirements in 117.430, 117.435, and 117.445
 - i. Stack oxygen, hourly records required;
 - ii. NO_x and CO (parametric measurements based on stack oxygen and fuel flow); hourly records required.
 - e. Stack Testing – Required within 60 days of first fire, Greater than or equal to 2.1 MMBtu/hr. Reference: 30 TAC 117.435 (a) (30 TAC (c)(1)
 - i. Notification due 15 days before testing,
 - ii. Report due within 60 days of testing.
 - f. NSR Authorization – Registered under one of the following, Less than or equal to 40 MMBtu/hr. Reference 30 TAC Chapter 116
 - i. Standard Permit for boilers,
 - ii. Individual NSR permit.
 - g. NNSR Authorization – Project NO_x emissions must be < 5 TPY (may require APD-CERT for sources not included in above permits), Potentially applicable to all heat input capacities. Reference 30 TAC 116.150 – 152, 30 TAC 116.615
 - h. Title V Authorization – Case by case, may warrant off-permit notification.
Reference: 30 TAC 122, 40 CFR Part 70
- C. Stack Testing Port Location Requirements:
 - 1. Gas sample ports may be constructed by welding a 1/2- to 1-inch collar or threadolet on the exhaust pipe and closing it off with a bull plug. Alternately use a 1- by 6-inch pipe nipple, closed with a pipe cap.
 - 2. Threaded connections should be made hand tight only and threads should be coated with high temperature anti-seize compound. There should be no obstructions within 2 pipe diameters of the direction pointed by the port.

3. 2 ports are needed at 90 degrees from each other

Figure 23.4-1 – Stack Testing Port Diagram: This diagram shows an example of a stack with a testing port location noted. From the bend or outlet side, this distance is a minimum of half the pipe diameter but not less than 1 foot. From the boiler exhaust, the distance is a minimum of 2 pipe diameters but not less than 1.5 feet. The direction of flow moves from the boiler exhaust towards the bend or outlet.



DIVISION 25 00 00 – INTEGRATED AUTOMATION

I. General Information

- A. The Facilities Utilities group manages the various building automation systems on campus for power and HVAC systems.

II. Design Review Submittal Requirements

- A. Refer to Volume 3 – Deliverable Requirements.

III. Automatic Temperature Controls

- A. Provide a temperature control/energy management system and control function for the entire building.
 - 1. The system shall include a standalone, Direct Digital Control (DDC) System.
 - 2. This system shall communicate with the Central Building Automation System (BAS) at the Facilities Services Department through an Ethernet card and the campus instrumentation control distribution wiring system.
- B. The BAS/Automatic Temperature Control (ATC) system must be compatible with the existing campus system.
 - 1. Systems or building components to be monitored and/or controlled by the campus systems include, but are not limited to, the following: temperature control, temperature, and humidity control of and the start and stop of major equipment.
 - 2. The monitoring of specific mechanical equipment and systems will be dependent on the recommendations of UTSW Facilities Department.
- C. Provide metering of utilities with indication and totalization capabilities.

IV. Building Automation System

- A. Provide a stand-alone direct digital control (DDC) system for space conditioning in campus buildings connected to the central campus BAS system.
- B. During the design development and construction documents phase, consult with the respective controls firm in order to determine the number of DDC Panels required and the location for each panel.
- C. The panel locations shall be shown on the detailed design drawings.

V. DDC System Manufacturer

- A. UTSW currently uses Siemens Building Technologies, Inc.

VI. FM Capital Projects

- A. FM capital projects in existing buildings shall extend and/or upgrade existing DDC control systems to control renovated areas.
- B. On off-campus locations, type of controls shall be as required in the Program of Requirements or as directed by UTSW PM. At a minimum, these locations shall have a means for night, weekend, and holiday setback.

DIVISION 26 00 00 – ELECTRICAL

I. General Information

- A. Electrical design for UTSW projects shall include requirements documented both in the UTSW Design Guidelines and the UTSW Master Specifications. Specification sections such as Section 26 00 00 – Basic Electrical Requirements, 26 00 10 - Electrical Design Requirements, and 26 05 00 - Basic Electrical Materials and Methods Requirements include critical design requirements that must be included for each project.
- B. All current carrying conductors shall be 95 percent conductivity copper. This includes primary cable, building wire, signal, communication and control wire, panel buses, switchgear and switchboard buses, and bus duct.
- C. Design Professional to confirm with UTSW PM any service outages and if that needs to be coordinated in the Contract Documents.
- D. Where power is critical or back-up power is required, electrical design shall provide diversity of power services/sources for building mechanical, electrical, and plumbing equipment. Ensure a panel failure does not result in all equipment going down.
- E. Main electrical switch gear shall be in a separate room and avoid liquid conveying pipes above the gear.
 - 1. Where such an arrangement is not possible, consult UTSW.
- F. Emergency Power:
 - 1. Confirm requirements per project with UTSW PM, User, Building Maintenance, Utilities, Access Control, and other team members.
 - a. Equipment requiring emergency power could include but is not limited to chillers, heaters, elevators, pumps, air handling units, and project specific equipment.
 - 2. Indicate the required number of auxiliary contacts to control all equipment.
- G. Confirm access requirements for WIFI access for all electrical spaces.
- H. For A.R.C. special requirements, refer to Volume 1, Section A1.
- I. UTSW preference is to provide disconnecting means for individual hard-wired equipment at readily accessible or accessible locations per code.

II. Design Review Submittal Requirements

- A. Refer to Volume 3 – Deliverable Requirements.

III. Utilization Voltages

- A. Voltages, generally, shall be as follows, unless determined differently by design team with UTSW PM and FM for approval:
 - 1. 4160 volts, 3 phase for motors 300 HP and larger.
 - 2. 480 volts, 3 phase for motors 1/2 HP and larger.
 - 3. 120 volts for motors 1/2 HP and smaller.
 - 4. 120 volts, 1 phase, for individual task lighting.
 - 5. 120 volts, 1 phase, for convenience outlets and specific equipment loads.
 - 6. 277 volts, 1 phase, for LED lighting.

7. 277 or 480 volts, 1 phase smaller space heating applications, and as required for special purpose outlets.
- B. The mixing of voltages in junction boxes and raceway is not permitted in UTSW facilities and goes beyond NEC 300 5(C)(1) Code.

IV. Section 26 00 10 UTSW Electrical Design Requirements

- A. Project Engineer shall utilize UTSW specification section for campus design requirements per project.

V. Section 26 05 01 Electrical Demolition

- A. Project Engineer shall utilize the associated specification section for all remodel projects.
- B. Coordinate requirements in this section with existing conditions identified in the project scope.
 1. Panelboards and luminaries to remain, shall be documented to be repaired and cleaned as indicated in article "Cleaning and Repair."

VI. Section 26 05 13 Single Conductor Medium-Voltage Cables

- A. Primary cable 5 KV and 15 KV shall be ethylene propylene insulated to 133 percent voltage level. Systems are to be grounded neutral with the extra thickness as a safety factor.
 1. Primary cables shall have copper conductors and copper shielding.
 2. Coordinate with the MV distribution system is fed from the 13.8 kV substation located on Inwood at the railroad tracks.
 3. MV distribution equipment and breakers shall be metal-clad-roll-out type.
 4. Warranties shall be indicated separately from the manufacturer and the contractor.
 5. Cable and equipment testing shall conform to manufacturer's specifications and relevant standards.
 6. Coordinate with FM Utilities for underground cabling.
- B. The characteristics of the primary power service shall be determined specifically for the campus involved and for the particular location on the campus.
- C. In general, each major building shall have two underground primary feeders terminating in a double ended sub-station. This does not apply to all campuses and shall be confirmed in programming during design criteria gathering.

VII. Section 26 05 19 Building Wire Cable and Connectors (600V and Below)

- A. Electrical conductors rated less than 1,000 volts shall be stranded and insulation rated for THHN/THWN or RHH/RHW as appropriate for installations in areas with normal operating temperatures. Conductor terminations for ratings of 100 amps or less and in sizes No. 1 AWG and less shall use the 60-degree F column of Table 310.15(B)(16) to comply with 110.14(C).
- B. Splices shall be by one of these methods:

1. Terminals rated for the amperage of the conductor or more.
2. Devices designed to screw onto the conductor with an internal spring.
3. Polaris type terminals that have factory applied insulation.
4. Split-bolt devices shall not be used.
5. Plug-in type splices shall not be used.

VIII. Section 26 05 33 Conduits and Boxes

- A. Floor Mounted Wireway for Communications and Power Systems:
 1. All floor low voltage wiring and communication cable protectors shall be aluminum finish and factory devices per plans unless noted otherwise by the UTSW PM.
 2. A removable wireway cap along the entire length of the floor protector shall be provided to allow for easy access to the wireway channel. Provide trim accessories to hide openings in wall, were applicable.
 3. Floor mounted wireways shall be Connectrac or UTSW approved equivalent.
 - a. For installations with hard flooring, such as LVT, wireways shall be mounted on top of the flooring with sloped sides to ensure TDLR compliance.
 - b. For installations with carpet flooring, surface wireways shall be mounted to concrete floors, underneath the carpet.
 - c. Wireways mounted in areas with carpet may be installed under carpet tiles or may have the removable cover exposed, sides and edges shall be tapered to ensure TDLR compliance.

IX. Section 26 09 23 Networked Lighting and Automatic Receptacle Control System

- A. UTSW has various existing types and levels of lighting controls throughout campus. For each project, the Design Professional shall confirm the lighting control requirements for the building, the user groups, and the space utilization.
- B. Lighting control systems shall comply with applicable code requirements including IECC, SECO, and energy efficiency goals. Off-campus locations shall follow the local AHJ.
- C. UTSW has implemented a campus standard for Networked Lighting Controls to ensure code compliance, energy efficiency, and to streamline management.
 1. In renovation projects over \$50,000 and in Capital Improvement Projects (CIP), a networked lighting controls system shall be provided in accordance with Section 26 09 23 "Networked Lighting Control System" of the UTSW Specification and the UTSW Design Guidelines.
 2. For existing buildings without the new lighting control system, the Design Professional shall work with the UTSW PM and UTSW FM to locate space for the new controller and ensure a connection to the UTSW Network is provided.
- D. Wireless systems and embedded fixtures may be considered with written approval from UTSW FM, IR / Wireless Group, and UTSW Electrical Shop.
 1. Wireless components shall not interfere with UTSW Wireless Network.
- E. Occupancy time delays before dimming or shutting off shall be factory set at 20 minutes unless otherwise required to meet energy code requirements. Ceiling mounted room occupancy sensors are preferred.

- F. Networked graphic wall stations shall be used at select space types such as auditoriums, training spaces, or large classrooms. Design Professional shall coordinate with user group requirements and include the scope in the contract documents.
- G. Power packs shall be group mounted wherever possible and located within 1-foot of doors, above the ceilings.
 - 1. All power packs placed above the ceiling for lighting controls shall be indicated by a ceiling label per UTSW specification Section 26 05 53 Electrical Identification.
- H. Relays shall be located in serviceable locations within electrical closets, mounted between 18 inches and 60 inches AFF. For existing electrical closets without adequate space, TR closets may be utilized.
- I. Refer to **EXHIBIT 26.2 Lighting Control Matrix** which indicates the preferred Sequence of Operation by space type.
 - 1. The Design Professional shall use this as the starting point for lighting controls discussion per project.
 - 2. Any deviations from this shall be approved in writing by the UTSW PM and Design Team.
- J. Starting at the earliest design phase, the Design Professional shall provide a lighting controls Sequence of Operation (SOO) or Narrative that describes the needs of each space type, amount of operability, system type, and the level of integration.
 - 1. This shall be revised at each design phase and a final version provided within the IFC package.
 - 2. Refer to Volume 3 to confirm the deliverable requirements per project type.
- K. Preinstallation meetings are required with the selected Lighting Controls Product vendor to ensure coordination of room level sequence of operations and overall system requirements.
- L. Automatic Receptacle Control System:
 - 1. Confirm compliance with current IECC code per project. Where required, provide a minimum of 50 percent automatic controls for power receptacles in the following spaces: enclosed offices, conference rooms, copy/print rooms, breakrooms, classrooms, individual workstations.
 - 2. Ensure allowed exceptions are integrated, such as automatic controls not required for continuously operated equipment, or where usage would negatively impact security or life safety.
 - 3. UTSW preference is to provide ceiling mounted occupancy sensors.
 - 4. Provide permanently engraved receptacles at each automatic control location showing the universally recognized power symbol and the word "controlled".
 - 5. Follow UTSW preferences for duplex and quadplex installations at workstations as well as cubicle installations. Refer to **Figures 26 09 23-01 through 04.**

Figure 26 09 23-01 – Standard Automatically Controlled Duplex Outlet. This sketch shows a standard automatically controlled duplex faceplate with the top receptacle marked with the word “controlled” and the power symbol. This would be seen in a space such as a breakroom or copy room.

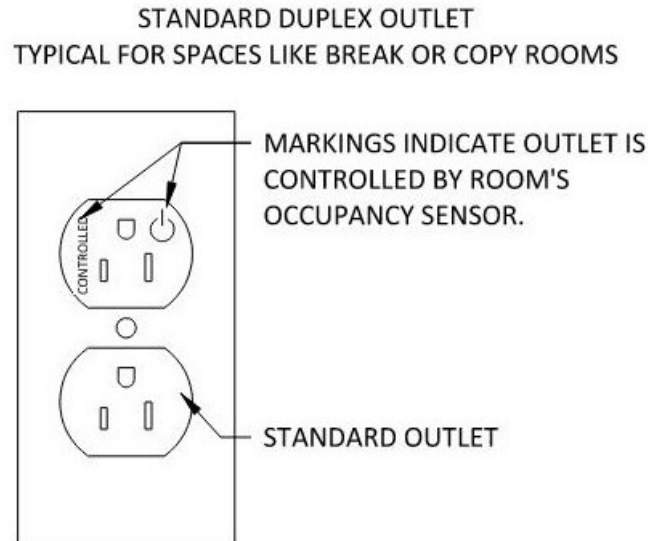


Figure 26 09 23-02 – Standard Automatically Controlled Quadplex Outlet. This sketch shows a standard automatically controlled quadplex faceplate with the left two receptacles marked with the word “controlled” and the power symbol. This would be seen in an office, at a desk location.

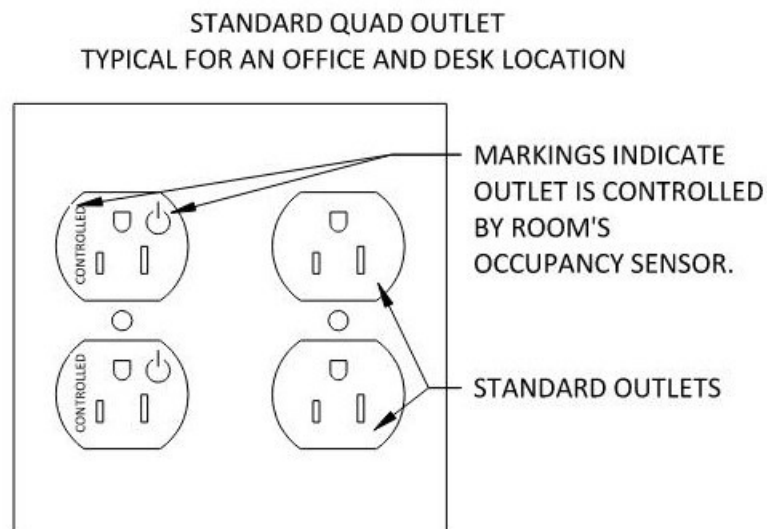


Figure 26 09 23-03 – Standard Cubicle Duplex Outlet. This sketch shows a standard cubicle duplex faceplate without any automatic controls. The outlet could be labeled with an “A” or “B”.

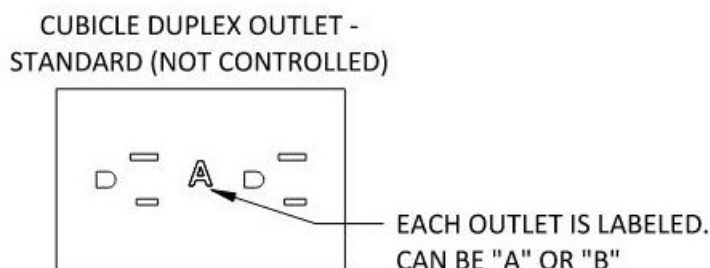
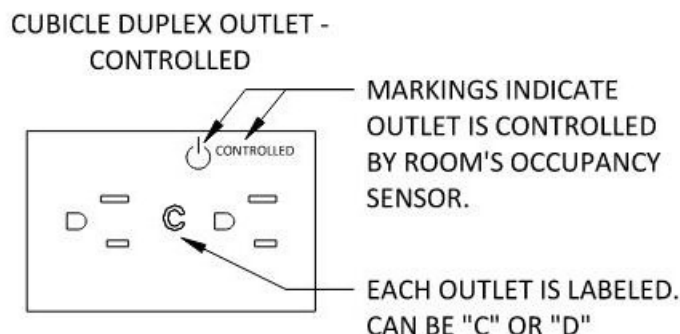


Figure 26 09 23-04 – Standard Cubicle Automatically Controlled Duplex Outlet. This sketch shows a standard cubicle automatically controlled duplex faceplate. Both receptacles are automatically controlled. The faceplate is marked with the word “controlled” and the power symbol. The outlet could be labeled with a “C” or “D”.



X. Section 26 10 00 Medium-Voltage Electrical Distribution

A. General:

1. UTSW has a Medium Voltage service entrance substation West of the campus. This substation receives power from four (4) ONCOR over-head transmission lines that share support towers. This substation contains two (2) 135 KV to 13.8 KV transformers and two (2) 13.8 KV Medium voltage distribution switchgear. The two (2) 13.8 KV Medium Voltage distribution switchgear are arranged in a Main-Tie-Main (MTM) arrangement. Distribution from each Medium voltage switchgear to campus building and loads is through two (2) separate underground ductbanks arranged in a Loop feeder configuration. Most existing buildings and new buildings are supplied by at least one (1) Medium Voltage feeder from each underground ductbank system. This arrangement is reliable enough that some new buildings constructed in the last 20 years are served by one (1) feeder from each ductbank system in a Loop arrangement without a backup generator.

2. Refer to UTSW Design Guideline Section 33 71 19 Underground Ductbanks and Manholes for distribution requirements.
- B. Secondary Unit Substations with Switchgear Secondary:
 1. Each transformer in a double-ended sub-station shall be sized to serve 75 percent of the maximum demand on the sub-station. In critical loads such as hospitals and research facilities, or where determined to be necessary by the University and design team, this may be increased to 100 percent.
 2. Where feeders are arranged in a looped system, full capacity feed-through capability will be required.
- C. Coordination:
 1. Coordination with UTSW FM shall begin during the Schematic Design stage for all projects.
 2. Coordination with Oncor shall begin during the Schematic Design stage for projects connecting directly into ONCOR's electrical system.
 3. The UTSW Medium Voltage group shall be informed of, and allowed to be part of, any coordination meetings with ONCOR.
 4. Any fees to be paid by UTSW to ONCOR for electrical service has to be coordinated with UTSW PM as soon as possible, but before the 100 percent Design Development stage.
- D. Mechanical equipment connections for mechanical equipment on campus shall be connected with liquid-tite flexible metallic conduit.

XI. Section 26 20 00 Low-Voltage (LV) Electrical Distribution

- A. General:
 1. Equipment designs, including CT, MRIs, PET CTs, Cage Washers, and similar equipment may have engineered documents.
 2. These documents may show power, data, required empty conduit, and other vendor specific requirements. These elements shall be incorporated into the overall design to ensure all requirements are captured and coordinated.
 3. The presence of these engineered documents shall not preclude the Design Professional from incorporating this required information into the contract documents.
- B. Low-Voltage Transformers:
 1. Generally, the first transformer shall be 480Y/277 volts, 3 phase, 4 wire. 4160 volts, 3 phase, 3 wire may be required for large motors.
 2. Three phase dry type transformers shall be installed at strategic locations to provide 208Y/120 volt, 3 phase, 4 wire service to LED lighting, convenience outlets, specific equipment loads and small motors. One of the determining factors of the transformer locations shall be the cost of the increased length of branch circuits versus the addition of transformers/panels.
- C. Switchboards and Panelboards:
 1. To protect personnel on campus, UTSW prefers that distribution panelboards 600 volts and less as well as 400 amperes and large shall be Square D I-Line panelboards.
 - a. Equivalent products may be submitted using substitution requests.

- b. Only manufacturers offering equivalent safety features for at least five (5) years in the United States market will be considered.
- 2. Branch Circuit Panelboards 240 volts and less and 400 amperes and less shall be Square D Type NQOD with factory means to individually install each breaker to the Panelboard bus by bolt-on means and plug-in means.
 - a. Products from other manufacturers that have manufactured an equivalent product for the United States market for at least five (5) years will be considered for substitution when submitted with proper substitution request form per Division 01 project specifications.
- 3. Branch Circuit Panelboards rated 480 volts and less and 400 amperes and less shall be Square D Type NF with factory means to individually install each breaker to the Panelboard bus by bolt-on means.
 - a. Products from other manufacturers that have manufactured an equivalent product for the United States market for at least five (5) years will be considered for substitution when submitted with proper substitution request form per Division 01 project specifications.
- 4. Covers shall be door-in-cover with continuous hinged front where factory available for the submitted Distribution and Branch Circuit Panelboards. Door-in-door covers shall be listed for the location installed.
- 5. Distribution Panelboards shall not have exposed bus when interior the cover is removed.
- 6. Two and three pole branch circuit breakers installed in Distribution and Branch Panelboards shall have factory installed lock-off devices that remain on the breaker when not locked off.
- 7. Feeder conductors for Distribution and Branch Panelboards shall be fully rated for the overcurrent protection device.
- 8. Distribution and branch Circuit Panelboards shall be labeled with this information as a minimum:
 - a. Name.
 - b. Voltage, phase, and wire count.
 - c. Where fed from and breaker size.
 - d. Feeder conductor sizes and conduit sizes.
 - e. BB.FF.RRRR. Where BB is Building designation, FF is the floor, and RRRR is the room where panel is located.
- 9. Branch circuits supplying minus 80 Degree-F freezers shall be 3#10, 1#10, 3/4-inch. These freezers can be 120-volt, 20 amp; 208-volt, single phase, 20 amp; and 208-volt, single phase, 30 amp. The extra conductors shall be capped off in the device box and in the panelboard.
- 10. Refer to Design Guideline Section 33 71 19 Underground Ductbanks and Manholes for distribution requirements.
- 11. Fire Pumps shall be fed from two (2) reliable power sources to comply with NFPA 70 (NEC) and NFPA 20 Stationary Fire Pumps.
 - a. The existing medium voltage underground distribution system is considered reliable.

- b. The required two (2) reliable sources could be from different Medium Voltage underground distribution systems without generator backup or a combination of normal feeders and a feeder from a backup generator.
 - c. This determination will be determined by the project conditions and the availability of a backup generator.
- 12. Arrangement one (1) is from both ends of a double-ended unit substation containing a Main-Tie-Main (MTM) arrangement when a generator is not available. The two (2) normal feeders shall be tapped ahead of the two (2) Main Circuit Breakers (MCB) in separate vertical sections from the MCBs.
- 13. Arrangement two (2) is from one end of a double-ended unit substation containing a Main-Tie-Main (MTM) arrangement and from a standby generator. The normal feeder shall be tapped ahead of one (1) of the Main Circuit Breakers in a separate vertical section. Fire pump service feeder from an available generator shall originate from a generator mounted breaker or from a generator distribution board.
- 14. Arrangement three (3) is from one (1) end of a double ended unit substation and from a standby generator. The normal feeder shall be tapped ahead of the Main Circuit Breaker in a separate vertical section. Fire pump service feeder from an available generator shall originate from a generator mounted breaker or from a generator distribution board.
- 15. Arrangement four (4) is from each end of two (2) single unit substations without a MTM arrangement when no generator is available.
- D. There shall be only one (1) breaker in the Normal power feeder before connecting to the Fire Pump controller. More than one (1) breaker is allowed in Fire Pump feeders supplied from a standby generator. The Automatic Transfer Switch (ATS) shall be located in the fire Pump Room to comply with NFPA 20 and NFPA 70. The ATS should be part of the Fire Pump controller to save space.
- E. Devices:
 - 1. New buildings shall be constructed to comply with current Texas Accessibility Standards. FM capital projects buildings and spaces shall be brought into compliance as required when renovated. This shall include, but not necessarily be limited to:
 - a. Height of wall mounted devices, receptacles, light switches, card readers, etc., above finished floor.
 - b. Type and location of audible and visible fire alarms and other distress signals.
- F. Low-Voltage Controllers:
 - 1. Variable Frequency Drives (VFD) shall be provided with input and output reactors and/or filters to limit harmonics transmitted back into the electrical system and to the motor.
 - a. VFD manufacturers shall provide calculations for each VFD provided to verify the amount of Harmonics generated and transmitted to system and motor.
 - b. Locate VDFs in a climate controlled mechanical space and to limit conductor length from VFD to motor to 75-feet.
 - 2. Engineer specifying VFDs shall be conscious of harmful harmonics and vibration generated by VFDs and add design features for mitigations.
 - 3. Harmonic mitigation units shall be located in the distribution panelboard.

4. Harmonics shall be calculated at 4 percent maximum at distribution panelboards and at the electrical service.
 5. The electrical service shall be considered the point of common coupling.
 6. Calculations shall be based on IEEE 519 and other applicable standards.
 7. Motors rated 0.5 Hp and larger shall be rated for VFD duty with motor shaft grounding rings. The use of 12 or 18 pulse VFDs may be used to reduce objectionable harmonics.
- G. Each VFD shall be in a separate enclosure.

XII. Section 26 27 13 Metering

- A. Provide a multi-function metering device, one for each main circuit breaker. Each metering device/s shall have a digital display and be rated for 120 Volts AC or DC. The metering device/s shall be Underwriters Laboratory listed per UL508.
 1. The electronic metering device/s shall be capable of the following electrical parameters:
 2. Volts, phase to phase and phase to neutral.
 3. Current, per phase RMS and 3 phase average.
 4. Average demand current, per phase.
 5. Power factor, per phase and 3-phase total.
 6. Real power, 3 phase total.
 7. Reactive power, 3 phase total.
 8. Apparent power, 3 phase total.
 9. Energy (MWH).
 10. Reactive energy (MVARH).
 11. Frequency.
 12. Average demand real power.
 13. Adjustable demand interval (5-60 minutes).
- B. The metering device/s shall have:
 1. Built-in communications capability to will allow multipoint communication via Ethernet to a SCADA system.
 2. Nonvolatile memory for storing all historical data.
 3. Waveform capture capability for steady-state power harmonic analysis for up to the 30th harmonic of the fundamental power frequency.
- C. Metering devices shall be capable of being set up from the display of the device. It shall not be necessary to open its enclosure to reach rear mounted Dipswitches. Setup parameters shall include CT ratio, PT ratio, System type 3 or 4 wire, and demand interval.

XIII. Section 26 32 13 Standby Power Generator Systems

- A. When required, a complete standby power supply system shall provide on-site generated electric power over a standby power distribution system. The system shall, upon loss of utility source power, automatically provide electrical service at 480/277 volts, three phase, four- wire, 60 Hertz. The system shall include an engine directly connected to a four-pole

alternator, with equipment to automatically start, connect to load, supply the load, and automatically stop on restoration of normal utility power.

- B. The power generation system shall be built, tested and shipped by a single equipment supplier so that there is one source of supply and responsibility. The engine, alternator and major items of equipment shall be product of U.S. manufacturers regularly engaged in the production of such equipment, and shall be assembled, tested and shipped to the job site by the engine manufacturer/authorized dealer.
- C. Provide a packaged sub-base, double-wall fuel tank system for the engine. The tank shall be a minimum of 8-hour full load capacity complete with all fuel tank accessories.
- D. The engine exhaust piping shall be schedule 40 black steel rigid exhaust pipe of size recommended by the generator manufacturer. Exhaust to be provided with double walled silencer and fully closed barometric rain cap.
- E. Provide maintenance free batteries and solid-state battery charger.
- F. Provide a remote alarm annunciator panel complying the requirement of NFPA-110, Level-1 indications.

XIV. Section 26 33 53 Uninterruptible Power Systems

- A. The Uninterruptible Power System (UPS) is three-phase continuous duty, on-line, solid-state uninterruptible power system. UPS operates with existing electrical systems to provide power conditioning, back-up and distribution for electronic equipment loads. The UPS system consists of UPS module, one or more maintenance free battery packs, options and accessories, and 3-breaker maintenance bypass panel.
- B. Protect equipment from extreme temperature and humidity by storing it in a conditioned space. Deliver batteries no sooner than 7 days before charging.
- C. Provide five (5) years warranty including batteries coverage.
- D. Design requirements: Estimate equipment reliability is 2 years minimum MTBF. Equipment maintainability MTTR not to exceed ½-hour.
- E. Environmental requirements: Acoustic noise 65 dBA at 1 meter, EMI suppression to meet FCC part 15 subpart J for class A devices, Electrostatic discharge (ESD) immunity to meet IEC 801-2 and withstand maximum 25 kilovolts without damage or adverse effect to critical load. System efficiency at full unity power factor load and nominal input voltage.
- F. Accessories: Remote emergency power off (REPO) station and Remote monitoring panel (RMP).

XV. Section 26 36 00 Transfer Switches

- A. Provide Automatic Transfer Switches to provide a normal and an alternate service to certain electrical loads. Transfer switches shall be listed with UL and constructed in accordance with NEMA standards.
- B. The transfer switch shall be electrically operated from the source to which the load is to be transferred and mechanically held after transfer. Power failure relays shall be provided to sense when the voltage of any phase drops below normal and causes transfer of load to the alternate source. Moreover, it will sense when all normal source phase voltages are rated voltages and re-transfer to the normal source.

XVI. Section 26 41 13 Lightning Protection System

- A. In general, all UTSW buildings shall have an Underwriters Laboratories, Inc. approved, Master Label lightning protection system.
 - 1. Where such a system is not provided, complete justification for its elimination shall be made a part of the record.
 - 2. UTSW PM shall coordinate with VP of FM and with OSBC for approval to not provide a lightning protection system.
- B. Lightning protection shall be provided for all roof top equipment.
- C. A lightning protection contractor shall review the need for protection and interconnections to existing lightning protection system.
- D. Lightning protection systems shall be maintained for the protection of buildings and life safety of occupants.

XVII. Section 26 43 13 Surge Protection Devices

- A. Provide transient protection on 480V/277V service entrance and on the 208V/120V distribution electrical system. The panel boards shall be UL listed under UL 1449 Third Edition as a transient voltage surge protection and shall meet the UL listing for each mode of protection.
- B. The surge protective device (SPD) shall be solid state electronic unit providing transient voltage surge suppression and high frequency noise attenuation on the electrical lines being protected. The unit shall be rated to withstand a single surge impulse of 250,000 amps and 100,000 amps line to line, line to neutral, and neutral to ground for service entrance and distribution panels without failure or degrading. Unit shall have frequency filter to provide an insertion loss ratio of 50:1 at 100,000 hertz and 500:1 at 10 megahertz. The unit shall operate continuously at 125 percent of the normal voltages of system being protected and shall survive a minimum of 5,000 surges without failure or degrading more than 5 percent.
- C. At the time of beneficial occupancy by the owner, test each unit to establish proper operation.
- D. Each unit shall be provided with a 20-year extended warranty by the manufacturer.

XVIII. Section 26 50 00 Lighting

- A. The Design Professional should be aware that lay-in lighting fixtures and lighting fixtures attached to the ceiling are required to be mechanically attached to the ceiling framing members by NEC code.
- B. UTSW additionally requires lay-in lighting fixtures to be supported by the building structure at two (2) locations.
- C. The Design Professional Engineer (PE) is responsible for researching and making recommendations for Foot-Candle (FC) levels that meet both Owner and IESNA requirements for the specific projects.
 - 1. Design Professional shall ensure light levels for MEP spaces provide lighting levels consistent across spaces appropriate to the work areas.

- D. Perform all lighting calculations based on IES Lighting Handbook and the lighting power density criteria of the applicable edition of ANSI/ASHRAE/IESNA 90.1. Include the following information in all submitted calculations:
 - 1. Room Name.
 - 2. Room Number.
 - 3. Fixture type chosen for the room.
 - 4. Number and type of lamps to be used in the room.
 - 5. Required illumination level calculated illumination level.
- E. LED Lights:
 - 1. When determining light fixtures, consideration shall be given to efficiency, LED life, and ease of maintenance of light source.
 - 2. Any LED luminaires proposed shall comply with UL and Design Lighting Consortium (DLC).
- F. Consider maximum flexibility for switching and circuiting for lighting control as natural illumination levels, and/or task change.
- G. Automatic occupancy sensing may be used in areas where this may be applicable to save energy, even where not required by ASHRAE 90.1 or IECC. These shall be proposed and described to UTSW PM for consultation with user group and FM for approval.
- H. Provide daylighting controls to meet code requirements.
- I. Where required by UTSW FM, provide multiple circuits for outside lighting, such that lighting can be reduced, yet uniform coverage retained, in times of critical energy shortage or as applicable for scheduling.
- J. Outside lighting shall be controlled by a contactor controlled with photo-electric cells in conjunction with a time-of-year adjustable time switch capable of one "off" and one "on" operation during the hours of darkness. Provide lighting contactor in an enclosure with a front mounted H-O-A switch.
- K. Designate exterior security fixtures that are to remain on all night as controlled with photocell only.
- L. Use task lighting techniques with lower room ambient lighting levels where applicable and where task areas can be defined to achieve energy conservation.
- M. Clearly indicate in specifications that contractor will provide training for lighting controls.
- N. Lighting - Energy Conservation:
 - 1. Electrical systems design shall comply with the Texas State Energy Conservation Office (SECO) Design Standard for State Buildings except Low-Rise Residential Buildings, based on ASHRAE Standard 90.1 or IECC for Nonresidential Buildings. Refer to Volume 3 for current editions.
 - 2. The energy performance of the lights shall be at least 5 percent above the minimum requirements of SECO.

XIX. Section 26 51 00 Interior Lighting Fixtures

- A. The lighting design of a building shall take code requirements, aesthetics, light level needs, longevity, energy efficiency as well as maintenance into consideration.
 - 1. Light fixtures chosen for use on campus shall be easy to maintain.
 - 2. Design and installation shall provide physical access for repair and service.

3. Light installation locations shall consider safety for those carrying out normal maintenance.
- B. Manufacturers of fixtures shall be companies with proven track record of quality fixtures, bulbs, and systems.
 1. Lighting fixture manufacturers shall have been in the lighting fixture business and producing LED fixtures for a minimum of 5 years.
 2. Catalog cut sheets on each lighting fixture shall be submitted to UTSW for review.
 3. LED fixtures shall be DLC certified LED with a 10-year warranty.
- C. LED Interior Lighting:
 1. The lighting level required and the type of luminary to be used in each area, shall be submitted to UTSW for approval.
 2. The calculated lighting level based upon the lighting system designed shall be submitted by the DD stage or early CD to prevent redesign.
 3. Floor or site plans with lighting software generated photometrics are required by the University for normal lighting and separately for emergency lighting.
 4. Recessed lighting fixtures shall be fed by a separate flexible "whip". The junction box serving the "whip" shall be accessible above the fixture. Lighting fixtures shall not be used for "through-wiring."
 5. Engineers shall verify lighting levels using photometric software and provide prints of these values during design. Photometric calculations shall be performed and submitted with all normal lighting ON and with only emergency lighting ON. Provide direction for contractors to provide photometric calculations for submitted light fixtures under two conditions: with all lighting at full brightness; and with only the egress lighting on. Egress lighting calculations shall provide the required lighting levels required by NFPA 101.
- D. Interior Lighting Controls (Hospital spaces):
 1. Standalone automatic light control shall be installed in offices, exam rooms, meeting rooms, restrooms, and similar areas.
 2. Automatic light control shall be in commonly used areas as lobbies, corridors, and similar areas. The light control shall be connected to a central lighting control system.
 3. Lighting – For A.R.C. special requirements, refer to Volume 1, Section A1.
- E. Lighting design of toilet rooms shall minimize wall-washing on tile walls while providing a comfortable, well-lit space.
- F. Refer to **EXHIBIT 26.1 Recommended Commonly Used Light Schedule**.

XX. Section 26 52 00 Safety Lighting

- A. Emergency Egress lighting shall be provided with backup power from a generator or by battery backup to comply with NFPA 101, Life Safety Code.
 1. This requirement shall include exit access, stairs, exit discharge, and stairs.
 2. The exit discharge also includes the exterior path from a building exit to a public way.
 3. Interior egress lighting may include a ceiling mounted light fixture or an architecturally pleasing wall mounted unit.
- B. Exit fixtures shall be provided and located to comply with NFPA 101, Life Safety Code.
 1. Exit fixtures shall be LED with a life of 60,000 hours minimum.

2. Exit fixtures may be a combination unit with “bug eyes” to also provide the required emergency egress lighting.
- C. Lighting levels in the exit access, stairs, exit discharge, stairs shall comply with NFPA 101 Life Safety Code.
- D. In some spaces, an emergency fixture red-light indicator may prevent proper optical measurement, which would impact required processes and equipment. In these conditions, provide an unlit wall-mounted test switch in lieu of the red-light. Provide labeling on both the switch and fixture “Push to test emergency lighting.”

XXI. Section 26 56 00 Exterior Lighting

- A. Exterior lighting type shall be proposed by Design Professional to address project scope and provide energy savings.
 1. Fixtures shall comply with applicable Texas laws for night sky requirements.
 2. Fixtures shall be mounted on poles of appropriate height for the location.
 3. Poles shall match the newest existing campus poles or be selected by project Architect with FM approval.
 4. Exterior and building mounted lighting fixtures shall be located to facilitate maintenance without the use of cranes.
- B. Garage Lighting:
 1. Within garages, lighting shall provide adequate lighting without causing distress to drivers.
 2. Entrances shall have additional lighting to comply with garage entrances and exits of the Illuminating Engineering Society of North America (IESNA).
 3. Exit light fixtures shall be located to direct people to the nearest exit.
 4. Back-up Power:
 - a. Exit fixtures shall have backup power from a generator or by battery backup integral to the fixture.
 - b. Selected garage lighting shall have backup power from a generator or by battery backup integral to the fixture.
 - c. Garages provided with generator power shall have the egress lighting fixtures providing egress lighting and exit fixtures connected to the generator.
 5. Emergency egress lighting and exit light fixtures with integral battery backup units shall be controlled by a separate breaker for each level or floor area of a large garage.
 - a. These breakers shall be noticeably labeled for monthly testing of the battery units.
- C. Exterior Lighting Controls:
 1. Exterior building lighting shall be controlled with an astronomical time clock with manual bypass switch. Outside area and street lighting may be controlled with photoelectric cells or an astronomical time clock. Lighting contactors shall have provisions for connection to building automation system.
- D. Exterior Night Lighting Level Standard:
 1. Exterior lighting levels on the UTSW Main campus shall conform to the lighting levels in this section as a guide. It is the responsibility of the design professional (PE) to

comply with IESNA and UTSW Police Department requirements regarding exterior light levels.

Figure 26 56 00-01 Exterior Lighting Level Standard – Building Exterior. This table shows lighting levels for the building exterior.

Description of Area	Light Level in foot-candles (FC)
Active – pedestrian and/or conveyance	5
Building Surroundings	1

Figure 26 56 00-02 Exterior Lighting Level Standard – Pedestrian Tunnels – D Plaza Area. This table shows lighting levels for pedestrian tunnels.

Description of Area	Average Horizontal foot-candles (FC)	Average Vertical foot-candles (FC)	Uniformity Ratio
Pedestrian Tunnel	4.3	5.4 at 6-foot	3 to 1

Figure 26 56 00-03 Exterior Lighting Level Standard – Covered Parking Facilities. This table shows lighting levels for areas within covered parking facilities. Parking areas are considered medium activity.

Description of Area	Average Day foot-candles (FC)	Average Night foot-candles (FC)	Uniformity Ratio
Basic	5	5	4 to 1
Ramps and Corners	10	5	4 to 1
Entrance Areas	50	5	4 to 1
Stairways			

Figure 26 56 00-04 Exterior Lighting Level Standard – Open Parking Facilities. This table shows lighting levels for areas in open parking facilities. Parking areas are considered medium activity.

Description of Area	Average Horizontal foot-candles (FC)	Uniformity Ratio
General Parking and Pedestrian Areas	0.6	4 to 1
Vehicle Use Area (only)	1.0	3 to 1

Figure 26 56 00-05 Exterior Lighting Level Standard – Sidewalks. This table shows lighting levels for sidewalks.

Description of Area	Average Horizontal foot-candles (FC)	Average Vertical foot-candles (FC)	Uniformity Ratio
Roadside Sidewalks	0.6	1.1 at 6-foot	3 to 1
Walkways distant from roadways. Note, light should extend 6 foot on either side at least 1/3 light level.	0.5	0.5 at 6-foot	3 to 1

Figure 26 56 00-06 Exterior Lighting Level Standard – Roadways. This table shows lighting levels for roadways.

Description of Area	Average Horizontal foot-candles (FC)	Uniformity Ratio
Local roads, intermediate traffic, R4 road	0.6	6 to 1

XXII. Exhibit 26.1 Recommended Commonly Used Light Schedule

- A. This table shows basic-of-design light fixtures. Design Professional to confirm building standards, user requirements, and provide initial recommendations using this information. Abbreviation shown for 'requirements' is 'reqs.'

Fixture Tag	Manufacturer and Proposed Fixture	CCT	Fixture Type (foot)	Space Types	Dimming (yes or no)	Space Sensor Required
A1	Lithonia CPX 2X2 ALO7 SWW7 M4	3500K	2 x 2 LED	Back of house, housekeeping, storage, retail, dining, restrooms, autoclave, equipment galley	No	Yes
B1	Lithonia CPX 2X4 ALO8 SWW7 M2	3500K	2 x 4 LED	Back of house, housekeeping, storage, retail, dining, restrooms, autoclave, equipment galley	No	Yes
A2	Lithonia CPX 2X2 ALO7 SWW7 M4	3500K	2 x 2 LED	MEP Spaces, IDF, fire command, equipment rooms, kitchen, server, corridor, lobbies	No	No
B2	Lithonia CPX 2X4 ALO8 SWW7 M2	3500K	2 x 4 LED	MEP Spaces, IDF, fire command, equipment rooms, kitchen, server, corridor, lobbies	No	No
A3	Lithonia CPX 2X2 ALO7 SWW7 M4	3500K	2 x 2 LED	Lab spaces, dark rooms	Yes	No
B3	Lithonia CPX 2X4 ALO8 SWW7 M2	3500K	2 x 4 LED	Lab spaces, dark rooms	Yes	No
C1	Lithonia STAKS 2X2 ALO3 SWW7	3500K	2 x 2 LED	Office, wellness, multi-person office, classroom, student gathering	Yes	Yes
C2	Lithonia STAKS 2X4 ALO6 SWW7	3500K	2 x 4 LED	Office, wellness, multi-person office, classroom, student gathering	Yes	Yes
D1	Lithonia CSVT L48 ALO3 MVOLT SWW3 80CRI	3500K	4-foot DLC listed and IP65 and IP66 rated. Part of CS)	Wet Locations: Parking Garage Stairwells, back of house overhangs, tunnels, shops, warehouses, etc.	Per space reqs.	Per space reqs.

Fixture Tag	Manufacturer and Proposed Fixture	CCT	Fixture Type (foot)	Space Types	Dimming	Space Sensor Required
D2	Lithonia CNY LED ALO SWW2 UVOLT PE PIR DDB M2	3500K	14 x 14 Canopy Luminaire	Parking garages, canopies	Per code	Per code
D3	Kenall Model CSEFL14 Lamp 23R/45L Step controller between light and Avidity controls. LUXdrive low voltage dimmer model A019	23W- Red 45W- White LED	1 x 4	A.R.C. Holding Areas	Yes	No
E1	Lithonia BLWP4 40L ADP GZ10 E10WLCP LP835 Unit with Passive Dual Technology that Dims to 50% with no occupancy, emergency backup	3500K	2-, 4-, and 8- foot lengths	Stairwell lighting, where acceptable per code	Per code	Per code
E2	Lithonia BLWP4 40L ADPT EZ1 LP835 MSDPDT7ADCX DIM50 Unit with Passive Dual Technology that Dims to 50% with no occupancy	3500K	2-, 4-, and 8- foot lengths	Stairwell lighting, where acceptable per code	Integrated sensors with auto dimming control photocell	Integrated sensors with auto dimming control photocell
F1	Lithonia 2SRTL G L24 5000LM IAW AFL MVOLT GZ1 35K 80CRI DWAM	3500K	2 x 2	Vapor Sealed, Clean Room, Negative Pressure Spaces, Bio-Sensitive	Per space reqs.	Per space reqs.

Fixture Tag	Manufacturer and Proposed Fixture	CCT	Fixture Type (foot)	Space Types	Dimming	Space Sensor Required
F2	Lithonia 2SRTL G L48 5000LM IAW AFL MVOLT GZ1 35K 80CRI DWAM	3500K	2 x 4	Vapor Sealed, Clean Room, Negative Pressure Spaces, Bio-Sensitive	Per space reqs.	Per space reqs.
U1	ABL-Juno UCES 24IN SWW6 90CRI WH	3500K	2 inches x 24 inches	Under cabinet lights	Per space reqs.	Per space reqs.
U2	ABL-Juno UCES 36IN SWW6 90CRI WH M6	3500K	2 inches x 36 inches	Under cabinet lights	Per space reqs.	Per space reqs.

XXIII. Exhibit 26.2 Lighting Control Matrix

A. This table shows the preferred Sequence of Operation (SOO) by space type for the Design Professional to use as a starting point. Refer to notes following table.

Space Type	Manual On/Off	0 – 10 v Dimming	Vacancy Mode Occupancy Sensor	Programmable Scene Control	Scheduled Time Control
Conference Room	Yes	Yes	Yes	Yes	No
Private Office	Yes	Yes	Yes	No	No
Wellness room, mediation room	Yes	Yes	Yes	No	No
Multi-person office	Yes	Yes	Yes	No	No
Open office (note 3)	Yes	Yes	Yes	No	No
Copy room, huddle, small meeting room	Yes	No	Yes	No	No
Breakroom, lounge	Yes	No	Yes	No	No
Building housekeeping, storage	Yes	No	Yes	No	No
Retail	Yes	No	Yes	No	No
Dining area (note 4)	Yes	No	Yes	No	No
Small public restroom, staff restroom	Yes	No	Yes	No	No
Large public restroom, large staff restroom (note 6)	No	Yes	Yes	No	No
Fire stair (note 6)	No	Yes	Yes	No	No
MEP Spaces, TR/IDF, fire command center, equipment rooms	Yes	No	No	No	No
Kitchen, servery	Yes	No	No	No	No
Corridor, lobbies (note 5)	Yes	No	No	No	Yes
Classroom	Yes	Yes	Yes	No	No
Student gathering college room	Yes	Yes	Yes	No	No
Lab – biochemistry, pharmacology (note 3)	Yes	Yes	No	No	No
Lab – optics, microscopy (note 2)	Yes	Yes	No	No	No
Lab – electro-physiology	Yes	Yes	No	No	No
Dark room (note 2) (note 7)	Yes	Yes	No	No	No

Space Type	Manual On/Off	0 – 10 v Dimming	Vacancy Mode Occupancy Sensor	Programmable Scene Control	Scheduled Time Control
Laser use spaces (note 1) (note 2)	Yes	Yes	No	No	No
Lab – tissue culture	Yes	No	Yes	No	No
Housekeeping – clean, soiled, chemicals	Yes	No	Yes	No	No
Autoclave	Yes	No	Yes	No	No
Equipment galley, freezer galley	Yes	No	Yes	No	No

Notes:

- 1: Red light indicators in emergency fixtures not allowed. Provide unlit wall-mounted test switch with labelling on both switch and light fixture indicating "Push to test emergency lighting".
- 2: Space will have lights off as standard.
- 3: Lighting zone sizes and locations shall occur with user input to identify group assignments.
- 4: There may be cases of specialty dining that may require dimming. Design Professional to confirm with UTSW user group.
- 5: Emergency Egress lighting to be uncontrolled.
- 6: Dim lighting to 50% when unoccupied. Provide battery packs or generator circuit as required for egress lighting. Ceiling mounted room occupancy sensors are preferred.
- 7: Dark rooms will require red light. Design Professional to confirm requirements per project.

General Notes:

- A.R.C. (Animal Resource Center) spaces and Sound Booths are excluded from this matrix. Refer to UTSW Design Guidelines for requirements.
- All under cabinet lighting in labs shall be controlled On/Off by the same means as the space lighting (No dimming). Other space types shall confirm with user groups.
- Where large equipment, tall lab benching, or other fixtures that may affect operability, design occupancy sensor locations to account for obstructions.
- Within offices and smaller spaces, type and location of occupancy sensor shall account for standard monitor and furniture placement to detect occupant movement. Ceiling mounted sensors are preferred.
- Lighting zone sizes and locations shall occur with user input. Labs may require special understanding of group assignments.
- For spaces with daylighting and 150 watts of lighting or greater shall be capable of dimming and be controlled via photocell per applicable IECC requirements.
- UL924 listed controls bypass devices can be used to bypass lighting controls in the event of an outage for spaces with UTSW approval.
- Occupancy mode sensors that auto on lighting to 50%, manual on to 100% may be used instead of Vacancy mode sensors where approved by UTSW Design Team and UTSW PM.
- For any space types that do not fall into one of the categories above, please reach out to the UTSW Design Team for directions.

DIVISION 27 00 00 – COMMUNICATIONS

I. General Information

- A. Every building shall have a Main Distribution Frame (MDF) that interconnects all building Intermediate Distribution Frame (IDF) and provides connectivity to all campus resources.
 - 1. The UTSW IR department shall be consulted for MDF design per project.
 - 2. Resources include but are not limited to network, phones, applications, and WIFI.
 - 3. Additional services within a MDF may include Cellular and Public Safety DAS, paging systems, nurse call, and other building management systems.
 - 4. Thoughtful design and layout shall ensure new MDF spaces will be functional, efficient, and provide required flexibility.
- B. Provide design and/or performance specifications for the General Contractor to procure and install a system of wire, cable management, and associated hardware for a complete system of communications. This design shall support voice transmissions, data transmission, and wireless information from the Technology Room (TR) / Intermediate Distribution Frame (IDF) to each voice/data outlet in the building.
 - 1. The General Contractor shall be responsible for all pathways.
 - 2. UTSW IR will confirm specific scope of cabling for the General Contractor per project as this will vary per project size, on versus off campus location, and contract requirements. Refer to IR Specification Guide in Volume 3.
- C. The design shall include Outside Plant (OSP) communications pathway, entrance facilities, building riser, horizontal building pathways, Main Distribution Frame (MDF), and TR / IDF designed for UTSW IR services.
- D. Every aspect of the Electronics Industries Alliances (EIA) / Telecommunications Industry Association (TIA) and Building Industry Consulting Services International (BICSI) standards must be followed for the design of this project.
- E. Do not route mechanical or plumbing utilities through or above any MDF, TR, or IDF spaces. The only exception allowed is the branch sprinkler line serving only the sprinkler head in the TR / IDF.
- F. Conduits in areas with hard ceilings must route to hallway access panel.
- G. Design Professional to confirm required locations for WIFI access, which include service within MEP spaces, and coordinate the data requirements for expected equipment. Coordinate with UTSW IR and Users to document services and locations needed.
- H. Design Professional to confirm per renovation project with UTSW IR if existing IDF / TR meets project needs or if a new IDF / TR will be identified as part of the project scope.

II. Design Review Submittal Requirements

- A. Refer to Volume 3 – Deliverable Requirements.

III. Technology Room (TR) / Intermediate Distribution Frame (IDF) Guidelines

- A. The exact physical layout of the room will be determined according to requirements for each project and the space provided. Layouts shown in this document are for guidance in

the bidding and design process. Designs shall be created for each project referencing **Figure 27.1 TR / IDF Typical Room Layout.**

B. Room Location:

1. All TR / IDF shall be located so they can be accessed through a door from a main corridor with card reader access.
2. There shall be a minimum of one space located on each floor.
3. Additional spaces shall be provided to keep voice/data outlet cable lengths to (270-feet) maximum in length.
4. Location of TR / IDF spaces shall be coordinated with and approved by IR.
5. If the distance from the work area outlet to TR / IDF, including slack, is greater than 270-foot, design shall include multiple spaces identified per floor.

C. TR / IDF Design:

1. The space must be a minimum of 10- by 10-foot or calculated using BICSI formula, whichever is larger, be centrally located, and stacked.
2. Floor areas of 5,000 square feet or less shall have a room no smaller than 10- by 8-foot to support that area.
3. Floor areas between 5,000 and 10,000 square feet shall have a room no less than 10- by 10-foot to support that area.
4. TR / IDF shall be free from angles and columns and the door must open outward.
5. TR / IDF on differing floors shall be stacked one on top of the other.
6. Fire retardant plywood shall cover all four (4) walls, floor to ceiling, using complete sheets of plywood where possible. Begin plywood at 4 inches above finished floor.
 - a. All plywood shall be painted with two (2) coats of fire-retardant white paint using caution not to cover the fire rated stamp on the plywood.

D. Electrical:

1. Each TR / IDF shall have multiple standard NEMA 5-20 convenience electrical outlets on walls located.
2. If the facility has a backup generator, the TR / IDF design will include generator receptacles as outlined in Section 27 11 26 "Communications Rack Mounted Power and Power Strips."
3. All power for racks or cabinets will be fed from receptacles mounted on ladder rack above and behind each equipment rack.
4. Note: Electrical requirements for a Main Distribution Frame (MDF) Room will be specified and outlined in the construction overview for each project.

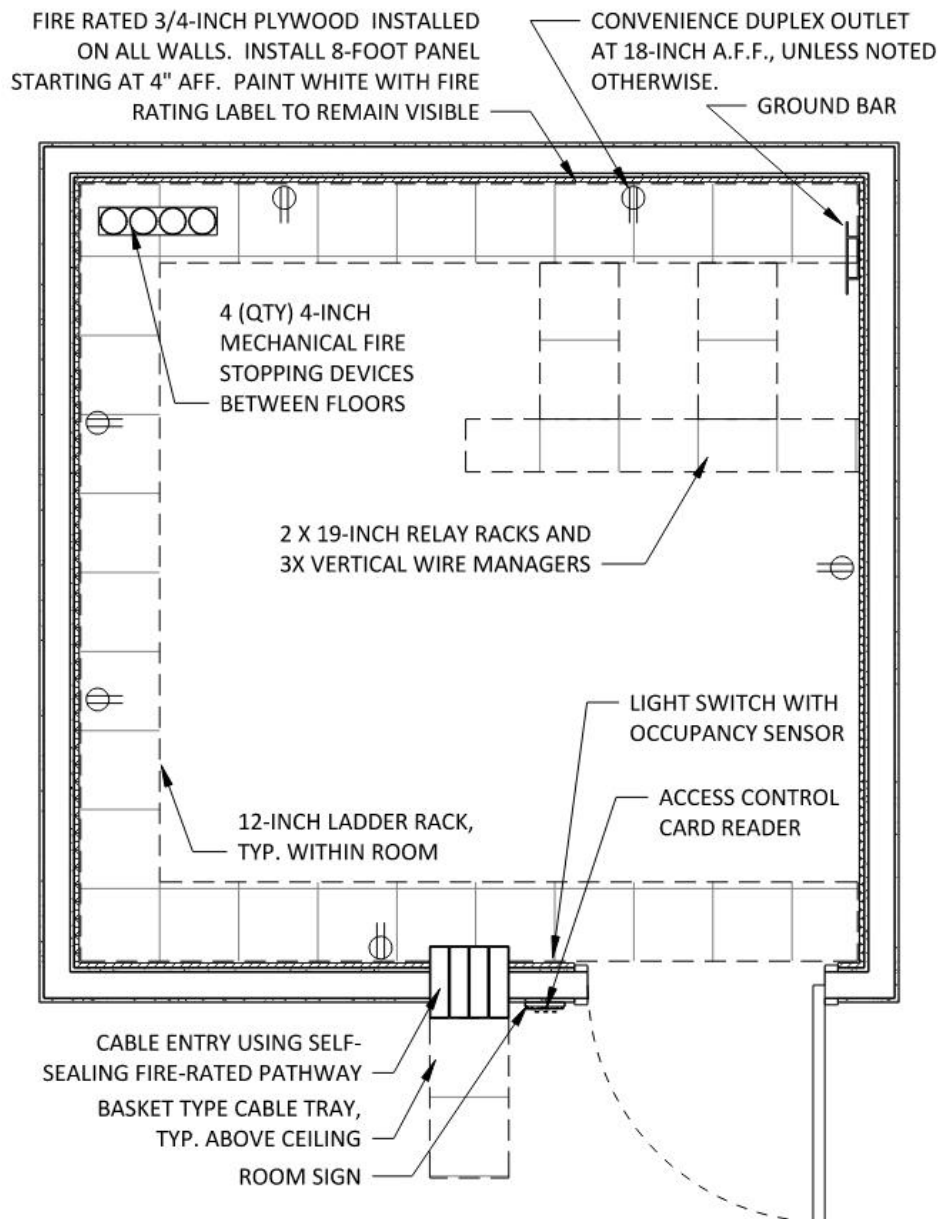
E. HVAC:

1. Each new TR / IDF shall be provided with HVAC and a means to control the temperature in within the space. The temperature range is 65-degrees F to 75-degrees F.

F. Lighting:

1. Each TR / IDF shall be provided with adequate lighting in front and behind equipment racks or cabinets to enable easy installation and maintenance of all components within the space. Provide a minimum of 50 fc.
2. Installation will vary depending on the ceiling height in the room.

Figure 27.1 TR / IDF Typical Room Layout: This floorplan shows a typical layout for an IDF layout of a rectangular room with 3/4-inch thick and 8-foot tall fire rated plywood installed on all interior walls, starting 4-inches above finished floor. The plywood is painted white with the fire rating label visible. Within the room, convenience duplex outlets are installed at 18-inches above finished floor unless noted otherwise. A ground bar will be installed to building ground and above ladder rack. Two 19-inch relay racks and three vertical wire managers will be installed opposite the door. Around the interior wall runs 12-inch ladder rack and four 4-inch vertical self-sealing mechanical firestopping devices. A basket type cable tray above the ceiling will meet the room at a self-sealing fire-rated pathway for cable entry. An access control card reader and room sign are located at the door with a light switch with occupancy sensor on the inside.

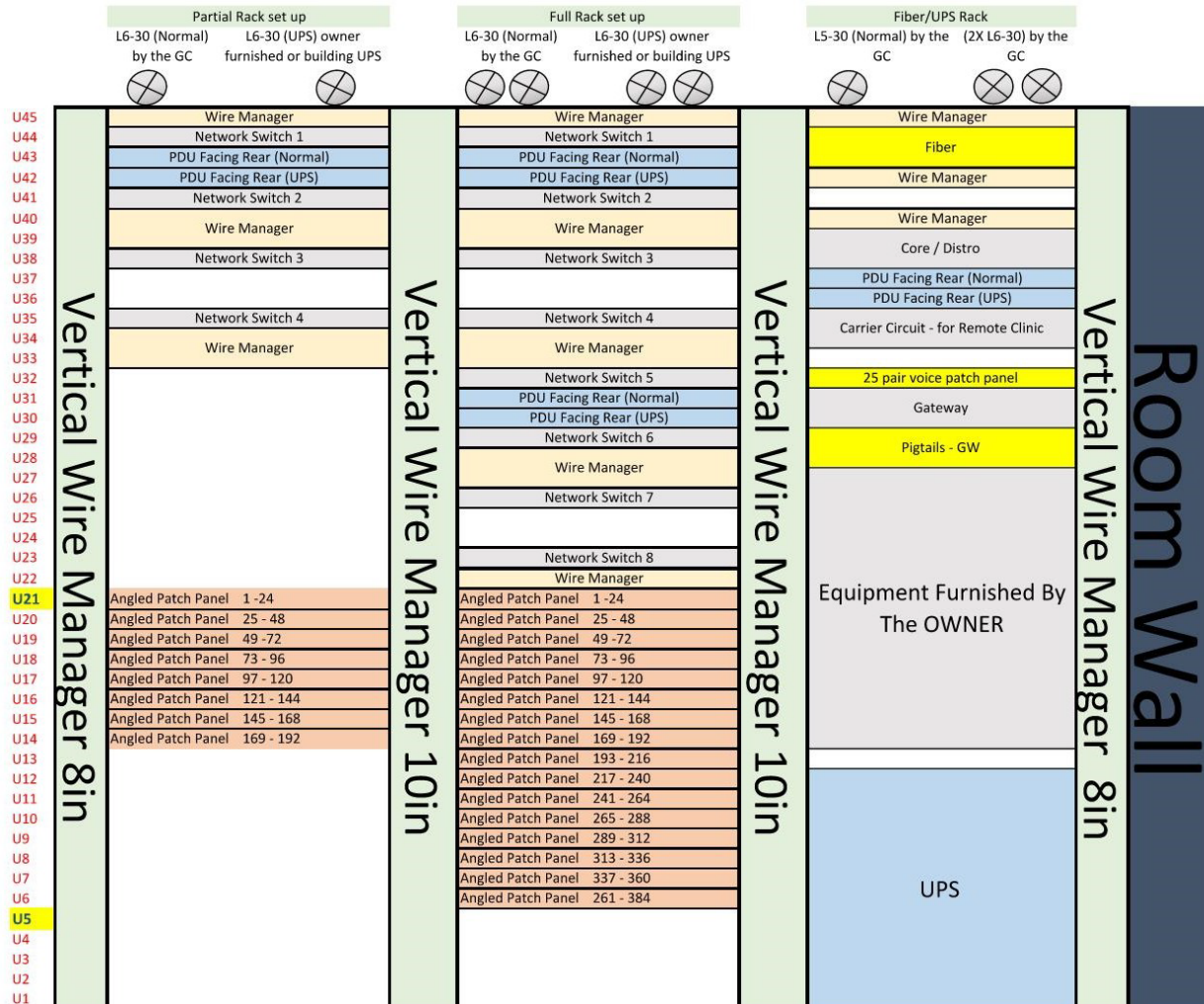


NOTE: REFER TO MASTER SPECIFICATION SECTION 27 84 13 - COMMUNICATIONS PENETRATION FIRESTOPPING FOR PRODUCT REQUIREMENTS

G. Pathways:

1. Final pathways shall be outlined per construction project, but Design Professional shall assume, for design and bidding purposes, a basket type cable tray, sized to fit, shall be installed from each TR / IDF and following every major corridor.
2. Any Low Voltage (LV) cabling that carries voltage will not be allowed inside the cable tray. Such cabling will be routed in J hooks or sidecars attached to the sides of cable tray.
3. All OSP 4-inch conduits that will house any fiber optic cables shall be fully populated with two (2) 3-cell ducts. This shall be installed by a certified Max Cell installer.
4. Strain relief shall be added to keep cabling from being routed in a direct 90-degree angle.
5. Refer to **Figure 27.2 TR / IDF Rack Typical Layout**.

Figure 27.2 TR / IDF Rack Typical Layout: This diagram identifies UTSW preferences for rack layout, which can be requested from UTSW IR.



H. Station Cables:

1. No cable shall be allowed to rest on ceiling grid wires or come in contact with ceiling tiles.
2. All station cables in the TR /IDF shall be routed through the back side of the horizontal wire managers.
3. Only Velcro shall be used to bundle and secure cable.
4. Conduit size for station cable shall be a minimum of 1-inch in diameter. The actual size may vary by project.
5. Flex conduit is not allowed on UTSW communications projects.
6. For each location in a hard ceiling, provide one (1) 1-inch conduit above ceiling to an accessible corridor location.
7. Document cable requirements for appropriate disciplines in Construction Documents.

IV. Section 27 41 00 Audiovisual Systems and Equipment

- A. Standard audiovisual components include wall-mounted monitors with additional components determined per project requirements.
1. A complete sound system shall be provided if the project scope requires either an assisted listening device or sound reinforcement.
- B. Audio-visual equipment is typically Owner purchased and Owner installed under a separate contract from the GC.
1. The design team shall identify equipment, coordinate the required infrastructure, indicate locations, and coordinate the documentation.
 2. Refer to **Figures 27.3, 27.4, and 27.5 Media Technology Audiovisual Charts 1, 2, and 3, AV Room Standard Chart (Recommended Setup)**.
- C. Monitors:
1. Standard monitor sizes are 43 inches, 55 inches, and 86 inches.
 2. Design Professional shall coordinate power and data to be located behind the monitor and above the mounting bracket.
 3. Recessed backboxes with multiple services are preferred where possible. Confirm preferences per project with A/V.
- D. Contact to UTSW Media are through:
1. James Turner, Assistant Director Media Technology,
James.Turner@UTSouthwestern.edu
 2. Adolfo Ortuzar, Director IRAAIR Operations, Adolfo.Ortuzar@UTSouthwestern.edu

Figure 27.3 Media Technology Audiovisual, Chart 1: This chart shows some standard installations by room types to use as guide. The Design Professional shall obtain the most current version from the UTSW PM or IR Team.

Installation Types	Elevator	Waiting rooms, lobbies, status board	Valet desk	Patient rooms	Dining, grab and go
Network	1	1	1	2	1
Wireless Network	1	1	1	1	1
Coaxial / Cable TV	1	1	1	1	
HDMI					
USB				1	
3.5 Audio					
XLR Audio					
Monitor	1	1	1	1	1+
Projector					
Projector Screen					
Control Panel					
Computer				TBD	
Signage Player	1	1	1		1
Conference Camera Location					
Aux Output Wall Plate					
AC Power, receptacle number	4	4	4	4	4
AV Table Box					
AV Floor Box					

Figure 27.4 Media Technology Audiovisual, Chart 2: This chart shows some standard installations by room types to use as guide. The Design Professional shall obtain the most current version from the UTSW PM or IR Team.

Installation Types	Parking services	Chapel	Hall	Simulation	Multipurpose, specialty	Offices, director, AVP / VP	AV Control, closet
Network	1	1	1	2	2	2	2
Wireless Network		1	1	1	1	1	1
Coaxial / Cable TV		1	1				1
HDMI		1		1	1	1	1
USB				1	1	1	
3.5 Audio		TBD		TBD	TBD	TBD	1
XLR Audio		TBD		TBD	TBD	TBD	1
Monitor	TBD	1+	TBD	1	1+	1	1+
Projector					TBD		
Projector Screen					TBD		
Control Panel				TBD	TBD	TBD	TBD
Computer		TBD		TBD	1	1	1
Signage Player	1	TBD	1				1
Conference Camera Location		1			1	1	
Aux Output Wall Plate							2
AC Power, receptacle number	4	4	4	4	4	4	8
AV Table Box				1	1	1	
AV Floor Box		1		1	1		

Figure 27.5 Media Technology Audiovisual, Chart 2: This chart shows some standard installations by room types to use as guide. The Design Professional shall obtain the most current version from the UTSW PM or IR Team.

Installation Types	Breakroom	Huddle room	Small Conference	Large conference	Small Class	Large Class	Auditorium
Network	2	2	2	2	2	2	2
Wireless Network	1	1	1	1	1	1	1
Coaxial / Cable TV	1			TBD			1
HDMI	1	1	1	1	1	1	1
USB		1	1	1	1	1	1
3.5 Audio			TBD	TBD	TBD	TBD	TBD
XLR Audio			TBD	TBD	TBD	TBD	TBD
Monitor	1	1	1	2	1	2+	2+
Projector					TBD	TBD	TBD
Projector Screen					TBD	TBD	TBD
Control Panel	TBD	TBD	TBD	TBD	TBD	TBD	TBD
Computer	TBD	1	1	1	1	1	2
Signage Player	TBD						
Conference Camera Location			1	1	2	2	4
Aux Output Wall Plate						1	2
AC Power, receptacle number	2	4	4	4	4	4	4
AV Table Box		1	1	1	1	1	1
AV Floor Box			1	1	1	1	1

V. Section 27 52 23 Nurse Call System

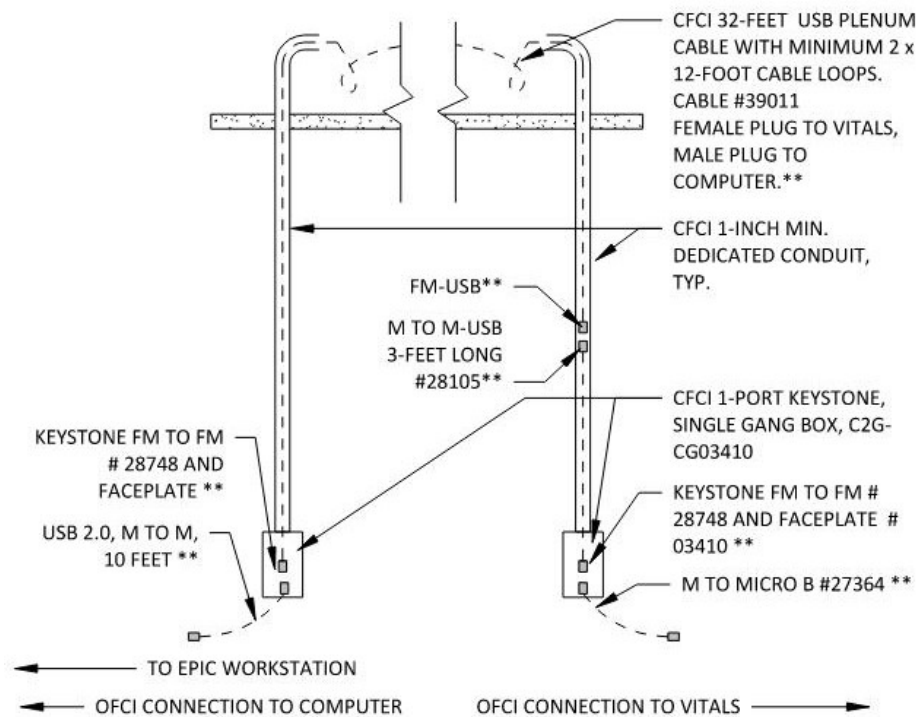
- A. Nurse call systems vary according to project and application type. Refer to UTSW Master Specifications for notes on existing hospital systems and clinical preferences.
- B. Nurse call system design and elements are determined by applicable regulations for each project and application. If no regulation entity exists, the Design Professional shall confirm UTSW preferences and requirements.
 - 1. Stakeholders shall include Hospital or Clinical leadership, User Representative, Nurse Call Committee (if applicable), and UTSW PM. For Hospital or Hospital-Based project, include UTSW IR.
 - 2. Nurse call system scope shall be identified in schematic design for pricing. Begin documentation of locations and elements in design development with finalization during Construction Documents.
 - 3. Design Professional shall confirm the needs of the patients and staff per space. Identify the best device to support the needs at each location.
 - a. Document components required, locations, programming, nomenclature desired, and system color requirements.
 - b. Components may include nurse consoles (a base station with annunciation), staff terminals, staff duty station, staff station, staff assist, enhanced patient stations, emergency pull stations, and corridor lights at each location.
 - 4. Confirm requirements for regular or emergency power.
 - a. At ambulatory locations, within the IDF room, connect the control panel to back-up power, if provided.
- C. Applications:
 - 1. Hospital – Any projects within a hospital shall match existing systems and requirements, providing complete integration.
 - 2. Hospital-Based Clinics: To be confirmed per project.
- D. Ambulatory / Clinical:
 - 1. Clinical installations will not have audio communication elements, code blue, or rapid response components.
 - 2. Standard locations within a clinic may include patient restrooms, infusion rooms, procedure rooms, such as stress test rooms, EKG rooms, and Echo rooms. Confirm additional locations per project.
 - 3. Additional nurse console locations, console types, and other elements shall be confirmed per project. The location of the Nurse Master Station is typically at a nurse station but is to be confirmed per project.
 - 4. At patient pillow speakers, connection to window shades, A/V, and lighting controls may be needed. Confirm per project.

I. Section 27 52 24 USB Vitals Monitoring System

- A. Typical installation information is in **Figure 27.5 Vitals USB**. This sketch is provided for reference only and each Design Professional is responsible for creating and documenting the requirements for their projects.

Figure 27.5 Vitals USB: This diagram shows a typical clinical installation for USB connection between vitals monitor and workstation. Part numbers indicated as a basis of design (BOD) and are from cablestogo.com. Equivalent vendor plenum rated parts are acceptable. The connection to the OFCI computer includes CFCI 1-port keystone, single gang box (BOD C2G-CG03410), a faceplate with blank. At this end, the connection is male.

The conduit from this box will go above the ceiling, with the USB cable connecting to conduit for the vitals monitor connection. The cable, which is CFCI, is a thirty-two-foot USB plenum cable with a minimum of 2 -12-inch cable loops (BOD cable 39011), with female plug to vitals and male plug to computer. Before reaching the vitals box, the female end will connect to a male end of a 3-foot-long USB, (BOD 28105). At this box, the keystone will be female to female (BOD 28748AND) with a faceplate (BOD 03410). From here, a CFCI male cable (BOD 27364) will be provided.



VITALS USB CONNECTION

NOTES:

- PART NUMBERS FROM CABLESTOGO.COM AND EQUIVALENT VENDOR PLENUM RATED PARTS ARE ACCEPTABLE.

** PROVIDED WITHIN CABLING SCOPE

VI. Section 27 53 13 Clock Systems Standard

- A. Wireless, wall-mounted clocks for research, academic, and clinical buildings shall follow the Primex synchronized systems or approved equivalent.
 1. Primex face type: Traditional Series.
- B. Stand-alone (battery) clocks shall follow AllSet Series Clocks with molded case or approved equivalent.
 1. AllSet face type: Time CH93.

VII. Section 27 53 18 WLAN

- A. UTSW preferences for wireless access point (WAP) and antenna mounting are seen in the following sketches from **Figure 27.6 through 27.11**. These sketches are provided for reference only and each Design Professional is responsible for creating and documenting the mounting requirements for their projects.

Figure 27.6 WAP Mounting – Acoustical Ceiling System: This diagram shows a section cut through a typical acoustical ceiling. A CAT 6/6A network cable is supported above the ceiling on a J-shaped hook, passes into a labeled biscuit, then runs through the acoustical ceiling to connect to the WAP (OFOI) that is mounted on a bracket beneath the ceiling tile. A laminated label is mounted on the grid identifying the WAP.

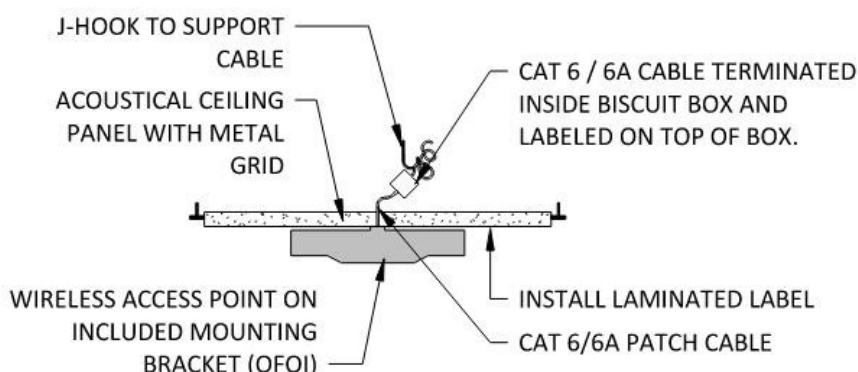


Figure 27.7 WAP Mounting – Gypsum Ceiling: This diagram shows a section cut through a typical gypsum ceiling. A CAT 6/6A network cable is routed through 3/4-inch conduit from an accessible ceiling, passes into a labeled biscuit, then runs through the acoustic ceiling to connect to the WAP (OFOI) that is mounted on a bracket beneath the ceiling tile. A laminated label is mounted on the grid identifying the WAP. Conduit has a pull string and protective bushing at the end.

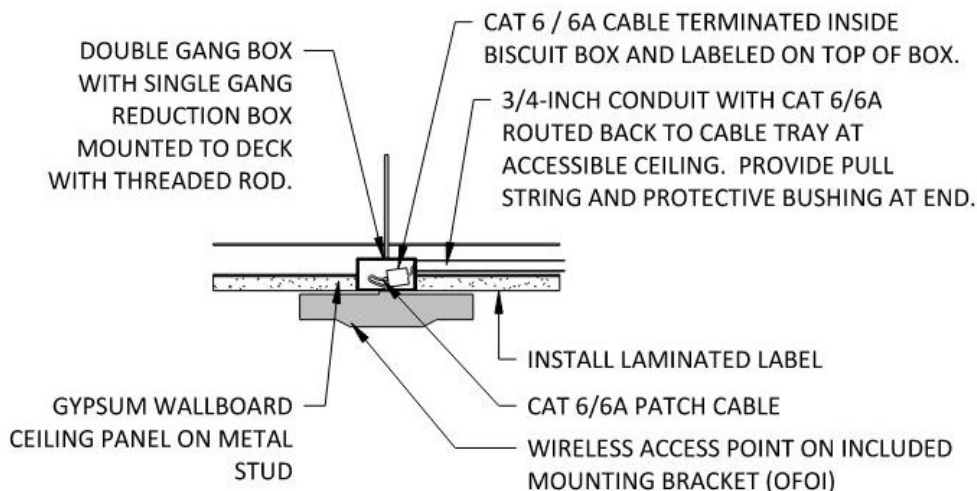


Figure 27.8 WAP Mounting – Exposed Ceiling: This diagram shows a section cut through a typical wireless access point (WAP) installed in an exposed ceiling condition. The WAP (OFOI) has an included mounting bracket that attaches to a double gang box or 4S box with single gang reduction box, mounted to deck with a threaded rod. From the WAP is a CAT 6/6A patch cable that will terminate inside a biscuit box with label. The cable will route through a 3/4-inch conduit back to a cable tray. The conduit has a pull string and protective bushing at the end.

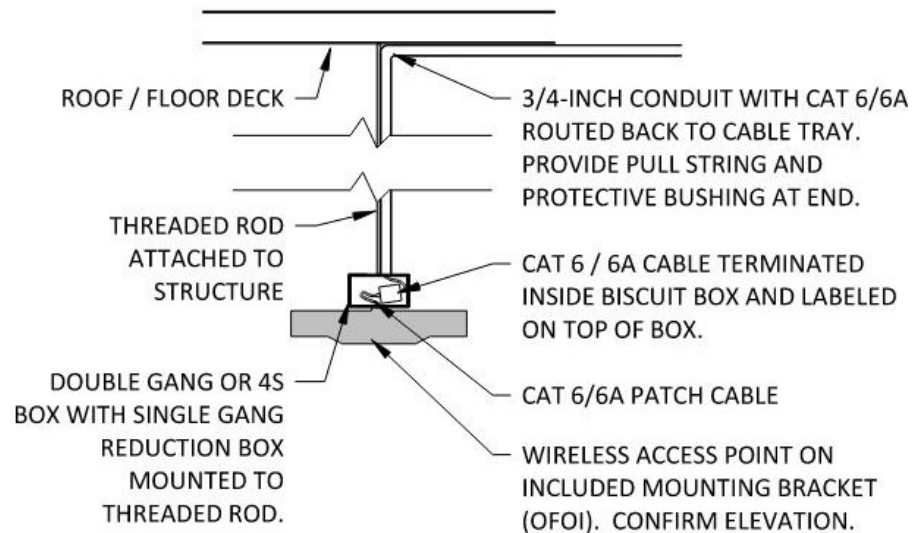


Figure 27.9 WAP Mounting – Exposed Joist System: This diagram shows a section cut through a typical wireless access point installed in an exposed joist condition. The WAP (OFOI) has an included mounting bracket that attaches to joist with toggle bolts. From the WAP is a CAT 6/6A patch cable that will terminate inside a biscuit box with label. The cable will route back to a cable tray.

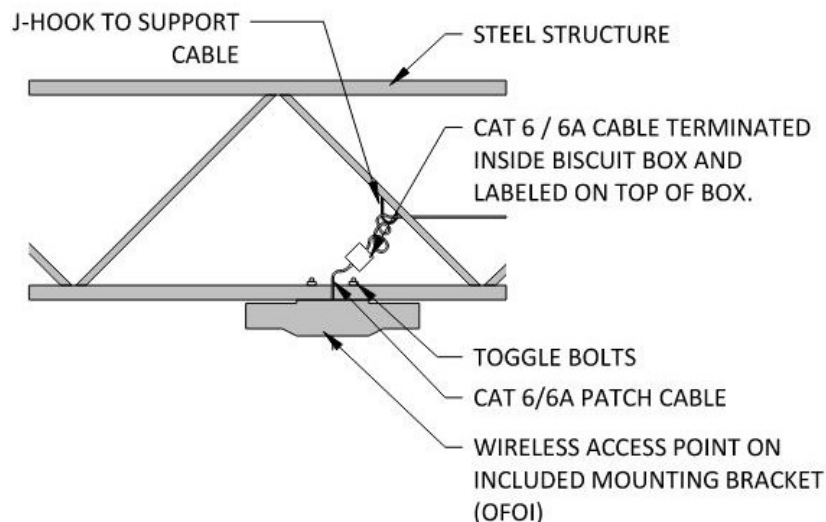


Figure 27.10 WAP Mounting – Gypsum Wall: This diagram shows a section cut through a typical wireless access point installed to a gypsum wallboard partition. The WAP (OFOI) has an included mounting bracket that attaches to a wall bracket (OFOI) that connects to a 4S box with single gang reduction box. From the WAP is a CAT 6/6A patch cable that will terminate inside a biscuit box with label. The cable will route through a 3/4-inch conduit back above the ceiling. The conduit has a provided pull string and protective bushing.

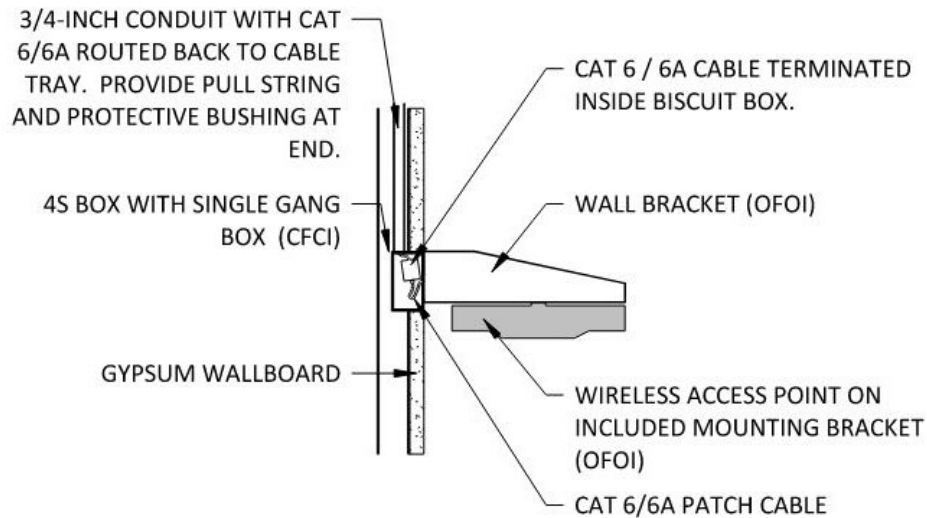
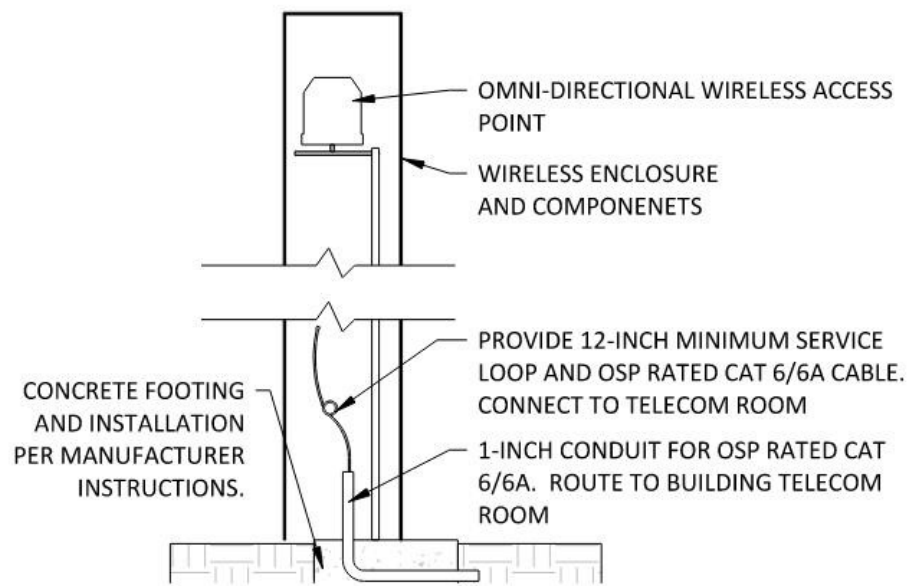


Figure 27.11 WAP Mounting – Wireless Bollard: This diagram shows a section cut through a typical wireless access point bollard installed on a concrete footing, per manufacturer instructions. A 1-inch conduit for OSP rated CAT 6/6A cable will route to the building telecom room. The cable shall have a 12-inch minimum service loop. The omni-directional WAP will be installed within the enclosure.



DIVISION 28 00 00 – ELECTRONIC SAFETY AND SECURITY

I. General Information

- A. The UTSW Police Department operates on property owned, leased, or otherwise under the control of the UT System or UTSW.
- B. The Access Control Division is responsible for operating and managing the integrated total security management system for UTSW, including the campus access-control system which manages all UT Southwestern ID badges and access control points.
 - 1. The centrally managed badge-access system is intended to provide security only for specific exterior campus perimeter entrances, high-security areas, or sensitive areas.
- C. The Access Control Division establishes processes necessary to operate and manage the badge-access system, grant system access, and monitor compliance.
- D. The Access Control Division oversees the University's security camera system and supports the information technology systems of the University Police.
- E. Observation camera systems are the responsibility of UTSW IR Project Management Office (PMO).
- F. Following project programming, to align with submittal requirements, the Design Professional shall prepare a concise summary of all security services (cameras, panic / duress devices, card readers, etc.) requested during review meetings.
 - 1. Before proceeding with security into farther phases, Design Professional must obtain approval from the project advocate and/or project Steering Committee before finalizing security systems requirements.

II. Design Review Submittal Requirements

- A. Refer to Volume 3 – Deliverable Requirements.

III. Section 28 05 37 Security Voice Communications – Distributed Antenna System (DAAS)

- A. Security Voice Communication shall be provided throughout the building via radio repeater systems for all buildings.
- B. Radio DAS coverage shall be provided throughout the building; a minimum of -95 dbm is required in all areas of the building regardless of occupancy. Compliance with NFPA and other regulations per Authority Having Jurisdiction shall be provided.
- C. Pathways for the system shall be maintained in Technology Rooms from the lowest required level to roof-top equipment.

IV. Section 28 10 00 Access Control

- A. Access control of buildings or spaces can be accomplished with standard keyed locks, keypad locks, reader-capable keypad locks, or badge readers (card reader). Access to the spaces by First Responders is required for any controlled area.

1. Keys will be keyed for the master key of the area and can be accessed using a master key. Keypad locks and reader-capable keypad locks shall have provisions for key over-ride keyed to the master key of the building.
2. Comply with master key requirements noted in Section 08 71 00 Door Hardware.
- B. Design Professional shall coordinate type of access required with user representative and UTSW PM for project requirements as well as all rooms containing medications.
 1. For A.R.C. special requirements, refer to Volume 1, Section A1.
- C. UTSW PM with support from Design Professional shall inform Access Control early in the design process of the department's request for badge readers and for rooms with special access control requirements.
 1. Doors controlled by card readers are allowed only with approval of the Chief of Police.
 2. Access Control will coordinate with user representative and UTSW PM to create a security plan, estimates for FM scope of work, and documentation to submit to the Chief of Police for approval.
- D. Access control along the means of egress paths as determined by the Life Safety/ Architectural drawings shall be coordinated with the Design Professional. These paths shall meet the minimum requirements of the currently adopted version of the Life Safety Code by the Texas State Fire Marshal.
- E. Pharmacies will not be required to have a direct means of access for first responders. A Key Management System (KMS) shall be provided to contain access keys for first responders. This panel shall have keypad for access and a data cable connected to the network which is then tied into the access control system. A security camera shall be located to monitor the KMS.
 1. Refer to "Key Control" article in Section 08 71 "Door Hardware."
- F. For MRI Spaces:
 1. Badge readers shall be installed and operable at all doors. Installation and testing of the badge readers shall follow all codes and specifications.
 - a. For Human Use at Zone III; and
 - b. For Non-Human Use at Zone III. If there is no Zone III door, install a badge reader at Zone IV.
- G. Campus standards – Access Control equipment placement locations:
 1. Card reader:
 - a. Building exterior perimeter entrances.
 - b. Interior stairwell entrances leading onto floors (hospitals and clinics).
 - c. Elevators.
 - i. Inside the elevator cab.
 - ii. On the floor as a call reader.
 - d. Elevator lobby doors (dependent on whether elevators are badge access controlled).
 - e. Interior entrances from a public lobby/waiting area leading into staff/clinical spaces.
 - f. Sky bridges between buildings.
 - g. Communications/MDF/IDF rooms.
 - h. Low voltage rooms.
 - i. Equipment storage (high value, sensitive materials).

- j. Cash rooms.
 - k. Pharmacy.
 - l. Irradiator/Select Agent locations.
 - m. Psychiatry areas.
 - n. Lab entrances (depends on the type of lab and materials being used).
 - i. Page turn meetings with occupants/customer determines what type of materials are being used within each lab and whether a card reader is needed or not.
 - o. Surgical areas.
 - p. Clean/dirty & hazardous waste locations.
 - q. Central sterile department.
 - r. Certain hospital corridors (separation of departments).
 - s. Medication rooms.
 - t. Hospital staff/physician lounges.
 - u. Hospital/Animal Resource Center locker rooms.
 - v. On-call rooms (hospital).
 - w. Clean supply areas.
 - x. Kitchen/pantries (hospitals and clinics).
 - y. Animal Resource Center
 - z. MRI/Imaging areas.
 - aa. Shipping/Receiving pedestrian entrances.
 - bb. Parking garage/lot, vehicle entrances/exits.
2. Head end enclosure (controller board, reader boards, input/output boards).
 - a. Low voltage rooms.
 - b. TR / IDF rooms.
 - c. Elevator control rooms (for elevator in-cab card readers).
 3. Door contacts only:
 - a. Building perimeter doors leading into fire control/command/pump/mechanical rooms.
 - b. Dock overhead doors.
 - c. Parking garage overhead doors.
 - d. Exit only doors (no exterior door hardware).
 - e. Roof hatches.
 - f. Rooftop stairwell doors.
 - g. Elevator machine rooms.
 - h. Floor hatches.
 4. Panic / Duress buttons:
 - a. Check-in desks (Hospital & clinic areas).
 - b. Check-out desks (hospital & clinic areas).
 - c. Cash rooms.
 - d. Cash registers.
 - e. Pharmacy.
 - f. Psychiatry units.
 - g. Hospital emergency department nurse/control stations.
 5. Intrusion panels (see Section 28 31 11 Building Intrusion Detection):

- a. Pharmacy.
 - b. Campus stores.
 - c. Irradiator rooms.
 - d. Gamma Knife/Pods.
 - e. Cash rooms.
 - f. Other specialty locations as determined.
6. Door release buttons - Shall include a video intercom to verify who is at the door. Coordinate with IR for video intercom requirements that IR will provide.
- a. Reception desks.
 - b. Admin desks.

V. Section 28 15 13 Emergency Intercom System

- A. This system consists of blue lights and blue phones located across the campus and parking garages which connect you to the UTSW Police Department in the event of an emergency.
 - 1. Emergency call boxes may be located on stanchions or wall surfaces.
- B. Locations and quantities for new projects to be determined by the UTSW Police Department. Integration required with UTSW Access Control.

VI. Section 28 20 00 Video Surveillance

- A. Network Video Recording and Management System for security can be accomplished when requested by UTSW Access Control.
 - 1. There are two types of video surveillance on campus, one for security and one for clinical observation.
 - a. Refer to UTSW Design Guideline Section 28 23 33 for Clinical Video Observation System requirements.
- B. Security cameras are managed with UTSW Access Control and IR groups.
 - 1. UTSW PM, with support from Design Professional, shall inform Access Control and IR early in the design process of the department's request for camera installations.
 - a. Security cameras are allowed only with approval of the Chief of Police.
 - b. Access Control will coordinate with user representative and UTSW PM to create a security plan, estimates for FM scope of work, and documentation to submit to the Chief of Police for approval.
 - c. The requesting department will coordinate with Information Resources department to coordinate installation of data cables.
 - 2. IP cameras:
 - a. Perimeter entrances with card readers.
 - b. Main lobbies/waiting areas.
 - c. Stairwells with card readers.
 - d. Elevator lobbies (buildings and parking garages).
 - e. Elevator cabs (interior).
 - f. Medication rooms.
 - g. Medication dispensing machines and medication disposal units.

- h. Major cross-corridor intersections (primarily hospital and clinic locations, e.g. UH and WC).
 - i. Building connectors/sky bridges.
 - j. Rooftop corners (parking lot coverage).
 - k. Loading docks.
 - l. Pharmacy.
 - m. Central sterile department.
 - n. ATM's.
 - o. Cash rooms.
 - p. Drug safe rooms.
 - q. Cafeterias/Café's/Kitchens/Grab-N-Go's/Pantry storage.
 - r. Parking garage/lot vehicle entrances/exits.
 - s. Valet/traffic circles.
 - t. Emergency call box locations in a parking garage.
- 3. Video recorders:
 - a. Seneca servers – primary (45+ cameras) shall be installed in NL1.130, WC1.206A, or Police Department server room depending on function/purpose.
 - 4. Dell servers – for satellite sites only (44 cameras or less) shall be installed on-site at satellite locations within the communications room(s).
 - a. Potential sites include clinical sites or other sites with high security or sensitive areas.
 - b. A primary recorder and a failover recorder are required for each satellite site.

VII. Section 28 15 23 Intercom Entry Systems

- A. General Information:
 - 1. Intercom entry systems are used at internal and external locations.
 - 2. All installations shall be ADA / TAS compliant.
 - 3. Connection to back-up power or battery is required.
 - 4. Coordination with security systems and door hardware are required.
 - 5. UTSW IR will manage systems after completion of projects.
- B. External Intercom Entry Systems:
 - 1. These solutions help manage access into buildings, normally at exterior locations.
 - 2. A video intercom will be connected to the UTSW phone network and route to a predetermined video phone location.
 - 3. Once the system and infrastructure are installed by a Contractor, UTSW IR will program devices, provide static IP address at exterior devices, and non-DID phone number. Interior video attendant may have a DID phone number.
 - a. Alternate destinations to receive calls may be discussed per project needs.
 - b. Recess or surface mount installations may be specified.
- C. Internal Intercom Entry Systems:
 - 1. These solutions help manage access into portions of buildings at interior locations such as a patient floor.
 - 2. A video intercom will be connected through the proprietary system to a video phone located at a nearby nurse station.

3. Utilizes Cat6 cables.

VIII. Section 28 23 33 Clinical Video Observation System

- A. Clinical Video Observation Systems may be required in some projects for training and patient safety. This system is used by clinical staff to monitor high-risk patients using power over ethernet (POE).
 1. Standard locations are where patient safety is a concern. This may be anywhere a patient can obtain access and may include rooms, corridors, and other identified spaces by the Clinical User Group.
- B. Clinical observation cameras are managed and installed through UTSW IR PMO.
- C. Locations to be indicated by Clinical Leadership.
 1. Stakeholders shall include Clinical leadership, User representative, IR PMO, and UTSW PM.

IX. Section 28 31 00 Addressable Fire Alarm System

- A. The fire alarm system shall be designed in accordance with NFPA 72: The National Fire Alarm Code by an individual appropriately licensed in accordance with the requirements of the Texas State Fire Marshal.
- B. All equipment and materials shall be installed in accordance with NFPA 72 and UTSW fire alarm design specifications.
- C. In MRI Spaces:
 1. Fire alarm system shall comply with the UTSW Master Specifications and be Class B wiring in the MRI room.
 2. If recommended by the MRI manufacturer, installation of wave guides and RF filters shall be installed in the fire alarm system wiring within the MRI room.
 3. Smoke detector(s) shall not be installed directly above the MRI.
 4. In the MRI room, installation of smoke detector(s) with NO intelligence shall be the only type permitted.
- D. Near Coolers and Freezers:
 1. Fire alarm notification devices shall not be placed in coolers or freezers. The device shall be located immediately outside of the unit so that the flash can be seen through the window (when a window is provided) or the occupant can be notified of the alarm immediately upon exiting the unit.
- E. Refer to Volume 3 for OSBC drawing submittal requirements.

X. Section 28 31 11 Building Intrusion Detection

- A. Building Intrusion Detection (Intrusion Panels) are required for the following project types within the project scope with review and approval by Access Control and UPD:
 - 1. Pharmacy.
 - 2. Campus stores.
 - 3. Irradiator rooms.
 - 4. Gamma Knife/Pods.
 - 5. Cash rooms.
 - 6. Other specialty locations as determined.
- B. These systems shall provide a battery back-up unless the system requires back-up power connection.
- C. Coordination is required with security systems, access control systems, and door hardware.

DIVISION 31 00 00 – EARTHWORK

I. General Information

- A. Earthwork processes on UTSW campus shall follow best practices to ensure solutions that will enhance long-term master planning goals.

II. Design Review Submittal Requirements

- A. Refer to Volume 3 – Deliverable Requirements.

III. Section 31 10 00 Site Clearing

- A. The OSBC Biological / Chemical Safety Director and/or the OSBC Environmental Compliance Manager must be consulted for elements of site clearing including:
 - 1. Any site clearing under a VCP Conditional Certificate of Closure, Restrictive Environmental Covenant, or similar environmental control.
 - 2. Prior to clearing any site which will require installation of a vapor instruction barrier before to building construction.
- B. Clearing and Grubbing:
 - 1. Clear/grub/strip site of trees, roots, and vegetation on that portion of the site to receive landscaping and improvements and remove roots to a minimum depth of 24-inches.
 - 2. Trees/vegetation to remain shall be adequately fenced and otherwise protected from damage by construction operations.
 - 3. No onsite burning is allowed unless approved by Owner.
 - 4. Refer to Division 32 00 00 – Exterior Improvement in the UTSW Design Guideline for more information on planting.
- C. Earth Stripping:
 - 1. If good quality, friable topsoil exists on site, strip this material to a depth of 4-inches and stockpile for reuse in areas to receive grass and other landscaping.
- D. Topsoil:
 - 1. Topsoil shall be a natural, fertile, and friable soil that is free of significant vegetation, rocks, or other deleterious materials. It shall be obtained from approved, naturally well-drained areas.
 - 2. Specifications shall include requirements for the Contractor to furnish the location where the topsoil is to be obtained and provide a one-gallon sample of such soil for approval by UTSW FM.
 - 3. Only the top 12-inches of earth shall be removed and used. Topsoil shall not be acidic or excessively alkaline or contain toxic substances, which may be harmful to the plant growth.
 - 4. Topsoil shall be without admixture of subsoil and shall contain a minimum of lumps, stones, stumps, roots, or similar substances 1-inc) or more in diameter, quality to be determined by Facilities Management Department or its representative.

- a. Topsoil shall not be collected from sites that are infected with a growth of, or the reproductive parts of, noxious weeds such as Nut Sedge or Johnson grass.
- b. Topsoil shall not be stripped, collected, or deposited while wet.

IV. Section 31 22 00 Grading

- A. Slopes of planted areas should allow easy maintenance.
 - 1. Turf areas shall have a slope of no more than 3:1 and no less than 1-percent. A 2-percent minimum slope is desirable.
 - 2. Areas with slopes greater than 3:1 must be planted with ground cover and constructed to control erosion.
- B. Slopes for walkways shall comply with Texas Accessibility Standards.
- C. Existing trees and other plant material to be preserved shall be indicated on the grading plan. Where trees are to be preserved no grading or paving of the existing grade within the drip line is allowed.
- D. Compact per the requirements of the Geotechnical Engineer or as a minimum compact the top 6-inches of all subgrades to receive embankment or paving/structural improvements to a minimum of 95-percent maximum density as per ASTM D-698. Open area embankment shall be placed in maximum 12-inch lifts and compacted to a minimum of 90-percent maximum density as per ASTM D-698.
- E. Structural embankment shall be compacted per the requirements of the Geotechnical Engineer or as a minimum compact in maximum 8-inch lifts to a minimum of 95-percent ASTM D-698. Backfill around structures shall be placed uniformly and only after the elements of the structure have attained the required strength to resist the soil pressure.
- F. Select fill where required shall be a material available in the general area of the project (if possible) having a plasticity index (PI) ranging from 7 to 15, a liquid limit of 35 or less and being free from organic matter, large rocks, or other deleterious materials.
- G. Mineral filler shall consist of some dust, crushed sand or other inert material approved by the Owner; and may be added in amounts not to exceed 10-percent of the weight of the sand or mixture of sands, to improve the workability or plasticity of the concrete mix.
 - 1. Such mineral filler must be of the quality specified for fine or coarse aggregate, and when tested by laboratory methods shall meet the following requirements for percentage by weight:
 - a. Number 30 (600 um) sieve – 0-percent retained.
 - b. Number 200 (75 um) sieve – 0 to 35-percent retained.
- H. Where a mineral filler is used, it shall be measured by volume or weighed and batched separately.

V. Section 31 23 00 Excavation and Fill

- A. Appropriate geotechnical and soil sampling is important to ensure there is no soil contamination prior to removal.
- B. Any excavation and digging below 1-foot around the campus bird sanctuary must be approved by the OSBC. The area of the bird sanctuary is defined as the tree line surrounding it.
- C. Backfilling is to be scheduled so there is a minimum amount of open excavation left during hours of no work.
 - 1. All open excavation shall be properly lighted and barricaded during hours that contractor is not on site.
 - 2. The open ends of all utility lines shall be temporarily sealed at the end of the working day.
- D. Adequate measures shall be taken to prevent runoff water from entering the trench without damage to surrounding facilities/properties.
- E. De-watering systems shall be provided as required for excavation/backfill activities and to allow installation of utility lines and embedment envelope on dry stable trench bottom.
 - 1. Prior to beginning de-watering, the OSBC Biological / Chemical Safety Director and/or the OSBC Environmental Compliance manager must be consulted.
 - 2. Discharge from the de-watering system shall be directed to drainage facilities of adequate capacity in a manner that will not damage or interfere with the use of adjoining facilities/properties.
 - 3. De-watering systems shall be provided at no additional cost to the Owner.
- F. The embedment zone for a utility line extends from 6-inches below the bottom of a utility line to 12-inches above its top.
 - 1. Embedment material for water and sanitary sewer PVC lines shall be clean sand.
 - 2. Embedment material for storm sewer RCP lines is fine gradation gravel with maximum diameter of 3/4-inch.
 - 3. Embedment material for pre-insulated thermal utility piping is sharp sand.
 - 4. Electrical ductbank is typically encased in red concrete and installed on the undisturbed trench bottom. Refer to Design Guideline Section 33 71 19 Underground Ductbanks and Manholes.
 - 5. High water table elevations may necessitate the use of an alternate embedment material and different embedment zone dimensions.
- G. Backfill above the embedment zone for trenches in open areas shall be native material compacted in maximum 12-inch lifts to 90-percent maximum density as per ASTM D-698.
 - 1. Backfill above the embedment zone for trenches in areas under existing or proposed pavement or ground supported structures shall be cement stabilized sand (1 ½ sacks of cement per cubic yard of sand) compacted in maximum 8-inch lifts.
 - 2. Consolidation of trench backfill by flooding/jetting is not allowed.
- H. An excavation/trench safety program shall be implemented which complies with OSHA Trench Safety Standards, Subpart P.
 - 1. The trench safety plan shall be prepared and sealed by a Texas Professional Engineer and submitted to the Owner prior to the start of construction.

VI. Section 31 31 16 Termite Control

- A. When soil treatment is required, all products used for the treatment of termites shall display labels bearing Environmental Protection Agency (EPA) approvals and shall be mixed and applied in accordance with directions on the label.

VII. Section 31 32 13 Lime Soil Stabilization

- A. If lime soil stabilization is required, refer to Division 32 00 00 "Site Paving" in the UTSW Design Guideline.
- B. Void Space Below Grade Beams - Provide soil retainers at the face of grade beams below grade to form a void of sufficient depth to prevent expansion of earth to cause pressure on bottom of beams.

DIVISION 32 00 00 – EXTERIOR IMPROVEMENTS

I. General Information

- A. UTSW Landscaping Services is responsible for maintaining over 100 acres of green space on the campus. This is accomplished through the coordination of landscape maintenance, irrigation, pest control, and maintenance of campus streets, sidewalks, and hardscapes with the goal of providing an inviting environment for visitors, students, faculty, and staff.

II. Design Review Submittal Requirements

- A. Refer to Volume 3 – Deliverable Requirements.

III. Section 32 10 00 Bases, Ballasts, and Paving

- A. Site Paving shall be provided to facilitate pedestrian and vehicular access along with ensuring emergency and service vehicles have clear access to the site and facility being designed.
- B. Materials, parameters, and methods shall be in basic conformance with the Texas Department of Transportation (TxDOT) “Standard Specifications for Construction of Highways, Streets and Bridges,” latest edition and applicable ASTM standards.
- C. Paving:
 - 1. Subgrade material to receive pavement sections other than pedestrian sidewalks which has a plasticity index (PI) greater than 17 shall be stabilized in place with lime prior to placing the pavement.
 - a. Lime shall be placed in slurry form or with Owner approval, lime may also be dry placed as Type C pelletized quicklime (grade DS).
 - b. Lime shall be thoroughly mixed into the subgrade with a rotary pulverizing mixer using a two-step preliminary mix/final mix procedure with appropriate curing times between mixes and compaction before opening to traffic or placing additional courses.
 - 2. Subgrade material to receive pavement sections other than pedestrian sidewalks which has a plasticity index (PI) less than 5 shall be stabilized in place with Type I Portland cement.
 - a. The cement shall be dry mixed into the subgrade using a rotary pulverizing mixer, appropriate water added and then thoroughly mixed with the cement and soil until a full depth uniform mix has been obtained.
 - 3. Appropriate compaction and moist curing shall occur prior to placing additional courses. Stabilized subgrade shall be compacted to the requirements of the Geotechnical Engineer or to a minimum of 95 percent of the maximum density as per ASTM D-698.
 - a. Stabilized subgrade shall extend a minimum of 12-inches beyond the supported pavement section.

- b. The amount of lime or cement to be added to the subgrade and the depth of stabilization shall be determined by the geotechnical consultant based on design mix tests and anticipated traffic loadings.
 - 4. Pavement sections subject to vehicular traffic shall be either a rigid section of Portland cement reinforced concrete (PCRC) or a flexible section consisting of hot mix asphaltic concrete (HMAC) surface over an approved flexible base material. UTSW PM shall confirm the appropriate pavement type per project.
 - a. PCRC pavement sections shall be a minimum of 6-inches thick.
 - i. Finish shall be broom or burlap drag. HMAC shall be Type "D" and the flexible base material shall be Type A, grade 1 or 2 as defined in the TxDOT standard specifications.
 - b. A rolling pattern for HMAC shall be established using a Troxler Nuclear Density Gauge.
 - i. The flexible base shall be compacted in maximum 8-inches lifts to a minimum density of 95-percent of the maximum density as per ASTM D-1557 and shall be primed with approved asphaltic material at a rate established by the team and shown on the plans prior to HMAC placement.
 - ii. The HMAC surface course shall be compacted to contain 3 to 8 percent air voids when tested in accordance with Tex-207-F and Tex-227-F.
 - 5. Concrete for all site paving/curbs/gutters shall have a minimum compressive strength of 3,000 psi at 28 days. Reinforcement shall be new deformed steel bars conforming to ASTM A615, Grade 60 minimum No. 4 bar in size. No welded wire fabric shall be used as reinforcement except in unique situations as approved by Owner.
 - 6. All concrete shall be adequately cured by protecting it against moisture loss for a period of not less than 72 hours beginning immediately upon completion of finishing operations and initial set of concrete.
 - 7. The thickness of the pavement section elements shall be recommended by the geotechnical engineer based on soil conditions and anticipated traffic loadings.
 - a. Pavement at dumpsters, loading docks, etc. subject to heavy vehicular maneuvering and turning shall be PCRC.
- D. Walking Surfaces:
 - 1. All stoops, porches, docks, and steps, exterior and interior, should have built-in abrasive surfaces.
 - 2. Slope exterior porches and treads to drain water 1/4-inch per foot.
 - 3. OSBC to be contacted to confirm requirements for coefficient of friction for sidewalk and pavements including broom finish levels. All flooring surfaces must provide slip resistance at wet and dry conditions of .5 or better with tribometer testing.
 - 4. Pedestrian sidewalks shall be PCRC with a minimum thickness of 4-inches and a minimum width of 4-feet. Pedestrian sidewalks that may also be service and/or emergency vehicle pathways shall be a minimum of 6-inches thick and appropriate width.
 - a. The finish shall typically be a light broom finish but shall be coordinated with any campus standard finish schemes.
 - b. Sidewalks shall be cross-sloped a maximum of 2 percent in the direction of site drainage patterns.

- c. Sidewalks adjoining concrete curb and gutter shall be doveled into the curb and gutter section.
 - d. Sidewalks adjoining foundations at doors and other points of pedestrian circulation shall be doveled to the foundation in a manner to prevent differential movement.
- E. Joints:
 - 1. Design Professional shall create a jointing plan to show the type and location of joints in all PCRC pavements, including sidewalks and curbs/valley gutters.
 - 2. Sidewalk expansion joints in shall be placed at walk intersections and at maximum 20-foot centers in straight runs.
 - 3. Expansion joints, contraction joints, construction joints and isolation joints shall be placed in accordance with good engineering practice as required to control cracking and other distress in the concrete pavement and to facilitate construction.
 - 4. Concrete sawn joints shall be cut “green” using the “soft saw cut technique” as soon as the concrete hardens to support the weight of an early entry type concrete saw and operator to avoid raveling.
 - 5. Expansion joints in concrete shall be primed before a urethane installation.
 - a. Self-leveling sealant is not preferred and shall be reviewed with Facilities Management for consideration.
 - b. All installations shall ensure the proper depth of urethane needed per specifications.

IV. Section 32 12 16 Asphalt Paving

- A. Asphalt paving is not typically installed on campus for permanent features. Any use shall be approved by FM and meet TXDOT requirements.

V. Section 32 13 13 Concrete Paving

- A. Concrete sidewalks width shall be sized to handle pedestrian flow.
 - 1. Sidewalks over 6-foot wide shall be designed to handle vehicular traffic.
- B. Concrete sidewalks are generally medium broom finish.
- C. Avoid surface drainage of storm water across sidewalks.

VI. Section 32 13 16 Decorative Concrete Paving

- A. Patterned concrete may be used on campus as it can be repaired easily.
- B. Imprinted and stamped concrete are not preferred as repairs are difficult to match original area.

VII. Section 32 14 00 Unit Paving

- A. Brick unit paving is utilized on campus and any new installations shall be judiciously studied before proposing.
 - 1. Issues to consider include foot and wheeled traffic, creation of slip hazards, trip hazards, maintenance, and aesthetics.
- B. Sand set paving is not preferred on campus as it causes trip hazards and increases maintenance in the long term.

VIII. Section 32 16 00 Curbs, Gutters, Sidewalks, and Driveways

- A. Concrete pavement shall typically be edged with a 6-inches concrete curb.
 - 1. A monolithic curb poured with the pavement is preferred.
 - 2. In non-monolithic pours, the curb section shall be recessed 1-inch into the pavement and attached with dowels of sufficient spacing and length to hold the curb firmly to the pavement.
- B. HMAC flexible pavement sections shall typically be edged by reinforced concrete curb and gutter.
- C. Curb and gutter section shall be placed on 4-inches of flexible base material compacted to the same requirements as the pavement section.
- D. Joints:
 - 1. Place doweled expansion joints in curb and gutter as a minimum at end of radius returns, at curb inlets and at maximum 40-foot centers in straight runs.
 - 2. Expansion joints in curbs with adjoining sidewalks shall match the joint location and spacing in the sidewalk.
 - 3. Contraction joints a minimum depth of 3/4-inches or 1/4 slab depth whichever is greater shall be placed at 10-feet intervals.
- E. Reinforced concrete valley gutters shall be placed in areas of concentrated storm water runoff across HMAC pavement such as at street/driveway intersections.
 - 1. The valley gutter section shall be placed on 4-inches of flexible base material compacted to the same density requirements as the pavement section.
 - 2. Doweled expansion joints shall be placed in valley gutters at maximum 40-foot centers.
- F. All pavement/surfaces and gutters shall be crowned and/or sloped sufficiently to positively direct storm runoff to points of discharge or collection as to eliminate 'birdbaths.'
 - 1. Minimum cross slopes for open pavement areas shall be 1-percent.
 - 2. Minimum crown for streets shall be 6-inches above the gutter line.
 - 3. Minimum slopes for curb and gutter shall be 0.5-percent.

IX. Section 32 17 00 Paving Specialties

- A. Parking Bumpers and parking blocks are not preferred since they are trip hazards.
 - 1. If required, they shall be painted safety yellow for contrast.
- B. The basic configuration of parking lots shall be as follows:
 - 1. Parking Angle: 90 degrees
 - 2. Stall Width: 9-foot (Compact spaces not preferred)
 - 3. Module Width:
 - a. 62-foot (stripe to stripe)
 - b. 60-foot (face of curb to stripe)
 - c. 58-foot (face of curb to face of curb)
 - 4. Drive Aisle: 24-foot (surface lots and garages)
 - 5. Stripe Width: 4-inch
 - 6. Stripe Length: 18-foot
 - 7. Stripe Colors:
 - 8. Pavement Markings Refer to color schedule in Specification Section 32 17 23
 - 9. Lighting: Refer UTSW Design Guidelines 26 56 00
 - 10. Landscaped Medians: Irrigated low-profile vegetation.
 - 11. Concrete Mow Strips: 2-foot-wide back of curb for head-in parking when no wheel stops are provided.

X. Section 32 17 23 Pavement Markings

- A. Pavement markings shall comply with Elimination of Architectural Barriers Texas Government Code Chapter 469, Texas Administrative Code 16 TAC part 4 chapter 68, Texas Accessibility Standards (TAS), and local jurisdiction for projects .
- B. Parking areas and roads may be managed by UTSW Parking Services or Facilities Management.
 - 1. Parking lots and parking garages are typically managed by Parking Services.
 - 2. Roads and restricted parking areas are typically managed by Facilities Management.
- C. Symbols, markings, and preferred materials shall be confirmed with UTSW FM and UTSW Parking Services per project.

XI. Section 32 31 00 Fences and Gates

- A. Fencing used on campus includes:
 - 1. Wrought Iron.
 - 2. Chain Link Fences and Gates.
 - 3. High-Security Chain Link Fences and Gates.
 - 4. Welded Wire Fenced and Gates.
 - 5. Expanded Metal Fences and Gates.
 - 6. Wire Fences and Gates.
 - 7. Wildlife Deterrent Fence.
- B. Design Professional shall confirm with UTSW PM the appropriate fencing type and design to match current standard designs per area of campus.

1. Coordinate grounding requirements with existing or proposed infrastructure.
- C. Access at gates shall be coordinated with Access Control and UTSW Key Control.

XII. Section 32 32 00 Retaining Walls

- A. UTSW utilizes many types of retaining walls including precast, unit masonry, and gabion retaining walls.

XIII. Section 32 33 00 Site Furnishings

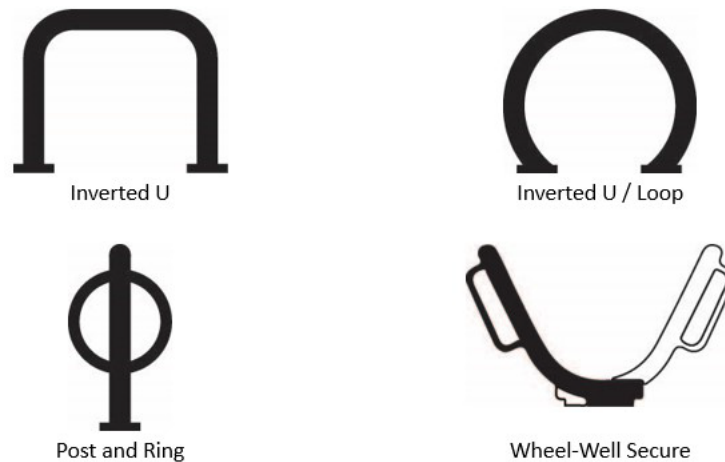
- A. Site Waste and Litter Containers.
 1. Refer to Master Specifications Section 32 33 00 – Site Furnishings for exterior basis of design products.
 2. Exterior layouts shall provide spaces for side-by-side waste and recycling containers in locations corresponding to building entrances, areas of seating, and expected traffic patterns with adequate lighting for usage after dark.
 - a. Locate waste containers at grade level in a manner so that they can be loaded from top as well as side while being screened from public view.
 - b. Where side-by-side locations are not possible, place recycling containers so they are visible from waste containers.
 3. In new construction, waste and recycling shall be matching units with labeling to identify recycling with text and/or the white triangular arrow symbol for recycling.
 4. At dumpster locations, provide a concrete pad of sufficient size and strength to accommodate the dumpster and truck. Ensure clear travel path for expected truck size, path, and turning space.

XIV. Section 32 33 13 Site Bicycle Racks

- A. Refer to Master Specification 32 33 13 – Site Bicycle Racks
- B. Bicycle racks shall be located near and be visible from building entrances but not placed to block any pedestrian movement. This location shall be in a well-lit, high-traffic areas, and be documented in Construction Documents.
 1. Preferred locations within covered parking garages or beneath building overhangs shall be discussed with Project Users and UTSW FM.
 2. Minimum lighting levels shall comply with UTSW Exterior Lighting Level Standard, refer to **Figures 26 56 00-01 through - 04 for Exterior Lighting Level Standards**.
 3. Design Professional to include safety discussions with UTSW PD for each installation and confirm requirements for additional safety or security.
 4. Locations shall be clear of accessible routes including those on sidewalks and pathways.
- C. The quantity of racks required will be determined during the schematic design stage with the UTSW PM.
- D. Rack Types:
- E. Bicycle racks shall be heavy and fastened to the ground surface. Utilize multiple mounting points either direct to concrete or to embedded anchors to prevent movement.

- F. Finish materials may include hot dipped galvanized steel, powder coated steel, or stainless steel. Confirm per campus standards per project.
- G. Rack configurations may include inverted-U (inverted horseshoe), post & ring (meter), and wheel-well secure types. High density configurations may be considered per project needs. Refer to **Figure 32 33 13.1 – Allowable Rack Configurations**.

Figure 32 33 13.1 – Allowable Rack Configurations: This sketch shows four styles of bike racks that are allowed on campus. These are the inverted U, Inverted U / loop, post and ring, and wheel-well secure.



XV. Section 32 84 00 Planting Irrigation

- A. Design and installation must meet Texas Commission on Environmental Quality (TCEQ) irrigation laws and requirements.
- B. Irrigation systems shall be installed under the supervision of a Texas Licensed Irrigator.
- C. Design of the irrigation system shall be positively separated from the domestic water system by a double check or reduced pressure type backflow preventer meeting the requirements of AWWA C506 and be suitable to the installation location and conditions.
 - 1. Backflow preventers may be placed in the mechanical space of the building when appropriate.
 - 2. Backflow preventers placed underground in landscape areas shall be in valve boxes or vaults with adequate room for testing.
 - 3. Backflow preventers placed above ground shall be located to minimize visibility and to maintain aesthetics.
- D. Enclose pipe and wiring beneath roadways, walks, curbs, etc., in sleeves.
 - 1. Extend sleeve ends 24-inches beyond the edge of paved surface.
 - 2. Mark sleeve location with 3/8- by 3-inches brass or stainless-steel stove bolt embedded in the concrete at each end. Refer to Design Guideline Division 33 00 00 for "Utility Marking."

3. Sleeving pipe beneath pedestrian pavements shall be PVC Class 200 with solvent welded joints.
 4. Sleeving pipe beneath drives and streets shall be Schedule 40 with solvent welded joints.
 5. Sleeves installed under pavement for future irrigation installation shall be loose capped on each end and marked with stove bolts as above.
 6. Size and depth of sleeve should be coordinated with the landscape architect, with a minimum size being 4-inches.
- E. Controller:
1. The satellite irrigation controllers should be located outside the building or as directed by FM.
 2. Controller units shall be compatible with the existing campus controller system.
 3. Locate a quick disconnect from the power source next to controller.
 4. Electric wire from the satellite controller to each remote-control valve and common wire shall be AWG No. 14 solid copper, type UF cable, UL approved for direct underground burial.
 - a. Wire color should be continuous over its entire length.
 - i. Use white for common ground wire.
 - ii. Use easily distinguishable colors for other control wires.
 - b. Control wire splices shall be made with 3M-DBY or equal direct burial splice kit. If multiple splices are made in one location, splices are to be placed in a valve box.
 - c. Install a control wire from controller to each remote-control valve.
 - d. Multiple valves on a single control wire are not permitted.
 - e. Control wires shall be in same trench as constant pressure lines.
 5. Provide an isolation valve for each zone; however, it is acceptable to install 2 zones to an isolation valve if necessary.
- F. Remote control valves and irrigation heads should be compatible with existing campus irrigation system.
1. Remote control valves shall be placed in valve boxes.
- G. Head-to-head spacing is required.
1. Spacing must not exceed manufacturer's recommended spacing.
 2. All heads shall be adjusted to factory specifications.
- H. Excavated material is generally satisfactory for backfill.
1. Backfill shall be free from rubbish, vegetation, frozen materials, and stones larger than 2-inches in dimension.
 2. Backfill placed next to pipe shall be free of sharp objects which may damage the pipe.
 3. Contractor shall be responsible for adding soil to trenches after settling has occurred.
- I. Upon completion of work, remove all tools, excess materials, and rubbish from site.
- J. Irrigation Materials List (last updated 06/2023):
1. Control System
 - a. Controller – WeatherTRAK cellular smart controller by Hydropoint with 10-year warranty and data. Controller model to be determined by irrigation system size.
 2. Valves
 - a. Control Valves - Hunter IBV Brass Valves
 - b. Drip Control Valves – Rain Bird XCZ-100-PRB-LC

- c. Isolation Valves
 - i. Manual Valves – Manual valves 2 ½-inch and smaller shall be all brass with wheeled handles, globe type with composition disc rated at 150 pounds W.O.G.
 - ii. Ball Valves – Ball Valves shall be used up to 4-inch in size. The size shall correspond to the main line they are attached to
- d. Quick Coupling Valves – Hunter HQ-33DRC
- e. Master Valve – Netafim Hydrometer (normally open)
- f. Flow Sensor – WeatherTRAK compatible flow sensor.
- g. Backflow Preventer - FEBCO 850 Double Check Assembly (DCA)
- 3. Valve Boxes
 - a. Control Valve Box – NDS Model No. 117BC Jumbo Box. Green Overlapping Lid
 - b. Isolation Valve for Control Valve Box – NDS Model No. 117BC. Jumbo Box. Green Overlapping Lid
 - c. Quick Coupler Valve Box – NDS Model No. 117BC SAND Black Jumbo Box. Purple Overlapping Lid
 - d. Main Line Isolation Valve Box – NDS Model No. 117BC SAND Jumbo Box. Sand Overlapping Lid
- 4. Swing Joints (NO Flex pipe or Funny pipe allowed)
 - a. 1/2 inch – Hunter
 - b. 3/4 inch to 1 inch - Lasco
- 5. Heads
 - a. Rotors
 - i. Hunter I-20-(04,06)-SS-ADJ
 - ii. Hunter I-25-(04,06)-SS-ADJ
 - iii. Hunter I-40-(04,06)-SS-ADJ
 - iv. Rain Bird R-VAN
 - b. Sprays
 - i. Hunter Pro-Spray Series (PRS30)
 - ii. Toro Precision Nozzles
 - c. Bubblers
 - i. Hunter Pro-Spray Series (PRS30)
 - ii. Irritrol 533 Adjustable flood bubble
- 6. Drip
 - a. Netafim Techline CV
- 7. Pipe
 - a. Mainline Pipe - ASTM D 2231, PVC, 1120 or 1220, Schedule 40 or Class 200
 - b. Lateral Line Pipe
 - i. Pipes 3/4-inch diameter and larger: ASTM D 2231, PVC, 1120 or 1220, SDR 21.0, 200 PSI
 - ii. Pipes 1/2-inch diameter: ASTM D 2231, PVC, 1120 or 1220, SDR 13.5, 315 PSI

8. Primer/Glue
 - a. Weld-On 711 for PVC pipe up to 4-inch and /or Weld-On 710 for PVC pipe up to 2-inch. In the event PVC pipe is greater than 4-inch then a Weld-On 711 series "heavy" body shall be used.
 - b. Weld-On P-68 or P-70 primer

XVI. Section 32 90 00 Planting

- A. Landscaped medians under 4-foot width must have drip irrigation.
 1. TCEQ check required.
 2. This includes any landscape strips between thorough fare and landscaped area.
- B. All landscaping plantings shall be planned and designed to be compatible with the overall campus landscaping scheme. Emphasis shall be placed on durability and low maintenance characteristics.
- C. Planting Mixture: Premixed blend of topsoil, organic matter, and sand in a ratio suited for the area and plant material specified.
- D. Planters: 12-inches minimum of planting mix placed in planter. Crown surface for drainage.
- E. Turf Areas: 3 to 4-inches of topsoil placed and fine graded before placement of turf.
- F. Concrete Mow Strip shall be used under any chain link fence location.
 1. Shall be one-foot wide minimum and be located at grade.
 2. If adjacent to a building, the mow strip shall not be doweled to the building foundation.
 3. Reinforcing shall be No. 3 rebar.
 4. Concrete shall be 5 sack mix, 3000 PSI at 28 days, minimum.
 5. Medium broom finish.
- G. All disturbed areas shall be seeded or sodded with a permanent grass and graded to properly drain.
- H. Landscape Architect shall ensure UTSW Landscape reviews and approves trees prior to any planting.

XVII. Section 32 92 00 Turf and Grass

- A. Sod / Sprig:
 1. TifGrand® (PP2117) (Cynodon dactylon (L.) Pers. x Cynodon transvaalensis)
 2. Palisades™ Zoysia (Zoysia Japonica Steud x Zoysia matrella (L.) Merr.)
- B. Seed:
 1. La Prima Bermuda (Cynodon dactylon (L.) Pers.)
 2. Princess 77 Bermuda (Cynodon dactylon (L.) Pers.)
 3. Riviera Bermuda (Cynodon dactylon (L.) Pers.)
- C. Sod variety shall be approved by the campus representative:
 1. Sod shall be purchased from a sod farm, composed of certified, approved, and true to name/variety:
 - a. Sod shall be cut, delivered and installed within 24 hours of cutting.
 - b. Sod shall be cut by mechanical means such as sod cutters.

- c. Sod shall not be cut when the moisture content (either excessively wet or dry) will affect the lifespan of the sod.
- 2. Sod shall be substantially free of noxious weeds, disease, insects, thatch, and undesirable grasses.
- 3. Sod shall have a sufficient density so that no surface soil is visible with a maximum mowing height of 1.5-inches.
- 4. Sod shall be neatly mowed and mature enough that when grasped at one end it can be lifted and handled without damage to the sod.
- 5. Sod shall be cut to provide a sufficient root zone and stand of live grass.
 - a. Sod shall be cut with a uniform soil portion of a 1/2-inch to 1-inch thickness, plus or minus 1/4-inches.
- 6. Area to be designated for sod, shall be fine graded, smoothed, and have topsoil placed before final grading. If soil is dry, lightly moisten before placement of sod.
- 7. First row of sod shall be placed in straight line with additional placement of rows shall be parallel and tightly placed against each row. Check boarding joints butted tightly shall be used. Sod shall not be stretched or overlapped.
- 8. Sod on slopes greater than 3:1 shall be placed perpendicular to slope. Sod on slopes shall be temporally fastened to ground by stakes, staples, pegs or other approved methods. After sod has become established, contractor shall remove fasteners.
- 9. Sod shall be rolled after section is placed and immediately watered prevent excessive drying. Thoroughly water sod so that underside of sod and soil are completely wet.
- 10. Upon laying of sod, UTSW Building Maintenance Landscape shop must be notified so irrigation can be adjusted for optimal growth.

XVIII. Section 32 93 00 Plants

- A. Allowable plant species on campus are below.
- B. Any Plant not specifically listed below will need approval from UTSW Landscape Department.

XIX. Section 32 93 13 Ground Covers

- A. Liriope.
- B. Mondograss.
- C. Purple Wintercreeper (*Euonymus fortunei* 'Coloratus').
- D. Sedge/Carex.
- E. Tam Juniper.
- F. Vinca Minor.
- G. Ornamental Grass:
 - 1. *Muhlenbergia capillaris*.
 - 2. *Miscanthus adagio*.
 - 3. *Miscanthus gracillimus*.
 - 4. *Miscanthus morning light*.
 - 5. *Pittosporum*.

XX. Section 32 93 23 Plants and Perennials

- A. Black Eyed Susan (*Rubeckia Goldsturm*).
- B. Butterfly Bush.
- C. Coneflower (*Echinacea*).
- D. Coral Bells (*Heuchera*).
- E. Coreopsis.
- F. Dianthus (perennial varieties).
- G. Daylily.
- H. Fern (Holly, Autumn & Wood).
- I. Guara.
- J. Hosta.
- K. Inland Sea Oats.
- L. Lantana.
- M. Phlox.
- N. Rock Rose.
- O. Russian Sage.
- P. Saliva:
 - 1. *Salvia greggii*.
 - 2. *Salvia farinacea*, 'Henry Duelberg.'
 - 3. *Salvia leucantha*.
 - 4. *Salvia sylvestris*, 'May Night.'
- Q. Senna (*Senna Corymbosa*).
- R. Skullcap.
- S. Turks Cap.
- T. Texas Gold Columbine.
- U. Verbena.
- V. Yarrow.

XXI. Section 32 93 33 Shrubs

- A. Abelia.
- B. Aspidistra.
- C. Aucuba.
- D. Azalea.
- E. Dwarf Burford Holly.
- F. Dwarf Yaupon Holly.
- G. Indian Hawthorne.
- H. Japanese Plum Yew.
- I. Juniper.
- J. Loropetalum.
- K. Nandina (dwarf/compact varieties).
- L. Pittosporum.
- M. Rose:
 - 1. Nacogdoches "Grandma's Yellow Rose."
 - 2. Antique & drift varieties.

- N. Spirea.
- O. Sunshine Ligustrum.
- P. Texas Sage (compact varieties).
- Q. Yucca (*Hesperaloe parviflora*) Red or Yellow.

XXII. Section 32 93 43 Trees

- A. Large Size (40+ Feet Tall) Requires Minimum 30 Foot Spacing. 3-inch Caliper minimum preferred.
 - 1. Black Walnut (*Juglans nigra*).
 - 2. Caddo Maple (*Acer saccharum*).
 - 3. Canby Oak (*Quercus canby*).
 - 4. Deodora cedar (*Cedrus deodara*).
 - 5. Ginkgo (MALE ONLY) (*Ginkgo biloba*).
 - 6. Louquat – Leaf Oak (*Quercus glaucoles*).
 - 7. Mexican sycamore (*Plantas Mexicana*).
 - 8. Mexican White Oak (*Quercus polymorpha*).
 - 9. Pecan (*Carya illinoensis*).
 - 10. Southern Magnolia (Cultivars Only) *Magnolia grandiflora*.
 - 11. Summer Red Maple (*Acer rubrum* 'HQSR').
- B. Trees – Medium Size (20 – 40 feet tall) – Requires 20 foot spacing.
 - 1. Arizona Cypress (*Cupressus arizonica*).
 - 2. Big Tooth Maple (*Acer grandidentatum*).
 - 3. Eastern Red Cedar (*Juniperus virginiana*).
 - 4. Lacebark Elm (*Ulmus parvifolia*).
 - 5. Lacey Oak (*Quercus laceyi*).
 - 6. Little Walnut (*Juglans Microcarpa*).
 - 7. Shantung Maple (*Acer truncatum*).
 - 8. Trident Maple (*Acer buergerianum*).
- C. Trees – Small Size (1 – 20 feet tall) – Requires 15 foot spacing.
 - 1. Eve's Necklace (*Sophora affinis*).
 - 2. Goldenball Leadtree (*Leucaena retusa*).
 - 3. Japanese maple (*Acer palmatum*).
 - 4. Loquat (*Eriobotya japonica*).
 - 5. Mexican Buckeye (*Ungnadia speciosa*).
 - 6. Red Buckeye (*Aesculus pavia*).
 - 7. Roughleaf Dogwood (*Cornus drummondii*).
 - 8. Texas Mountain Laurel (*Sophora secundiflora*).
 - 9. Texas Persimmon (*Diospyros texana*).
- D. Refer to Specification Section 32 90 00 Planting for additional information.

DIVISION 33 00 00 – UTILITIES

I. General Information

- A. All connections to campus utility distribution systems or public utilities shall be accurately located by dimensions or coordinates.
- B. All site utilities shall be included as part of the drawing deliverables. They shall be shown accurately in terms of size, depth, and location. Depth includes inverts shown at manholes and other critical points.
- C. Site telephones:
 - 1. Provide at least two ADA accessible exterior emergency telephones.
 - 2. Contractor to provide one telephone conduit, one power conduit, one power line, and foundation with anchor bolts.
 - a. Conduit shall be one-inch minimum size.
 - b. Verify exact location with UTSW PM.
 - c. Comply with campuses standard for emergency telephones.

II. Design Review Submittal Requirements

- A. Refer to Volume 3 – Deliverable Requirements.

III. Utility Marking

- A. Locations of utility lines, sleeves, and pipes underneath sidewalks, driveways, parking, or other paving shall be permanently marked with utility identification.
 - 1. Utility markers shall be brass, stainless steel, or other rugged metal drilled and adhered into the pathway near the perimeter.
 - 2. Markers shall have wording on the top with a general description of items buried as well as arrows indicating the direction of utilities.

IV. Section 33 05 00 Concrete Utility Boxes

- A. Concrete boxes required by the mechanical, plumbing, civil site work, and/or electrical divisions must be properly dimensioned, reinforced and/or detailed.
- B. Chilled water and heating water valves in underground systems shall have a concrete valve box with sufficient space to maintain and operate valves.
- C. Direct buried valves may be considered if acceptable to UTSW FM.

V. Section 33 05 61 Manhole Covers

- A. UTSW has standardized utility manhole covers shall be conventional cast iron or steel covers with H-20 & AASHTO HS-25 load rating.
 - 1. Provide TxDOT-rated thickness to be used for vehicular traffic on roadways and drives.
 - 2. The top surface is slip resistant.

3. "UTILITIES" to be cast into center of all manholes together with utility commodity name (ELECTRICAL, THERMALS, SANITARY, STORM) where applicable.
4. No commodity name to be shown on access covers for utility tunnels.
5. All covers are to be ordered with a locking device.
6. Provide and install manhole inflow protectors at all ductbank manholes and other locations as required by UTSW FM.
7. Provide and install aluminum label markers at each manhole. The identification wording shall be approved by UTSW FM prior to installation.

VI. Section 33 10 00 Water Utilities

- A. The domestic water system shall be designed and installed in accordance with TCEQ requirements.
- B. Domestic water piping from 4- to 12-inch in size shall be AWWA C-900 or AWWA C-909, Class 200 PVC with elastomeric gasketed push-on joints.
 1. Piping smaller than 4-inch shall be SDR 21 Class 200 ASTM D2241, PVC with elastomeric gasketed push on joints. Fittings shall be PVC of equal strength.
 2. Domestic water piping larger than 12-inch shall be AWWA C-905, Class 200 PVC with elastomeric gasketed push-on joints.
 3. Fittings shall be cement mortar lined and appropriately coated and protected mechanical joint ductile iron.
- C. All angles, bends, tees etc. shall be stabilized with concrete thrust blocks sized by the Design Professional.
- D. Appropriately spliced and terminated tracer wire or aluminum tape shall be laid with all non-metallic water line.
- E. Line Valves:
 1. Line valves shall be placed at all points of connection to existing water lines, at branch intersections, and any other location necessary for adequate control of the water system.
 2. Typically, the number of valves at an intersection will equal the number of branches less one.
 3. "In line" valves shall be placed in long runs of pipe at approximate 2000-foot spacing.
 4. Adequately supported air/vacuum relief valves shall be installed as required along the main in enclosures to facilitate draining and maintenance/inspection.
 5. Line valves 3-inch and larger shall be direct bury resilient wedge gate valves meeting the requirements of AWWA C509 with mechanical joint connectors and non-rising stem nut operator.
 6. Valves shall be poly wrapped in accordance with AWWA C105.
 7. All valve operators shall open when turned counterclockwise and close when turned clockwise.
 8. Line valves smaller than 3-inch shall be bronze body ball valves with threaded connectors, stainless steel ball and stem, lever operated with a rated working pressure of 200 psi.
- F. Cast iron adjustable valve boxes with surface reinforced concrete collar shall be provided over all buried valves to provide access from ground surface to valve operating nut.

- G. Fire Hydrants:
 - 1. Adequate fire hydrants shall be placed around the facility such that no portion of the building is over 300-foot from a hydrant.
 - 2. Fire hydrants shall be 5 1/4-inch main valve opening with 2 ~ 2-1/2-inch hose nozzles and a 4 1/2-inch pumper nozzle.
 - 3. Coordinate nozzle size and thread requirements with entity providing fire protection.
 - 4. Fire hydrants shall be dry-top compression type hydrants, traffic model, complying with AWWA C502.
 - 5. Auxiliary gate valves shall be placed in all fire hydrant leads.
- H. Where necessary, connections to existing water mains shall be a “hot” tap using a tapping sleeve and valve appropriate to the type of pipe being tapped.
 - 1. No full-size taps shall be made without approval by the Owner.
- I. The domestic water supply to a facility shall be metered unless directed otherwise by the Owner.
- J. The complete site domestic water system installed for the project shall be pressure tested for leakage in accordance with TCEQ requirements along with applicable fire protection codes and shall be disinfected in accordance with the requirements of AWWA C601.
- K. All waterlines shall have an aluminum detector tape placed 12-inch below final grade.

VII. Section 33 30 00 Sanitary Sewerage Utilities

- A. The sanitary sewer system shall be designed, installed, and tested in accordance with Texas Commission on Environmental Quality (TCEQ) requirements.
 - 1. Leakage test on PVC pipe shall be a low-pressure air test performed as set forth by the Uni-Bell PVC Pipe Association.
 - 2. Deflection tests shall be by a mandrel pulled 30 days following trench backfill.
 - 3. All tests shall be witnessed by the Owner.
- B. Sanitary sewers sizes shall be determined by a Texas Professional Engineer (PE) and is to be based on existing/future capacities.
- C. Sanitary sewer and storm sewer shall be shown on separate sheets along with the profiles for all pipe sizes. Include depth of cover, other utility crossings with verified elevations, slope, inverts, pipe material, and class of pipe at a minimum.
- D. Piping:
 - 1. Gravity sanitary sewer mainlines shall be no less than 6-inch and services lines shall be no less than 4-inch.
 - 2. All gravity sanitary sewer piping shall be SDR 26 PVC (ASTM D 3034) or heavier.
 - 3. Exposed piping shall be ductile iron with appropriate coating protection.
 - 4. PVC and ductile iron piping shall have watertight push-on joints using elastomeric gaskets meeting the requirements of ASTM F 477 and AWWA C111 respectively.
 - 5. Fittings shall be of equal strength as the piping. Appropriately spliced and terminated tracer wire or aluminum tape shall be laid with all non-metallic sewer piping.
 - 6. All pipes penetrating exterior walls or foundations of buildings below grade must be installed properly with sleeves to prevent breakage due to building settlement or expansive soil.

- E. Manholes:
 - 1. Manhole construction and testing shall be in accordance with TCEQ requirements.
 - 2. Sanitary sewer manholes shall be either cast-in-place or pre-cast (ASTM C478)) with a reinforced concrete base. Minimum 28-day concrete strength shall be 3,000 psi.
 - 3. Provide 30-inch diameter minimum size access openings for all sanitary manholes.
 - 4. Manholes are required for all horizontal and vertical bends as well as changes in pipe size.
 - 5. Manholes on sanitary sewer mainlines shall be spaced no further than 350-feet apart. Additional locations include at all piping intersections and angle points with an exception at 4-inch service lines. Appropriate wye fittings shall be used at such service connections.
 - 6. Manholes shall be placed on 9-inch of 1-1/2 sack cement stabilized sand.
 - 7. The invert of the manhole shall be sloped and smooth finished sufficiently to prevent deposition of solids.
 - 8. If the elevation difference between an entering pipe and the existing pipe is more than 2-feet, a drop type connection to the manhole shall be used.
- F. Cleanouts shall be provided for all service laterals and be located at the building and at each bend. Cleanouts shall be installed on all 4-inch sanitary sewer service lines as required to facilitate line cleaning.
- G. Sanitary sewer lift stations shall consist of precast (ASTM C478) or cast-in place reinforced concrete wet well containing a heavy-duty duplex pumping system readily accessible/removable for replacement/maintenance.
 - 1. A lockable hatch system of adequate size for maintenance/access shall be provided.
 - 2. A reliable level control system shall be provided to start/stop the pumps including a high-level alarm.
 - 3. The basic control system shall consist of a remote disconnect, combination starter for each motor, H-O-A switches, visual and audible high-level alarm, run lights and seal failure sensors. All Conduit connections to the wet well will be adequately sealed to sewer gases/moisture.
 - 4. Pump discharge piping for each pump shall be flanged ductile iron containing a check valve and plug valve located in a valve pit exterior to the wet well. Metal surfaces inside the wet well and the inside surfaces of the wet well shall be protected by appropriate coatings.
 - 5. Valve pit shall have a lockable hatch of adequate size for operation and maintenance of valves.
- H. Sanitary sewer force mains shall be SDR 21 PVC complying with ASTM D2241.
 - 1. All fittings shall be of equal Class and pressure rating as pipe. All angles, bends, tees, etc. shall be stabilized with concrete thrust blocks, sized by the Design Professional.
 - 2. All non-metallic force mains shall have aluminum detector tape 12-inch placed below final grade.

VIII. Section 33 40 00 Storm Drainage Utilities

- A. Storm sewer sizes shall be determined by a Texas Professional Engineer (PE) and is to be based on existing/future sewer capacities and a drainage study for storm sewers. If the existing infrastructure cannot accommodate the increased loads, then an estimate shall be presented to the Owner to determine if additional funds need to be appropriated for any up sizing.
- B. Storm sewer shall either be RCP Class III (ASTM C76) for 12-inch and above or SDR 26 PVC (ASTM D3034) or heavier for less than 12-inch. RCP joints shall meet ASTM C443. PVC pipe shall have watertight push-on joints meeting the requirements of ASTM F477.
- C. Storm roof drains shall be run separately from all other storm water sources to the outside of the building.
- D. Manholes:
 - 1. Manholes and/or junction boxes with access openings shall be installed on the storm sewer system at all piping intersections, changes in slope, and changes in angle points. The exception is at small drain leads, which may use appropriate wye fittings.
 - 2. Manholes shall be either pre-cast (ASTM C 478) or cast-in-place with a reinforced concrete foundation.
 - 3. Iron castings for manhole rings and covers shall conform to ASTM A 48, Class 30 and be traffic rated.
 - 4. Junction boxes shall be of reinforced pre-cast or cast-in-place construction. Minimum 28-day concrete strength shall be 3,000 psi.
 - 5. The foundation for manholes and/or junction boxes shall be on 1-1/2 sack cement stabilized sand.
 - 6. Provide 30-inch diameter minimum size access openings for all manholes.
- E. Inlets:
 - 1. Area inlets for the storm sewer system shall be either pre-cast or cast-in-place reinforced concrete with frame and grate iron castings conforming to ASTM A48 Class 30 and shall be traffic rated.
 - 2. Curb inlets shall also be either pre-cast or cast-in-place with a manhole frame and cover installed in the top to allow access.
 - 3. At pedestrian drop-off points or other high visibility areas design inlet tops to be cast-in-place. Minimum concrete 28-day compressive strength for inlets shall be 3,000 psi.
- F. Typically storm sewer discharge points shall be stabilized with either a pre-cast or cast-in-place headwall structure with adequate surrounding rip-rap to control erosion. Minimum concrete 28-day compressive strength for headwalls shall be 3,000 psi.

I. Section 33 60 00 Hydronic and Steam Energy Utilities

- A. Piping:
 - 1. Chilled water and heating water distribution piping shall be pre-insulated ductile iron. All straight section shall be factory insulated. Fittings and joints shall be provided with field insulation kits compatible with the factory insulation. The insulation shall be protected by an HDPE outer shell. Pipe shall be listed suitable for use with 43-degree chiller water and 180-degree heating water. Ductile iron pipe shall be Class 50 thickness, restrained joint conforming to ANSI A 21.512 or AWWA C 151-75.
- B. Pipe and fittings shall be cement lined and have an external bituminous/tar coating and no internal coating. Pipe and fittings shall be U.S. Pipe TR FLEX or Clow Super Lok.
- C. Spacing between chilled and heating pipes should be at least 10 – 12 inches.
- D. Direct burial of steam piping is not acceptable but may be required on some areas of campus. This is only allowed after review and approval from Utilities group.
- E. Use Cor-ten® bolts or corrosion resistant alloy bolts on underground piping especially heating water piping.
- F. Direct bury of valves is not recommended. Valves shall be located for access within a vault or manhole.

IX. Section 33 71 19 Underground Ductbanks and Manholes (Electrical)

- A. Underground ductbanks provide pathways for services throughout the UTSW campus. Design considerations shall include the campus master plan for future construction, existing utilities, efficiencies, future growth, and providing redundancy for required service and maintenance.
 - 1. Provide redundant manholes.
- B. Ductbanks shall be indicated and sections shown in Design Development stage at the latest.
 - 1. Normal electrical service ductbank from exterior transformer to the building shall not include conductors of other systems.
 - 2. Ductbanks from exterior generator to building shall not include conductors of other systems not serving the generator.
 - 3. Generator conductors for controls, status indicator, and feeders to generator mounted branch panels shall be allowed.
 - 4. Normal and generator conductors shall not share manholes.
- C. Outside the perimeter of buildings, install underground medium-voltage conductors in red-colored, concrete-encased, steel-reinforced ductbanks with not less than 3-inches concrete coverage and 1.5-inches between adjacent ducts.
- D. Specify red-dyed concrete for medium-voltage ductbank embedment.
 - 1. Dye shall consist of red ferrous-oxide concrete coloring pigment mixed at the rate of two pounds per sack of cement.
- E. Minimum duct trade size (nominal voltage class):
 - 1. Low-Voltage (0 - 1000 V): 2-inches
 - 2. Medium-Voltage (15kV): 6-inches
- F. Specify duct material to be Schedule 40 polyvinyl chloride (PVC).

- G. Design ductbanks and manhole systems to slope a minimum of 3-inches per 100-feet to a suitable sump in a manhole.
- H. Provide and install manhole inflow protectors at all ductbank manholes.
 - 1. Provide and install aluminum label markers at each manhole. The identification wording shall be approved by UTSW FM prior to installation.
- I. Design the ductbanks to provide a minimum cover of 30 inches from the ground surface to the top of the concrete.
- J. For new power ductbank installations, provide 33-percent spare ducts, rounding all fractions up to the next whole number, but not less than one spare duct.
- K. For projects involving the addition of cable(s) to an existing ductbank, provide a new duct run along the same route if the installation will fill the only remaining open duct(s).
- L. Provide a minimum of two new spare ducts. A fault in a ductbank frequently results in the faulted cable adhering to the walls of the duct, very difficult or impossible to remove.
- M. Install underground warning tape below grade and above all ductbanks marked "BURIED ELECTRIC LINE." Warning tape shall be metallic (detectable) or contain a detection strip integral to the tape material.

X. Section 33 71 19.13 Power Manholes

- A. Provide precast concrete manholes dedicated to the campus medium-voltage utility and distribution system. Include all standard hardware and accessories.
- B. Provide precast manholes for all site medium voltage power distribution. The maximum allowed spacing is 400-feet and at all 90 degree horizontal changes in direction.
- C. Medium-voltage manholes used for the distribution of power shall have nominal dimensions of 8-feet high by 10-feet long by 8-feet wide to accommodate the space required for pulling, bending, wrapping, and supporting the largest shielded MV105 cables required for a 600A main feeder circuit consisting of 3-500 kcmil conductors plus a 600V-rated 2 AWG grounding conductor, in addition to the largest submersible medium-voltage switch that may be installed (a unit with 5 switched-ways each rated at 600A).
- D. Standard hardware and accessories for power manholes include:
 - 1. Thin-wall knockouts on every wall.
 - 2. Ladder with skid-resistant rungs anchored to floor and wall.
 - 3. H-20 rated manhole ring and cover.
 - 4. Sump pit & pump.
 - 5. "Ladder Up" safety post.
 - 6. All metal parts bonded to ground rod.
 - 7. Cable racks.
 - 8. Pull irons.
- E. Existing manholes must always remain accessible during construction.

XI. Section 33 80 00 Data/Communications Distribution

- A. The contractor shall furnish and install a communications ductbank consisting of 4 four-inch conduits surrounded by reinforced concrete similar to the 12KV ductbanks except the concrete shall not be dyed orange.

- B. This ductbank shall include a No. 2/10 bare ground wire cast inside the concrete envelope. The ductbank shall run from the building's main distribution frame room (MDF) to the Owner designated communications manhole.
- C. Sand shall not be used as a backfill.
- D. A minimum of 18-inches of backfill is required but 24-inches is preferred.
- E. There must be a minimum of 24-inches of cover above the concrete encasement.
- F. All hand holes shall be traffic rated and large enough to store cable slack without damaging cable.
- G. Two of the three ducts must have 3-2 cell flexible fabric inner duct installed.

XII. Site Lighting

- A. Refer to Division 26 00 00 of the UTSW Design Guidelines.

FACILITIES MANAGEMENT DESIGN GUIDELINES – VOLUME 2 UPDATE LOG JUNE 25, 2026

FORMAT AND TERMINOLOGY UPDATES

The UTSW Design Guidelines was reformatted to comply with new requirements under Title II of the Americans with Disabilities Act (ADA) from April 24, 2024 as well as UTSW Policy ETH-151, which requires compliance with WCAG 2.1 Level A and AA Standards.

The original document is now divided into three volumes to provide greater accessibility of the information. The following identifies the old and new format, noting where components have moved or been removed.

Previous Document Format	New Document Format
No Volume	Volume 1 – Design Philosophy, Codes, and Standards
Section A – Design Philosophy	Section A – Design Philosophy
Section A1 – Master Specifications (now B2)	NA
Section A2 - Animal Resource Center (A.R.C.) Design Requirements	Section A1 - Animal Resource Center (A.R.C.) Design Requirements
Section A3 – Clinical Design Requirements	Section A2 – Clinical Design Requirements
Section A4 – Laboratory Design Requirements	Section A3 – Laboratory Design Requirements
No Volume	Volume 2 – Design Requirements
Divisions 00 00 00 through 32 00 00	Divisions 00 00 00 through 32 00 00
No Volume	Volume 3 – Deliverable Requirements
Section B – Codes and Standards	Section B – Codes and Standards
Section B1 - Definitions	Section B1 – Definitions
NA	Section B2 – Master Specifications (previously A1)
Section C – Deliverable Requirements for Design Documents	Section B3 – Deliverable Requirements for Design Documents
Section C1 – Deliverables Checklist (Removed)	NA
Index (Removed)	NA

Format changes:

- Images and tables have new descriptions preceding each one to describe the content shown.
- Images have alternate text added and color has been revised to provide greater contrast.
- Tables have been revised to simplify the content to provide more accessible content. In some cases, larger individual tables have been divided into multiple, smaller tables. In general, the content has not changed unless it is noted in the revisions list below.
- For sections 00 00 00 through 32 00 00, subchapter II, Design Review Submittal Requirements have all been revised to indicate the new format. They now say to refer to Volume 3 – Deliverable Requirements

Terminology changes:

- “AE” changed to “Design Professional”
- “OSBC....” changed to “Safety”
- “Director FPD&C” changed to “Asst. VP of FPD&C”

CONTENT REVISIONS

The following changes were implemented. Updated text in **bold**.

Section	Revision/Addition
Table of Contents	Updates for new sections, section name changes, and page number adjustments.

Volume 2:

Division 23 00 00 VII Research Lab Spaces HVAC System

Addition

- G. **Equipment and freezer galley spaces, which hold many heat producing pieces of laboratory equipment, are typical in UTSW buildings. The Design Professional shall offer solutions for review to assist with the efficient exhaust of heat. Potential solutions include low-level exhaust grilles in lieu of ceiling level exhaust.**

Division 23 00 00, XXIX Section 23 50 00 Central Heating Equipment

Revision

- B. **For any projects that add or modify boilers, the UTSW emissions consultant must review the plans to determine additional requirements. Refer to EXHIBIT 23.4 Boiler Emission Requirements for guidelines**

Division 23 00 00, XXXIII Section 23.4 Boiler Emission Requirements

Reformatting and Addition. Original tables have been reformatted into text lists for accessibility. Regulatory references have been added.

- A. **The information in this exhibit is intended to serve as a guideline for Design Professionals.**
1. **Regulatory References:**
 - a. **DFW Chapter 117 applicability, exemptions and emission limits - 30 TAC §117.400 - §117.410**
 - b. **Initial demonstration of compliance - 30 TAC §117.435**

- c. Continuous demonstration of compliance - 30 TAC §117.440
 - d. Reporting, recordkeeping and notifications - 30 TAC §117.445
 - e. Compliance stack testing and report requirements - 30 TAC §117.8000 and §117.8010
 - f. Emissions monitoring – 30 TAC §117.8100, §117.8120, and §117.8130
 - g. Federal NSPS Boilers - 40 CFR Part 60, Subparts A and Dc
 - h. New Source Review Authorizations – PBR: 30 TAC §106.183, Standard permit: 30 TAC Chapter 116, Nonattainment NSR Authorization: 30 TAC §§116.150–152, 30 TAC §116.615
 - i. Title V Authorization – 30 TAC Chapter 122; 40 CFR 70
- B. Natural Gas-Fired Hot Water and Steam Boiler Design Phase – Air Quality Compliance**
- 1. **≤ 2.0 MMBtu/hour Maximum Design/Rated Heat Input Capacity.**
 - a. Federal Air Quality Regulations – Not Applicable, presumes no diesel fuel/fuel oil used as backup-fuel. Reference: 40 CFR, 60.40c(a)
 - b. State Emission Limits – Not Applicable, Less than or equal to 2.0 MMBtu/hr. Reference: 30 TAC, 117.403(a)(1)(A)
 - c. Meters – Not Required, Less than or equal to 2.0 MMBtu/hr. Reference: 30 TAS 117.403(a)(1)(A)
 - d. Emissions Monitoring – Not Required, Less than or equal to 2.0 MMBtu/hr. Reference: 30 TAS 117.403(a)(1)(A)
 - e. Stack Testing – Not Required, Less than or equal to 2.0 MMBtu/hr. Reference: 30 TAS 117.403(a)(1)(A)
 - f. New Source Review (NSR) Authorization – Permit by Rule; No registration required, Greater than or equal to 2.1 MMBtu/hr. Reference: 30 TAC 106.183
 - g. Nonattainment NSR (NNSR) Authorization – Case-by-case assessment; Project NO_x emissions must be < 5 TPY; May require APD-CERT, Less than 10 MMBtu/hr. Reference 30 TAC 116.150 – 152, 30 TAC 116.615
 - h. Title V Authorization – Case-by-case assessment. May warrant off-permit notification, especially if not included within currently permitted boiler groups, Less than 10 MMBtu/hr. Reference: 30 TAC 122, 40 CFR Part 70
 - 2. **2.1 to < 10 MMBtu/hour Maximum Design/Rated Heat Input Capacity**
 - a. Federal Regulatory Applicability – Not Applicable, presumes no diesel fuel/fuel oil used as backup-fuel. Reference: 40 CFR, 60.40c(a)
 - b. State Emissions Limits – NO_x Limit = 0.036 lb/MMBtu (30 ppmvd at 3 percent O₂); CO Limit = 400 ppmvd at 3 percent O₂. Less than or equal to 2.0 MMBtu/hr. Reference: 30 TAC, 117.410(c)(1)
 - c. Meters – Fuel Use, totalizing flow meter (monthly records). Less than or equal to 2.0 MMBtu/hr. Reference: 30 TAC 117.440 (a)
 - d. Emissions Monitoring – No_x and CO, quarterly, portable analyzer. Less than or equal to 2.0 MMBtu/hr. Reference: Periodic Monitoring option 30 TAC, 117.430 (b)

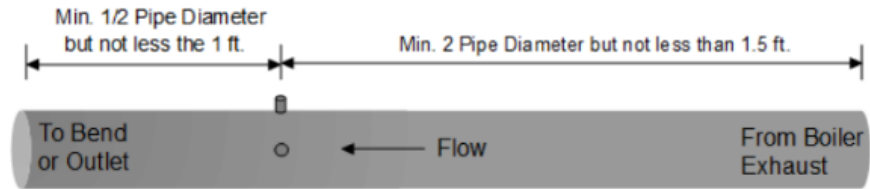
- e. **Stack Testing** – Required within 60 days of first fire, Notification due 15 days before testing, Report due within 60 days of testing. Greater than or equal to 2.1 MMBtu/hr. Reference: 30 TAC 117.435 (a) (30 TAC (c)(1)
 - f. **NSR Authorization** – Permit by Rule; No registration required. Less than 10 MMBtu/hr. Reference: 30 TAC 106.183
 - g. **NNSR Authorization** – Project NOx emissions must be < 5 TPY; May require APD-CERT. 100 MMBtu/hr or less, but greater than or equal to 10 MMBtu/hr. Reference 30 TAC 116.150 – 152, 30 TAC 116.615
 - h. **Title V Authorization** – Case-by-case, may warrant off-permit notification. 100 MMBtu/hr or less, but greater than or equal to 10 MMBtu/hr. Reference: 30 TAC 122, 40 CFR Part 70
3. **≥ 10 to 40 MMBtu /hour Maximum Design/Rated Heat Input Capacity**
- a. **Federal Regulatory Applicability** – Requires Notifications, for less than 10 MMBtu/hr. at:
 - i. Date construction is commenced (initial + 45-day interruptions), postmarked ≤ 15 days after.
 - ii. Date construction complete postmarked within 15 days after.
 - iii. Date of initial startup submitted prior to, with time that allows regional rep to be present.
 - iv. Reference: Federal: 40 CFR 60.7 (a)(1)-(3), 60.48c(a); State: If standard permit, 30 TAC 116.615(4)
 - b. **State Emissions Limits** - NOx Limit = 0.036 lb/MMBtu (30 ppmvd at 3 percent O₂); CO Limit = 400 ppm at 3 percent O₂, greater than or equal to 2.1 to less than 40 MMBtu/hr. Reference: 30 TAC, 117.410(c)(1)
 - c. **Meters** – Meter required to measure fuel use totalizing flow meter; monthly records required, greater than or equal to 2.1 to less than 40 MMBtu/hr. Reference: 30 TAC 117.440 (a)
 - d. **Emissions Monitoring** – Nox and CO (quarterly, portable analyzer), greater than or equal to 2.1 to less than 40 MMBtu/hr. Reference: Periodic Monitoring option 30 TAC, 117.430 (b)
 - e. **Stack Testing** – Required within 60 days of first fire, greater than or equal to 2.1 MMBtu/hr. Reference: 30 TAC 117.435 (a) (30 TAC (c)(1)
 - i. Notification due 15 days before testing.
 - ii. Report due within 60 days of testing.
 - f. **NSR Authorization** – Permit by Rule; No registration required, less than or equal to 40 MMBtu/hr. Reference: 30 TAC 106.183
 - g. **NNSR Authorization** – Project NOx emissions must be < 5 TPY; May require APD-CERT, potentially applicable to all heat input capacities. Reference 30 TAC 116.150 – 152, 30 TAC 116.615
 - h. **Title V Authorization** – Case-by-case; may warrant off-permit notification. Reference: 30 TAC 122, 40 CFR Part 70
4. **40 to 100 MMBtu /hour Maximum Design/Rated Heat Input Capacity**
- a. **Federal Regulatory Applicability** – Requires Notifications a
 - i. Date construction commenced (initial + 45-day interruptions) postmarked within ≤ 15 days after.

- ii. Date of construction complete postmarked 15 days after.
 - iii. Date of initial startup submitted prior to, with time that allows regional rep to be present.
 - iv. Reference: Federal: 40 CFR 60.7 (a)(1)-(3), 60.48c(a); State: If standard permit, 30 TAC 116.615(4)
 - b. State Emissions Limits – NO_x Limit = 0.01 lb/MMBtu (9 ppmvd at 3 percent O₂); CO Limit = 50 ppmvd at 3 percent O₂, greater than or equal to 2.1 to less than 40 MMBtu/hr. Reference: TCEQ BACT / Standard permit for boilers (30 TAC 116.111 and related NSR requirements)
 - c. Meters – Meter required to measure the following, greater than or equal to 2.1 to less than 40 MMBtu/hr. Reference: 30 TAC 117.440(a), 30 TAC 117.445(f)(2)(A)
 - i. Fuel use, totalizing flow meter, hourly records required.
 - ii. Hours of operation.
 - d. Emissions Monitoring – Monitors required to measure the following, Greater than or equal to 2.1 to less than 40 MMBtu/hr. Reference 30 TAC 117.440, with related requirements in 117.430, 117.435, and 117.445
 - i. Stack oxygen, hourly records required;
 - ii. NO_x and CO (parametric measurements based on stack oxygen and fuel flow); hourly records required.
 - e. Stack Testing – Required within 60 days of first fire, Greater than or equal to 2.1 MMBtu/hr. Reference: 30 TAC 117.435 (a) (30 TAC (c)(1))
 - i. Notification due 15 days before testing,
 - ii. Report due within 60 days of testing.
 - f. NSR Authorization – Registered under one of the following, Less than or equal to 40 MMBtu/hr. Reference 30 TAC Chapter 116
 - i. Standard Permit for boilers,
 - ii. Individual NSR permit.
 - g. NNSR Authorization – Project NO_x emissions must be < 5 TPY (may require APD-CERT for sources not included in above permits), Potentially applicable to all heat input capacities. Reference 30 TAC 116.150 – 152, 30 TAC 116.615
 - h. Title V Authorization – Case by case, may warrant off-permit notification. Reference: 30 TAC 122, 40 CFR Part 70
- C. Stack Testing Port Location Requirements:
- 1. Gas sample ports may be constructed by welding a 1/2- to 1-inch collar or threadolet on the exhaust pipe and closing it off with a bull plug. Alternately use a 1- by 6-inch pipe nipple, closed with a pipe cap.
 - 2. Threaded connections should be made hand tight only and threads should be coated with high temperature anti-seize compound. There should be no obstructions within 2 pipe diameters of the direction pointed by the port.
 - 3. 2 ports are needed at 90 degrees from each other

B. Figure 23.4-1 – Stack Testing Port Diagram: This diagram shows an example of a stack with a testing port location noted. From the bend or outlet side, this distance is a

minimum of half the pipe diameter but not less than 1 foot. From the boiler exhaust, the distance is a minimum of 2 pipe diameters but not less than 1.5 feet. The direction of flow moves from the boiler exhaust towards the bend or outlet.

Stack Testing Port Location Requirements



Division 26 00 00, III Utilization Voltages

Addition

- B. **The mixing of voltages in junction boxes and raceway is not permitted in UTSW facilities and goes beyond NEC 300 5(C)(1) Code**

Division 26 00 00, IX Section 26 09 23 Networked Lighting Control System

Section Renamed:

Networked Lighting and Automatic Receptacle Control System

Addition:

- E. Occupancy time delays before dimming or shutting off shall be factory set at 20 minutes unless otherwise required to meet energy code requirements. **Ceiling mounted room occupancy sensors are preferred.**

Addition:

- A. **Automatic Receptacle Control System:**
1. **Confirm compliance with current IECC code per project. Where required, provide a minimum of 50 percent automatic controls for power receptacles in the following spaces: enclosed offices, conference rooms, copy/print rooms, breakrooms, classrooms, individual workstations.**
 2. **Ensure allowed exceptions are integrated, such as automatic controls not required for continuously operated equipment, or where usage would negatively impact security or life safety.**
 3. **UTSW preference is to provide ceiling mounted occupancy sensors.**
 4. **Provide permanently engraved receptacles at each automatic control location showing the universally recognized power symbol and the word “controlled”.**
 5. **Follow UTSW preferences for duplex and quadplex installations at workstations as well as cubicle installations. Refer to Figures 26 09 23-01 through 04.**

Figure 26 09 23-01 – Standard Automatically Controlled Duplex Outlet. This sketch shows a standard automatically controlled duplex faceplate with the top receptacle marked with the word “controlled” and the power symbol. This would be seen in a space such as a breakroom or copy room.

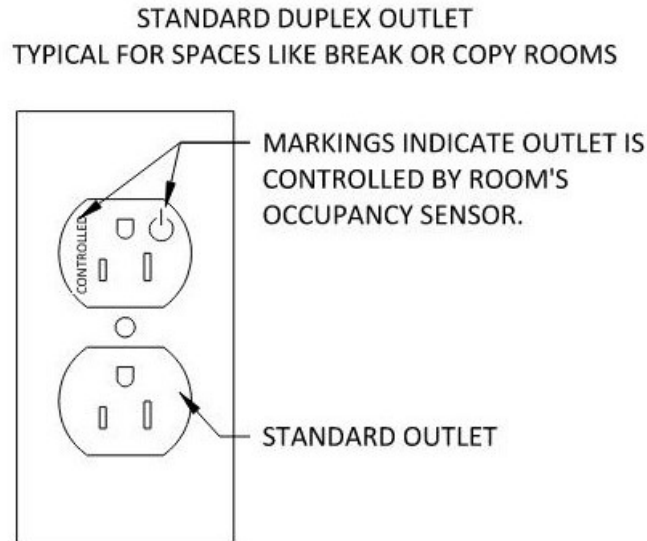


Figure 26 09 23-02 – Standard Automatically Controlled Quadplex Outlet. This sketch shows a standard automatically controlled quadplex faceplate with the left two receptacles marked with the word “controlled” and the power symbol. This would be seen in an office, at a desk location.

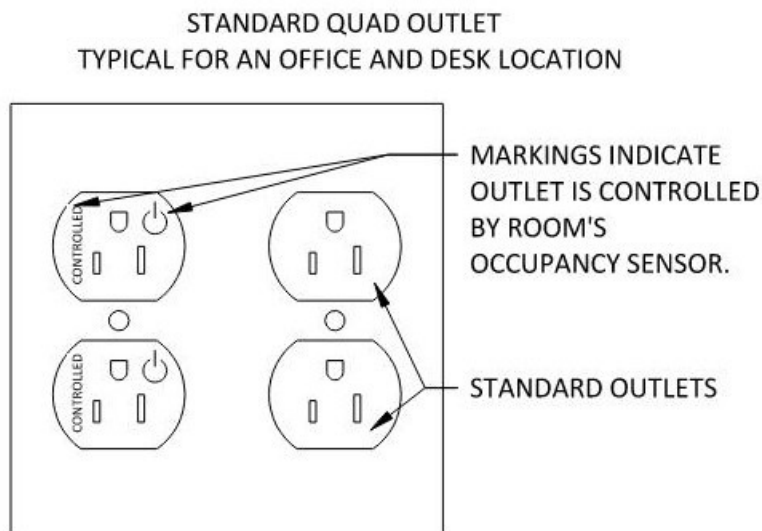


Figure 26 09 23-03 – Standard Cubicle Duplex Outlet. This sketch shows a standard cubicle duplex faceplate without any automatic controls. The outlet could be labeled with an “A” or “B”.

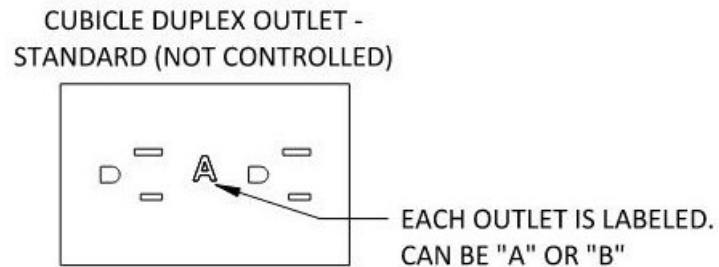


Figure 26 09 23-04 – Standard Cubicle Automatically Controlled Duplex Outlet. This sketch shows a standard cubicle automatically controlled duplex faceplate. Both receptacles are automatically controlled. The faceplate is marked with the word “controlled” and the power symbol. The outlet could be labeled with a “C” or “D”.

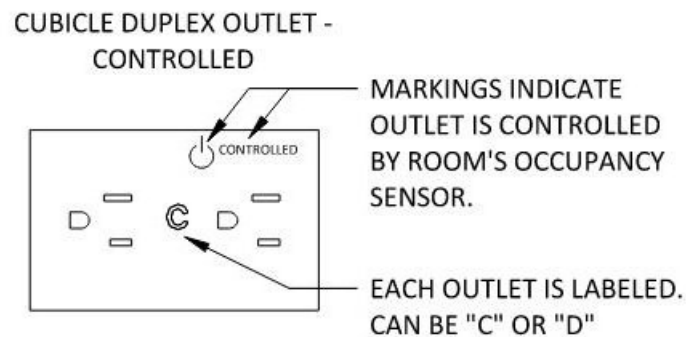


Table reformatted into multiple tables for accessibility. New descriptions provided.

Figure 26 56 00-01 Exterior Lighting Level Standard – Building Exterior. This table shows lighting levels for the building exterior.

Description of Area	Light Level in foot-candles (FC)
Active – pedestrian and/or conveyance	5
Building Surroundings	1

Figure 26 56 00-02 Exterior Lighting Level Standard – Pedestrian Tunnels – D Plaza Area. This table shows lighting levels for pedestrian tunnels.

Description of Area	Average Horizontal foot-candles (FC)	Average Vertical foot-candles (FC)	Uniformity Ratio
Pedestrian Tunnel	4.3	5.4 at 6-foot	3 to 1

Figure 26 56 00-03 Exterior Lighting Level Standard – Covered Parking Facilities. This table shows lighting levels for areas within covered parking facilities. Parking areas are considered medium activity.

Description of Area	Average Day foot-candles (FC)	Average Night foot-candles (FC)	Uniformity Ratio
Basic	5	5	4 to 1
Ramps and Corners	10	5	4 to 1
Entrance Areas	50	5	4 to 1
Stairways			

Figure 26 56 00-04 Exterior Lighting Level Standard – Open Parking Facilities. This table shows lighting levels for areas in open parking facilities. Parking areas are considered medium activity.

Description of Area	Average Horizontal foot-candles (FC)	Uniformity Ratio
General Parking and Pedestrian Areas	0.6	4 to 1
Vehicle Use Area (only)	1.0	3 to 1

Figure 26 56 00-05 Exterior Lighting Level Standard – Sidewalks. This table shows lighting levels for sidewalks.

Description of Area	Average Horizontal foot-candles (FC)	Average Vertical foot-candles (FC)	Uniformity Ratio
Roadside Sidewalks	0.6	1.1 at 6-foot	3 to 1
Walkways distant from roadways. Note, light should extend 6 foot on either side at least 1/3 light level.	0.5	0.5 at 6-foot	3 to 1

Figure 26 56 00-06 Exterior Lighting Level Standard – Roadways. This table shows lighting levels for roadways.

Description of Area	Average Horizontal foot-candles (FC)	Uniformity Ratio
Local roads, intermediate traffic, R4 road	0.6	6 to 1

Division 26 00 00, XXII. Exhibit 26.1 Recommended Commonly Used Light Schedule

Table reformatted for accessibility

- A. **This table shows basic-of-design light fixtures. Design Professional to confirm building standards, user requirements, and provide initial recommendations using this information. Abbreviation shown for 'requirements' is 'reqs.'**

Fixture Tag	Manufacturer and Proposed Fixture	CCT	Fixture Type (foot)	Space Types	Dimming (yes or no)	Space Sensor Required
A1	Lithonia CPX 2X2 ALO7 SWW7 M4	3500K	2 x 2 LED	Back of house, housekeeping, storage, retail, dining, restrooms, autoclave, equipment galley	No	Yes
B1	Lithonia CPX 2X4 ALO8 SWW7 M2	3500K	2 x 4 LED	Back of house, housekeeping, storage, retail, dining, restrooms, autoclave, equipment galley	No	Yes
A2	Lithonia CPX 2X2 ALO7 SWW7 M4	3500K	2 x 2 LED	MEP Spaces, IDF, fire command, equipment rooms, kitchen, server, corridor, lobbies	No	No
B2	Lithonia CPX 2X4 ALO8 SWW7 M2	3500K	2 x 4 LED	MEP Spaces, IDF, fire command, equipment rooms, kitchen, server, corridor, lobbies	No	No
A3	Lithonia CPX 2X2 ALO7 SWW7 M4	3500K	2 x 2 LED	Lab spaces, dark rooms	Yes	No
B3	Lithonia CPX 2X4 ALO8 SWW7 M2	3500K	2 x 4 LED	Lab spaces, dark rooms	Yes	No
C1	Lithonia STAKS 2X2 ALO3 SWW7	3500K	2 x 2 LED	Office, wellness, multi-person office, classroom, student gathering	Yes	Yes
C2	Lithonia STAKS 2X4 ALO6 SWW7	3500K	2 x 4 LED	Office, wellness, multi-person office, classroom, student gathering	Yes	Yes
D1	Lithonia CSV T L48 ALO3 MVOLT SWW3 80CRI	3500K	4-foot DLC listed and IP65 and IP66 rated. Part of CS)	Wet Locations: Parking Garage Stairwells, back of house overhangs, tunnels, shops, warehouses, etc.	Per space reqs.	Per space reqs.

Fixture Tag	Manufacturer and Proposed Fixture	CCT	Fixture Type (foot)	Space Types	Dimming	Space Sensor Required
D2	Lithonia CNY LED ALO SWW2 UVOLT PE PIR DDB M2	3500K	14 x 14 Canopy Luminaire	Parking garages, canopies	Per code	Per code
D3	Kenall Model CSEFL14 Lamp 23R/45L Step controller between light and Avidity controls. LUXdrive low voltage dimmer model A019	23W- Red 45W- White LED	1 x 4	A.R.C. Holding Areas	Yes	No
E1	Lithonia BLWP4 40L ADP GZ10 E10WLCP LP835 Unit with Passive Dual Technology that Dims to 50% with no occupancy, emergency backup	3500K	2-, 4-, and 8- foot lengths	Stairwell lighting, where acceptable per code	Per code	Per code
E2	Lithonia BLWP4 40L ADPT EZ1 LP835 MSDPDT7ADCX DIM50 Unit with Passive Dual Technology that Dims to 50% with no occupancy	3500K	2-, 4-, and 8- foot lengths	Stairwell lighting, where acceptable per code	Integrated sensors with auto dimming control photocell	Integrated sensors with auto dimming control photocell
F1	Lithonia 2SRTL G L24 5000LM IAW AFL MVOLT GZ1 35K 80CRI DWAM	3500K	2 x 2	Vapor Sealed, Clean Room, Negative Pressure Spaces, Bio- Sensitive	Per space reqs.	Per space reqs.

Fixture Tag	Manufacturer and Proposed Fixture	CCT	Fixture Type (foot)	Space Types	Dimming	Space Sensor Required
F2	Lithonia 2SRTL G L48 5000LM IAW AFL MVOLT GZ1 35K 80CRI DWAM	3500K	2 x 4	Vapor Sealed, Clean Room, Negative Pressure Spaces, Bio-Sensitive	Per space reqs.	Per space reqs.
U1	ABL-Juno UCES 24IN SWW6 90CRI WH	3500K	2 inches x 24 inches	Under cabinet lights	Per space reqs.	Per space reqs.
U2	ABL-Juno UCES 36IN SWW6 90CRI WH M6	3500K	2 inches x 36 inches	Under cabinet lights	Per space reqs.	Per space reqs.

Division 26 00 00, XXIII. Exhibit 26.2 Lighting Control Matrix

Revision and table reformat for accessibility.

Reformat:

Subheadings deleted for “administration” as well as “research and education.”

- A. **This table shows the preferred Sequence of Operation (SOO) by space type for the Design Professional to use as a starting point. Refer to notes following table.**

Space Type	Manual On/Off	0 – 10 v Dimming	Vacancy Mode Occupancy Sensor	Programmable Scene Control	Scheduled Time Control
Conference Room	Yes	Yes	Yes	Yes	No
Private Office	Yes	Yes	Yes	No	No
Wellness room, mediation room	Yes	Yes	Yes	No	No
Multi-person office	Yes	Yes	Yes	No	No
Open office (note 3)	Yes	Yes	Yes	No	No
Copy room, huddle, small meeting room	Yes	No	Yes	No	No
Breakroom, lounge	Yes	No	Yes	No	No
Building housekeeping, storage	Yes	No	Yes	No	No
Retail	Yes	No	Yes	No	No
Dining area (note 4)	Yes	No	Yes	No	No
Small public restroom, staff restroom	Yes	No	Yes	No	No
Large public restroom, large staff restroom (note 6)	No	Yes	Yes	No	No
Fire stair (note 6)	No	Yes	Yes	No	No
MEP Spaces, TR/IDF, fire command center, equipment rooms	Yes	No	No	No	No
Kitchen, servery	Yes	No	No	No	No
Corridor, lobbies (note 5)	Yes	No	No	No	Yes
Classroom	Yes	Yes	Yes	No	No
Student gathering college room	Yes	Yes	Yes	No	No
Lab – biochemistry, pharmacology (note 3)	Yes	Yes	No	No	No
Lab – optics, microscopy (note 2)	Yes	Yes	No	No	No
Lab – electro-physiology	Yes	Yes	No	No	No
Dark room (note 2) (note 7)	Yes	Yes	No	No	No

Space Type	Manual On/Off	0 – 10 v Dimming	Vacancy Mode Occupancy Sensor	Programmable Scene Control	Scheduled Time Control
Laser use spaces (note 1) (note 2)	Yes	Yes	No	No	No
Lab – tissue culture	Yes	No	Yes	No	No
Housekeeping – clean, soiled, chemicals	Yes	No	Yes	No	No
Autoclave	Yes	No	Yes	No	No
Equipment galley, freezer galley	Yes	No	Yes	No	No

Notes:

1. Red light indicators in emergency fixtures not allowed. Provide unlit wall-mounted test switch with labelling on both switch and light fixture indicating "Push to test emergency lighting".
2. Space will have lights off as standard.
3. Lighting zone sizes and locations shall occur with user input to identify group assignments.
4. There may be cases of specialty dining that may require dimming. Design Professional to confirm with UTSW user group.
5. Emergency Egress lighting to be uncontrolled.
6. Dim lighting to 50 percent when unoccupied. Provide battery packs or generator circuit as required for egress lighting. **Ceiling mounted room occupancy sensors are preferred.**
7. Dark rooms will require red light. Design Professional to confirm requirements per project.

General Notes:

- A.R.C. (Animal Resource Center) spaces and Sound Booths are excluded from this matrix. Refer to UTSW Design Guidelines for requirements.
- All under cabinet lighting in labs shall be controlled On/Off by the same means as the space lighting (No dimming). Other space types shall confirm with user groups.
- Where large equipment, tall lab benching, or other fixtures that may affect operability, design occupancy sensor locations to account for obstructions.
- Within offices and smaller spaces, type and location of occupancy sensor shall account for standard monitor and furniture placement to detect occupant movement. Ceiling mounted sensors are preferred.
- Lighting zone sizes and locations shall occur with user input. Labs may require special understanding of group assignments.
- For spaces with daylighting and 150 watts of lighting or greater shall be capable of dimming and be controlled via photocell per applicable IECC requirements.
- UL924 listed controls bypass devices can be used to bypass lighting controls in the event of an outage for spaces with UTSW approval.
- Occupancy mode sensors that auto on lighting to 50%, manual on to 100% may be used instead of Vacancy mode sensors where approved by UTSW Design Team and UTSW PM.
- For any space types that do not fall into one of the categories above, please reach out to the UTSW Design Team for directions.

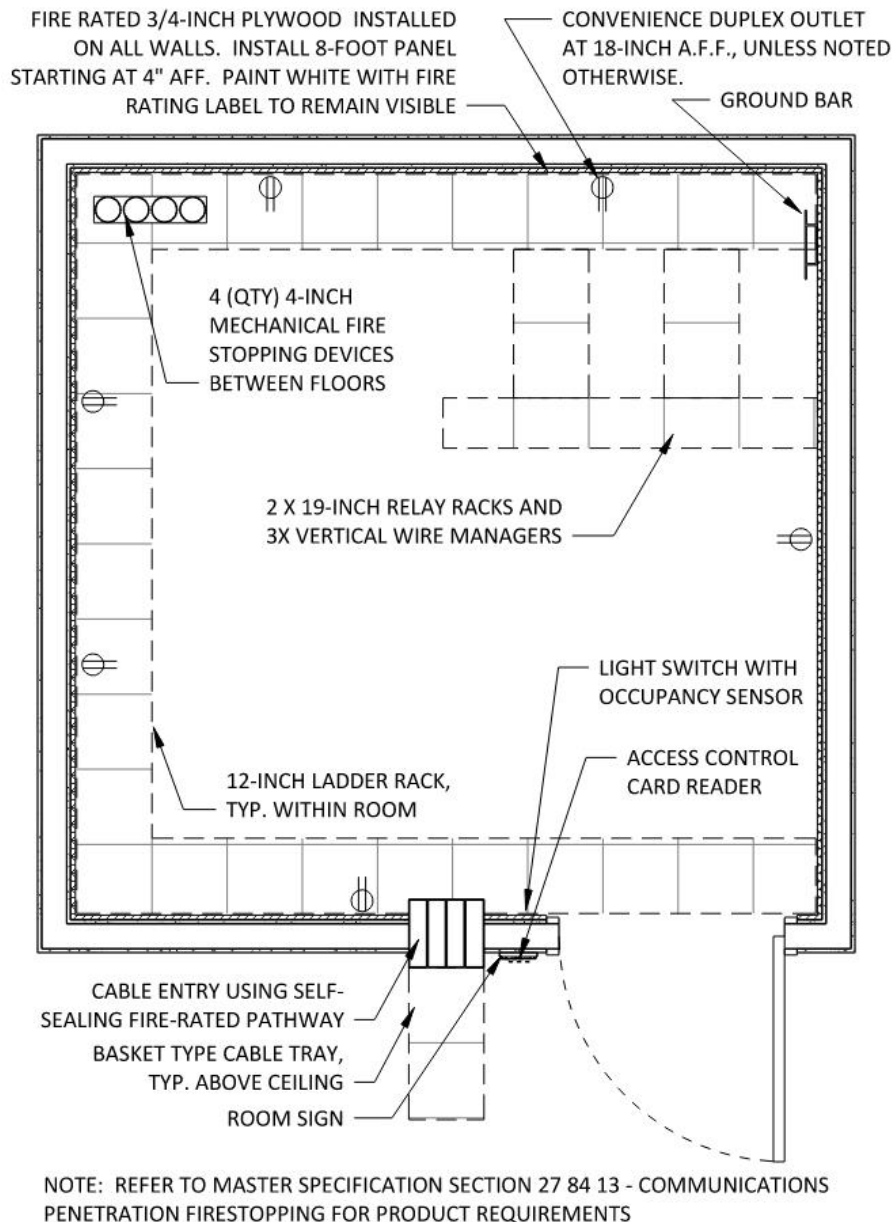
Division 27 00 00, III. Technology Room (TR) / Intermediate Distribution Frame (IDF) Guidelines

New Reference

- A. The exact physical layout of the room will be determined according to requirements for each project and the space provided. Layouts shown in this document are for guidance in the bidding and design process. Designs shall be created for each project referencing **Figure 27.1 TR / IDF Typical Room Layout.**

New description of image and minor revisions to image.

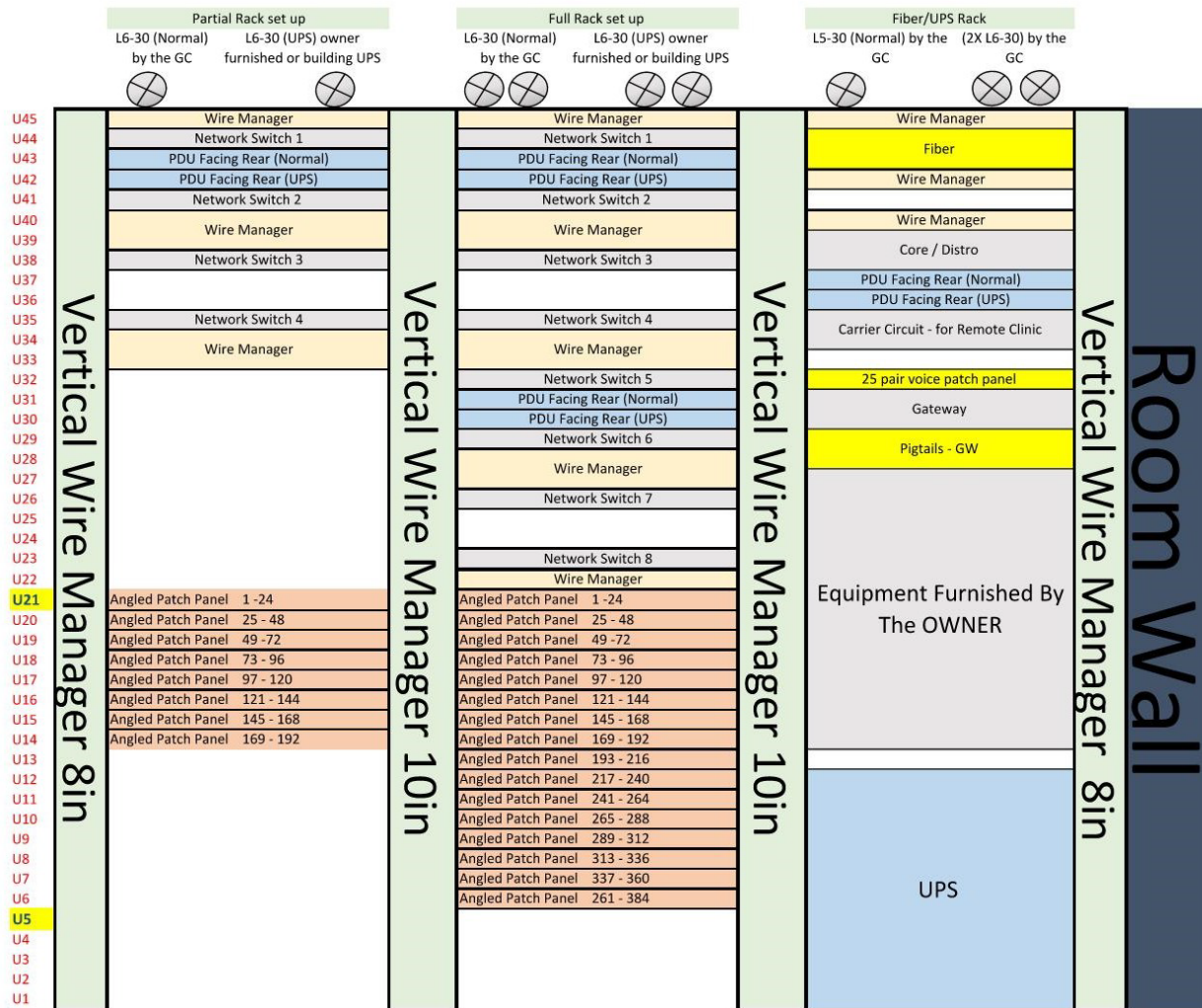
Figure 27.1 TR / IDF Typical Room Layout: This floorplan shows a typical layout for an IDF layout of a rectangular room with 3/4-inch thick and 8-foot tall fire rated plywood installed on all interior walls, starting 4-inches above finished floor. The plywood is painted white with the fire rating label visible. Within the room, convenience duplex outlets are installed at 18-inches above finished floor unless noted otherwise. A ground bar will be installed to building ground and above ladder rack. Two 19-inch relay racks and three vertical wire managers will be installed opposite the door. Around the interior wall runs 12-inch ladder rack and four 4-inch vertical self-sealing mechanical firestopping devices. A basket type cable tray above the ceiling will meet the room at a self-sealing fire-rated pathway for cable entry. An access control card reader and room sign are located at the door with a light switch with occupancy sensor on the inside.



New reference, new description of image.

5. Refer to **Figure 27.2 TR / IDF Rack Typical Layout**.

Figure 27.2 TR / IDF Rack Typical Layout: This diagram identifies UTSW preferences for rack layout, which can be requested from UTSW IR.



Division 27 00 00, IV. Section 27 41 00 Audiovisual Systems and Equipment

New Reference

- B. Audio-visual equipment is typically Owner purchased and Owner installed under a separate contract from the GC.
 - 1. The design team shall identify equipment, coordinate the required infrastructure, indicate locations, and coordinate the documentation.

2. **Refer to Figures 27.3, 27.4, and 27.5 Media Technology Audiovisual Charts 1, 2, and 3, AV Room Standard Chart (Recommended Setup).**

New Reference

Media Technology table reformatted into multiple tables for accessibility. New descriptions for each table.

Figure 27.3 Media Technology Audiovisual, Chart 1: This chart shows some standard installations by room types to use as guide. The Design Professional shall obtain the most current version from the UTSW PM or IR Team.

Installation Types	Elevator	Waiting rooms, lobbies, status board	Valet desk	Patient rooms	Dining, grab and go
Network	1	1	1	2	1
Wireless Network	1	1	1	1	1
Coaxial / Cable TV	1	1	1	1	
HDMI					
USB				1	
3.5 Audio					
XLR Audio					
Monitor	1	1	1	1	1+
Projector					
Projector Screen					
Control Panel					
Computer				TBD	
Signage Player	1	1	1		1
Conference Camera Location					
Aux Output Wall Plate					
AC Power, receptacle number	4	4	4	4	4
AV Table Box					
AV Floor Box					

Figure 27.4 Media Technology Audiovisual, Chart 2: This chart shows some standard installations by room types to use as guide. The Design Professional shall obtain the most current version from the UTSW PM or IR Team.

Installation Types	Parking services	Chapel	Hall	Simulation	Multipurpose, specialty	Offices, director, AVP / VP	AV Control, closet
Network	1	1	1	2	2	2	2
Wireless Network		1	1	1	1	1	1
Coaxial / Cable TV		1	1				1
HDMI		1		1	1	1	1
USB				1	1	1	
3.5 Audio		TBD		TBD	TBD	TBD	1
XLR Audio		TBD		TBD	TBD	TBD	1
Monitor	TBD	1+	TBD	1	1+	1	1+
Projector					TBD		
Projector Screen					TBD		
Control Panel				TBD	TBD	TBD	TBD
Computer		TBD		TBD	1	1	1
Signage Player	1	TBD	1				1
Conference Camera Location		1			1	1	
Aux Output Wall Plate							2
AC Power, receptacle number	4	4	4	4	4	4	8
AV Table Box				1	1	1	
AV Floor Box		1		1	1		

Figure 27.5 Media Technology Audiovisual, Chart 2: This chart shows some standard installations by room types to use as guide. The Design Professional shall obtain the most current version from the UTSW PM or IR Team.

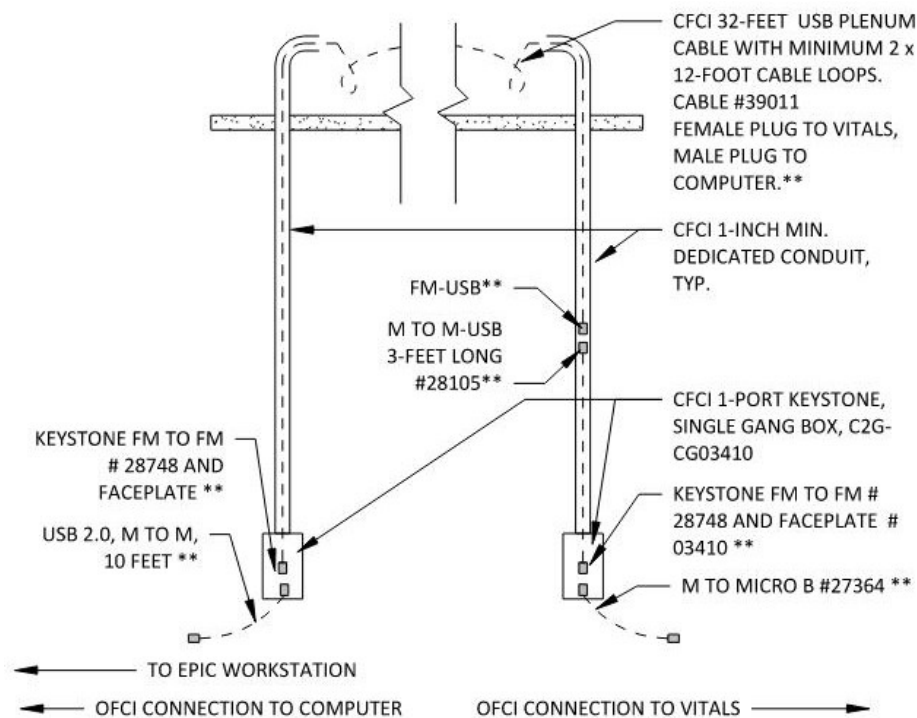
Installation Types	Breakroom	Huddle room	Small Conference	Large conference	Small Class	Large Class	Auditorium
Network	2	2	2	2	2	2	2
Wireless Network	1	1	1	1	1	1	1
Coaxial / Cable TV	1			TBD			1
HDMI	1	1	1	1	1	1	1
USB		1	1	1	1	1	1
3.5 Audio			TBD	TBD	TBD	TBD	TBD
XLR Audio			TBD	TBD	TBD	TBD	TBD
Monitor	1	1	1	2	1	2+	2+
Projector					TBD	TBD	TBD
Projector Screen					TBD	TBD	TBD
Control Panel	TBD	TBD	TBD	TBD	TBD	TBD	TBD
Computer	TBD	1	1	1	1	1	2
Signage Player	TBD						
Conference Camera Location			1	1	2	2	4
Aux Output Wall Plate						1	2
AC Power, receptacle number	2	4	4	4	4	4	4
AV Table Box		1	1	1	1	1	1
AV Floor Box			1	1	1	1	1

I. Section 27 52 24 USB Vitals Monitoring System

New description of image

Figure 27.5 Vitals USB: This diagram shows a typical clinical installation for USB connection between vitals monitor and workstation. Part numbers indicated as a basis of design (BOD) and are from cablestogo.com. Equivalent vendor plenum rated parts are acceptable. The connection to the OFCI computer includes CFCI 1-port keystone, single gang box (BOD C2G-CG03410), a faceplate with blank. At this end, the connection is male.

The conduit from this box will go above the ceiling, with the USB cable connecting to conduit for the vitals monitor connection. The cable, which is CFCI, is a thirty-two-foot USB plenum cable with a minimum of 2 -12-inch cable loops (BOD cable 39011), with female plug to vitals and male plug to computer. Before reaching the vitals box, the female end will connect to a male end of a 3-foot-long USB, (BOD 28105). At this box, the keystone will be female to female (BOD 28748AND) with a faceplate (BOD 03410). From here, a CFCI male cable (BOD 27364) will be provided.



VITALS USB CONNECTION

NOTES:

- PART NUMBERS FROM CABLESTOGO.COM AND EQUIVALENT VENDOR PLENUM RATED PARTS ARE ACCEPTABLE.

** PROVIDED WITHIN CABLING SCOPE

New descriptions of images

Figure 27.6 WAP Mounting – Acoustical Ceiling System: This diagram shows a section cut through a typical acoustical ceiling. A CAT 6/6A network cable is supported above the ceiling on a J-shaped hook, passes into a labeled biscuit, then runs through the acoustical ceiling to connect to the WAP (OFOI) that is mounted on a bracket beneath the ceiling tile. A laminated label is mounted on the grid identifying the WAP.

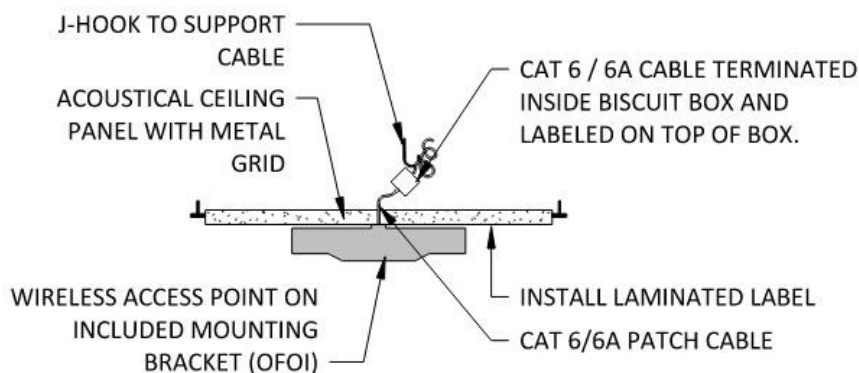


Figure 27.7 WAP Mounting – Gypsum Ceiling: This diagram shows a section cut through a typical gypsum ceiling. A CAT 6/6A network cable is routed through 3/4-inch conduit from an accessible ceiling, passes into a labeled biscuit, then runs through the acoustic ceiling to connect to the WAP (OFOI) that is mounted on a bracket beneath the ceiling tile. A laminated label is mounted on the grid identifying the WAP. Conduit has a pull string and protective bushing at the end.

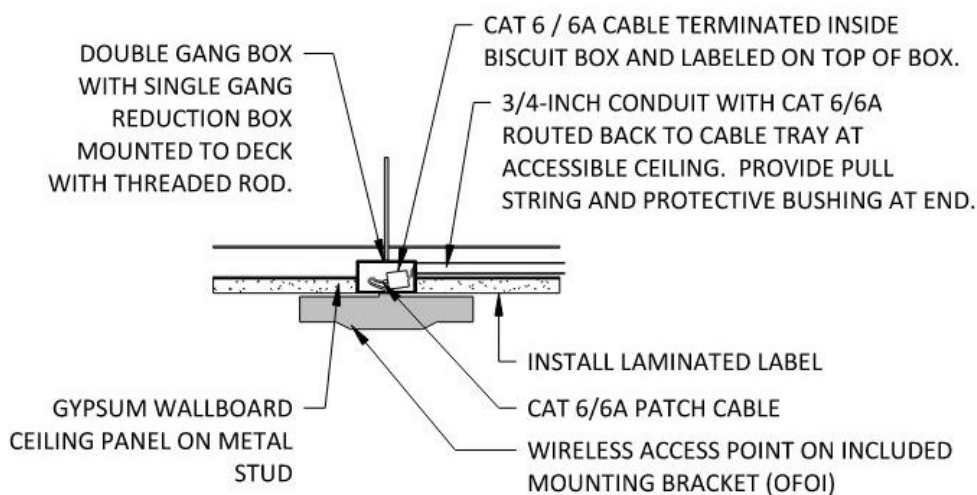


Figure 27.8 WAP Mounting – Exposed Ceiling: This diagram shows a section cut through a typical wireless access point (WAP) installed in an exposed ceiling condition. The WAP (OFOI) has an included mounting bracket that attaches to a double gang box or 4S box with single gang reduction box, mounted to deck with a threaded rod. From the WAP is a CAT 6/6A patch cable that will terminate inside a biscuit box with label. The cable will route through a 3/4-inch conduit back to a cable tray. The conduit has a pull string and protective bushing at the end.

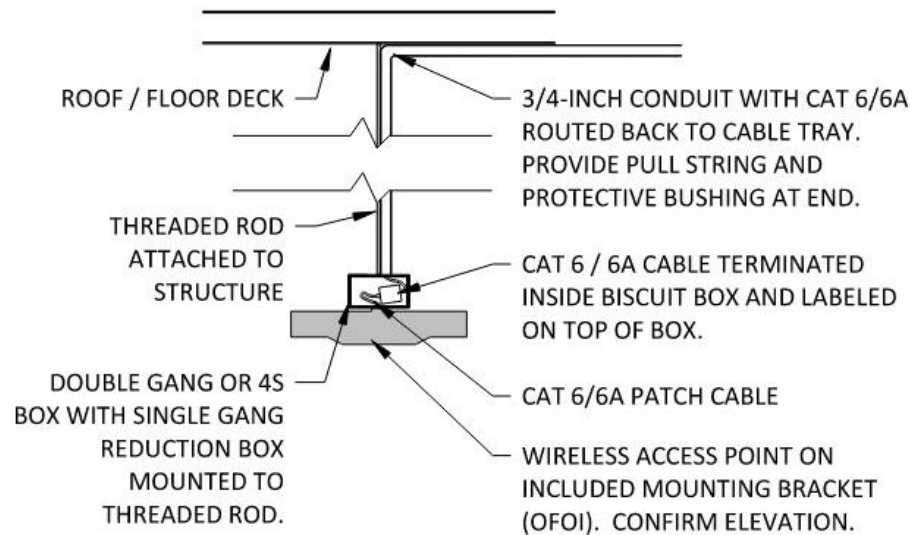


Figure 27.9 WAP Mounting – Exposed Joist System: This diagram shows a section cut through a typical wireless access point installed in an exposed joist condition. The WAP (OFOI) has an included mounting bracket that attaches to joist with toggle bolts. From the WAP is a CAT 6/6A patch cable that will terminate inside a biscuit box with label. The cable will route back to a cable tray.

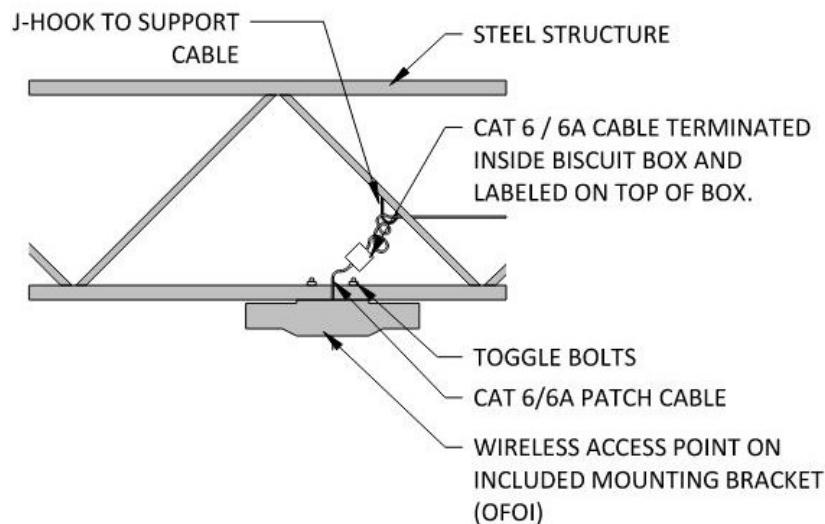


Figure 27.10 WAP Mounting – Gypsum Wall: This diagram shows a section cut through a typical wireless access point installed to a gypsum wallboard partition. The WAP (OFOI) has an included mounting bracket that attaches to a wall bracket (OFOI) that connects to a 4S box with single gang reduction box. From the WAP is a CAT 6/6A patch cable that will terminate inside a biscuit box with label. The cable will route through a 3/4-inch conduit back above the ceiling. The conduit has a provided pull string and protective bushing.

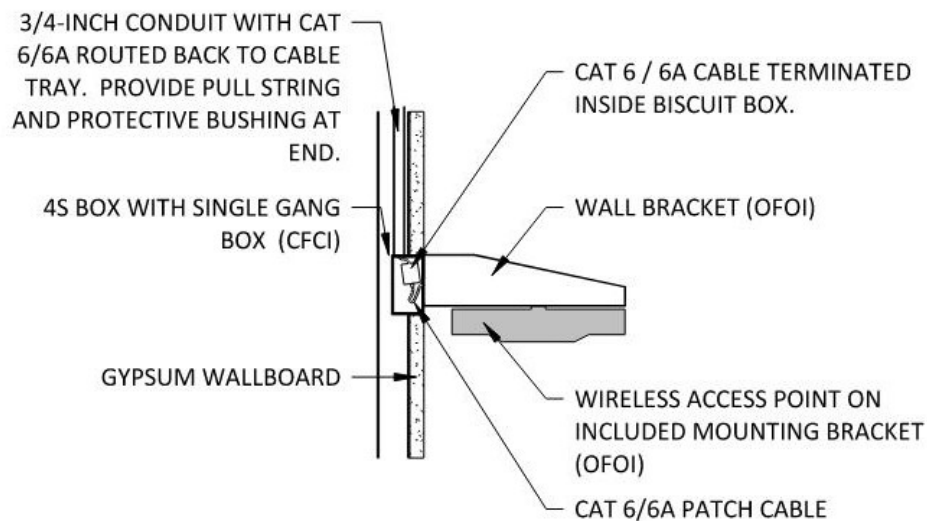
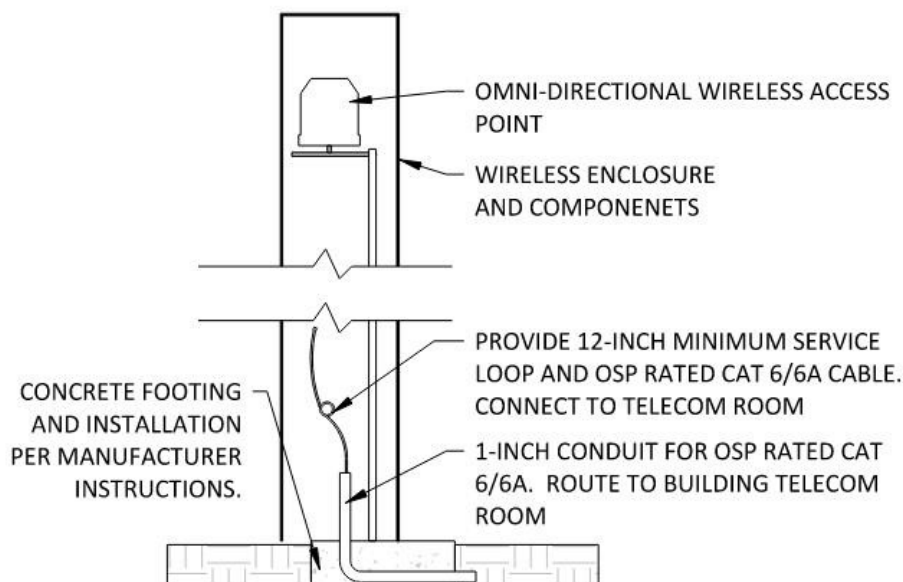
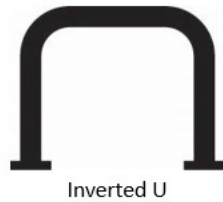


Figure 27.11 WAP Mounting – Wireless Bollard: This diagram shows a section cut through a typical wireless access point bollard installed on a concrete footing, per manufacturer instructions. A 1-inch conduit for OSP rated CAT 6/6A cable will route to the building telecom room. The cable shall have a 12-inch minimum service loop. The omni-directional WAP will be installed within the enclosure.

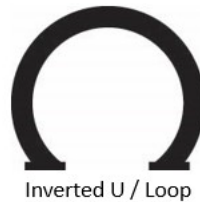


New description of image

Figure 32 33 13.1 – Allowable Rack Configurations: This sketch shows four styles of bike racks that are allowed on campus. These are the inverted U, Inverted U / loop, post and ring, and wheel-well secure.



Inverted U



Inverted U / Loop



Post and Ring



Wheel-Well Secure