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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 through formal approval using the MSU Standard Deviation approval process. Approval must documented on the MSU Standards deviation log.. 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

0. MSU CAMPUS PLANNING PRINCIPLES

. The MSU Campus Planning Principles are included as part of The MSU Campus Land Use Plan can be found here https://ipf.msu.edu/campus-plan.

1. DOCUMENT STANDARDS

. To facilitate record keeping by Planning, Design and Construction, the format of project documents are restricted as follows:

- Specifications will be 8 ½" 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
- MSU standard title block will be used for all design and construction drawing sheets.
- North arrow should be shown on plans.

A. Planning, Design and Construction will provide room/space numbering.

B. 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.

C. Additional direction on specification formatting is found in Exhibit 2

2. LIFE CYCLE COSTING

. 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. An important part of this analysis is energy modeling and sustainability assessment.

3. LEED™

. It is the intent of Michigan State University that all new buildings and major remodeling projects will be designed to qualify for LEED™ Silver Certified using the most current version available. Certification will be addressed on a case by case basis.

A. 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 LEED™ criteria for appropriate inclusion. Also see Exhibit 3, MSU BEST PRACTICES LEED™ and Exhibit 7, LEED™ 2009 for New Construction and Major Renovations, Project Checklist.

B. 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 LEED™ 2009 Materials and Resources Credit 2.

4. UNIVERSAL DESIGN INITIATIVE

. 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.
- 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
- Provide fully accessible restrooms at all floor of the facility
- Provide fully accessible single occupant restrooms on all floors of the facility.
- Provide personal health rooms on all floors of the facility.

5. ENERGY CONSERVATION

. 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.

A. All new buildings will meet current Michigan Energy Code requirements, including the corresponding adopted ASHRAE requirement.

B. 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 the current version of the ASHRAE/IESNA Standard 90.1, and also against a baseline building that complies with MSU Construction Standards.

C. Opportunities for additional savings include the following:

- Building Envelope: Reduce heat conduction through roofs and walls and window ratio optimization. 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 and/or enthalpy wheels. 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.

6. ENERGY IMPACT STATEMENT

. 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 Department. 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.

   B. 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. Each building will contain the following rooms: equipment, bulk storage, check in, and custodian break room. All spaces should be located in proximity, near the freight elevator and/or loading dock. Depending on building size these rooms can be combined into different configurations (custodial leadership to be consulted)
      - All spaces
        - Provide heat, ventilation, and exhaust the same as other rooms in the building and as required per code.
        - This space is not to be used as a mechanical room or to be in a mechanical room.
      - Bulk Storage
        - Dry storage with wire rack wheeled shelving.
        - Min size requirement 200 sq. ft.
        - Locate near the service/freight elevator if one is provided in the building.
      - Equipment Storage
        - 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.
        - Min. 48inch door opening.
        - Min. Size requirement 200 sq. ft.
      - Check In Area
        - Min. 200 sq. ft.
        - 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.
        - Room requires a time clock installed.
        - Provide a communications outlet for Ethernet and power connection for time clock.
      - Break Room
        - Coat hooks
        - Table and chairs appropriate for crew size. Approximately one FTE per 40,000 sq. ft.
        - Minimum 300 sq. ft. depending on size of building and necessary staffing levels.

- Custodial Closets
  - Provide at least one custodial closet per floor, meeting the following requirements:
  - Located near restrooms, ideally in between the restrooms.
  - 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.
  - Sealed concrete floor with drain.
  - The closets will have ventilation, exhaust, 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.
  - Space Requirements for the room is minimum 36 sq. ft. depending on configuration:
  - 36” door access
  - The sink should be located across from door.

3. 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. Hydraulic Elevators require an oil separator system. Work with PDC Mechanical Rep for space required. 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 stairs if 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.

4. 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 unless preapproved by the maintenance services department.

- Orient mechanical rooms to minimize the distance to existing 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 shall be ventilated.
- 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 floor sinks where indirect waste is needed. Use trench drains near water softeners. Consider tripping hazards when laying out floor drains/sinks.
- Provide a communications outlet adjacent to each Building Automation Panel for the building for Ethernet connection.
- Provide full high speed WIFI coverage to all mechanical spaces.
- All mechanical space doors are to be accessed through an electronic card access system.

5. ELECTRICAL SPACES

A. 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
- All electrical space doors will be accessed through an electronic card access system
- All electrical spaces will have full high speed WIFI coverage.
- 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
- No plumbing or water lines or drain piping to be located above electrical vault transformers, substations, or switchgear.
- 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.

B. Communication Space Design Requirements

i. Main Communication Rooms
- Campus communications utilities will enter the building at 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 next to the Broadband Utility Room with a cable passage between each room.
- Minimum ceiling height shall be 10 feet.
- All three rooms will have sealed concrete floors and the walls painted white. Three walls of the Broadband Utility Room will be covered with 4’ x 8’ x ¾” plywood.
- Provide heat and/or ventilation or cooling to maintain rooms between 60 degrees and 85 degrees Fahrenheit.
- All communication rooms will have an electronic card access system..
- Each of the main communication rooms shall have two double duplex receptacles installed. Each double duplex shall be on its own circuit.

ii. 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 vertical alignment 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 10’ x 10’ with an 8’ ceiling. The door shall open out into the corridor. Two walls will be covered with 4’ x 8’x ¾” plywood. The rooms will be under the control of IT Services.
- All communications rooms will have an electronic card access system..

iii. 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).
- 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.

6. OTHER SPACES

A. 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.

B. 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 http://www.recycle.msu.edu/.
   - 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.

C. Vending Machine Space
   - Provide an alcove or similar space off a main corridor for vending machines.

D. Single-occupant Restroom – refer to Single Occupant Restroom Standard.
   - 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.

E. Personal Health Rooms – Refer to Standard.

F. Laboratories – Refer to Laboratory Standards.

7. INTERIOR FINISHES

- In public spaces the use of natural products with low maintenance surfaces is encouraged with painting reserved for plaster and drywall. 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. The use of wall fabric as a finish is discouraged.
- Unless acoustical transfer is expressly stated as not a concern by the design team, interior partitions shall be constructed of veneer plaster on gypsum lath, and extend one side to the superstructure above deck above and be sealed tight at top, bottom and sides with meeting with dissimilar materials, as well as around all partition penetrations.
- Heavy traffic areas such as corridors, lobbies, waiting areas, stairways, etc., shall have a durable, washable wall finish.
- All first floor Entries and Lobbies to have poured in place epoxy floors. At Corridors and other heavy traffic areas 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.

- Finishes in areas with floor drains should be accommodate required slope to drain. If tile it is utilized it shall be sized and laid out to accommodate appropriate drainage.
- Public traffic stairs shall have stainless steel handrails poured in place terrazzo treads and abrasive formed into the terrazzo treads. Avoid aluminum or cast iron nosing's.
- Egress-only stairs shall have rubber treads and stainless steel handrails and painted steel guardrails with high performance powder coat or 2 part epoxy finish.

8. SAFETY

A. Facility protection
   - 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 and major building renovations will have automatic sprinklers throughout, whether or not required by code. (See Construction Standards Division 21 – Section 211313 WET-PIPE SPRINKLER SYSTEMS. Consult with MSU Fire Marshal and MSU assigned mechanical engineer to determine fire suppression requirement for all other projects.

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 NFPA1 and NFPA14 Code, 205MBC905.3., 205 MBC 403.1,2015 MRC 804.3.:
   - 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 Infrastructure Planning and Facilities..

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 and eyewash/drench hoses – locations need to be approved by EHS (See Construction Standards Section 224500 – EMERGENCY PLUMBING FIXTURES, Mechanical Guidelines and Laboratory Guidelines)

9. 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

i. 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.

ii. 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.

iii. Classroom Doors

- (new requirements for the classroom doors to match what is being done right now?)

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

EXHIBIT 2: DOCUMENT STADARDS INFORMATION

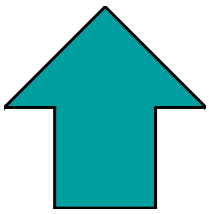
INSTRUCTIONS FOR FORMATTING SPECIFICATIONS

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. Single side all your work. 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.

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

. 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.

A. Mechanical – Reduce energy and water consumption

- Discuss with your PDC Mechanical representative.
- 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.

B. 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

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)
_____#Hr _____#/Hr.
_____#Hr _____#/Hr.
_____#Hr _____#/Hr.
Average Steam Demand_____#/Hr.
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 Units_____KW Special Equipment_____KW
Misc. Equipment_____KW
Supplementary Electrical Loads (itemize below):
_____#Hr _____#/Hr.
_____#Hr _____#/Hr.
_____#Hr _____#/Hr.
Winter Average Electrical Demand_____KW
Summer Average Electrical Demand_____KW
Maximum Electrical Demand_____KW
Estimated Yearly Electrical Load_____KWH/YR

Water

Water Closets_____GPM 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

Sewer

Sanitary- Average Daily Usage_____ _____GPD
Storm - Average Daily Usage_____ _____GPD

EXHIBIT 5: CAMPUS COMMUNICATION ROOM SIZES

TYPE OF ROOM	**SERVICE**
Broadband Utility Room	Broadband service coaxial or fiber to the building will enter in this room – Infrastructure Planning and Facilities domain
Telephone Utility Room	Telephone service to the building 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 – Departmental space

TYPE OF ROOM	**BUILDING SIZE**	**APPROXIMATE SIZE OF ROOM**
Broadband Utility Room	Any size	12 ft. x 15 ft. (180 sq. ft.)
Telephone Utility Room	0 – 80,000 sq. ft.	9 ft. x 12 ft. (100 sq. ft.)
Telephone Utility Room	80,000 sq. ft. +	12 ft. x 15 ft. (180 sq. ft.)
User Communication Room	Any size	180 sq. ft. or larger as required by the department

EXHIBIT 6: LODAL PICKUP STATION DESIGN

WORK IN PROGRESS

EXHIBIT 7: STANDARDS DEVIATION LOG

MICHIGAN STATE UNIVERSITY
PROJECT NAME

<Description and date of document set, ex: Bid Documents>

<Current Date of Log>

Does the project deviate from MSU standards? ○ Yes, see below ◉ No

MSU PROJECT NO: CPXXXXX
<CONSULTANT NAME> PROJECT NO: XXX

ITEM NO	STANDARDS REFERENCE SECTION	PART	DESCRIPTION	STANDARDS REQUIRE	PROPOSED APPROACH, REASON FOR NON-CONFORMANCE, AND DESCRIPTION OF POTENTIAL IMPACT (AND COST IMPLICATION IF APPLICABLE)	ACCEPTED (A) OR REJECTED (R) A/R	DATE	NAME

EXHIBIT 8: ASL FORMATTING GUIDLINES

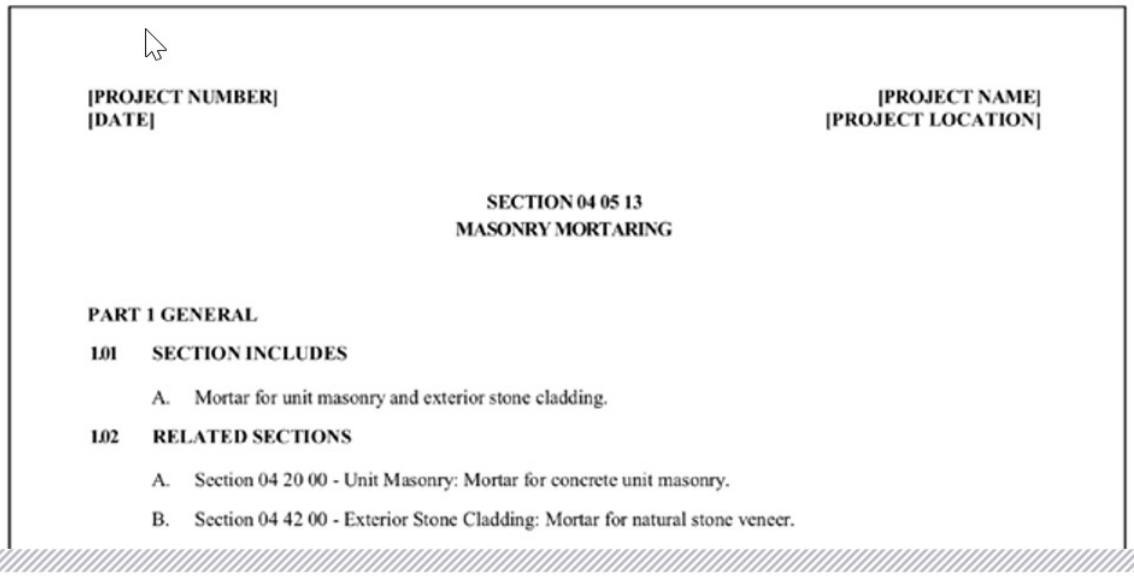
PlanGrid

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").



[PROJECT NUMBER]
[DATE]

[PROJECT NAME]
[PROJECT LOCATION]

SECTION 04 05 13
MASONRY MORTARING

PART 1 GENERAL

1.01 **SECTION INCLUDES**

A. Mortar for unit masonry and exterior stone cladding.

1.02 **RELATED SECTIONS**

A. Section 04 20 00 - Unit Masonry: Mortar for concrete unit masonry.

B. Section 04 42 00 - Exterior Stone Cladding: Mortar for natural stone veneer.

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

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.

Exhibit 9: TITLE BLOCK EDITING INFORMATION