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## ARCHITECTURAL DESIGN

### 1. SUSTAINABILITY

- A. The performance standard, LEED™ v3, shall be implemented to the extent feasible and practicable in all new buildings and major renovations in existing buildings. Refer to LEED™ in Design Guidelines – General Section for more information.

### 2. BUILDING ORIENTATION

- A. The building should be oriented on the site in a manner that will reduce the effect of winter winds on heating, summer sun on cooling, and infiltration of winter winds at entrances. Use compact building shapes to minimize the surfaces exposed to exterior heat or cold.
- B. A main entrance will be oriented toward a bus stop and accessible parking. Unless directed otherwise, the means of access to this entrance will have automatically controlled heated sidewalks to maintain access during snow and ice storms.

### 3. BUILDING STYLE

- A. M.S.U. desires new buildings to be distinctively designed and complementary to the existing campus. Alterations to the exterior of existing buildings shall match the existing building and additions to existing buildings shall match or at least harmonize with the existing building unless directed otherwise. Brick and limestone are the predominant exterior building materials.

### 4. HAZARDOUS MATERIALS:

- A. On every project involving existing facilities the design professional shall check for the existence of asbestos, lead paint, heavy metals, toxic substances, and other regulated hazardous materials, and incorporate strategies acceptable to the University into the project documents. Some buildings and portions of buildings have been inspected for asbestos containing materials and lead based paint. Available records of asbestos building inspections and lead based paint testing can be requested from the Office of Environmental Health and Safety (EHS). Contact with EHS should be made through the M.S.U. Project Design Representative.
- B. To avoid problems that may result from the use of asbestos building inspections for renovation demolition projects a type II inspection may be needed. A type II inspection is used to identify material that could be hidden behind walls and above solid ceilings and to sample materials that are excluded from testing or were assumed to contain asbestos in the initial inspection.
- C. Asbestos Containing Materials(ACM) that are determined to be regulated asbestos containing materials (RACM) as defined by 40 CFR 61 NESHAP will need to be removed if they have the potential to be disturbed during the renovation or demolition. The policy for removal of ACM/RACM from existing buildings shall be as follows:
  - Remove any ACM/RACM that must be disturbed as part of the construction. If the existing ACM/RACM occurs on a pipe that only needs to have a tap for a branch run, valve or fitting, remove only that portion of the ACM required to effect the tie in. This removal must include the removal of adjacent material and the proper encapsulation of

- exposed material to ensure that mechanical workers are not exposed and will not damage remaining material.
- Remove ACM/RACM in the work area that is friable or shows signs of damage or deterioration.
  - All dust and debris in a work area that is associated with ACM shall be cleaned up prior to the initiation of a renovation demolition in the same general area.
  - Remove all ACM that has a reasonable potential for becoming damaged either during or after the construction process.
- D. Removal procedures shall comply with the latest local, state and federal rules, codes and/or regulations relative to asbestos removal and disposal.
- Removal shall be conducted by a state of Michigan licensed abatement contractor utilizing state accredited asbestos supervisors and workers.
  - Removal of friable asbestos containing material in quantities greater than 260 linear feet or 160 square feet in the same room shall be conducted in a full negative pressure enclosure. The glove bag procedure may be used at or above these quantities only with the written approval of the Office of Environmental Health and Safety.
  - Air monitoring and project oversight shall be provided by an independent neutral third party that will represent the interest of MSU and or the general contractor on all projects that remove friable material greater than 10 linear feet or 15 square feet. If the renovation/demolition project is managed by a general contractor they will be required to retain the “consulting” air monitoring firm. If the project is directly managed by MSU, MSU shall retain the services of the air monitoring firm.
  - Clearance samples shall be collected on all projects that include the removal of friable material and on projects removing greater than 10 linear feet or 15 square feet of non-friable material.
  - A copy of all reports generated for inspection or asbestos abatement will be supplied to the Office of Environmental Health and Safety.
- E. On projects involving new facilities, the design professional shall coordinate with the facility/building manager and EHS to identify the maximum expected quantities of compressed gas and cryogenic fluids to be used or stored, and to indicate the methods of protection from such hazards in the report and on the construction documents. Complete code trail, ventilation control analysis and hazard evaluation shall be reviewed by MSU Fire Marshall, PDC and EHS; and be included in the report.
5. STRUCTURE
- A. The preferred structural system is poured-in-place reinforced concrete. Other systems will be considered if detailed cost comparisons are made.
  - B. Ferrous metals will be avoided on the exterior of buildings. All necessary exterior steel and interior steel in damp or humid locations will be hot-dipped galvanized after fabrication, e.g. exterior window lintels, cooling tower support framing, etc.
  - C. Structural drawings shall indicate in tabular form the soil pressure used for footing design and design loads used in designing floors, roofs, stairs, etc.
6. MINIMUM DESIGN VALUES:

Minimum design values will be in accordance with the most current edition of the Michigan Building Code except as follows, or as more stringent parameters would dictate.

- A. Roofs: 35 lb./sq.ft. live snow load plus allowances for drifting. Analyze lower projecting canopies carefully. Wind up-lift on any roof will be analyzed with 90 mph. wind.
- B. Exterior Walls: 20 lb./sq.ft. wind load plus allowances for effects of any unusual shapes.
- C. Floors: Minimum live loads are as follows, but consideration must be given to possible space change alterations and actual design condition:
  - Classrooms and Laboratories 100 lb./sq.ft.
  - Offices 80 lb./sq.ft.
- D. Provide structural isolation of large compressor equipment or other vibrating equipment not located on the basement floor of the building.

## 7. BUILDING ENVELOPE

- A. Energy Performance:
  - Energy Analysis Computer Programs: Building energy requirements are best analyzed through the use of computer programs which simulate weather conditions, building occupancy, and systems operation over a typical year. All proposed facilities should run a comparative analysis of project options using an energy analysis program. The input and output data from these computer programs will be provided to Planning, Design and Construction for review.
  - An energy impact statement is to be completed and returned to the owner. A sample format is located at the back of this division.
  - ASHRAE 90, current edition, shall be followed as a minimum for energy conservation in buildings design. Where these Construction Standards call for a more stringent design requirement, the Construction Standards shall be followed.
- B. Exterior Finishes:
  - No material or products requiring painting shall be used on the exterior of a building. No special brick shapes shall be used in or on the building.
- C. Exterior Walls:
  - Cavity masonry walls will have extruded polystyrene insulation with a minimum five year aged R Value of 12. Below grade masonry walls will have polystyrene insulation with a minimum five-year aged R Value of 5.
  - Stud walls will have a minimum of R-19 fiberglass batt insulation. Exterior walls will have a vapor/infiltration barrier. Vapor retarder will have a maximum permeance rating of 0.13 perm.
  - Minimize the use of freestanding brick walls. Brick fin-walls, fences, vision screens, tall parapet walls, etc., are subject to extreme and excessive freeze-thaw cycling with no heat to dry-out. If such walls are required, provide ample expansion control and through wall flashing under a capstone.
- D. Roofs
  - Roofs and rain conductors will be designed for a rain fall intensity of 6" per 5 minute period, and 2-1/2" per 60 minute period applied separately.

- Flat roofs are generally acceptable and are typically the protected membrane type. A minimum slope of 1/4:12 should be provided. Alterations within the field of an existing conventional built-up roof will match the existing conventional roof construction, but where a break can be made, the new roof will be the protected membrane type.
- All main roof areas will be accessible by stairway roof hatch or doorway from a penthouse. Small secondary roof areas will be accessible from the main roof by way of permanent fixed ladders. Roofs that cannot be accessed by maintenance personnel, without carrying ladders, will be avoided.
- Scuppers and exterior drains will not be used including on canopies and other small flat roofs. Place drains within 3 ft. of heated part of building, (but not in the base flashings), and insulate conductor to inside of building.

E. Entrances:

- The entrance and slab outside of all entrance doors will be supported on all sides by the building foundation with insulation or drainage to prevent frost heaving action. The sidewalk will be keyed to this approach slab.
- To eliminate the possibility of concrete slabs settling next to buildings or structures, all concrete pavement (e.g. walks, driveways, etc.) adjacent to structures (e.g. buildings, planters) that have a frost-free footing, shall be placed over a concrete haunch that is an integral part of the structure. The haunch shall not be less than 6" wide and extend the width of the pavement.
- Public Entrances:
  - ◇ All main entrances will be designed with a vestibule, a canopy or a sheltered recess to minimize infiltration and to protect the entrance from the weather and to reduce the use of deicing chemicals. The main entrance doors nearest the accessible parking and the bus stop will be automated. (See SECTION 084229 – AUTOMATIC ENTRANCES). The main entrance lobby shall include barrier-free toilet rooms, telephones (public and campus), dual level drinking fountain, and elevator.
  - ◇ All other barrier-free public entrances and vestibules which are not automated will each have a 36" clear wall space on the latch side of the door and flush with the door to facilitate accessible access, especially wheelchair user access to the doors.
  - ◇ A building directory will be installed at the main building entrance. Where other entrances are major entrances, additional directories will be installed. Directories shall be changeable letter type with a hinged door. The door shall have a concealed continuous piano hinge and use a Corbin cabinet lock. Acceptable manufacturers: Davsar or A.L. Davenport & Son, Co. or equal.
  - ◇ Entrance recesses will be wide enough to allow doors to swing free for a minimum of 120 deg. before contacting a doorstep to minimize shock on door, frame, and hardware.
  - ◇ The vestibule of main entrances for academic buildings should have a non-corrosive grating with 1/2" slots over a waterproof stainless steel pan with a trap. Provide an indoor hose bib for cleaning. Light traffic and residence hall entrances shall have flush hard tile or terrazzo with surface mats.
- Service Entrances:
  - ◇ All main service entrances will be designed with a loading dock, a canopy, and a sheltered recess to protect the entrance from weather and to reduce the use of

deicing chemicals. Overhangs will provide 14 ft. clearance above grade for trucks. Loading docks will be accessible from grade by stairs and handrails, not ladders. Doors will be flush swinging or sectional overhead (See Construction Standards Section 083613 – Sectional Doors). Do not use coiling doors because they have poor resistance to impact and thermal and infiltration performance is less than that of sectional doors.

- ◇ With new building construction, there may be a need to provide a Grounds Maintenance Substation to house personnel and equipment, with direct access to a drive or parking area. Contact MSU PDC project manager for specific requirements.

8. **RODENT AND INSECT PROOFING:** All openings into the buildings shall be rodent and insect proof. Basement windows and other openings, which might provide access, will be provided with double strength screening or regular screening and hardware cloth.