

Exhibit C

The Ohio State University

Hydronic System Cleaning, Flushing Water Treatment

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Date of Revision: 18 November 2014

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1.04 CLEANING // FLUSHING // WATER TREATMENT - COMPLETION

The Contractor and OSU Project Manager must execute this form at the completion of the CFW (Cleaning/Flushing/Water Treatment) process. The Contractor shall include this Form, and all attachments, in the O&M manual and Systems Manual.

Comments:	
Inspected by: Date	Reviewed and Approved by: Date (With Conditions)
Signatures	
Final Inspection by: Date (Conditional Approval)	Final Review and Approval by: Date
Signatures	

APPENDIX J

2006 Edition, Published January 1, 2006; Document Revision Date: July 1, 1996

RANGES OF DESIGN LIMITS FOR SOUND CONTROL

<u>Type of Room or Area</u>	<u>Range of A-Sound Levels in Decibels</u>	<u>Range of NC Criteria Curves</u>
AUDITORIUMS		
Concert and Music Halls	25-35	20-25
Lecture Halls and Auditorium	35-45	30-35
Multi Purpose Halls and Theaters	30-40	25-30
CIRCULATION		
Corridors, Lobbies, and Waiting Rooms	40-50	35-45
Wash Rooms and Toilets	45-55	40-45
CLASS ROOM AND STUDY AREAS		
Class Rooms	35-45	30-40
Conference Rooms, Seminar Rooms	30-40	25-35
DINING AREAS		
Cafeterias	45-55	40-50
Dining Rooms	35-45	30-40
Restaurants	40-50	35-45
LABORATORIES		
Laboratory Class Rooms	40-50	35-45
Processing Laboratories	40-50	35-45
Research Laboratories	40-50	35-45
LIBRARIES	35-45	30-40
OFFICES		
Executive Offices	35-45	30-40
General Offices and Reception Rooms	35-50	30-45
Open Offices and Drafting Rooms	40-55	35-50

RECREATION

Gymnasiums, Bowling Alleys, Squash and Hand Ball Courts	40-50	35-45
Recreation Halls and Rooms	40-55	35-50
Sports Arenas	35-45	30-40
Swimming Pools	45-60	40-55

STUDY AREAS

Auto Tutorial Study Carrel Rooms,
Closed Study Carrels, and Study
Rooms and Lounges

35-45 Range of A-Sound Levels in Decibels	30-40 Range of NC Criteria Curves
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Type of Room or Area

STUDIOS

Sound Reproduction Studios	30-40	25-30
Television Studios	35-45	30-35

MISCELLANEOUS

Computer Machine Rooms	45-65	40-60
Dormitory Sleeping Rooms	35-45	30-40
Kitchens and Laundries	45-55	40-50
Museums, Court Rooms	35-45	30-40

END OF APPENDIX J

**TECHNICAL PROVISIONS FOR CORROSION-SCALE INHIBITORS,
MICROBIOCIDES, AND WATER ANALYSIS SERVICES FOR COOLING TOWERS****1. SCOPE**

This specification covers the materials, field service, lab service, and technical assistance required for first class treatment of water used in open recirculating condenser systems.

2. MATERIAL DESCRIPTION

- .1 The treatment shall be a one (1) component system for the control of scale, corrosion, and fouling caused by air borne debris. The chemical treatment level in the bleed-off shall meet the criteria established by the State of Ohio for discharge directly into streams. The supplier must supply BOD and COD information. The treatment shall be a synthetic organic containing no inorganic pollutants such as chromates, zinc, and phosphates. The treatment shall contain not only a scale inhibitor, but shall contain an antifoulant to keep suspended matter in suspension. The treatment shall have no detrimental affect on wood and shall not require the addition or use of acid to reduce the pH and total alkalinity.
- .2 The treatment shall provide corrosion protection for copper, admiralty brass, steel, and galvanized steel, with corrosion rates not to exceed 1 mil per year when applied at "use" concentrations in local city water.
- .3 The material shall not deteriorate, breakdown in any way, or precipitate when stored for a period of one (1) year. No deposits shall appear in the line from the drum to the pump and from the pump to where material is introduced into the water being treated.
- .4 All material bid shall have the following physical characteristics:

Appearance	Color Optional
Form	Free Flowing Liquid
Freezing Point	5 degrees F.
Flash Point	None
Density	10 Pounds Per Gallon Minimum

- .5 Type of Container: The material is to be furnished in 30 gallon drums of steel or suitable plastic. The drums shall have 2" and 3/4" top bung. The supplier

shall furnish product number, brand name, and weight of 30 gallon drum for all products quoted.

- .6 The selection and application of chemicals for water treatment shall be based on the most efficient use of energy, water, equipment, manpower, and materials. Heat exchange surfaces will be maintained with minimum resistance to heat transfer. Solids will be maintained in suspension for maximum concentration without deposit build-up. The supplier will make specific recommendations regarding the type and quantity of his products to be used to meet the requirement of this paragraph and other applicable sections of this specification.
- .7 The treatment in the cooling tower water shall inhibit the formation of deposits in the heat exchanger in which it is flowing, when the material on the other side of the exchanger is as high as 275 degrees F.
- .8 The chemical treatment shall be a proven, commercially available product.
- .9 The supplier shall furnish a sufficient number of corrosion test coupons to test each tower. They shall be a mild steel. They shall be inserted into the systems at points being representative of conditions within the system. The contractor is to determine these locations, which shall be approved by The Ohio State University.

The coupons shall be of standard size, have identification numbers stamped into the surface, have mounting holes, and be supplied with insulated mounting plugs. They shall be preweighed to the nearest 0.1 milligram. The corrosion rate shall not exceed 1 mil per year. Corrosion test results must contain a photograph of test strip and the formula used in the calculations for determining the mils per year corrosion rate. Corrosion strips must be supplied preweighed, with weight supplied for each fresh strip. The coupons or strips are to be checked at 60 day intervals, or more frequent if there is reason to suspect high corrosion rate. The maximum time permitted for corrosion results to be returned to the University is forty (40) days from the date of removal from system. The coupons are to be provided at no cost to the University.

- .10 Two completely different non-oxidizing microbiocides shall be supplied for an alternating program of microorganism control. They shall be broad spectrum microbiocides. The microbiocides shall be non-foaming and shall not affect or reduce the operating efficiency of the system. The microbiocides shall be effective within the 30-80 p.p.m. range, with dosage not to exceed 200 p.p.m. In the event that microbiocides do not produce microorganism control, non-foaming alternates must be supplied at no cost to the University.
- .11 The microbiocides can be in briquette form or liquid or a combination of briquette and liquid.



- .12 Product bulletins or brochures shall be furnished for each product recommended. OSHA safety data sheets shall be submitted for each product quoted. These data sheets shall accompany the bid documents.

3. WATER ANALYSIS AND SERVICE

- .1 Furnish a one year service program by a qualified service person, performing service on a full time basis. Service calls will be scheduled on a twice a month schedule coordinated with the University as to the day of the month that service will be performed. Upon arriving on campus, the service person will contact the University Representative. Upon completion of the service call, a copy of the service report will be given to that representative. Response to emergency service calls shall be less than 24 hours. The University shall make the equipment available to the service person so as not to cause delays.

Wexner Medical Center:

1. Service calls will be scheduled on a twice a month schedule coordinated with lead Med Center Facility technician as to the day of the month that service will be performed.
 2. The company should come in to test and provide a report of the system monthly for the following: Hardness, p & M Alkalinity, Chloride, pH, TDS or conductivity, iron, copper, inhibitor levels being used, make up water used and at least a quarterly bacteria and legionella test, along with any issues that they observe.
- .2 The chemical company shall supervise the installation wiring and operation of the chemical feed equipment.
- .3 The mechanical contractor shall notify the chemical company one week prior to system start up. The system is not to be started unless chemicals are on hand.
- .4 As soon as it can be coordinated with the University maintenance personnel, a minimum of four hours training session of theory and operation of the chemical treatment system will be scheduled.
- .5 The electrical contractor will furnish and install all necessary wiring. Power for condenser water treatment shall be 120V single phase taken from auxiliary contacts on the condenser pump starter. Wiring and proper operation will be under the supervision of the chemical company.
- .6 If condenser tubes are not free of scale at the end of the operating year, the chemical company will clean the system at no cost to the University.



- .7 It will be the responsibility of the chemical company to service the tower and set all controls for a period of one year from start up. It will not be the responsibility of The Ohio State University to maintain this operation.

4. WATER ANALYSIS – Contact FOD Energy Services & Sustainability (ESS) for current water quality report. CITY OF COLUMBUS WATER

~~The following city water analysis data is to be used as the basis for determining the amount and type of chemical treatment required.~~

City Water

Total Hardness, CaCO ₃	100
Calcium, CaCO ₃ , PPM	60
Magnesium, CaCO ₃ , PPM	40
Phenolphthalein Alkalinity, CaCO ₃ PPM	0
Methyl Orange Alkalinity, CaCO ₃ PPM	35
Chloride, Cl ⁻ , PPM	20
Silica, SiO ₂	6
pH	8
Specific Conductance, Micromhos, 25 degree C	240
Iron as Fe, PPM	0.001

END OF APPENDIX K

THE OHIO STATE UNIVERSITY SAMPLE SPECIFICATION CONDENSER WATER TREATMENT SYSTEMS

1. GENERAL

.1 REFERENCE

Section 23 63 05, Condensing Units and Condensers.

.2 SCOPE OF WORK INCLUDED

- .2.1 Furnish and install water treatment systems for the chemical treatment of all condenser water systems shown on the drawings or implied in the specifications.
- .2.2 Provide a chemical treatment system for all closed loop systems described or shown on the drawings.
- .2.3 Contractor shall include in his bid, the cost of chemicals, and service contract for one year from the date of system start up as described herein.

2. PRODUCTS

.1 CONDENSER WATER TREATMENT

- .1.1 Provide one impulse water meter on a make up water line to each tower. Meter will be of bronze body type by Rockwell, Badger or Hershey. Plastic will not be accepted. It shall consist of a bronze body impulse water meter. All water meters shall be mounted no higher than 5' off the floor, with the register in full view. It shall register in cubic feet.
- .1.2 Each chemical system shall be a Morr Control wired duplex function controller in a metal, lockable cabinet with an on-off manual switch, test switch, power, and function indicating lights visible when the door is closed. Provide a duplex receptacle in the bottom of the panel. Each system will include an injection assembly and a magnatrol bleed valve model #18-A-23-V with in-line strainer. (Size indicated on drawing.) Chemical pump shall be LMI Model A111 capable of pumping .48 to 24 gpd at 75psi, 120/60/1. All parts in contact with a chemical solution shall be impervious to solutions used in cooling tower treatment. Pump shall incorporate an anti-siphon pressure relief valve.
- .1.3 Solids in the condenser water system shall be controlled by a JA-12-G-7-C-M3 (OSU) Morr controller. This unit will receive a signal from a quick disconnect probe, piped across the condenser pump. The dial model shall be a full linear scale, 0-3000 micro-Mho's of conductance. The controller shall provide a proportional linear output signal of 4 to 20 ma to the central building automation system. The controller shall contain a 15 amp relay to handle a chemical feed pump as well as the bleed solenoid. The unit is to be pre-wired with a duplex receptacle in the bottom of the cabinet.
- .1.4 See attached specification for Cooling Tower Water Treatment.

.1.5 Furnish one test kit with all necessary apparatus and reagents to perform all required tests on the condenser water system necessary for proper control and monitoring. The test kit shall include a portable conductivity meter plus iron and copper test kits to monitor corrosion.

.1.6 Adequate sizing and operation of the control system and the chemical pumps shall be the responsibility of the chemical company.

.2 CLOSED LOOP SYSTEMS

.2.1 The chemical treatment for the closed loop systems shall be nitrite based on the following:

.2.1.1 The nitrite water treatment for the chilled water system shall be a liquid treatment, with an active ingredient range of 10 percent minimum to 35 percent maximum of nitrite, by weight.

It is the intent to maintain a nitrite level of 1000 PPM in the chilled water system. It shall incorporate selected alkalinity builders, dispersers, and buffers. The material shall give effective protection against corrosion of brass, steel, copper, cast iron, and solder.

The treatment must stay in suspension for one year in the shipping container without agitation. The product will be shot-fed in the chilled water system.

.2.1.2 The treatment shall have no corroding or disintegrating effect on gaskets and pump seals.

.2.1.3 The product shall meet F.D.A. and E.P.A. acceptance.

.2.1.4 The material shall have the following characteristics:

Appearance	Color
Optional	Form
Free Flowing	Liquid
Density	9.3 pounds/gallon
Flash Point	None

.2.1.5 Control levels shall be maintained at 1000 to 1200 ppm of nitrite. Chromates and phosphates will not be accepted.

Wexner Medical Center:

1. Service calls will be scheduled on a twice a month schedule coordinated with Lead Med Center Facility Technician as to the day of the month that service will be performed.

2. The company should come in to test and provide a report of the system monthly for the following: Hardness, p & M Alkalinity, Chloride, pH, TDS or conductivity, iron, copper, inhibitor levels being used, make up water used and at least a semi-annual bacteria and legionella test, along with any issues that they see.

- .2.2 Feed equipment shall consist of a shot-feeder piped across the circulation pumps with quarter turn ball valves on each side of the shot-feeder. Arrange piping so the feeder will be functional when any one of the condenser pumps is in operation. The feeder shall consist of two gallon cast steel body, funnel and valve, with drain and vent cocks. Piping and installation by this contractor.
- .2.3 Provide nitrite and pH test kits in the system test kit.
- .2.4 Treatment and equipment similar and equal in all aspects may be furnished by Vulcan, Calgon, Betz, Chardon, or Columbus Technical Services at the contractor's option.

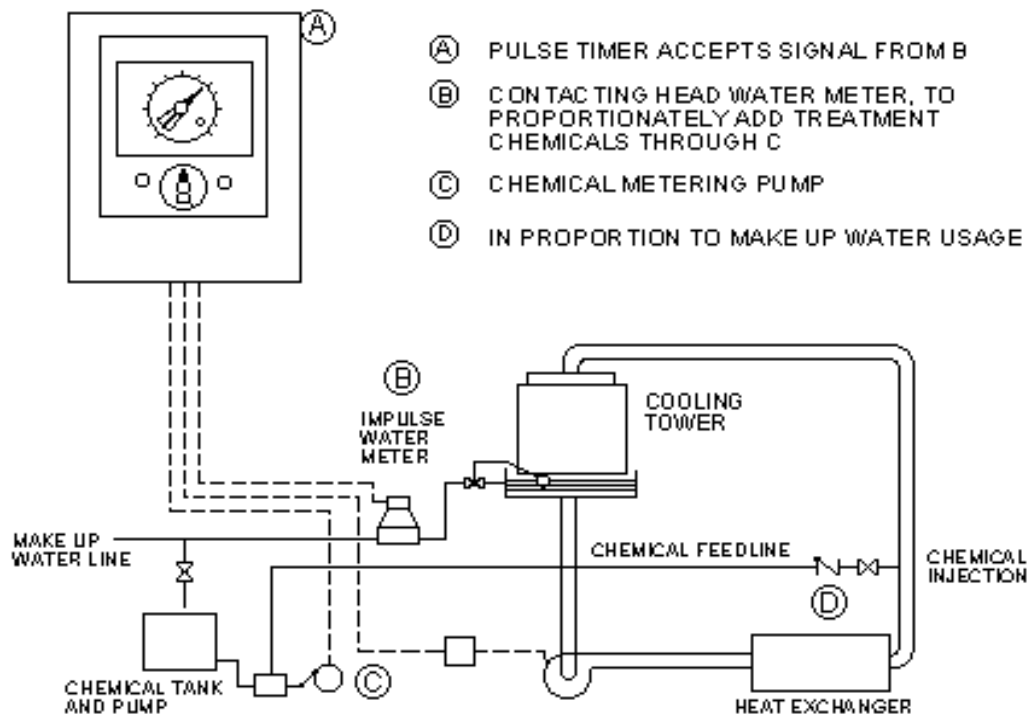
Wexner Medical Center:

- 1. Chemical Treatment Company shall be coordinated with OSUWMC Facilities Engineering.

3. INSTALLATION

- .1 Furnish and install all mounts, piping, tubing and valves necessary to install the complete operable water treatment system as shown on the drawings and under the supervision of the chemical company.

TYPICAL INSTALLATION - PULSE TIMER
PROPORTIONAL CHEMICAL FEED DUAL TIMER IN A COOLING TOWER



JA12-G-7-CM3 (O.S.U.)

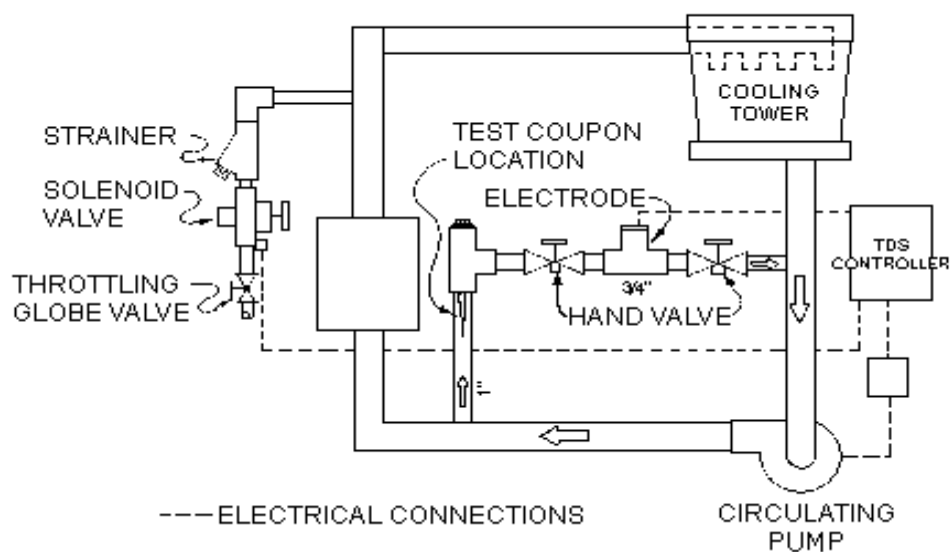


FIGURE 1 - TYPICAL INSTALLATION

Figure 1: Normal installation, with electrode installed in a bypass line across the tower recirculating pump. Hand valves are installed to facilitate removal of electrode for periodic cleaning or inspection.

- A. The power to the Ac/Trol unit is shown connected to the main cooling water circulating pump. Power should be supplied to the unit in this manner so the controller functions only when the system is in operation.
- B. The solenoid valve used should be 115 VAC with a minimum of 5 psi and a maximum of 125 psi pressure at this point. It should have a hand valve for flow throttling.
- C. The normal operation will be bleed-off only from the TDS controllers. Should there be a failure of the probe or internal operation of the TDS controller, the solenoid valve electric power can be unplugged and plugged into a dual timer.
- D. The normal operation of the dual timer is to take an impulse signal from the water meter and send a signal to the chemical pump to inject chemicals should the impulse meter or timers fail, the chemical pump can be unplugged and plugged into the TDS controller for feed and bleed.
- E. When installing the water meter, it is recommended that provisions be made for a backflow preventer or an air gap must be provided, in-line strainer, and manually operated bypass.

END OF APPENDIX L

THE OHIO STATE UNIVERSITY COMMUNICATIONS CABLING STANDARD

For all Wexner Medical Center projects, replace Office of the Chief Information Officer (OCIO) with Wexner Medical Center Network Infrastructure (WMCNI). This variance is highlighted in yellow.

For items that vary from the standards and apply only to Wexner Medical Center, note yellow highlighted text.

General

OCIO [WMCNI] personnel will be consulted during the planning stages of any building construction or building renovation. In some cases, current Entrance Facilities (EF), Equipment Rooms (ER), Main Technology Room and Technology Rooms (TR) may need to be enlarged or redesigned to accommodate changes in the use of building space.

OCIO [WMCNI] will review drawings and specifications on construction and renovation projects for compliance with the University Communications Cabling Standard. OCIO [WMCNI] will approve drawings and specifications through the Architects Office.

The project will request OCIO [WMCIT] to connect, disconnect, and/or move communication cables connected to the campus communication network, in the EF, MTR and TR(s), following established guidelines before project commencement. OCIO [WMCIT] will be responsible to perform the work once the request is received. The project will be responsible to remove all cabling back to the EF/MTR/TR once disconnected.

The project contractor shall contact OCIO six weeks prior to installation of any new facilities needing placed (if temporary service must placed it will be done at the cost of the project). Contractors must submit a request to 8-HELP (614.688.HELP) or via the web site https://osuitsm.service-now.com/selfservice/help_splash , for both installation and removals. Questions can be directed to 614.688.HELP. Outside Plant, services must be installed into the building prior to being able to install service.

Medical Center: The project contractor must contact WMCIT twelve weeks prior to installation of any new facilities needing placed (if temporary service must placed it will be done at the cost of the project). Contractors must submit a request to WMC Help Desk at (614)293-3861 or via the web site <https://osumc.service-now.com/wmc/main.do> , for both installation and removals. Questions can be directed to (614)293-3861. Outside Plant, services must be installed into the building prior to being able to install service.

Any project that requires moving or rerouting of telecommunications and networking cables will bear the cost of said moves.

All pathway work will be paid by project funding. The Project will be responsible for pathway to new/renovated building from the nearest manhole/tunnel or point of feed designated by OCIO Outside Plant Department. These pathways shall meet OCIO standards and meet all applicable codes. These pathways are for low voltage cables only. It will be the responsibility of the project to coordinate with OSU Campus Mapping System to schedule site visits to obtain GPS locates. OCIO will provide main feed cables to each new building, including placement and terminations of each cabling medium (voice, data, and video).

Medical Center: The Project will be responsible for pathway to new/renovated building from the nearest Point of Service (POS) designated by approved service provider working with WMCNI. These pathways shall meet WMC standards and meet all applicable codes. These pathways are for low voltage cables only.

For on campus work, it will be the responsibility of the project to coordinate with OSU Campus Mapping System to schedule site visits to obtain GPS locates. Working through the WMCNI department it will also be required to coordinate any outside plant work for POS with the Office of the Chief Information Officer (OCIO). OCIO department will provide main feed cables to each new building, including placement and terminations of each cabling medium (voice, data, and video) and covered by project funding.

All work specified shall be UL listed and in accordance with the most current versions of the following codes and agencies:

The National Electrical Code, Article 800
National Fire Code (N.F.P.A. 72A)
Life Safety Code (N.F.P.A. 101)
National Electronic Manufacturer's Association (NEMA)
Institute of Electronic and Electrical Engineers (IEEE)
EIA/TIA 568, Commercial Building Telecommunications Wiring Standard which includes EIA/TIA 568C series, 569, 598, 606, 607, 758-B.

Medical Center: Americans with Disabilities Act (ADA)
ANSI/TIA-1179 "Healthcare Facility Telecommunications Infrastructure"
Occupational Safety and Health Administration (OSHA) – all applicable
Local Codes and Standards - all applicable

Marked up field drawings will be turned over to the OCIO [WMCNI] Outside Plant Department at first Life Safety Inspection. The marked up field drawings will contain all riser diagrams and cable counts along with all technology outlets and their associated. An additional electronic set will be turned over to the Manager–Data Storage & Retrieval.

To enable OCIO to inspect telecommunications and networking facilities work, the contractor must:

- Provide a progress schedule with the installation of telecommunications and networking raceways and spaces shown as a separate item.
- Immediately notify University Project Manager and OCIO [WMCNI] of any change in architectural drawings and/or plans affecting OCIO [WMC] facilities.
- Allow that all underground work be approved by OCIO [WMCNI] and Facilities Operations and Development before the site is covered with dirt or concrete. Failure to have the work inspected shall result in uncovering the area at the contractor's expense.
- Provide proper access and facilities for inspections.

With the Wireless initiative at The Ohio State University each remodel and new build will need to assess the wired versus wireless connection, and IPTV versus CATV needs. Specific requirements for each room and each project shall be collected during the Program of Requirement (POR) stage and the Design Development stage. The design team will coordinate with the department and OCIO [WMCNI] in the planning stages of any project, to better understand and plan for the best method of deployment of connectivity.

All projects will have a minimum 20-year warranty offered by the connectivity solution. Warranties provided by cabling partners to cover the system will not be accepted.

For questions concerning this document, please email ocio.osp@osu.edu

Medical Center: For questions concerning this document, please email
ITNetworkInfrastructure@osumc.edu



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EXHIBITS

- A. Pull and Splice Boxes
- B. Elevator Phone Schematic
- C. Entrance Facilities (EF) and Technology Room (TR) layouts
- D. Rack Detail with Fiber enclosure
- E. Rack Detail with Voice Panel
- F. Wireless Access Point Detail- Drop Ceiling
- G. Wireless Access Point Detail- Drywall/Hard Ceiling
- H. Conduit Fill Chart
- ~~I. Notshelter Setup~~
- J. TBB Sizing Chart
- K. Technology Outlet Label

L. Optical Fiber Labeling

M. Elevator Phone Schematic

N. Technology Room Sizing

O. Technology Room Layout

P. Relay Rack Detail 1-4

Q. Relay Rack Detail 5-8

R. Wireless Access Point Detail – Drop Ceiling

S. Wireless Access Point Detail – Drywall/Hard Ceiling

Medical Center: ABBREVIATION REFERENCES

WMC	Wexner Medical Center
WMCIT	Wexner Medical Center Information Technology
EF	Entrance Facilities
MTR	Main Technology Room
TR	Technology Rooms
WMCNI	Wexner Medical Center Network Infrastructure
POS	Point of Service
OCIO	Office of the Chief Information Officer
POR	Program of Requirement
TO	Technology Outlets
OSP	Outside Plant
CCTT	Certified Cable Testing Technician
MPOE	Main Point of Entry

SECTION I**Cabling Contractor Qualifications:**

- 1) A BICSI certified RCDD, listed on the BICSI website with current credentialing. Contractor submittals shall include copies of all certificates of staff to work on the project.
- 2) The Contractor must hold a current certification from the manufacturer of the proposed connectivity solution. This certification must be valid for both installation and testing and shall enable the Contractor to offer the full manufacturer's product and applications warranties as specified. All technicians working on the project will have manufacturers training and training certificates.
- 3) The cabling contractor must have a minimum of five (5) years of documented experience installing structured cabling systems.
- 4) Installation personnel shall consist of 100% BICSI certified staff and listed on the BICSI website. There shall be at least one BICSI certified Technician during all cable installation work.
- 5) A Fluke Certified Cabling Test Technician (CCTT) will perform all testing on the project.
- 6) Ohio State may approve or deny contractor based on contractor qualifications and work history at The Ohio State University.

SECTION II Submittals Guidelines

1. Contractor submittals will include the entire contractor qualifications based on Section 1 of this document, if these qualifications are incomplete or do not meet the standard the contractor will not be approved.
2. Product submittals must be received by the university OCIO [WMCNI] no more than 10 days after the award of the company's contract. Prior to start of any project or ordering of materials selected contractor shall turn in submittals with an adequate amount of time to allow for review in advance for the university to review and comment. Submittals are to include the following at a minimum:
 - A. Division 27 contractor
 - I. All product material for a complete and operable system to include but not limited to:
 - Cable
 - Ladder rack (within the TR)
 - Support systems
 - Jacks
 - Faceplates
 - Patch cords
 - Patch panels
 - Fiber patch cords
 - Fiber termination housings
 - Fiber panels and types
 - Firestop and UL systems being used
 - Racks/Cabinets
 - II. All BICSI certificates for installation technicians.
 - III. If installation staff change, the contractor shall inform the university and provide updated documentation.
 - IV. Manufacturers training certificates for each technician
 - V. RCDD certificate
 - VI. Fluke CCTT certificate
 - VII. Factory calibration sheets for all testers being used on project
 - B. Division 26 contractor to include but not limited to:
 - I. Cable tray (outside the TR)
 - II. Backbone pathway
 - III. Conduit
 - IV. Firestop and UL systems being used for project.
 - V. Any ancillary support items for the Division 27 contractor
 - VI. Ground bars for both the ER and TR.

SECTION III TECHNOLOGY PATHWAYS

GENERAL

Cable facilities (conduit, cable trays, raceways etc.) are required for connecting laboratory, classroom, office areas, Entrance Facilities (EF) and Technology Rooms (TR). Cable facilities are furnished by project funding.

Medical Center: Cable facilities (conduit, cable trays, raceways etc.) are required for interbuilding horizontal cabling installations. This includes clinical, laboratory, pharmacy, retail, classroom, office areas, Entrance Facilities (EF), Main Technology Rooms (MTR), and Technology Rooms (TR). Cable facilities are furnished by project funding.

Upon completion, riser pathway (conduits/sleeves) shall have one additional empty conduit/sleeve in place for future.

Medical Center: A primary and secondary backbone riser pathway for copper and optical fiber cabling is required for all projects to every TR. Provide minimum of 8 sleeves.

OCIO **[WMCNI]** should be consulted before removal of telephone wire and equipment, i.e., when office partitions are relocated. All wiring must be removed back to the source by the contractor.

The electrical contractor shall provide a pull string in all empty conduits.

Conduit will be used in inaccessible environments such as: drywall ceilings/walls or any location where pathway is not readily accessible. This includes but not limited to: above HVAC ductwork, fume hoods, lab counters, cabinets and height issues not being able to safely access pathway from a stepladder.

Conduit types can vary per building the use of PVC or metallic conduits are acceptable as long as they meet code. If at any time metallic flex or non-metallic flex is used it shall be sized ½" larger than what is required to meet finished fill at 40%.

J-Hooks and/or cable tray will not be placed above hard ceiling or areas where there is no access or limited access (HVAC ducts or piping) Pull boxes, if needed, must be accessible. (See Exhibit A).

J-hooks will be placed only above drop tile ceiling with a minimum clearance of 6" between T-bar and j-hook; at no time will the cable clearance be less than 3" to the T-bar. J-hooks will be placed at intervals no longer than 4'. At no point, will the cable contact the ceiling or any other trades work.

Any cable pathway, shall be at 40% fill rate or less at project completion, if cable pathway is greater than 40% additional pathway will be added by the project.

At no time is it acceptable to place any other low voltage cabling within any pathway intended for voice and data cabling.

Plastic "zip-ties" are strictly prohibited for use of cable support.

All cable pathway shall be placed parallel and perpendicular to building lines.

ALL CABLE PATHWAYS:

- A) Shall maintain the following clearances from possible sources of Electromagnetic Interference exceeding 5 kVA:
- i. Power lines enclosed in a grounded metal conduit (or equivalent shielding) in proximity to grounded metal conduit pathway: 6"
 - ii. Unshielded power lines or electrical equipment in proximity to a grounded metal conduit pathway: 12"
 - iii. Unshielded power lines or electrical equipment in proximity to open or nonmetal pathways: 24"
 - iv. Electrical motors and transformers: 47"

1) Technology Outlet Pathway

- A) Open Air (low voltage cabling with j-hooks and no conduit stub ups within walls- fishable walls)

i) J-hooks

- (1) Only acceptable if walls are fishable, if any of the conditions below exist conduit "stub ups" shall be placed:

- (a) Fixed casework
- (b) lab counters
- (c) fume hoods
- (d) horizontal bracing in walls
- (e) firewall

- ii) J-hooks shall not be routed along walls, pathway will run to center of room and out to hallway if drywall is extended to ceiling a sleeved hole will be placed. Pathway fill ratios shall be adhered too.
- iii) J-hooks shall not be placed more than 18" above drop ceiling.

B) Conduit stub ups & J-hooks

- i) J-Hooks are an acceptable method of installation from the cable tray to the communications stub up with spacing 4' on center or less to the "stub ups" located within the rooms.
- ii) Conduits to the technology outlets are to be a minimum of one inch based on fill. A dedicated conduit will serve each outlet box. Conduit "stub ups" will extend 2' from the wall, angle to the center of the room which it feeds, and must have conduit bushings on the ends.
- iii) Conduit will be used in any open ceiling environment, unless the University Project Manager/OCIO has approved an alternate method of delivery.
Medical Center: Conduit will be used in any open ceiling environment, unless the WMC Project Manager/Network Infrastructure has approved an alternate method of delivery.
- iv) Do not support cable from designated ceiling system or system tie wires or grid in fire rated systems. Tie wires installed specifically for IT with breakaway grid clips are acceptable upon approval.

C) Technology Outlet boxes/low voltage mounting brackets

- i) Technology outlet boxes will be H-4 11/16" X W-4 11/16" X D-2 1/8", equipped with a 2-gang cover/plaster ring when installed with conduit.



- ii) Wall-phone outlets will be equipped with a single-gang cover/plaster ring. The height of these boxes will be determined by the use of the box.
- iii) For wireless AP installs in the ceiling requiring conduit, basis of design is: Randall Product # T-55017 with a single gang mud ring or University Project Manager/OCIO approved equal.
- iv) Low voltage mounting brackets for “open air” installs Basis for Design and Performance:
 - (1) Double gang new construction attaches to stud: Caddy MP2S
 - (2) Single gang new construction attaches to stud: Caddy MP1S
 - (3) Double gang existing walls: MPLS2
 - (4) Single gang existing walls: MPLS

2) Conduit

- A) No conduit run, without a pull box, is to exceed 100 feet with no more than 180 degrees bends.
- B) No LB(s) are to be used in lieu of pull boxes for communications.
- C) See D rating chart. (See Exhibit H). This includes all conduits, 40% fill at turnover and one additional conduit if fill ratio is at 40% or greater within that pathway.
- D) All riser pathway will have at a minimum one empty conduit upon project completion.
- E) All conduits that extend more than 25' will be required to be bonded/grounded per the NEC.
- F) All conduit will have bushings installed.
- G) Do not place pull boxes above fixed ceilings, HVAC ducts or piping
- H) Electrical Non-Metallic (ENT) conduit is acceptable.
 - i) ENT is only to be used for TOs (technology outlet) not main pathway.
 - ii) When ENT style conduit is used size shall be increased by ½”.
 - iii) ENT will be securely fastened to tray and TOs.
 - iv) Bushings shall be installed at each end.
 - v) Not acceptable in exposed conditions

3) Basket Tray

- A) A basket tray will be placed above drop ceilings in the hallways/corridors; it will not be placed above offices or classrooms. At no time is it acceptable to have basket tray above a hard ceiling or HVAC ducts. At no time does an access panel constitute an accessible space.
Medical Center: In addition, a basket tray will be placed above drop ceilings in hallways and corridors; it shall not be placed above patient/treatment rooms, procedure rooms, conference rooms, and offices.
- B) This tray will provide a path back to the Technology Room (TR). Cable trays and conduits must be properly grounded. All NEC codes for grounding of cable trays will be adhered to. Tray supports will be installed per the heaviest load rating per the manufacturer and NEMA Standards Publication VE-2000.



Medical Center: Supports shall not exceed 5' spans, 4' if secondary j-hook pathways are installed in them.

- C) If basket tray changes elevations and travels above other mechanicals for more than 5', conduit must be placed in lieu of tray. The conduit will be sized per the max fill on the tray.
- D) Basis for Design and Performance: Cablofil part number CF-XXX or approved equal through the University Project Manager/OCIO [WMC Project Manager/Network Infrastructure]
- E) Center Support Hangers shall only be used due to space restrictions and must be approved by owner.
- F) Conduit sleeves shall be installed over rod and extend 8" above tray wall to protect cabling from damage during installation.
- G) Tray may not be altered or notched to allow structural or other mechanicals passage.

4) Fire stopping

- A) An approved UL fire stop system must be used when penetrating fire rated walls or floors. All firestopping devices will be of the mechanical type, if for some reason a mechanical firestop solution is not available firestop will be a non-hardening pliable putty. All firestop penetrations will be an UL listed system, with labels adjacent to each penetration. Close out documents will include pictures of each penetration and the label affixed to the wall. Basis for Design and Performance: Hilti CP653BA, CP653, CP618 IFP26TI or equal approved by the University Project Manager/OCIO.

Medical Center: All firestopping devices will be of the mechanical type, if for some reason a mechanical firestop solution is not available, consult with WMCNI for a solution. All firestop penetrations will be an UL listed system, with labels adjacent to each penetration. Close out documents will include pictures of each penetration and the label affixed to the wall.

Basis for Design and Performance: Hilti CP653BA, CP653, and CFS-PL or approved equal through the WMC Project Manager/Network Infrastructure.

SECTION IV ENTRANCE FACILITIES (EF), AND TECHNOLOGY ROOMS (TR) (see exhibit C)

MEDICAL CENTER: All new EF(s) / MTR(s), or TR(s) will utilize modular Keystone patch mounted racks for connectivity of all category 6 cabling. (Exhibit N and O)

- 1) All new EF(s)/MTR(s), or TR(s) will utilize modular patch panels mounted on racks for connectivity of all category 6/6A cabling.

A) Basis of Design and Performance: Hubbell HPJ24 and HPJ48

MEDICAL CENTER: All new EF(s) / MTR(s), or TR(s) will utilize modular Keystone patch panels mounted on racks for connectivity of all category 6/6A cabling.

- i) Basis for Design Performance: Standard TO CAT6 – Commscope 2111528-1
- ii) Basis for Design Performance: Wireless CAT6A – Commscope 760207274

B) All EF(s)/MTR(s)/TR(s) will be connected via cable pathway that shall consist of basket tray or conduit.

C) In the EF, only Cat 3 riser cables will be placed on 110 blocks, next to the entrance cables. Cat 3 riser cables will be a minimum of 25 pair to each TR. In the TR, riser cables will be terminated on the racks in patch panels with one pair per port except for the last RJ45, which will terminate with two pair (V/BR-V/SL) on pins 4/5 and 3/6. Within the EF, a minimum of 25 pair cable will be run to the riser wall field to the termination rack. Basis for Design and Performance: Hubbell® 110BLK300FTK5

Medical Center: Within the EF, a minimum of 25 pair cable will be run to the riser wall field to the termination rack. Basis for Design and Performance: COMMSCOPE® 110AB2-100FT

D) Cable tray will be sized in each EF/TR so that no cable will hang over the edge and that all bend radius' are met per the cabling manufacturer's specifications. The minimum size shall be an 18" cable tray (basket tray is not acceptable within any EF/TR). Basis for Design and Performance: Hubbell HLS06**B

Medical Center: Basket tray basis for Design Performance: Legrand CF105/450EZ

E) When using 110 blocks, all riser cable will be routed at the bottom of all boards and will feed up into the bottom of the 110 blocks. At no time will cable be placed down the center of a board, all cables will be routed down the corner of the TR.

F) In existing buildings, the new installation will match the existing EF/MTR/TR (blocks, patch panels) installation. New EF/MTR/TR installs will be built according to the new guidelines

G) All cables will be secured with Velcro style ties; plastic cable ties of any type are not acceptable.

H) **Medical Center:** All EF(s)/MTR(s)/TR(s) should be considered critical path and ready for commissioning at the same time electrical rooms are.

- I) All TRs should be vertically stacked above and below each other to reduce cost and impact to business for new and future technology installations.
 - J) There must be at least one EF, MTR, or TR per floor. One EF is required per building and shall not be placed above the second floor of any building. An MTR is required if the building exceed five floors and shall not be placed below the 5th floor of any building. A TR should be placed centrally. If any cable length exceeds 90m (295 ft), including slack, from the TR an additional TR is required to support the total area.
- 2) Spaces for connection of the building communication cable to equipment will be provided in a separate room and not shared with other utility services, particularly the electrical service. When possible, this room will not be adjacent to the electrical distribution room. EF(s)/MTR(s)/TR(s) will be a secure room directly accessible from a hallway, public access space, or within a mechanical room built out to meet Campus Cabling Standards. All TR(s) require the design, installation, and commissioning of an appropriately sized HVAC system. Room temperature must be maintained between 65 to 85 degrees Fahrenheit, with a relative humidity range of 20 to 60 percent. System should be designed to allow a 30% increase to the overall British Thermal Unit count of the finalized design.
- 3) Janitor's closets and electrical closets are not considered appropriate EF/MTR/TR spaces.
- 4) Unless approved otherwise by the University Project Manager/OCIO the EF/MTR room size shall be a minimum 10'x14' and located not more than 50' from the outside plant cable main point of entry (MPOE). Threaded rigid metallic conduit shall be placed from the MPOE to the EF. TR(s) minimum room size shall be 10'x10'. Larger EF/TR(s) may be required based on the number of Work Areas that will feed from the EF/TR(s). EF/TR(s) will be environmentally controlled to insure proper reliability of electronic equipment.
- Medical Center:** Unless approved otherwise by the University WMCNI the EF/MTR room size shall be a minimum 14'-8"x21' and located not more than 50' from the outside plant cable main point of entry (MPOE). Threaded rigid metallic conduit shall be placed from the MPOE to the EF. A TR(s) minimum room size shall be 12'-6"x14'-8". EF(s)/MTR(s)/TR(s) will be environmentally controlled to insure proper reliability of electronic equipment.
- 5) All walls of EF(s)/MTR(s)/TR(s) shall have backboards. Backboards for EF(s)/MTR(s)/TR(s) are to be ¾"x48"x96" fire retardant treated plywood with the A side facing the room, mounted vertically, and placed within 12" of floor. At no time is it acceptable to run/mount anything on backboard within any ER/MTR/TR other than communications cabling or equipment. All electrical outlets and switches will be installed within wall cavities. Backboards are to remain unpainted or they will have to be replaced at projects expense.
- 6) At no time will any water or sanitary pipes be run through an EF/MTR/TR, unless these items are needed for equipment within this room. If required, drip pans shall be installed to minimize damage to equipment below the pipes in the event of a leak. Sprinkler heads will be provided with guards.
- 7) At no time is it acceptable to have a transformer within the EF/MTR/TR, the only time an electrical panel is acceptable is if feeds equipment within the EF/MTR/TR. At no time shall any liquid or sanitary pipes be run through an EF/MTR/TR, unless required for equipment directly serving the room. If required, drip pans shall be installed to minimize damage to equipment below the pipes in the event of a leak.



- 8) EF(s)/TR(s) can house ~~NetShelter~~/Lenel/ACAMS equipment, BUCKID, AV, and Fire Alarm controls as long as clearances are maintained for all racks and wall mount equipment and all codes are met for equipment. ~~For the NetShelter layout, refer to exhibit I.~~
- Medical Center:** EF(s)/MTR(s)/TR(s) can house Security equipment, Nursecall, Facilities, Clinical Engineering, AV, and Fire Alarm controls as long as clearances are maintained for all racks and wall mount equipment and all codes are met for equipment.
- 9) EF(s)/MTR(s)/TR(s) will be designed as to allow 3' of room at the back of the racks (measured from the back of installed switches) and 3' on the front and side (one) of the racks.
- 10) All EF(s)/MTR(s)/TR(s) will be secured with a card swipe whether a remodel or new. The door will swing out. There will be no ceiling, and walls finished to deck.
- 11) At all EF/MTR/TR locations a double duplex electric outlet will be **provided on a dedicated circuit** **placement of these circuits shall be at the top of each data rack** (on the outside of the cable tray). A 20-amp courtesy outlet will be placed on each usable wall of the room.
- Medical Center:** In all EF/MTR/TR locations, double duplex electric outlets shall be **provided on dedicated emergency circuits at the top of the data racks between every other rack** (attached on the outside of the basket tray). A 20-amp courtesy outlet will be placed on each usable wall of the room. Additional power at specific racks will need to be determined, designed, and installed by the project. These requirements will have to be determined during the Design Document phase of the project. These outlets are to directly support UPS systems and network gear deployed by WMCNI and WMCNE once capacity is determined.
- 12) Lighting for all EF/MTR/TRs will be 50 foot candles 3' off finished floor, including behind and in front of racks.
- 13) In large buildings, more than one TR per floor may be required. A large building is defined as any building in which the physical layout of a floor would require cable "runs" (EF/TR to Telecommunications Outlet (TO)) in excess of 90 meters.
- 14) The floor of the EF/MTR/TR can be tile or sealed concrete.
- 15) A "ring run" will be provided at all Entrance Facilities to keep jumper (crosscut) wire organized. This will be accomplished by the use of 4-inch wide aluminum "D" rings screw-mounted above the top of the 110 Cat 3 riser blocks. The bottom of the "D" ring will be mounted two inches above and centered over the space between each vertical row of blocks. "D" rings should be open or split to allow placement of crosscut wire.
- Medical Center:** Wire management shall be provided at all Entrance Facilities to keep jumper (crosscut) wire organized. This will be accomplished by the use of cable trough with legs screw-mounted above the top of the 110 Cat 3 riser blocks and vertically on each side. Basis for Design and Performance: COMMSCOPE 107831133.
- 16) Equipment Racks:



- A. Basis for Design and Performance; Hubbell® HPW84RR19D or OCIO approved equal through the University Project Manager/OCIO

Medical Center: Basis for Design and Performance; Eaton® SB55609619U6AL or approved equal through the WMC Project Manager/Network Infrastructure.

- i. Any racks that are floor mounted will be supported at the top by the cable tray system. The cable tray system will be engineered at such a height that cable water falls work properly.
Medical Center: Standard 8 foot high by 19 inch wide by 6" deep aluminum/metallic unpainted.
- ii. All racks must be grounded to the Telecommunications Main Ground Bar (inside the EF) or the Telecommunications Ground Bar (TGB) in each MTR/TR. The connection in the rack must be connected by a rack grounding busbar with no less than fourteen mounting holes.
- iii. Provide a multi-outlet AC plug strip. Provide enough outlets to accommodate all electronic devices in the relay rack. The strips shall be mounted on standoff brackets to provide 6 inches of separation from the cable management system. Strips shall be mounted on the rear of the rack. If UPS systems are being used, AC power must be evenly distributed between UPS and other source of AC power. Basis for Design and Performance: Hubbell® PR10420 with PRSLB4 or approved equal through the University Project Manager/OCIO
- iv. For rack layouts refer to Exhibits D and E.
Medical Center: For rack layouts refer to Exhibits P and Q.

17) Wire Managers:

- A. Vertical Wire Managers (2 per rack-black)

- i. The wire manager shall be sized to match cabling requirements.

Medical Center: The wire manager shall be a sized at 10" unless otherwise specified and agreed upon by WMCNI.

THE FOLLOWING PARAGRAPHS (ii AND iii) OCIO ONLY

- ii. A single vertical wire manager may be used in between bayed racks/frames if it is sized to match cable requirements for both racks/frames.
- iii. Finish shall be powder coat paint in the color as specified.
 - (1) 1-Hubbell® EA ICKSS6 (spindles pack of 50) will be included with each rack, or approved equal through the University Project Manager/OCIO

- B. Basis for Design and Performance; Hubbell® VM610 (2-each) or approved equal through the University Project Manager/OCIO

Medical Center: Basis for Design and Performance; Eaton® SB860810D096FB or approved equal through the WMC Project Manager/Network Infrastructure.

C. Horizontal Wire Managers (3 per rack-black)

- i. Horizontal wire managers will be 2 rack units and be the same depth as vertical wire managers.
- ii. Basis for Design and Performance: Hubbell® HM27C or approved equal through the University Project Manager/OCIO

Medical Center: Basis for Design and Performance: Panduit® WMP1E or approved equal through the WMC Project Manager/Network Infrastructure.

18) Patch panels

- A. Patch Panels shall be sized to accommodate current project requirements plus 30% growth capacity. Patch panels shall not exceed 5 x 48 port (maximum total of 240 connections) in a rack.

Medical Center: Patch Panels shall be sized to accommodate current project requirements plus 30% growth capacity. Patch panels shall not exceed 6 x 48 port (maximum total of 288 connections) in a rack. Must be unloaded keystone panels.

- i. Basis for Design and Performance: Hubbell® HPJ48 or approved equal through the University Project Manager/OCIO

Medical Center: Basis for Design and Performance: COMMScope® 2111528-1 or approved equal through the WMC Project Manager/Network Infrastructure.

- ii. Rear cable management bars for patch panel are required (2 per patch panel)
- iii. Basis for Design and Performance: Hubbell® HPRCMB or OICO approved equal through the University Project Manager/OCIO

19) Enclosed cabinets:

- A. Enclosed cabinets shall have a roof mounted cable fan and cable entry
- B. Enclosed cabinets must be at least 32 inches deep to accommodate a rack mounted UPS.
- C. Basis for Design and Performance is: Hubbell® part #H2N8032 or approved equal through the University Project Manager/OCIO

THE PREVIOUS SECTION 19) DOES NOT APPLY TO WEXNER MEDICAL CENTER

20) Wall mounted racks:

- A. All wall mounted racks will be mounted on ¾ inch” type APA A-D Group 1 plywood, fire retardant treated, with the A side facing the room.
- B. Basis for design: Hubbell® part # HSQ2426 or approved equal through the University Project Manager/OCIO

THE PREVIOUS SECTION 20) DOES NOT APPLY TO WEXNER MEDICAL CENTER

- 21) For each Work Area Outlet the project is to provide one 1' and one 10' Cat 6 patch cord of the same manufacturer and level of the Structured Cabling System being installed. Basis for design: Hubbell part #HC6xx01 and #HC6xx10

THE PREVIOUS SECTION 21) DOES NOT APPLY TO WEXNER MEDICAL CENTER

- 22) All terminations will be labeled left to right in sequential/alpha order.

THE PREVIOUS SECTION 22) DOES NOT APPLY TO WEXNER MEDICAL CENTER

- 23) Build out of terminations will be left to right.

THE PREVIOUS SECTION 23) DOES NOT APPLY TO WEXNER MEDICAL CENTER

- 24) Technology Rooms must be periodically cleaned after being turned over for equipment installs and construction in the room is completed to ensure a clean environment during the rest of the construction process.

GROUNDING

- 1. All grounding and bonding is to be done in Accordance with the NFPA/NEC codes and ANSI/TIA/EIA standards, for new construction and renovations.
- 2. At each EF there will be one TMGB grounded and bonded to the buildings main ground. The gauge of the grounding conductor will be a minimum of a 3/0 AWG. This conductor shall be in conduit to each TR.
- 3. At each MTR/TR, there will be one TGB (size based on the number of grounds within TR and backbone needs). Size of ground/bonding conductor to each TR is based on footage and can be found in Exhibit J. This conductor will be in a separate conduit from the EF to each MTR/TR.



4. All grounding/bonding connectors will be 2-hole compression style connectors or Cad welded. Each connector will be secured to the TMGB/TGB with a minimum of two bolts and antioxidant inhibitor applied.
5. Each rack will contain a horizontal ground bar and will be grounded/bonded to the TMGB/TGB.
 - a. Basis for Design and Performance: Hubbell® part # HGRKTHC or approved equal through the University Project Manager/OCIO.
Medical Center: Basis for Design and Performance: Panduit® part # RGRB19Y or approved equal through the WMC Project Manager/Network Infrastructure.
6. All tray will be bonded with a bonding jumper and bonded to the ground bar within each EF/MTR/TR.
7. Install Bonding Equalizer where required per ANSI/TIA/EIA-607.
8. For TBB/GE size, see Exhibit J.
9. All TBB/GE will be run in conduit between EFs/MTRs/TRs.
10. Daisy chaining or serial connections from one rack or cabinet to another will not be accepted.
11. Each individual patch panel shall be installed with at least one green thread-forming bonding screw.
12. All TMGB(s) and TGB(s) will be pre drilled and the wall mounting brackets shall provide a minimum of 2" separation from the wall to the back of the busbar.
13. All Equipment shall be bonded to the rack groundbar.

SECTION V LIFE SAFETY CIRCUITS WIRELESS ACCESS POINTS AND NETSHELTER**1) ELEVATOR PHONES (Exhibit B)****Medical Center: (Exhibit M)**

A) It shall be written into the contract documents that the Electrical Contractor is responsible for the installation costs of the elevator phone line(s).

- i) The Electrical Contractor shall send OCIO [WMCNI] a letter on company letterhead/company email requesting service be activated to the specific elevator equipment room(s). Indicating the date of service is also required.

NOTE: Normal installation time for OCIO is 5 working days from the date of receipt of the request. OCIO email for service requests: ocio-request@osu.edu.

Medical Center: NOTE: Normal installation time is 12 weeks from the date of receipt of the request. WMCIT email for service requests: ITNetworkInfrastructure@osumc.edu.

- ii) The University Architects Project Manager shall send the OCIO an E-Request requesting that monthly service fees for the elevator phone lines at the specific location be charged to them on the account number provided.
- iii) The University Project Manager/OCIO will solicit the above documents from the Electrical Contractor and Facilities, Operation and Development, attach them together and forward them to OCIO [WMCNI].
- iv) Before request for elevator, lines are submitted the OCIO shall have been notified to place the main feeds coming into the building. If any temporary cabling is needed the project will be responsible for this cost.
- v) See exhibit B for details
Medical Center: See exhibit M for details

vi) Medical Center: WMCNI will have to engage a vendor to have the proper lines installed, so advanced notification is encouraged.

vii) Phones will be patched with a red patch cable.

THE PREVIOUS SECTION vii) DOES NOT APPLY TO WEXNER MEDICAL CENTER

viii) D-marc will be placed at wall phone height.

THE PREVIOUS SECTION viii) DOES NOT APPLY TO WEXNER MEDICAL CENTER**2) EMERGENCY PHONES**

- A) Cable will be an outdoor rated 6 pair Category 3 cable with water blocking compounds to prevent moisture intrusion, have an operating range suitable for -40oC to +80oC, and meet Category 3 transmission requirements. Basis for design: Superior Essex part number 04-061-85
- B) From the protection unit in the TR a 4 pair cable will be extended to the rack and terminated on a jack in the patch panel.
- C) Overvoltage protection to be provided at both ends. Grounding will be provided at both ends and NEC codes and applicable standards will be met. Electrical contractor to provide ground at stanchion. Basis for design: Circa Telecom model # 502 equipped with two 1360-75 modules.
- D) One 2" conduit will be placed for low voltage communications to each stanchion from the nearest building telecommunications room. Prior to entering the building the 2" conduit will transition to rigid metallic conduit to the nearest TR. The communication pathway will be separate from power pathway.
- E) Meets Category 3 transmission requirements.
- F) Pathway will meet Outside Plant standards.

THE PREVIOUS SECTION 2) DOES NOT APPLY TO WEXNER MEDICAL CENTER**3) WIRELESS ACCESS POINTS****GENERAL**

Upon completion of the Design Development (DD) phase of documents AutoCAD prints will be submitted to the University Project manager. University Project Manager/OCIO will submit a request through Service Now for a virtual survey. OCIO Wireless Networking will design a solution and submit to the University Project Manager for inclusion into the bid documents.

Medical Center: Upon completion of the Design Development (DD) phase of documents AutoCAD prints shall be submitted to the OSUWMC Project manager. WMC Project Manager (WMCPM) will engage WMC Network Engineering (WMCNE) to do virtual survey. WMCNE will design a solution and submit to the WMCPM for inclusion into the bid documents. The design will include an additional allowance of locations to be determined by the project size and scope to augment any coverage shortfalls identified once the final certification is performed by WMCNE.

During this process it will be determined which option below the project would like to use for the installation of the Wireless Access Points. For installation instructions refer to Exhibits F and G.

Medical Center: For installation instructions refer to Exhibits R and S

There are three installation options available to construction projects:

A) Option A

OCIO [WMCIT] complete install, this includes the following:

- i) Installation of Wireless Access Points including cabling and basic pathway by the OCIO [WMCIT]. Cable tray pathways are not included.
- ii) If additional pathway is required it will be included in the estimate to the customer
- iii) Full price no credits.

B) Option B

Project supplies pathway and cable terminations, OCIO [WMCIT] installs Wireless Access Points

- i) Installation of pathway and cabling by project
- ii) Project is responsible for all terminations, labeling and testing
- iii) Prior to placement project will provide a mock-up of the installation and work with the University Project Manager/OCIO [WMCNE] for approval.
- iv) OCIO [WMCNE] will place Wireless Access Points upon completion of all testing.

C) Option C

Project is responsible for pathway, cabling, terminations and Wireless Access Point installation.

- i) Installation of pathway and cabling by project
- ii) Project is responsible for all terminations, labeling and testing
- iii) Prior to placement project will provide a mock-up of the installation and work with the University Project Manager/OCIO [WMCNE] for approval.
- iv) Project will place Wireless Access Points upon completion of all testing.
- v) OCIO [WMCIT] will provide all Wireless Access Points to the project for installation.

Medical Center: Once the wireless system is installed, a final verification and certification will be completed by WMCNE. If any shortfalls are discovered WMCNE will identify them to the project to have the appropriate vendor take action and install the identified additional locations from the allowance determined in the design. If the additions exceed the designed allowance, WMCIT will negotiate a resolution with the project.

Design considerations for wireless installations should include penetrations for roof access and any outside locations.

1. Medical Center: Ceiling tile installations will utilize the following:

- i) Basis for Design and Performance: VENDEV part # TW-CTEN-2X2-3802B or approved equal through the WMC Project Manager/Network Engineering.

2. Solid ceiling installations will utilize the following:

- i) Basis for Design and Performance: VENDEV part # TW-HCEN-3802 or approved equal through the WMC Project Manager/Network Engineering.

4) CAMERAS

- A. Cameras will be placed on their own patch panels in the rack and follow Appendix M standards for cabling.



5) Overvoltage/lightning Protection for data cabling (when required):

Basis for Design and Performance ITWLinx part # 2090-192-30B or 2090-220-30B depending on installation environment. Or approved equal through the University Project Manager/OCIO. **[WMCIT]**

6) ~~NetShelter~~

- ~~A) The project shall install a minimum of twelve Category 6 data link lines with the installation of the NetShelter. These will be placed from the NetShelter to the Rack within the EF/TR. These link lines shall be placed on their own patch panel and labeled as "NetShelter Link 1, NetShelter Link 2 and so on". Make and Model numbers for the Netshelter can be found in Division 28 of the BDS. Please see exhibit I for installation guidelines and required conduits.~~
- ~~B) The project will also install one additional CAT 6 line for a dial backup line from the technology outlet patch panels. Located in the racks to the NetShelter.~~
- ~~C) See Exhibit I for installation instructions.~~

THE PREVIOUS SECTION 6) DOES NOT APPLY TO WEXNER MEDICAL CENTER

SECTION VI TECHNOLOGY OUTLETS (TO), JACK, CABLE DESIGN & PERFORMANCE GUIDELINES**GENERAL**

All components of the structured cabling system will be **Component Certified** to meet the appropriate category of cabling being installed. The manufacturer shall provide Category 6 component compliance certificates from a recognized third party testing organization upon request. All jacks, faceplates, patch panels, and patch cords will be of one manufacturer and supplied by the contractor. At no time are “modular plugs” for terminations acceptable.

- 1) Minimum Requirements for work area Technology Outlets (TOs), except for Wireless Access Points and wall phone outlets will be Category 6, black RJ45 jacks.

- A) Basis for Design and Performance: Hubbell® part # HXJ6BK or OCIO approved equal through the University Project Manager/OCIO

Medical Center: Minimum Requirements for work area Technology Outlets (TOs), except for Wireless Access Points will be Category 6, black RJ45 jacks unless otherwise noted for below systems.

- A. Basis for Design and Performance: COMMScope or approved equal through the WMC Project Manager/Network Infrastructure

- i) Black – Standard Data Outlet – part # 2291216-2
 - ii) Orange – Dedicated Circuit - part # 2291216-5
 - iii) Red – Security - part # 2291216-7
 - iv) Grey – Facilities (Circuits for BAS and Nurse Call) - part # 2291216-4
 - v) Green – Patient Phones/Dedicated Voice/POTS/T1 circuits - part # 2291216-9
 - vi) Blue – Clinical Engineering (designated clinical on drawings) - part # 2291216-6
 - vii) Yellow – Clinical Engineering, Time Clock, and Digital Clocks - part # 2291216-8
 - viii) Purple/Violet – Special Circuits (MOXA(OBIX), PCI) - part # 2291216-0
 - ix) White – In ceiling cameras and other devices – part # 760235588

- 2) Minimum Requirements for Wireless Access Point (Wireless Access Points) will be one Category 6A, gray RJ45 jack. The jack will be terminated within a single opening surface mount box. A 1’ cat 6A patch cord will be supplied for each end and will be channel tested for Performance. Please see Exhibit F & G for installation guidelines.

Medical Center: Minimum Requirements for Wireless Access Point (Wireless Access Points) will be one Category 6A, white RJ45 jack. The jack will be terminated within a single opening surface mount box. A white 5’ Cat 6A patch cord will be supplied for the TR end and the installation shall be channel tested for Performance. See Exhibits R and S for WMC.

- A) Basis for Design and Performance: Hubbell® part # HJ6AGY or OCIO approved equal through the University Project Manager/OCIO

Medical Center: Basis for Design and Performance: COMMScope or approved equal through the WMC Project Manager/Network Infrastructure

- i) White – at TR for Wireless Access Points – part # 68301835-01

ii) White – at Wireless Access Points – part # 760235592

- 3) Wall phone outlets will be stainless steel, equipped with a flush Cat6 data jack, and designed for modular mounting of wall phones. Basis of design: Hubbell part #SP6F or equal approved by the University Project Manager/OCIO. The mounting must be ADA compliant.

Medical Center: Wall phone outlets must be ADA compliant and are a standard RJ45 outlet.

- 4) Patch cords:

A) For TOs two patch cords will be included, one 1' and one 10' for each outlet, for bid purposes, contractor will work with customer/project A/E/OCIO for sizing prior to ordering.

- i) Basis for Design and Performance: Hubbell® part # HC6BXX (XX=length) or OCIO approved equal through the University Project Manager/OCIO

A) Medical Center: For TOs three patch cords shall be included, two 5' and one 7' for each Category 6 cable, for bid purposes, contractor will work with customer/project A/E/OCIO for sizing prior to ordering.

1. Standard Data Patch Cable Teal

- i. Basis for Design and Performance: COMMSCOPE part #UNC6-GRXX (XX=length) or approved equal through the WMC Project Manager/Network Infrastructure.

2. Standard Data Patch Cable Pink

- i. Basis for Design and Performance: COMMSCOPE part # UNC6-PKXX (XX=length) or approved equal through the WMC Project Manager/Network Infrastructure.

3. Standard Data Patch Cable Yellow

- i. Basis for Design and Performance: COMMSCOPE part # UNC6-YWXX (XX=length) or approved equal through the WMC Project Manager/Network Infrastructure.

Colors for patch cords:

- i. Standard Cat 6A data- green
ii. Clinical Engineering – pink and yellow

- B) For Wireless Access Point two patch cords will be included one 1' and one 1'.for each outlet.

- i) Basis for Design and Performance: Hubbell® part # HC6AGY01 or OCIO approved equal through the University Project Manager/OCIO.

Colors for patch cords:

- 1) Standard Cat 6 data- blue
2) Wireless- gray
3) Cameras, Life Safety and Security- Red

B) Medical Center: For a Wireless Access Point one 5' patch cord will be included for each outlet unless another length is specified.

- 1) Basis for Design and Performance: COMMSCOPE part # UC1AAA2-08F0XX (XX=length) or approved equal through the WMC Project Manager/Network Infrastructure.

Colors for patch cords:

1. Wireless - white

- 5) Floor mounted outlets will be coordinated with the architect, user, and OCIO [WMCNI] during the planning stages of each project. All floor boxes and poke throughs must be approved by the OCIO [WMCNI].



Approval of any outlets (jacks) on shop drawings shall be approved by the OCIO [WMCNI] through the University [WMC] Project Manager.

- 6) The faceplate will be stainless steel or plastic in accordance with architectural design. The faceplate shall have four or six modular openings. Openings without jacks installed, will have blank inserts installed. Stainless steel covers shall be used in auditoriums, classrooms, and where frequent use or abuse is more likely.
 - A) Plastic Faceplates basis for Design and Performance: Hubbell® IFP26TI or equal approved by the University Project Manager/OCIO
 - B) Stainless Steel Faceplates Basis for Design and Performance: Hubbell® SSF206 or equal approved by the University Project Manager/OCIO
 - C) Blanks for Faceplates Basis for Design and Performance: Hubbell® SFB110 or equal approved by the University Project Manager/OCIO
- 6) **Medical Center:** The faceplate will be plastic and will be from the same manufacturer as the jacks. The faceplate shall have the required modular openings for the installation. Openings without jacks installed will have blank inserts installed.
 - A) Faceplates basis for Design and Performance: COMMSCOPE part # 1-21110XX-3 (XX=openings style) or WMCNI approved equal by the University Project Manager/IT.
 - B) Blanks for Faceplates Basis for Design and Performance: COMMSCOPE part # 1-2111486-3 or approved equal through the WMC Project Manager/Network Infrastructure.
- 7) Any configurations beyond this minimum standard will be handled on a per job basis.

TECHNOLOGY CABLE

1) CAT 6 CABLE- RISER RATED

- A) Basis for Design and Performance is Hubbell® part #: C6RRB or approved equal through the University Project Manager/OCIO

1) **Medical Center:** CAT 6 CABLE

- A) Teal Cable
 - i) Basis for Design and Performance is COMMSCOPE part #: 4662504/10 or approved equal through the WMC Project Manager/Network Infrastructure.

2) CAT 6 CABLE- PLENUM

- A) Basis for Design and Performance is Hubbell® part #: C6RPB or approved equal through the University Project Manager/OCIO

2) **Medical Center:** CAT 6 CABLE

- A) White Cable
 - i) Basis for Design and Performance is COMMSCOPE part #: 4763314/10 or approved equal through the WMC Project Manager/Network Infrastructure.

3) CAT 6A CABLE- RISER

- A) Basis for Design and Performance is Hubbell® part #: C6ASRDSGY or approved equal through the University Project Manager/OCIO

3) Medical Center: CAT 6 CABLE

- A) White Cable
 - i) Basis for Design and Performance is COMMScope part #: UN884025514/10 or approved equal through the WMC Project Manager/Network Infrastructure.

4) CAT 6A CABLE- PLENUM

- A) Basis for Design and Performance is Hubbell® part #: C6ASPDSGY or approved equal through the University Project Manager/OCIO

4) Medical Center: CAT 6/6A CABLE

- A) Standard Data White Color
 - i) Basis for Design and Performance is COMMScope part #: UN874026814/10 or approved equal through the WMC Project Manager/Network Infrastructure.

RISER CABLE

GENERAL

All riser cable pathways whether horizontal or vertical will be based upon on all sleeves with 40% fill plus as a minimum of 1 empty new pathway for future.

THE PREVIOUS SENTENCE DOES NOT APPLY TO WEXNER MEDICAL CENTER

There will be no splicing of riser cables in the pathway, all cables will be direct home runs from each EF to each MTR/TR. The only splicing allowed will be inside the EF/MTR/TR for fiber pigtails within each housing.

1) COPPER

- A) Riser cables will be 24 gauge, Category 3, twisted solid annealed copper conductors, individually insulated and color coded in accordance with telephone industry standards. Cables having more than 25 pairs will be assembled in individual color-coded binders. All communications wire or cable installed in a building must meet requirements of Article 800 of the National Electrical Code.
- B) During renovation, projects where an EF, MTR or TR is being created or relocated splicing the riser cables shall be reviewed by OCIO. Upon approval, splicing may be permitted in the copper riser cables only. Modular splicing devices that are to be used must also be approved.
- C) Minimum size is 25 pairs.
- D) Six copper Cat 6 cables will be placed for “link lines” from each EF/MTR to each TR if the distance is within 90 meters. These link lines will be terminated on separate patch panels in each EF/MTR/TR and labeled with TR number and patch panel position.

2) FIBER

- A) Install one six-strand OM3 armored fiber cable. The cable will be placed from each EF to each TR and terminated with six strand fusion spliced pigtails, or factory preterm with LC/UPC style connectors. Sheath will be bonded and grounded on both ends.
 - i) Basis of design and Performance: Corning 006T81-31180-A1 for riser rated or approved equal through the University Project Manager/OCIO
 - ii) Basis of design and Performance: Corning 006T88-31180-A3 for plenum or approved equal through the University Project Manager/OCIO
- B) Install one six-strand singlemode armored fiber cable. The cable will be placed from each EF to each TR and terminated with six strand fusion spliced pigtails, or factory preterm with SC/APC style connectors.
 - i) Basis of design: Corning 006E81-31131-A1 for riser rated or approved equal through the University Project Manager/OCIO
 - ii) Basis of design: Corning 006E88-31131-A3 for plenum or approved equal through the University Project Manager/OCIO
- C) Fusion spliced cassettes will be used at each EF/TR for connectivity. LC/UPC shall be used for multimode and SC/APC will be used for singlemode.
 - i) Basis of design: Corning CCH-CSXX-XX-XXXXX or WCH-XXP or OCIO approved equal through the University Project Manager/OCIO
- D) All splice cassettes will be placed in appropriate sized fiber housings intended for that purpose.
- E) For every six strands of fiber terminated there will be two duplex fiber patch cords supplied. Multimode will be LC/UPC-to-LC/UPC three meters in length. Singlemode will be SC/APC to LC/UPC 3 meters in length.
- F) Jumpers will be of the same manufacturer/material as fiber.
- G) There will be a 20' service loop at each TR and the EF on each fiber. The 20' service loop will be placed on the wall using Leviton 49800 FR for slack management (see Exhibit A) in a craftsmanship like manner.
- H) All Fiber Optic cables shall be home run from the EF or MTR to each TR. The only allowable splicing is within the fiber termination housing for the final fusion spliced terminations. **All Fiber Optic Cable inside of buildings will be armored for protection and be bonded and grounded at each end if metallic armored.**

THE PREVIOUS SECTION 2) DOES NOT APPLY TO WEXNER MEDICAL CENTER

2) Medical Center: FIBER

GENERAL

Multi-Mode fiber is only allowed in data center applications. Multi-Mode is not allowed in building backbone applications. 62.5 Multi-Mode cable is prohibited unless approved by owner for any application.

A) Data Center

- i) 12 strand OM3 Multi-Mode MTP-MTP fiber cable. The cable will be placed from rack to rack and terminated in LC/UPC MTP adapter modules (Cassettes).
 - (1) OM3 Cable basis of design and Performance: Corning Inc. A757512TPNBB (lengths to be determined) plenum rated only or approved equal through the WMC Project Manager/Network Infrastructure.

- (2) Modules basis of design and Performance: Corning Inc. CCH-UM12-05-70T or approved equal through the WMC Project Manager/Network Infrastructure

B) ER/MTR/TR Backbones

- i) Install one twelve strand singlemode plenum dielectric armored fiber cable. Cables will be placed one each from the EF and MTR to each TR and spliced to factory pretermed cassettes.
 - (1) OS2 Cable Basis of design: Corning Inc. part # 012E88-33131-D3 for plenum rated or approved equal through the WMC Project Manager/Network Infrastructure
- ii) Fusion spliced cassettes will be used at each EF/MTR/TR for connectivity. LC/APC connectorized pigtails will be fusion spliced to the singlemode fiber cable.
 - (1) Basis of design: Corning Inc. part # CCH-CS12-A9-P00RE or approved equal through the WMC Project Manager/Network Infrastructure
- iii) All splice cassettes will be placed in appropriate sized connector housings intended for that purpose.
 - (1) 2RU Housing basis of design: Corning Inc. part # CCH-02U or approved equal through the WMC Project Manager/Network Infrastructure
 - (2) 4RU Housing basis of design: Corning Inc. part # CCH-04U or approved equal through the WMC Project Manager/Network Infrastructure
- iv) There will be a 20' service loop at each MTR/TR and the EF on each fiber. The 20' service loop will be placed on the wall using Leviton 49800 FR for slack management in a craftsmanship like manner.
- v) All Fiber Optic cables shall be home run from the EF or MTR to each TR. The only allowable splicing is within the fiber termination housing for the final fusion spliced terminations. All Fiber Optic Cable inside of buildings will be dielectric armored for protection.

C) Optical Fiber Labeling

- i) Each fiber optic enclosure shall be uniquely labeled with a numerical and alphabetical combination to create a unique identifier. This unique code applies to newly installed Corning systems; existing systems are not covered by this labeling standard currently. New enclosures in technology rooms shall be identified beginning with **1A**, sequential labeling shall advance alphabetically through **Z** before advancing numerically (e.g., 1A through 1Z and then 2A). See *Exhibit L 2* for label placements.
- ii) Each fiber optic backbone cable shall be uniquely identified. This identifier consists of the cables source, enclosure ID, strand enclosure position, strand count, destination, enclosure ID, strand enclosure position and strand count. The label shall be 1.500" W x 0.750" H (38.100 mm W x 19.050 mm H) in size and shall contain two rows of text per label. See *Exhibit L*.
- iii) A fiber optic cable sheath label shall be placed on the cable itself in strategically placed areas or points of interest based upon the footage, floor changes, building changes, within pull boxes, splice points, and the entry and exit of conduits as defined below in diagram 3. The cable shall also be identified within the source and destination at least 12 inches and no more than 3 feet from the point of jacket removal. The fiber optic cable shall also be labeled at a minimum of every one hundred (100ft.) feet over the entire span of the run. This label will be placed directly on the cable wrapped so all information can be easily identified. The label shall be sized based upon the cable diameter and shall contain two rows of text per label. The label shall completely wrap the cable one time and shall be a self-laminating label. The label shall be 1.500" W x 0.750" H (38.100 mm W x 19.050 mm H) in size and shall contain two rows of text per label.



SECTION VII CABLE INSTALLATION & TERMINATION GUIDELINES

General:

During the POR and DD phase, it shall be decided on the quantity of cables needed at each Technology Outlet (TO). Each wall phone outlet will be cabled with one 4 pair unshielded (**Category 6**) cable. All communication cable installed in a building must meet the requirements of ARTICLE 800 of the National Electrical Code. Splicing in station cable is not permitted cable must be continuous from the nearest TR to the Telecommunications Outlet (TO). Mutoas or Consolidation Points shall not to be used on Campus [at the Wexner Medical Center].

- 1) Each Wireless Access Point (WIRELESS ACCESS POINT) will be cabled with one unshielded Cat 6A cable, gray in color and terminated on a gray Cat 6A jack. All WIRELESS ACCESS POINT terminations will be on their own patch panel. These will be continuous runs from the nearest TR to the TO. These will be Cat6A channel tested.

Medical Center: Each Wireless Access Point (WIRELESS ACCESS POINT) will be cabled with one unshielded Cat 6A cable, white in color and terminated on a white Cat 6A jack. All WIRELESS ACCESS POINT terminations will be on their own patch panel. These will be continuous runs from the nearest TR to the TO. These will be Cat6A channel tested.

- 2) Any cabling that is kinked, stretched, punctured, ripped, twisted, discolored, deformed or painted (even overspray) will be removed and reinstalled at contractor/project cost, regardless if it passes testing.
- 3) No low voltage cabling will touch ceiling tile, ceiling grids, conduits, walls, or any other structure/trade. Cable will only rest in the pathway that it was designed to be installed in.
- 4) All cables from the TO will be terminated on the modular patch panels located in the EF/MTR/TR that the cables run to. All category cabling shall be terminated 568A.
- 5) The proper rated cable shall be used for its intended environment. Cable will be riser rated, plenum, or riser/filled for floor boxes/emergency phones. **If it is a plenum environment and floor boxes/emergency phones are installed, each run will be required to be placed in conduit to the nearest EF/MTR/TR.** The conduit will be placed from the technology outlet to the nearest EF/MTR/TR with a riser rated/filled cable application and meet the conduit specifications within this document.
- 6) In new building installations riser cables will terminate on the rack one pair per port except for the last jack and it will be terminated with both the violet/brown and violet/slate pair on pins 4/5 and 1/2.
- 7) Each Technology Outlet will be identified with a unique identifier. Each TO will be labeled with the TR room number which the cable terminates in, and a four digit number which the first number will identify the floor that the TO is on and a three digit following that.
 - A) For example:: for cable number 21 on the 2nd floor terminating in room the second floor TR room 214 the unique identifier would be 214-2021 if the same cable was on the 3rd floor terminating in the same closet it would be labeled 214-3021.

Medical Center: Each Technology Outlet will be identified with a unique identifier. Each TO will be labeled with the EF/MTR/TR room number which the cable terminates in, the room number of the room the TO is in and a three digit number which identifies the patch panel by alphabet and then the corresponding numeric port number on the patch panel. *Exhibit K.*

- (i) Example: 2202 (TR) / W326 (Room) / A26 (Patch Panel and Port)
 1. 2202 / W326M / A26



- B) Each floor will be placed on its own patch panel.
- C) All numbering will be sequential and flow left to right on patch panels. When TR(s) contain different floors there will be 3 rack units left blank for each floor for future adds.

THE PREVIOUS SECTIONS B) AND C) DO NOT APPLY TO WEXNER MEDICAL CENTER

- D) **Medical Center:** Final space identifications for the building must be completed prior to TO labeling. If changed after final TO labeling, the project may be subject to additional cost to correct labeling if room identifications are altered after completion.

SECTION VIII IPTV & CATV OUTLET DESIGN & PERFORMANCE GUIDELINES

General:

During the POR gathering phase the OCIO will meet with the customer and project designers to determine if a CATV or IPTV is the required design and fits the needs for the project. During this phase, the locations will be determined and documented.

THE PREVIOUS PARAGRAPH DOES NOT APPLY TO WEXNER MEDICAL CENTER

Commentary: For all new buildings, IPTV is the preferred method of delivery.

IPTV

IPTV locations shall be treated as a Cat6 data drop and follow the standards for installation, labeling and testing within Appendix M.

Medical Center: Under no circumstances is CATV coax to remain or be re-used in renovation projects

CATV

If during the POR phase a CATV offering is required the OCIO shall design the cable TV distribution upon completion of the DD phase of the drawings. The project will submit a set of AutoCAD drawings to the OSU project manager, the project manager will open a request in Service Now for the OCIO to design the system.

Upon completion of the design OCIO will submit drawings and cost estimate for splicing, hardware, testing and activation to the University Project Manager for inclusion into the bid document.

Contractor will be required to place backbone hardline and cable drops to OCIO standards. The contractor will be responsible for work area coax terminations. The OCIO will terminate the backbone and CATV drops within each TR.

Should OCIO find damaged CATV cable, OCIO will notify the contractor. The contractor will have first opportunity to replace damaged coax at contractor's expense. Should contractor not be able to replace damaged coax in a timely manner, OCIO will have the coax replaced and bill the construction project.

All cable TV runs will be routed directly from the TR to the outlet. Splitters and Amplifiers shall be mounted at the TR. There will be no splicing of station drop cables.

The CATV outlet shall be a 75-ohm female "F" to female "F" wall plate adaptor.

The connectors will be an "F" type compression type fitting. OCIO recommends a Ripley Cablemantic C.A.T. "All Series" compression assembly tool.

CATV CABLE & CONNECTORS

1) STATION CABLES

A) RISER RATED

- i) For runs less than 200' cable shall be a 6 Series quad-shield 75-ohm coaxial cable.



- (1) Basis for Design and Performance: Commscope 5781 or OCIO approved equal
- (2) F connector for riser rated cable: Gilbert GF-URS-6 or OCIO approved equal
- ii) For runs of 201-350' cable shall be 11 Series quad-shield 75-ohm coaxial cable
 - (1) Basis for Design and Performance: Commscope 5940 or OCIO approved equal
 - (2) F connector for riser rated cable: Gilbert GAF-URS-11 MH or OCIO approved equal

B) PLENUM RATED

- i) For runs less than 200' cable shall be 6 Series quad-shield 75-ohm coaxial cable
 - (1) Basis for Design and Performance: Commscope 2227V or OCIO approved equal
 - (2) F connector for plenum rated cable: Gilbert GF-UR-6 PL or OCIO approved equal
- ii) For runs of 201-350' cable shall be 11 Series quad-shield 75-ohm coaxial cable
 - (1) Basis for Design and Performance: Commscope 2287K or OCIO approved equal
 - (2) F connector for plenum rated cable: Gilbert GAF-UR-11 PL or OCIO approved equal

2) RISER CABLE FOR BUILDING DISTRIBUTION

- A) Shall be 0.500" aluminum sheathed 75-ohm distribution cable
 - i) Basis for Design and Performance: Commscope P3 500 CA or OCIO approved equal
 - ii) Connector Basis and Design: GRS-500-CH-DU-03-T or OCIO approved equal

THE PREVIOUS SECTION CATV DOES NOT APPLY TO WEXNER MEDICAL CENTER

SECTION IX TESTING

GENERAL

Upon completion of installation and acceptance by the OCIO, the cabling contractor will contact the OCIO to witness testing. The OCIO will be given at least one week (5 working days) advanced notice for testing. This testing will be arranged through the University Project Manager/OCIO/**WMCNI**, at no time will contractor dictate the time/date for testing.

To be tested the system must be complete, this includes all pathway, cabling dressed, labeling, faceplates secured and fire stopping.

All testing will be done with a CCTT (Certified Cable Testing Technician); the CCTT shall perform all testing. The approved test instrument is the Fluke Versiv™ (DSX-5000) or OCIO approved equal.

MARGINAL TESTS WILL NOT BE ACCEPTED.

Test instrument shall be within its 12-month calibration period and have the latest software and firmware versions installed. If the test instrument is not within calibration period testing will not take place.

Permanent Link test results, including individual frequency measurements, shall be recorded in the test instrument for subsequent uploading to a PC, using Fluke software, from which administrative documentation (testing reports) may be generated

Testing shall be performed on each cabling segment (connector to connector). Sampling is not acceptable.

OCIO **WMCNI** will witness all setup and referencing of test instruments prior to testing.

Permanent Link adapters made from twisted pair Category 5e, 6, 6A, 7 or 7A cords are not permitted as their performance degrades with use and can cause false Return Loss failures.

The installer shall build a reference link. All components shall be anchored so it is not possible to disturb them. The technician is to conduct a Category 6 Permanent Link test each day to ensure no degradation of the test instrument or its Permanent Link adapters.

The detailed test results documentation data is to be provided in an electronic database for each tested balance twisted-pair and shall contain the following information:

- The overall Pass/Fail evaluation of the link under test
- The date and time the test results were saved in the memory of the tester
- The identification of the customer site as specified by the end-user
- The name of the test limit selected to execute the stored test results
- The name of the personnel performing the test
- The version of the test software and the version of the test limit database held within the test instrument
- The manufacturer, model and serial number of the field-test instrument
- The adapters used
- The factory calibration date

Provide actual test results in Fluke software form and PDF copies to the OCIO upon completion of project.

TESTING

1) COPPER- Cat 3 riser

- A) Riser cable will be tested one pair at a time with the Fluke Versiv with a single pair block adapter.
- B) All tests will be saved and turned in upon completion of project with other test results.

2) COPPER- Cat 6

- A) All testing procedures and field-test instruments shall comply with applicable requirements of:
 - i) ANSI/TIA-1152, Requirements for Field Test Instruments and Measurements for Balanced Twisted-Pair Cabling
 - ii) ANSI/TIA-568-C.0, Generic Telecommunications Cabling for Customer Premises.
 - iii) ANSI/TIA-568-C.1, Commercial Building Telecommunications Cabling Standard
 - iv) ANSI/TIA-568-C.2, Balanced Twisted-Pair Telecommunications Cabling and Components Standards.
 - v) ANSI/TIA-606-B, Administration Standard for Commercial Telecommunications Infrastructure, including the requirements specified by the customer, unless the customer specifies their own labeling requirements.
- B) All cables will be tested for the following:
 - i) Wire Map
 - ii) Length
 - iii) Propagation Delay
 - iv) Delay Skew
 - v) DC Loop Resistance – recorded for information only
 - vi) DC Resistance Unbalance – recorded for information only
 - vii) Insertion Loss
 - viii) NEXT (Near-End Crosstalk)
 - ix) PS NEXT (Power Sum Near-End Crosstalk)
 - x) ACR-N (Attenuation to Crosstalk Ratio Near-End) – recorded for information only
 - xi) PS ACR-N (Power Sum Attenuation to Crosstalk Ratio Near-End) – recorded for information only
 - xii) ACR-F (Attenuation to Crosstalk Ratio Far-End)
 - xiii) PS ACR-F (Power Sum Attenuation to Crosstalk Ratio Far-End)
 - xiv) Return Loss
 - xv) TCL (Transverse Conversion Loss) – recorded for information only
 - xvi) ELTCTL (Equal Level Transverse Conversion Transfer Loss) – recorded for information only
- C) All installed cabling Permanent Links shall be field-tested and pass the test requirements and analysis. Any Permanent Link that fails these requirements shall be diagnosed and corrected. Any corrective action that must take place shall be documented and followed with a new test to prove that the corrected Permanent Link meets performance requirements. The final and passing result of the tests for all Permanent Links shall be provided in the test results documentation.
- D) Acceptance of the test results shall be given in writing after the project is fully completed and tested in accordance with Contract Documents and to the satisfaction of the OCIO.

3) COPPER CAT6A

- A) All testing procedures and field test instruments shall comply with applicable requirements of:

- i) ANSI/TIA-1152, Requirements for Field Test Instruments and Measurements for Balanced Twisted-Pair Cabling
 - ii) ANSI/TIA-568-0. D, Generic Telecommunications Cabling for Customer Premises.
 - iii) ANSI/TIA-568-1. D, Commercial Building Telecommunications Cabling Standard
 - iv) ANSI/TIA 568 C.2, Balanced Twisted-Pair Telecommunications Cabling and Components Standards.
- B) All cables will be tested for the following:
- i) Wire Map
 - ii) Length
 - iii) Propagation Delay
 - iv) Delay Skew
 - v) DC Loop Resistance
 - vi) DC Resistance Unbalance within a pair
 - vii) DC Resistance Unbalance between pairs
 - viii) Insertion Loss
 - ix) NEXT (Near-End Crosstalk)
 - x) PS NEXT (Power Sum Near-End Crosstalk)
 - xi) ACR-N (Attenuation to Crosstalk Ratio Near-End)
 - xii) PS ACR-N (Power Sum Attenuation to Crosstalk Ratio Near-End)
 - xiii) ACR-F (Attenuation to Crosstalk Ratio Far-End)
 - xiv) PS ACR-F (Power Sum Attenuation to Crosstalk Ratio Far-End)
 - xv) Return Loss
 - xvi) TCL (Transverse Conversion Loss)
 - xvii) ELTCTL (Equal Level Transverse Conversion Transfer Loss)
 - xviii) PS ANEXT (Power Sum Alien Near-End Crosstalk)
 - xix) Average PS ANEXT (Average Power Sum Alien Near-End Crosstalk)
 - xx) PS AACR-F (Power Sum Alien Attenuation to Crosstalk Ratio Far-End)
 - xxi) Average PS AACR-F (Average Power Sum Alien Attenuation to Crosstalk Ratio Far-End)
- C) All installed cabling Permanent Links shall be field-tested and pass the test requirements and analysis. Any Permanent Link that fails these requirements shall be diagnosed and corrected. Any corrective action that must take place shall be documented and followed with a new test to prove that the corrected Permanent Link meets performance requirements. The final and passing result of the tests for all Permanent Links shall be provided in the test results documentation. No Permanent Link will exceed 295'.
- D) Acceptance of the test results shall be given in writing after the project is fully completed and tested in accordance with Contract Documents and to the satisfaction of the OCIO

4) FIBER OPTIC

- A) All testing procedures and field-test instruments shall comply with applicable requirements of:
- i) ANSI Z136.2, ANS for Safe Use of Optical Fiber Communication Systems Utilizing Laser Diode and LED Sources
 - ii) ANSI/EIA/TIA-455-50B, Light Launch Conditions for Long-Length Graded-Index Optical Fiber Spectral Attenuation Measurements
 - iii) ANSI/TIA/EIA-455-59A, Measurement of Fiber Point Discontinuities Using an OTDR
 - iv) ANSI/TIA/EIA-455-60A, Measurement of Fiber or Cable Length Using an OTDR
- B) Great care will be taken when testing fiber. All cleaning procedures will be adhered to during testing. At no time is it acceptable not to clean connectors when mating.

- C) Each strand will be verified for continuity with a VFL prior to light meter testing.
- D) All strands will have an end face connector test performed with a pass/fail automated result.
- E) Riser cables will be tested with light source and power meter. Fiber will be tested at 850 nm and 1300 nm for multimode cable, 1310 nm and 1550 nm for singlemode cable. Factory calibration must be current for the fiber optic testers; factory documentation must be provided in submittals.
- F) Each strand will be tested and results electronically stored. Once testing is complete results will be down loaded and turned over to the OCIO [WMCNI] Electronically with manufacturer viewing software accompanying results.
- G) Multimode testing will be performed using TIA/EIA-526-14-B Method B for in building riser cables Encircled Flux testing is a requirement, proper mandrels must be used.
- H) Single mode testing will be performed using TIA/EIA-526-7 Method A.1 for in building riser cables. For outside plant cables, TIA/EIA-526-7 Method A.1 and Method B will be used. If issues arise in the building riser cables it will be the responsibility of the contractor to supply an OTDR for further testing and trouble shooting.
- I) All fiber testing will be bidirectional
- J) All installed cabling links and channels shall be field-tested and pass the test requirements and analysis. Any link or channel that fails these requirements shall be diagnosed and corrected. Any corrective action that must take place shall be documented and followed with a new test to prove that the corrected link or channel meets performance requirements. The final and passing result of the tests for all links and channels shall be provided in the test results documentation.
- K) Acceptance of the test results shall be given in writing after the project is fully completed and tested in accordance with Contract Documents and to the satisfaction of the OCIO. [WMCIT]

Section X OUTSIDE PLANT STANDARDS

GENERAL

Conduit sizing and quantities between buildings shall be determined by OCIO and will be communicated to the University Project Manager/OCIO [WMCIT] for inclusion in the project specifications. Minimum requirements are outlined in the following paragraphs.

Prior approval and coordination with OCIO, University Project Manager/OCIO [WMCIT], and other concerned parties is necessary when the situation requires any modification to the conduit system.

Repair or replacement of damaged conduit is the responsibility of the party involved in causing the damage. All damages shall be reported to OCIO [WMCIT], Construction Management and Facilities Management immediately.

Since communications and networking is vital to departments, redundant entrances to new, buildings/renovations will be looked at during the initial design phase to be included in the overall scope of the project.

It is the responsibility of the contractor to notify O.U.P.S. at 1-800-362-2764, 72 hours prior to start of construction, excluding holidays (recognized University holidays) and weekends, for all utility markings. Those utilities that are not listed with O.U.P.S. must also be notified by the contractor.

It will be the responsibility of the project to obtain the necessary permits involved in placing OCIO [WMCIT] conduit/cable through public right of ways. Costs for this process must be preapproved by the project prior to obtaining the permits.

When crossing privately owned properties with OCIO [WMCIT] facilities, easements shall be coordinated by OCIO Outside Plant Department and The Ohio State University's Property and Real Estate (PARE) Department.

It will be the responsibility of the contractor to inform the University mapping department to take shots of the installation throughout the installation. They can be reached at 614.292.HELP or service2facilities@osu.edu.

OSP REQUIREMENTS

1. All new facilities or renovations will be subject to meet minimum requirements. 2-4" (I.D.) PVC encased will be required for every new building for the placement of voice, data, and video. Conduit is to be placed at 36" below grade to top of encasement. Variances must be approved by OCIO, for each entrance.

Medical Center: All new facilities or renovations will be subject to meet minimum requirements. A minimum of 4-4" (I.D.) PVC encased will be required, 2 each for each entrance for every new building for the placement of voice, data, and video. Conduit is to be placed at 36" below grade to top of encasement. Variances must be approved by OCIO, for each entrance.

2. Conduits will not feed building to building.
3. Duct banks will be placed as straight as possible, if turns or offsets need to be made, manhole/hand holes will be used for this function. From manhole/handhole to the building entrance one 90-degree bend is acceptable. All runs will be proofed with a mandrel with the OCIO or OCIO representative in attendance. OCIO Outside Plant Department must approve all duct bank/manhole installations prior to start.
4. A Kevlar pull string or a measure tape shall be installed and tied off in each conduit. Pull wires used in outside conduit shall be stainless steel or copper; #12 AWG or strings shall be of the Kevlar type.

OCIO shall be contacted for final dimension approval. Each duct bank will have a locator wire installed after conduits have been “proofed”.

5. All underground conduits and ducts, rigid or PVC, added to a project shall be added in groups of 2, 4, 6, 8, 10, 12 or more.
6. All underground conduit, duct bank and raceways shall be concrete encased (2500psi minimum).
7. The minimum separation for communications ducts and power ducts in a joint trench environment is 3" (8 cm) of concrete, 4" (10 cm) of masonry or 12" (30 cm) of well-tamped earth. All communications ducts shall also be a minimum of 48" from steam pipes and condensation lines when running parallel. If crossing perpendicular (min of 24" of clearance), Gillsulate insulation (or OCIO/FOD approved equal) must be placed over the top or underneath the encasement to reduce the risk of damage due to heat.
8. PVC schedule 40, encased in reinforced concrete with 5/8" rebar placed on 5" on center shall be used in any location subject to abuse, such as under roadways, slabs or foundations.
9. In new construction, all conduit duct banks will enter the lowest bottom bay of the manhole. In existing structures, ducts will be placed in the next available bay.
10. All necessary precautions shall be taken by the contractor during construction to prevent the lodging of dirt, plaster, concrete or trash in all conduit. All conduit in floors, concrete or below grade shall be swabbed free of debris and moisture before wires are pulled. All conduit shall have duct plugs (expandable mechanical) installed at both the manhole and building entrance to prevent water migration into the building. All building entrances will be sloped to drain back towards the manhole. Under no circumstances will a manhole be placed above the entrance to a building allowing it to drain towards the building. Off campus locations conduit shall be extended to the property line. A handhole shall be installed at the property line to receive WMCIT conduits and service providers conduits.

AERIAL

1. Most university low voltage cabling is underground. No aerial cabling shall be installed on campus unless approved by the University Project Manager/OCIO [WMCIT].

TUNNELS

1. Where conduit, ducts, or cable trays are in tunnels, they shall be kept as far away as possible from parallel runs of flues, steam pipes, hot gas pipes, hot water pipes, or any other utility line which is hot during normal operation of the facility it serves. It is the preference of OCIO Outside Plant Department that all communication cabling is placed opposite the steam side of tunnels. All conduit sections crossing steam lines shall be rigid and shall be provided with a means of insulation from the steam lines, unless a written exception is provided by the University Project Manager/OCIO and OCIO Outside Plant Department.

TRAPS

1. All conduit, tubing, raceways, ducts, and duct banks shall be installed in such manner to insure against collection of trapped condensation. Raceway runs shall be arranged to be void of traps.
2. When conduit passes through exterior concrete walls of any facility, the entrance shall be watertight. Pipe sleeves, at the conduit entrance, shall be sized large enough to place Link Seals between the sleeves and entrance conduit. Link Seals will be placed on both sides of the entrance.

TYPES



1. Abandoned gas, water, steam and any pipes that might contain asbestos insulation shall not be used as telecommunications and networking conduit under any circumstances.
2. Four types of conduit are accepted for underground conduit systems. Project specifications will detail the types of conduit to be used in the various locations covered by the project.
 - A. Rigid galvanized steel conduit with threaded fittings. This conduit shall be installed with concrete casing in areas subject to abuse. This conduit will have an epoxy coating that has been applied by the manufacturer. Coating shall extend to 6" above ground level where conduit is installed by a pole, or side structure, or inside a pedestal.
 - B. Schedule 40 PVC conduit. This conduit shall be installed with concrete encasement. No PVC conduit is acceptable without concrete, unless specified by OCIO Outside Plant Department.
 - C. "C"-Duct conduit: This conduit shall be installed only with concrete encasement.
 - D. HDPE SDR11 or Bore Guard schedule 40: To be used for only directional boring. Boring must be preapproved by OCIO/FOD
3. The duct encasement shall be rectangular in the cross section and have a minimum concrete thickness of 2" around any conduit. The duct encasement shall be sized and placed as shown on construction documents.
4. All conduit and ducts must be terminated with bell ends at the manhole, facility, or other termination point.
5. Duct spacers shall be provided at a maximum of 5' intervals. Conduit shall be anchored at 3'-6" intervals and at each spacer to prevent duct floating during concrete installation.

Entrance Facility

1. The Entrance Facility (EF) in the building must be placed within 50' of the Main Point of Entry (MPOE). At the MPOE of the building, rigid metallic conduit (number of rigid metallic conduits equal the number of conduits entering the building) must be placed to the EF. All unlisted OSP cables will be placed in rigid conduit.
2. Conduit will have expandable plugs installed at each end to prevent water intrusion.

MANHOLES

GENERAL

1. Manhole sizes may vary depending on space limitations. All manholes shall be placed in accordance with the manufacturer's specifications and all required safety regulations. All manholes shall be placed with a collar height of 18" minimum. Locking lids are required and shall be 30" in diameter with "COMMUNICATIONS" engraved on the lid. Manhole lids will not have recessed handles that pull out. All manholes will be precast. See material list for acceptable manufacturer and part numbers.
2. The OCIO outside Plant Designer must approve Handholes on campus.
3. The maximum distance between manholes connected in any one run shall not exceed 500', unless approved by OCIO Outside Plant Department.
4. All telecommunication manholes/handholes must be placed in accordance with manufacturer's specifications unless special conditions are approved by OCIO **WMCIT** Telecommunications and Networking Outside Plant Department.



5. All Telecommunication Precast manholes/handholes shall include the associated hardware package (for racking), ladder, frame, cover, and collar (neck) for the specific structure being placed. Note: Lids must be marked as Communications.
6. See below for approved product vendor or OCIO approved equal:

Concrete Precast Manholes/Handholes:

Oldcastle Hartford Concrete Products
1400 North Wabash Avenue
P.O. Box 660
Hartford City, Indiana 47348-0660
1-800-428-8110
Telefax: 765-348-3121

Manhole Interior

1. All materials used in a manhole shall be resistant to corrosion. All steel shall be galvanized or zinc coated. All racking in manholes shall be in accordance with manufacturers' specifications.
2. Manholes shall have pulling rings opposite to the conduit entrance on each wall.
3. Each manhole will be grounded

Restoral

1. All surfaces must be restored to like or better condition as soon as possible. Where settling occurs, it is the responsibility of the contractor to correct the given area and take appropriate measures to reseed and regrade as necessary at no additional charge to the project or OCIO. The contractor is responsible for 1 year from project completion date.
2. All restoral must meet Division 31, 32 & 33 of the Building Design Standards.

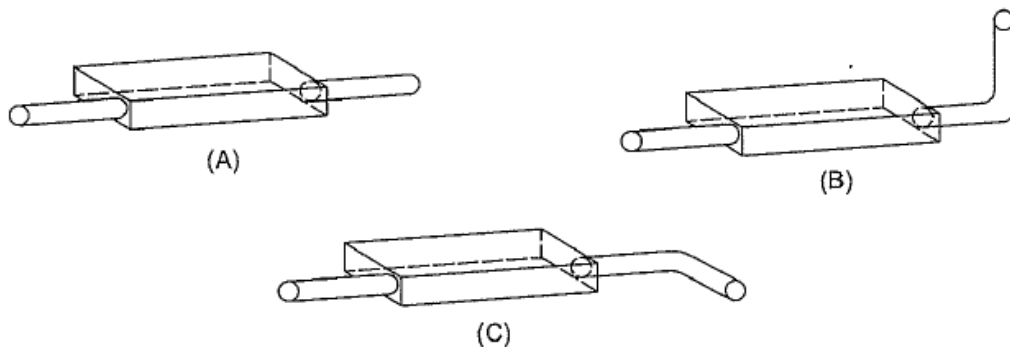
EXHIBIT A

PULL AND SPLICE BOXES

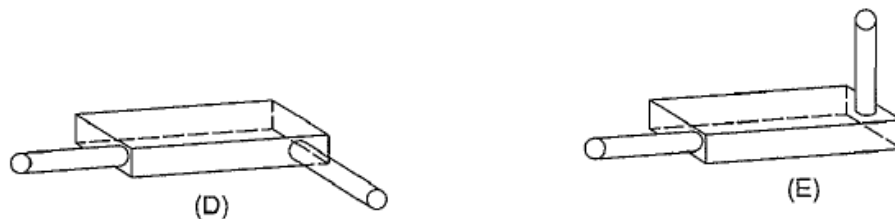
A PULL BOX SHOULD BE PLACED WHERE CONDUIT RUNS EXCEED 100 FEET IN LENGTH OR CONTAIN THE EQUIVALENT OF MORE THAN TWO (2) 90 DEGREE BENDS. CONDUIT SHOULD ENTER AND LEAVE THROUGH OPPOSITE ENDS OF THE BOX. NO BENDS SHOULD BE MADE INSIDE THE BOX. IF A 90 DEGREE TURN IS REQUIRED AT A BOX IT IS PREFERABLE TO PLACE IT ADJACENT TO THE BOX AS ILLUSTRATED IN (B) AND (C). DO NOT PLACE THEM AS ILLUSTRATED IN (D) AND (E).

THESE SAME CONSIDERATIONS APPLY TO SPLICE BOXES PLACED AT TURNS.

PULL AND SPLICE BOXES PERMITTED



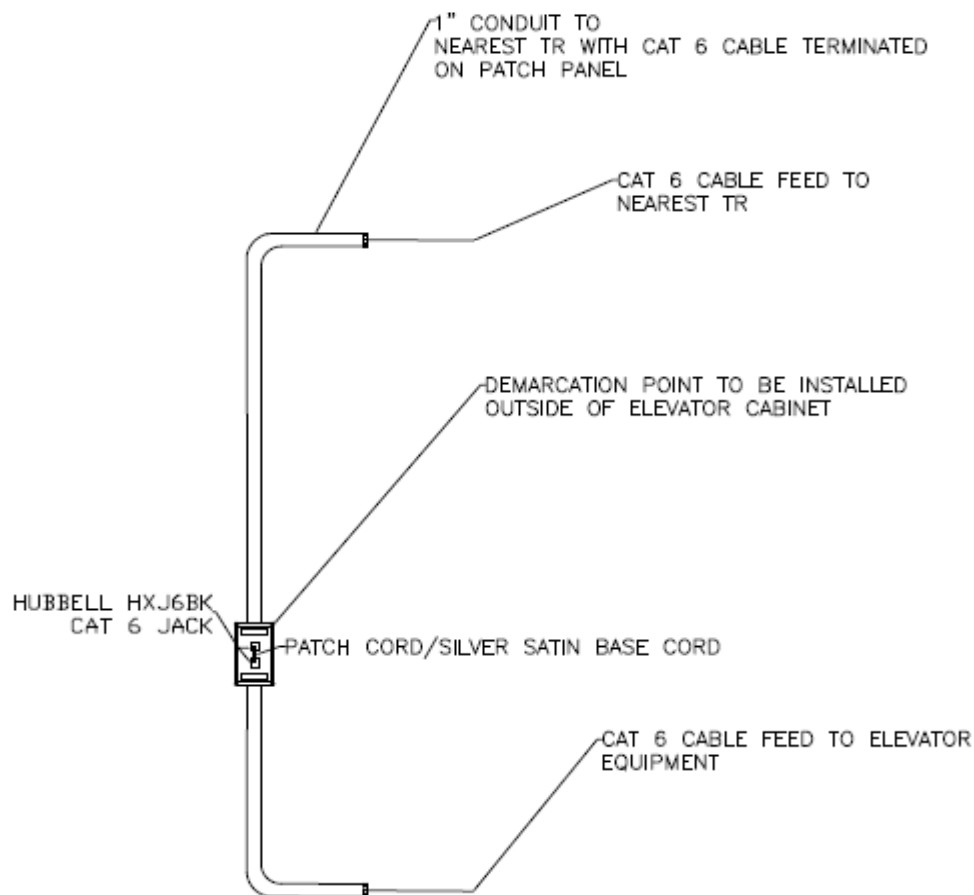
PULL AND SPLICE BOXES NOT PERMITTED





SEE EXHIBIT M FOR WEXNER MEDICAL CENTER

EXHIBIT B



SEE EXHIBIT N & O FOR WEXNER MEDICAL CENTER

EXHIBIT C

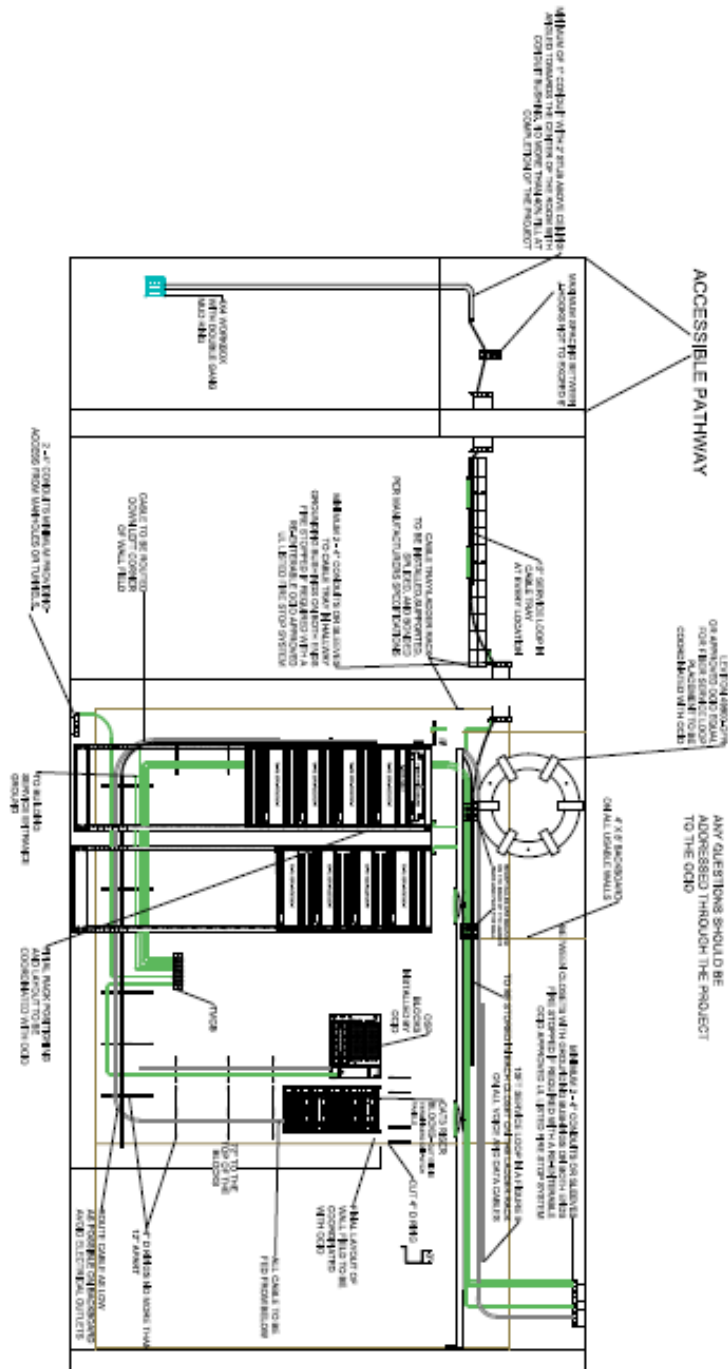
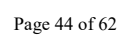
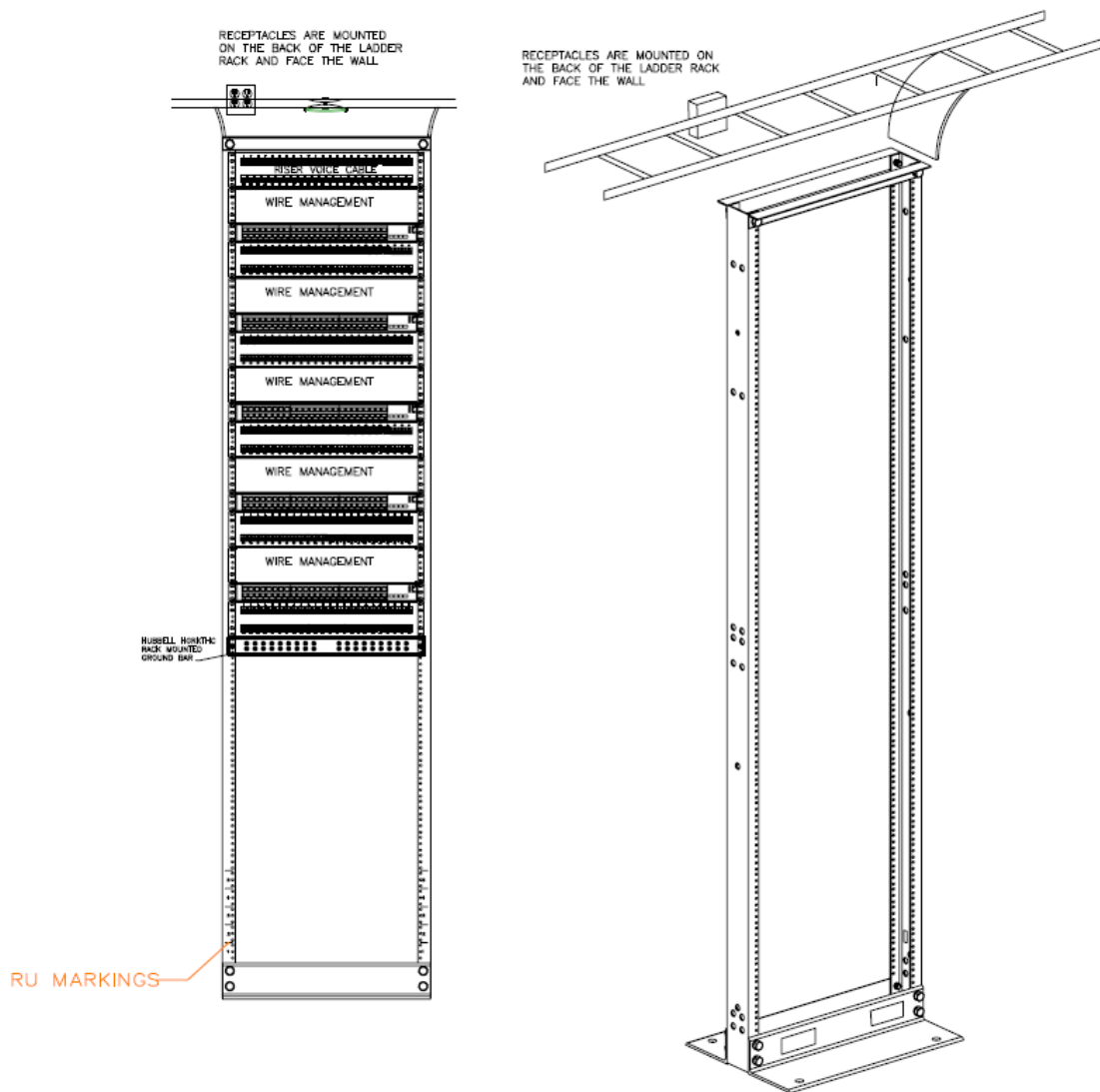


EXHIBIT D



SEE EXHIBIT Q FOR WEXNER MEDICAL CENTER

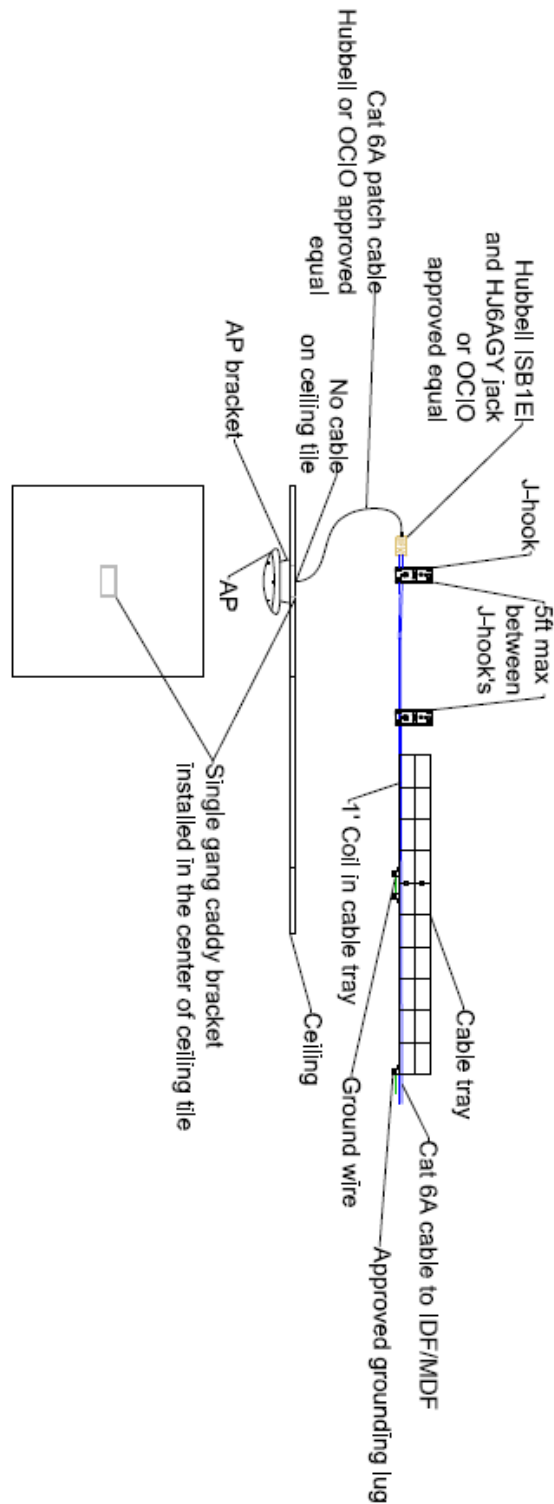
EXHIBIT E



SEE EXHIBIT R FOR WEXNER MEDICAL CENTER

EXHIBIT F

AP install in a drop ceiling





SEE EXHIBIT S FOR WEXNER MEDICAL CENTER

EXHIBIT G

AP install in a hard ceiling

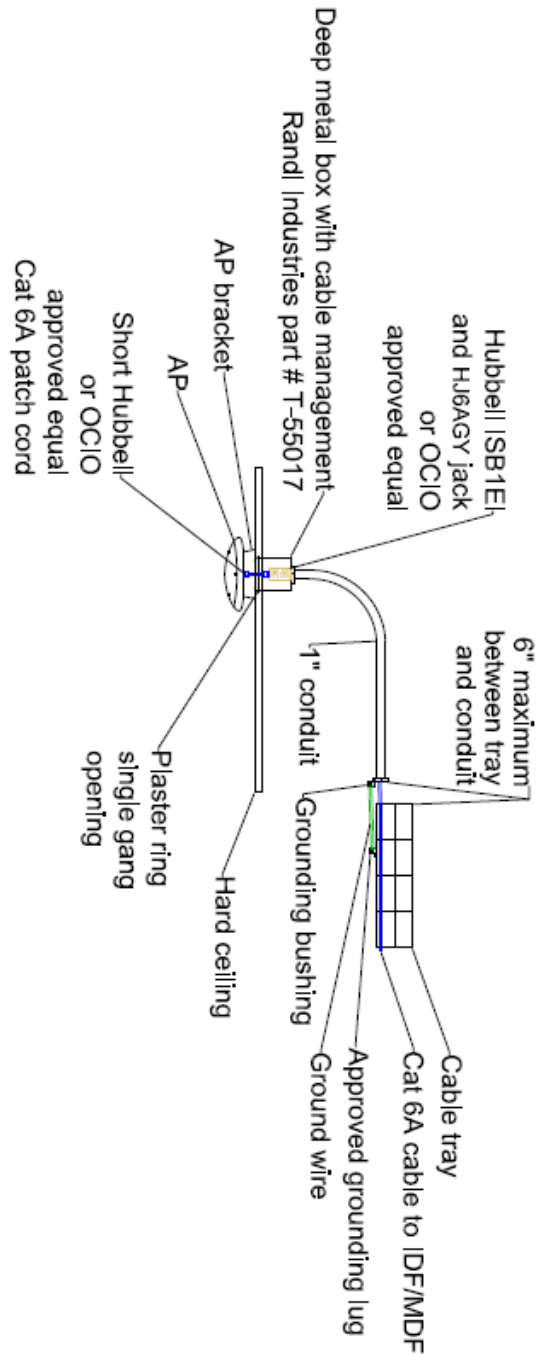




EXHIBIT H

CAT 6 CONDUIT CABLE FILL WITH 180 DEGREES OF BENDS

CONDUIT TRADE SIZE	# OF CABLES
1"	4
1.5"	9
2"	16
2.5"	30
3"	45
4"	75

CAT 6A CONDUIT CABLE FILL WITH 180 DEGREES OF BENDS

CONDUIT TRADE SIZE	# OF CABLES
1"	1
1.5"	3
2"	6
2.5"	11.9
3"	17
4"	29

CAT 6 CONDUIT CABLE FILL NO BENDS/OFFSETS

CONDUIT TRADE SIZE	# OF CABLES
1"	6
1.5"	14
2"	24
2.5"	42
3"	65

CAT 6A CONDUIT CABLE FILL NO BENDS/OFFSETS

CONDUIT TRADE SIZE	# OF CABLES
1"	2
1.5"	5
2"	9
2.5"	16
3"	25



4"	108	4"	42
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EXHIBIT I No longer Applicable June 28, 2019

EXHIBIT I

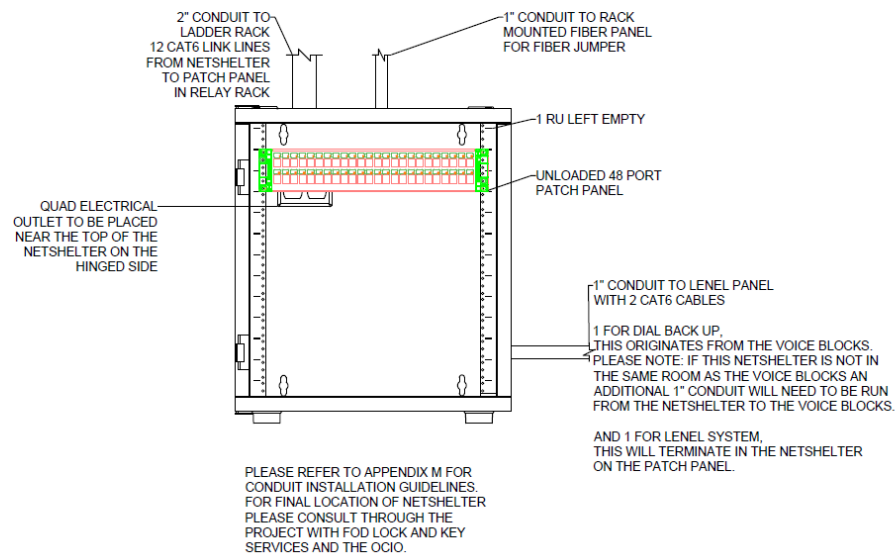




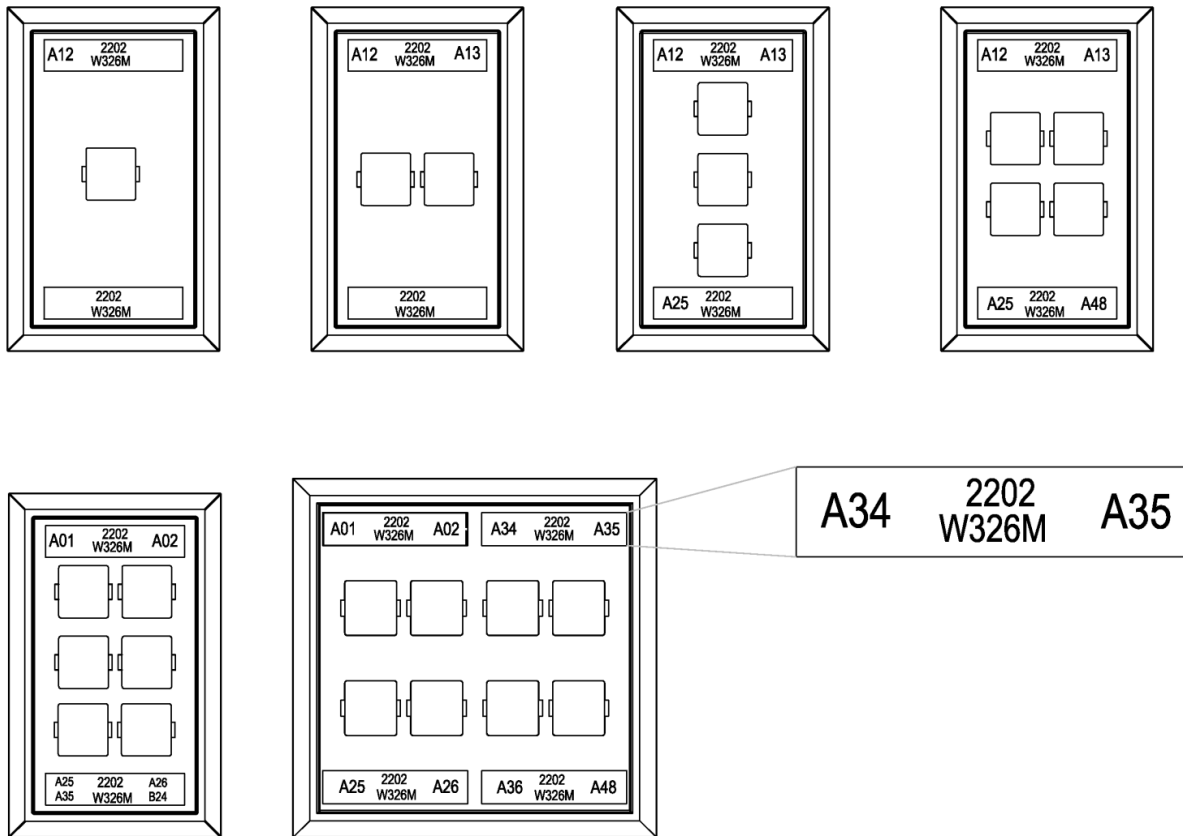
EXHIBIT J

TBB sizing chart

TBB/GE linear length m (ft)	TBB/GE size (AWG)
less than 4 (13)	6
4 – 6 (14 – 20)	4
6 – 8 (21 – 26)	3
8 – 10 (27 – 33)	2
10 – 13 (34 – 41)	1
13 – 16 (42 – 52)	1/0
16 – 20 (53 – 66)	2/0
20 – 26 (67 – 84)	3/0
26 – 32 (85 – 105)	4/0
32 – 38 (106 – 125)	250 kcmil
38 – 46 (126 – 150)	300 kcmil
46 – 53 (151 – 175)	350 kcmil
53 – 76 (176 – 250)	500 kcmil
76 – 91 (251 – 300)	600 kcmil
Greater than 91 (301)	750 kcmil

EXHIBIT K

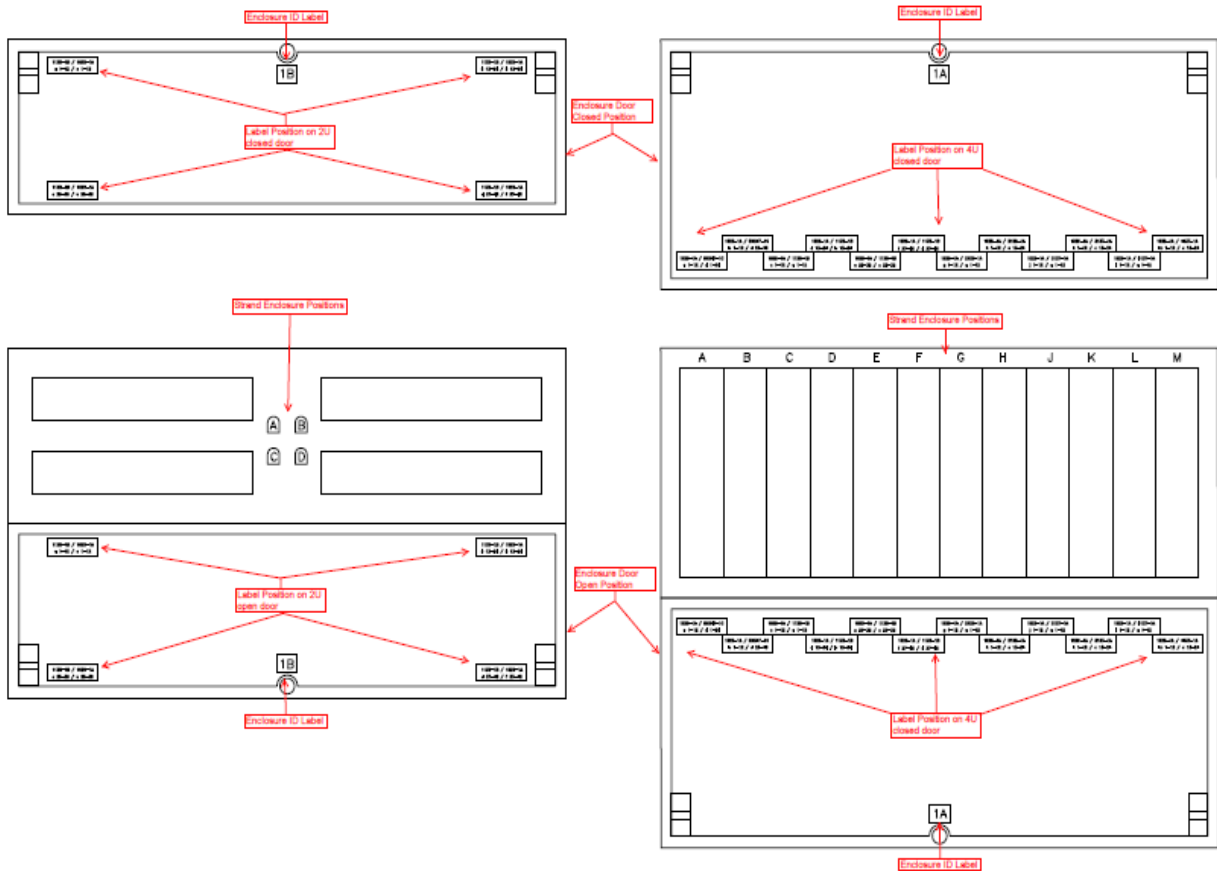
Technology Outlet Label



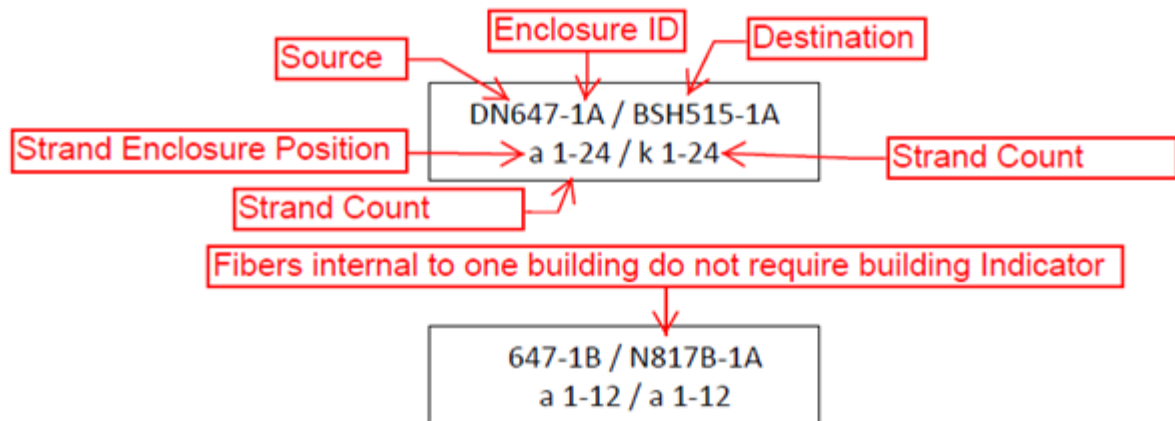
MEDICAL CENTER - EXHIBIT L

Optical Fiber Labeling

Fiber Enclosure



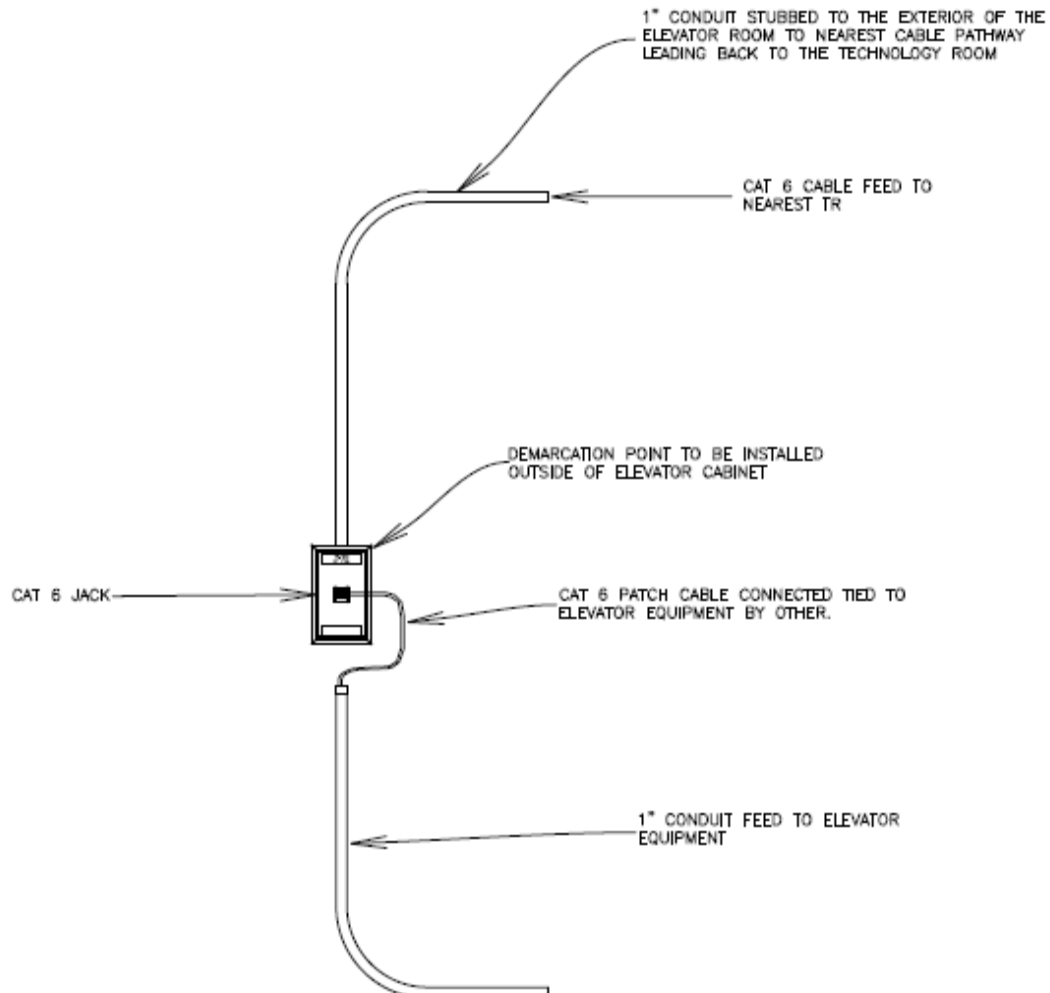
Fiber Optic Termination Label





MEDICAL CENTER - EXHIBIT M

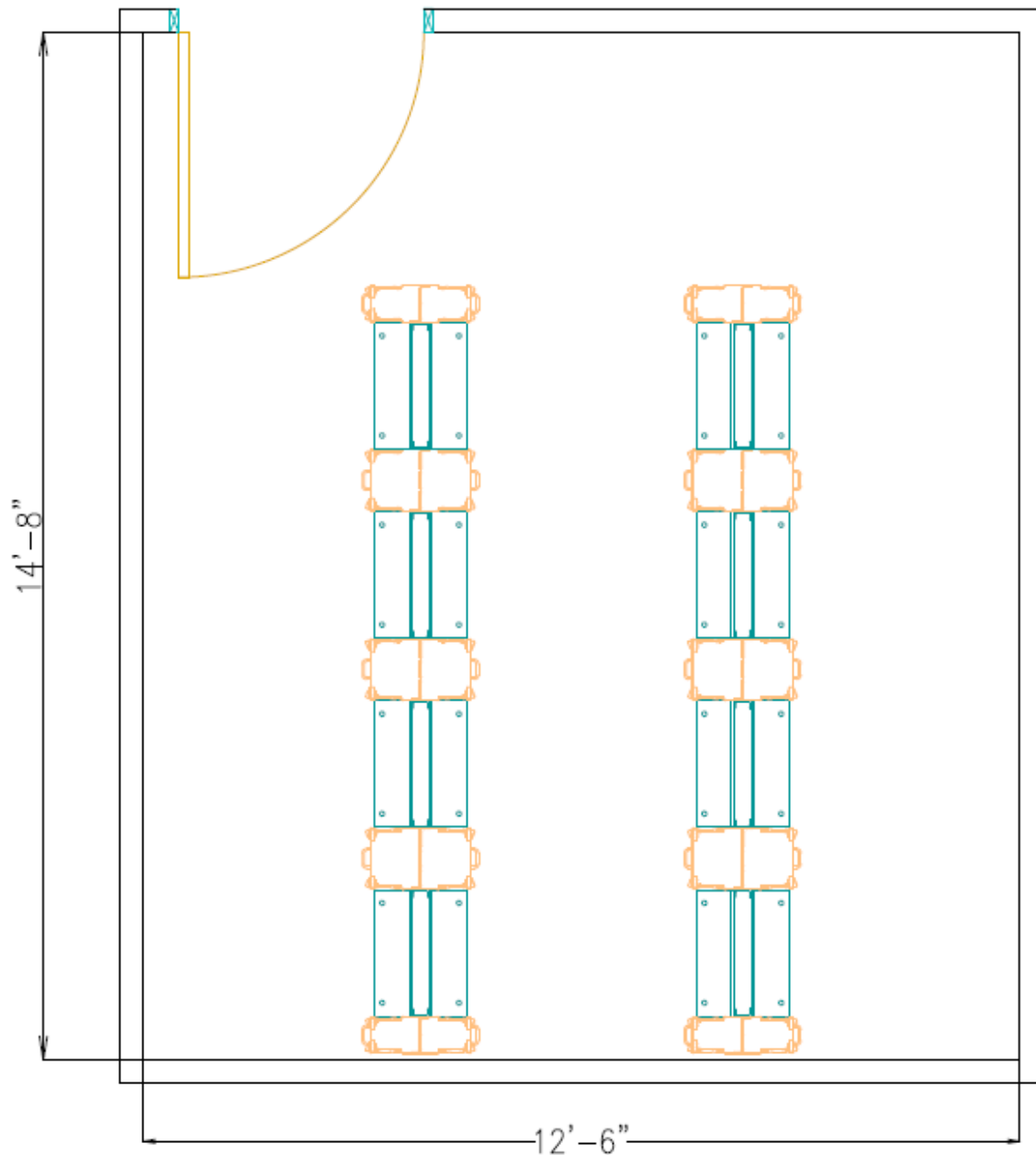
Elevator Phone Schematic





MEDICAL CENTER - EXHIBIT N

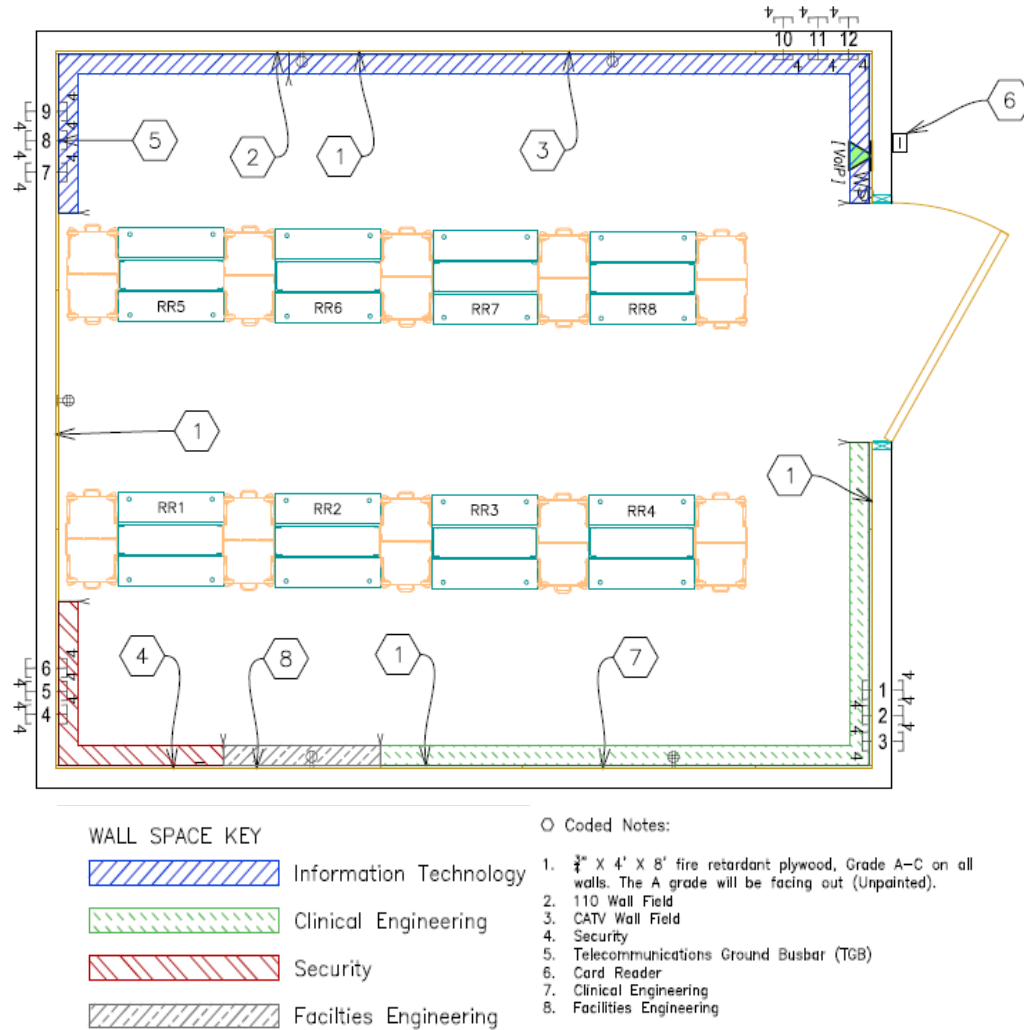
Technology Room (TR) Sizing



NOTE: Space should be free of all other building structural components and beams.

MEDICAL CENTER - EXHIBIT O

Technology Room (TR) Layout





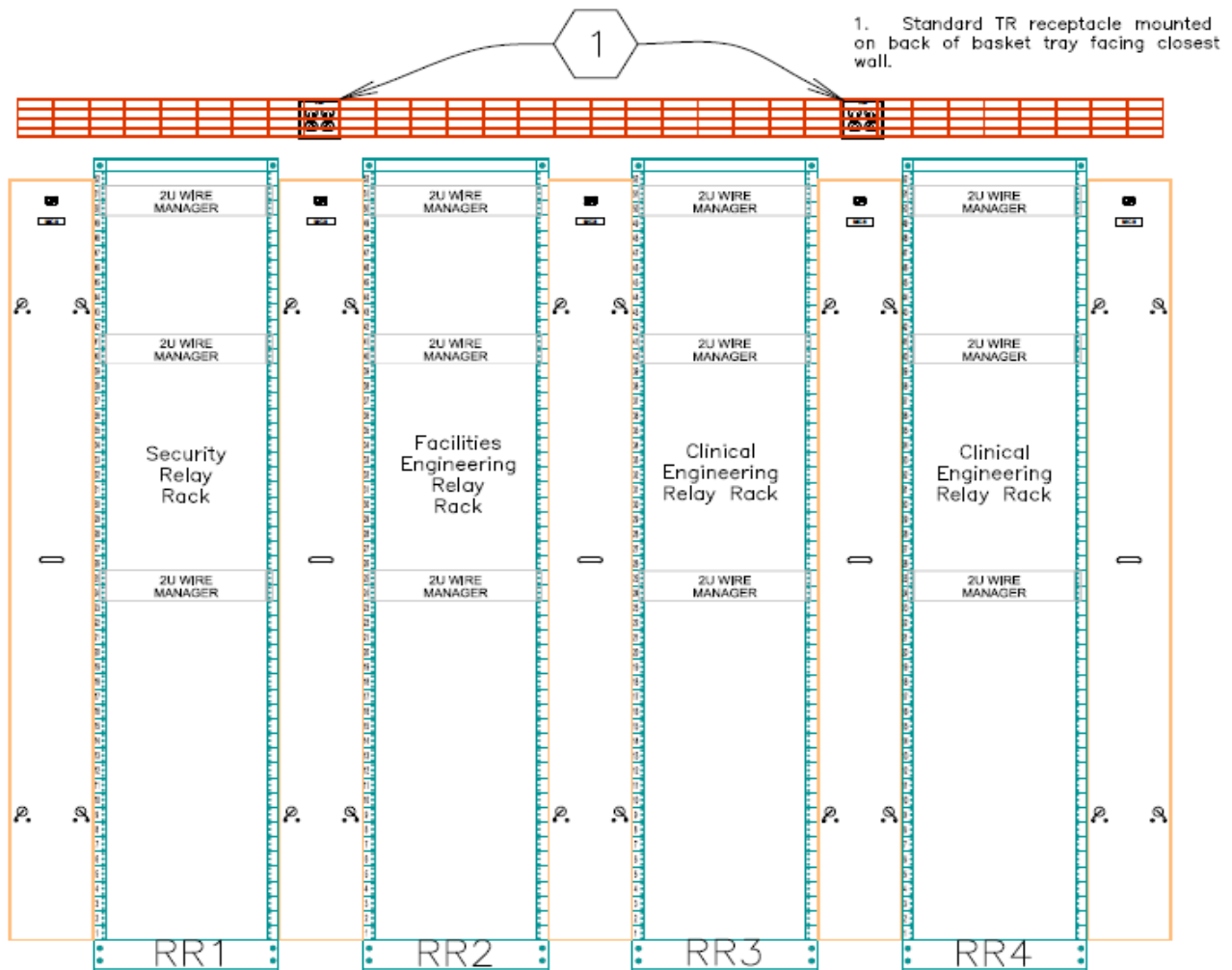
General Notes:

1. 12'-6" X 14'-8" room
2. 168 square feet of continuous floor space
3. No drop ceiling
4. No windows
5. Door located on a 12'-6" wall, must open out and be 48" wide.
6. RR1: Relay rack 1 is Security
7. RR2: Relay rack 2 is Facilities Engineering
8. RR3: Relay rack 3 is Clinical Engineering
9. RR4: Relay rack 4 is Clinical Engineering
10. RR5: Relay rack 5 is Information Technology
11. RR6: Relay rack 6 is Information Technology
12. RR7: Relay rack 7 is Information Technology
13. RR8: Relay rack 8 is Information Technology



MEDICAL CENTER - EXHIBIT P

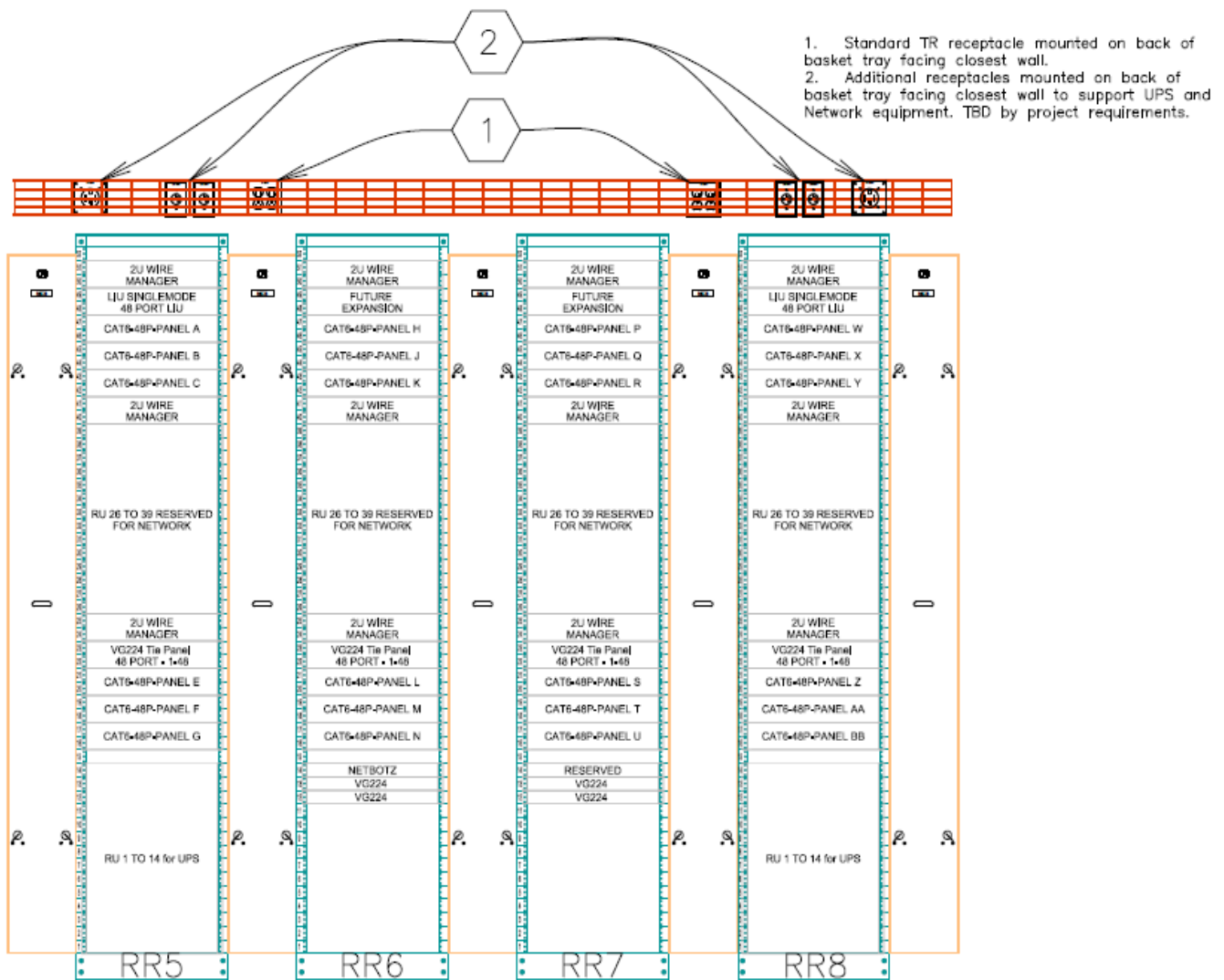
Relay Rack Detail 1 - 4



Note: Wire managers are to be installed in RU 24 & 25, 40 & 41, and 50&51.

MEDICAL CENTER - EXHIBIT Q

Relay Rack Detail 5 - 8

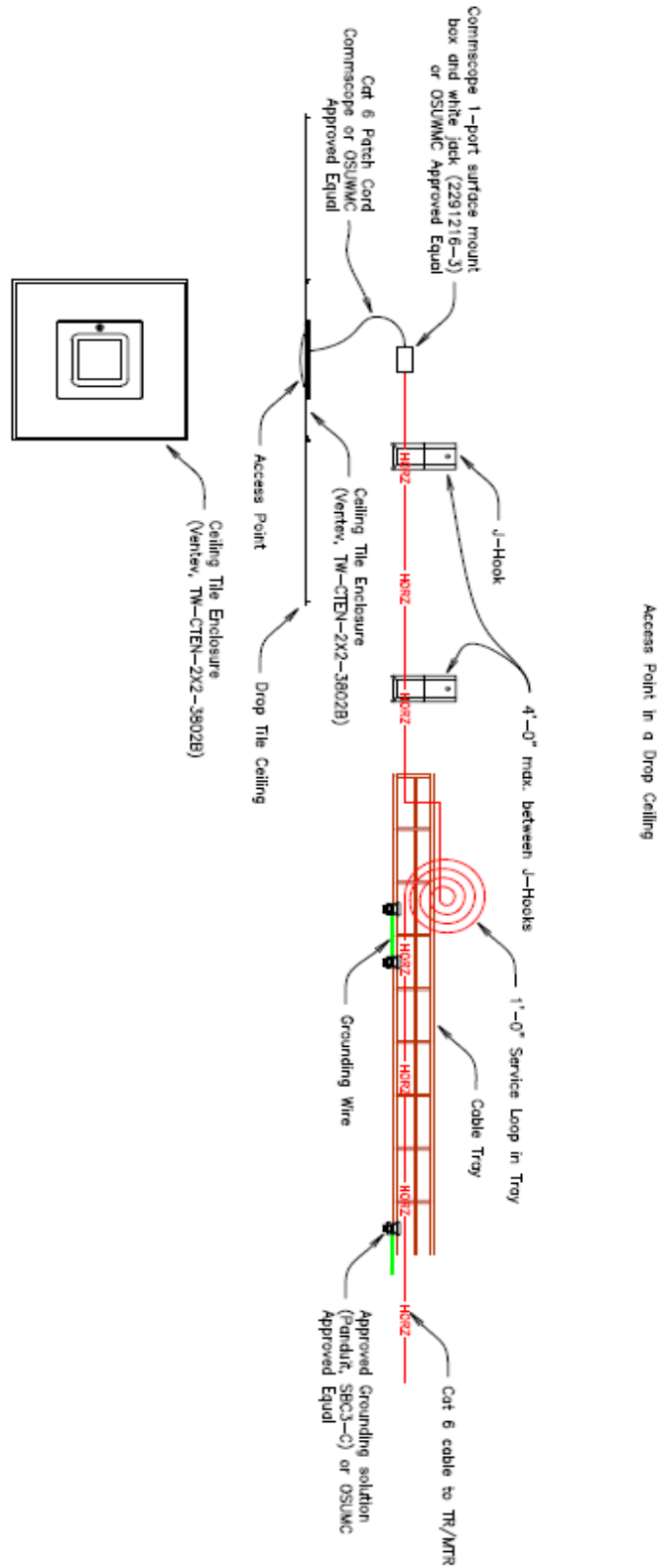


Note: Wire managers are to be installed in RU 24 & 25, 40 & 41, and 50&51.



MEDICAL CENTER - EXHIBIT R

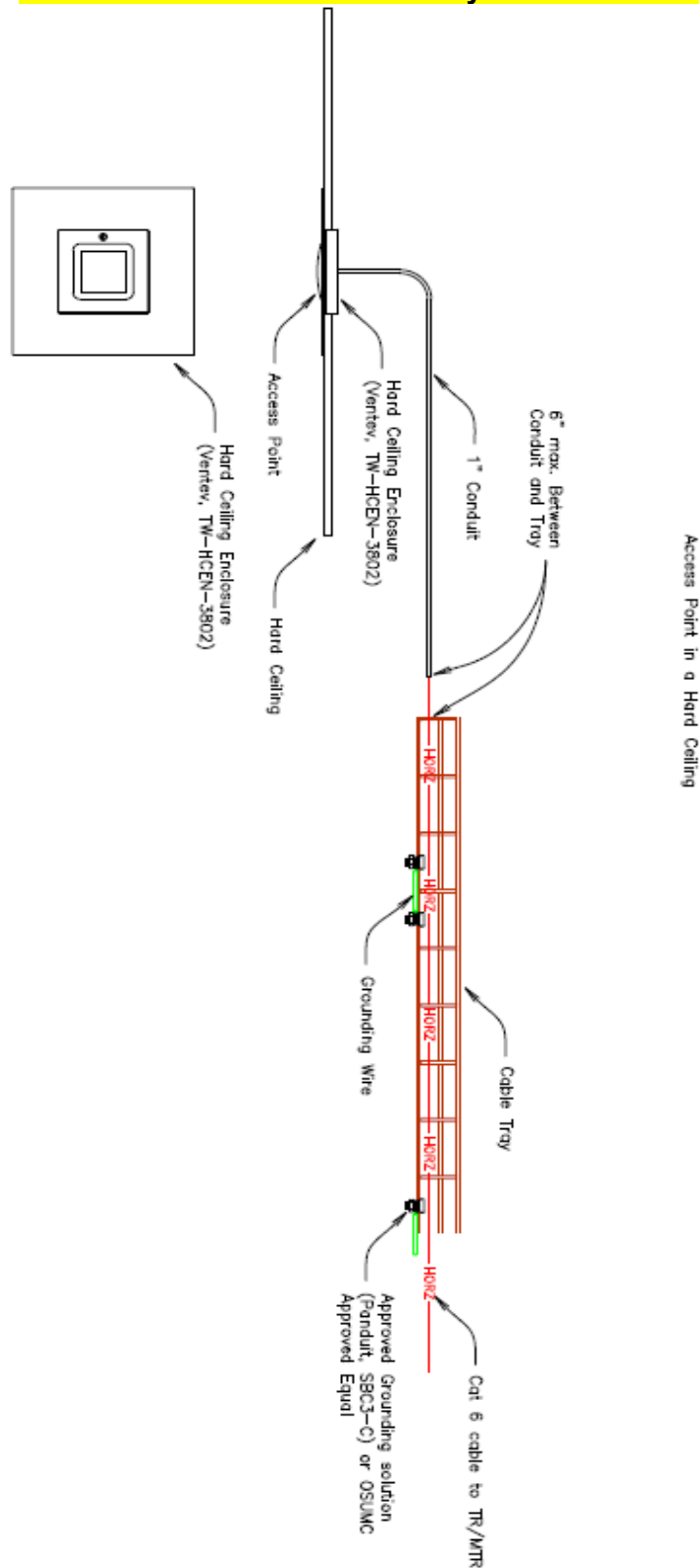
Wireless Access Point Detail- Drop Ceiling





MEDICAL CENTER- EXHIBIT S

Wireless Access Point Detail- Drywall/Hard Ceiling



APPENDIX O

2000 Edition, May 1, 2000; Revision Date: October 16, 2017

CLASSROOM DESIGN GUIDELINES

The Ohio State University

PART I: ROOM GEOMETRICS	SEMINAR ROOMS (20 or less)	GENERAL PURPOSE CLASSROOMS (21-80)	LECTURE HALLS (81 or more)
A. ASPECT RATIO (Length to Width)	ideally length (dimension perpendicular to teaching center) shall be equal to width and shall not exceed 1.5 width	<u>ideal aspect ratio length to width is 1.5:1</u>	not applicable due to varying room shape -- effective sight lines for viewing <u>entire teaching area and</u> projected images are critical adherence to guidelines is mandatory (see PART III-D)
B. CEILING HEIGHT	8' minimum	- minimum 9.5', desired [(room length/666+4) feet]	<u>10' minimum at rear wall; front wall viewing area height to be minimum of [(room length / 6 + 4)feet] while maintaining clear sight lines from each seat</u>
C. TEACHING AREA DEPTH (Least Distance) (perpendicular measure from center of teaching wall to nearest student seat)	minimum 6' if an identifiable teaching station is provided by furniture arrangement	<u>Minimum 8' -</u>	depth of teaching area dependent on stage dimensions and location of any fixed equipment such as <u>demonstration bench or electronic lectern; general minimum 15 feet</u>
D. SIGHT LINES FROM EACH STUDENT SEAT TO CENTER OF TEACHING SURFACES	Vertical: not > 20° from horizontal sight line of seated person Horizontal: not > 45° from <u>perpendicular line to each teaching surface from student seat</u>	Vertical: <u>±15° from horizontal sight line of seated person</u> Horizontal: not > 45° from <u>perpendicular line to each teaching surface from student seat</u>	Vertical: <u>±15° from horizontal sight line of seated person</u> Horizontal: not > 30° from <u>perpendicular line to each teaching surface from student seat</u>
E. FLOOR ELEVATION CHANGES	not permitted	rooms with >70 capacity may provide tiered seating to improve sight lines from rear access as needed	- <u>should provide tiered seating to improve sight lines from rear access as needed</u>
F. CEILING ELEVATION CHANGES CEILING ANGLES WITH TEACHING WALL	not permitted	normally flat--in rooms >70 capacity ceiling above teaching center may be angled to better reflect sound to rear of room	ceilings must be angled properly to provide for sound reflection from teaching center to rear portions of room

G. SIDEWALL ANGLES WITH TEACHING WALL	normally perpendicular but may be angled for architectural reasons	normally perpendicular but may be angled for architectural reasons in smaller rooms (<50 capacity)	sidewalls must not be parallel -- angle(s) with teaching all shall be determined from study of acoustics in each room depending on size and shape
H. TEACHING AREA ELEVATION	required to be same as seating area if a separate teaching area is demarked by furniture arrangement	<u>ADA accessible platform required to be same as seating area except in rooms of > 70 capacity where an ADA accessible platform not to exceed 7 inches in height may be provided for the teaching center.</u>	<u>must be at same elevation as entry corridors to "front" of lecture hall and adjacent classroom service rooms</u> <u>provide ADA accessible to & from "stage" front and rear area</u>

PART II: SONIC CONDITIONS & CONTROLS	SEMINAR ROOMS	GENERAL PURPOSE CLASSROOMS	LECTURE HALLS
A. ROOM SOUND QUALITY	all rooms must feature a sonic environment which provides for good aural conditions at every student seat with particular attention to: 1) preventing unwanted sounds outside the room from entering through walls, floor, mechanical ducts or other openings into the room 2) preventing interfering sound reverberations within the room 3) providing for clear transmission of sounds from the teaching area to all student seats		
B. SOUND CONTROLS	room enclosures shall have a sound transmission coefficient of at least 45 - -- sound levels in empty room shall have ambient noise not greater than 35 db measured at average head height (44") for a seated person -- all walls must extend to structure -- doors shall not have louvers	same as Seminar Rooms	same as Seminar Rooms
C. SOUND CONTROLS: INTERIORS	teaching wall must be hard surface -- side and rear walls may have sound dampening material applied as needed -- - use sound reduction material with a noise reduction coefficient of 0.6	same as Seminar Rooms except that rooms of >70 capacity may provide a sound amplification system for both live and recorded presentation and shall have acoustical shaping to insure good sound projection to rear seats	side walls shall be neither parallel nor of continuous hard surface expanse and have a sound transmission coefficient not less than 45 - -- teaching wall must be of hard surface materials -- rear wall and side walls shall have sound dampening material applied to "tune" the room so that sound is adequately reflected without interfering reverberations -- - designers are strongly encouraged to use services of an acoustician in Lecture Hall design

D. SOUND AMPLIFICATION	<u>-rooms must have audio amplification system and volume control accessible to the instructor.</u>	<u>-Same as Seminar rooms. Classrooms - with >70 to provide speech reinforcement as well, wireless microphone is desired. Audio system required to accommodate current ADA requirements. - -</u>	<u>Same as General Purpose Classrooms— a wireless microphone is required – Audio system required to accommodate current ADA requirements.</u> -
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PART III: VISUAL CONDITIONS AND CONTROLS	SEMINAR ROOMS	GENERAL PURPOSE CLASSROOMS	LECTURE HALLS
A. LIGHT QUALITY AND INTENSITY	<u>light levels must be uniform throughout the task area</u> -- <u>audience light levels shall be 40-50 foot candles for non-mediated instruction, audience light levels shall be 2-10 foot-candles for mediated and note taking instruction, chalkboard illumination shall be 60-70 foot-candles</u> -- <u>audience level measurements to be taken at desktop height</u>	<u>same as Seminar Rooms</u>	<u>same as Seminar Rooms with the inclusion of appropriate aisle/entrance lighting be uniform throughout task area -- all fixtures flush with the ceiling. -</u>
B. ARTIFICIAL LIGHT CONTROL	<u>lighting controls shall be standardized in layout and location as much as possible -- all controls must be labeled clearly and adhere to all applicable ADA requirements and building regulations -- an entry lighting control shall be located at each room entrance, full room lighting controls shall be located - with easy access from the teaching station -- Classrooms required to have multiple lighting levels available for different tasks as specified by Office of distance Education and eLearning – Learning Environment team. - -</u>	<u>same as Seminar Rooms</u> -	<u>same as Seminar Room with these additions:</u> - -- <u>optional lectern spots with separate controls may be used, placement and design of these fixtures must eliminate any chance of shadowing or bleeding onto the projection screen - -- consideration for the ease of lamp replacement must be taken when choosing fixtures --</u> *-
C. NATURAL LIGHT CONTROL	<u>all fenestration openings must be equipped with light control devices which will eliminate natural light on the projection screen and permit room darkening to 5 foot candles at student stations even if direct sunlight is a factor (NOTE: this includes interior door glass) -- since frequent room darkening is required in classrooms, window area shall be minimized</u>	<u>same as Seminar Rooms</u>	<u>windows not recommended in Lecture Halls, otherwise, same as Seminar Rooms</u> <u>provide room darkening if needed in entry door vision panels</u>
D. PROJECTED IMAGES -- ANGLES AND DISTANCES	<u>sight lines from average person's seated eye level (44") to center of projection screen(s) shall not exceed 45° from perpendicular in the horizontal plane -- student seats shall be no closer than 1.5 times a single image width nor farther than 6 times a single image height -- lowest part of projected image to be 36"- 48" AFF -- top of projection screen shall subtend an angle not > 35° from the horizontal sight line of average seated person</u>	<u>same as Seminar Rooms</u>	<u>same as General Purpose Classrooms except that student sight line angle shall be reduced to a maximum of 30 degrees from perpendicular in the horizontal plane</u> <u>lowest part of projected image based on stage characteristics</u>
E. SURFACE	<u>reflectance values of surface finishes shall be</u>	<u>same as Seminar Rooms</u>	<u>same as Seminar Rooms except for ceilings</u>

REFLECTANCES	within the following ranges: • Ceilings 60-90% • Walls 40-60% • Floors 20-50% • Table or tablet-arm tops 30-50% • Chalkboards 20-30%		(see Part IX-B)
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PART IV: THERMAL CONDITIONS AND CONTROLS	SEMINAR ROOMS	GENERAL PURPOSE CLASSROOMS	LECTURE HALLS
A. IN-ROOM HVAC CONTROLS	room HVAC controls shall be part of a building zone or whole building control system with tamper proof thermostats -- <u>in-room systems or window units not permitted due to noise generation</u>	same as Seminar Rooms	<u>due to room volume and occupation of multiple building levels, in-room HVAC controls may be used -- install tamper-proof thermostats</u>
B. HVAC SYSTEMS	<u>air conditioning required -- shall be part of a building central system or at minimum a building area system -- in-room HVAC systems or window units not permitted due to noise generation -- air flow (supply/return) in room shall not move the projection screen</u>	same as Seminar Rooms	<u>same as Seminar Rooms</u> <u>consider separate air handlers for one or groups of similar rooms</u>
C. TEMPERATURE AND HUMIDITY TOLERANCES	<u>Temperature and humidity should be maintained to meet the health and comfort requirements of the occupants</u>	same as Seminar Rooms	same as Seminar Rooms

PART V: TEACHING SURFACES	SEMINAR ROOMS	GENERAL PURPOSE CLASSROOMS	LECTURE HALLS
A. VERTICAL WRITING SURFACES	Teaching wall must have whiteboard (chalk board is acceptable) at 4' vertical height mounted 3' above finished floor . Chalk tray required below entire length of the board. Writing surface on corridor sidewall optional. To accommodate writing surface the teaching wall shall have no projections such as pilasters, columns, chases, etc. Writing surfaces must be properly illuminated (see Part III-A, B)	same as Seminar Rooms	Chalkboards optional . Size of auditorium and intended use would dictate that chalkboard specifications for each room shall be engineered individually. If multi-tiered boards are preferred, those requiring manual operation are recommended. Installed whiteboards or chalkboards must be properly illuminated (see Part III-A,B)
B. PROJECTION SCREENS	Optional. If desired, provide one projection screen per room. Screens may be either wall or ceiling mounted per manufacturer instructions. Screens shall be mounted the greater of 6" or the minimum distance required to clear any obstructions + 1". Installation must support the weight of the screen and any dynamic loads applied during screen operation. For screens mounted to hollow walls, brackets shall be fastened to a surface-mounted continuous 1x wood board with blocking behind (paint or stain). The - center of the extended screen shall meet the viewing angles described in PART I-D and PART III-D	Required, installation same as Seminar Rooms	Screen size, type and placement to be determined by consultation with the ODEE. When an electric screen is utilized the controls shall be placed adjacent to the lighting controls in the teaching area Adhere to viewing angles described in Part III-D
C. TEACHER TABLE (movable)	Optional.	2' x 4' movable table minimum	Optional, same as General Purpose Classroom when desired
D. VERTICAL DISPLAY SURFACES	Optional. If provided, shall be in the hallway and not classroom.	same as Seminar Rooms	Same as in Seminar Rooms

PART VI: MOVABLE EQUIPMENT	SEMINAR ROOMS	GENERAL PURPOSE CLASSROOMS	LECTURE HALLS
A. AUDIO-VISUAL EQUIPMENT	<u>Each room shall permit the use of all current educational technologies. All projects shall be coordinated with the Office of Distance Education and eLearning – Learning Environments team.</u>	same as Seminar Rooms	<u>Same as Seminar Rooms</u>
B. TEACHING STATION MOVABLE EQUIPMENT	<u>Rooms may have a free-standing podium; provisions must be made to meet ADA regulations.</u> -	<u>Same as Seminar Rooms</u>	<u>Same as Seminar Rooms</u>
C. STORAGE UNITS	<u>optional</u> <u>(see PART XIII-A)</u>	<u>same as Seminar Rooms</u> <u>(see PART XIII-A)</u>	<u>Same as Seminar Rooms</u> <u>(see PART XIII-A)</u>

PART VII: FIXED EQUIPMENT	SEMINAR ROOMS	GENERAL PURPOSE CLASSROOMS	LECTURE HALLS
A. TV MONITORS	<u>Optional</u>	<u>not recommended</u>	<u>not recommended</u>
B. SOUND REPRODUCTION AND REINFORCEMENT	<u>In-room system required – project designer shall consult with the Office of Distance Education and eLearning Learning Environments team</u> <u>(see PART II-D)</u>	<u>In-room system required – project designer shall consult with the Office of Distance Education and eLearning Learning Environments team</u> <u>(see PART II-D)</u>	<u>in-room system required -- project designers must consult with the Office of distance Education and eLearning Learning Environments team</u> <u>(see PART II-D)</u>
C. AUDIO-VISUAL EQUIPMENT CONTROLS	<u>All AV devices controllable from teaching area</u>	<u>Same as Seminar Rooms</u>	<u>Same as Seminar Rooms</u>
D. VIDEO/DATA PROJECTION	Fixed video/data projection or displays and related equipment to be installed in all rooms. To be coordinated with the Office of Distance Education and eLearning – Learning Environments team -	<u>Same as Seminar Rooms</u>	<u>Same as Seminar Rooms</u>
E. CLOCK	<u>rear of room</u>	<u>rear of room</u>	<u>rear of room</u>
F. DEMONSTRATION BENCH (fixed)	<u>optional</u>	<u>optional</u>	<u>optional in rooms where natural sciences are taught -- where specified, provide an instructor's fixed demonstration bench, - with acid resistant top and 120v power outlets</u>

PART VIII: FURNITURE	SEMINAR ROOMS	GENERAL PURPOSE CLASSROOMS	LECTURE HALLS
A. STUDENT SEATS	student seats shall be selected to provide comfort for all size students -- provide sturdy armless chairs for classroom capacity -- chairs shall be designed so that rear legs project further than top of seat back ____ Chairs shall be on casters to promote flexible learning	<u>Option 1: -sturdy tablet-arm chairs with usable writing surface >180 sq. in. with a minimum 12 in. in one dimension.- - 10% of all chair stations shall have - left-hand tablet arms unless the writing surface is >200 sq. in.</u> <u>Option 2: Tables and chairs. Tables shall be minimum 18 inches deep and afford at least 30-inch width work space per student station.</u> <u>All: aisle width per code and ADA regulation. Seating shall be selected to provide comfort for all size students. Chairs shall be on casters to promote flexible learning.</u>	<u>Option 1: fixed theater type seat with fold-up tablet arm having usable writing surface >180 sq. in. with a minimum 12 in. in one dimension.-10% of all tablet-arm stations shall be left-hand unless the writing surface is >200 sq. in. Fixed seating shall be back-mounted to risers if possible.</u> <u>Option 2: loose armless chairs with fixed, continuous strip tables.</u> <u>All: provide stations for wheelchair at 5% of room capacity. Seating shall be selected to provide comfort for all size students. If not fixed, seating should be on casters to promote flexible learning.</u>
B. STUDENT TABLES	<u>provide tables with at least - 24 inch depth and 30-inch width work space per seat to afford minimum - 5 sq. ft. of table space per student station –</u> <u>tables shall be on casters to promote flexible learning.</u>	<u>Same as seminar room</u>	<u>Same as seminar room</u>
C. SEATING FOR PEOPLE WITH DISABILITIES	<u>leave clear space in front -- do not block aisles -- location and number of seats per ADA guidelines</u>	<u>leave clear space in front -- do not block aisles -- location and number of seats per ADA guidelines</u>	<u>leave clear space in front -- do not block aisles -- location and number of seats per ADA guidelines</u>
D. TEACHING STATION	<u>If teacher workspace is not included in room furnishings, provide instructors desk or table at least 24 inches deep by 48 inches long and one armless chair</u> <u>(In addition, see Part VI-B)</u>	<u>provide instructors desk or table at least 24 inches deep by 48 inches long and one armless chair</u> <u>(In addition, see Part VI-B)</u>	<u>Same as General Purpose Classroom</u> <u>(In addition, see Part VI-B)</u>
E. WRITING SURFACE AT STUDENT SEATS	very durable, hard finish plastic laminate or equivalent required whether table top or tablet arm	same as Seminar Rooms	same as Seminar Rooms
F. WASTE AND RECYCLING RECEPTACLES	one located near room entrance(s)	same as Seminar Rooms	Same as Seminar rooms

PART IX: ROOM SURFACES	SEMINAR ROOMS	GENERAL PURPOSE CLASSROOMS	LECTURE HALLS
A. FLOOR FINISHES	vinyl tile or rubber tile--(sheet vinyl not permitted) -- carpet may be considered	<u>Same as Seminar Room</u>	resilient tile or finished concrete required in seating areas, carpet in main aisles for sound control
B. CEILING FINISHES	light color materials preferred --acoustical drop surface preferred -- painted plaster or gypsum board acceptable -- unfinished structure not usually acceptable	same as Seminar Rooms except in rooms > 50 capacity--acoustical properties must be carefully planned to insure sound reflectance to rear of room and control of reverberations	shall be light colored non-reflective materials -- acoustical properties shall be the over-riding factor in selection and application of ceiling finish materials
C. TEACHING WALL FINISHES	<u>if a teaching area is established, sound and light reflectance are the most critical factors</u> -- wall finishes or coverings below <u>chalkboards must be of easily cleanable material</u> -- <u>teaching walls shall be free of projections such as pilasters, columns, chases, etc., front teaching wall shall not contain windows</u>	same as Seminar Rooms	same as Seminar Rooms
D. OTHER WALL FINISHES	<u>gypsum board or concrete block, painted or textured are preferred -- light colors preferred -- in rooms with movable table and chair furniture, chair rails required. -</u>	<u>same as Seminar Rooms--sound reflectance is more critical in rooms with > 50 capacity</u> <u>(see Part II-C)</u>	<u>same as Seminar except that acoustical properties become more critical, especially rear wall and rear portions of side walls, chair rail not required with fixed seating.</u> -

PART X: ELECTRICAL SERVICES	SEMINAR ROOMS	GENERAL PURPOSE CLASSROOMS	LECTURE HALLS
A. ELECTRICAL SERVICE	<u>each classroom shall have multiple circuits on breakers not shared with other spaces number and location per Building Design Standards</u> -	<u>Same as Seminar Rooms</u> -	<u>Same as Seminar Rooms with special consideration given to AV Systems. Consult with the Office of distance Education and eLearning – Learning Environments team.</u> -
<u>B. COMMUNICATION AND DATA TRANSMISSION</u>	refer to OSU wiring standards	refer to OSU wiring standards	refer to OSU wiring standards

PART XI: ROOM ACCESS AND CIRCULATION	SEMINAR ROOMS	GENERAL PURPOSE CLASSROOMS	LECTURE HALLS
A. ROOM LOCATION IN BUILDING	<u>location away from other high student access rooms is encouraged (e.g. libraries, computer labs, departmental offices) shall not be located adjacent to, above, or below toilet rooms, mechanical rooms or elevator shafts</u>	<u>Same as Seminar Rooms -- shall not be located more than three levels above grade -- rooms > 50 capacity shall be located on lower floors -- access from secondary building corridors is discouraged -- clustering classrooms for ease of support services is strongly encouraged</u>	grade or ground floor access is required with preference for exterior ingress to a lobby area outside the Lecture Hall -
B. ROOM INTERNAL CIRCULATION	unobstructed access to all student seats with a minimum 36" passageway is required	<u>same as Seminar Rooms. Also: capacities up to 50 require at least one distribution aisle perpendicular to the teaching wall with two cross aisles row or two distribution aisles with one cross aisle -- rooms > 50 capacity require at least two distribution aisles and two cross aisles directed at doorways -- for fixed seating, aisles between rows must allow minimum 12 inches between rear of seat and raised writing tablet or other furthest protrusion</u>	<u>unobstructed access to all student stations with adequate passage aisles to meet all ADA and Building codes -- multiple distribution aisles</u>
C. DOORS	<u>One access door with a clear glass view panel of 2-1/2" x 17-1/2" required. Door located at rear (opposite end of room from teaching wall). All other door characteristics per ADA and Building guidelines</u>	Same as Seminar Rooms. Rooms > 49 capacity require two access doors, one at rear and another near center of corridor wall	<u>exit openings as required to meet ADA and Building codes for room capacity -- student access shall be at rear of room for normal ingress/egress pattern -- view panel of 2-1/2" x 17-1/2" required in all exit doors</u>
E. ASSOCIATED ROOMS AND SPACES	<u>Classrooms in buildings create demands for nearby waiting space, - and toilet rooms -- however, vending areas shall not be located near classrooms -- waiting spaces shall be design to reduce need for students to sit on floor which interferes with emergency egress</u>	same as Seminar Rooms	same as Seminar Rooms
F. ROOM IDENTIFICATION	provide room number per University signage system	same as Seminar Rooms	same as Seminar Rooms

PART XII: SPACE ALLOCATIONS	SEMINAR ROOMS	GENERAL PURPOSE CLASSROOMS	LECTURE HALLS
A. TEACHING AREA SPACE	<u>Optional due to unusual furniture arrangement -- if a teaching area is defined the minimum depth shall be 6 feet</u>	<u>Size of teaching area will vary with room dimensions -- teaching area equals: (depth as specified in Part I-C) x (room width)</u>	<u>depth of teaching area dependent on stage dimensions and location of any fixed equipment such as demonstration bench or electronic lectern; general minimum = (15 feet) x (stage width)</u>
B. AREA PER STUDENT STATION	<u>Seating area per student station will vary with seating type and arrangement.</u>	<u>Seating area per student station will vary with seating type and arrangement, typical range from 13-17 sq. ft., adhere to all ADA and Building Design Standards.</u>	<u>Seating area per student station will vary with seating type and arrangement. Typical range from 9-13 sq. ft. per station for fixed tab-arm chairs, 14-17 sq. ft. per station for fixed tables and moveable chairs. Adhere to all ADA and Building design standards for number and width of aisles</u>

PART XIII: CLASSROOM SERVICE ROOMS	SEMINAR ROOMS	GENERAL PURPOSE CLASSROOMS	LECTURE HALLS
A. AUDIO/VISUAL AND COMPUTER EQUIPMENT STORAGE ROOM	<u>Provide one 10' x 10' lockable closet with hallway access for up to 10 classrooms in a building. in buildings with more than 10 classrooms provide one additional storage closet for each additional lot or fraction of 10 classrooms</u>	<u>same as Seminar Rooms</u>	<u>separate lockable room, accessible from front of classroom and located adjacent to teaching area as specified per the Office of Distance Education and eLearning – Learning Environments team.</u>
B. PROJECTION BOOTH	optional	optional	<u>optional</u>
C. PREPARATION ROOM	optional	<u>Optional -- Per special departmental requests and not as a general requirement</u>	<u>Optional -- Per special departmental requests and not as a general requirement</u>

APPENDIX P

2006 Edition, Published January 1, 2006; Document Revision Date: July 1, 2001

WALKWAY POLICY - THE OHIO STATE UNIVERSITY

With the volume of physical projects generally underway on the various campuses of The Ohio State University, including new and renovated buildings and their sites, new or modified streets and roadways, underground utilities, open space development, and other landscape improvements, as well as periodic walkway maintenance and repair projects, campus walkways are continually being constructed, replaced or repaired.

A general policy is needed to insure that a continuity of design exists in the development of the pedestrian circulation system on the campuses and to effect economies in the long-term maintenance of that network. Further, the policy should take into consideration the specific character of defined areas or regions of the campuses and recognize the unique purposes for various projects that include or result in walkway construction.

POLICY STATEMENT: It is the policy of The Ohio State University that, absent other considerations, the walkways of the University shall be of concrete construction. Pavers, such as pressed brick masonry units or interlocking pavers, may be used as adjunct surfaces for those areas where it is appropriate, to provide for improved drainage, to protect the viability of plant materials, or for design purposes. The use of pavers shall especially be avoided on sloping walks or drives.

EXCEPTIONS: Deviations from the policy above shall be permitted in those areas where a predominant character has already been established for walkways by use of other materials.

Deviations from the policy shall also be permitted in especially-defined areas (field areas, gardens, natural areas, special feature sites, etc.) where the use of concrete walkways or masonry pavers would clearly be inappropriate or where structural considerations apply.

The campuses of the institution serve as outdoor teaching laboratories for many disciplines, among which are the School of Natural Resources, the Departments of Architecture, Landscape Architecture, City and Regional Planning, Agricultural Engineering, Horticulture, Botany, Industrial Design, Civil Engineering, the Cooperative Extension Service and others. Deviations from the policy shall be permitted in defined campus areas in support of the academic mission of the University when they contribute to the student's learning environment.

REQUIREMENTS: Nothing in this policy shall be construed to mean that all other University standards and requirements shall not be observed in projects involving walkways on the campuses of The Ohio State University. Accessibility, safety, quality of construction and maintenance considerations are not altered by this policy and its exceptions.

END OF APPENDIX P

Tree Grading Standard: The Ohio State University

Introduction:

Because of the extensive ongoing planting due to construction of new and renovated buildings and greenspaces the Campus Tree committee felt it necessary to produce a document that will aid in the beautification of campus, increase the longevity of trees, reduce tree care costs, and could be used by consultants in selection of trees for campus grounds. This document explains the grade of trees expected for all trees planted on campus. The Ohio State University requires trees to be planted on campus to be graded as Florida Fancy or Florida #1.

The Florida Grades and Standards, which this document is based on, is a result of years of cooperation between the Florida Nursery and Landscape Association, private local growers/nurseries, and Dr. Ed Gilman of the University of Florida in Gainesville, FL. The State of Florida's Nursery Grades and Standards document will be adopted for The Ohio State University using pertinent species appropriate for the state. The terms "Florida Fancy", "Florida #1", "Florida #2" and "Cull" will be utilized to describe the grade class designations for consistency with the original system. The included examples have been adapted to Ohio species and the tree list has been updated to reflect what is most commonly grown in nurseries readily available to OSU. All images and most text in this document have been taken directly from the Florida Grading System and changed to reflect Ohio's nursery trees.

This grading system is meant to be used while tagging field trees or selecting trees from ones already dug. The Balled and Burlap (B&B) questions are obviously after harvest and may be ignored when grading trees in the field. After several uses the Worksheet at the end of the text should be sufficient to grade trees in the field or nursery holding yard.

Since most trees have a life expectancy of many years, it is important to plant good quality trees. The quality or grade of a tree at planting can have a huge impact on longevity in the landscape. Tree quality is based on trunk, branch, crown, leaf and root characteristics.

Large-maturing trees which are allowed to develop a double or multiple trunks should not be planted unless it is their habit (i.e. (birch) *Betula spp.*) These are sturdy when young, but could become increasingly hazardous as they grow larger and older. Except for small maturing trees normally grown with multiply trunks, such as; Amelanchier spp (serviceberry), Aesculus parviflora (bottlebrush buckeye) and other nursery trees should have one trunk up through the center to the top of the tree. Some trees can be grown with a modified dominant leader as shown in Figure 1 on page 7 Florida Fancy. Branch diameter should not be larger than 2/3 the diameter of the trunk measured directly above the branch. There should be no flush cuts anywhere on the tree and no open injuries on the trunk or major branches. The crown should be full of foliage and show little, if any, evidence of chlorosis, necrosis, disease or insect infestations. The root ball should be appropriately sized (see any matrix, e.g., page 13),

such a tree is given top grade—**Florida Fancy**.

Trees graded **Florida #1** may require some corrective pruning so they develop good trunk and branch structure. They may have minor trunk injuries or could have other defects. Defects can be corrected by pruning the tree once or twice within a year or two after planting. **Florida #2** is a lesser grade. These trees require major corrective pruning to form a structurally strong tree, or are badly misshapen. Great skill and effort (two or more prunings) are required to develop a structure in these trees which will promote longevity. Defects may take several years to correct.

The lowest grade is a **Cull**. Defects are not correctable. These trees lack vigor and/or have poor trunk and branch structure or circling roots. They have other problems such as open wounds, flush cut or loose root ball which may prevent them from becoming established in the landscape. If they become established, long life is unlikely.

The better grades of trees will require less pruning after planting and they will establish more quickly. These have been properly trained and pruned in the nursery to develop a structure which will be resistant to damage from winds and other outside forces. Most tree maintenance budgets have not been developed to allow for the pruning of a tree after planting, so it makes sense to start with a tree which is healthy and well formed. If there is a large tree-pruning allocation in the landscape maintenance budget, trees with the poorer grades may be trained into sturdy trees in the landscape by skilled arborists.

Special Note: There is a specialty market for trees trained into forms which are not typical of their normal growth habit. Examples include standards, braided stems, poodles, espalier, topiary and bonsai to name a few. When grading these trees, the height, spread and root-ball diameter-to-caliper relationships outlined in the matrices for these grades and standards do not apply. Therefore when grading such trees, enter the grading process outlined below beginning at Step 6, skipping Steps 1 through 5. Large-maturing trees, such as oaks are always graded beginning with Step 1 unless the planting specifications indicate that the trees will be maintained as topiaries or other small, clipped specimens throughout their lives in the landscape.

Grades established for trees (Florida Fancy, Florida #1, and Florida #2) do not apply to trees used in wetland mitigation.

STEPS FOR DETERMINING THE GRADE OF A TREE:

Skip Step 2 if you are grading conifers, magnolias, bald-cypress and other narrow upright trees

Step 1: Trunk Form

Look inside the crown of the tree at the trunk form. Grade the tree according to the drawings and captions in Figure 1 (page 7). Trees with one dominate trunk are graded as Florida Fancy. Those with multiple trunks

are given a lesser grade depending on the extent of the defect. Circle the appropriate grad below based on trunk form only.

**Florida
Fancy**

**Florida
#1**

**Florida
#2**

Cull

Step 2: Branch Arrangement

Check branch arrangement. Grade the tree according to the drawings and captions in Figure 2 (page 8). Trees with optimum branch arrangement are graded as Florida Fancy. Those with branch arrangement defects are given a lesser grade according to the extent of the defects. Circle the appropriate grade below based on branch arrangement only. **Note: All conifers, magnolias, bald cypress and other narrow, upright trees are exempt from Step 2.**

**Florida
Fancy**

**Florida
#1**

**Florida
#2**

Cull

Step 3: Matrix Type

Choose the appropriate tree matrix type based on the natural form of the tree as it should appear the nursery see index of trees on pages 30-34 for guidance.

Appropriate matrix type: _____

Step 4: Measure Caliper

Measure the caliper of the trunk (under 4" measure 6" up from root flare, 4-6" measure at 12" 6 and above 4.5' off ground).

Caliper: _____

Step 5: Root-ball/container Size

**Florida
Fancy**

**Florida
#1**

**Florida
#2**

Cull

Locate the caliper of the tree in the left column of the appropriate matrix chart chosen in Step 3. Find the container size or root-ball diameter of the plant you are grading and ignore the caliper (see Figure 5 on page 25). A tree must have a spread equal to or larger than the minimum for the grade. Circle the appropriate grade

below based on minimum crown spread only.). Refer to Matrix 1 page 13; Matrix 2 page 16; Matrix 3 page 19; Matrix 4 page 22.

Step 6: Crown Uniformity

Grade the tree according to structural uniformity of the crown (see Figure 3 on page 10). Circle the appropriate grade below based on the structural uniformity only. Skip Step 6 when grading other trees with a naturally irregular canopy.

**Florida
Fancy**

**Florida
#1**

**Florida
#2**

Cull

Step 7: Lowest Grade

What is the lowest grade determined in Steps 1,2,5 and 6?

Grade _____

Step 8: Considerations

If two of the following statements are true, reduce the grade determined in Step 8 by one. If more than two of the statements are true, reduce the grade by two. **Note: It takes two true statements to reduce a Florida Fancy to a Florida #1, three, true statements to reduce a Florida Fancy to a Florida #2.**

T F The tree with a trunk caliper larger than 1" requires a stake to hold it erect.

T F The crown is thin and sparsely foliated. Many evergreen and other trees are thin and sparsely foliated in the late winter/early spring just prior to the spring growth flush. Recently dug field-grown trees might also be thin. Do not downgrade for this.

T F More than 5% of the branches have tip die-back.

T F Tree height (see Figure 9 on page 28) is shorter than the maximum height specified in the appropriate matrix chart. Small multi-stemmed specialty plants should not be downgraded if they are shorter than the minimum height.

T F Flush cuts were made when pruning branched from the trunk (see Figure 4 on page 11)

T F Branch stubs are left beyond the branch collar (see Figure 4 on page 11). A branch stub can be removed and not reduce the grade.

- T F** Open trunk wounds or other bark injury is evident. (Open trunk wounds must be less than 10% of the trunk circumference and less than 2 inches tall on Florida #1 trees. An open pruning scar on the trunk resulting from removing a branch is not considered an open trunk wound.)
- T F** More than the lower 40% of the trunk is free of branches. (The portion of the lower trunk with shortened, temporary branches is not considered part of the canopy.) **Note: If planting specifications require that a larger portion of the trunk should be clear of branches, do not downgrade.**
- T F** More than 5% of the leaves are chlorotic or more than 5% of the canopy exhibits damage from pests and diseases. **Note: A Florida #1 cannot have more than 10% of the leaves chlorotic or more than 10% of the canopy damaged from pests or diseases.**
- T F** Most leaves are smaller than normal.
- T F** There is bark included between the trunk and a major lateral branch or between main trunks (Figure 8a on page 27).
- T F** Trunks and/or major branches are touching. Secondary branches on major branches may touch each other.

Grade: _____

The tree is a cull if 1) any or all of the branches are tip pruned. 2) If it has a root greater than 1/10 the diameter of the trunk circling around more than 1/3 of the trunk in the top half of the root ball. Circling roots can be found on the periphery of the root ball or inside the root ball (Figure 6 on page 25). Those inside the root ball result from being in a smaller container when the tree was younger. Circling roots less than 1/3 the trunk diameter can be cut at the point where they begin to circle. Following cutting, the tree is no longer a Cull.

Final Grade: _____

Additional Consideration if any are true the tree is a Cull:

- T F** The root ball or container is undersized (consult proper tree matrix Type I page 13, Type II page 16, Type III page 19, Type IV page 22).
- T F** The root ball on B&B tree is not secured tightly with pins, twine or wire.
- T F** The tree is excessively root-bound.
- T F** There is evidence that one or more large roots (greater than 1/5 the diameter of the trunk) were growing out of the container .
- T F** There is excess soil on top of the root ball (excess soil may be removed to make it acceptable).

STEP 1—Determining the Quality of Trunk Structure

Instructions: Locate the drawing, caption and associated text below that most closely represents the trunk structure of the tree you are grading. Circle the appropriate tree grade at the end of Step 1 on page 3.

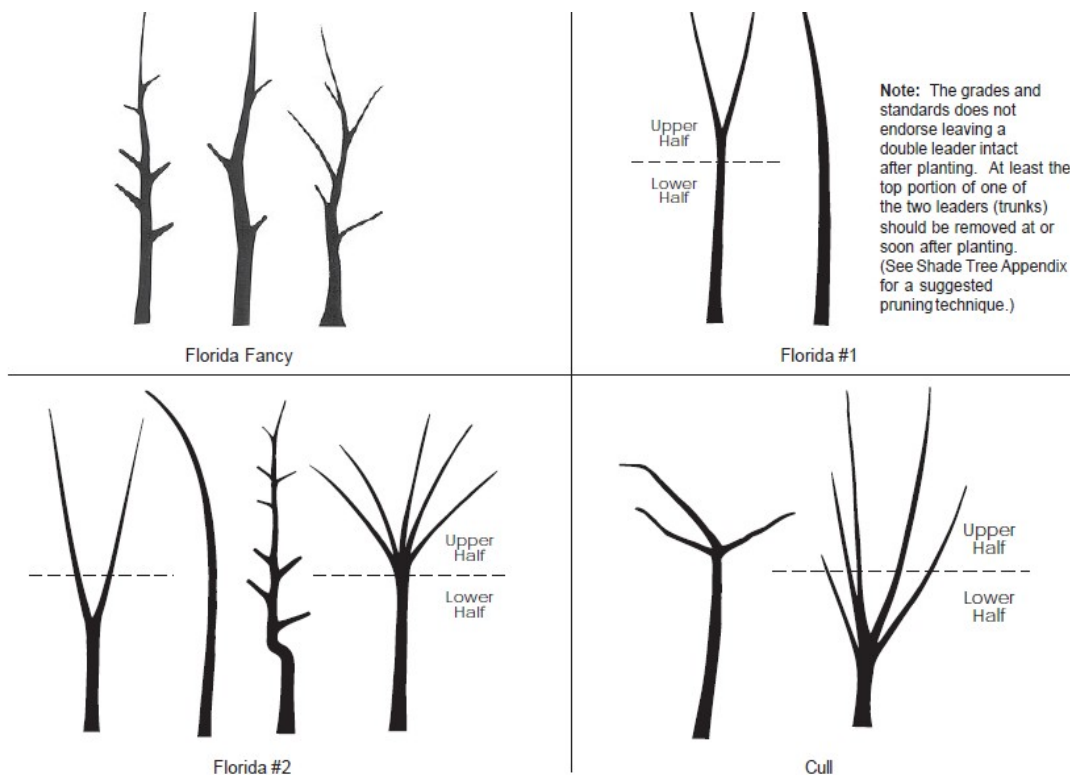


Figure 1.

Florida Fancy—There is one trunk, more or less in the center of the tree as shown above. It may be straight or have a very slight bow less than 5 degrees. Some trees such as Chinese elm, live oak, and some others can be grown with a modified (not straight) trunk as shown on the right and center. The tip of the leader on the main trunk must be intact and its terminal bud must be the highest part of the tree. No trunk or branch can have a diameter greater than 2/3 the trunk diameter measured directly above the branch crotch. If the trunk divides in two nearly equal-diameter stems in the upper 10% of the tree, the trunk is not downgraded to a Florida #1.

Florida #1—The trunk branches (forks) into two nearly equal-diameter trunks in the upper 1/2 of the tree. If one trunk is 2/3 or less than the diameter of the other trunk (they do not have equal diameters) making the trunk Florida Fancy. A noticeable but small void will be left in the crown after removing the top portion of one of the trunks. If there is one trunk, but it has a 5 degree to 15 degree bow, grade it Florida #1. The tip of the leader on the main trunk must be intact and its terminal bud must be the highest part of the tree.

Florida #2—The trunk branches into two nearly equal trunks along the lower 1/2 of the tree as shown on the left; or, the trunk branches into three or more nearly equal-diameter trunks in the upper 1/2 of the tree as shown on the right. (Do not downgrade the tree if competing trunks are 2/3 or less the diameter of one main trunk measured above the crotch.) Pruning to create only one trunk will leave a large void in the crown. If there is one trunk, but it has a bow greater than 15 degrees or a dogleg (see Glossary), grade it Florida #2. A dogleg in the crown of the tree is not a downgrading factor.

Cull—The trunk branches into three or more nearly equal-diameter trunks along the lower 1/2 of the trunk.

STEP 2—Determining the Quality of Branch Arrangement

Instructions: Locate the drawing, caption and associated text below that most closely represents the branch structure of the tree you are grading. Circle the appropriate tree grade at the end of Step 2 on page 3. **Note:** All conifers, magnolias, hollies, loblolly bay and other narrow, upright trees are exempt from Step 2. Major branches on trees less than 5 feet tall do not have to be 4" or 6" apart to meet Florida #1 or Florida Fancy standards, respectively.

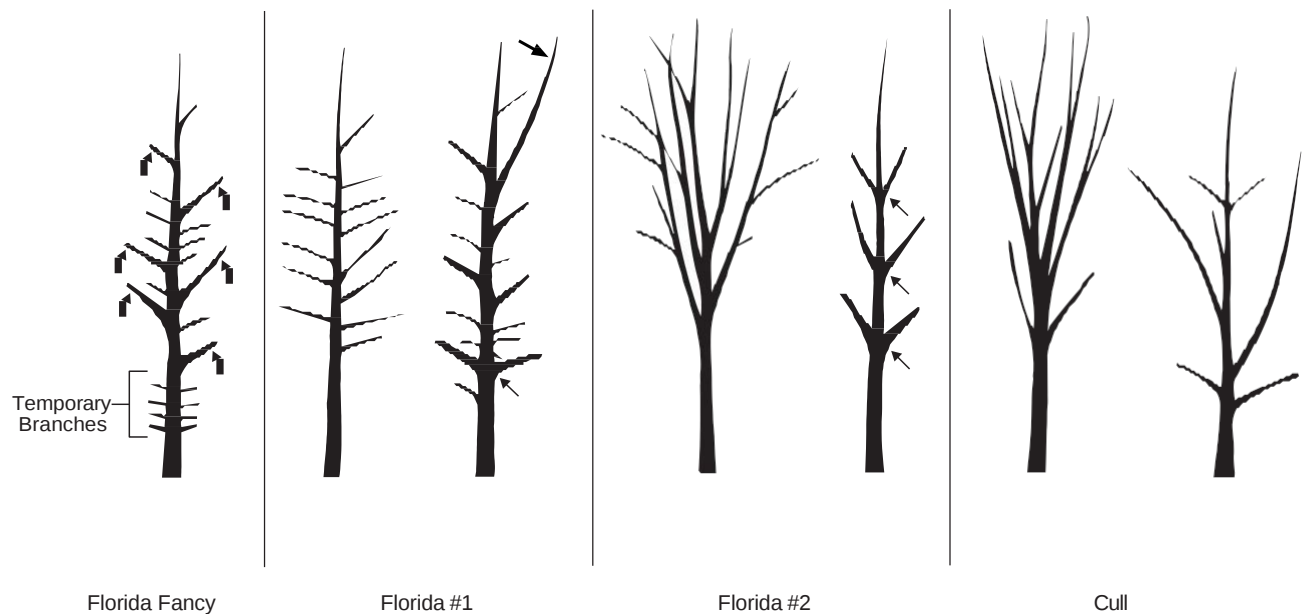


Figure 2

Florida Fancy—Several branches are larger in diameter (and obviously more dominant) than others. These (indicated by arrows) should be spaced at least 6" apart along the trunk. No branches are greater than $\frac{2}{3}$ the diameter of the trunk measured directly above the branch. No major branches are oriented nearly vertical with the trunk. There may be temporary branches on the lower trunk, but these should be no larger than $\frac{1}{5}$ the diameter of the trunk.

Florida #1—All branches are more or less equally dominant as shown in the left illustration; or, as shown in the illustration on the right, there are several dominant major branches but two are nearly equal diameter and less than 4" apart (see arrow at bottom). Other major branches of nearly equal diameter are at least 4" apart. One branch in the upper half of the tree can be greater than $\frac{2}{3}$ the diameter of the trunk measured directly above the branch. No branch tips are taller than the trunk (see arrow). Note: A number of trees such as bald-cypress, and others with an excurrent (strong dominant leader) growth habit naturally have many lateral branches with a similar diameter. These trees should not be downgraded to Florida #1 due to this growth habit. (See page 3 for trees exempt from step 2.)

Florida #2—Most major branches are oriented vertically; and/or nearly equal-diameter major branches are located within 4" of each other at two or more positions on the trunk (see arrows); and/or one or more branches in the lower half of the tree are larger than $\frac{2}{3}$ the diameter of the trunk measured directly above the branch.

Cull—All branches are growing vertically, and they are forming narrow angles with the trunk; or most major branches are growing from the same point on the trunk. Culls may have only a few large branches as in the illustration on the right. Some are less than 4' from the ground. Several branches of nearly equal diameter are opposite each other on the trunk.

STEP 6 - Determining the Structural Uniformity of the Crown

Instructions: Identify the drawing, caption and associated text below that most closely represents the structural uniformity of the tree you are grading. Circle the appropriate tree grade at the end of Step 6 on page 4.

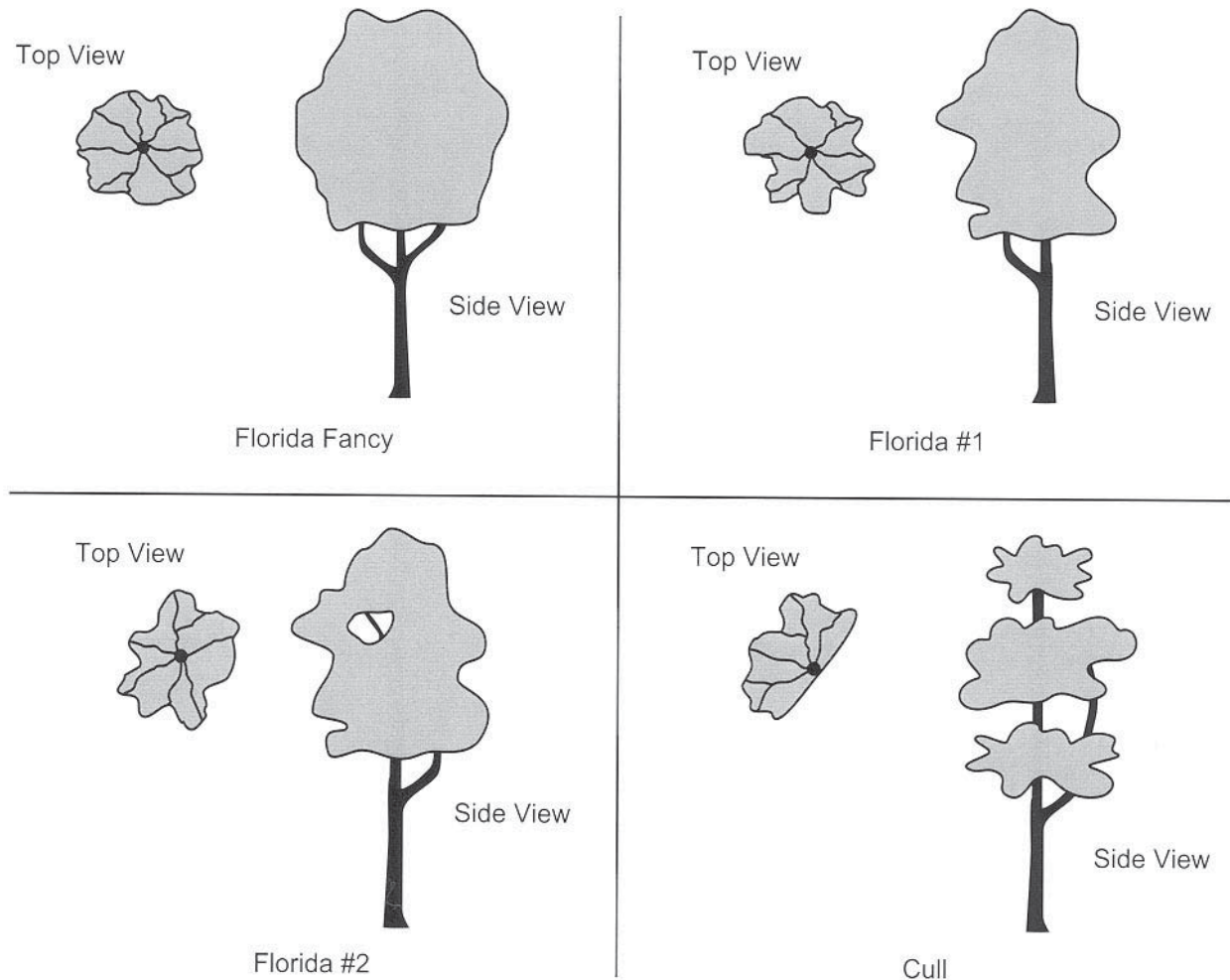


Figure 3.

Florida Fancy—Branches are evenly distributed around the trunk. No major branch is located directly above another. The crown is full of foliage which is evenly distributed around the tree.

Florida #1—One major branch may be located directly above another but the others are nearly evenly distributed around the trunk. The crown is not completely full of foliage and there may be some small voids.

Florida #2—Branches are not evenly distributed around the trunk. Several are growing from the same side of the trunk and two or more may be located directly above others. The crown has a large void.

Cull—The tree is one-sided or is flat-sided. Major branches are growing from only one or two sides of the trunk. There are large gaps in the crown.

Step 8 - Determining If Pruning Cuts Were Made Correctly

Instructions: Locate the photograph, drawing, caption and associated text below which most closely represents the condition of the pruning scars on the tree you are grading. Check the 'true' column in Step 9-b if incorrect pruning cuts were made. Check the 'false' column if correct pruning cuts were made, and if there are no trunk injuries.

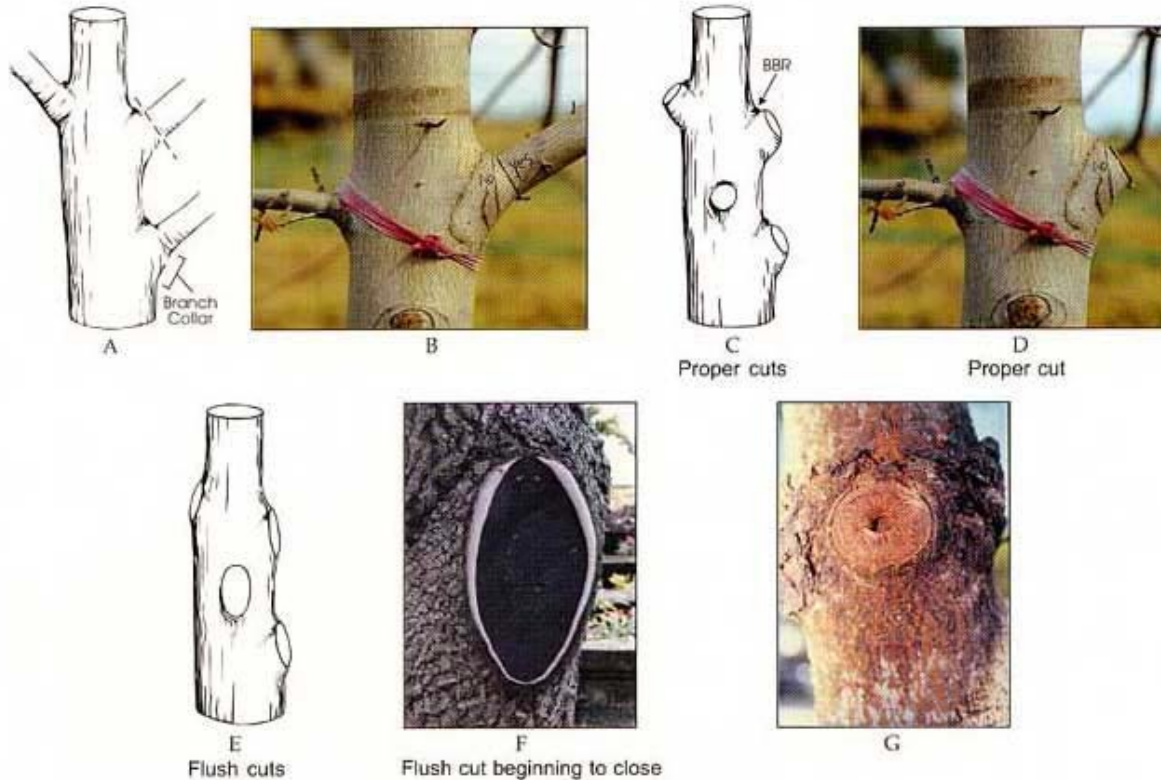


Figure 4

Fig. 4A—Notice the swelling at the base of each branch. This is trunk tissue (called the branch collar) and helps hold the branch securely on the trunk. A proper cut is made along the dashed line.

Fig. 4B—Cut along the line just to the left of the word 'yes' to properly remove the branch. If the cut is made closer to the trunk, this is a flush cut. If it is made farther from the trunk, a stub will be left.

Fig. 4C—This shows how to properly remove branches from the trunk. Always cut to the outside of the branch collar and branch bark ridge (BBR). Notice that the branch bark ridge is still visible on top of the pruning cut and the pruning scar is nearly circular.

Fig. 4D—This shows a properly executed pruning cut (right hand side of photograph).

Fig. 4E—Never make a flush cut as shown here. Notice that the branch bark ridge is missing from the top of the pruning cut. This improper cut, usually oval, initiates trunk decay and can reduce growth in the nursery and landscape after planting.

Fig. 4F—The pruning scar and the woundwood or callus growth which begins to close over the pruning scar from an improperly executed pruning cut is often shaped like an oval. Callus is often missing from the top or bottom of the pruning scar on an improperly executed pruning cut.

Fig. 4G—Woundwood or callus growth around a proper pruning cut is circular. Some species have no swelling at the base of branches, and it may be more difficult to determine exactly where to make a proper pruning cut. Always begin the cut to the outside of the branch bark ridge, and angle it away from the trunk.

TYPE ONE MATRIX — SPREADING & ROUNDED SHAPES							
CALIPER	MINIMUM TREE HEIGHT	MAXIMUM TREE HEIGHT	MINIMUM CROWN SPREAD DIAMETER			MINIMUM B&B ROOT-BALL DIAMETER	MINIMUM CONTAINER VOLUME
			FL. FAN.	#1	#2		
1/4"	18"	30"	10"	8"	6"	6"	4" Sleeve
1/2"	24"	6'	14"	12"	8"	8"	1 Gal.
3/4"	4'	8'	30"	24"	18"	14"	3 Gal.
1"	5'	10'	36"	30"	24"	16"	5 Gal.
1 1/4"	6'	11'	42"	36"	30"	18"	7 Gal.
1 1/2"	7'	12'	48"	42"	34"	20"	15 Gal.
2"	8'	15'	54"	48"	42"	24"	15 Gal.
2 1/2"	9'	16'	60"	54"	48"	28"	25 Gal.
3"	10'	18'	66"	60"	54"	33"	45 Gal.
3 1/2"	11'	18'	6'	5 1/2'	5'	38"	65 Gal.
4"	12'	22'	7'	6 1/2'	6'	44"	95 Gal.
4 1/2"	14'	24'	8'	7 1/2'	7'	50"	95 Gal.
5"	16'	26'	10'	9'	8'	55"	95 Gal.
5 1/2"	17'	28'	11'	10'	9'	61"	200 Gal.
Notes: 1. Trees to be graded under this matrix are listed in the index of trees on pages 29-32. 2. Any liner less than 1/4" caliper shall be a minimum of 12" in height, well-rooted in its container which shall not be less than 2" in diameter. Bare-root trees shall be so noted. 3. Ball depth on B&B stock shall be at least 2/3 of the root-ball diameter shown. For trees larger than 5 1/2" caliper, root-ball diameter shall be 8.5" for each inch of tree caliper. Trees grown in soils with a high water table can have shallower root balls provided the root-ball diameter is increased to the next larger tree size in the table.. 4. ANZI Standards Z60.1 designations for container size (e.g. #3, #15, #30, etc.) can be substituted for minimum spread diameter 5. NO excess soil above the trunk fair or transport roots is allowed for container or B&B grown plants.							



Type One Matrix

Spreading and Rounded Shapes

Florida Fancy—Branches are well-distributed along a dominant trunk, and the crown is uniform and full of foliage.



Florida #1—Branches are well-distributed along a straight dominant trunk, but the crown is not uniform and is thin.



Florida #2—The trunk forks in the bottom half of the tree and the canopy is sparse. There are few branches on the tree, and they are not well distributed along the trunk.



Type One Matrix

Spreading and Rounded Shapes

Florida Fancy—The trunk has a slight bend which is acceptable for a Florida Fancy on any species.



Florida #1—The trunk forks in the top half of the tree



Florida #2—The trunk is nicely formed, but the crown is one-sided and not uniform.

TYPE TWO MATRIX — PYRAMIDAL SHAPES							
CALIPER	MINIMUM TREE HEIGHT	MAXIMUM TREE HEIGHT	MINIMUM CROWN SPREAD DIAMETER			MINIMUM B&B ROOT-BALL DIAMETER	MINIMUM CONTAINER VOLUME
			FL. FAN.	#1	#2		
1/4"	18"	30"	10"	8"	6"	6"	4" Sleeve
1/2"	24"	6'	14"	12"	8"	8"	1 Gal.
3/4"	4'	8'	30"	24"	18"	14"	3 Gal.
1"	5'	10'	36"	30"	24"	16"	5 Gal.
1 1/4"	6'	11'	42"	36"	30"	18"	7 Gal.
1 1/2"	7'	12'	48"	42"	34"	20"	15 Gal.
2"	8'	15'	54"	48"	42"	24"	15 Gal.
2 1/2"	9'	16'	60"	54"	48"	28"	25 Gal.
3"	10'	18'	66"	60"	54"	33"	45 Gal.
3 1/2"	11'	18'	6'	5 1/2'	5'	38"	65 Gal.
4"	12'	22'	7'	6 1/2'	6'	44"	95 Gal.
4 1/2"	14'	24'	8'	7 1/2'	7'	50"	95 Gal.
5"	16'	26'	10'	9'	8'	55"	95 Gal.
5 1/2"	17'	28'	11'	10'	9'	61"	200 Gal.
Notes: 1. Trees to be graded under this matrix are listed in the index of trees on pages 29-32 . 2. Any liner less than 1/4" caliper shall be a minimum of 12" in height, well-rooted in its container which shall not be less than 2" in diameter. Bare-root trees shall be so noted. 3. Ball depth on B&B stock shall be at least 2/3 of the root-ball diameter shown. For trees larger than 5 1/2" caliper, root-ball diameter shall be 8.5" for each inch of tree caliper. Trees grown in soils with a high water table can have shallower root balls provided the root-ball diameter is increased to the next larger tree size in the table.. 4. ANZI Standards Z60.1 designations for container size (e.g. #3, #15, #30, etc.) can be substituted for minimum spread diameter 5. NO excess soil above the trunk fair or transport roots is allowed for container or B&B grown plants.							



Type Two Matrix

Pyramidal

Shapes

Florida Fancy—Branches are well distributed along the single trunk. The crown is uniform and full of foliage.



Florida #1—The trunk has a moderate bend or bow, and the crown is not uniform. Either characteristic alone places this tree in the Florida #1 category. The crown is also sparsely foliated.



Florida #2—The trunk has a major bend or bow and is sparsely foliated



Type Two Matrix

Pyramidal Shapes

Florida Fancy—There is one straight trunk, branches are well distributed along it, and the crown is full and uniform.



Florida #1—The crown is very narrow for this species of tree.



Florida #2—There is one trunk, but it has a major dogleg at the bottom of the crown.

TYPE THREE MATRIX — COLUMNAR / UPRIGHT SHAPES							
CALIPER	MINIMUM TREE HEIGHT	MAXIMUM TREE HEIGHT	MINIMUM CROWN SPREAD DIAMETER			MINIMUM B&B ROOT-BALL DIAMETER	MINIMUM CONTAINER VOLUME
			FL. FAN.	#1	#2		
1/4"	18"	30"	10"	8"	6"	6"	4" Sleeve
1/2"	24"	6'	14"	12"	8"	8"	1 Gal.
3/4"	4'	8'	30"	24"	18"	14"	3 Gal.
1"	5'	10'	36"	30"	24"	16"	5 Gal.
1 1/4"	6'	11'	42"	36"	30"	18"	7 Gal.
1 1/2"	7'	12'	48"	42"	34"	20"	15 Gal.
2"	8'	15'	54"	48"	42"	24"	15 Gal.
2 1/2"	9'	16'	60"	54"	48"	28"	25 Gal.
3"	10'	18'	66"	60"	54"	33"	45 Gal.
3 1/2"	11'	18'	6'	5 1/2'	5'	38"	65 Gal.
4"	12'	22'	7'	6 1/2'	6'	44"	95 Gal.
4 1/2"	14'	24'	8'	7 1/2'	7'	50"	95 Gal.
5"	16'	26'	10'	9'	8'	55"	95 Gal.
5 1/2"	17'	28'	11'	10'	9'	61"	200 Gal.
Notes: 1. Trees to be graded under this matrix are listed in the index of trees on pages 29-32. 2. Any liner less than 1/4" caliper shall be a minimum of 12" in height, well-rooted in its container which shall not be less than 2" in diameter. Bare-root trees shall be so noted. 3. Ball depth on B&B stock shall be at least 2/3 of the root-ball diameter shown. For trees larger than 5 1/2" caliper, root-ball diameter shall be 8.5" for each inch of tree caliper. Trees grown in soils with a high water table can have shallower root balls provided the root-ball diameter is increased to the next larger tree size in the table.. 4. ANZI Standards Z60.1 designations for container size (e.g. #3, #15, #30, etc.) can be substituted for minimum spread diameter 5. NO excess soil above the trunk fair or transport roots is allowed for container or B&B grown plants.							



Type Three Matrix

Columnar/Upright Shapes

Florida Fancy—There is a single trunk, and the crown is full and uniform.



Florida #1—There is a single trunk, and the crown is full but not uniform.



Florida #2—There is a single trunk, but the crown is thin and not well-balanced.



Type Three Matrix

Columnar/Upright Shapes

Florida Fancy—There is one trunk, and the crown is uniform.



Florida #1—There is one trunk, and there is a portion of the crown missing, forming an asymmetrical canopy.



Florida #2—The crown is very one-sided and asymmetrical.

TYPE FOUR MATRIX — VASE SHAPES							
CALIPER	MINIMUM TREE HEIGHT	MAXIMUM TREE HEIGHT	MINIMUM CROWN SPREAD DIAMETER			MINIMUM B&B ROOT-BALL DIAMETER	MINIMUM CONTAINER VOLUME
			FL. FAN.	#1	#2		
1/4"	18"	30"	10"	8"	6"	6"	4" Sleeve
1/2"	24"	6'	14"	12"	8"	8"	1 Gal.
3/4"	4'	8'	30"	24"	18"	14"	3 Gal.
1"	5'	10'	36"	30"	24"	16"	5 Gal.
1 1/4"	6'	11'	42"	36"	30"	18"	7 Gal.
1 1/2"	7'	12'	48"	42"	34"	20"	15 Gal.
2"	8'	15'	54"	48"	42"	24"	15 Gal.
2 1/2"	9'	16'	60"	54"	48"	28"	25 Gal.
3"	10'	18'	66"	60"	54"	33"	45 Gal.
3 1/2"	11'	18'	6'	5 1/2'	5'	38"	65 Gal.
4"	12'	22'	7'	6 1/2'	6'	44"	95 Gal.
4 1/2"	14'	24'	8'	7 1/2'	7'	50"	95 Gal.
5"	16'	26'	10'	9'	8'	55"	95 Gal.
5 1/2"	17'	28'	11'	10'	9'	61"	200 Gal.
Notes: 1. Trees to be graded under this matrix are listed in the index of trees on pages 29-32. 2. Any liner less than 1/4" caliper shall be a minimum of 12" in height, well-rooted in its container which shall not be less than 2" in diameter. Bare-root trees shall be so noted. 3. Ball depth on B&B stock shall be at least 2/3 of the root-ball diameter shown. For trees larger than 5 1/2" caliper, root-ball diameter shall be 8.5" for each inch of tree caliper. Trees grown in soils with a high water table can have shallower root balls provided the root-ball diameter is increased to the next larger tree size in the table.. 4. ANZI Standards Z60.1 designations for container size (e.g. #3, #15, #30, etc.) can be substituted for minimum spread diameter 5. NO excess soil above the trunk fair or transport roots is allowed for container or B&B grown plants.							



Type Four Matirx

Vase Shapes

Florida Fancy—Branches are well-distributed along a single trunk, and the crown is uniform.



Florida #1—The crown is uniform, but two major branches in the crown are opposite to each other.



Florida #2—The trunk divides into two nearly equal-sized trunks in the lower half of the tree.

Tree Terms Glossary

Balled and burlapped (B & B): A soil ball containing roots of the plant wrapped and secured in synthetic, natural or treated burlap, and/or wire. All synthetic fabric (Lenomesh) and wire should be removed from the root ball prior to planting. True biodegradable burlap can be left around the root ball.

Branch Collar: The attachment structure in woody plants connects a branch to its parent branch or to the trunk.

Caliper: Trunk caliper (trunk diameter) is measured 6 inches from the ground on trees up to and including 4 1/2 inches in caliper, and 12 inches above the ground for larger trees.

Dominant leader: The trunk that grows up through the center of the tree and obviously dominates the rest of the branches. A dominant leader originates from a single dominant trunk and is the topmost part of a tree.

Chlorotic: A lightness or bleaching (typically yellowing) of green color in the foliage unlike the normal color. This indicates that the plant has not been maintained in the best of health. Chlorotic is not to be confused with normal yellowing of foliage common on many deciduous species late in the season. It is also not to be confused with yellowing of leaves on evergreens just prior to a new leaf flush.

Clear trunk: An industry term referring to that portion of the trunk maintained free of any branches. The clear trunk is the lower portion of the trunk measured from the soil line up to the first major branch. Temporary branches may exist on a clear trunk.

Conifer: A cone bearing tree such as a fir, spruce or pine. Includes the genera *Abies*, *Picea*, *Pinus*.

Corrective pruning: Pruning which removes one or more branches or trunks to create a stronger, well-structured tree framework.

Crown: The branches, twigs and leaves that make up the foliage portion of the tree. The above-ground portion of the tree including the branches, twigs and leaves

Crown spread diameter: Crown spread diameter is the average of the widest branch spread and that perpendicular to it (see Fig. 5).

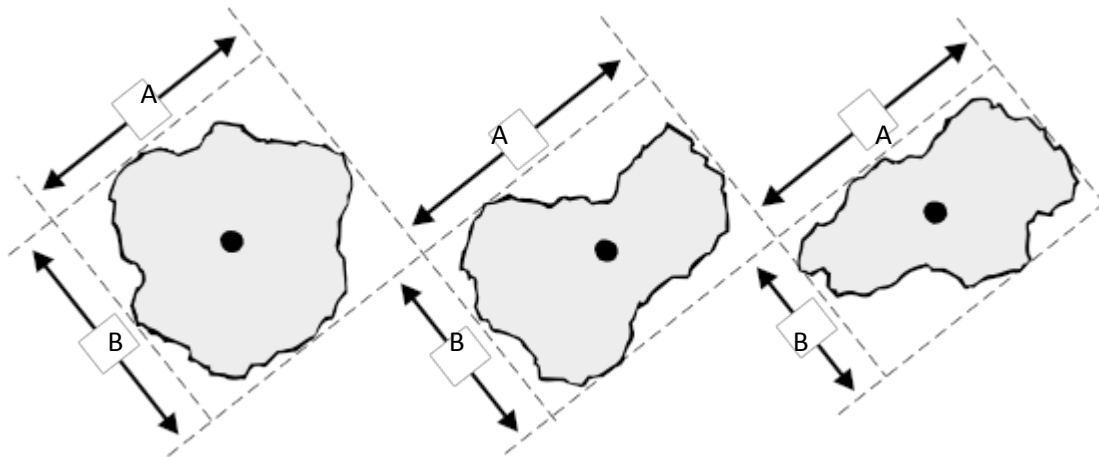


Fig. 5. Add A and B together and divide by two to obtain crown spread diameter.

APPENDIX Q

Cull: A tree that, as a result of multiple defects (structural and/or health), does not meet the basic standard or specification and is otherwise not acceptable.

DBH: Diameter at breast height, which is 4.5 feet of the ground for trees over 6" caliper.

Excessively root bound: A condition of container-grown trees where there are several roots larger than 1/4 inch diameter growing on the outside edge of the root ball (see Fig. 6).



Fig. 6. Note the circling roots growing along the outside surface of the root ball

Flush cut: A pruning cut made too close to, or directly against the trunk. This type of cut is very detrimental to tree health and is not recommended (see Fig. 4 on page 13). It is often difficult to determine whether a flush cut was made 2 or more years after the cut was made on a young tree.

Grade: A level of plant quality that meets minimum standards.

Included bark: Also referred to as embedded bark. Tree bark growing in contact with tree bark because of the growth of 2 stems (trunks and/or branches) against one another (see Fig. 7a). This typically happens on upright-growing, large-diameter branches which grow at a rate which is similar to the growth rate of the trunk. This branch will be poorly connected to the trunk and could easily break off from the trunk as the tree grows older.



Fig. 7a. Example of a weak union illustrating embedded or included bark which is squeezed between the two trunks.



Fig. 7b. Example of strong branch union without embedded or included bark. **Note** the dark tissue on the trunk just above the branch crotch. This is the branch bark ridge. Its presence above the branch indicates there is no included bark.

Leader: That part of the trunk that extends into the top 1/4 of the tree.

Major branch: A branch that is among the largest in diameter on the tree.

Multiple leaders: Two or more trunks growing nearly parallel to each other, originating any place along the stem. The crotch angle between them is often very narrow. This tree defect is more serious when it occurs on the lower portion of the tree.

Nearly-equal diameter: One trunk or branch is at least 2/3 the diameter of the other. Measure the branch diameter several inches out from the crotch beyond any swelling at the branch base. Measure the larger branch or trunk just above the crotch.

Necrosis: dead non-functioning tissue of the foliage

Root-ball diameter: The average diameter of the widest portion of the root ball and that perpendicular to it. This shall be measured near the top of the root ball.

Root crown: also known as the root collar or root neck (Figure 8), is that part of a root system from which a stem arises. Since roots and stems have quite different vascular anatomies, major vascular changes take place at this point.

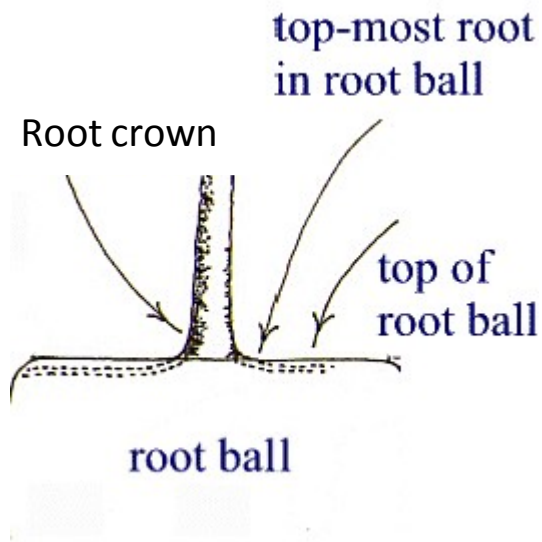


Figure 8

Secondary branches: Branches originating from primary or major branches.

Sturdy in the root ball: When the trunk bends along its vertical length instead of pivoting at the base of the trunk, or moving in the root ball. When the root ball of a container-grown plant can be slipped from the container with all or most of the media intact with the roots.

Temporary branches: Short branches meant to be pruned from the tree in the near future as the tree grows and produces major branches.

Tree height: Tree height is measured from the ground to the topmost portion of the tree (see Fig. 9). Height must be measured before pruning the tree. On small, multi-trunked trees, tree height is measured to the top of the main body of the crown.

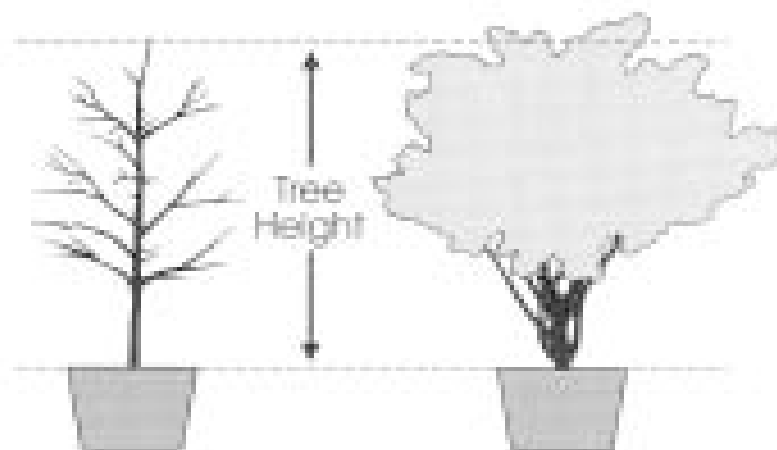
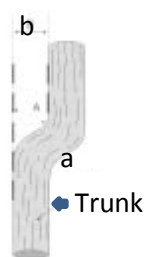


Fig. 9. Measuring tree height

APPENDIX Q

Trunk dogleg: A significant 's' - shaped deformation in the trunk (see Fig. 10). A dogleg in the crown is not a downgrading factor.

Fig. 10. The angle 'A' can be no more than 30°. The distance 'B' can be no more than the trunk diameter



Trunk wound: A trunk injury that is open and not sealed over, or closed. A properly executed pruning cut that is not closed over is not considered a trunk wound.

Woundwood : Woundwood is a very tough, woody tissue that grows behind callus and replaces it in that position. When woundwood closes wounds, then normal wood continues to form. After wounding, callus forms first about the margins of the wound. Woundwood forms later as the cells become lignified. Callus is a tissue that is meristematic, low in lignin, and homogenous as to cell types. Woundwood is not meristematic, is high in lignin, and has differentiated cells -vessels, fibers, axial and radial parenchyma. Woundwood is differentiated tissue that has lots of lignin.

Table 5. Matrix or habit rating for trees and other plants in Ohio. Plants are listed alphabetically by scientific name.

Scientific Name	Common Name	Matrix Type
<i>Abies balsamea</i>	Balsam Fir	2
<i>Abies concolor</i> & cultivars	White Fir	2
<i>Acer buergerianum</i>	Trident Maple	1
<i>Acer campestre</i> & cultivars	Hedge Maple	1
<i>Acer xFremannii</i> F	Freeman Maple	1
<i>A F.Armstrong</i>	Armstrong Fremann Maple	1
<i>Acer ginnala</i> & cultivars	Amur Maple	4
<i>Acer griseum</i> & cultivars	Paperbark Maple	1
<i>Acer japonicum</i> & cultivars	Full Moon Maple	4
<i>Acer negundo</i> & cultivars	Box Elder	1
<i>Acer nigrum</i> & cultivars	Black Maple	1
<i>Acer palmatum</i>	Japanese Maple	4
<i>Acer pensylvanicum</i>	Striped Maple	1
<i>Acer platanoides</i> & cultivars	Norway Maple	1
<i>A.p.Columnare</i>	Upright Norway Maple	3
<i>Acer pseudoplatanus</i> & cultivars	Sycamore Maple	1
<i>Acer rubrum</i> varieties and cultivars	Red Maple	1
<i>Acer saccharinum</i> & cultivars	Silver Maple	1
<i>Acer saccharum</i> & cultivars	Sugar Maple	1
<i>Acer tegmentosum</i> & cultivars	Manchu Striped Maple	1
<i>Acer tataricum</i>	Tatarian Maple	1
<i>Aesculus x carnea</i>	Ruby Red Horsechestnut	1
<i>Aesculus glabra</i>	Ohio Buckeye	1
<i>Aesculus hippocastanum</i> & cultivars	Common Horsechestnut	1
<i>Aesculus octandra</i>	Yellow Buckeye	1
<i>Aesculus parviflora</i>	Bottlebrush Buckeye	1
<i>Aesculus pavia</i>	Red Buckeye	1
<i>Alnus glutinosa</i> & cultivars	Black Alder	1
<i>Amelanchier canadensis</i>	Common Serviceberry	4
<i>Amelanchier x grandiflora</i> & cultivars	Apple Serviceberry	4
<i>Amelanchier laevis</i> & cultivars	Allegheny Serviceberry	4
<i>Aralia spinosa</i>	Devil's Walking Stick	3
<i>Asimina triloba</i>	Pawpaw	1
<i>Betula lenta</i>	Sweet Birch	1
<i>Betula alleghaniensis (lutea)</i>	Yellow Birch	1
<i>Betula nigra</i> & cultivars	River Birch	1
<i>Betula papyrifera</i>	Paper Birch	1
<i>Betula pendula</i> & cultivars	European White Birch	1
<i>Betula populifolia</i> & cultivars	Gray Birch	1
<i>Caragana arborescens</i>	Siberian Peashrub	1
<i>Carpinus betulus</i>	European Hornbeam	1
<i>Carpinus betulus fastigiata</i>	Upright European Hornbeam	2
<i>Carpinus caroliniana</i>	American Hornbeam	1
<i>Carpinus japonica</i>	Japanese Hornbeam	1
<i>Carya</i> (species not listed)	Hickory	1
<i>Carya ovata</i>	Shagbark Hickory	1
<i>Carya illinoensis</i>	Pecan	
<i>Castanea mollissima</i> & cultivars	Chinese Chestnut	1
<i>Catalpa speciosa</i>	Northern Catalpa	1
<i>Cedrus atlantica</i>	Atlas Cedar	2
<i>Celtis laevigata</i>	Sugar Hackberry	1
<i>Celtis occidentalis</i>	Common Hackberry	1

<i>Cercidiphyllum japonicum</i> & cultivars	Katsura Tree	1
<i>Cercis canadensis</i> & cultivars	Redbud	1
<i>Cercis chinensis</i>	Chinese Redbud	1
<i>Chamaecyparis nootkatensis</i> & cultivars	Nootka Falsecypress	2
<i>Chamaecyparis obtusa</i> & cultivars	Hinoki Falsecypress	2
<i>Chamaecyparis pisifera</i> & cultivars	Sawara Falsecypress	2
<i>Chionanthus retusus</i>	Chinese Fringe Tree	1
<i>Chionanthus virginicus</i>	White Fringe Tree	1
<i>Cladrastis kentuckea</i>	American Yellowwood	1
<i>Cornus alternifolia</i>	Pagoda Dogwood	1
<i>Cornus controversa</i>	Giant Dogwood	1
<i>Cornus florida</i> & cultivars	Flowering Dogwood	1
<i>Cornus kousa</i> & cultivars	Kousa/Chinese Dogwood	1
<i>Cornus mas</i> & cultivars	Cornelian Cherry Dogwood	4
<i>Cornus officinalis</i>	Japanese Cornel	4
<i>Cornus racemosa</i>	Gray Dogwood	1
<i>Corylus avellana</i> & cultivars	European Hazel	1
<i>Corylus columna</i>	Turkish Hazel	1
<i>Corylus maxima</i> & cultivars	Giant Filbert	4
<i>Crataegus crus-galli</i> & cvs	Cockspur Hawthorn	4
<i>Crataegus phaenopyrum</i>	Washington Hawthorn	4
<i>Crataegus species</i> & cultivars	Hawthorn	4
<i>Crataegus viridis</i> & cultivars	Green Hawthorn	4
<i>Diospyros virginiana</i>	Common Persimmon	1
<i>Elaeagnus angustifolia</i>	Russian Olive	4
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<i>Euonymus europaea</i>	European Spindletree	1
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<i>Ilex decidua</i>	Possumhaw	1
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<i>Ilex pedunculosa</i>	Longstalk Holly	1
<i>Ilex verticillata</i>	Winterberry	4
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<i>Magnolia acuminata</i> & cultivars	Cucumbertree	2
<i>Magnolia grandiflora</i> & cultivars	Southern Magnolia	2
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<i>Pinus ponderosa</i>	Ponderosa Pine	2
<i>Pinus resinosa</i>	Red Pine	2
<i>Pinus rigida</i>	Pitch Pine	2
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<i>P.s. fastigiata</i>	Upright White Pine	3
<i>Pinus sylvestris</i> & cultivars	Scotch Pine	2
<i>Pinus thunbergiana</i> (thunbergii)	Japanese Black Pine	2

<i>Pinus virginiana</i>	Virginia Pine	4
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<i>Populus deltoides</i>	Cottonwood	1
<i>Prunus armenica</i>	Apricot	1
<i>Prunus avium</i>	Sweet Cherry	1
<i>Prunus</i> x 'Hally Jolivette'	Hally Jolivette Cherry	4
<i>Prunus</i> x <i>blireiana</i>	Purpleleaf Plum	1
<i>Prunus cerasifera</i> & cultivars	Cherry Plum	1
<i>Prunus persica</i> & cultivars	Peach	4
<i>Prunus padus</i>	European Bird Cherry	1
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<i>Prunus sargentii</i> & cultivars	Sargent Cherry	1
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<i>Prunus serrulata</i> & cultivars	Japanese Flowering Cherry	1
<i>Prunus subhirtella</i> & cultivars	Higan Cherry	4
<i>Prunus virginiana</i> 'Shubert'	Shubert Chokecherry	1
<i>Prunus yedoensis</i> & cultivars	Yoshino Cherry	1
<i>Pseudotsuga menziesii</i> & cultivars	Douglas Fir	2
<i>Ptelea trifoliata</i>	Water Ash, Hop Tree	1
<i>Quercus acutissima</i>	Sawtooth Oak	1
<i>Quercus alba</i>	White Oak	1
<i>Quercus bicolor</i>	Swamp White Oak	1
<i>Quercus cerris</i>	Turkey Oak	1
<i>Quercus coccinea</i>	Scarlet Oak	1
<i>Quercus ellipsoidalis</i>	Northern Pin Oak	1
<i>Quercus falcata</i>	Southern Red Oak	1
<i>Quercus ilicifolia</i>	Scrub Oak/Bear Oak	1
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<i>Quercus macrocarpa</i>	Mossycup Oak, Bur Oak	1
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<i>Quercus Muehlenbergii</i>	Chinquapin Oak	1
<i>Quercus palustris</i>	Pin Oak	1
<i>Quercus petraea</i>	Durmast Oak	1
<i>Quercus phellos</i>	Willow Oak	1
<i>Quercus prinus</i>	Chestnut Oak	1
<i>Quercus robur</i> & cultivars	English Oak	2
<i>Q r. fastigiata</i>	Upright English Oak	3
<i>Quercus rubra</i>	Northern Red Oak	1
<i>Quercus shumardii</i>	Shumard Red Oak	1
<i>Quercus stellata</i>	Post Oak	1
<i>Quercus variabilis</i>	Oriental Oak	1
<i>Quercus velutina</i>	Black Oak	1
<i>Rhus</i> species & cultivars	Sumac	1
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<i>Stewartia</i> species	Stewartia	1
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<i>Syringa pekinensis</i>	Peking Lilac	1
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<i>Taxodium distichum</i> & cultivars	Bald Cypress	2
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<i>Thuja occidentalis</i> & cultivars	American Arborvitae	2
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<i>Tilia x euchlora</i>	Crimean Linden	1
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<i>Ulmus carpinifolia</i> & cultivars	Smooth-leaf Elm	1
<i>Ulmus glabra</i> & cultivars	Scotch Elm	1
<i>Ulmus japonica</i>	Japanese Elm	1
<i>Ulmus parvifolia</i> & cultivars	Lacebark Elm	4
<i>Ulmus pumila</i>	Siberian Elm	1
<i>Ulmus rubra</i>	Slippery Elm	1
<i>Ulmus thomasii</i>	Rock Elm	1
<i>Ulmus x</i>	Hybrid Elm	1
<i>Viburnum lentago</i>	Nannyberry	4
<i>Viburnum prunifolium</i>	Black Haw	4
<i>Viburnum rhytidophylloides</i>	Willowwood Viburnum	4
<i>Viburnum rhytidophyllum</i>	Leatherleaf Viburnum	4
<i>Viburnum rufidulum</i>	S Blackhaw Viburnum	4
<i>Viburnum sieboldii</i>	Siebold Viburnum	1
<i>Viburnum x</i>	Hybrid Viburnum	4
<i>Zelkova serrata</i> & cultivars	Japanese Zelkova	4

STEPS FOR DETERMINING THE GRADE OF A TREE Draft

Circle the Appropriate Grad

Step 1: Trunk Form:

Florida Fancy	ID Tag Number Florida #1	Florida #2	Cull
---------------	-----------------------------	------------	------

Step 2: Branch Arrangement:

Florida Fancy	ID Tag Number Florida #1	Florida #2	Cull
---------------	-----------------------------	------------	------

Step 3: Matrix Type:_____

Step 4: Individual Tree Caliper:_____

Step 5: Crown Spread:

Florida Fancy	ID Tag Number Florida #1	Florida #2	Cull
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Step 6: Structural Uniformity:

Florida Fancy	ID Tag Number Florida #1	Florida #2	Cull
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Step 7: Lowest Grade in Steps 1, 2, 5 and 6_____

Step 8: If two of the Following are true reduce the grade in Step 7 by one. If more than two are true reduce the grade by two:

T F The tree with a trunk caliper larger than 1" requires a stake to hold it erect.

T F The crown is thin and sparsely foliated. Many evergreen and other trees are thin and sparsely foliated in the late winter/early spring just prior to the spring growth flush. Recently dug field-grown trees might also be thin. Do not downgrade for this.

T F More than 5% of the branches have tip die-back.

T F A) Tree height is taller than the maximum height specified in the appropriate matrix chart.

T F B) Flush cuts were made when pruning branches from the trunk

T F C) Branch stubs are left beyond the branch collar. A branch stub can be removed and not reduce the grade.

T F D) Open trunk wounds or other bark injury is evident. (Open trunk wounds **must be less than 10% of the trunk circumference** and less than 2 inches tall on Florida #1 trees. An open pruning scar on the trunk resulting from removing a branch is not considered an open trunk wound.)

T F F) More than the lower 40% of the trunk is free of branches. (The portion of the lower trunk with shortened, temporary branches is not considered part of the canopy.)

T F G) More than 5% of the leaves are chlorotic or more than 5% of the canopy exhibits damage from pests and disease infestations. Reject as Cull if significant or serious.

T F H) Most leaves are smaller than normal.

T F I) There is bark included between the trunk and a major lateral branch or between main trunks

T F J) Trunks and/or major branches are touching. Secondary branches on major branches may touch each other.

Consider a cull if: The branches are tip pruned:

Additional considerations of trees in containers or are already harvested if any are true consider the tree a Cull and do not accept:

T F B) The root ball or container is undersized (consult proper tree matrix).

T F C) The root ball on B&B tree is not secured tightly with pins, twine or wire.

T F D) The tree is excessively root-bound.

T F E) There is evidence that one or more large roots (greater than 1/5 the diameter of the trunk) were growing out of the container.

T F F) Does it have a root larger than 1/10 the diameter of the trunk circling 1/3 of the root ball.

Final Grade:_____

THE OHIO STATE UNIVERSITY

UNIVERSITY SIGNAGE STANDARDS

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UNIVERSITY SIGNAGE STANDARDS

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UNIVERSITY SIGNAGE STANDARDS

EXECUTIVE SUMMARY

History and Purpose, Scope, Content

HISTORY & PURPOSE

The Ohio State University Signage Standards (OSU USS or USS) represents the culmination of an effort to design a comprehensive signage and wayfinding system, and is published as the first implementation projects are underway. This is a living document that will evolve as we learn from implementation, as the needs of the university change and as governing regulations and statutes which affect signage are revised.

The primary purpose of most of the signage outlined in this document is to create a system to convey information. The primary audience of this system is first time and infrequent visitors. The primary purpose of this document is to outline a consistent, uniform signage and wayfinding system applicable to The Ohio State University Columbus Campus. The signage system includes some specialty signage for the purposes of recognition, interpretation and marketing. Thus, primary vehicular and pedestrian informational signage should not be relied upon for branding and marketing.

In the spring of 2013, the university finalized its visual identity guidelines. The intention of this document is to align all signage with those guidelines, however this alignment is still a work in progress due to the timing of the public release of the visual identity guidelines.

The Ohio State University also has four regional campuses, each with a co-located, separate institution. These co-located institutions have unique visual identity guidelines distinct from Ohio State. Thus, signage for these campuses will be adapted from the OSU USS as needed.

SCOPE

The USS applies to all signage and information transfer systems on campus, including interior and exterior, permanent and temporary, but excluding audible communication, TDDs, oral and sign language communication.

CONTENT

The University Signage Standards includes:

1. References to University Policies and procedures describing responsibility, authority and processes for requesting all signage on campus.
2. A section outlining the standards for each type of sign within the current sign family. This section will be updated at least annually to address new signage and wayfinding needs as they are identified.

The Policy and Procedures section outlines processes for requesting signage, requesting assistance with or seeking approval of signage and graphics proposals, seeking approval for variances to existing sign standards and/or types of signage not specifically covered by these guidelines. This section also outlines procedures for updating, proposing and making amendments to this document.

The Standards section provides specific information about the purpose, location and content of each sign type. In addition, this section contains design specifications for signage materials, structure, size, font size and typeface, standard symbols, colors, and any accessories. New sign types that have been recommended are identified as “to be developed” sign types and will be progressively developed by the University Signage Coordinator in consultation with the Signage Committee.

A Glossary of Terms explains the meaning of the terms used in the USS.

STANDARDS

Introduction, Purpose and Scope, Authority

INTRODUCTION

One of the key principles of the One Ohio State Framework Plan is to make the campus navigable with a restored street network and dynamic wayfinding. To implement this principle, the university allocated funding to develop a comprehensive wayfinding plan and to implement a number of pilot projects. As part of this plan, this document was developed to support the initial investment in signage. The first step in this process was to review and update the university's current signage policy, procedures and guidelines. The USS was developed to incorporate new signage types designed as part of the wayfinding plan, and to clarify and strengthen the approval process and signage standards.

Please contact the University Signage Coordinator (see the contacts section) with questions or recommendations for manual content.

PURPOSE AND SCOPE

The University Signage Standards (USS) was created to provide a consistent and uniform signage and wayfinding system applicable to the OSU Columbus campus, and adaptable to the regional campuses.

The scope of this USS includes all passive and electronic signage systems. For terms and definitions please refer to the Glossary of Terms section of this manual.

Signage and graphics are defined as:

- Any object that reflects association with the university and is designed to be seen from a public area or within a university facility.
- Any object placed within a public area, on or within a university facility that is intended to communicate information, identification, or direction through the use of letters, words, numbers, symbols, pictures, or patterns.

OSU Purchasing categorizes signage as a "Purchase that Requires Special Review and Approvals" [Purchasing Policy 2.21](#). A direct purchase order cannot be issued to a department for signage, instead a requisition must be entered that will workflow to the Purchasing Department for approval by the University Signage Coordinator.

All new signage shall comply with the guidelines set forth in the USS. All university signage must conform with the design, size, material, content, format, symbols, type style, and color standards outlined in this document.

This document will incorporate all university signage, including types unique to other units such as Facilities Operations and Development, Wexner Medical Center (WMC), Student Life, Athletics, and Transportation and Traffic Management (TTM), etc. Thus, all university units shall conform with this standard. To accomplish consistency, all signage that does not currently conform with the USS shall, as new construction, space renovations, and open space improvements occur, be progressively replaced with new compliant signage, or modified to be compliant.

AUTHORITY

All signage or graphics projects, without exception, will be reviewed for conformance with [Campus Signage and Graphics Policy 3.33](#). No signage design or implementation shall be completed without approval as outlined in the next two pages.

Currently, all WMC interior signage and graphics are reviewed and approved by WMC Wayfinding Analyst and all other university signage and graphics are reviewed and approved by The University Signage Coordinator. In the near future, these two entities will be integrated. All signage or graphics projects, without exception, must be reviewed and approved by one of these individuals.

1. All signage and graphics on campus will conform to the USS.
2. Signage and graphics will conform to the graphics code and/or regulations of the appropriate jurisdiction.
3. Signage and graphics other than vehicular wayfinding signage will not be located in a public right-of-way.
4. No permanent or temporary sign or graphic will be erected or installed in public areas on university property without the prior written approval of the University Signage Coordinator or the WMC Wayfinding Analyst.
5. All signage and graphics erected without appropriate review and approval are subject to removal or modification at the direction of the University Signage Coordinator or WMC Wayfinding Analyst.

UNIVERSITY STANDARDS AND PROCEDURES

STANDARDS

Process

PROCESS

All Other Unit Signage Requests:

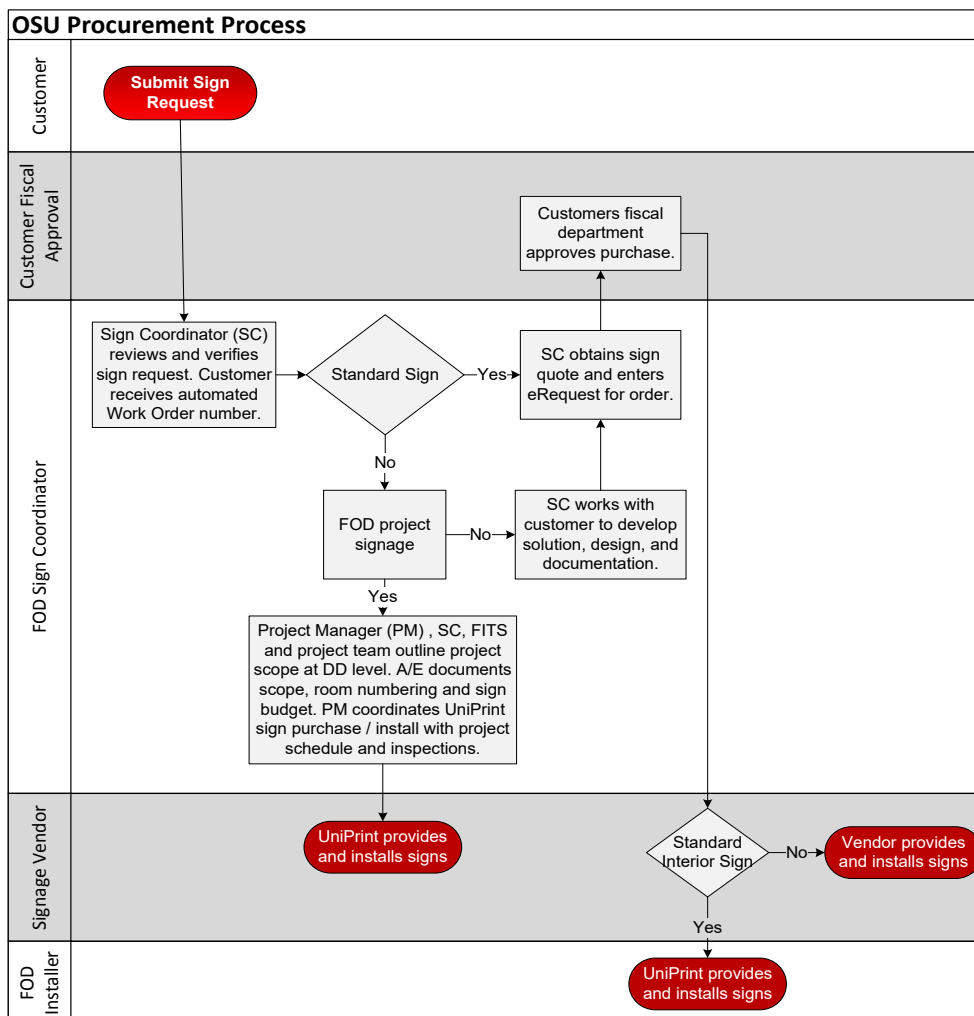
All requests for signage and graphics not associated with WMC are required to submit a Sign Request Form through FOD at <https://fod.osu.edu/make-request#signage>. The request will then be forwarded to FOD at signage@osu.edu for processing.

All signage requests will go through the process outlined below.

1. The University Signage Coordinator will verify the signage request and meet with the customer as necessary to assess the request and establish the appropriate solution for the signage need(s).
2. If an appropriate standard sign type is available, the University Signage Coordinator will select the applicable sign, obtain a price quote and enter an eRequest from the signage vendor.

3. If an appropriate sign is not available in the standard signage library, the University Signage Coordinator will work with the customer to develop designs and documentation, and request a price quote from the vendor. If the sign is for a construction project, the University Signage Coordinator will work with the project manager to develop the appropriate sign package.
4. Once the quote is received from the vendor, it will be sent back to the customer for review and approval.
5. Upon customer approval, standard interior signs will be ordered and installed by Facilities, Operations, and Development. All other signs will be installed by the signage vendor.

All signage orders placed outside of this process may encounter delays in the review and approval process or be denied.



PROCESS

WMC Signage Requests:

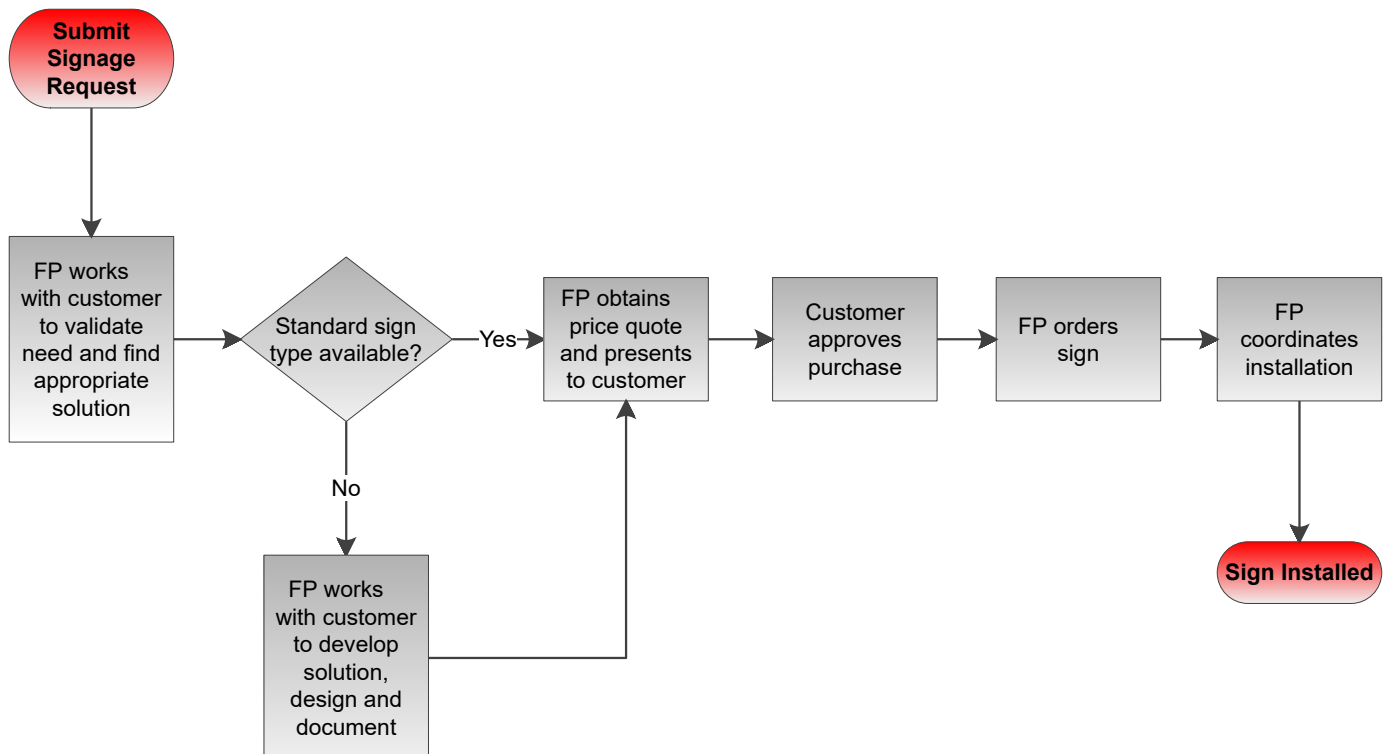
To request a sign in a WMC building, submit a signage request through Eservices at <https://osumc.service-now.com/>. The request will then be forwarded to the WMC Facility Planning (FP) group for processing. All WMC signage requests will go through the process outlined below. The customer will be notified through Eservices at the completion of each step.

1. An associate in Facility Planning (FP) will contact and meet with the customer as necessary to assess the request and establish the appropriate solution for the signage need(s).
2. If an appropriate standard sign type is available, FP will select the applicable sign, develop documentation, review with the customer, and request a price quote from the preferred signage vendor.
3. If an appropriate sign is not available in the standard

signage library, FP will work with the customer to develop designs and documentation, and request a price quote from the vendor.

4. Once the price quote is received from the vendor, it will be sent back to the customer for review and approval.
5. Upon customer approval, FP will request a purchase order (PO) for the signage. Once the PO has been released to the vendor, production of the signage will begin.
6. Once the signage is delivered, FP will coordinate with Facilities Services or the contracted signage installer for installation.

All signage orders placed outside of this process will be sent to an associate of FP for review of signage standards and vendor/purchasing policies.



SIGNAGE COMMITTEE

The Signage committee is an ad-hoc committee that supports the WMC Wayfinding Analyst and the University Signage Coordinator in signage review and approval as needed.

In addition, the Signage Committee:

- Annually reviews the USS and identifies needed modifications or updates to the policy, process or guidelines.
- Meets as least annually, and otherwise as necessary based on review supports needs, appeals or other agenda items brought to its attention.
- Considers appeals to the decisions of the University Signage Coordinator.
- Considers request for modifications or changes to the USS.

The Signage Committee consist of the following representatives:

- Standing Members:
 - o University Signage Coordinator
 - o Representative from WMC
 - o University Landscape Architect
 - o University Architect
 - o PPARE staff to represent alignment with wayfinding plan.
- Members as needed:
 - o Representative of University Communications for issues related to brand, visual identity or common mapping
 - o Representative of Public Safety for issues involving safety or security
 - o Representative of TTM as needed for signage related to traffic or transportation elements, or as a liaison with entity responsible for parking facilities.
 - o Representatives of Advancement as need for signage related to donor or honorific recognition of affinity agreements.
 - o Representative from Student Life
 - o Representative from Athletics

APPEALS

Should an entity desire to contest all or a portion of the policy and guidelines found herein, or the decision taken by the University Signage Coordinator on a specific case, the following procedure must be allowed:

1. A variance request shall be forwarded to the Technical Services Group within Facilities Design and Construction describing the proposed deviation.
2. A Building Design Standards adjudication meeting will be held to review the request and approve or deny the request based solely on its individual merits.
3. If the requesting entity finds the decision of the adjudication unsatisfactory, a written appeal shall be elevated and issued to the attention of the Signage Committee.
4. The Signage Committee will discuss any and all formally presented appeals. The Committee will review all cases, and will pronounce the final arbitration.
5. The decision taken by the Signage Committee will be final and cannot be further appealed. Shall a deviation be granted, it will not constitute precedent for future or similar signage deviation request.

NAMING, COMMEMORATIVE AND HONORIFIC RECOGNITION

The university Office of Advancement is responsible for the naming of all campus buildings, spaces or other entities. Customers desiring to name a building or space must follow all established procedures for naming and must provide evidence of approval this before a signage proposal can be approved. The full current naming policy, including eligibility for various levels of recognition, is provided as an appendix X. It is the responsibility of the customer to seek out any updated documents or processes relating to naming from the Office of Advancement.

The system includes signage types which may be used for commemorative (donor) or honorific recognition, such as sign types EX-3, SP-1 and SP-2. More information about use of these sign types for commemorative and honorific recognition is outlined under sign type SP-3.

Primarily vehicular, pedestrian, parking garage and building identification signage will contain a shortened version of the name and should not be relied on for recognition.

FUNDING OF SIGNAGE

Wayfinding Signage

New or replacement vehicular and pedestrian directional signage (for example, sign type EX-4) is typically funded as a stand-alone project through the capital planning process. In addition, capital funds may be requested for replacement of existing signage in designated zones of campus. If a construction project affects and entire campus district or zone, and involves the creation of new roads or pedestrian routes, that project will be required to include appropriate wayfinding signage as part of its contribution to the public realm. Changes or additions to existing wayfinding signage must be requested through the University Signage Coordinator and, if approved, will be funded by the requestor.

A fund for the routine maintenance of wayfinding signage is under review. Regular replacement of outdated maps will be funded through this maintenance program. If a project alters and area significantly, then that project will be responsible for funding map updates within the affected area.

Building Signage

Every new construction or renovation project is required to include funding for basic signage as appropriate to the scope of the project. Every capital project must include at a minimum:

- Building identification sign (types EX-1, EX-2, EX-3) - at least one sign at the primary entrance to the building.
- Interior wayfinding signs - including ADA-compliant room number, rest room, electrical equipment room, stair and elevator signage. May also include ADA-compliant sign frames with room numbers and removable inserts for labeling rooms.
- Building directory - at least one directory at the primary entrance to serve the whole building.

When a unit moves to a new building, that unit is responsible for all signage costs associated with the move, including providing or modifying signage in new location, and removing signage from previous location.

Commemorative and Honorific Signage

Commemorative signage must be funded by a project or the unit benefitting from the contribution if not related to a project. Honorific recognition must be funded out of project funds or by the unit requesting the naming if not related to a project. Historical or interpretive signage must be paid for by the unit requesting the signage. Administrative names are recognized only with building ID signage, which must be funded by a project or by the unit requesting the building name.

Commemorative or honorific recognition related to the renovation or construction of a building or outdoor space should be included in the scope and budget of the project and should be an integral part of the project's design, subject to final approval by the University Signage Coordinator, University Architect and Landscape Architect, if applicable. The identification of fundraising and recognition strategies should occur as early as possible in the life of a project, so signage can be planned as the building or landscape design evolves.

If an existing building is renamed, but there is no project associated with the re-naming, the unit requesting the re-naming must fund any and all signage changes, which may include removing the name from a building or location previously named.

Parking Garage Signage

A stand-alone project will implement signage in all existing garages, with a visitor parking garages as a first priority. Additional garage signage may be required if current faculty/staff garages become available to visitors and/or patients full time, as existing garages are modified, or if new garages are constructed. All garage signage must conform to the guidelines, or variations approved by the University Signage Coordinator. Garage signage will be funded by the entity responsible for management of the garages (see contact list). Individuals and units with recommendations for new, additional or modified garage signage should contact the entity responsible for parking garages with their suggestions or requests.

University and WMC Signage

A customer requesting signage in a university or WMC building will be required to fund the requested signage including all fabrication and installation costs.

STANDARDS*Glossary of Terms*

ADA The Americans with Disabilities Act, which includes architectural or building design guidelines aimed at improving accessibility in the built environment. All signage on campus must comply with these guidelines.

Adjusted letterform A wordmark or primarily text element that has been transformed or modified and cannot be typeset. May combine text and simple graphics such as a line or shape.

Arrow Symbol representing movement or direction.

Audible Communication Information perceived through hearing.

Braille Method of writing works by means of dots for the use of sight impaired; each cell is an arrangement of dots within a six dot matrix and represents a sound or word.

Cap Height Vertical distance occupied by a capital or upper-case letter.

Capital Letters Upper-case letters, as distance from lower-case.

Center To position a word or symbol in the lateral middle of the viewing area, as distance from either flush right or flush left.

Commemorative (signage or naming) Recognizes contributions of financial resources or goods and services to the university.

Environmental Graphics Communication A form of information transfer that is graphic in nature, as opposed to audible.

Flush (left or right) A typesetting term to indicate no indentation from the margin, type or symbols aligned at the right or left margin.

FITS Abbreviation or acronym for Facilities Information and Technology Services at The Ohio State University Wexner Medical Center.

Gloss Sheen reflected off a surface measured from matte (no sheen) to super gloss (very shiny).

Graphics Any object that reflects an association with the university and is designed to be seen from a public area or within a university facility.

Heads up (Map orientation) Maps placed according to their location in space, or oriented in the direction the viewer is facing, rather than north-south.

Honorific (signage or naming) Recognizes significant non-monetary contributions or service to the university.

Hierarchy (of information or destination) A graded or ranked system of presenting information delivered in a logical sequence. For signage, progressively more detailed information is presented as one nears the destination, with the highest level of detail provided inside the facility.

Inter-letter spacing Lateral or horizontal space between letters, determined optically.

Inter-line spacing Vertical space between lines, determined mechanically.

Inter-word spacing Lateral or horizontal space between words, equivalent to lower-case "r".

Layout The result of determining whether text and symbols are centered or flush.

Legibility The ease with which a displayed message can be seen or discerned.

Letter style Form that a letter takes in a given design or typeface, as identified by names such as Proxima Nova, Arial, Capita, Times, etc. Letter styles are also classified as serif (Capita or Times Roman) vs. san serif (Proxima Nova or Arial).

Lowercase Letters that are not upper-case or capital.

Non-Verbal Communication Communication which relies on symbols or pictures, rather than words, for meaning.

Oral Spoken, audible.

Orientation Location or position relative to the points of the compass or other specific direction. The adjustment or alignment of oneself to surroundings.

Pictograph Symbol incorporated into as sign.

Readability Ability to be seen and perceived. Legibility.

San Serif Letter forms or typefaces without as serif, such as Proxima Nova and Arial.

Serif Short cross lines at the ends of letters classified in this way as distinct from san serif. Typefaces or letter forms such as Capita and Times Roman are serif fonts.

Set Upper or lower case.

Sign Visual or tactile element utilized to communicate a message through typography, symbols and pictograms.

Sign Face Reading area of a sign on which text and symbols are displayed.

STANDARDS

Glossary of Terms

Signage Any object placed within a public area or within a university facility that is intended to convey information, identification or direction through the use of letters, words, numbers, symbols, pictures or patterns.

Signage Committee Ad-hoc committee which supports the University Signage Coordinator and the WMC Wayfinding Analyst (see contacts page) in the review and approval of signage as needed.

Standard Establish mandatory expectations and may be set by responsible offices and others. Governing document used as the approved model or to state the baseline required in practice at Ohio State. Are usually developed in accordance with published federal, state, or industry regulations, requirements, or standards. A standard or requirement may apply university wide or to a particular unit or units.

SPG abbreviation or acronym for this document, *Signage Policy and Guidelines*.

Symbol Pictograph, pictorial representation, used in signs. Symbols are a non-verbal means of conveying information.

Policy Set of criteria to guide decisions on selection of appropriate sign types and to identify authority and responsibility for such decisions.

Tactile Signs Information perceived through the sense of touch. Tactile signs have raised letters, symbols or braille which can be interpreted by tracing with fingers over the surface.

Typeface, Typography Letter form or font.

Uppercase Capital letters.

Verbal Communication using words; distinct from non-verbal (communication using symbols or pictures); distinct from oral, which is audible.

Visual Communication Information perceived through the sense of sight.

Wayfinding Finding one's way to a destination; spatial problem solving comprising three independent processes; information processing, decision making, and decision execution.

WMC Abbreviation/acronym for The Ohio State University Wexner Medical Center.

Wordmark A distinct, typographic treatment of the name of a company, institution, or product name used for purposes of identification and branding. Wordmarks are primarily text, but may include simple shapes or lines that are secondary to the name.

Zone A smaller region of a larger geographical area. For The Ohio State University campus three zones have been developed: Academic Campus, Athletic Facilities, and Medical Campus.

STANDARDS

Contacts and References

CONTACTS

University Signage Coordinator

Steve Malone
614-247-4587
signage@osu.edu

Wexner Medical Center Facilities Wayfinding Analyst

Keriann Ours
614-293-3439
keriann.ours@osumc.edu

University Architect

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614-247-7053
costantino.6@osu.edu

University Landscape Architect

Stephen W. Volkmann
614-292-3673
volkmann.4@osu.edu

University Branding

Justin Winget
614-292-2025
winget.31@osu.edu

CampusParc

Management of university parking lots and garages
614-688-0000
osu.campusparc.com

REFERENCES

ADA (Americans with Disabilities Act) Architectural Guidelines

[ada.gov/2010ADASTandards_index.htm](https://www.ada.gov/2010ADASTandards_index.htm)

Building Design Standards

Full BDS: fod.osu.edu/bds/

One Ohio State Framework Plan

oneframework.osu.edu/

Design Guideline Buildings and Landscape

fod.osu.edu/sites/default/files/buildings-landscape.pdf

OSU Signage Requests

fod.osu.edu/signage/

University Branding Guidelines

osu.edu/brand/

Wexner Medical Center Signage Requests (Eservices)

osumc.service-now.com/

Signage Committee: (refer to page 8)

- University Landscape Architect
- University Architect
- University Signage Coordinator
- WMC Representative
- Athletics Representative
- Student Life Representative
- PARE Representative
- CampusParc Representative
- Branding Representative

THE OHIO STATE UNIVERSITY

UNIVERSITY SIGNAGE STANDARDS

INTRODUCTION

ISSUE: 07/01/2014 | REVISION 01/15/2018

INTRODUCTION

Purpose and Criteria

THE PURPOSE OF SIGNAGE

The Ohio State University has over 6 million visitors annually. Our visitors are a diverse group and many are unfamiliar with the Columbus area and the Ohio State Campus. Visitors to our medical campus may be under additional stress due to illness, or concern over the health of their family members. The primary purpose of wayfinding signage is to provide clear, legible and understandable directional information to campus visitors. The primary audience is the first time and occasional visitor.

CRITERIA FOR DEVELOPING THE STANDARDS

Several criteria were used in developing the signage family and standards for each type of sign, including the design, material and construction specifications of the signs. While these standards provide a broad range of signage to cover the most common needs for signage on campus, they cannot be all-inclusive. There will be a need for modifications and additions to the sign types in these standards. If requests for signage for a certain purpose or certain modifications become common, the University Signage Coordinator will consider modifying the standards. All requests for additional signage types or variations on the requirements contained in these standards should be addressed to the University Signage Coordinator. The criteria outlined below will be significant considerations in the evaluation of modifications, variations and additions to the sign types.

Design Criteria

Simplicity and legibility are primary design criteria for effective wayfinding signage. Simplicity includes the use of common, shortened version of names, consistent terminology, internationally recognized symbols, and limiting the number of messages on a sign. Legibility includes the use of fonts at adequate size, colors with appropriate levels of contrast and limiting the amount of information appropriate to the speed and viewing time of the user of the sign. Thus, vehicular signage will require larger letters, more space around the lettering, and less information to be legible, particularly on higher speed roads. Pedestrian signage can use smaller type sizes, and can contain more information, as it can be viewed in a more leisurely fashion, but information is still limited by human ability to comprehend and remember.

Consistency of color and appearance are important factors in developing a cohesive system, and will contribute to the recognition of the system as belonging to Ohio State, but branding and marketing are secondary considerations to informational effectiveness for signage.

The signage system includes signage types for special purposes including recognition, interpretation, education, promotion and retail signage. Primary vehicular, pedestrian, parking garage and building identification signage should not be used for these purposes.

Hierarchy of Information

The signage and wayfinding system depends on a hierarchy of information that delivers information in a logical sequence at an increasing level of detail as visitors move from the regional highway system, to the city and campus street system, park their cars or bikes or exist a transit vehicle and access their destination on foot or with a mobility device. The hierarchy of information developed for this system was based on data collected on visitor counts for major destinations on campus.

At the highest level the freeway signage has been modified to direct visitors to SR 315. The campus has been divided into three “zones” – Academic Campus, Medical Campus and Athletic Facilities. Signage on SR 315 reflects these three zones, and vehicular and pedestrian wayfinding signage also reflect the zoning concept. The destination hierarchy for signage is outlined in the chart on the next page

Compatibility with Code Requirements

All signage must meet rules and regulations set forth by this University, ADAAG, Public Safety, and any other State, City, and local codes, regulations and statutes.

Durability and Maintenance

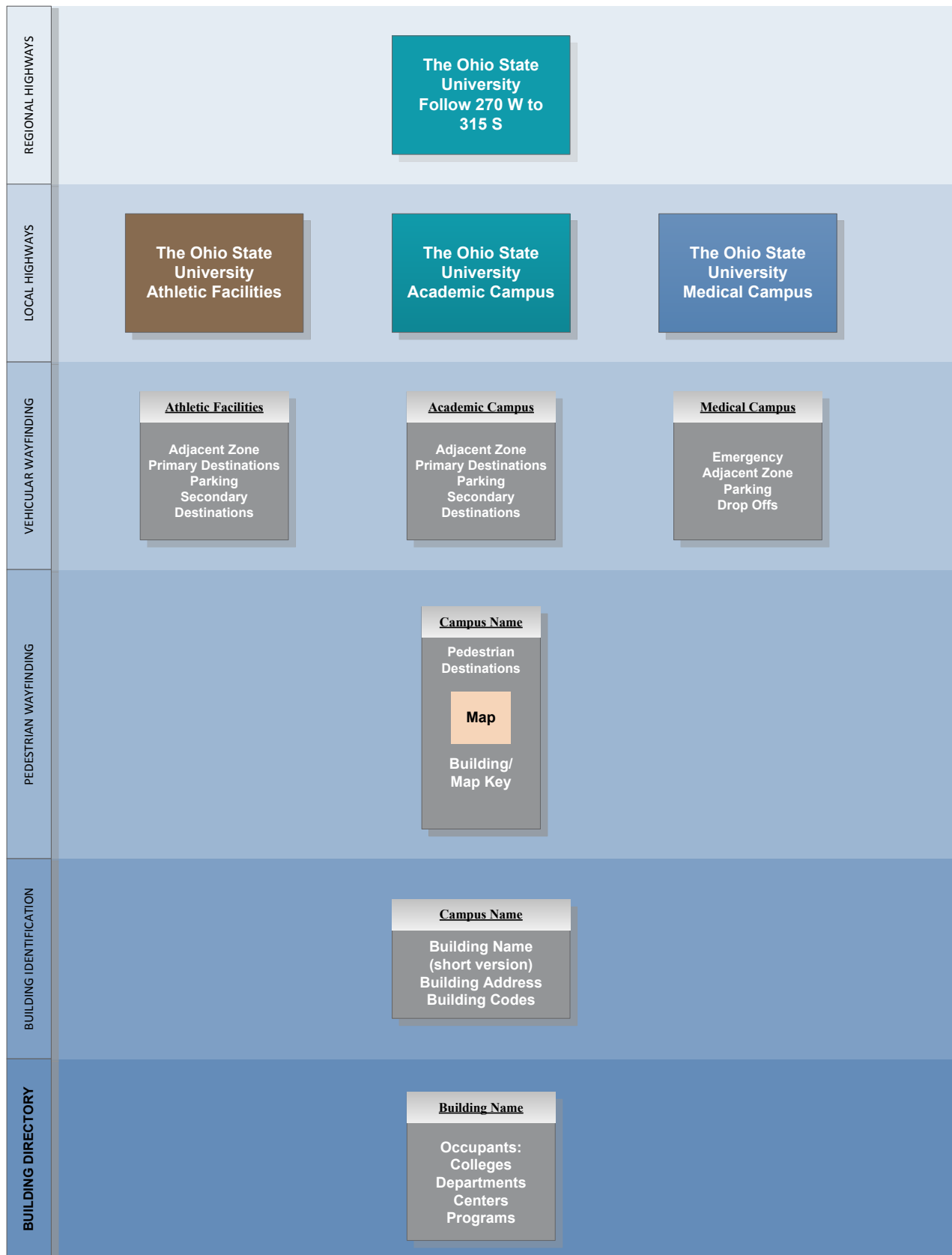
The materials and construction specifications contained in this document are intended to ensure that signage and graphics are to be durable, resilient, easily maintained and resistant to normal deterioration and acts of vandalism.

Availability

The signage standards contained in this document are intended to be bid and fabricated by multiple manufacturers, with replacement components readily available in the market. The ability to obtain competitive pricing from multiple vendors will be a significant consideration in the evaluation of modifications, variations and additions to the sign types.

INTRODUCTION

Hierarchy of Information



THE OHIO STATE UNIVERSITY

UNIVERSITY SIGNAGE STANDARDS SYSTEM STANDARDS

ISSUE: 07/01/2014 | REVISION 08/01/2016

PROXIMA NOVA, REGULAR

ABCDEFGHIJKLMNOPQRSTUVWXYZ
abcdefghijklmnopqrstuvwxyz
1234567890

PROXIMA NOVA, SEMI-BOLD

ABCDEFGHIJKLMNOPQRSTUVWXYZ
abcdefghijklmnopqrstuvwxyz
1234567890

PROXIMA NOVA, BOLD

ABCDEFGHIJKLMNOPQRSTUVWXYZ
abcdefghijklmnopqrstuvwxyz
1234567890

PROXIMA NOVA, EXTRABOLD

ABCDEFGHIJKLMNOPQRSTUVWXYZ
abcdefghijklmnopqrstuvwxyz
1234567890

CAPITA, MEDIUM

ABCDEFGHIJKLMNOPQRSTUVWXYZ
abcdefghijklmnopqrstuvwxyz
1234567890

WORDMARKS

THE OHIO STATE UNIVERSITY

The wordmark is an adjusted letterform version of the name “The Ohio State University” combined with the baseline, which anchors and protects the integrity of the wordmark. It cannot be replicated through typesetting. Wordmark artwork is available from the University Signage Coordinator.

ACADEMIC CAMPUS

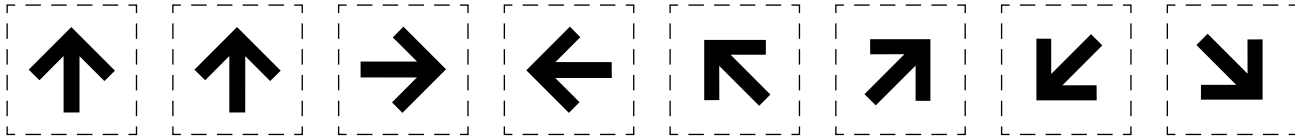
MEDICAL CAMPUS

ATHLETICS FACILITIES

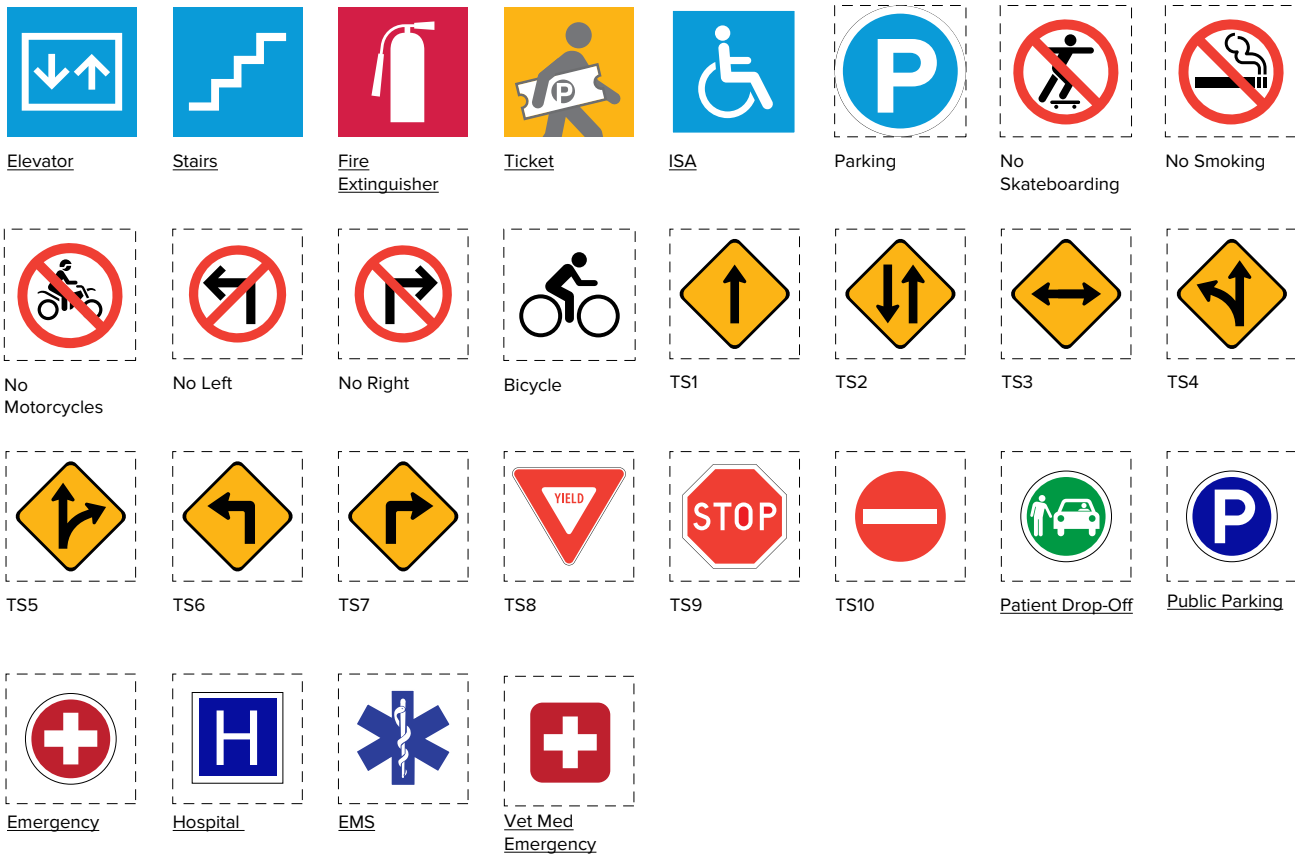
Additional wordmarks have been developed for the campus “zones.” These are also adjusted letterforms combined with the baseline, and cannot be replicated through typesetting. Artwork for all wordmarks is available from the University Signage Coordinator.

ARROWS

Dotted line designates the required clear space for the arrow. Arrow dimensions include the dotted area.

**SYMBOLS**

Dotted line designates the required clear space for the symbol. Symbol dimensions include the dotted area.



SYSTEM COLORS



P1
Rear Panels
Matthews Red
MP 10256
High Gloss



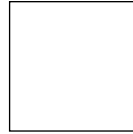
P2
Post & Hardware
Matthews "Hot Plate"
Metallic
MP 23468
High Gloss



P3
Sign Panel
Matthews "Smoke Gray"
Metallic
MP 18207
Semi Gloss



P4
Painted Cut Letters
Matthews "Nuance White"
MP 4240
Semi Gloss



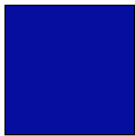
P5
Message Copy
3M Scotchlite
Reflective 5-10-20 white



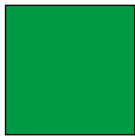
P6
Message Copy
3M Scotchcal
3650-10 white



P7
Header Copy
3M Scotchcal
230-121
Light Silver Metallic



Parking



Valet

SYSTEM STANDARDS

GRAPHIC STANDARDS

Garage Colors

COLORS

PAINT

VINYL

GROUND	C0-G: Ground Level MP05252 / Grey Mare	V0-G: Ground Level Gerber High Performance Series 220 / Traffic Grey
LEVEL 1	C0-1: Level 1 MP10256 / Espirit Red	V0-1: Level 1 Gerber High Performance Series 220 / Cardinal Red
LEVEL 2	C0-2: Level 2 MP09133 / Process Cyan U	V0-2: Level 2 Gerber High Performance Series 220 / Olympic Blue
LEVEL 3	C0-3: Level 3 MP00292 / Palermo Purple	V0-3: Level 3 Gerber High Performance Series 220 / Dark Violet
LEVEL 4	C0-4: Level 4 MP13427 / Anole Green	V0-4: Level 4 Gerber High Performance Series 220 / Apple Green
LEVEL 5	C0-5: Level 5 MP08528 / Engine Orange	V0-5: Level 5 Gerber High Performance Series 220 / Bright Orange
LEVEL 6	C0-6: Level 6 MP10147 / Impulse	V0-6: Level 6 Gerber High Performance Series 220 / Sapphire Blue
LEVEL 7	C0-7: Level 7 MP03415 / Prairie Rose	V0-7: Level 7 Gerber High Performance Series 220 / Process Magenta
LEVEL 8	C0-8: Level 8 BM2056-30 / Surf Blue	V0-8: Level 8 Gerber High Performance Series 220 / Teal
	C1 MP18207 / Slate Metallic	V1 Gerber Premium Metallic / Slate
	C2 MP15026 / Fire Breathing Red	V2 Gerber High Performance Series 220 / Tomato Red
	C3 MP02548 / Dahlia Yellow	V3 Gerber High Performance Series 220 / Chrome Yellow
	C4 MP46351 / Subtle Silver Metallic	<i>No Vinyl Equivalent</i>
	C5 MP32071 / White Wonder	V5 Gerber High Performance Series 220 / Matte White
	<i>No Paint Equivalent</i>	V6 Gerber High Performance Reflective Series 280i / 280i White
	<i>No Paint Equivalent</i>	V7 Gerber High Performance Translucent Series 230 / Intense Blue
	C8 Federal Standard 595B, No. 15090 (Blue)	V8 Gerber High Performance Series 220 / Intense Blue
	<i>No Paint Equivalent</i>	V9 Gerber High Performance Series 220 / Matte Black

CONCRETE

1. All sign foundations shall be Cast in Place concrete with buff wash finish and 1" beveled edge.
2. Concrete shall be air-entrained type, conforming to ASTM C 94. Air-Entraining Admixture: ASTM C 260.
3. Unless otherwise indicated on the Drawings, minimum 28 day compressive strength shall be 4,000 PSI.
4. Concrete slump shall be no less than 2 inches nor greater than 4 inches, determined in accordance with ASTM C 143
5. Cement shall be Portland cement, conforming to ASTM C 150, Type I or II.
6. Aggregates shall conform to ASTM C 33. Aggregate for areas exposed to view shall be crushed limestone only.
7. Unprocessed sand run materials shall not be used in any concrete mix.
8. Chemical Admixtures: Provide admixtures certified by manufacturer to be compatible with other admixtures and that will not contribute water soluble chloride ions exceeding those permitted in hardened concrete. Do not use calcium chloride or admixtures containing calcium chloride.
 - Water-reducing Admixture: ASTM C 494/C 494M, Type A.
 - Retarding Admixture: ASTM C 494/C 494M, Type B.
9. No calcium chloride or admixtures containing calcium chloride shall be added to concrete. No admixtures other than those specified shall be used in concrete without the specific written permission of the University Signage Coordinator in each case.

THE OHIO STATE UNIVERSITY

UNIVERSITY SIGNAGE STANDARDS

EXTERIOR SIGNS

ISSUE: 07/01/2014 | REVISION 01/15/2018

EXTERIOR SIGNS

TYPE: EX-1

Building Identification, Ground Mounted

FUNCTION

The primary purpose for this type of signage is to identify the building by name, address, code and number to pedestrian traffic. This type of sign is not intended for recognition or for use as a building directory.

LOCATION

Located at or near primary accessible pedestrian entrance to buildings or other facilities.

CONTENT

Building Name

- Short form of the building name, 4 word maximum.
- Maximum 2 lines of text.

Street Address

- Use OSU Assigned Street Address (see current contacts page)
- One line of copy only

Pictorial

- Symbol and text at the bottom right corner of each sign will be used to indicate the accessible building entrance.

Not allowed on building ID signs

- College, department, section, unit or center names. University departments and units change names and locations frequently, and this creates confusion to the visitor. Building directories should be used to provide this information.
- Names of individual building parts or spaces. Individual destinations within a building may be considered for signage on a case by case basis if sufficient annual visitors or criticality of services can be established.
- Services or transaction points. If it is critical for visitors to know the location of a service or transaction point, a variation on retail signage may be considered.
- Full Donor or commemorative names. Other signage types have been developed to recognize honorific or commemorative names.

NUMBER

One per building, secondary entrances on a public street or primary pedestrian route will be identified using vinyl building names.



EXTERIOR SIGNS

TYPE: EX-2

Building ID Wall Mounted

FUNCTION

The purpose of this sign type is to identify the building name and address when:

- No good location exists for a ground mounted sign.
- To indicate a secondary entrance
- To be sensitive to buildings historical character

LOCATION

The sign should be located at or near a pedestrian entrance to a building, visible from major pedestrian paths and unobstructed by vegetation or other objects.

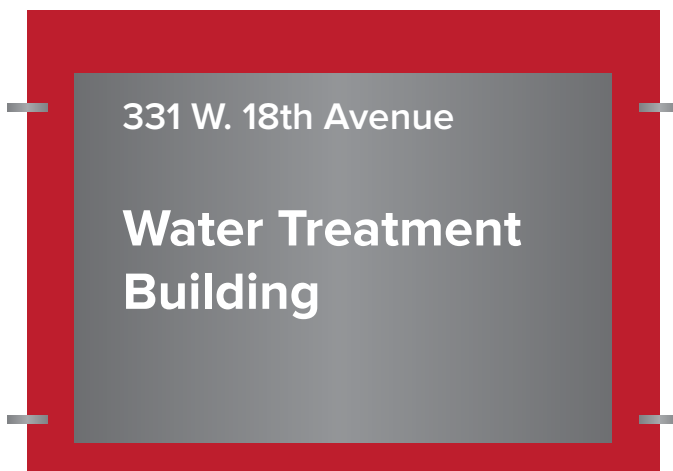
Location must respect the architecture of the building and be approved by the University Architect

CONTENT

Content is limited to the name of the building (short from if purpose is Building ID)

NUMBER

One sign per building entry



EXTERIOR SIGNS

TYPE: EX-2H

Historic Building ID Wall Mounted Plaque

FUNCTION

The purpose of this sign type is to identify historical buildings:

- No good location exists for a ground mounted sign.
- To indicate a secondary entrance
- To be sensitive to buildings historical character

LOCATION

The sign should be located at or near a pedestrian entrance to a building, visible from major pedestrian paths and unobstructed by vegetation or other objects.

Location must respect the architecture of the building and be approved by the University Architect

CONTENT

Content is limited to the building name or building name and address.

NUMBER

One sign per building entry



EXTERIOR SIGNS

TYPE: EX-3

Building Mounted Letters

FUNCTION

The purpose of this sign type is to identify the facility name. This sign type may be used:

- When no good location exists for a ground mounted sign.
- To indicate additional primary entrances.
- To recognize a donor or honorific name for a building or wing of a building.

LOCATION

Sign should be positioned on a building facade in view or major pedestrian walkways

Location must respect the architecture of the building and be approved by the University Architect

Names should be sized to fit within a single area, surface or architectural element. Letters should not bridge two distinct areas, surfaces or elements.

If used for building identification, the letters should be mounted at or near the building entrance.

If used for donor or honorific recognition, recommended locations include:

- At or near the building entrance.
- On a smooth horizontal area, surface or element integral to the design of the building, such as a belt course, horizontal mullion or cornice.

CONTENT

Content is limited to:

- The name of the building.
- If the purpose is Building Identification, use a short or common form of the name.
- If the purpose is Donor or Honorific recognition, a fuller name may be used, keeping in mind that the longer the name the smaller the letters may be.

Not allowed on signage:

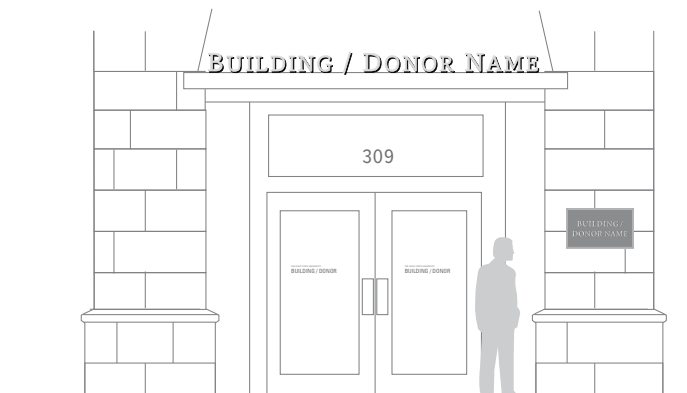
College, department, section, unit or center names

NUMBER

Limited to one sign per building.

Additional signage may be considered:

- For distinctly separate building elements, such as wings, which have significant, unique identity or recognition needs.
- Only if the building's architectural features, circulation, layout and pedestrian traffic volume justify such signage.



THOMPSON LIBRARY

Typeface: Capita

THOMPSON LIBRARY

Typeface: Proxima Nova Bold

COLORS

Brushed Aluminum with clear coat
Stainless Steel with clear coat

LETTERS

San Serif Font: Proxima Nova

Serif Font: Capita

- All uppercase
- Size will vary with length of name and location of letters.
- Letters should be proportional to the area on which the letters are mounted
- 12" cap height is recommended for most applications

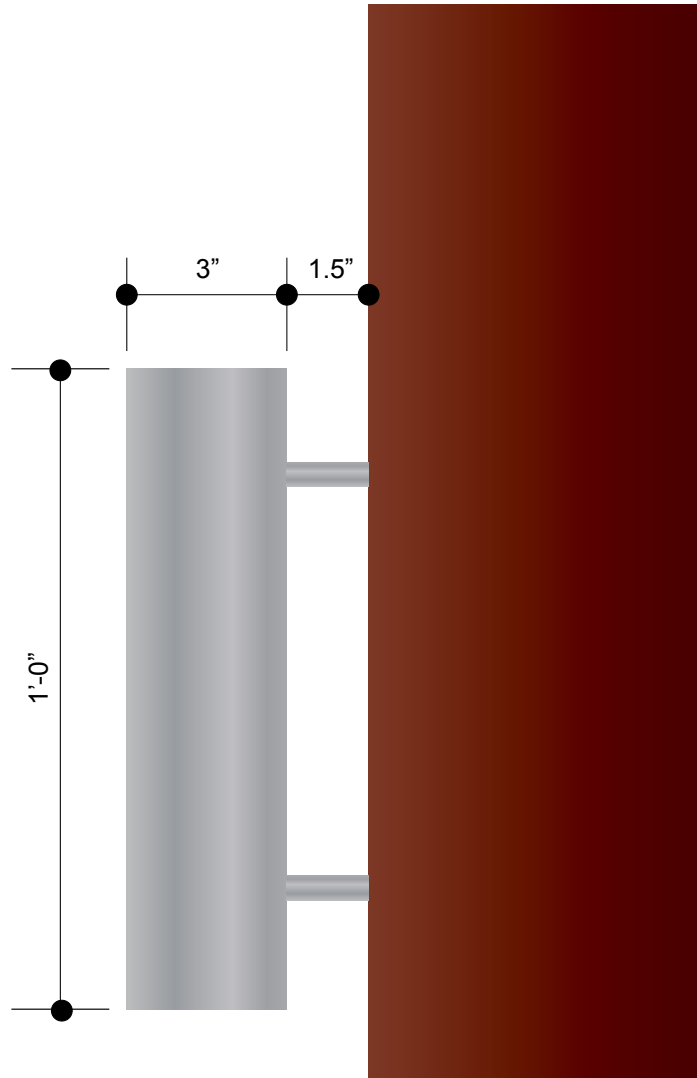
GRAPHICS

Not needed for this sign

EXTERIOR SIGNS

TYPE: EX-3

Building Mounted Letters



INSTALLATION

- Fabricated reverse channel letters, 1/8" Thick Wall
- Threaded studs with sleeves painted to match letter face, set with silicone adhesive.
- Letters to be mounted in a manner that does not damage the building materials or architectural elements.

EXTERIOR SIGNS

TYPE: EX-4

Vehicular Wayfinding, Post Mounted

FUNCTION

Provide drivers with advance directional information to university destinations and parking facilities.

LOCATION

- City streets and campus roads with less than two lanes in each direction
- Placed perpendicular to the road, facing oncoming traffic
- Placement (height and location) to maximize visibility

CONTENT

Maximum of four (4) destinations:

1st priority

- Primary Destinations
- Next Campus
- Visitor Parking garages, circle P

2nd priority

- Secondary Destinations
- Destinations which draw from outside region

3rd priority

- Tertiary destinations

Medical Campus:

1st priority

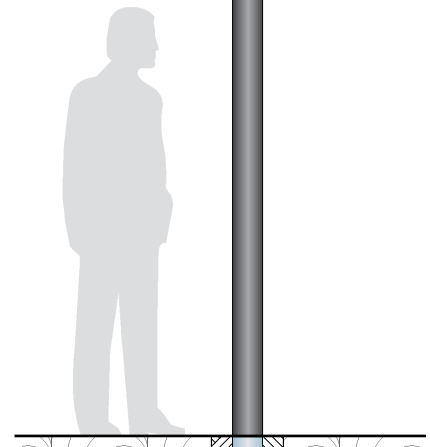
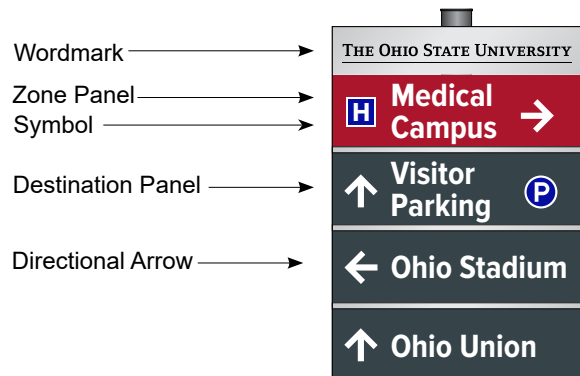
- Emergency
- Visitor/ Patient Garages, circle P

2nd priority

- Next campus
- Medical facilities in adjacent areas

3rd priority

- Other primary destinations in next campus



EXTERIOR SIGNS

TYPE: EX-5

Vehicular Directional: Supplemental

FUNCTION

The primary purpose of the small 2-sided vertical non-illuminated monument sign is for vehicular directional wayfinding at non-academic clinical/patient, performance focused or public safety locations open extended hours of operation. The small monument sign is used in large parking lots, loading areas, service roads and dock areas for vehicular wayfinding. This type of sign is not intended for recognition or for use as a building directory.

LOCATION

Located at intersections or primary access points leading to building entrances, loading and dock areas when wayfinding signs are needed.

Location must respect the architecture of the building and landscape and be approved by the university architect.

CONTENT

Primary Identification - Text

- Building address when building is not on roadway
- Building name when building is not on roadway
- Directional roadway information
- Directional patient or valet drop off information
- Outpatient Care Information
- Clinical Information
- Specialty Services Information
- Public Safety Information

Secondary Identification - Symbols

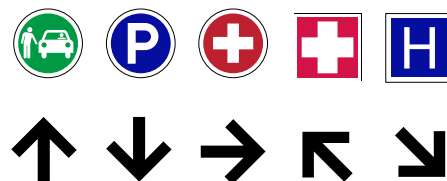
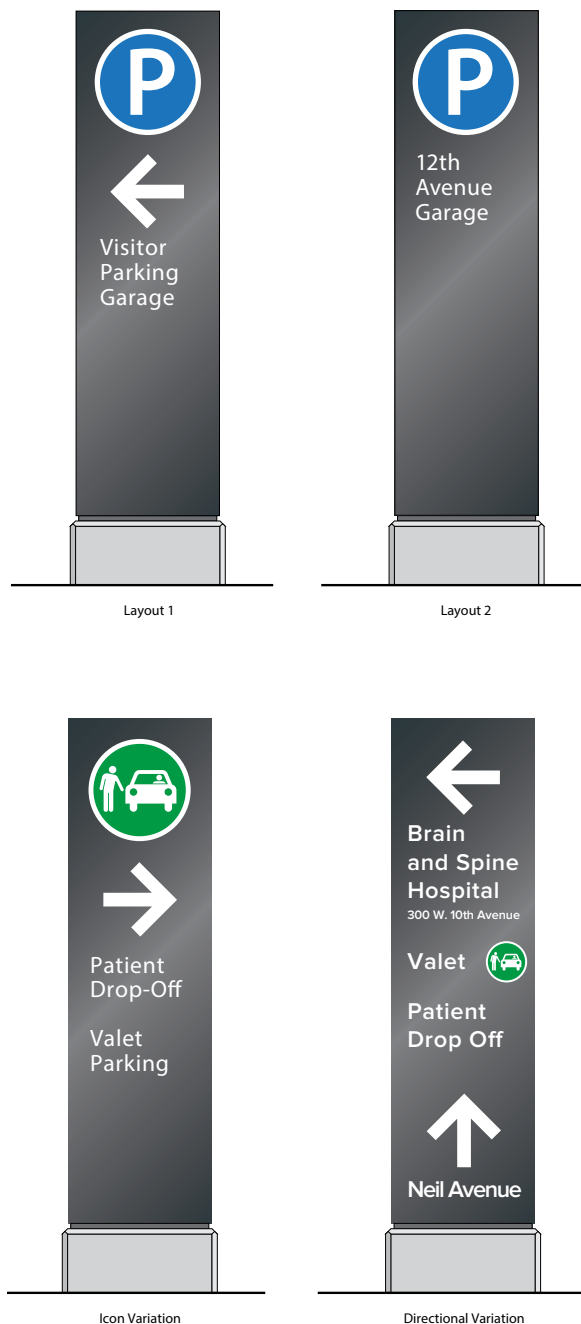
- Directional Arrows
- International Hospital Symbol
- International Emergency Symbol
- International Parking Symbol
- International Valet Symbol

Not allowed

- Department, section, unit names. University departments and units change names and locations frequently, and this creates confusion to the visitor. Building directories should be utilized to provide this information.
- Names of individual building parts or spaces. Individual destinations within a building may be considered for signage on a case by case basis if sufficient annual visitors or criticality of services can be established.
- Full donor or commemorative names. Other signage types have been developed to recognize honorific or commemorative names.
- Academic or research buildings not serving patient or visitor services

NUMBER

One per roadway leading to building entrance, large parking lots, loading areas, service roads and dock areas. Secondary or access drives may be considered on case by case basis or approved by the university architect.



Directional Sign Symbols

EXTERIOR SIGNS

TYPE: EX-6

Service Court Sign

FUNCTION

Provide vehicular traffic identification of loading dock and service destinations.

LOCATION

- At loading dock and service area entrances
- Located along major roadways at loading dock and service courts navigation, drive access location, and navigation throughout the campus.

CONTENT

- Large, unique sequential service court number for recognition
- Smaller text may be added for secondary building entry destination within service areas

NUMBER

One sign located at each major vehicular traffic confluence point.



EXTERIOR SIGNS

TYPE: EX-7

Electronic Marquee

FUNCTION

To provide changeable/programmable event information

LOCATION

- All locations must be approved by the University Signage Coordinator.
- Only for use at venues with many and frequently changing events such as:
 - Ohio Union
 - Wexner Center
 - Mershon Auditorium
 - Weigel Hall
 - Schottenstein Center
 - Drake Union and Theater
 - Theaters/Large Performance Venues
 - Sports Arenas

CONTENT

- Permanent information will include name of district, venue and entity responsible for venue only.
- Changeable messaging may contain:
 - Name of current or future event(s)
 - Featured group or performer(s)
 - Date and Time of Event(s)
 - Contact information for tickets (website, telephone number, box office location)
 - Cross promotion of other department, district, or campus events
- Programming of digital messaging is the responsibility of the requesting venue. Messaging must be kept current and relevant. Default messaging (time, temperature, etc.) is only allowed during brief breaks in season schedules.
- Programming may be superseded by public safety notices in the event of a campuswide emergency.

In some locations, it may be preferable not to have both a marquee sign and a building ID sign. In this case, the sign must also contain the building address.

Not allowed on sign:

Default messaging (time and temperature, etc.) is strongly xx

NUMBER

- Limited to one per event venue
- Where multiple venues exist in close proximity (such as in an arts or athletic district), it is strongly recommended that the venues collaborate on a single, combined sign that can advertise multiple event and venues.



EXTERIOR SIGNS

TYPE: EX-8

Tobacco Free Decal

FUNCTION

To communicate that smoking and the use of tobacco are prohibited in or on all university owned, operated or leased property including vehicles by resolution of the Board of Trustees effective January, 2014 .

LOCATION

Signs are mounted on all entry doors of university owned buildings and leased properties. A minimum of one door at each pair of doors in series.

CONTENT

Messaging that communicates the [University Tobacco Free Policy 7.20](#). To communicate that weapons, bikes, skateboard, rollerblades or pets are prohibited on or within OSU owned or leased properties. In some specific areas are subject to video recording and surveillance.

THE OHIO STATE UNIVERSITY

Building Hours:
This building is open during normal University business hours and for dedicated use (libraries, laboratories, auditoriums, etc.)
For other hours, access limited to authorized persons only
For special access or information contact Service2Facilities 614-292-HELP(4357)

**Tobacco Free Environment**

Smoking and the use of tobacco products are not permitted on any Ohio State University property

To report smoking violations call: 866-559-OHIO(6446)
O.R.C. 3794
4/2007

**All weapons, including licensed concealed carry weapons, are prohibited on OSU owned or leased property**

**No bicycles, skateboards, rollerblades or pets permitted inside the building**

THE OHIO STATE UNIVERSITY

Building Hours:
This building is open during normal University business hours and for dedicated use (libraries, laboratories, auditoriums, etc.)
For other hours, access limited to authorized persons only
For special access or information contact Service2Facilities 614-292-HELP(4357)

**Tobacco Free Environment**

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To report smoking violations call: 866-559-OHIO(6446)
O.R.C. 3794
4/2007

**All weapons, including licensed concealed carry weapons, are prohibited on OSU owned or leased property**

**No bicycles, skateboards, rollerblades or pets permitted inside the building**

EXTERIOR SIGNS

TYPE: EX-9

Tobacco Free Pole-Mounted Sign

FUNCTION

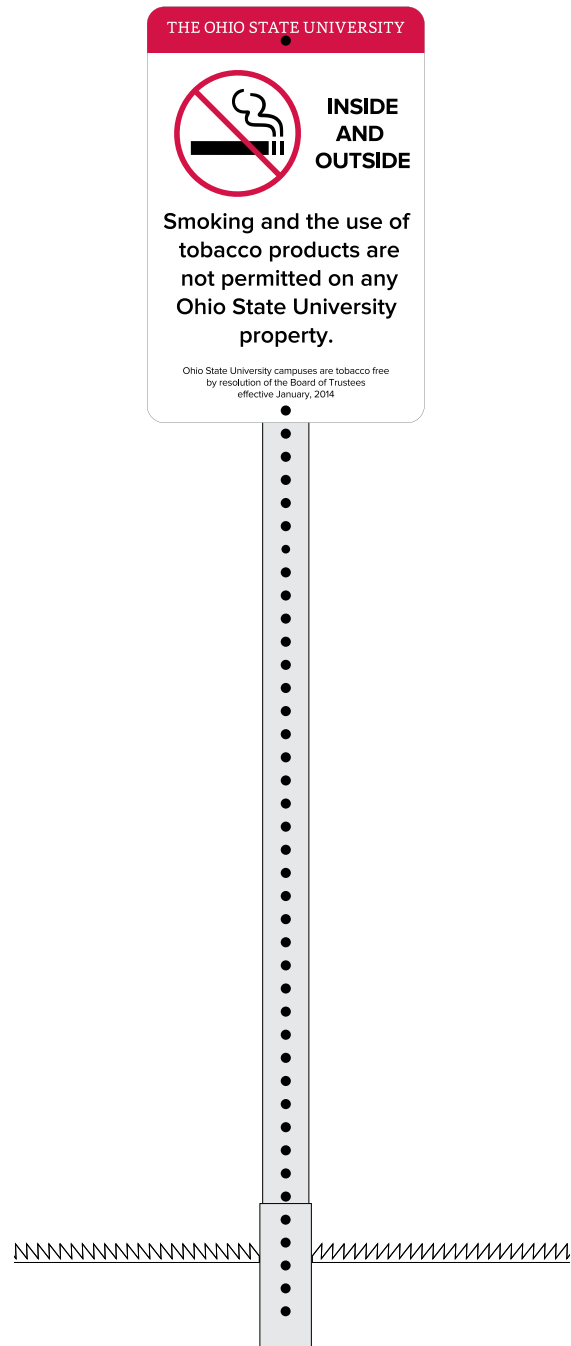
To communicate that smoking and the use of tobacco are prohibited in or on all university owned, operated or leased property including vehicles by resolution of the Board of Trustees effective January, 2014 .

LOCATION

Signs are located at the major pedestrian entry and exit points of parking lots, outdoor event areas and tailgate spaces.

CONTENT

Messaging that communicates the [University Tobacco Free Policy 7.20](#).



EXTERIOR SIGNS

TYPE: EX-10

Tobacco Free Wall Sign

FUNCTION

To communicate that smoking and the use of tobacco are prohibited in or on all university owned, operated or leased property including vehicles by resolution of the Board of Trustees effective January, 2014.

LOCATION

Signs are wall mounted at loading dock areas, outdoor pavilions, terrace or other gathering spaces between buildings and structures on properties away from other buildings.

CONTENT

Messaging that communicates the [University Tobacco Free Policy 7.20](#).



EXTERIOR SIGNS

TYPE: EX-11

Tobacco Free Dumpster Signs

FUNCTION

To communicate that smoking and the use of tobacco are prohibited in or on all university owned, operated or leased property including vehicles by resolution of the Board of Trustees effective January, 2014.

LOCATION

Signs are mounted on the front side of university dumpsters on owned and leased properties.

CONTENT

Messaging that communicates the [University Tobacco Free Policy 7.20](#).



THE OHIO STATE UNIVERISTY

UNIVERSITY SIGNAGE STANDARDS

BUILDING ILLUMINATED EXTERIOR SIGNS

ISSUE: 017/15/2018 | REVISION 01/15/2018

EXTERIOR SIGNS

TYPE: IX-1

Building Illuminated Exterior Signs

FUNCTION

The primary purpose of the large horizontal internally illuminated monument sign is to identify the building by name, address at non-academic clinical/patient, performance-focused or public safety locations that are open extended hours of operation. The large monument sign is used on roadways with faster traffic and primarily vehicular visitors. This type of sign is not intended for recognition or for use as a building directory.

LOCATION

Located at or adjacent to the primary accessible pedestrian entrance on the street the building is addressed.

Location must respect the architecture of the building and landscape and be approved by the university architect.

CONTENT

Street Address - Illuminated

- Use OSU assigned street address (left justified at top of sign)
- One line of copy only

Wordmark

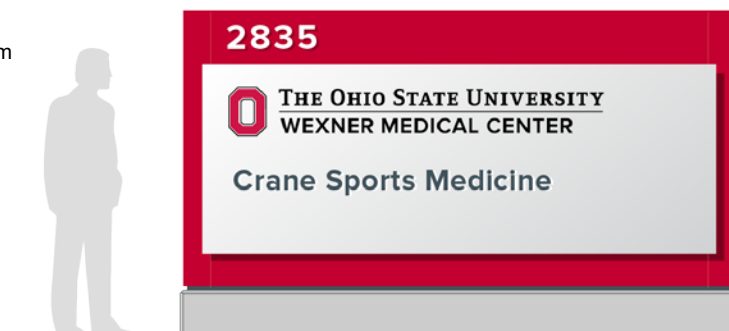
- Block O is internally illuminated for university branding and recognition
- The Ohio State University in applied vinyl per branding standards
- Linear or optional stacked wordmarks can be used

Building Name - Illuminated

- Short form of the building name, 4 work maximum
- Maximum 2 lines of text

Secondary Identification - Illuminated

- Outpatient Care
- Primary Care
- Speciality Services
- Rehabilitation Hospital
- Public Safety
- Institute
- Clinic



Not allowed

- Department, section, unit names. University departments and units change names and locations frequently, and this creates confusion to the visitor. Building directories should be utilized to provide this information.
- Names of individual building parts or spaces. Individual destinations within a building may be considered for signage on a case by case basis if sufficient annual visitors or criticality of services can be established.
- Full donor or commemorative names. Other signage types have been developed to recognize honorific or commemorative names.
- Academic or research buildings not serving patient or visitor services

Horizontal Monument Sign - Large

NUMBER

One per building adjacent to main building entrance, secondary or access drives may be considered on case by case basis or approved by the university architect.

EXTERIOR SIGNS

TYPE: IX-2

Building Illuminated Exterior Signs

FUNCTION

The primary purpose of the small horizontal internally illuminated monument sign is to identify the building by name, address at non-academic clinical / patient, performance focused or public safety locations open extended hours of operation. The small monument sign is used on roadways with low vehicular traffic and primary pedestrian visitors. This type of sign is not intended for recognition or for use as a building directory.

LOCATION

Located at or adjacent to the primary accessible pedestrian entrance on the street the building is addressed.

Location must respect the architecture of the building and landscape and be approved by the university architect.

CONTENT

Street Address - Illuminated

- Use OSU assigned street address (centered at top of sign)
- One line of copy only

Wordmark

- Block O is internally illuminated for university branding and recognition
- The Ohio State University in applied vinyl per branding standards
- Linear or optional stacked wordmarks can be used

Building Name - Illuminated

- Short form of the building name, 4 words maximum
- Maximum 2 lines of text

Secondary Identification - Illuminated

- Outpatient Care
- Primary Care
- Specialty Services
- Rehabilitation Hospital
- Public Safety
- Institute
- Clinic



Horizontal Monument Sign - Small

Not allowed

- Department, section, unit names. University departments and units change names and locations frequently, and this creates confusion to the visitor. Building directories should be utilized to provide this information.
- Names of individual building parts or spaces. Individual destinations within a building may be considered for signage on a case by case basis if sufficient annual visitors or criticality of services can be established.
- Full donor or commemorative names. Other signage types have been developed to recognize honorific or commemorative names.
- Academic or research buildings not serving patient or visitor services

NUMBER

One per building adjacent to main building entrance, secondary or access drives may be considered on case by case basis or approved by the university architect.

EXTERIOR SIGNS

TYPE: IX-3

Building Illuminated Exterior Signs

FUNCTION

The primary purpose of the large vertical internally illuminated monument sign is to identify the building by name, address at non-academic clinical / patient, performance focused or public safety locations open extended hours of operation. The large monument sign is used on roadways with faster traffic and primary vehicular visitors. This type of sign is not intended for recognition or for use as a building directory.

LOCATION

Located at or adjacent to the primary accessible pedestrian entrance on the street the building is addressed.

Location must respect the architecture of the building and landscape and be approved by the university architect.

CONTENT

Street Address - Illuminated

- Use OSU assigned street address (centered at top of sign)
- One line of copy only

Wordmark

- Block O is internally illuminated for university branding and recognition
- The Ohio State University in applied vinyl per branding standards
- Linear or optional stacked wordmarks can be used

Building Name - Illuminated

- Short form of the building name, 4 words maximum
- Maximum 2 lines of text

Secondary Identification - Illuminated

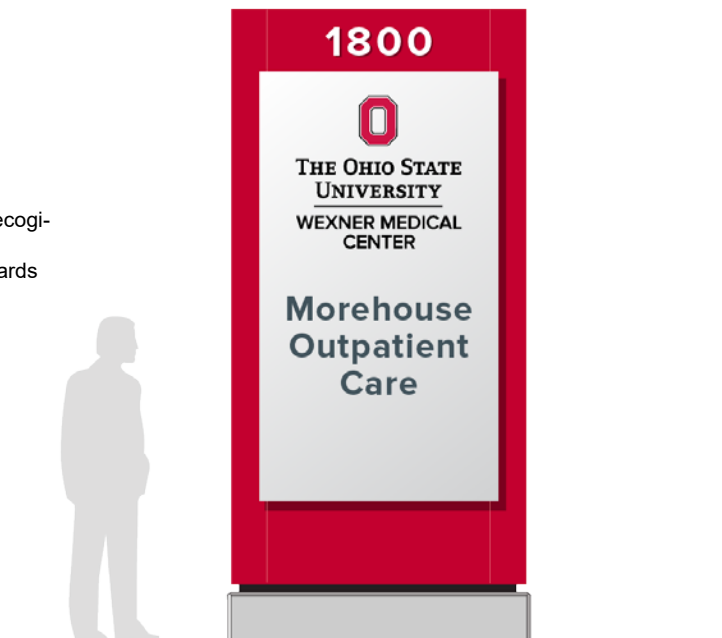
- Outpatient Care
- Primary Care
- Specialty Services
- Rehabilitation Hospital
- Public Safety
- Institute
- Clinic

Not allowed

- Department, section, unit names. University departments and units change names and locations frequently, and this creates confusion to the visitor. Building directories should be utilized to provide this information.
- Names of individual building parts or spaces. Individual destinations within a building may be considered for signage on a case by case basis if sufficient annual visitors or criticality of services can be established.
- Full donor or commemorative names. Other signage types have been developed to recognize honorific or commemorative names.
- Academic or research buildings not serving patient or visitor services

NUMBER

One per building adjacent to main building entrance, secondary or access drives may be considered on case by case basis or approved by the university architect.



Vertical Monument Sign - Large

EXTERIOR SIGNS

TYPE: IX-4

Building Illuminated Exterior Signs

FUNCTION

The primary purpose of the small vertical internally illuminated monument sign is to identify the building by name, address at non-academic clinical / patient, performance focused or public safety locations open extended hours of operation. The small monument sign is used on roadways with low vehicular traffic and primarily pedestrian visitors. This type of sign is not intended for recognition or for use as a building directory.

LOCATION

Located at or adjacent to the primary accessible pedestrian entrance on the street the building is addressed.

Location must respect the architecture of the building and landscape and be approved by the university architect.

CONTENT

Street Address - Illuminated

- Use OSU assigned street address (centered at top of sign)
- One line of copy only

Wordmark

- Block O is internally illuminated for university branding and recognition
- The Ohio State University in applied vinyl per branding standards
- Linear or optional stacked wordmarks can be used

Building Name - Illuminated

- Short form of the building name, 4 word maximum
- Maximum 2 lines of text

Secondary Identification - Illuminated

- Outpatient Care
- Primary Care
- Specialty Services
- Rehabilitation Hospital
- Public Safety
- Institute
- Clinic

Not allowed

- Department, section, unit names. University departments and units change names and locations frequently, and this creates confusion to the visitor. Building directories should be utilized to provide this information.
- Names of individual building parts or spaces. Individual destinations within a building may be considered for signage on a case by case basis if sufficient annual visitors or criticality of services can be established.
- Full donor or commemorative names. Other signage types have been developed to recognize honorific or commemorative names.
- Academic or research buildings not serving patient or visitor services

NUMBER

One per building adjacent to main building entrance, secondary or access drives may be considered on case by case basis or approved by the university architect.



Vertical Monument Sign - Small

EXTERIOR SIGNS

TYPE: IX-5

Building Illuminated Exterior Signs

FUNCTION

The primary purpose of the small square internally illuminated monument sign is to identify the building by name, address at non-academic clinical / patient, performance focused or public safety locations open extended hours of operation. The small monument sign is used at both vehicular and pedestrian visitors destinations with local sign or code restrictions. This type of sign is not intended for recognition or for use as a building directory.

LOCATION

Located at or adjacent to the primary accessible pedestrian entrance on the street the building is addressed.

Location must respect the architecture of the building and landscape and be approved by the university architect.

CONTENT

Street Address - Illuminated

- Use OSU assigned street address (centered at top of sign)
- One line of copy only

Wordmark

- Block O is internally illuminated for university branding and recognition
- The Ohio State University in applied vinyl per branding standards
- Linear or optional stacked wordmarks can be used

Building Name - Illuminated

- Short form of the building name, 4 word maximum
- Maximum 2 lines of text

Secondary Identification - Illuminated

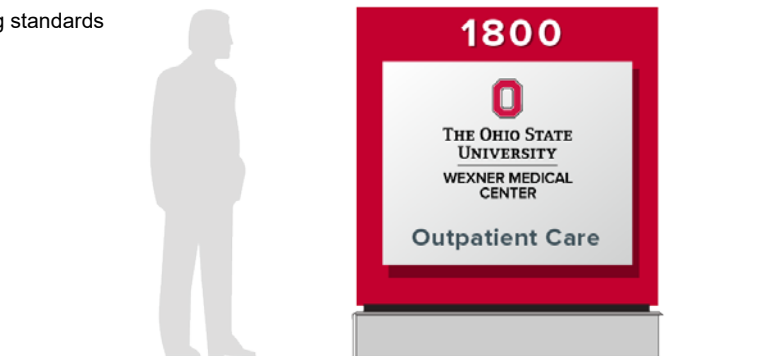
- Outpatient Care
- Primary Care
- Specialty Services
- Rehabilitation Hospital
- Public Safety
- Institute
- Clinic

Not allowed

- Department, section, unit names. University departments and units change names and locations frequently, and this creates confusion to the visitor. Building directories should be utilized to provide this information.
- Names of individual building parts or spaces. Individual destinations within a building may be considered for signage on a case by case basis if sufficient annual visitors or criticality of services can be established.
- Full donor or commemorative names. Other signage types have been developed to recognize honorific or commemorative names.
- Academic or research buildings not serving patient or visitor services

NUMBER

One per building adjacent to main building entrance, secondary or access drives may be considered on case by case basis or approved by the university architect.



Vertical Monument Sign - Square

EXTERIOR SIGNS

TYPE: IX-6

Building Illuminated Exterior Signs

FUNCTION

The primary purpose of the internally illuminated rail mounted front lit acrylic wordmark sign is used for university branding at non-academic clinical / patient, performance focused or public safety locations open extended hours of operation. The scale of the wordmark must comply with all university branding requirements. The workmark cannot exceed 1 square feet of sign to each 100 lineal feet of building facade.

LOCATION

Located at the top left of the building facade facing the main building entrance.

Wordmark must respect the architecture of the building and must be approved by the university architect.

CONTENT

Wordmark

- Block O is front lit acrylic internally illuminated for university branding and recognition
- The Ohio State University is front lit rail mounted internally illuminated for university branding and recognition
- Linear or optional stacked wordmarks can be used

Not allowed

- Department, section, or unit names not approved by university branding for use with the workmark.
- Names of individual building parts or spaces. Individual destinations within a building may be considered for signage on a case by case basis if sufficient annual visitors or criticality of services can be established.
- Academic or research buildings not serving patient or visitor services

NUMBER

One per building adjacent to main building entrance, secondary or access drives may be considered on case by case basis or approved by the university architect.



Horizontal Building Workmark - Large

EXTERIOR SIGNS

TYPE: IX-7

Building Illuminated Exterior Signs

FUNCTION

The primary purpose of the internally illuminated Block O sign is used for university branding at non-academic clinical / patient, performance focused or public safety locations open for extended hours of operation. The scale of the Block O must comply with all university branding requirements. The Block O should only be used in locations where the entire wordmark is too large for the building facade.

LOCATION

Located at the top left of the building facade or centered on an existing building feature facing the main building entrance.

Maintain the required clear space around the Block O to comply with all branding guidelines

The Block O must respect the architecture of the building and use must be approved by the university architect.

CONTENT

Wordmark

- Block O is front lit acrylic internally illuminated for university branding and recognition

Not allowed

- Academic or research buildings not serving patient or visitor services

NUMBER

One per building adjacent to main building entrance, secondary or access drives may be considered on case by case basis or approved by the university architect.



Branded Block O - Large

EXTERIOR SIGNS

TYPE: IX-8

Building Illuminated Exterior Signs

FUNCTION

The primary purpose of the internally illuminated front lit acrylic address is used for building identification at non-academic clinical / patient, performance focused or public safety locations open for extended hours of operation. The scale of the address can range from 18"-40" numbers with 24" being the most common size. The address should be used appropriately and not be too large for the building facade.

LOCATION

Located primarily at the top right of the building facade or centered on an existing building feature facing the main building entrance.

Maintain clear space around the address to respect the architecture of the building and use must be approved by the university architect.

CONTENT

Address

- Only the official street address will be used for building identification

Not allowed

- Official street name, building and suite numbers

NUMBER

One per building adjacent to main building entrance, secondary or access drives may be considered on case by case basis when the building faces major roadways or approved by the university architect.

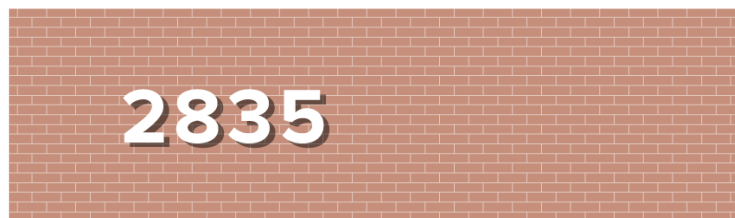
DETAIL

Proxima Novia

Semi Bold

Standard sizes include 18", 24" and 30"

Custom size available upon request



Horizontal Building Address - Large

EXTERIOR SIGNS

TYPE: IX-9

Building Illuminated Exterior Signs

FUNCTION

The primary purpose of the back lit “halo” internally illuminated building or donor sign is for recognition to match other building illuminated signs. Internally illuminated signage should only be used in locations where other building mounted illuminated signage exist.

LOCATION

Located adjacent to or centered over the primary accessible pedestrian entrance of the building. Donor signage should be located at a comfortable height for public view at the entrance for proper recognition.

In some instances it may be appropriate to have the building or donor signage at the top of the building at locations with primarily vehicular traffic facing major roadways for recognition.

Location of donor signage must respect the architecture of the building and be approved by the university architect.

CONTENT

Content is limited to:

- The name of the building
- If the purpose is Building Identification, use the a short or common form of the building name.
- If the purpose is Donor or Honorific recognition, a fuller name may be used, keeping in mind that the longer the name the smaller the letters will be.

Not allowed

- College, department, section, unit or center names

NUMBER

Limited to one sign per building

Additional signage may be considered:

- For distinctly separate building elements, such as wings, which have significant, unique identity or recognition needs.
- Only if the building’s architecture features, circulation, layout and pedestrian traffic volume justify such signage.
- Additional donor signs will be considered on case by case basis or approved by the university architect.



Jameson Crane
Sports Medicine Institute

Left Justified Back lit Donor Letters - Large



Jameson Crane
Sports Medicine Institute

Right Justified Back lit Donor Letters - Large

THE OHIO STATE UNIVERSITY

UNIVERSITY SIGNAGE STANDARDS

CAMPUSPARC PARKING SIGNS

ISSUE: 01/15/2018 | REVISION 01/15/2018

TYPE: CP-1

Accessible Parking

FUNCTION

To identify parking stalls reserved for ADA Vehicles

LOCATION

At the head of each reserved parking stall; CP-1.2 where there is an available wall surface facing the head of the parking stall, CP-1.1 where there is no suitable wall surface.

CONTENT

Symbol

Symbol to support primary message.

Primary Message

Specified parking stall function.

Secondary Message

Cautionary fines.

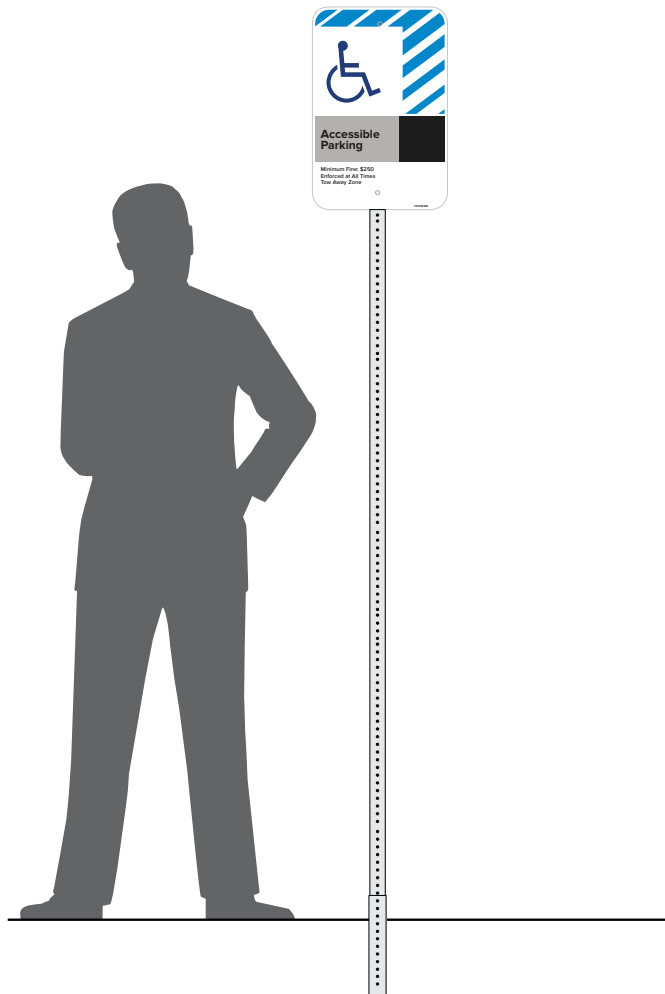
POST

Vulcan Utility Signs

2.25" x 2.25" x 3' Anchor Base, Galvanized
2" x 2" x 8' Quick Punch Post, Galvanized



CP-1.2
Wall Mount



CP-1.1
Post Mount

TYPE: CP-2

Morehouse Accessible Parking

FUNCTION

To identify parking stalls reserved ADA Vehicles

LOCATION

At the head of each reserved parking stall; CP-2.2 where there is an available wall surface facing the head of the parking stall, CP-2.1 where there is no suitable wall surface.

CONTENT

Symbol

Symbol to support primary message.

Primary Message

Specified parking stall function.

Secondary Message

Cautionary fines.

POST

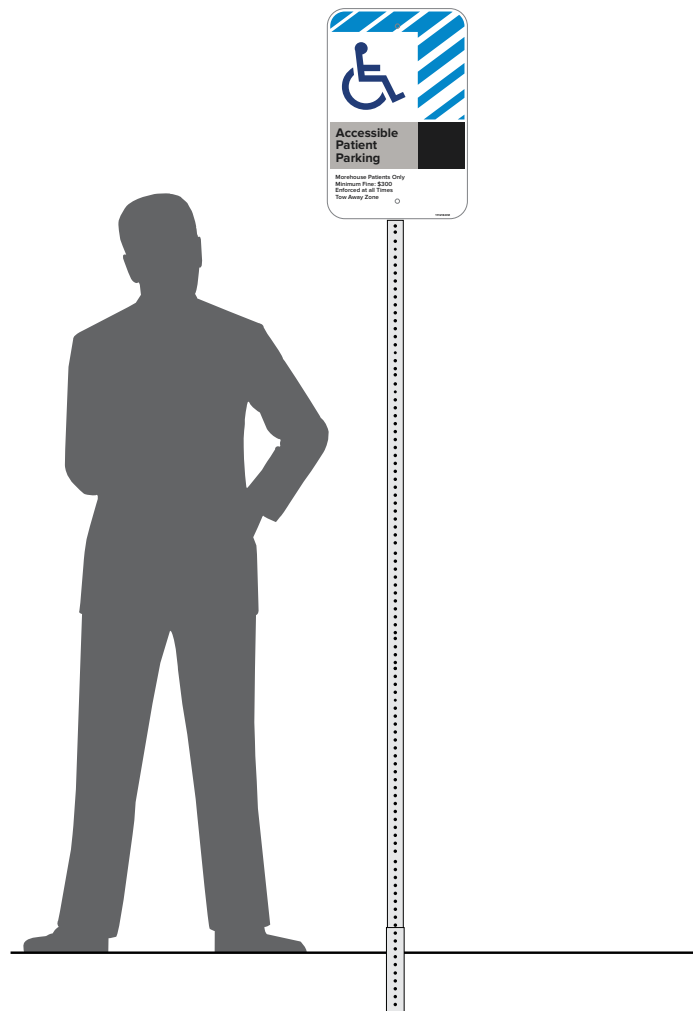
Vulcan Utility Signs

2.25" x 2.25" x 3' Anchor Base, Galvanized

2" x 2" x 8' Quick Punch Post, Galvanized



CP-2.2
Wall Mount



CP-2.1
Post Mount

TYPE: CP-3

Hourly Accessible Parking

FUNCTION

To identify parking stalls reserved for ADA Vehicles

LOCATION

At the head of each reserved parking stall; CP-3.2 where there is an available wall surface facing the head of the parking stall, CP-3.1 where there is no suitable wall surface.

CONTENT

Symbol

Symbol to support primary message.

Primary Message

Specified parking stall function.

Secondary Message

Cautionary fines.

POST

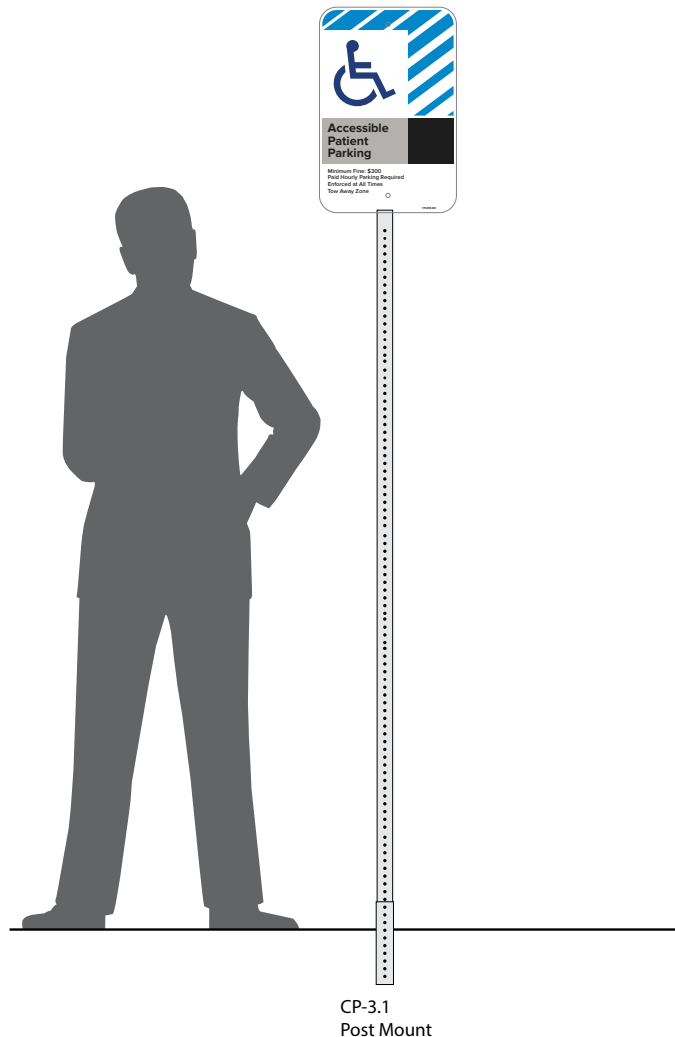
Vulcan Utility Signs

2.25" x 2.25" x 3' Anchor Base, Galvanized

2" x 2" x 8' Quick Punch Post, Galvanized



CP-3.2
Wall Mount



CP-3.1
Post Mount

TYPE: CP-4

Fire Lane

FUNCTION

To identify Fire Lane

LOCATION

At the head of each reserved parking stall; CP-4.2 where there is an available wall surface facing the head of the parking stall, CP-4.1 where there is no suitable wall surface.

CONTENT

Symbol

Symbol to support primary message.

Primary Message

Specified parking stall function.

Secondary Message

Cautionary fines.

POST

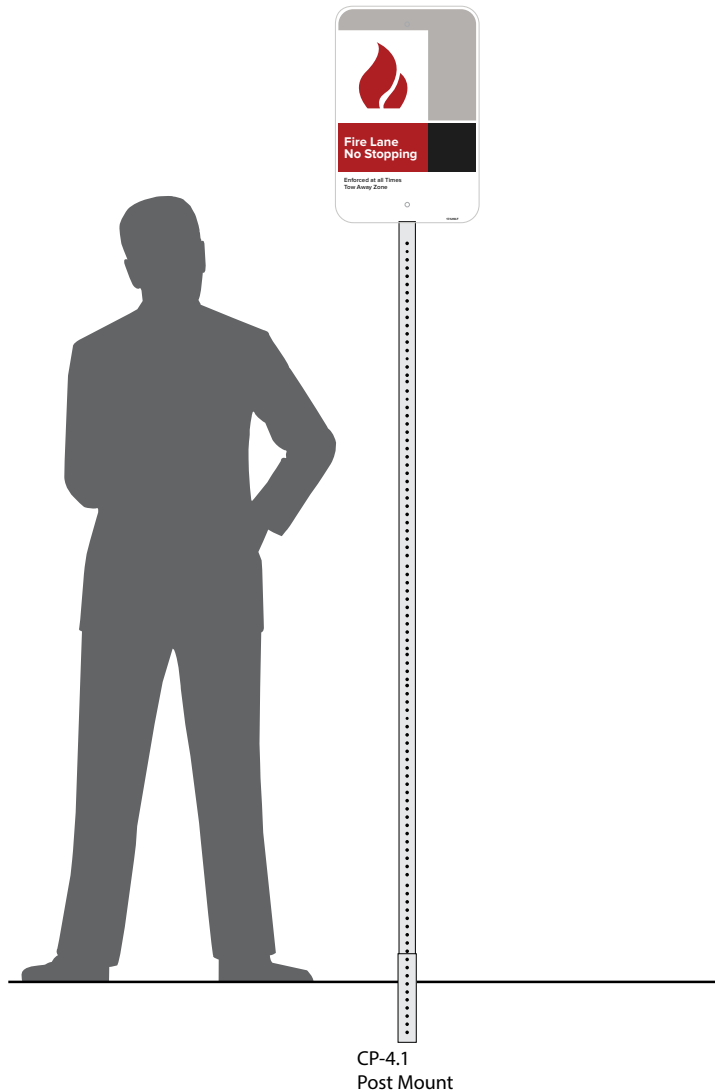
Vulcan Utility Signs

2.25" x 2.25" x 3' Anchor Base, Galvanized

2" x 2" x 8' Quick Punch Post, Galvanized



CP-4.2
Wall Mount



TYPE: CP-5

Loading Zone

FUNCTION

To identify parking stalls reserved for 10, 15, 20 & 30 minute Loading Zones

LOCATION

At the head of each reserved parking stall; CP-5.2 where there is an available wall surface facing the head of the parking stall, CP-5.1 where there is no suitable wall surface.

CONTENT

Symbol

Symbol to support primary message.

Primary Message

Specified parking stall function.

Secondary Message

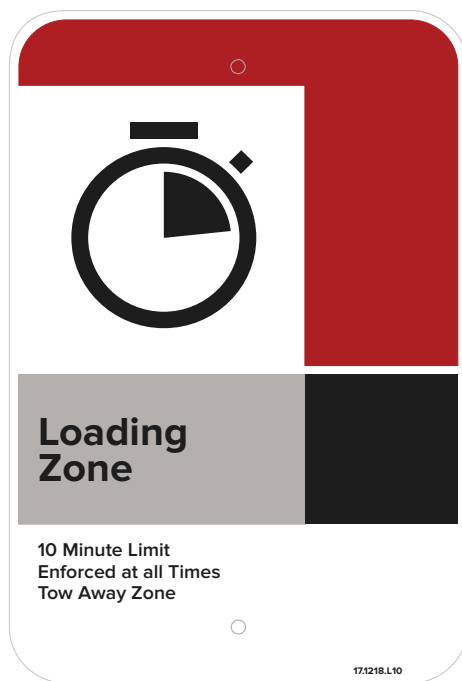
Cautionary fines.

POST

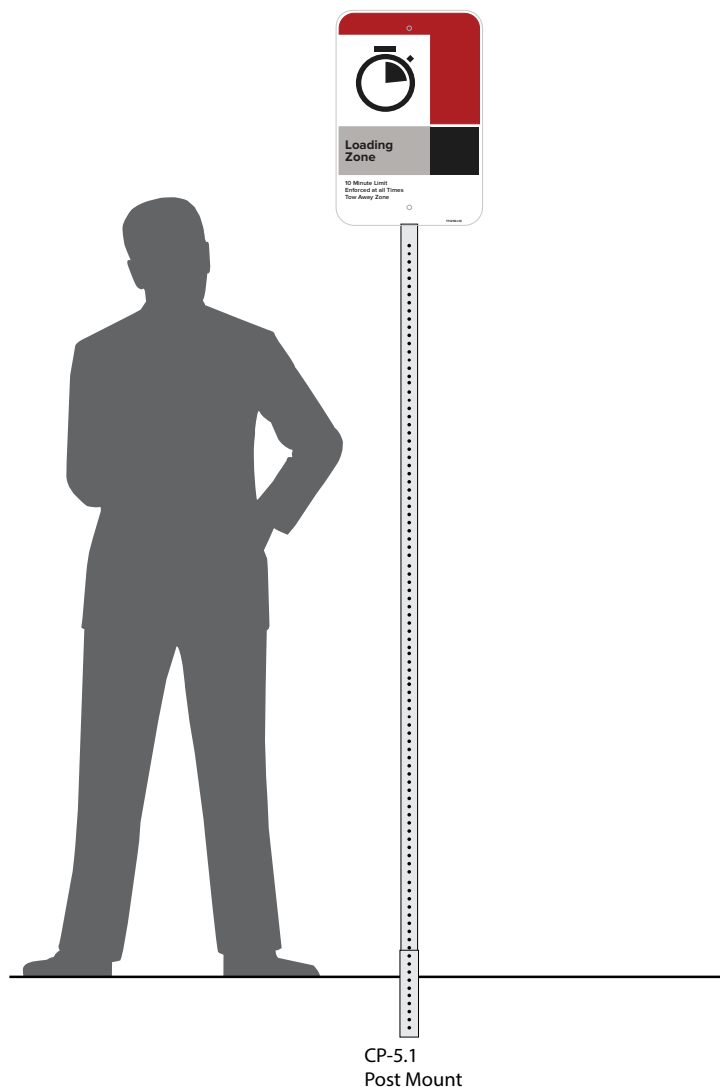
Vulcan Utility Signs

2.25" x 2.25" x 3' Anchor Base, Galvanized

2" x 2" x 8' Quick Punch Post, Galvanized



CP-5.2
Wall Mount



CP-5.1
Post Mount

TYPE: CP-9

LEFE

FUNCTION

To identify parking stalls reserved for LEFE Vehicles

LOCATION

At the head of each reserved parking stall; CP-9.2 where there is an available wall surface facing the head of the parking stall, CP-9.1 where there is no suitable wall surface.

CONTENT

Symbol

Symbol to support primary message.

Primary Message

Specified parking stall function.

Secondary Message

Cautionary fines.

POST

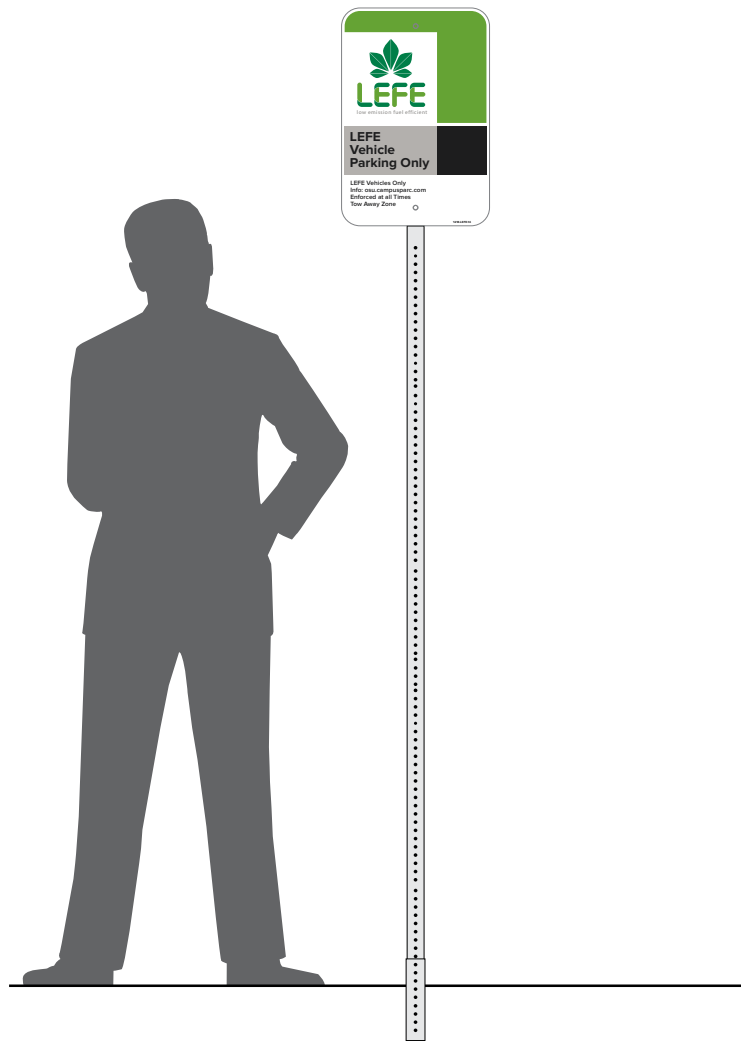
Vulcan Utility Signs

2.25" x 2.25" x 3' Anchor Base, Galvanized

2" x 2" x 8' Quick Punch Post, Galvanized



CP-9.2
Wall Mount



CP-9.1
Post Mount

TYPE: CP-10

Motorcycle

FUNCTION

To identify parking stalls reserved for Motorcycle Parking

LOCATION

At the head of each reserved parking stall; CP-10.2 where there is an available wall surface facing the head of the parking stall, CP-10.1 where there is no suitable wall surface.

CONTENT

Symbol

Symbol to support primary message.

Primary Message

Specified parking stall function.

Secondary Message

Cautionary fines.

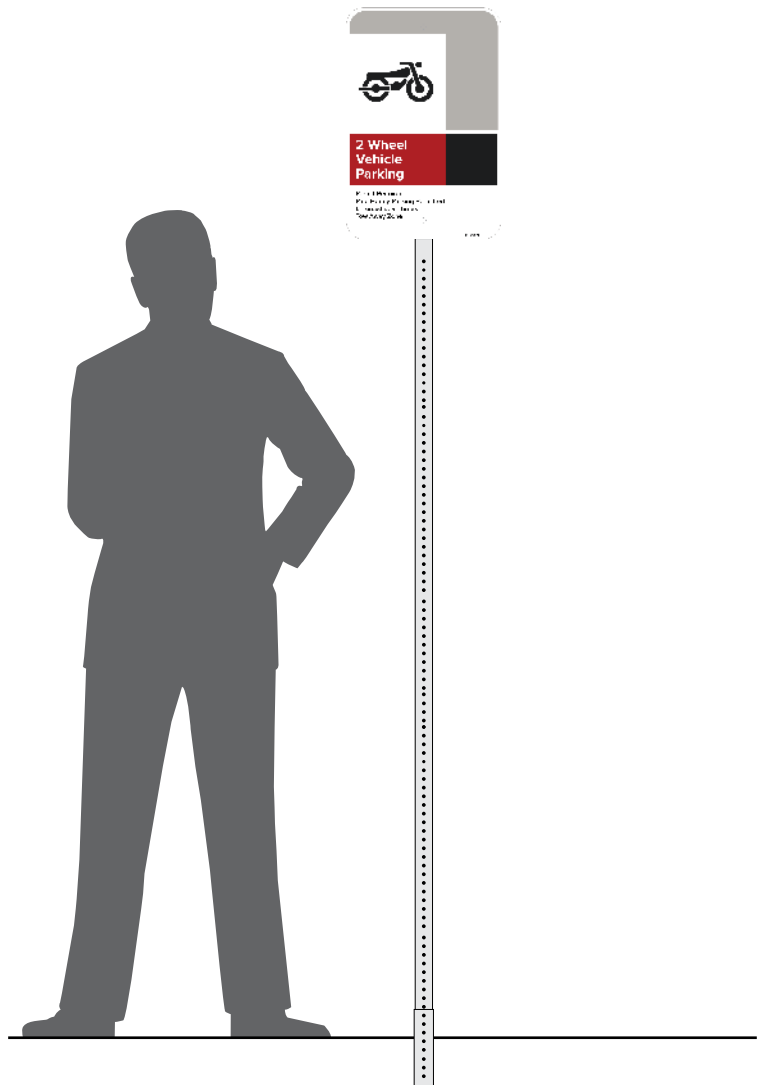
POST

Vulcan Utility Signs

2.25" x 2.25" x 3' Anchor Base, Galvanized
2" x 2" x 8' Quick Punch Post, Galvanized



CP 10.2
Wall Mount



CP 10.1
Post Mount

TYPE: CP-11

No Parking

FUNCTION

To identify where no parking is permitted

LOCATION

At the head of each reserved parking stall; CP-11.2 where there is an available wall surface facing the head of the parking stall, CP-11.1 where there is no suitable wall surface.

CONTENT

Symbol

Symbol to support primary message.

Primary Message

Specified parking stall function.

Secondary Message

Cautionary fines.

POST

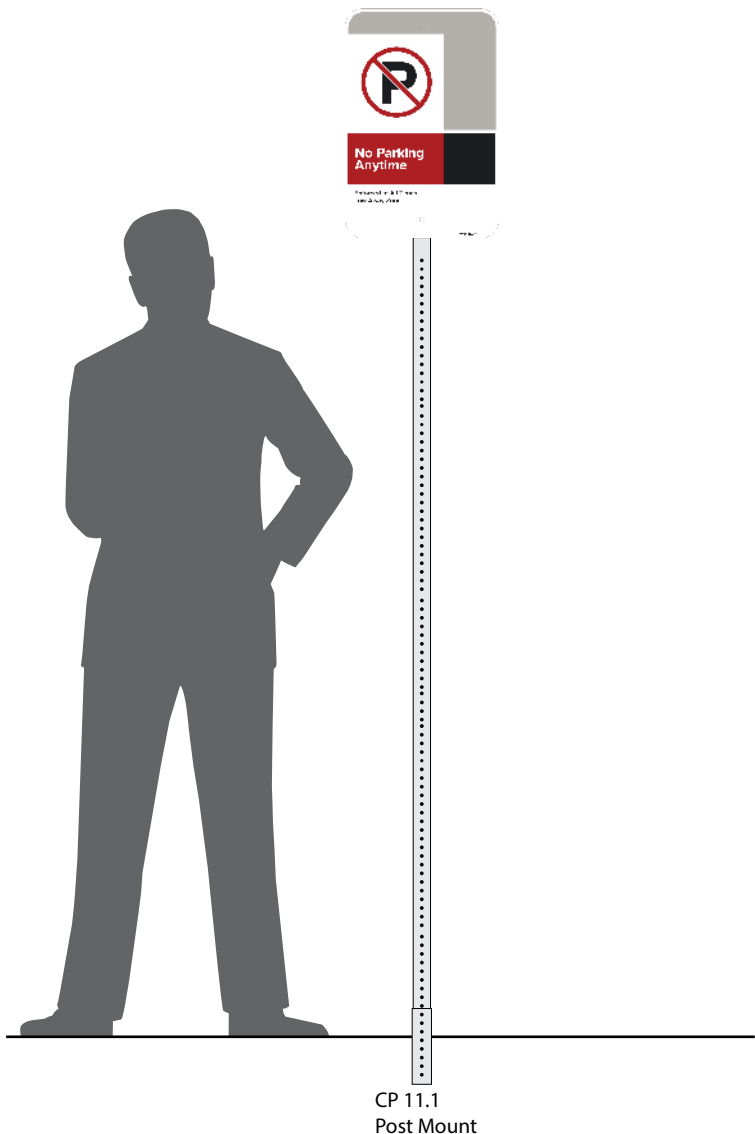
Vulcan Utility Signs

2.25" x 2.25" x 3' Anchor Base, Galvanized

2" x 2" x 8' Quick Punch Post, Galvanized



CP 11.2
Wall Mount



CP 11.1
Post Mount

TYPE: CP-12

Reserved Parking

FUNCTION

To identify reserved parking stalls

LOCATION

At the head of each reserved parking stall; CP-12.2 where there is an available wall surface facing the head of the parking stall, CP-12.1 where there is no suitable wall surface.

CONTENT

Symbol

Symbol to support primary message.

Primary Message

Specified parking stall function.

Secondary Message

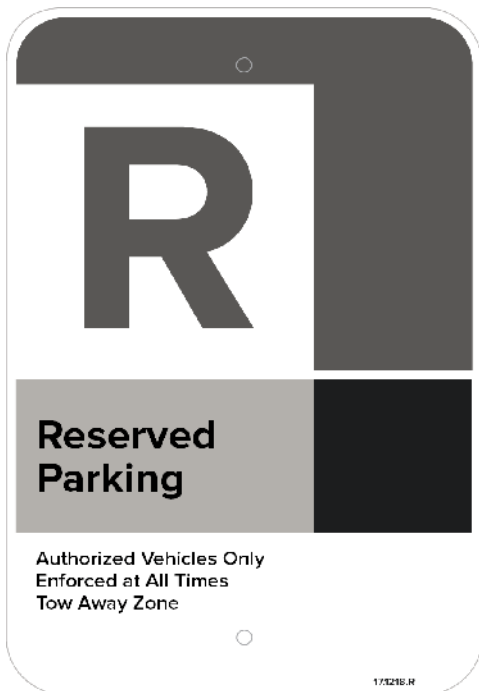
Cautionary fines.

POST

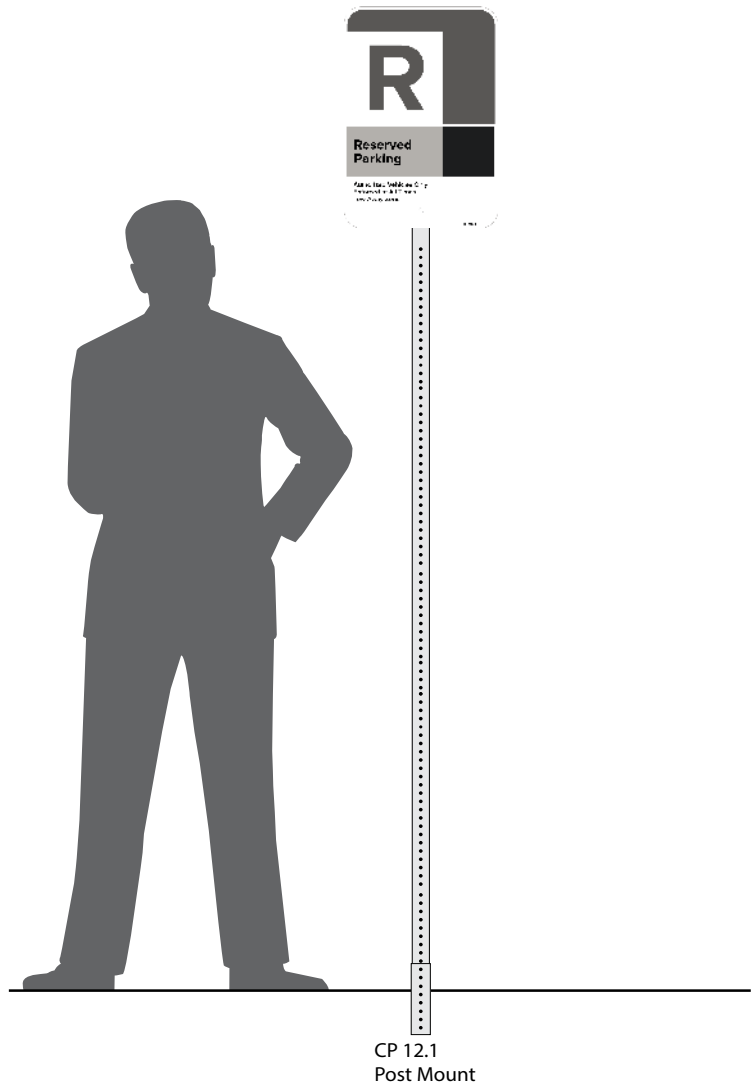
Vulcan Utility Signs

2.25" x 2.25" x 3' Anchor Base, Galvanized

2" x 2" x 8' Quick Punch Post, Galvanized



CP 12.2
Wall Mount



CP 12.1
Post Mount

TYPE: CP-13

Reserved Accessible Parking

FUNCTION

To identify reserved parking stalls

LOCATION

At the head of each reserved parking stall; CP-13.2 where there is an available wall surface facing the head of the parking stall, CP-13.1 where there is no suitable wall surface.

CONTENT

Symbol

Symbol to support primary message.

Primary Message

Specified parking stall function.

Secondary Message

Cautionary fines.

POST

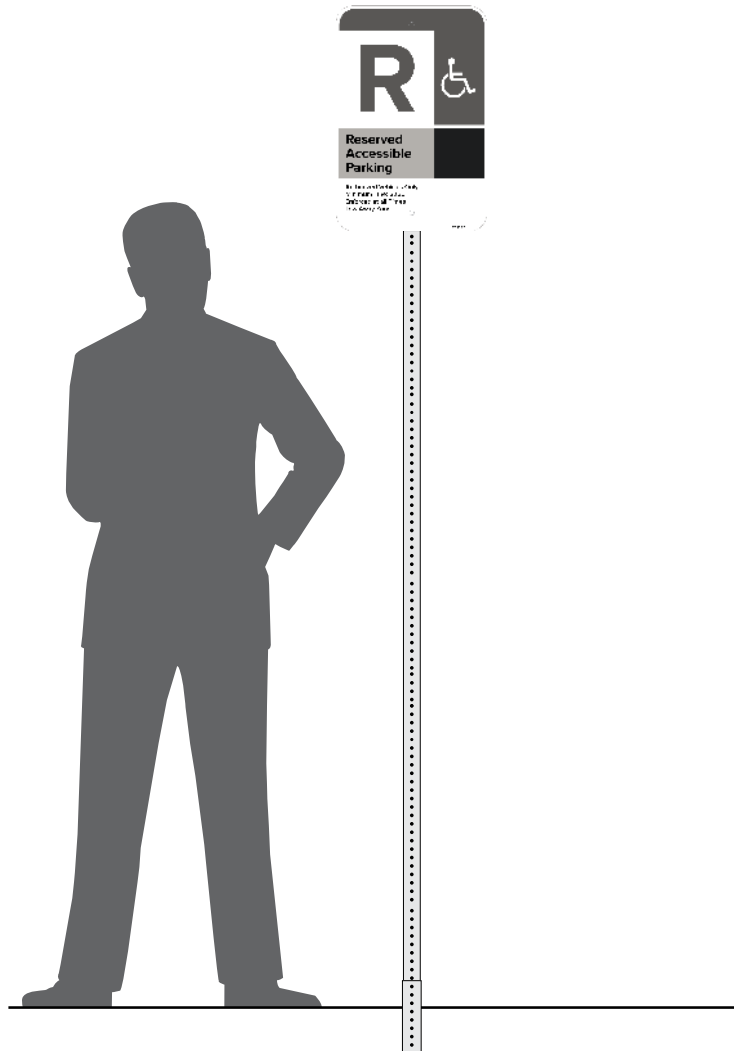
Vulcan Utility Signs

2.25" x 2.25" x 3' Anchor Base, Galvanized

2" x 2" x 8' Quick Punch Post, Galvanized



CP 13.2
Wall Mount



CP 13.1
Post Mount

TYPE: CP-14

State Vehicle Parking

FUNCTION

To identify reserved parking stalls for State Vehicles

LOCATION

At the head of each reserved parking stall; CP-14.2 where there is an available wall surface facing the head of the parking stall, CP-14.1 where there is no suitable wall surface.

CONTENT

Symbol

Symbol to support primary message.

Primary Message

Specified parking stall function.

Secondary Message

Cautionary fines.

POST

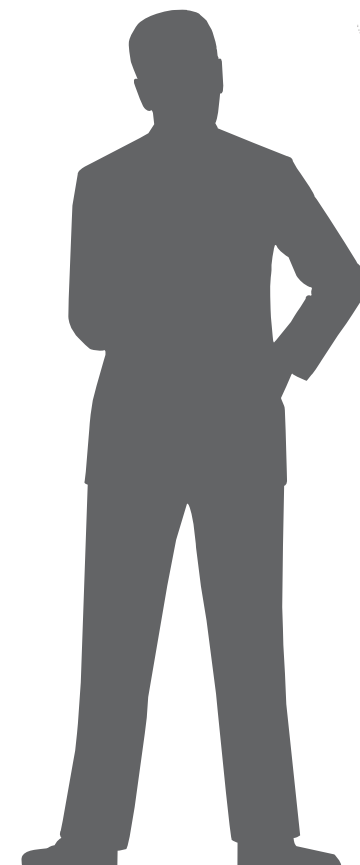
Vulcan Utility Signs

2.25" x 2.25" x 3' Anchor Base, Galvanized

2" x 2" x 8' Quick Punch Post, Galvanized



CP 14.2
Wall Mount



CP 14.1
Post Mount

TYPE: CP-15

Hourly Parking

FUNCTION

To identify parking stalls with Paid Hourly Parking

LOCATION

At the head of each reserved parking stall; CP-15.2 where there is an available wall surface facing the head of the parking stall, CP-15.1 where there is no suitable wall surface.

CONTENT

Symbol

Symbol to support primary message.

Primary Message

Specified parking stall function.

Secondary Message

Cautionary fines.

POST

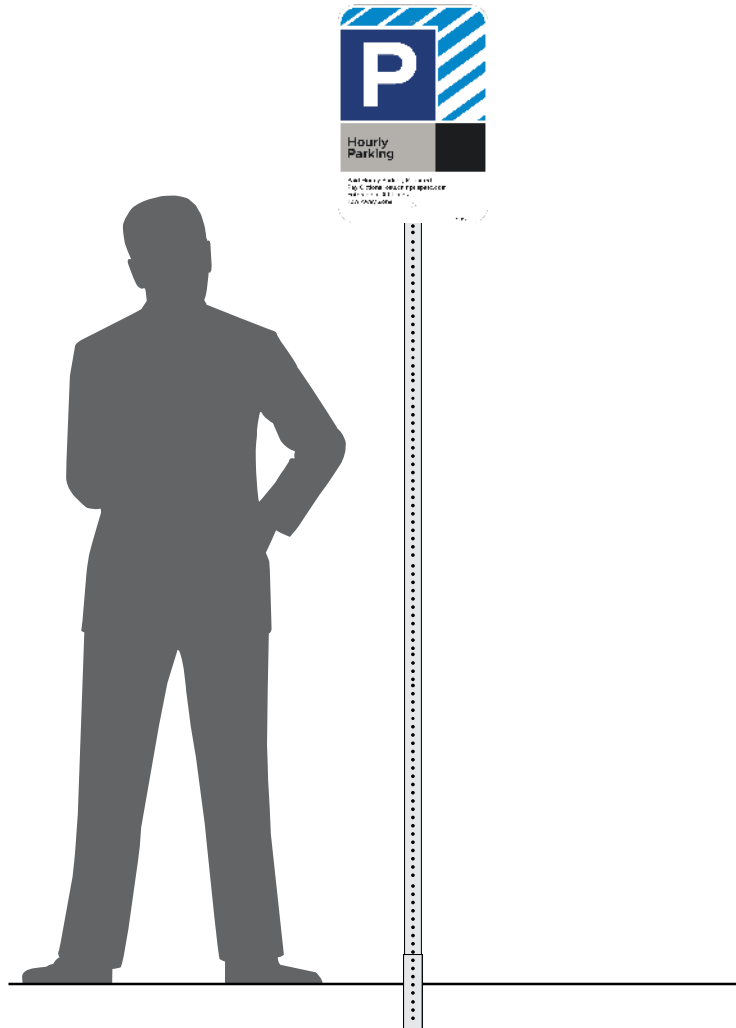
Vulcan Utility Signs

2.25" x 2.25" x 3' Anchor Base, Galvanized

2" x 2" x 8' Quick Punch Post, Galvanized



CP 15.2
Wall Mount



CP 15.1
Post Mount

TYPE: CP-16

West Campus Faculty

FUNCTION

To identify reserved parking stalls for Faculty Parking

LOCATION

At the head of each reserved parking stall; CP-16.2 where there is an available wall surface facing the head of the parking stall, CP-16.1 where there is no suitable wall surface.

CONTENT

Symbol

Symbol to support primary message.

Primary Message

Specified parking stall function.

Secondary Message

Cautionary fines.

POST

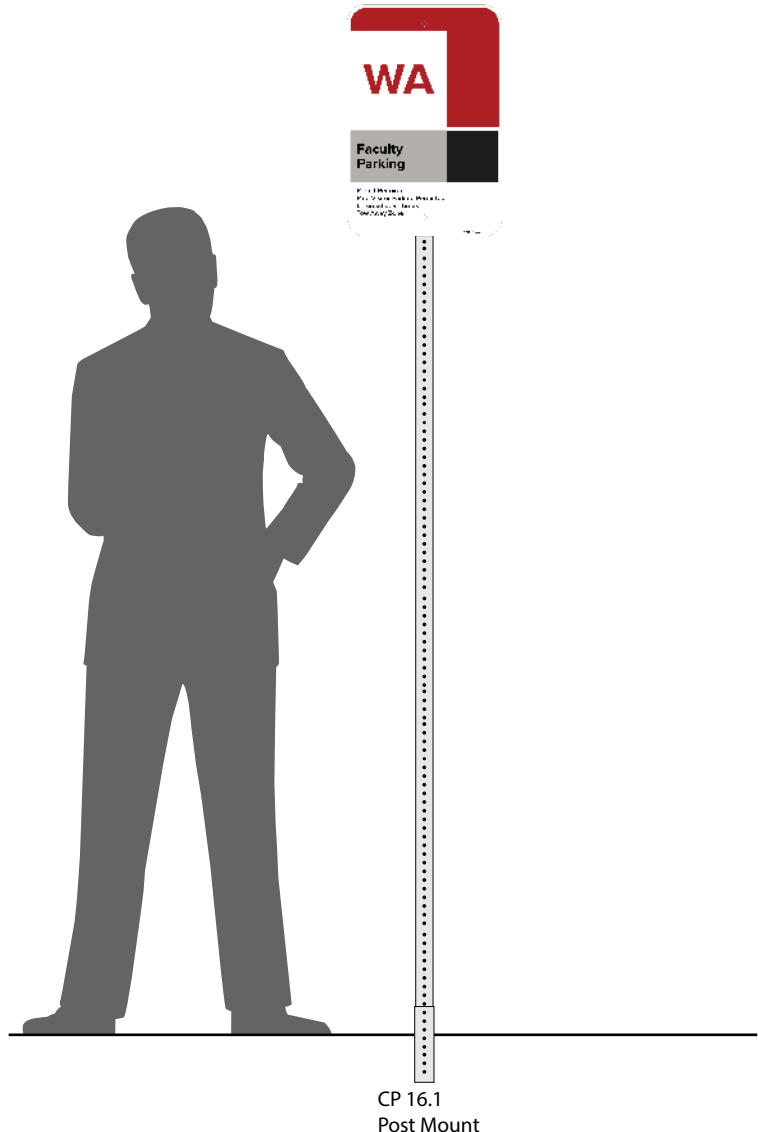
Vulcan Utility Signs

2.25" x 2.25" x 3' Anchor Base, Galvanized

2" x 2" x 8' Quick Punch Post, Galvanized



CP 16.2
Wall Mount



CP 16.1
Post Mount

TYPE: CP-17

West Campus Staff

FUNCTION

To identify reserved parking stalls for Staff Parking

LOCATION

At the head of each reserved parking stall; CP-17.2 where there is an available wall surface facing the head of the parking stall, CP-17.1 where there is no suitable wall surface.

CONTENT

Symbol

Symbol to support primary message.

Primary Message

Specified parking stall function.

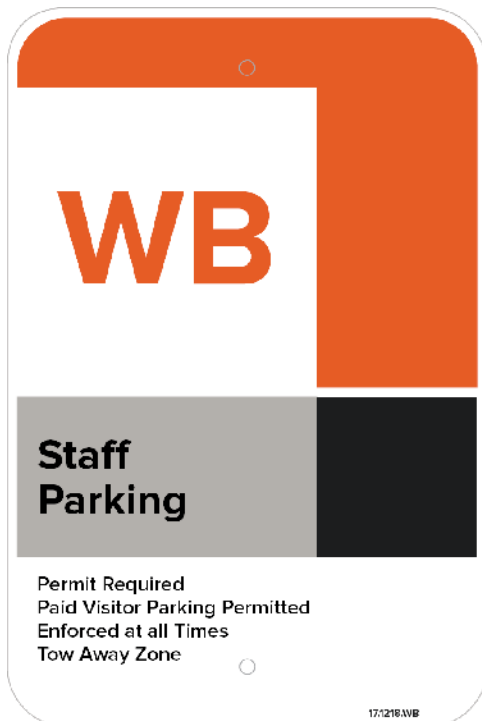
Secondary Message

Cautionary fines.

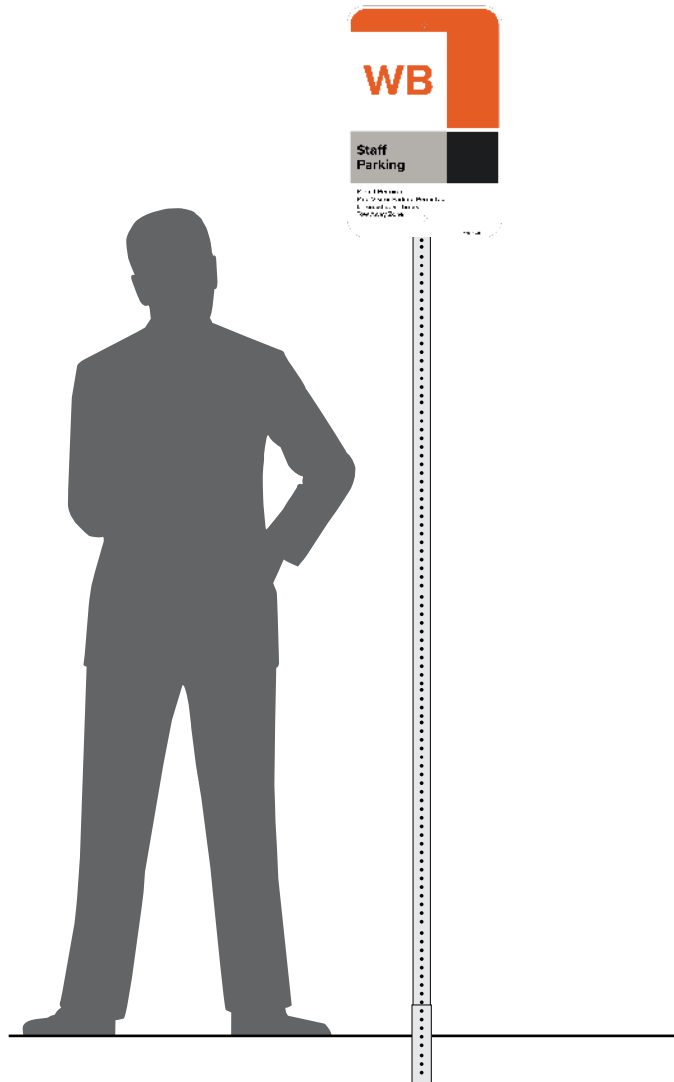
POST

Vulcan Utility Signs

2.25" x 2.25" x 3' Anchor Base, Galvanized
2" x 2" x 8' Quick Punch Post, Galvanized



CP 17.2
Wall Mount



CP 17.1
Post Mount

TYPE: CP-18

West Campus Student

FUNCTION

To identify reserved parking stalls for Students

LOCATION

At the head of each reserved parking stall; CP-18.2 where there is an available wall surface facing the head of the parking stall, CP-18.1 where there is no suitable wall surface.

CONTENT

Symbol

Symbol to support primary message.

Primary Message

Specified parking stall function.

Secondary Message

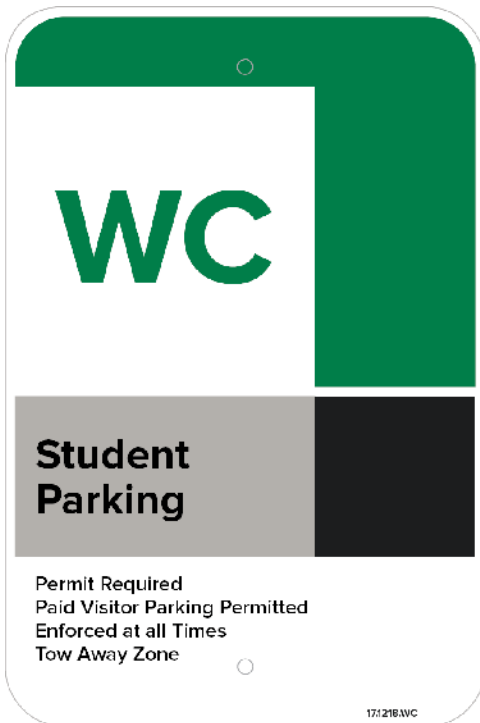
Cautionary fines.

POST

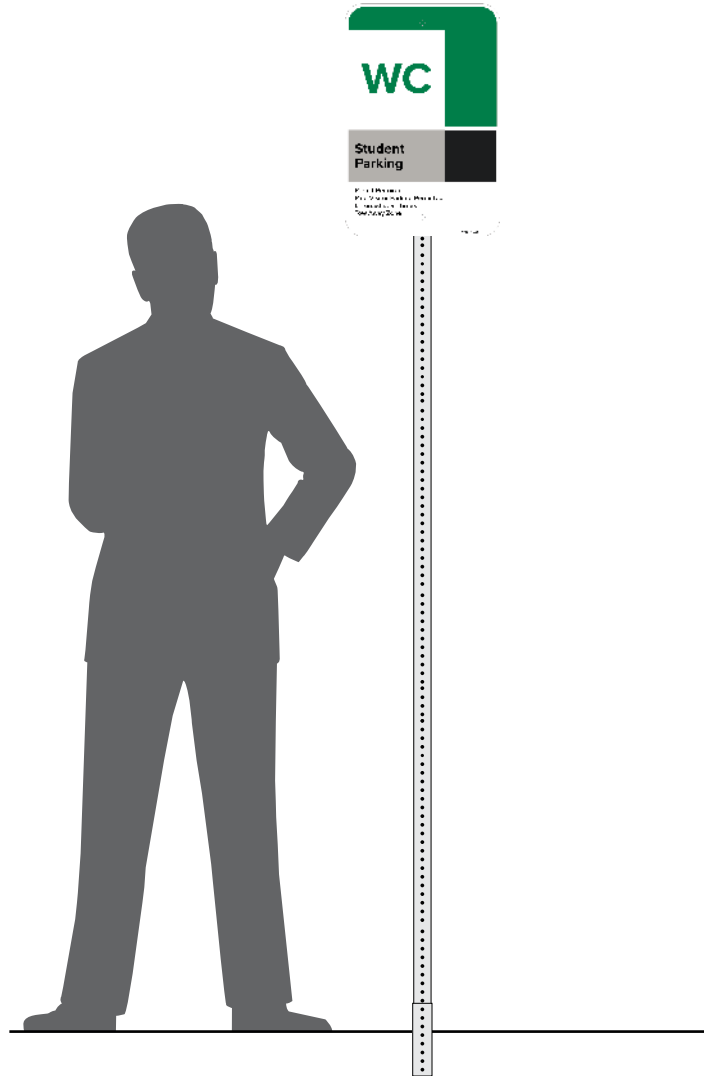
Vulcan Utility Signs

2.25" x 2.25" x 3' Anchor Base, Galvanized

2" x 2" x 8' Quick Punch Post, Galvanized



CP 18.2
Wall Mount



CP 18.1
Post Mount

TYPE: CP-19

West Campus Accessible

FUNCTION

To identify reserved Accessible parking stalls

LOCATION

At the head of each reserved parking stall; CP-19.2 where there is an available wall surface facing the head of the parking stall, CP-19.1 where there is no suitable wall surface.

CONTENT

Symbol

Symbol to support primary message.

Primary Message

Specified parking stall function.

Secondary Message

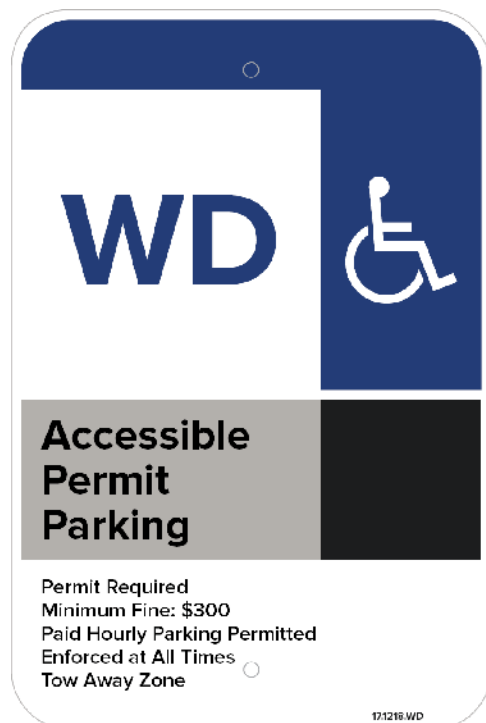
Cautionary fines.

POST

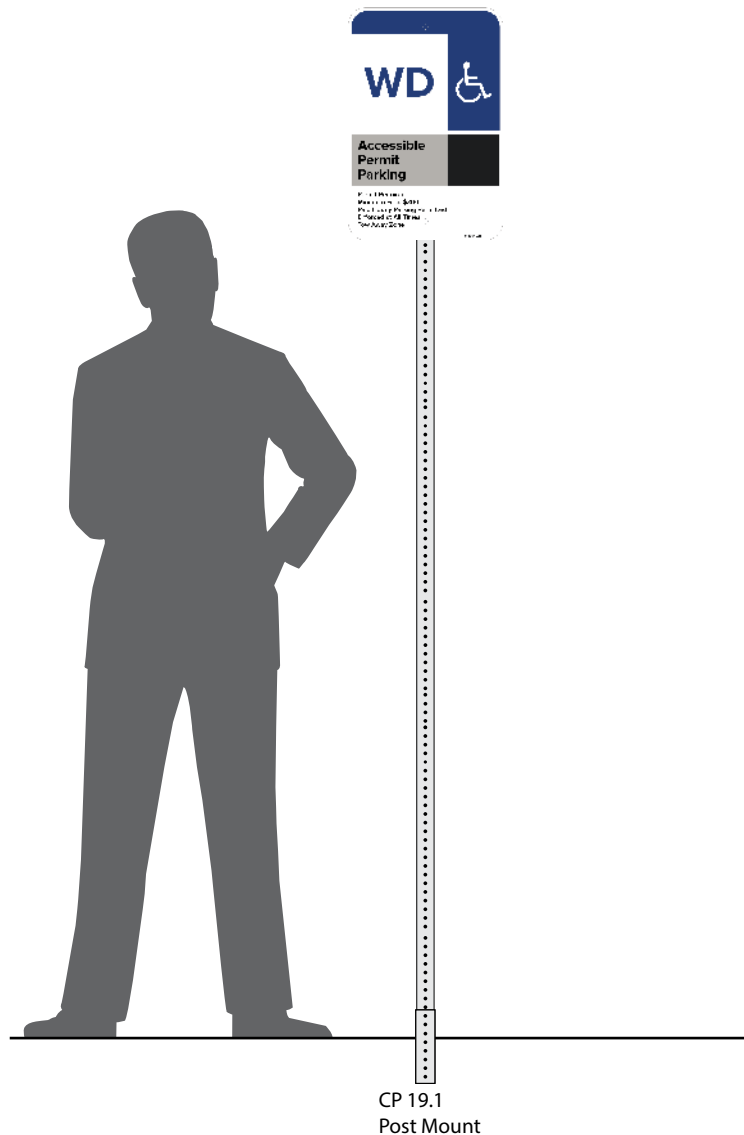
Vulcan Utility Signs

2.25" x 2.25" x 3' Anchor Base, Galvanized

2" x 2" x 8' Quick Punch Post, Galvanized



CP 19.2
Wall Mount



CP 19.1
Post Mount

TYPE: CP-20

Modifiers

FUNCTION

To modify existing signage

LOCATION

Below existing signage

POST

Vulcan Utility Signs

2.25" x 2.25" x 3' Anchor Base, Galvanized

2" x 2" x 8' Quick Punch Post, Galvanized

License Plate
UZ204/FFD6090
Required

Valet
Parking Only

Student Health
Patients Only
Permit or Paid Hourly Parking Required

VAN
ACCESSIBLE

Speech
and Hearing
Permit Required

License Plate
WEXMED
Required

License Plate
S30-782
Required

Approved
WOSU Visitors
Only

Overnight
Parking Area

No Student
Overnight
Parking

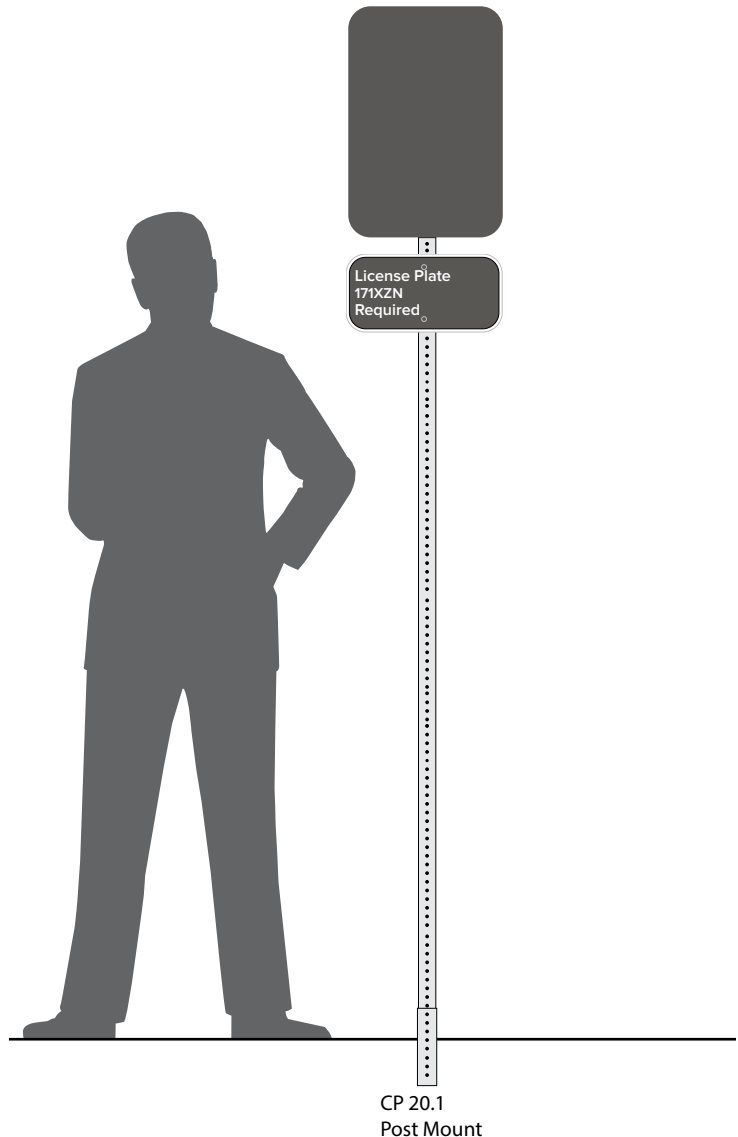
Morehouse Patient
Parking Only

Student Health
Patients Only

Wright Center of
Innovation
Hangtag Required

Veterinary
Hospital Client
Parking Only

License Plate
XPV9279
Required



CP 20.2
Wall Mount

CP 20.1
Post Mount

This foregoing document was electronically filed with the Public Utilities

Commission of Ohio Docketing Information System on

11/6/2019 11:19:11 AM

in

Case No(s). 19-1641-EL-BGN

Summary: Application Application Part 7 of 17 - Exhibit C (Part 5 of 8) electronically filed by Ms. Kari D Hehmeyer on behalf of Alexander, Trevor Mr. and THE OHIO STATE UNIVERSITY