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INSTRUCTIONS TO PROFESSIONAL SERVICE PROVIDERS

- The Michigan State University Design Guidelines and the Michigan State University Construction Standards have been compiled for Architects, Engineers, and others retained to provide professional services for Michigan State University. They reflect the planning, construction, and maintenance experience of persons responsible for the university facilities.
- These standards for design and construction of buildings at Michigan State University have been prepared to achieve quality structures of maximum utility, requiring a minimum of maintenance and operating expense, and prudent use of energy.
- Adherence to the Design Guidelines and Construction Standards is mandatory unless a deviation has been approved in writing by the Michigan State University Project Manager. Any equal or improved concept, method, or product will be given full consideration.
- The Construction Standards are intended to be used as the basis for specifications. The architects and engineers are expected to either a) include the applicable sections in the project documents with edits as needed for specific project conditions, or b) use their own spec book and comply with all written standards and formatting requirements in the Design Guidelines and Construction Standards.
- Sections of the Design Guidelines and Construction Standards will be revised and updated as experience or construction developments warrant. Each revised section supersedes all previous editions and directives concerning construction practices for Michigan State University. The Michigan State University website will always contain the most current version with the latest revision date indicated in red.
- The Design Guidelines and Construction Standards are prepared and published by: Planning, Design and Construction, Infrastructure Planning and Facilities, Michigan State University.

GENERAL

1. MSU CAMPUS PLANNING PRINCIPLES

A. The MSU Campus Planning Principles are included as part of The MSU Campus Master Plan.

2. DOCUMENT STANDARDS

- A. To facilitate record keeping by Planning, Design and Construction, the format of project documents are restricted as follows:
 - Specifications will be 8 ¹/₂" X 11" and will not have fold-out pages. Paper will be white. They will be permanently bound.
 - Drawings will be standard sizes and bound as a set. Maximum size will be 42" X 30".
 - Titles will reflect the official project name, CP number, PDC project team, and Drawing name, page number and total number of pages,.
- B. Planning, Design and Construction will provide direction for room/space numbering.
- C. To allow for use of the PlanGrid Automatic Submittal Log (ASL), the project specifications shall conform to AIA standards, use Masterformat section numbering, and be provided as a vector PDF (not a scanned version). ASL may be used by the Owner or other project team members to create a list of documents required to be submitted on the project. Additional formatting to allow for ASL functionality can be found in Exhibit 8.
- D. Additional direction on specification formatting is found in Exhibit 2

3. LIFE CYCLE COSTING

A. Life cycle costing shall be an integral part of the design process. Most campus buildings are intended to last an indeterminate amount of time so adaptable facilities and planned maintenance are the norm, rather than short-term, write-off solutions. Simplicity of construction makes new construction and future alterations less expensive.

4. LEEDTM

- A. It is the intent of Michigan State University that all new buildings and major remodeling projects will be designed to qualify for LEEDTM Silver Certified using the most current version available. Certification will be addressed on a case by case basis.
- B. Certain sections of the Design Guidelines and Construction Standards have been modified to guide accomplishment of this goal. It is the responsibility of the Project Architect or Engineer (A/E) to review these and other applicable LEEDTM v3 criteria for appropriate inclusion. Also see Exhibit 3, MSU BEST PRACTICES LEEDTM and Exhibit 7, LEEDTM 2009 for New Construction and Major Renovations, Project Checklist.
- C. For all projects, the Construction Waste Management form and the applicable version of Specification Section 024200 (PO or Minor/Major) will be included in the bid documents. For Purchase Order projects (budget less than \$250,000), the Contractor is required to complete and submit the form only. For Minor and Major projects (budget \$250,000 or greater), the Contractor is required to comply with LEEDTM 2009 Materials and Resources Credit 2.
- D. At minimum, all projects shall meet requirements of the following Prerequisites and Credits in the LEEDTM 2009 for New Construction and Major Renovations with all applicable errata and amendments:
 - SS Prerequisite 1: Construction Activity Pollution Prevention
 - ♦ Intent: To reduce pollution from construction activities by controlling soil erosion, waterway sedimentation, and airborne dust generation.
 - Create and implement an erosion and sedimentation control plan during the design phase of the project.
 - SS Credit 8: Light Pollution Reduction
 - ♦ Light trespass shall be eliminated from the building and site to improve night sky access and reduce development impact on nocturnal environments.
 - Design interior lighting to comply with either Option 1 or Option 2 of this credit.
 - Option 1 Automatically reduce the input power of all nonemergency interior luminaires with a direct line of sight to any openings in the envelope by at least 50 percent between 11 p.m. and 5 a.m. After-hours override shall be provided by a manual or occupant-sensing device provided the override lasts no more than 30 minutes.
 - □ Option 2 All openings in the envelope with a direct line of sight to any nonemergency luminaires must have shielding (controlled/closed by automatic device for a resultant transmittance of less tha 10 percent between 11p.m. and 5 a.m.)

- Only light areas as required for safety and comfort. Lighting power densities shall not exceed ASHRAE/IESNA Standard 90.1-2010 Exterior Lighting Section with Addenda 1 and shall comply with the control requirements.
- Classify the project as LZ1, LZ2, LZ3 or LZ4 as appropriate under the IESNA RP-33 and follow requirements of that zone.
- ◊ Design exterior lighting such that the maximum % lumen emitted does not exceed that allowable for the LZ at an angle above 90% or higher from straight down as established by ASHRAE/IESNA Standard 90.1-2010 Exterior Lighting Standards and LEEDTM 2009 SS credit 8 Light Pollution Reduction.
- WE Prerequisite 1: Water Use Reduction
 - ♦ Intent: To increase water efficiency within buildings.
 - ♦ Use 20% less water than the water use baseline calculated for the building.
 - ♦ Use high efficiency fixtures.
- WE Credit 1: Water Efficient Landscaping
 - ♦ Intent: To limit the use of potable water for landscape irrigation.
 - \diamond Reduce potable water consumption for irrigation by 50%.
 - Consider using plant species, density and microclimate factor; irrigation efficiency; and use of captured rainwater.
- WE Credit 3: Water Use Reduction
 - ♦ Intent: To further increase water efficiency within buildings.
 - ♦ Use 30% less water than the water use baseline calculated for the building.
 - \diamond Use high efficiency fixtures.
 - ♦ Consider using rainwater for nonpotable applications.
- EA Prerequisite 1: Fundamental Commissioning of Building Energy Systems
 - ♦ Intent: To verify that the project's energy related systems are installed and calibrated to perform according to the owner's project requirements, basis of design and construction documents.
 - \diamond Engage a CxA in the design process.
 - Determine owner's project requirements, develop and maintain commissioning plan for use during design and construction and Determine owner's project requirements, develop and maintain commissioning plan for use during design and construction and incorporate commissioning requirements in bid documents.
 - Assemble the commissioning team, and prior to occupancy verify the performance of energy consuming systems.
 - Complete commissioning reports with recommendations prior to accepting the commissioned systems
- EA Prerequisite 2: Minimum Energy Performance
 - ♦ Intent: To establish the minimum energy efficiency level for the proposed buildings and systems.
 - ♦ Use Whole Building Energy Simulation Option. Comply with specific requirements of ASHRAE/IESNA Standard 90.1-2010 (with errata but without addenda). Where applicable, the designer may alternatively use the other compliance options available in LEEDTM EA Prerequisite 1 to demonstrate the required improved performance percentage.

- Use a computer simulation model to assess the energy performance and identify the most-cost effective energy efficiency measures.
- ♦ Quantify energy performance compared with a baseline building.
- EA Prerequisite 3: Fundamental Refrigerant Management
 - ♦ Intent: To reduce stratospheric ozone depletion.
 - ♦ Zero use of CFC-based refrigerants.
- EA Credit 1: Optimize Energy Performance
 - ♦ Intent: To improve on the energy performance level.
 - ♦ Use Whole Building Energy Simulation Option. Design and specify systems and components such that building energy performance is a minimum of 30% better for new buildings and 26% better for existing buildings than the base requirements of the ASHRAE/IESNA Standard 90.1- 2010 (with errata but without addenda) using a whole building analysis method allowed under the standard. Where applicable, the designer may alternatively use the other compliance options available in LEEDTM EA Credit 1 to demonstrate the required improved performance percentage.
 - Use a computer simulation model to assess the energy performance and identify the most-cost effective energy efficiency measures.
 - ♦ Quantify energy performance compared with a baseline building.
- EA Credit 2: On-site Renewable Energy
 - ♦ Intent: To reduce environmental and economic impact associated with fossil fuel energy use.
 - ♦ Minimum renewable energy is 1% of the building's annual energy cost.
 - ♦ Renewable energy potential includes solar, wind and geothermal
- EA Credit 4: Enhanced Refrigerant Management
 - ♦ Intent: To reduce ozone depletion.
 - ♦ Select HVAC&R equipment that minimize or eliminate the emission of compounds that contribute to ozone depletion and climate change.
- EA Credit 5: Measurement and Verification
 - ♦ Intent: To provide for the ongoing accountability of building energy consumption over time.
 - Use either Option D: Calibrated Simulation or Option B: Energy Conservation Measure Isolation as specified in the International Performance Measurement & Verification Protocol (IPMVP) Volume III: Concepts and Options for Determining Energy Savings in New Construction.
- MR Prerequisite 1: Storage and Collection of Recyclables
 - ♦ Intent: To facilitate the reduction of waste generated by building occupants that would otherwise be hauled to and disposed of in landfills.
 - Design and allocate an easily accessible dedicated space serving the entire building for recycling of office paper, newspaper, other paper items, corrugated cardboard, glass, plastics and metals.

- Design the recycling space such that it supports campus building collection methods. Obtain design input and review from the MSU Recycling and Waste Management Office (<u>http://www.recycle.msu.edu/</u>).
- MR Credit 2: Construction Waste Management
 - ♦ This credit requires diversion of construction and demolition debris from disposal and incineration facilities. Redirect recyclable recovered resources back to the manufacturing process and reusable materials to appropriate sites.
 - ♦ Recycle and/or salvage nonhazardous construction and demolition debris.
 - Develop and implement a construction waste management plan that, at a minimum, identifies the materials to be diverted from disposal and whether the materials will be sorted on-site or comingled.
 - ♦ Excavated soil and land-clearing debris do not contribute to this credit.
 - Calculations can be done by weight or volume, but must be consistent throughout.
 - ♦ The minimum percentage debris to be recycled or salvaged for each point threshold is follows:
 - \square Recycled or Salvaged 50% 1 point (Minimum)
 - \square Recycled or Salvaged 75% 2 points (Evaluate based on project)
- MR Credit 4: Recycled Content, 20% (post-consumer + $\frac{1}{2}$ pre-consumer).
 - ♦ This credit requires the use of an additional 10% of materials beyond credit MR Credit 4.1 with recycled content such that the sum of post-consumer plus one-half of the post industrial content constitutes at least 10% of the total value of the materials in the project.
 - Select and specify the use of materials with recycled content such that the sum of post-consumer plus one/half of the post-industrial content constitutes at least 20% of the total value of the materials in the project. Materials classified as recycled shall meet the definitions of "Post-consumer" and "Pre-consumer" established in the LEEDTM Credit 4.1. Exclude mechanical, electrical, plumbing and specialty items such as elevators and materials not permanently installed in the building from the calculation. Refer to ISO 14021-Environmental Labels and Declarations-Self Declared environmental claims (Type II environmental labeling).
 - Specify that the contractor develop and implement documentation necessary to establish that the recycled materials are used during construction.
- MR Credit 5: Regional Materials, 10% Extracted, Processed & Manufactured Regionally
 - ♦ Intent: To use materials that are manufactured and extracted locally in order to reduce environmental impacts of transportation, use indigenous resources and support the local economy.
 - Specify materials that have been extracted, harvested and manufactured within 500 miles of the project site, such that the value of these materials total at least 10% of materials used in the project. Exclude mechanical, electrical, plumbing and specialty items such as elevators, and materials not permanently installed in the building from the calculation.
 - ♦ Include in project specifications, contractor submittal and documentation requirements necessary to demonstrate compliance by contractors during construction.
- IEQ Prerequisite 1: Minimum Indoor Air Quality Performance

- ♦ Intent: To establish minimum IAQ performance to enhance IAQ in buildings.
- ♦ Design ventilation systems to meet or exceed the minimum outdoor air ventilation rates as described in the ASHRAE Standard 62.1-2007, Ventilation for Acceptable Indoor Air Quality (with errata but without addenda).
- IEQ Prerequisite 2: Environmental Tobacco Smoke (ETS) Control
 - ♦ Intent: To prevent or minimize exposure of building occupants, indoor surfaces and ventilation air distribution systems to ETS.
 - ◊ Prohibit smoking in buildings.
- IEQ Credit 1: Outdoor Air Delivery Monitoring
 - ♦ Intent: To provide capacity for ventilation system monitoring.
 - ♦ Install CO2 and airflow measurement equipment and feed the information to the HVAC equipment and BAS to trigger corrective action.
- IEQ Credit 3.1: Construction IAQ Management Plan: During Construction
 - ♦ Intent: To reduce IAQ problem resulting from construction or renovation.
 - Adopt an IAQ management plan.
 - ♦ Sequence the installation of materials.
 - ♦ Coordinate with IEQ Credit 3.2 and IEQ Credit 5.
- IEQ Credit 3.2: Construction IAQ Management Plan: Before Occupancy
 - ♦ Intent: To reduce indoor air quality problems resulting from construction operations.
 - ♦ Compliance with this requirement will largely depend on project schedule. The designer therefore shall plan for either the flush-out periods or testing options included in LEEDTM IEQ credit 3.2.
 - Specify both testing and flush-out procedures in the contract documents.
 - ♦ Include in project specifications contractor submittal and documentation requirements necessary to demonstrate compliance.
- IEQ Credit 4.1: Low-Emitting Materials: Adhesives and Sealants
 - ♦ Intent: To reduce the quantity of harmful or irritating indoor air contaminants which result from building materials.
 - Compliance with this credit is not mandatory when in the judgment of the specifier and concurrence of MSU that products that would meet this sustainability requirement would not perform in other respects.
 - Specify adhesives and sealants for interior applications which meet the maximum VOC content requirements of the South Coast Air Quality Management District Rule #1168, effective date July 1, 2005 and amendment date January 7, 2005.
 - ♦ Specify that Aerosol Adhesives comply with the Green Seal Standard for Commercial Adhesives GS-36 requirements in effect on October 19, 2000.
 - ♦ Specifiers should recognize that installation of some systems may include the incidental use of sealants and adhesives. The specifier should take care in preparing specifications for all systems which may use any adhesives or sealants to include these sustainability requirements.
 - ♦ The specifier should carefully consider all performance criteria and select only products which meet other necessary performance criteria in addition to the sustainability criteria.

- Include in project specifications, contractor submittal and documentation requirements necessary to demonstrate compliance by contractors during construction.
- The design team shall submit a summary list of applications and products specified which do not comply with this standard.
- IEQ Credit 4.2: Low-Emitting Materials: Paints and Coatings
 - ♦ Intent: To reduce the quantity of harmful or irritating indoor air contaminants which result from building materials.
 - Compliance with this credit is not mandatory when in the judgment of the specifier and concurrence of MSU that products that would meet this sustainability requirement would not perform in other respects.
 - Specify paints and coatings which are to be field applied to interior surfaces which meet the maximum VOC and chemical content limitation of the following:
 - □ Architectural paints, coatings and primers applied to interior walls and ceilings shall comply with Green Seal's Standard GS-11, Paints First Edition, May 20, 1993. For VOC requirements and list of prohibited chemicals see www.greenseal.org/standards/paints.htm.
 - Anti-corrosive and anti-rust paints applied to interior ferrous metal: Green Seal Standard GC-03. Anti-Corrosive Paints, Second Edition, January 1997.
 - □ Clear wood finishes, floor coatings, stains and shellacs applied to interior elements: shall comply with the South Coast Air Quality Management District Rule #1113, effective date January 1, 2004.
 - ♦ Specifiers should recognize that installation of some systems may include the incidental use of paints and coatings. The specifier should take care in preparing specifications for all systems which may use any paints or coatings to include these sustainability requirements.
 - ♦ The specifier should carefully consider all performance criteria and select only products which meet other necessary performance criteria in addition to the sustainability criteria.
 - ♦ Include in project specifications, contractor submittal and documentation requirements necessary to demonstrate compliance by contractors during construction.
 - ♦ The design team shall submit a summary list of applications and products specified which do not comply with this standard.
- IEQ Credit 4.3: Low-Emitting Materials: Carpet
 - ♦ Intent: To reduce the quantity of harmful or irritating indoor air contaminants which result from building materials.
 - ♦ Specify Carpets and cushion pads that meet The Carpet and Rug Institute's CRI Green Label[™] Plus program <u>www.carpet-rug.org.</u>
 - ♦ Limit carpet adhesive VOC contents to those required by LEEDTM IEQ 4.1: VOC limit of 50 g/l.
 - ♦ The specifier should carefully consider all performance criteria and select only products which meet other necessary performance criteria in addition to the sustainability criteria.

- Include in project specifications, contractor submittal and documentation requirements necessary to demonstrate compliance by contractors during construction.
- IEQ Credit 5: Indoor Chemical & Pollutant Source Control
 - ♦ Intent: To avoid exposure of building occupants to potentially hazardous chemicals that adversely impact air quality.
 - ♦ Design permanent entry way systems for regular building user entry points, which use permanently installed grilles that allow for cleaning in accordance with LEEDTM IEQ Credit 5.
 - ♦ Meet the exhaust system and air requirements of LEEDTM IEQ Credit 5 for building service areas including housekeeping, laundries, copy/printing rooms, garages where hazardous gases or chemicals may be present.
 - ♦ Design service areas to meet the enclosure and separation requirements of LEEDTM IEQ Credit 5.
 - ♦ Design service areas to meet the enclosure and separation requirements of LEEDTM IEQ Credit 5.
- IEQ Credit 6.1: Controllability of Systems, Lighting
 - Provide a high level of lighting system control by individual occupants or specific groups in multi-occupant spaces such as classrooms and conference areas to promote productivity, comfort and well being of building occupants.
 - Design individual lighting system controls for 90% of occupants to enable lighting adjustments to suit individual task needs and preferences.
 - Plan for lighting controls for multi-occupant spaces such as classrooms and conference areas to enable lighting adjustment that meets group needs and preferences
- IEQ Credit 7.1: Thermal Comfort Design
 - ♦ Intent: To provide a comfortable thermal environment.
 - Design the HVAC systems and the building envelope to meet the requirements of ASHRAE Standard 55-2004, Thermal Comfort Conditions for Human Occupancy (with errata but without addenda.)
- IEQ Credit 7.2: Thermal Comfort Verification
 - ♦ Intent: To provide for the assessment of building occupant thermal comfort over time.
 - Establish thermal comfort criteria and documenting and validating building performance to the criteria.
- E. Documentation Requirements
 - Design Team shall submit required MSU Sustainability Documentation showing compliance with this standard in accordance with the MSU Sustainability Documentation Requirements.
 - For projects which are to be LEEDTM registered and certified submit LEEDTM on-line Design Stage and Post Construction documentation as required showing compliance with this standard.

- F. When proposing the use of any other LEEDTM standards comply with the following:
 - Comply with the intent, design and construction parameters and document requirements of the appropriate standard of the LEEDTM NC 2009 for New Construction and Major Renovations, with all applicable errata and amendments.
 - Consider other appropriate cost and performance criteria, in addition to the LEEDTM "sustainability" requirements when designing, selecting and detailing systems and specifying products and processes. To the extent possible meet the other performance criteria included in the posted MSU Construction Standards.
 - Identify and submit summaries of required deviations from the posted MSU Construction Standards in support of the specific LEEDTM standard selected.
 - Include construction details and specifications and administrative requirements in contract documents necessary to comply with the LEEDTM standard.

5. UNIVERSAL DESIGN INITIATIVE

- A. It is the intent of Michigan State University to develop a built environment which is universally designed to accommodate persons with disabilities as an integral element in anything built or purchased. The designer will take the initiative to provide these accommodations, which are not separate or special, but rather are universal in utility. Successful examples that accommodate the greatest diversity of human characteristics and enhance esthetics are:
 - Grade level building approaches with automatic snow melting rather than separate unheated ramps and steps provide hazard-free entrances for everyone.
 - Signs on automatic doors that read "automatic door: rather than a barrier free logo. Mobility aid users can select which door to use like everyone else.
 - Lever-handle hardware, which is more convenient for everyone.
 - Exit signs that flash when an emergency alarm is activated, which reinforces that an emergency exit condition exists and warns the hearing impaired as well.
 - Low service counters, where possible, to be equally functional for wheelchair-users and non-wheelchair-users.
 - Room number signs with raised or incised characters, which can be read by touch as well as by sight, and at a standard mounting height.
 - Vertical sliding chalkboards in a percentage of classrooms and other areas, which provide increased writing area and a better view for everyone.

6. ENERGY CONSERVATION

A. Identify energy-efficiency measures. Evaluate energy efficiency of proposed new construction, building expansion, remodeling, and new equipment purchases. Estimate savings and implementation costs. Implement approved energy-efficiency measures.

- B. All new buildings and additions shall be designed to reach an energy conservation target of 30% below ASHRAE standards. Identify additional ECMs that would reduce the energy usage to 45% below ASHRAE standards.
- C. For new construction and major renovation projects, perform a whole building project simulation. The proposed design must be compared against a baseline building that complies with Appendix G of the ASHRAE/IESNA Standard 90.1-2010, and also against a baseline building that complies with MSU Construction Standards.
- D. Opportunities for additional savings include the following:
 - Building Envelope: Reduce heat conduction through roofs and walls. Reduce infiltration. Control or reduce solar heat gains. Reduce heat conduction and long wave radiation.
 - Lighting Systems: Reduce illumination levels. Improve lighting system efficiency. Curtail operating hours. Use daylighting.
 - HVAC Systems: Improve equipment performance. Provide water side economizers. Reduce ventilation requirements to minimum acceptable levels.
 - HVAC Distribution Systems: Optimize the distribution system to reduce the energy required to transport fluids and to reduce the energy losses during transport.
 - Energy Management Control Systems: Select optimum equipment operating times and setpoints as a function of electrical demand, time, weather conditions, occupancy, and heating and cooling requirements.
 - Power Systems: Use high efficiency motors to improve the power system efficiency.
 - Water Heating Systems: Improve equipment performance. Reduce distribution losses.
 - Heat Recovery Systems: Apply where there is a need to reject heat from a constant supply of high temperature air, water, or refrigerant.
 - Renewables: Solar, wind, geothermal and rainwater.
 - Building Operation: Lower the heating and raise the cooling temperature setpoints to minimize the space conditioning requirements whenever possible. Lower the humidification setpoints and raise the dehumidification setpoints to minimize the space conditioning requirements whenever possible.

7. ENERGY IMPACT STATEMENT

A. An Energy Impact Statement is required for each project in accordance with the individual design services contract. Appropriate format for the document is found in Exhibit 4.

SPACE ALLOCATIONS AND DESCRIPTIONS

1. GENERAL

- A. A program statement will be provided by the Planning, Design and Construction. This statement will establish specific space and other project parameters to satisfy departmental or university needs, such as number, size, and descriptions of office spaces, laboratories, meeting rooms, auditoriums, etc. The descriptions of spaces that follow apply to all university construction.
- A. LEED: It is the intent of MSU that its building designs will meet the design requirements of MR Prerequisite 1: Storage and Collection of Recyclables of LEED[™] 2009 For New Construction and Major Renovation with all applicable errata and amendments. The intent of the prerequisite is to facilitate the reduction of waste generated by building occupants that would otherwise be hauled to and disposed of in landfills.

2. CUSTODIAL FACILITIES

- A. Custodial Room: Each building will have one room meeting the following requirements for the exclusive use by the custodial staff:
 - Locate near the service/freight elevator if one is provided in the building.
 - One service sink will be provided.
 - Walls behind and near the service sink and time clock will be filled and finished with epoxy paint. Other walls will be unpainted.
 - Provide heat and ventilation same as other rooms in the building.
 - This space is not to be used as a mechanical room or to be in a mechanical room.
 - Provide six single-circuited 120V, 20A duplex receptacles in one wall for recharging floor maintenance equipment and several additional duplex convenience receptacles in each wall.
 - Provide a communications outlet for Ethernet connection and telephone connection.
 - Space requirements for the room are as follows:

Building Size		Approximate Space Required			
\diamond	0 - 50,000 sq.ft.	200 sq.ft.			
\diamond	100,000 – 200,000 sq.ft	600 sq.ft.			
\diamond	200,000 or more sq.ft.	700 sq.ft.			

- B. Custodial Closets: Provide at least one custodial closet per floor, meeting the following requirements:
 - Shelves on one wall 12" wide, 18" apart, first shelf 24" from the floor. Heavy duty K&V adjustable shelf tracks or equal.
 - One service sink will be provided.
 - All walls in custodial closets will be filled and finished with epoxy paint or other waterproof finish material such as glazed block, as approved.

- Mop rack over sink and mixing faucet 24" from the floor.
- Sealed concrete floor
- The closets will have ventilation and, when on an outside wall, will be heated.
- This space will not be used as a mechanical room or have mechanical equipment located in it, except for an inspector's test station for a sprinkler system when such a room affords the most convenient location.
- Space Requirements for the room are as follows:

Building Size		Approximate Space Required		
\diamond	0-100,000 sq.ft.	6 ft. by 6 ft.		
\diamond	100,000 or more sq.ft.	8 ft. x 12 ft.		

C. ELEVATOR EQUIPMENT SPACE

- Traction elevators are preferred over hydraulic elevators for higher frequency use, faster than 125 fpm over four stops, and high load installations. Consult with Planning, Design and Construction.
- Hydraulic elevators will have their hoisting equipment located within 25 ft. of the hoistway and at the lowest landing of the elevator. Traction elevators will be overhead traction type with the machine room above the shaft in the attic or penthouse.
- When the size of the building or the occupancy justifies two elevators, they should be installed immediately adjacent to each other.
- Machine space will be separate from any other, and accessible from within the building via stair if it all possible. Ladders or roof access are unacceptable.
- Provide heat and/or ventilation and cooling as required to maintain machine room between 60 degrees F and 85 degrees F where electronic controllers are permitted by MSU.
- One elevator will be connected to the emergency generator.
- Provision will be made for lifting traction hoist equipment in and out of the machine room from the bottom floor of the building. Provide a removable concrete panel in the floor, and a hoist beam on the machine room ceiling in line with the hoist equipment and the floor opening, or equal.
- Provide a communications outlet for Ethernet connection.

D. MECHANICAL SPACES

- This section contains information that serves as general requirements for mechanical space design. Refer to applicable codes and standards for further information on the criteria mentioned in this section.
- Refer to the MECHANICAL DESIGN section of this document for mechanical design requirements and to appropriate sections in the MSU Construction Standards for additional design considerations.

- Separate spaces shall be provided for departmental equipment requiring access by department personnel so security can be maintained on building equipment. The departmental equipment shall not be located in building mechanical rooms.
- Orient mechanical rooms to outside utility services. Provide doors and areaways to the outside as required for replacement of heavy equipment.
- Penthouse mechanical rooms are desirable for buildings requiring mechanical spaces at a higher level. Provide natural light in penthouse.
- Mechanical spaces should be accessible to maintenance personnel without extensive travel through finished areas.
- Provide elevator service to the mechanical rooms where possible for delivery of operating materials, such as softener salt, water treatment chemical, etc. Mechanical rooms shall be accessible by stairs, not ladders.
- Mechanical spaces housing high heat generating equipment shall be adequately insulated and ventilated to protect adjoining areas. Rooms containing high heat generation equipment require thermal insulation from adjoining spaces.
- Building gas meter shall be located on the exterior.
- Provide at least one 3" floor drain in every mechanical room. See Mechanical guidelines for further information.
- Provide a communications outlet adjacent to the main Central Control cabinet for the building for Ethernet connection.

E. ELECTRICAL SPACES

- Electrical Space Design Requirements
 - Departmental equipment requiring access by departmental personnel shall be located in spaces separate from building transformer vaults, electrical rooms, telephone rooms, communication rooms, etc., so security can be maintained on building equipment and systems.
 - ♦ Do not locate transformer vaults under wet areas. Orient transformer vaults adjacent to exterior walls for access of underground electrical service. Provide doors and areaway to outside as required to provide means of replacing transformer equipment.
 - Emergency Generator Rooms will be located on an exterior wall and be adequately ventilated.
 - ♦ In general, electrical panels shall be located in electrical closets to provide for new and future conduit and cable installation. Sufficient empty wall space shall be provided for future electrical panels and equipment.
- Communication Space Design Requirements
 - ♦ Main Communication Rooms
 - □ Campus communications utilities will enter the building at the Telephone Utility Room and the Broadband Utility Room. A User Communication Room will be provided to accommodate departmental communication equipment. The types, service, and size of these three rooms shall be as shown in Exhibit 5.

- □ Ideally, the User Communication Room would be located between the Broadband Utility Room and the Telephone Utility Room with a cable passage between each room.
- □ Minimum ceiling height shall be 10 feet.
- All three rooms will have the floor tiled and the walls painted white. Three walls of the Telephone Utility Room will be covered with 4' x 8' x ³/₄" plywood. The Broadband Utility Room shall have a lay-in ceiling to minimize dust from the ceiling cavity above entering fiber optic equipment.
- Provide heat and/or ventilation or cooling to maintain rooms between 60 degrees and 85 degrees Fahrenheit.
- □ All communication rooms will have locksets. Infrastructure Planning and Facilities (IPF) space shall be on IPF keying.
- □ Each of the main communication rooms shall have two double duplex receptacles installed. Each double duplex shall be on its own circuit.
- ♦ Floor Communication Rooms
 - At least one Floor Communication Room shall be provided on each floor. These rooms will house telephone switching and broadband equipment. Locate the Floor Communication Rooms central to the area they will serve, and in <u>vertical alignment</u> from floor to floor, to facilitate routing of large connecting conduits. Each of the Main Communication Rooms will feed the closest Floor Communication Room.
 - □ Room shall be a minimum of 9' x 9' with an 8' ceiling. The door shall open out into the corridor. Two walls will be covered with 4' x 8'x ³/₄" plywood. The rooms will be under the control of Infrastructure Planning and Facilities. All communications rooms will have locksets.
- ♦ Floor User Communications Rooms
 - At least one Floor User Communication Room shall be provided on each floor. These rooms will house User Communication equipment. Locate the Floor User Communication Rooms adjacent to the Floor Communication Rooms. The number of Floor User Communication Rooms may have to be increased so that the longest run of any Category 5 ethernet cable is not greater than 300' (90m).
 - \Box Room shall be a minimum 8 ft. x 8 ft. with a 8 ft. ceiling height. Refer to EIA/TIA 569 for additional room requirements. The door shall open out into the corridor. The rooms will be under the control of the Department. All communication rooms will have locksets. Other utilities shall not pass through communication rooms in order to keep the ceiling space clear for routing of communication cables and installation of communication cable trays.

F. OTHER SPACES

- Solid Waste Management: Solid waste is removed from the University by Grounds Maintenance in trucks equipped with front-end lodal container handling equipment and self-contained compactors. Provide an enclosed Lodal Pickup Station in accordance with the detail in Exhibit 6. This room shall have a floor drain to the sanitary sewer.
- Recycling: Design and allocate an easily accessible dedicated space serving the entire building for the recycling of office paper, newspaper, other paper items, corrugated

cardboard, glass, plastics, and metals. Design the recycling space such that it supports campus building collection methods. Obtain design input and review from the MSU Recycling and Waste Management Office <u>http://www.recycle.msu.edu/</u>. The design team shall submit required MSU Sustainability Documentation showing compliance with this standard in accordance with the MSU Sustainability Documentation Requirements. For projects which are to be LEED registered and certified, submit LEED on-line Design Stage and Post Construction documentation as required showing compliance with this standard.

- Vending Machine Space: Provide an alcove or similar space off a main corridor for vending machines.
- Single-occupant Restroom: There will be a minimum of one single-occupant restroom on each floor of all new buildings or additions. This restroom will be fully accessible and not designated by gender.

G. INTERIOR FINISHES

- Interior surfaces that require painting should be kept to a minimum. Because a percentage of University facilities are constantly being altered for new uses, the designer should consider selecting materials that can be matched or easily duplicated in the future so as to allow future designers to patch and repair to match existing while maintaining the original design intent.
- Unless acoustical transfer is expressly stated as not a concern by the design team, interior shall be constructed of veneer plaster on gypsum lath, and at a minimum, extend one side full height to deck above and be sealed tight at top and bottom and around all penetrations. In cases where acoustical transfer is expressly stated as a significant concern, masonry walls are preferred.
- Heavy traffic areas such as corridors, lobbies, waiting areas, stairways, etc., shall have a durable, washable wall finish. The preferred wall surface for these areas is structural glazed facing tile. If the building design requirements dictate an alternate surface, vinyl wall covering should be used.
- All windows with the potential to have blinds or draperies in the future will be provided with 2" X 12" solid wood blocking at the ceiling to support window treatment. The blocking will be provided to accommodate a drapery and liner rod, or blinds, whether they are used or not. Coordinate required blocking with the appropriate trades.
- Draperies should hang in front of window stools to prevent the uneven look of draperies ending above the stool. If blinds are used, they will not be less than three (3) inches from the interior surface of the glass.
- All first floor corridors and other heavy traffic areas should have terrazzo floors. Other hard-surface floors, including large format porcelain tile or polished and ground concrete with sealer, may be considered on a case by case basis in place of terrazzo. Carpet in these areas will be permitted only with the approval of both IPF Planning, Design and Construction and IPF Building Services.
- At areas with floor drains, floors and selected floor finishes should accommodate a slope of 1/8" per foot minimum toward drains. Confirm with particular project, as some areas can have overriding functional requirements.
- All stair handrails will be continuous. Minimum vertical headroom shall be 8'0".

- Heavy traffic stairs shall have stainless steel handrails and balustrades attached to the side of the stringer, poured in place terrazzo treads with six inch abrasive tile nosing or carborundum/epoxy strips poured into formed strips in the terrazzo treads. Avoid aluminum or cast iron nosings because they work loose, crack or crack concrete, and corrode, especially at stairs near entrances.
- Light traffic stairs shall have rubber treads and painted steel handrails and painted steel balustrades with high performance urethane finish.
- Loading dock stairs or other exterior utility stairs shall be cast concrete with troweled carborundum/epoxy treads. Handrails shall be hot dipped galvanized or stainless steel.

SAFETY

1. FACILITY PROTECTION

- A. Protective systems involving fire, security, and access control shall be reviewed with the Department of Police and Public Safety regarding the scope of work and the type of systems to be implemented.
- B. Automatic Sprinklers: All new major buildings will have automatic sprinklers throughout. (See Construction Standards Division 21 Section 211313 WET-PIPE SPRINKLER SYSTEMS.
- C. Detection and Alarm: All new buildings will have a protected premises fire alarm system consisting of pull stations, area and duct smoke detectors, and evacuation alarms/strobes throughout the building. (See DESIGN GUIDELINES ELECTRICAL DESIGN and Construction Standards Section 283100 Detection and Alarm).
- D. Fire Hose Standpipes
 - Threading on hose connections shall match MSU equipment.
 - All new buildings over two stories above ground will have fire hose standpipes in accordance with NFPA Code and as follows:
 - Standpipes will normally be wet systems placed in stairwells, and be interconnected. Intermediate risers may be needed in long buildings.
 - Hoses will not be provided. Provide both Siamese and O.S. & Y. connections.
- E. Fire Extinguishers: Fire extinguishers will be furnished and installed by the MSU Department of Police and Public Safety, unless otherwise specified. (See Construction Standards Section 104400 Fire Protection Specialties)
- F. Miscellaneous: The following items are commonly installed wherever conditions warrant their use:
 - Breather Mask Cabinets (See Section 104400 Fire Protection Specialties)
 - Valve Cabinets: For emergency shut-off of laboratory gas.
 - Fire Blanket Cabinets
 - Emergency Showers (See Construction Standards Section 224500 EMERGENCY PLUMBING FIXTURES)

2. ACCESS CONTROL

- A. A Siemens access control system compatible with the access control system located in the Department of Police and Public Safety shall be implemented on building doors as follows:
 - Exterior Doors:
 - All exterior doors (personnel, overhead, access, etc.) shall be equipped with a magnetic position switch, request to exit, electric strike, and be prepared for electronic access control.
 - ♦ The accessible door to the building and any other designated exterior doors shall be equipped with electronic accessible control; a reader, electric strike, magnetic position switch and request to exit.
 - If this door is the automatic swinging door, then activation of the access control shall cause the door to open automatically.

• Interior Doors:

- All interior doors shall be prepared for access control with boxes and conduit for future magnetic position switch, request to exit, electric strike, and reader.
- ♦ Interior doors designated in the building program or subsequently determined shall be equipped the same as Exterior Doors above. The list of interior doors to be equipped with access control shall be reviewed with the MSU Department of Police and Public Safety.
- ♦ All interior and exterior Mechanical Room, Electrical Room, and Communication Room doors shall be equipped the same as Exterior Doors above.

EXHIBIT 1: MSU PLANNING PRINCIPLES –Part of Campus Master Plan

EXHIBIT 2: DOCUMENT STADARDS INFORMATION

INSTRUCTIONS FOR FORMATTING SPECIFICATIONS

Planning, Design and Construction request all specifications be presented in the same format. Microsoft Word 2010 or newer will be used.

- 1. Times New Roman 11 Pitch will be used.
- 2. All margins will be 1".
- 3. See attached for layout of headers.
- 4. Please note all Page Nos. should be at the top of the page and within the header.
- 5. Keep a consistent outline layout with 5 space indents and tabs.
- 6. Double space between Section Titles and text.
- 7. Start a new page for each Section.
- 8. Watch for paragraphs being split due to end of page. If at all possible start new page.
- 9. Be consistent with bolding, capitalizations, and underlining formats.
- 10. Show "End of Section" notation.
- 11. <u>Single side all your work</u>. Double siding will only occur when the document is sent for printing via the Planning, Design and Construction office.
- 12. If an outside consultant prepares the Specification, please submit a digital copy of the work as well to enable our office to expedite minor corrections.
- 13. A Footer may be used for Consultant name. Consultant's project number must be identified as such.

H:/forms/specformat.doc

Michigan State University DESIGN GUIDELINES

Building Name – Project Name

MSU PROJECT NO. xxxx

TITLE OF SECTION (UPPER CASE)

PAGE (Section No.) – (Page No. of Section)



Sample Header

Please use this format for all backend documents.

Consultant's Name

SECTION 16630 - AUDIO-VISUAL EQUIPMENT

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes
 - 1. Provide all labor, materials, and equipment as necessary to complete all work as indicated on the drawings, and as specified herein.
 - 2. The Contractor shall furnish and install a complete audio-visual system as described herein and as shown on drawings with all necessary components for a complete system.
- B. Related Sections:
 - 1. Division 1 General Requirements
 - 2. Applicable sections of Division 16 Electrical

1.2 SYSTEM DESCRIPTION

A. Furnish and install new ceiling mounted speakers, conduit and cable for a complete and functional system.

1.3 SUBMITTAL

- 1. Shop Drawings
 - 1. Speaker assembly and enclosures.PART 2 PRODUCTS

2.1 PRODUCTS

Speakers shall be Lowell model 8C10W with WB-8H ceiling baffles, 8" speaker with 70V transformers, CP speaker enclosure and Quam SSC-1 support channels. Speaker cable to be West Penn WP 25225B.

End of Section

EXHIBIT 3: MSU BEST PRACTICES LEED

- 1. Green Checklist
- 2. Requirements
 - A. General/Architectural/Furnishings
 - Identify materials to be recycled and establish a plan for removal.
 - Identify items for Surplus and coordinate with Surplus for removal.
 - Provide measurement data and documentation of recycled materials by project.
 - Confirm equipment to be used or purchased is energy star rated.
 - Include purchase of recycling containers in project budget.
 - Include recycled content materials where applicable Verify with Interior Design the options for recycled content carpet.
 - Specify low volatile organic compound (VOC) adhesives and paint.
 - Take advantage of day lighting options during design.
 - Design to incorporate appropriate spaces for recycling containers.
 - Review enhanced security checklist of security needs/card access.
 - Evaluate the efficiency of open ceiling plans for laboratories.
 - Where applicable use locally manufactured materials including furnishings.
 - Review the MSU Green Certification list such that this new space would be MSU Green certified (FUTURE DEVELOPMENT.)
 - Future consideration of motion activated paper towel dispenser type and hand dryer.
 - B. Mechanical Reduce energy and water consumption
 - Low Flow 1/8 gallon urinals for restroom renovations or other spaces that may have a toilet/urinal.
 - New installations shall be waterless urinals.
 - Include commissioning when major mechanical equipment and/or systems are replaced or installed as new.
 - Provide metering capability where appropriate (water and condensate.)
 - Provide Heating, Ventilating, Air Conditioning (HVAC) demand capability with override buttons where applicable.
 - Provide occupancy sensors for setback on fume hoods where applicable.
 - C. Electrical Reduce Energy Consumption
 - Provide occupancy sensors for lights where applicable In particular common areas such as lunch rooms, restrooms, classrooms, etc.
 - Provide 2 level switching option for lighting control in all spaces where this type of control is applicable such as conference rooms, classrooms, offices, etc.
 - Provide photocell control for lighting where applicable.
 - Verify appropriate fixtures and light levels are specified.
 - Provide electrical sub-metering where appropriate

Michigan State University DESIGN GUIDELINES





EXHIBIT 4: ENERGY IMPACT STATEMENT FORMAT

MICHIGAN STATE UNIVERSITY INFRASTRUCTURE PLANNING AND FACILITIES PLANNING, DESIGN AND CONSTRUCTION DEPARTMENT

ENERGY IMPACT STATEMENT

Project Name:	
Gross sq. footage/net sq. footage Gross cubic footage	
Steam Load	
Domestic Hot Water	#/Hr.
Space Heating	
Air Handling Units #/Hr. Hot Water Heating	#Hr.
Fintube, Convectors, Units Heaters, etc#/Hr.	
Absorption Air Conditioning	#/Hr.
Process Equipment (Stills, Autoclaves, etc.)	#/Hr.
Special Equipment (Itemize Below)	
<u> </u>	#/Hr.
# <u>Hr</u>	#/Hr.
#Hr	#/Hr.
Average Steam Demand	<u> </u>
Summer Operation: Maximum Steam Demand	#/Hr.
Average Steam Demand	#/Hr.
Winter Operation: Maximum Steam Demand	#/Hr.
Estimated Yearly Steam Load	#/Yr.
Electrical Load	
Lights:	KW
Equipment:	
AC Systems (includes chiller and related pumps, cooling towers, etc.)	KW
Air Handling UnitsKW Special Equipment	KW
Misc. EquipmentKW	
Supplementary Electrical Loads (itemize below):	
<u>#Hr</u>	#/Hr.
# <u>Hr</u>	#/Hr.
# <u>Hr</u>	#/Hr.
Winter Average Electrical Demand	KW
Summer Average Electrical Demand	KW
Maximum Electrical Demand	KW
Estimated Yearly Electrical Load	<u>KWH/YR</u>

<u>Water</u>

Water Closets <u>GPM</u> Urinals	GPM
Lavatories Lab Sinks and Equip	GPM
Cooling Tower/Evap. Condenser Make-Up GPM	
Special Uses (Itemize Below)	
GPM	GPM
GPM	GPM
GPM	GPM
Average Water Demand	GPM
Maximum Water Demand	GPM
Average Daily Usage	GPM
Estimated Yearly Usage	GPY
<u>Sewer</u>	

Sanitary - Average Daily Usage	GPD
Storm - Average Daily Usage	GPD

EXHIBIT 5: CAMPUS COMMUNICATION ROOM SIZES

Type of Room

Service	2				
Broadband Utility Room		Broadband service coaxial or fiber to the building will enter in this room; Infrastructure Planning and Facilities domain.			
Telephone Utility Room	1	Telephone servi	ice to the buildin	ng will enter in this room;	
		Infrastructure Planning and Facilities domain.			
User Communication Room		Departmentally owned communication and computer equipment used to interface the broadband and/or telephone systems will be located in this room; Department space.			
Type of Room	<u>Buildin</u>	<u>g Size</u>	Approx. Size of	f Room	
Broadband Utility Room	Any siz	ze	12 ft. x 15 f(180	Osq.ft.)	
Telephone Utility Room	0 - 80,0	000 sq.ft.	9 ft. x 12 ft.	(100 sq.ft.)	
	80,000	sq.ft.+	12 ft. x 15 ft.		
User Communication Room	Any siz	by the	(180 sq.ft. or la department)	rger as required	

Michigan State University DESIGN GUIDELINES

EXHIBIT 6: LODAL PICKUP STATION DESIGN



EXHIBIT 7: LEED™ PROJECT CHECKLIST

	2009 for New Construction and Maio	r Renovations				Proje	ot Name
Projec	t Checklist					,-	Date
Aggge Hojee							
Sustai	inable Sites Possibl	e Points: 26		Materi	als and Resources, Continued		
Y N 7	Coastauction Activity Bollution Prevention		YNZ	Curlle 4	Recurled Content		1 += 2
T Prevent 1	Site Selection	1		Credit 4	Resignal Materials		1 to 2
Credit 2	Development Density and Community Connectivity	5		Credit 6	Ranidly Renewable Materials		1
Credit 3	Brownfield Redevelopment	1		Credit 7	Certified Wood		1
Credit 4.1	Alternative Transportation—Public Transportation Access	. 6					•
Credit 4.2	Alternative Transportation-Bigvole Storage and Changin	e Rooms 1		Indoor	Environmental Quality Possible Po	ints:	15
Credit 4.3	Alternative Transportation-Low-Emitting and Fuel-Effici	ent Vehioles 3					
Credit 4.4	Alternative Transportation-Parking Capacity	2	Y	Prereg 1	Minimum Indoor Air Quality Performance		
Credit 5.1	Site Development-Protect or Restore Habitat	1	Y	Prereq 2	Environmental Tobacco Smoke (ETS) Control		
Credit 5.2	Site Development-Maximize Open Space	1		Credit 1	Outdoor Air Delivery Manitoring		1
Credit 6.1	Stormwater Design-Quantity Control	1		Credit 2	Increased Ventilation		1
Credit 6.2	Stormwater Design-Quality Control	1		Credit 3.1	Construction IAQ Management Plan-During Construction		1
Credit 7.1	Heat Island Effect-Non-roof	1		Credit 3.2	Construction IAQ Management Plan-Before Occupancy		1
Credit 7.2	Heat Island Effect—Roof	1		Credit 4.1	Low-Emitting Materials—Adhesives and Sealants		1
Credit 8	Light Pollution Reduction	1		Credit 4.2	Low-Emitting Materials—Paints and Coatings		1
				Credit 4.3	Low-Emitting Materials—Flooring Systems		1
Water	Efficiency Possible	e Points: 10		Credit 4.4	Low-Emitting Materials-Composite Wood and Agrifiber Produ	ots	1
_				Credit 5	Indoor Chemical and Pollutant Source Control		1
Y Prereg 1	Water Use Reduction-20% Reduction			Credit 6.1	Controllability of Systems-Lighting		1
Credit 1	Water Efficient Landscaping	2 to 4		Credit 6.2	Controllability of Systems-Thermal Comfort		1
Credit 2	Innovative Wastewater Technologies	2		Credit 7.1	Thermal Comfort-Design		1
Credit 3	Water Use Reduction	2 to 4		Credit 7.2	Thermal Comfort-Verification		1
				Credit 8.1	Daylight and Views-Daylight		1
Energ	y and Atmosphere Possible	e Points: 35		Credit 8.2	Daylight and Yiews—Yiews		1
Y Present	Fundamental Commissioning of Building Energy Systems			Innova	tion and Design Process Possible Po	ints:	6
Y Preven 2	Minimum Energy Performance			minore	Rion and besign rocess	inc.	•
Y Prerez 3	Fundamental Refrigerant Management			Credit 1.1	Innovation in Design: Specific Title		1
Credit 1	Optimize Energy Performance	1 to 19		Credit 1.2	Innovation in Design: Specific Title		1
Credit 2	On-Site Renewable Energy	1 to 7		Credit 1.3	Innovation in Design: Specific Title		1
Credit 3	Enhanced Commissioning	2		Credit 1.4	Innovation in Design: Specific Title		1
Credit 4	Enhanced Refrigerant Management	2		Credit 1.5	Innovation in Design: Specific Title		1
Credit 5	Measurement and Verification	3		Credit 2	LEED Accredited Professional		1
Credit 6	Green Power	2					
				Region	nal Priority Credits Possible Po	oints:	4
Mater	ials and Resources Possible	e Points: 14		_			
_				Credit 1.1	Regional Priority: Specific Credit		1
Y Prereq 1	Storage and Collection of Recyclables			Credit 1.2	Regional Priority: Specific Credit		1
Credit 1.1	Building Reuse-Maintain Existing Walls, Floors, and Roof	1 to 3		Credit 1.3	Regional Priority: Specific Credit		1
Credit 1.2	Building Reuse-Maintain 50% of Interior Non-Structural B	lements 1		Credit 1.4	Regional Priority: Specific Credit		1
Credit 2	Construction Waste Management	1 to 2		T • • •			110
Credit 3	Materials Reuse	1 to 2		Total	Possible P	aints:	110
				Certified	40 to 49 points selver 50 to 59 points. Gold 60 to 79 points. Platinum 80 to	110	

EXHIBIT 8: ASL Formatting Guidelines

O PlanGrid

ASL Formatting Guidelines

ASL tries to be flexible with different spec doc formats, but it works best with a predictable, consistent format. For best results, follow this format as closely as possible.

The ASL extraction expects a strict hierarchy of sections, parts, articles (aka "subsections"), paragraphs (aka "submittals"). Any section must contain parts, any part must contain articles, and articles must contain paragraphs. If this hierarchy is not present in the document, we are unlikely to extract submittals correctly. Paragraphs may also contain additional subparagraphs (in the form of bulleted or numbered lists) and we will extract these as part of the description of the item. A number of keywords are used to identify particular boundaries of the document structure (e.g. "END OF SECTION" to mark the end of a section). These are generally matched exactly but in a case-insensitive manner (i.e. we will also recognize "End of section" but not a typo such as "End of seciton").



CS_DSG_GENERAL.docx Rev. 5/1/2019

Page Headers and Footers

We use the similarity of content at the top and bottom of subsequent pages to try to guess which parts of the page should be considered the header and footer. If the location of page headers/footers are guessed incorrectly it is likely to lead to issues identifying the section start correctly. It may also result in more subtle issues where part of the header or footer is accidentally extracted as part of the submittal item text.

For best results, follow these rules for headers/footers:

- Headers/footers should be consistent across pages. E.g. don't alternate which side your project name appears on.
- Headers/footers shouldn't appear too close to the spec doc's body. A good rule of thumb is if a word in your header is closer to the body than it is to another word in the header, it's probably not going to work.
- Try to avoid using a header/footer for a single page. Part of detecting these elements is looking for patterns across multiple pages. If the header contains the project name (that is constant on all pages) it is more likely to be identified than if it only contains the section name/number (which may change through a document with many spec sections).

Sections

Section "start" markers

Section headings are best detected in the format "Section <CSI Code>", where "<CSI Code>" is the five or six digit Masterformat code, formatted with or without spaces. There should be white space above and below the heading. Each section must start on a new page. For example:

SECTION 06 10 53 - MISCELLANEOUS ROUGH CARPENTRY

Even if we fail to find a section start header, we still keep looking for the part start header, so in some cases we are able to recover from a failure to correctly identify the section start header.

Section "end" markers

Always explicitly mark where sections end. For example:

END OF SECTION 06 10 53

Part start markers

The part start header must match "PART <NUMBER> - <NAME>" or "<NUMBER> - <NAME> where NAME must be one of "GENERAL", "PRODUCTS", "EXECUTION" and NUMBER must be 1, 2, 3 or 4. The dash and space between NUMBER and NAME is optional and can vary in length but everything else about the format has to match exactly.

Articles (aka "subsections")

Subsections must start as a line numbered with two numbers e.g. "1.1", "1.02" or "2.43". The last number can optionally be followed directly by a period.

Paragraphs (aka "submittals")

We recognize two different numbering schemes for paragraphs: letters and numbers. When letters are used, the line must start with lower- or uppercase letter numbering e.g. "A.", "B.", "c." etc. The letter must be followed by a period. The paragraph extends until the next line that is similarly indented and has the following letter in the sequence, e.g. a paragraph that starts with "E." will end when a similarly indented line is seen starting with "F.". When numbers are used, the line must start with ".1", ".2", etc. Notice that the dot is in front of the number (this is the CSC recommended format).

The following is an ideally formatted "Product Data" submittal following the CSI format:

PART 1 – GENERAL

- 1.1 Action Submittals
 - A. Product Data:
 - 1. Describe properties of items used in Project
 - 2. Submit Work-related product data

We also try to extract submittals that follow the CSC (Canadian) format:

1 GENERAL

2

1.01 SECTION INCLUDES

.1 Mortar for unit masonry and exterior stone cladding.

1.02 RELATED SECTIONS

- .1 Section 04 20 00 Unit Masonry: Mortar for concrete unit masonry.
- .2 Section 04 42 00 Exterior Stone Cladding: Mortar for natural stone veneer.

We also support a different format where the paragraphs are written with full numbering (e.g. "1.12.1." as in this example):

1.12. EXTRA MATERIALS

1.12.1. Furnish extra materials that match products installed and that are packaged with protective covering for storage and identified with labels describing contents. Supply as a part of this contract the following items:

1.12.1.1. Two (2) wrenches for disassembly and adjustment of each type of sprinker head used in the irrigation system.

Strikeout text (aka "tracked changes")

We currently make no effort at even detecting these markings in the document and will just extract the text behind the strikeouts. This means that we are likely to extract confusing and incorrect description texts for submittals that use strikeout text. We also are likely to report these documents as correctly extracted despite the incorrect descriptions.

Numbered lines

There are some basic rules in place to try to remove line numbers from documents that have those. If this doesn't work correctly, the line numbers will likely cause the rest of the extraction to be very confused and fail to extract anything. Documents without numbered lines are more likely to extract correctly.