PLANNING & DESIGN STANDARDS

GRAND VALLEY STATE UNIVERSITY

PLANNING & DESIGN STANDARDS

Instructions:

THIS IS THE END INSERT FOR A 3-RING BINDER.
THE BINDER FRONT COVER INSERT IS ON THE PREVIOUS PAGE.
(Print on sturdy paper or card stock for best results)

REVISION DATES

March 13, 1996
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Current revisions are highlighted.

GRAND VALLEY STATE UNIVERSITY

PLANNING AND DESIGN STANDARDS

REVISION INSTRUCTIONS

DATE: **JANUARY 2021**

The following divisions and/or individual pages have been revised or deleted and are to be replaced and/or removed in their entirety. Revised divisions or pages indicated below can be printed from the GVSU Facilities Planning web page. Revisions, deletion or additions are notes by a vertical line in the right hand margin as follows:

| Denotes all new and revised text

1. 06 65 00 - Added Section
2. 09 21 00 - Updated
3. 09 65 00 - Added general note
4. 10 14 00 - Updated #4
5. 11 31 00 - Updated Spec #
6. 12 36 61 .16 - Updated #1
7. 26 05 33 - Added note #5, shifted notes down.
8. 26 24 16 - Updated approved manufacturer list
9. 26 24 19 - Updated approved manufacturer list
10. 26 28 11 - Updated approved manufacturer list
11. 28 31 00 - #1 & #10, Updated approved manufacturer list

END

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CONTRACTING REQUIREMENTS

DIVISION 01: GENERAL REQUIREMENTS

DIVISION 02: EXISTING CONDITIONS

DIVISION 04: MASONRY

END OF TABLE OF CONTENTS

DIVISION 00: INTRODUCTORY, PROCUREMENT & CONTRACTING INFORMATION

INTRODUCTORY INFORMATION

00 01 00 GENERAL INFORMATION

00 01 10 DOCUMENT STANDARDS

1 To facilitate uniformity in presentation documents and record keeping by Facilities Planning, the format of project documents are restricted as follows:

00 01 11 PRESENTATION DOCUMENTS

1 Standard is 24-inch high by 36-inch wide board with) graphic scale, 1/2-inch white space border, size image to fill board, project name, image description, north arrow (up or to the left), board production date, company name (to be minimum one font size smaller than GVSU logo and name), GVSU name and logo, space designations by function, color coded and/or legend (as required to illustrate new, existing, and renovation). See sample illustration below.

SAMPLE PRESENTATION BOARD

2 Two productions (design development stage, which shows preliminary furniture layouts) and start of construction, which shows proposed furniture layouts, three copies each. Second production to be "colorized" and also include a file reduced to 8.5 x 11 size to allow responses to requests for publication.

3 Provide, at a minimum, for each project the following:
- A. Site plan boards.
- B. Floor plan boards. For multi-story buildings where there are typical floors, only one typical floor plan need be provided.
  - i. 4 - Rendered exterior elevation boards.
  - ii. 4 - Rendered perspective boards (This requirement may be waived at the University's discretion).
  - iii. 2-3 Interior 3D perspectives of key areas.
  - iv. Sets of all the above in 11" x 17" and 8-1/2" x 11" format.
  - v. 1 – Electronic file of all the above illustrations in Adobe Illustrator (AI) and PDF format.

4 Interior design presentations shall, at a minimum, conform to the following:
- A. A finish material presentation board with samples of all proposed finishes mounted to the board. Each material item shall be identified as to color and manufacturer. Each material item will be identified with a key number.
- B. Board mounted floors plans, color coded and identified with the corresponding key number used on the finish material presentation board. The intent is to provide a readily identifiable visual reference as to where selected materials are being used in the plan.

00 01 12 SPECIFICATIONS

1 Format shall comply with most recent published edition of the Construction Specification Institute's (CSI) MasterFormat.

2 Paper size shall be 8-1/2" x 11" and will not have foldout pages. Permanently bound.

3 Omit all text which does not apply to the project. Avoid excess verbiage and vague statements. As you write, think how you would enforce.

4 When other standards (ASTM, ANSI, etc.) are referred to, architect/engineer will be able to produce a copy if needed. When referencing a standard, also include the standard date.

5 Include index for all sections in the Table of Contents.

00 01 13 DRAWINGS

1 Drawings shall be either 24" x 36" or 30" x 42", depending upon the requirements of the specific project.

2 Additional ½ size drawings are to be provided as part of the documents required at bidding.

3 Cover sheet of construction drawings shall indicate the following additional information:
- A. Each contractor is responsible for calling Miss Dig AND GVSU Dig.
- B. Show a building location map with site access route.
- C. Include key project team members and contact information. DO NOT provide GVSU contact on cover sheet.

4 Other drawings shall include:
- A. Total gross building area of new construction, and if applicable, renovated area.
- B. Total gross area, by floor, of new construction, and if applicable, renovated area.
- C. Total net assignable to gross ratio for building, expressed as percentage. Use the State of Michigan's definition of Net Assignable Area. The University, for all building projects regardless of funding source, requires this calculation. This calculation is mandatory for all University projects receiving State funding. Refer to CURRENT requirements published by the State of Michigan's Department of management and Budget. Below link for reference only. http://www.michigan.gov/documents/dmb/DMB494_October_2008_254913_7.pdf
- D. Total gross useable area by floor, expressed as percentage of floor gross area.
- E. Capacity of each room as it pertains to code.
- F. AutoCAD outline of entire building, including any additions.

00 01 15 PROJECT REVIEWS

1 The University reviews drawings and specifications for compliance with these standards. The University's review is NOT to be substituted for the Consultants own internal quality control reviews for compliance with overall industry standards and best practices, and the University's standards.
- A. Comprehensive project reviews shall be held with GVSU Faculty/Staff at 50% and 95% completion of both, Design Development and Construction Document phases.

00 01 20 ADHERENCE TO STANDARDS

1 Failure to Comply with Standards: It is the University's expectation that the Professional will comply with the University's Planning and Design Standards. Deviation from these standards is possible but only with the University's approval and following the process outlined below. The Professional will be held responsible, as stipulated in Chapter 3, Article 7 of the University's Contract for Professional Services, for any corrections required to the work when not in accordance with these Planning and Design Standards.

2 Request for deviation from the University's Design and Planning Standards shall be submitted on the Facility Standards/Guidelines Deviation Form included in Appendix E of this manual.

00 01 40 HAZARDOUS MATERIALS

1 No **asbestos containing** building materials shall be employed in any GVSU facility. The Architect AND General Contractor shall provide GVSU a statement certifying compliance as part of the projects closeout documentation. "No asbestos containing building materials were used in the construction of the _____ building at Grand Valley State University. The Architect/Engineer is to include this requirement in the projects specifications.

00 01 50 PHOTOGRAPHIC & IMAGE MATERIALS

1 Upon receiving advanced written authorization from the Owner, the Contractor/Professional and/or their agent(s) may take photographs and/or videotapes during the course of construction, and at the completion of the project for its own use.

A. Any photographs taken that include person(s), whether or not that person(s) are employed by the University or whether or not these person(s) are students of the University, shall have the proper and legally required waivers granting permission, by the photographed person(s), to use these photographs for other purposes. Such waivers shall also include and grant the same permission to the Owner. Copies of all waivers shall be provided to the Owner.

B. If the Contractor/Professional or a photographer contracted by the Contractor/Professional takes photographs of the project, in part or in whole, one complete set of the photographs taken shall be provided to the Owner at no additional cost. The photographs furnished to the Owner shall be in JPEG or TIFF digital format, minimum of 300 dpi. Furthermore:

C. The Owner shall be granted a non-exclusive right to use photograph(s) or video recording(s) taken by the Contractor/Professional, or any agent(s) of the Contractor/Professional for any purpose it deems appropriate.

D. The owner shall be granted permission for an indefinite period of time to use the photograph(s) or video recording(s) and any copies or reproductions of same and such grant cannot be revoked by the Contractor/Professional or the Contractor/Professional's agent(s).

E. The Owner may duplicate the photograph(s) or video recording(s) in any medium and may modify the photograph for reproductions or copies as it deems appropriate.

F. The Owner may publish, sell or re-broadcast the photograph(s) or video recording(s) without seeking prior approval from the Contractor/Professional or the Contractor/professional's agent(s).

G. The Contractor/Professional and or their agent(s) warrants that he/she is vested with sole ownership with the power to convey all rights that the photograph(s) does not infringe any valid copyright or other proprietary right of any person.

H. Photographs or video recordings, provided to the Owner, shall be free from watermarks, labels, branding or advertising or any other printed or digital overlay that obscures or otherwise detracts from the original photographic or video image.

2 Photographs and/or video content used by the Contractor/Professional for commercial advertising and/or marketing purposes shall be used only after the written approval of the Owner and used for such purposes only when crediting and acknowledging Grand Valley State University as the owner of the entity photographed and/or videoed.

3 The use of (UAS) Unmanned Aircraft Systems or Drones are not allowed on University property unless prior written approval from an Executive Officer of the University is obtained. Contact Project Manager for approval process.

00 02 00 SITE PLANNING

00 02 10 GENERAL

1 Site Investigation: Design firm is required to visit site and ascertain existing field conditions. Reliance upon GVSU supplied documents is not recommended as a basis for design. Effective on-site investigation is required. The intent is to provide adequate information to complete the design and to allow the contractor to prepare a comprehensive cost proposal.

2 Architect/Engineer: shall be responsible for identification of any site items which are to be protected during the course of a construction project, provide documentation, on drawings and/or specifications, for protection of the items. The Architect/Engineer is to compile a list, for University approval, of such items to be coordinated prior to the project being released for bids.

3 Architect/Engineer shall assist the University in addressing the following tasks:

A. Does the proposed project affect pedestrian or auto traffic?
B. If yes, to what extent does it impact normal operation?
C. Is there an alternative to eliminate the disruption (discuss the proposed alternatives with Public Safety Department)?
D. If no, what is required to detour traffic and/or pedestrians safely around construction activities.
E. Does it involve trained personnel and signs to direct traffic and/or pedestrians around the construction activity?
F. If yes, add the cost of the required staffing and signs to the project budget.
G. Add the required traffic control requirements to the description of the project; note this requirement in discussions about the project (include in discussions with Executive Officers).
H. At the pre-bid meeting for the project, describe the expectations for traffic control; make note of this discussion with the bidders in the project file.
I. At the pre-construction meeting, confirm the arrangements for traffic and pedestrian control (include Public Safety in the discussions with the contractor(s).
J. Monitor the controls through each phase of the project.

4 If the answer to question three A (3A) is yes then the following points are to be addressed in the architect's/engineer's contract drawings and/or specifications:

A. Campus Drive and other primary streets must remain available for traffic at the peak times of the day and at class change periods.
B. Prior warning of a traffic disruption must include at least a 10 day notice to the campus community with signs being erected at least seven (7) days before the closure or re-routing of traffic. If the work is delayed by weather, the work must proceed immediately upon arrival of appropriate weather.
C. Temporary sidewalks and other pedestrian routes must accommodate the traffic load. If a temporary pedestrian way is expected to be used during snow removal season, it must support snow removal by pick-up trucks (snow removal capacity is not required if the contractor removes snow to University standards)
D. In instances where the permanent surface is cut to allow the installation of new work, a permanent repair must be made immediately upon completion of the new work. A graveled trench will not be permitted in a permanent surface.
E. All temporary pedestrian routes shall be ADA compliant.
F. Is temporary lighting required for temporary pedestrian/vehicular detours? If yes, account for lighting in budget.
G. Traffic control personnel must be trained, properly attired, dedicated to the traffic control task, given the responsibility to stop the work to relieve traffic problems, able to communicate with the work crew to summon assistance as required to keep traffic flowing.
H. All temporary routes must allow the University to conduct normal operations. (For instance, a four (4) foot temporary sidewalk will not be permitted along an eight (8) foot route, as the 4 feet does not allow for normal University operations).

5 In general, all building entrances except for loading docks shall be at grade level, with no steps from the accessible path at the adjacent street, sidewalk or parking lot to the entrance doors.

6 Provide for service entrance separate from a pedestrian entrance.

7 Provide for adequate drainage for all exterior areas.

8 Avoid all raised structures at building entrances that would hinder snow removal.

9 Avoid long steep overhangs on the building to reduce icicle formation and buildup. Example: Kirkhof Center east side entrances.

10 Provide parking for contractors, deliveries, mail, etc. at a service entrance. Design to accommodate delivery vehicles.

11 Provide for Service Drives and provide a large indoor trash storage room. (or design attractive outdoor trash holding area). Provide recycle container space. Confirm with GVSU.

12 Avoid using small radii corners at sidewalk intersections.

13 At perimeter of buildings, provide 18-inch wide, 4-inch thick, concrete maintenance strip. Where sloped roofs are used without gutters, provide gravel maintenance strip, in lieu of concrete, of sufficient depth to catch roof run off at eaves and roof valleys.

00 02 20 SOIL BORINGS

1 Soil boring locations shall be determined by the Architect/Engineer and contracted by the Construction Manager.
2 Soil borings shall be conducted in consideration of and coordination around, existing ongoing operations such as parking, classroom schedule or other campus activities for which the soil boring activity may be in conflict with.
3 Miss Dig and GVSU Dig requirements shall be adhered to prior to the commencement of soil boring activities.

00 02 30 FLOOD CONTROL

1 The first floor elevation of any building shall be a minimum of 12" above the highest part of any adjacent surrounding roads.

00 02 40 UTILITY DESIGN

00 02 41 GENERAL

1 Where possible, all utilities should come into one area in the building
2 Excavation Plans should indicate all underground utilities and the effects of new grading should be carefully coordinated with existing utilities and other appurtenances.
3 The elevation and location of underground utilities shall be field verified by excavation or other reliable means during design.
4 On one drawing, all existing and all new utilities shall be shown to make apparent any interference and to help in coordinating the connection of new utility systems to the existing.
5 All new and existing utilities are to have profile drawings to show elevations for construction and clearances from other utilities.
6 Design of all new utilities will be performed in coordination with Facilities Planning and Facilities Services Engineering.
7 All utility tunnel penetrations to be approved by Facilities Services Engineering before Contract Documents are let for bidding.
8 New buildings or additions shall not be built over new or existing utility mains.

00 02 50 CAMPUS UTILITY SYSTEMS

00 02 51 GENERAL

1 The following utility systems are located underground throughout the Allendale campus:
A. Steam: Central high-pressure steam is available to most new structures for heating. The system is generally extended via walkable tunnels which house steam supply and pumped condensate.
B. Potable water: Is provided by a campus loop system from Allendale Township and City of Grand Rapids water supply mains
C. Chilled Water: For air conditioning purposes, chilled water is available from a central chilled water plant located at the Central Utilities Building (CUB) at the north end of campus Utilities Building (SUB) located at the east end of Calder Dr. The Architect/Engineer shall contact Facilities Services Engineering, (616) 331-3000, to verify available additional capacity.
D. Sanitary Sewer: Sanitary sewers are connected to a central system leading to the Allendale Township trunk line running thru campus from Pierce St. to M-45 and leads to their sewage treatment plant located north of M-45.
E. Storm Sewer: Storm water is run separately into a central system and eventually leads to the river on the east or to ravines bordering M-45 and heading to the north. In keeping with the University's Sustainable initiatives it is the intent of the University to minimize outflow of storm water off the University's main campus. Storm water design will be handled on a project by project basis but whenever possible storm water should be managed by utilizing various methodologies such as, but not necessarily limited to, the following:
1) Retention and detention (both surface and underground). Couple retention with irrigation opportunities if any.
F. Electric: Electricity is provided by a 12,470 volt distribution system. Distribution system is fed by a Consumers Energy main transmission line at the north end of campus and feeds a campus sub-station located at north end of campus, west of the Central Utilities Building. All switches on the primary loops are to be non-fused. Switches may be fused to the respective building they serve.
G. Site Lighting: Underground distribution with voltages of 277 and 480.
H. Communications**:** Telephone and data systems are provided by GVSU.

I. Natural gas: Provided by DTE. Main lines are 60#. Gas service routing and loads are to be shown on construction and bidding documents. See Section 33 51 00
J. Irrigation: Consult Facilities Planning Project Manager for current GVSU irrigation controls system.

2 Facilities Services Engineering shall approve placement and location of all utilities placed in the existing campus utility tunnel.

00 03 00 ARCHITECTURAL REQUIREMENTS

00 03 10 GENERAL

00 03 11 ORIENTATION

1 Where possible, buildings should be oriented on the site in a manner that will reduce the effect of winter winds on heating, summer sun on cooling, and infiltration of winter winds at entrances.
2 Be cognizant of building entrances and their relationship to handicap parking and bus stops.

00 03 12 ARCHITECTURAL CHARACTER

1 The University desires new buildings to be distinctively designed but sensitive and complementary to the existing campus. Alterations to exterior of existing buildings shall match the existing building and additions to existing buildings shall match or, at a minimum, harmonize with the existing building unless otherwise directed by the University.
2 Brick is a predominate exterior building material.
3 University may elect to have architect employ interior design professional as selected by GVSU and coordinate design and costs.

00 03 13 SUSTAINABLE DESIGN

1 It is the intent of the university to utilize sustainable design strategies, following the standards established by the U.S. Green Building Council in its Leadership in Energy and Environmental Design current rating systems, where applicable and appropriate for specific projects. It is the University's intent that all new building construction shall meet, at a minimum, LEED Silver Certification requirements.
2 When registering a University project with USGBC, the **Project LEED administrator shall do the following**:
A. The USGBC submitted project name shall be approved by the University prior to any submission being made.
B. USGBC allows project names to be only 40 characters long (including spaces, periods, commas, etc.) as listed on the USGBC website or the GBCI website - a project name should be selected that does not automatically truncate at the USGBC LEED project listing.
C. The project name shall be submitted to USGBC in Title case, not in all capitals.
D. The Owner name shall be spelled out as "Grand Valley State University".
E. At no time shall the abbreviated term "GVSU" be found anywhere in the project listing.
3 Design Professionals and Construction Managers, through their document preparation and work execution, will insure that all projects can meet the requirements of the current LEED Rating System as it applies to new construction and major renovation projects, and as delineated on the following project checklist.

00 03 16 ACCESSIBLE DESIGN

1 Designs shall conform to, at a minimum, to the most current version of the ADA Standards for Accessible Design. Plan shall be reviewed with Disability Support Resources.
2 The following University Standards amend, by enhancing, the current requirements stipulated in the following sections of the most current, adopted ADA Standards for Accessible Design:
A. 308.2 Front Reach & 308.3 Side Reach: Front and side reach to card swipe devices and ADA push button devices shall be 36-inches maximum from floor or walk surface to the centerline of the device.
B. 402.2 Accessible Routes: The running slopes of walking surfaces shall not exceed 1:20. In approaches to building entrances with a slope of 1:20, the maximum rise shall be 60-inches. Requirements for landings shall be consistent with 405.7 of the most current, adopted ADA Standards for Accessible Design.
C. All computer labs shall include (1) one height adjustable 24”x60” desk.
D. Consult with the GVSU Project Manager as to quantity and location of hearing loops.

00 03 20 BUILDING ENVELOPE AND SPACES

00 03 21 GENERAL

1 Building envelope including glass must conform to Michigan Energy Code. Provide calculations and copies of manufacturer's performance testing data.
2 Attic areas shall have sufficient ventilation to minimize roof snow melts and subsequent ice damns at eaves and valleys that cause water leaks and roof damage. The attic ambient air temperature shall not vary more than 10 degrees from the outside ambient air temperature.
3 Provide overhang at all entrances, to reduce snow accumulation. Overhang needs to be adequate for given conditions, such as directional orientation, exposure to prevailing winds, etc. The Architect shall take these factors into consideration in design of overhangs to provide adequate protection of building entrances.
4 Roof and canopy surfaces shall be sloped in such a manner so as to prohibit snow slide-off of snow and/or ice onto walk surfaces and building entrances. Do not design roofs or canopies that slope down toward building entrances or exits.
5 Fresh Air Intakes: Do not locate where vehicle exhaust from standing vehicles may be present; locate at least 25 feet away from any designated smoking areas. Consider prevailing winds and other mechanical exhaust locations.
6 Provide protection of entrances from ice and snow slides from roof. Design solutions shall include ice melt and ice management features so that icicles do not form at entries in any type of snow or ice conditions.
7 Window Cleaning: For buildings 3 stories or higher, provide sealed engineering plans for a roof mounted window-washing support system.

00 03 22 EXTERIOR WALL CONSTRUCTION

1 Design for severe wind-driven rain conditions. Design for secondary means of weather protection -do not just caulk joints. Assume that water will get past primary weather barrier.
2 Include vapor barriers.

00 03 23 ROOF

1 Refer to Division 7 for additional requirements
2 Provide stairs to any roof mechanical penthouses so maintenance personnel can climb with a toolbox and parts in one hand and grip a railing with the other. Do not use ship's ladders.

00 03 24 BUILDING SIGNAGE

This guideline addresses the appropriate size and scale of letters on university buildings, which include donor recognition. The size and scope of the building project will dictate the size and scope of all lettering. Letters must fit aesthetically with architectural design. **All signage must be approved by GVSU Facilities Planning.**

1 The largest lettering scale and dominant name will be "Grand Valley State University", placed on the highest level and /or most prominent or public facing area deemed appropriate for the building and sign and will be in logo format.
2 Font and color for "Grand Valley State University" "Donor Name", and "Building Name" will be consistent with the Facilities Planning Exterior Signage Standards Manual.
3 The "circle G" logo will be used at all times, consistent with Institutional Marketing Logo/Identity Standards, with the following exception: the GV Athletics logo will be used for athletic facilities and athletics branding only.
4 If a donor name is present, all donor signage must meet University Development approval. Lettering should be secondary in size and prominence than the GVSU signage above and placed lower on the building than the GVSU signage. If a building usage title is used, it should be smaller than the donor name and placed below.

00 03 25 ACOUSTICAL CONSIDERATIONS

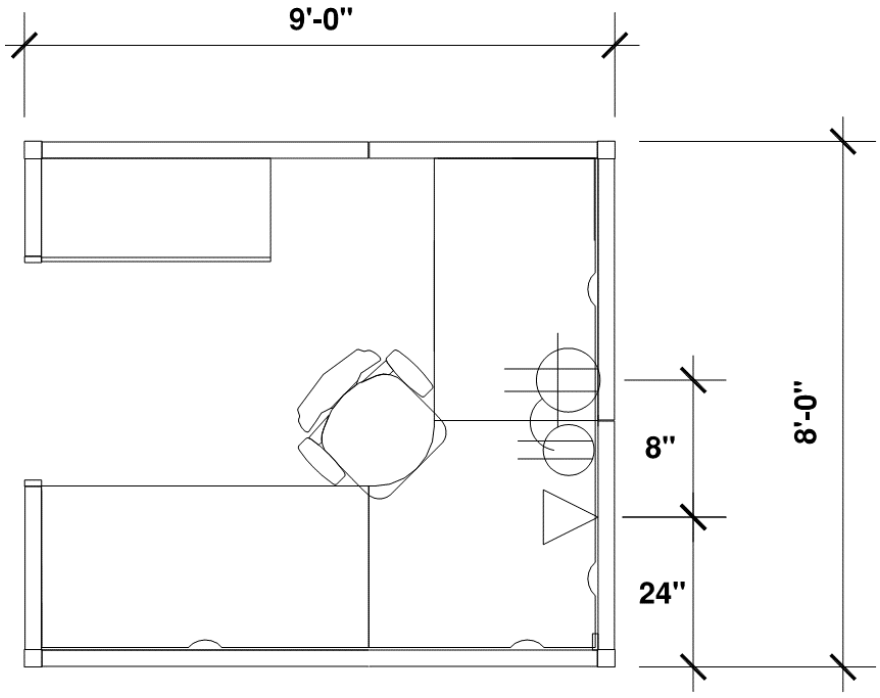
1 Design firm shall be responsible for determining and reviewing acoustic requirements with the University. Sound control, both reduction and management, shall be addressed.
2 In office areas, corridor doors should not face each other.
3 Conference and counseling areas, including offices, shall support confidential conversations.

00 03 27 SPACE ALLOCATIONS

00 03 27.01 OFFICES

1 Standard office layouts shall be in accordance with the following illustrations as indicated by GVSU position labels.

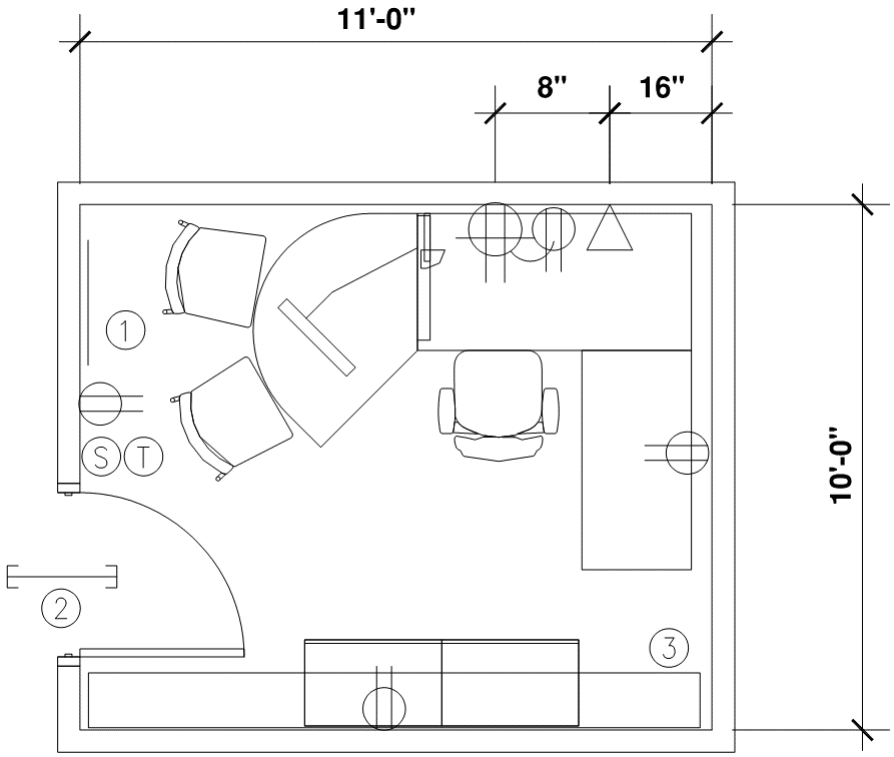
Note: Gross square feet (g.s.f.) is measured to outside of panels. Net square feet (n.s.f.) is as measured from interior finish within room.



PROFESSIONAL SUPPORT STAFF (P.S.S.) WORKSTATION
72 g.s.f. (8 ft. x 9 ft.)

PRODUCE/EQUIPMENT LIST

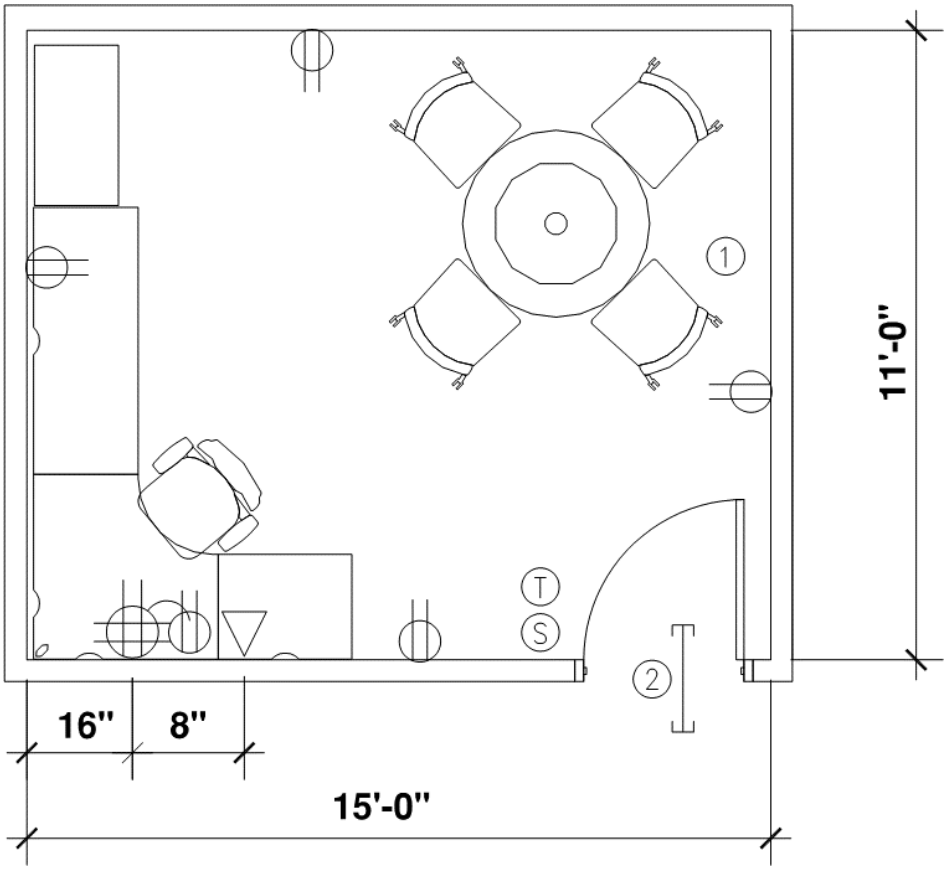
1. In-feed panel for data and electric. Data and electrical boxes to be centered to install electrical feeds.



STANDARD FACULTY/ADMINISTRATIVE & PROFESSIONAL (A.P.) OFFICE OR (4) PERSON CONFERENCE ROOM.
110 n.s.f. (10 ft. x 11 ft.)

Typical Placements

1. 3'w x4'h magnetic marker board (by general contractor)
    a. Confirm locations
2. 1 ¼" sleeve
3. 55 LF of shelving. (5) rows of 11'. Refer to specifications for type.
4. "S" Switch (placed within 18" to 24" of door latch)
5. "T" Thermostat (place within 18" to 24" of door latch)
6. Wall and furniture placement shown is for reference only and is subject to change.
7. Furniture design/layout by GVSU. Coordinate with MEP engineers.
8. CO2 Sensor (place within 18"-24" of door latch)
9. On faculty offices (not staff), 18"w x 36"h tack board on the corridor side of door. (Confirm with Project Manager)
10. Coat hook shall be installed on the office side of the door so that coats do not obstruct the window.
11. **Delete item #'s 3, 9 & 10 above for (4) Person conference rooms.**
12. Faculty offices may have 18"Wx36"H tack board with fabric wrapped edges on outside of office door. Confirm with GVSU Project Manager.



STANDARD APPOINTING OFFICER'S OFFICE
165 n.s.f. (11 ft. x 15 ft.)

Typical Placements

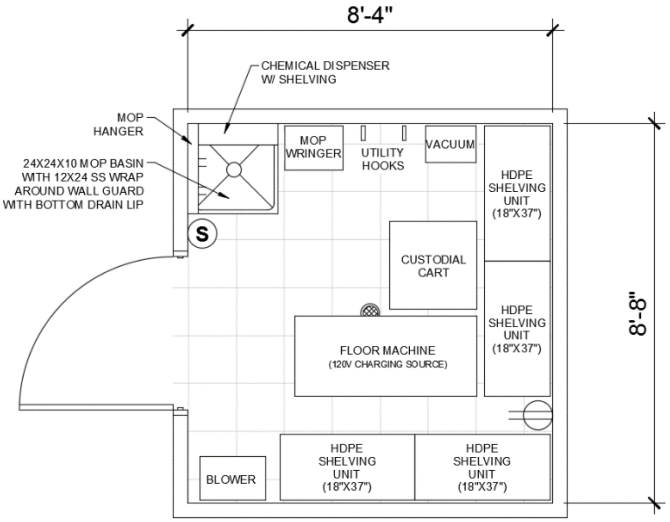
1. 3'x4' tack board or marker board (by general contractor)
    a. Confirm location and type
2. 1 ¼" sleeve
3. "S" Switch (placed within 24' of door latch)
4. "T" Thermostat (place within 24" of door latch)
5. Wall and furniture placement shown is for reference only and is subject to change.
6. Furniture design/layout by GVSU. Coordinate with MEP engineers.
7. Review if shelves are needed with GVSU Project Manager.

00 03 27.02 CUSTODIAL/BUILDING/STORAGE SUPPORT ROOMS

1 Design firm shall identify and show, on each design submission rooms which are required for the cleaning, maintenance, and operation of the building. In general, one custodial/building support room should be provided per floor; however actual requirements are to be reviewed on a project -by-project basis. Rooms should be a minimum of 8' x 8' in size.

2 Furnishing of these rooms is base building construction. These rooms shall be provided with water and drain, lights, a dedicated ventilation system, and power. The exhaust rate for the ventilation system shall be at least 0.50 cfm/s.f., with no air re-circulation. The pressure differential with the surrounding spaces shall be at least 5 Pa (0.02 inches of water gauge) on average and 1 Pa (0.04 inches of water) at a minimum when the doors to the rooms are closed. Provide self- closing doors and deck-to-deck partitions or a hard-lid ceiling. Provide one custodial room for each floor of each building unit.

3 Each Custodial/Building Support room is to have space for a vacuum, wet-dry vacuum, extractor, trash cart, mop bucket cart, and basic supplies such as lamps, paper towels, toilet tissue, liners for wastebaskets, etc. Provide adequate shelving and mounting for equipment. During the winter, the room is a temporary location for snow removal equipment and chemicals. Consult with GVSU on special storage requirements (i.e. large floor scrubber) that would impact room size.



4 Mop sink shall be floor-type, located near the door, and should be easily accessible. Wall area adjacent to mop sink shall have FRP wall guards. Provide hot and cold water and install in accordance with Standard Detail 22.002a,b,c&d in Appendix C. Provide wall mounted cam style broom and mop hanger similar or equal to Bobrick model #B239. (See Standard Detail 10.001 in Appendix C.)

5 Provide ground fault electrical outlets in custodial room at 4 feet above finish floor.

6 Do not locate electrical panels in Custodial rooms.

7 Any storage type rooms with sprinkler heads shall have a painted line on the walls indicating the upper limits of storage.

00 03 27.03 MECHANICAL EQUIPMENT ROOMS

1 Lay out so all equipment can be readily serviced and replaced if necessary. Provide at a minimum, clearances as recommended by equipment manufacturers and/or code requirements. For rooftop penthouses, provide openings through which units can be removed. Note on mechanical drawings emphasizing the need for maintenance clearance and ability to remove equipment such as boilers and water tanks without complete disassembly of major components and shut down of entire systems is unacceptable and will not be permitted. Where mechanical equipment rooms are located in a basement an area well shall be provided adjacent to the mechanical room and of sufficient size so as to permit the removal of equipment. The area well shall be provided with proper and adequate drainage. Corrections, as a result of non-compliance with this standard, and that are required in the field, during construction will be performed at the cost of the architect/engineer responsible for the inadequate and non-compliant design.

2 Provide floor drains where needed for draining coils and other items of equipment. Provide watertight, (sealed finish), curbed floor sloped to drain if room is above a finished space. Drains to be at lowest point in floor.
3 Piping labeled in accordance with Sections 21, 22 and 23 of this Standard.
4 Provide adequate and appropriate lighting to service all equipment.
5 Provide MIOSHA-approved means of access to different levels.
6 Provide floor service sink and hose bib with hot and cold water for cleaning of coils. Provide all coils with a means for allowing draining and internal flushing with a hose. (Applicable for steam heating systems)
7 Provide ground-fault outlets near points of service of equipment for testing equipment, trouble lamps, etc. Within 6 feet of every unitary control and/or any other HVAC control cabinet.
8 Provide access panels or access means for all equipment mounted inside of air ducts.
9 Provide and identify coil and filter removal areas.
10 Mechanical rooms should have exterior access and adequate space for replacement of heavy equipment.
11 Mechanical spaces housing high heat generating equipment shall be adequately insulated and ventilated to protect equipment and adjoining areas.
12 Condensate drain.

00 03 27.04 TOILET ROOMS

1 Also refer to Section 10 20 00
2 Provide centrally located floor drain. Floor slopes to provide positive drainage to floor drain from all points in toilet room.
3 ADA handicap restroom stalls shall be sized sufficiently to equip each with a hand sink, soap dispenser, paper towel dispenser, frameless mirror, baby changing station and trash can.
4 Provide a single user/family restroom with a door closer and occupancy indicator in each new building.
5 ADA accessible counters located in public areas, such as great rooms within student housing shall conform to Standard Detail 06.001, Appendix C of this manual.
6 Hose bib for custodial activities.

00 03 27.05 ELECTRICAL EQUIPMENT ROOMS

1 Electrical closets for electrical equipment shall be separate spaces and not contain any other non-electrical related equipment and not be combined with custodial spaces or storage spaces. Sufficient space shall be provided for future electrical panels and equipment.
2 Emergency generators shall be located on an exterior wall with adequate ventilation.
3 Hatch floor area in front of panels depicting minimum clearance.
4 Painted stenciled letters, reading “Fire Barrier” along with the required hour rating of the fire barrier or “Smoke Barrier” if a required smoke barrier wall with no fire rating, shall be applied to the walls around the interior perimeter of the electrical equipment room. Lettering shall be;
   A. a minimum of three (3”) inches in height,
   B. located a minimum of eight (8) feet above finish floor,
   C. spaced a maximum of twelve (12) feet part, but no less than twice per wall for walls longer than eight (8) feet in length and,
   D. red in color.

00 03 27.06 TELECOM EQUIPMENT ROOMS

1 See Division 27

00 03 27.07 BUILDING CLUSTER MECHANIC WORK ROOMS

1 For University housing, academic, food service and student activity buildings provide space, separate from mechanical, electrical or other building support spaces that are assigned as a cluster mechanics work room. Room to be a maximum of 250 square feet. Coordinate, with University, for the number of rooms required per housing project.
   Requirements for space are, but not necessarily limited, to the following:
   A. Bookcase or shelving for books and reference manuals. (Owner FF&E)
   B. 1 – 4 drawer lateral file cabinets. (Owner FF&E)
   C. Minimum 8ft. work bench. (Owner FF&E)
   D. Desk (Owner FF&E)
   E. 2– 5 shelf metal shelving units for parts storage. (Owner FF&E)
   F. Computer and telephone ports. (by A/E & Contractor)
   G. Outside access door, where feasible. (by A/E & Contractor)
   H. Proximity to service parking

I. Proximity to elevator, if elevator is provided in housing unit.
J. HVAC system, equal to housing unit, to support space. (by A/E & Contractor)
K. Sink (by A/E & Contractor)
L. Adequate electrical suitable for small motor loads such has drills, saws and other small power tools. (by A/E & Contractor)
M. Sound isolation from adjacent spaces. (by A/E & Contractor)
N. Floor drain (by A/E & Contractor)
O. Allow space for small air compressor with air piping to and quick connect at workbench. (by A/E & Contractor)

2 The above requirements are to be reviewed on a project by project basis.

3 Any storage type rooms with sprinkler heads shall have a line painted on the wall indicating the upper limits of storage.

00 03 27.08 CORRIDORS

1 If corridors have exposed structure as part of the interior design treatment this requirement is to be deleted.

2 Corridors in non-academic or housing buildings, where smoke/fire rated walls are NOT required per code, shall still be constructed smoke tight with all penetrations sealed to prevent transfer of noise from office/conference spaces.

00 03 27.09 ROOMS FOR NURSING MOTHERS

1 Rooms for nursing mothers are separate private spaces for nursing mothers to express breast milk. Provision of this space is in accordance with the patient Protection and Affordable Health Care Act of 2010 and shall not be a bathroom and at a minimum, include the following:

A. Minimum 10’x10’ in size and in a location that is easy to find and near other water sources.
B. Locking door with occupancy indicator.
C. A vanity with sink deep enough to was bottles.
D. Soap and paper towel dispensers.
   - Supplied by Owner. Installed by contractor.
E. Comfortable lounge style, washable furnishings near an outlet. Include small side table.
F. Soft paint colors and dimmable lighting.
G. Full length mirror.
H. Coat hook.
I. Individual heat/cool with individual control.
J. Carpet flooring w/rubber base except for an area two feet in front of the vanity, and for the length of the vanity, that shall be water resistant flooring with appropriate transition strip to carpet flooring.
K. Baby changing table.

00 03 27.10 CONFERENCE ROOMS

1 Conference rooms which accommodate more than eight (8) people shall be furnished with standard Simplex clock tied to the University’s master clock system. Review room requirements with GVSU Project Manager as these may change based on building type or room location.

2 (4) Person conference rooms shall follow the same layout as a standard 110sf AP office. Furniture selections will be made by GVSU. See detail in section 00 03 27 for specifics.

00 03 27.11 LAB CLASSROOMS

1 In labs that do not allow food/drinks, ADA compliant cabinets shall be designed near the entrance to store such items. Review requirements with GVSU Project Manager.

00 03 27.12 CLASSROOMS

1 Standard size is 48 students + 1 instructor = 49 max capacity. (1) door and room size shall remain under 1,000sf.

2 Room capacities > 50 require (2) doors.

3 Must maintain all ADA clearances. Keep chair rail thickness in mnd when calculating aisle widths.

4 36” between rows of tables. Standard classroom table size is 18”x60”. Confirm with GV Project Manager.
   - Tables should allow for a 120 degree viewing angle to the screen.

5 Table next to instructor station for instructor materials.

6 Door to swing into corridor/alcove.

7 Projector, projector screen placement, see Appendix C, Details 27.001 & 27.002
   - Contractor to supply and install projector plate.

8 Maximize whiteboards along front of classroom. 16’ max length per board. But joints to be frameless.
   - Verify if boards are needed on side walls.

9 2’x3’ tackboard outside each classroom.

10 Coordinate chair rail locations and height with GV Project Manager and furniture design layout.

11 Leave a 2'x4' space for trash cans.
12 Provide coat rack at rear of classroom.
13 Lighting and switching controls, refer to Appendix C, Details 27.003(a,b,c&d)
- All lighting shall be on occupancy sensors.

14 Classroom AV, See Appendix C, Details 27.001-27.006
15 Verify speaker locations.
16 Hearing Loops –Review requirements with GV Project Manager.
17 Signage – Show area indicating emergency instructions, room numbers, hearing loop.
18 Clocks shall be analog in classrooms or digital in other areas. Confirm with GV Project Manager. All clocks to be PoE clocks. Roughin by electrical contractor and cabling by low voltage cabling contractor.

00 03 50 ROOM AND EQUIPMENT NUMBERING

1 Architect and University shall meet to establish the room numbers for the building. This shall be done at the end of schematic design and shall be finalized during design development. The number scheme shall allow effective directions within the building. The room numbers follow through on the mechanical and electrical systems.
2 At completion of 100 percent construction documents, the Design Professional shall review the room numbering identified on the construction documents to assure consistency with the original room numbering assignments provided the Design Professional, by the University, at completion of theschematic design phase.
3 Engineer and University shall meet to establish equipment numbers during design development. Final equipment numbers shall be used in the drawings, specifications, submittals and controls programming.
4 Where an addition or renovation is being made to an existing structure, room and equipment numbers shall not be duplicated.
5 When there are multiple floors in a building, the numbering of rooms should stack when possible. Example, room 207 should be above 107 when possible

00 03 60 HOUSING CONSIDERATIONS (May also apply to other University buildings)

1 ARCHITECTURAL

A. Access to spare parts for modular furniture if needed.
B. Bi-fold doors are not to be used. Only hinged doors shall be used for closet applications.
C. Use double hung or single hung windows. No crank casement windows. Windows must be capable of cleaning from the exterior of the building. See Division 8 for additional requirements.
D. 1 pc. Acrylic shower units or combination tub and shower units shall receive factory inspection prior to shipment. Confirmation of inspection is to be provided to the University prior to shipment. Field strength reinforcement, as a correction for deficient units, is not acceptable. Provide grouted sub-base in void beneath shower floor, if any, and if not expressly prohibited by manufacturer's installation instructions. Do not grout under drain piping. Aquaglass is not an acceptable manufacturer.
E. For accessible housing units with showers that accommodate slide-off and roll-in configurations, in accordance with ADA requirements. In a housing facility provide at least one of each style shower accommodation.
F. Provide, in each unit entry door, a privacy/security-viewing device (peep hole). In accessible units provide two in the entry door. One at standard mounting height and one at ADA required mounting height.
G. Provide air locks/vestibules at building entrances. Provide ADA required clearances.
H. No garbage disposals in student apartments. Disposals are to be provided only in the building manager's apartment. They create huge maintenance problem because of abuse. (At design and development review rough-in opportunities with GVSU.)
I. It is very critical to provide good drainage at entrance (outside) cement slabs.
J. For Public toilet rooms within Housing buildings, toilet paper holders, towel dispensers, and soap dispensers should comply with GVSU standards.
K. Provide a means to walk across roofs at times with heavy load, without damaging roofing materials. (Applies to flat roof designs)
L. Provide stairs to roof mechanical penthouses so maintenance personnel can climb with a toolbox and parts in one hand and grip a railing with the other.
M. Specify commercial grade bathroom exhaust fans, field-tested to a minimum 110 CFM and equipped with an internal adjustable time-delay shutoff. Such fans shall be included in Fundamental and Enhanced Commissioning of the building energy systems. Fan motors shall meet Energy Star performance criteria.
N. 2 foot square access panels for bathroom tub drains and heating components.
O. Ball valves in plumbing and piping systems.
P. Window blinds, per University standard, are required on every exterior window in housing apartments.
Q. Vanity sinks attached to counters and not just caulked into counter tops. Provide adequate intermediate and end supports.
R. When providing card access at entrances insure that locations of card readers and controls for barrier free access are properly located to allow wheelchair user to operate both card swipe and depress door activation button and access door without door closing on user. Operations cannot be remote from one another and should be reasonably adjacent to entrance door. Keep in mind that some wheelchair users have limited upper body movement, or use chairs with electrified operation, and require additional time to operate card swipe and

button and then move safely through open door. The cost of relocating improperly located card swipes and door activation buttons will be the responsibility of the design professional.

2 PLUMBING

A. Copper supply plumbing throughout system. (Type "L")
B. Provide isolation valves in heating and plumbing systems on all branch piping and at each apartment or utility room. CIf PVC elbows and fitting covers are used, they must be reinforced so they can't collapse and can be painted.
C. Floor level janitor sink.
D. Provide floor drains where needed for draining coils and other items of equipment especially over finished space (watertight).
E. Provide single bowl sink at kitchens. Minimum 25"x22"x8". Single hole preferred.
F. Kitchen faucets shall have stops on them so that the faucet can't swing outside the sink.
G. Gas meters shall be located in such as to avoid damage from falling ice.
H. Exterior hose bibs shall not be installed along pedestrian walkways as these create tripping and slip hazards.
I. Do not locate any piping near exterior air intakes; avoid exposing piping to freeze situations.
J. Provide clearance for maintenance and code compliance between all equipment and any installed obstruction.

3 MECHANICAL

A. Consider steam or gas instantaneous domestic water heating system with storage tank.
B. Units can be grouped to accommodate larger utility systems--hot water, heat, etc.
C. Provide access panels for coil cleaning up and down stream of coil. Size the panels to allow access by maintenance personnel. Keep access to coils, valves and filters unobstructed by other piping, conduit, ductwork, etc. Provide minimum 24" square access door. See Section 08 31 00 for additional requirements.
D. Coils should be accessible for service from hallways wherever possible.
E. Provide air bleeds at every coil and at system high points.
F. Provide ball valves on each side of control valves. Circuit setters are not to be used for isolation.
G. Use for small pumps under 15 HP due to quick service (less than 12 hours).
H. Do not install fin tube heat adjacent to water closets.
I. Coordinate thermostat and other control device location with furniture plan. Furniture shall not block these devices.
J. Provide clearance for maintenance and code compliance between all equipment and any installed obstruction.
K. Maintainable venting (no turns) on dryer and other exhausts.
L. Direct mounted thermostat for baseboard radiators (mounted on radiators). Remote electronic type acceptable.
M. Consider in-floor radiant floor heating for slab-on grade applications.
N. All exposed duct work and piping mounted below 7' should be covered with foil faced fiberglass duct wrap and faced pipe insulation in accordance with Section 22 07 00 of this Standard

4 ELECTRICAL

A. Where Romex is used as a wiring method and permitted by the National Electric Code (NEC), and an isolated ground is required by the NEC or these Standards, the ground wire **must** be a covered (not bare) copper wire to point of connection at both termination points.
B. Underground high voltage lines shall be installed in conduit. Consider budget costs for encasing in concrete.
C. If underground junction vaults are used they must be adequately drained to a storm sewer so as to prevent standing water accumulating in vault or junction box.
D. Consider security implications for lighting of housing developments. Review with GVSU public safety unit at design development. Coordinate with LEED requirement for light pollution reduction.
E. In meeting rooms, switch lights nearest white board separate from remainder. Check with GVSU on need for dimmable light systems in rooms.
F. All devices to have circuits identified on back (inside) of device cover plate with marker pen.
G. Provide conduit to entrance doors to nearest electrical panel to support future installation of auto door operators. Provide auto door operators at communal entrances and at "commons" buildings.
H. All low voltage control transformers used to control valves to base board room heating in living center, are to be remotely located, not within the baseboard housing.
I. Fully addressable and ADA compatible fire alarm fixtures. Review code requirements and options with GVSU at design development.

00 03 70 FURNITURE, FIXTURES & EQUIPMENT (FF&E)

1 GVSU has established standards for the FF&E finishes. For the current standard contact the Facilities Office.
2 Electrical connections to FF&E shall be included in the construction cost.
3 Wall mounted items shall be included in the construction cost i.e. shelves, tack boards, whiteboards, display cases, projection screens…

4 Coordinate building devices with furniture plan: i.e. thermostats, electrical outlets, data location….
5 GVSU has established standards for workrooms, offices, file rooms, conference rooms, computer labs and classroom. For the current standard, contact the Facilities Office.
6 Shelving: Custodial rooms, office, file room and work room shelving to be included in construction budget and installed by construction contractor.
7 Furniture Selection: All furniture selections will be by GVSU

CONTRACTING REQUIREMENTS

00 70 00 CONDITIONS OF THE CONTRACT

00 72 00 GENERAL CONDITONS

1 General Conditions referenced in contract documents shall be in conformance with GVSU contractual documents.

00 73 00 SUPPLEMENTARY CONDITIONS

00 73 16 INSURANCE REQUIREMENTS

1 Builders Risk: GVSU will provide as a part of its coverage.
2 Architect shall email a set of working drawings and specifications at 90% AND 100% completion to GVSU insurance carrier for review when one of the following conditions exist:
A **Any project that requires submittal for review by Michigan's Bureau of Fire Services, regardless of construction value**
B **Any project that does not require submittal for review by Michigan's Bureau of Fire Services and with a construction value in excess of $1,000,000.00**

Submit to: Gary Hopson
Global Risk Consultants
10974 Stoney Point Drive
South Lyon, MI. 48178
Telephone number: (586) 419-1766
Email: gary.hopson@tuvsud.com

3 Submission to be made with transmittal. Copy transmittal to **Heather Taylor** at the office of GVSU's Legal Compliance & Risk Management Division, 4068 James H Zumberge Hall, Allendale, MI 49401, and the GVSU Project Manager.
4 **Allow 10 working days for response turn-around**. Review response with University and be prepared to include changes as agreed with the University.
5 Architect shall email the approved fire protection shop drawings and hydraulic calculations during the submittal process.

END OF SECTION

DIVISION 01 - GENERAL REQUIREMENTS

NOTE: It is intended that the following General Requirements are covered, where applicable for a specific project, in the Architect/Engineers Specifications and/or Construction Documents.

0010 00 GENERAL REQUIREMENTS

00 11 00 SUMMARY OF WORK

1 The Contract encompasses the furnishing of all labor, materials, services, equipment, bonds and insurance to complete the project as shown on the drawings and specifications.
2 Any premium time necessary to complete the Project as scheduled shall be included in the Contractors base bid.
3 All pertinent requirements of the Invitation to Bidders, Instructions to Bidders and General Conditions and required GVSU supplements to the same shall form a part of the specifications.
4 Right-to-know: Contractor to have on hand MSD sheets on all substances used on project.

01 14 00 WORK RESTRICTIONS

1 Grand Valley State University has expectations from contractors, subcontractors and all individuals who work for them. These are, but not necessarily limited to, the following:
   A. The campus is an urban environment and worksite areas are limited. The university expects that worksites be free of debris with a focus on safety. Some members of the university may not recognize the dangers of the work being performed by contractors, thus it is the responsibility of the contractor to ensure safety is a priority for all.
   B. It is the contractor's responsibility to clearly define the area where work will be taking place and provide security of the site.
   C. Vehicle and pedestrian traffic may be high, especially between classes. It's critical that transferring of materials and equipment by contractors does not hamper normal traffic flow.
   D. Parking is limited on campus and strict regulations are enforced. All vehicles parking on campus are required to have a parking permit. Project managers and Public Safety will work with you to identify areas where you may park. Failure to comply with GVSU's parking rules and regulations will result in penalties that may include revocation of on-campus parking privileges. Contractor parking shall not be permitted on sidewalks, driveways or at building entrance or egress locations. Violators will be ticketed.
   E. While on campus, contract employees are held to the same standard as university employees. Illegal drugs and alcohol are prohibited. Any employee with a criminal conviction for a sex offense is required by law to identify themselves to the campus police. Any negative behaviors, including, but not limited to, larceny, assault and sexual harassment are not tolerated. Employees who engage in any criminal activity will be investigated and prosecuted. Notification will be made to the project manager of contract employees that are arrested by the campus police.
   F. Possession or use of firearms or other lethal weapons are not permitted on University property.
   G. Smoking is prohibited within all indoor spaces. Smoking is prohibited within 25-feet of any GVSU building or bus stop. Smoking is prohibited with the building envelope of any building under construction, regardless of the stage of construction.
2 Unless otherwise stated, University buildings will continue to function and remain occupied during the construction process.
3 Site access shall be through designated routes or temporary roads as designated by the University's Project representative and as shown on the drawings.
4 **Dig Requirements**: Contractors are to contact Miss Dig for location of public utilities. For locating University utilities the contractor shall follow University digging procedures and submit the required dig request form. Instructions and permit form can be obtained at, and when completed, submitted to:
   A. In Allendale: Customer Service office located in the Facilities Services Building. Phone (616) 331-3000
   B. Pew Campus and other remote campuses: Pew Campus Operations located in the Bike Factory Office Building, 201 Front Ave. SW, Grand Rapids, MI. 49504, Phone (616) 331-6700.
   C. The procedure outline and submittal permit form are to be included in the professional's construction specifications.
   D. Excavations, drilling or boring that is done within 6 feet of any utility marking are to be hand dug until marked utility is located and visually identified so that mechanical excavation can be commenced without damage to marked utility.
   E. Utility Damage: Any contractor causing damage to underground utilities shall be responsible for all costs required to repair or replace the damaged utility.

5 Utility tie-ins: Owner shall be notified at least one week in advance. If utility tie-in requires the utility to be shut down or service to other buildings to be shut down the tie in should be done outside normal business hours and coordinated with the University at no additional cost to owner.

6 **Fire Protection System Impairment:** When work requires an existing fire prevention, protection, alarm or supervisory system shut-off, impairment or otherwise taken out of service, completely or in part, a GVSU Fire Protection System Impairment Notification Permit shall be completed. Instructions and permit form can be obtained at, and when completed, submitted to:
   A. In Allendale: Customer Service office located in the Facilities Services Building. Phone (616) 331-3000
   B. Pew Campus and other remote campuses: Pew Campus Operations located in the Bike Factory Office Building, 201 Front Ave. SW, Grand Rapids, MI. 49504, Phone (616) 331-6700.

7 **Hot Works Permit:** When work in existing buildings, new construction within an existing building and new construction that is attached to an existing building requires an open flame or work that generates heat, sparks, slag or other superheated materials, a GVSU Hot Works Permit shall be completed and submitted prior to the work commencing. Instructions and permit form can be obtained at, and when completed, submitted to:
   A. In Allendale: Central Utilities Building located northeast of the Facilities Services Building. Boiler Operator Phone (616) 331-3555
   B. Pew Campus and other remote campuses: Pew Campus Operations located in the Bike Factory Office Building, 201 Front Ave. SW, Grand Rapids, MI. 49504, Phone (616) 331-6700.

8 **Electrical Lockout/Tagout:** Contractors will be responsible for lockout/tag out of the nearest source of power supplying equipment to be repaired, replaced or removed. Any breaker, breaker panel, disconnects, switches, contractors, starter, controls and/or other electrical devices not locked out or tagged out, will be deemed in use. Prior to shutdown of any equipment and/or power, contractors will notify the Plant Customer Service (331-3000).

9 Site access and parking: show construction limits, haul routes, and site access on drawings. Limit access to West Campus Drive during fall, winter and spring; North or South Campus Drive all year. Violators will be ticketed. Contractor to provide for and maintain temporary parking and maneuvering space within contract site limits. This will require installation, maintenance and later removal of at least 6" road gravel or crushed concrete - clay soil here is impassable in wet weather. Improperly parked vehicles will be ticketed by campus police. Unpaid tickets are turned over to Ottawa County.

10 Walks and drives: Contractor must keep existing walks and drives swept and free of sand and dirt during construction. Provide means to keep construction dirt off of streets.

11 Receiving of Materials: GVSU will not accept drop-shipped items for any contractor at its Central Receiving. Contractor could be charged for costs associated with misdirected deliveries.

12 Pedestrian and vehicle access through, around or at the perimeter of the project must be maintained at all times. It is the responsibility of the design firm to determine needs, the method to accomplish the need, and to include the means in the design documents. The complete traffic detour plan must be discussed with the University prior to start of construction documents.

13 Lawn and Site Protection: To the extent possible, do not use lawn areas during construction project. When lawns are used, immediate repair is required. Delay of repair until end of project will not be permitted. After use, lawn and ruts are to be filled in with quality topsoil and re-seeded, to match surrounding conditions and per Division 32 of these standards.

14 DO NOT USE University equipment ie. cleaning equipment, dumpsters, etc. during course of the project. Contractor is responsible for cost of replacement of damaged University equipment improperly used for construction purposes.

15 Photographs: Any Consultant, Contractor, Supplier or Vendor shall not photograph University projects without the expressed written permission of Grand Valley State University.

16 MSD Sheets: Right-to-know: Contractor to have on hand MSD sheets on all substances used on project.

01 20 00 PRICE AND PAYMENT PROCEDURES

01 21 00 ALLOWANCES

01 21 13 CASH ALLOWANCES

Any allowance must be identified and defined in a separate list. These are not to be buried in specification section.

01 40 00 QUALITY REQUIREMENTS

01 41 00 REGULATORY REQUIREMENTS

01 41 13 CODES

1 **DLEG Bureau of Construction Codes/Administration:**
The codes listed below typically apply for buildings that would not fall under the Michigan Bureau of Fire Services jurisdiction and typically fall under local building code administrative authority[1] which is an authority that state universities are exempted from.

A. Use the edition of the below codes that is CURRENTLY adopted by the State of Michigan, which may not necessarily be the current edition.
Michigan Building Code
Michigan Mechanical Code
Michigan Plumbing Code
Michigan Residential Code
Michigan Rehabilitation Code and the
National Electrical Code
NFPA 13 Installation of Sprinkler Systems (as referenced in Michigan Building Code)
NFPA 13R Installation of Sprinkler Systems for Residential (as referenced in Michigan Building Code) NFPA 72 National Fire Alarm and Signaling Code (as referenced in Michigan Building Code)

2 Michigan Bureau of Fire Services (aka State Fire Marshal):

The codes listed below apply to the building categories indicated. These specific building categories may fall under the Michigan Bureau of Fire Services jurisdiction.

A. Use the edition of the below codes that is CURRENTLY adopted by the State of Michigan, which may not necessarily be the current edition.

For the category described as Schools/Colleges and Universities this is defined as: *A College or University means a building or part of a building which is used for instructional purposes, which is occupied by 6 or more students and used 4 or more hours per day or more than 12 hours per week, and which is owned or leased by, or under the control of, a junior college, community college, college, or university that is duly authorized to grant degrees by one of the following:*
(i) Article VIII of the Michigan Constitution of 1963; (ii) The Michigan legislature; (iii) Action by the state board of education.[2]

For Schools/Colleges and Universities:
NFPA 101 Life Safety Code
NFPA 13 Installation of Sprinkler Systems
NFPA 72 National Fire Alarm and Signaling Code

For the category described as Dormitory this is defined as "Buildings or spaces in buildings where group sleeping accommodations are provided for more than 16 persons who are not members of the same family in one room or a series of closely associated rooms under joint occupancy and single management, with or without meals, but without individual cooking facilities[3]." Michigan exception states "A dormitory that is
divided into suites of rooms which have one or more bedrooms opening into a living room or study that has a door which opens into a common corridor that serves a number of suites is classified as an apartment building and shall be in compliance with section 18 of the code[4]."

For Dormitory:
NFPA 101 Life Safety Code
NFPA 13 Installation of Sprinkler Systems
NFPA 72 National Fire Alarm and Signaling Code

Penal institutions and health care facilities are building categories that also fall under the jurisdiction of the Michigan Bureau of Fire Services for which the same codes listed above would apply.

In regard to apartment buildings, which are not under the Michigan Bureau of Fire Services jurisdiction the codes listed under the DLEG Bureau of Construction Codes/Administration would apply.

NOTE: When a University facility falls under the jurisdiction of the Bureau of Fire Services, electrical permit and inspections are required.

[1] e.g.; Allendale Township, City of Grand Rapids or similar local unit of government.
[2] R29.1903(e) of the Administrative Rules for New and Existing Schools, Colleges and University Fire Safety.
[3] NFPA 101 Life Safety 1997; 16-1.3 Definitions
[4] R29.2021; 16-1.1 as amended, of the Administrative Rules for Dormitory Fire Safety for Schools, Colleges and Universities.

3 Accessibility

ADA Standards for Accessible Design, updated March 15, 2012, and Chapter 11 of the 2015 Michigan Building Code, strictest condition governs.

4 Plan Review and Permits

When a building does not fall under the jurisdiction of the Michigan Bureau of Fire Services, the university, the design professional or any contractor is not required to, and shall not make any plan submittals to a state and/or other local governmental entity for review and approval. The contactor is not required to submit for any construction permits.[5]
When a building does fall under the jurisdiction of the Michigan Bureau of Fire Services, the design professional is required to make plan submittal to the Michigan Bureau of Fire Services for life safety review and approval. The electrical contractor and fire protection contactor is required to submit plans for review and approval, and obtain a permit for:

A. Fire sprinkling system layout and design (plan submittal and permit),
B. Fire alarm system (plan submittal and permit),
C. Electrical permit (permit only)(plan submittal is part of the design professional's initial plan review submittal)
D. No other permits (e.g. plumbing) are required to be obtained.[6]

5 Additional Comments

The "amendments" referenced by the State Fire Marshal consists of two separate documents commonly referred to Act 207 of PA 1941, MCL29.3c and 29.451, and titled New and Existing School, College and University Fire Safety and Dormitory Fire Safety for Schools, Colleges and Universities. These two documents amend selected sections of NFPA 101.

Copies of these two documents are attached to Facilities Planning copy of NFPA 101 Life Safety Code, 1997 version.

The listings, both above and below, address the primary construction codes and standards that impact new and existing building construction/renovation/remodeling. There are other ancillary codes that can also impact new and existing buildings such as MiOSHA and the State's Elevator Safety Code.

6 Application of Codes on All University Projects

Since we are required to follow NFPA 101 Life Safety Code 1997 and referenced NFPA versions for buildings that fall under the jurisdiction of Michigan Bureau of Fire Services, we will apply NFPA 101 Life Safety Code 1997 for life safety provisions on ALL university buildings. This will insure consistency from building to building in the application of life safety related standards.

Thus, below is an outline of which codes and applicable NFPA standards will be applied to ALL university buildings and which are consistent with the current requirements of the Michigan Bureau of Fire Services, and to the extent that they apply, the requirements of DLEG.

A. Use the edition of the below codes that is CURRENTLY adopted by the State of Michigan, which may not necessarily be the current edition.
NFPA 101 Life Safety Code
NFPA 13 Installation of Sprinkler Systems
NFPA 13R Installation of Sprinkler Systems for Residential (student apartments only)
NFPA 72 National Fire Alarm and Signaling Code Michigan Building Code* (*except for life safety*),
Michigan Mechanical Code,
Michigan Plumbing Code,
Michigan Residential Code,
Michigan Rehabilitation Code, and the National
Electrical Code.
ADA Standards for Accessible Design, update July 1, 1994*, and Chapter 11 of the 2006 Michigan Building Code, strictest condition governs.

For each individual project the Design Professional is to confirm compliance of their designs with the above "Application of Codes" listing and verify that this listing is still current.

[5] This does not apply for plan submittals that may be required for earth change and SESC permits or other project specific permits that may be required from a local Road Commission, MDOT, DEQ or local health department.

7 Drawing Submittals for Regulatory Compliance: A GVSU Insurance Carrier (See 00 73 00)

A. Soil Erosion & Sedimentation Plan: Grand Valley State University is designated, by the State of Michigan Department of Environmental Quality, as an Authorized Public Agency (APA). Soil erosion and sedimentation control plan submittals are to be made to the University and not to local County/City authority. Soil erosion and sedimentation controls shall be provided in conformance with Part 91 of 1994 PA 451. The Architect/Engineer shall include in the project specifications the Checklist for Contractor's Soil Erosion and Sedimentation Control Plan included in Appendix K of this Standard.

B. County Health Department (Food Service, Pools and others that may apply).

01 45 00 QUALITY CONTROL

01 45 23 TESTING AND INSPECTION SERVICES

1 Testing and Balancing: The contractor shall provide for 3rd party final balancing of HVAC systems.

2 The Owner reserves the right to conduct independent testing to verify field conditions.

01 50 00 TEMPORARY FACILITES AND CONTROLS

01 51 00 TEMPORARY UTILITIES

01 51 01 GENERAL

1 Hookup fees for water & sewer for permanent service in Allendale will be paid directly by GVSU. Hookup fees for projects at other campus locations are to be included in the Contractor's General Conditions. Please note: Self-supporting units (such as housing, dining, etc.) must account for this cost in the project budget.

2 The Contractor shall notify the utility company and the University at least 30 days prior to the Contractor's anticipated switch over from temporary service to permanent service

3 Underground utilities: At Allendale, most utility lines belong to GVSU and MISS DIG will not locate. Contractor shall provide minimum 7 days-advanced notice. Call GVSU DIG at 331-3000 and GVSU will locate. Call MISS DIG for gas, cable television, and non-GVSU phone lines. Identified utilities shall be located by hand excavation, not mechanical excavation. At Holland, Muskegon and Grand Rapids campuses call MISS DIG for ALL utility locations.

01 51 13 TEMPORARY ELECTRICITY

1 Electricity: GVSU will provide at nearest source at Allendale Campus only. Contractor to provide a temporary electrical meter. At other GVSU sites, contact local utility and include responsibility in construction work/bid. Contractor to arrange and pay for connections and wiring to point of use. At satellite campuses, a temporary electric meter shall be installed to allow proper billing of electrical consumption from the start to the end of the construction period. All temporary meters shall be replaced with the final building meter before the University assumes occupancy of the building. To make sure the construction costs are covered under construction and not the University's energy budget. The permanent meter shall not be used for construction purposes.

01 51 23 TEMPORARY HEATING, COOLING AND VENTILATING

1 Temporary heat: Responsibility of contractor. Any use of permanent HVAC equipment shall meet current LEED and/or GVSU standards; whichever is more stringent. Warranties for final HVAC equipment shall not be impacted by use during construction. Permanent gas installation shall be coordinated by the Construction Manager, but paid for by GVSU.

01 51 26 TEMPORARY LIGHTING

1 Temporary site lighting: Responsibility of contractor. Provide security lighting around building site. This is to include walkways and driveways, outside the construction zone but immediately adjacent to the construction zone.

01 51 33 TEMPORARY COMMUNICATIONS

1 Telephone service: Where possible, GVSU will provide construction telephone lines. Contractor will be billed for installation and service costs.

2 Internet access: Where possible, GVSU will provide wired or wireless internet access.

3 Contact GVSU's Project Manager for installation and connection.

01 51 36 TEMPORARY WATER

1 Construction water: Contractor to arrange and pay for connections and piping to point of use at all campus sites.

01 52 00 CONSTRUCTION FACILITIES

01 52 19 SANITARY FACILITIES

1 Trash: Prohibit contractor use of GVSU trash containers; site is to be kept clean and all waste materials are to be removed from site and diverted from landfills. Prohibit trash burning and trash burial on site. Require the development and implementation of a Construction Waste Management Plan as described in the LEED Reference Guide in which the project is registered under. Require that packaging materials be kept to a minimum; in selecting vendors or distributors, consideration should be given to their ability to avoid single-use or disposable products, provide bulk shipping, to take back excess materials and scrap.

2 Toilet facilities: provided by contractor. With few exceptions, use of University facilities is strictly prohibited

01 56 00 TEMPORARY BARRIERS AND ENCLOSURES

01 56 36 TEMPORARY SECURITY ENCLOSURES

1 Security: Contractor to provide for security of vehicles, site, excavations, construction in progress, tools, etc. Construction site to be protected, when adjacent to existing operations, with minimum 6-foot high chain link fence. Place signs saying "CONSTRUCTION AREA - NO TRESPASSING" at reasonable intervalsaround
fenced perimeter in clear view of public and at each gated location entering into the construction site. Signs are to be made of durable materials capable of withstanding total construction duration.

2 Locks are to be installed on construction-gated entrances. The contractor is to provide their own lock at each gate. The university will also provide a pad lock for university and public safety staff to enter the site.

3 Locking Procedure: Each night, the contractor shall attach one end of the chain to their pad lock and the other end to the university pad lock. The two locks shall then be locked together, thus allowing either party to access the site with their own keys.

01 56 39 TEMPORARY TREE AND PLANT PROTECTION

1 Regarding construction around existing trees to be retained: Require adherence to Bulletin no. 285 (Appendix D of these Standards)

01 57 00 TEMPORARY CONTROL

01 57 13 TEMPORARY EROSION AND SEDIMENT CONTROL

1 Erosion Control and Site Protection: Take care not to allow discharge of soil, sediment, construction debris into ravines, or public right-of-way. Prevent erosion or displacement of soils and discharge of soil bearing water runoff to adjacent properties and waterways. Provide and maintain erosion control during the entire project in accordance with applicable regulations. Remove erosion control measures after the permanent ground cover has been established. Provide temporary guards to protect trees from vehicle, foot, and material pile up and construction damage. This protection will extend out to the drip line of the tree(s) or plant material. Require compliance with the SESC manual on GVSU's Facilities Planning website. Contractor must have a certified storm water operator, who is responsible for all required site inspections and documentation.

01 58 00 PROJECT IDENTIFICATION

01 58 13 TEMPORARY PROJECT SIGNAGE

1 Standard project identification signs shall conform to Figure 1 below. Quantities and locations to be confirmed with GVSU project manager and identified on bid documents. Grand Valley logo to conform to GVSU trademark standard. Project title to be Helvetica Medium. CM/Contractor and Consultant to be Helvetica.

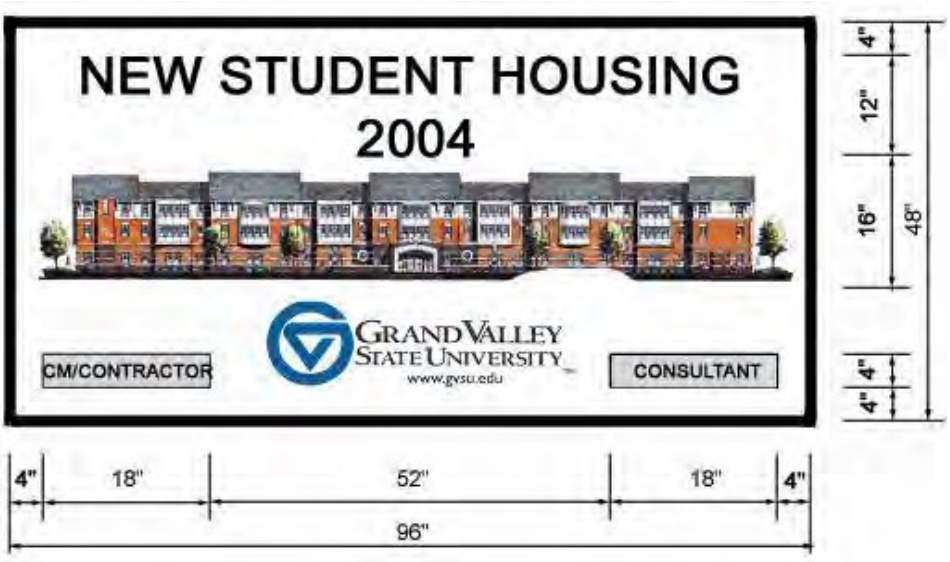


FIGURE 1

01 70 00 EXECUTION AND CLOSEOUT REQUIREMENTS

01 78 00 CLOSEOUT SUBMITTALS

01 78 39 PROJECT RECORD DOCUMENTS

1 All contractors performing work on the Project shall be required to provide as part of their trade division closeout documents a directory of suppliers for all products used by the contractor on the Project. The directory shall indicate the products provided and the supplier's name, telephone number, fax number and address.

2 The requirements of this section shall be part of the closeout requirements for the project and required as part of Final Completion, therefore no final payments to the Contractor or Architect/Engineer shall be made until this requirement is fulfilled along with all other project closeout requirements.

3 Project close-out documentation shall include:

A. Architect Close-out: Record drawings and specifications incorporating all addenda, bulletins and contractor as-built mark-ups and field changes. Two hard copies of drawings and specifications are to be provided along with one electronic copy provided on two separate USB flash drives. Drawings shall be provided in .dwg and pdf format and labeled by sheet number. File names MUST remain under 80 characters.

i. Drawings shall be stand-alone AutoCad drawings with no Xref's.
ii. Drawings should be saved-as AutoCad Release 13 for users with older versions.
iii. Plans and details shall be drawin at a 1:1 scale in Model Space, not Paper Space
iv. File names shall match the sheet numbers. Example, A101
v. Layer names should be easily identifiable.
vi. Drawings should be completely purged.

B. CM/General Contractor Closeout: One electronic copy provided on two separate **USB flash drives**. All documents to be in **pdf format**. Links to CM project management software are not acceptable. Provide, at a minimum, the following close out documents, saved in separate folders according to the format below:
   i. Project Directory – Shall indicate the subcontractor listing and contact information and warrantee
   ii. Approved submittals – labeled by equipment and spec section
   iii. Boiler inspections
   iv. Contractor as builts – field mark ups
   v. Elevator inspections
   vi. Equipment and material warrantees
   vii. Fire Protection hydraulic calculations and record drawings
   viii. Lighting Controls Diagram
   ix. Lightning Protection Certification
   x. Miscellaneous
   xi. NICET Certification
   xii. Operation and Maintenance Manuals
   xiii. Test and Balance Reports
   xiv. Tests – potable water tie-ins, backflow preventer and other tests not included in Cx reports or submittals
   xv. Statements of No Asbestos Containing Materials
   xvi. Owner Training Logs
   xvii. All project warranties

C GVSU Project Manager Closeout:
   i. Final Commissioning (Cx) Report
   ii. Final LEED Scoresheet and LEED Online Documentation
   iii. BFS Final Occupancy Approval, if needed.
   iv. Other Agency Approvals

01 78 46 EXTRA (ATTIC STOCK) MATERIALS

01 78 46.13 SCHEDULE OF REQUIRED MINIMUM ATTIC STOCK COMPONENTS

1 All attic stock items shall be provided in original boxes or containers. Where original boxes or containers are not available, items shall be furnished in a plain cardboard box with contents and quantity therein clearly labeled on the top and one end of the box. Loose items provided will be rejected for resubmittal in accordance with the above requirements. Exceptions are carpet, walk-off mats and appliances.

2 All attic stock is to be delivered, to the Owner, at one time along with the Architect/Engineers checklist indicating all items provided.

3 The Architect or Engineer shall, as part of the project punch list and closeout, prepare a checklist of all attic stock items required for the specific project in accordance with the schedule of requirements listed below. The checklist shall identify each item furnished and the quantity furnished.

DIVISION 04 – Brick

1 Confirm quantities of brick or brick paver attic stock with Project Manager.

DIVISION 07 – THERMAL & MOISTURE PROTECTION

1 Roofing Shingles: 2 squares (6 bundles).

DIVISION 08 - OPENINGS

1 Hardware: One lockset of each type used; i.e. storeroom function, classroom function, cylinder type, mortise type.
   A. One door closer of each hand.
   B. One additional, for each hand used in project, handicap overhead door operator and actuator.
   C. One overhead stop (if required for project)
   D. One Von Duprin panic hardware repair kit.
   E. One Best cylinder for each mortise function used.
   F. One (1) set of instruction sheets for each item furnished.
   G. One (1) each of any non-standard tool and metric tools used for installation of each item furnished.

2 For electronic hardware:
   A. Combination keypad/card swipe stand-alone battery units: 3 of each hand; 6 in total.
   B. Card swipe only standalone battery units: 3 of each hand; 6 in total.
   C. Two power supplies
   D. Two power transfers
   E. Two SMR 20 on-line readers.

3 Hardware attic stock shall be provided ONLY in original packaging.

DIVISION 09 - FINISHES

1 Carpet: 240 s.f. of rolled goods; one box if carpet tile; for each color used.
2 Floor tile (resilient or hard): One full box of each color used.
3 Vinyl wall base: One full box for each color used.
4 Carpet base: 50 lineal feet, for each color used.
5 Ceramic or Quarry tile base: One complete box of each color used.
6 Ceiling tile: Two (2) boxes of each style used in building.
7 Paint: One full, unopened gallon of each color used. Paint can is to be labeled with paint number from finish schedule, color mix number and name of company along with a color marking on the lid for easy identification.

DIVISION 12 - FURNISHINGS

1 Walk-Off Mats: One additional complete set for every location required by the drawings and/or specifications.
2 Appliances: For student housing projects provide spare appliances, two of each type as required for project.
3 Book shelving: Attic stock required will be based on the amount used in the project. Confirm quantity with the GVSU Project Manager.

DIVISION 21 – FIRE SUPPRESSION

1 Sprinkler Heads: Two, but not less than any amount as may be required by code, of each type and temperature rating used.

DIVISION 23 – HVAC

1 Filters: One complete change out for all HVAC equipment.
2 For Student Housing only: Five (5) spare motors and five (5) spare control valves for the apartment fan coils.

DIVISION 26 – ELECTRICAL

1 Lamps: six lamps of each style or type used. This includes lamps used in other systems or equipment, such as hoods, that may be installed, even if furnished by Owner, as part of the construction contract.
2 Light Fixture Lenses: For fixtures that use acrylic diffusing lenses, either lay-in or wrap around, provide 3 extra lenses of each style and size used. Lenses are to be packaged in a cardboard box clearly labeled indicating contents and size thereof.
3 LED Drivers – 5% of total used in project, but a minimum of (1) one driver per fixture type.
4 Control Device Indicator Lights: 2 of each type and color used. This requirement applies to lamps within indicator lights that have readily changeable, non-soldered connections.
5 Exit Signs: One sign with knock outs in place.
6 Fuses & Circuit Breakers:
   A. For Distribution panels, 120/208V and 277/480 for single phase breakers, 30 amps and less:
      I. For each panel, supply three (3) of each amperage size fuse and/or circuit breaker where there are 10 or more breakers and/or fuses of the same size in the panel.
      II. For each panel, supply one (1) of each amperage size fuse and/or circuit breaker where there are less than 10 or more breakers and/or fuses of the same size in the panel.

DIVISION 28– ELECTRONIC SAFETY & SECURITY

1 Smoke & Heat Detectors: six of each type used.
2 Fire Alarm Audible and Strobe Devices: 2 of each type and style used.

END OF SECTION

DIVISION 02 – EXISTING CONDITIONS

02 40 00 DEMOLITION AND STRUCTURE MOVING

02 42 00 REMOVAL AND SALVAGE OF CONSTRUCTION MATERIALS

1 Contractor to salvage, and return to Owner, all control devices removed as part of the demolition. If Contractor cuts control wiring, wiring must be labeled to identify which device it was wired to. Existing work, including electrical equipment, to remain in place but damaged by demolition operations shall be repaired by the contractor at their expense.

2 Require the development and implementation of a Construction Waste Management Plan as described in the LEED-NC Reference Guide in which the project is registered under. If the project is not registered as a LEED project, contractor must follow the current LEED guidelines.

02 80 00 FACILITY REMEDIATION

02 82 00 ASBESTOS REMEDIATION

02 82 13 ASBESTOS ABATEMENT

1 The Design Professional shall confirm with the Owner if an asbestos survey has been completed for the area(s) affected by construction. If a survey has been completed, a copy of the survey shall be incorporated into the construction documents.

2 All demolition and renovation work to be accomplished on GVSU properties shall be in accordance with NESHAPS regulations 40 CFR Part 61, as a start. Paragraph 61.145, Standard for Renovation and Demolition has been compiled by GVSU at this time, and those records are available in the Safety Office, located in the Facilities Services Center.

3 Once the Contractor has determined the exact location and impact of the proposed work, and knows the status of asbestos materials, contact the Safety Office for further instruction.

4 The Design Professional, when completing construction documents involving the renovation and/or demolition of an existing building must be aware of, and provide proper notation on the documents, as to asbestos containing materials that may be encountered in existing underground utilities. Verify, with the University and to the extent possible, the type and quantity of such asbestos containing underground utilities.

A. No asbestos containing building materials shall be employed in any GVSU facility. The Architect AND General Contractor shall provide GVSU a statement certifying compliance as part of the project's closeout documentation. "No asbestos containing building materials were used in the construction of the _____ building at Grand Valley State University." The Architect/Engineer is to include this requirement in the project's specifications.

5 All asbestos abatement activity is divided into four classes, and each of these classes of work will be executed in compliance with the written procedures spelled out in the O & M Manual (the O & M Manual is developed from the protocol established by the National Institute of Building Sciences) located in the Safety Office, at the Facilities Services Center.

A. Class I work is activity involving the removal of TSI and surfacing ACM and PACM. Sections IV and V of the O&M Manual.

B. Class II work is activity involving the removal of ACM which is not thermal system insulation or surfacing material. This includes, but is not limited to, the removal of asbestos-containing wallboard, floor tile and sheeting, roofing and siding shingles, and construction mastics. Sections VI and VII of the O&M Manual.

C. Class III work is repair and maintenance operations where ACM, including thermal system insulation and surfacing material, is likely to be disturbed. Sections III of the O&M Manual.

D. Class IV work means maintenance and custodial activities during which employees contact ACM or PACM and activities to clean waste and debris containing ACM and PACM. Sections IV, V, VI & VII of the O&M Manual.

02 83 00 LEAD REMEDIATION

02 83 13 LEAD HAZARD CONTROL ACTIVITIES

1 The Design Professional shall confirm with the Owner if a lead material survey has been completed for the area(s) affected by construction. If a survey has been completed, a copy shall be incorporated into the construction documents.

2 All demolition and renovation work to be accomplished on GVSU properties shall be in accordance with NESHAPS Regulations 40 CFR Part 61, as a start.

3 Once it has been determined that a) lead is present and will be impacted by the project, and b) the exact location of lead is known, contact the Safety Office for further instruction.

4 All lead abatement activity being conducted on GVSU property, owned or rented, shall be by a contractor licensed in Michigan under Public Act 188, Section 210.

5 All personnel working for licensed lead abatement contractors, on GVSU property, owned or rented, shall be licensed in Michigan, as required by Rule 408.1058, Sec. 58, of Act 154, P.A. of 1988.

6 All lead abatement activities fall under one of the following classifications, per 29CFR1926.62.

A. Demolition or salvage of structures where lead or materials containing lead are present
B. Removal or encapsulation of materials containing lead
C. New construction, alteration, repair, or renovation of structures, substrates, or portions thereof, that contain lead, or materials containing lead
D. Installation of products containing lead
E. Lead contamination/emergency cleanup
F. Transportation, disposal, storage, or containment of lead or materials containing lead on the site or location at which construction activities are performed, and

7 All work related to the activities shall be conducted in concert with the directions spelled out in Title 29 CFR 1910.1025 and Title 29 CFR 1926.62 and adopted by the State of Michigan Department of Public Health Occupational Health Standards Commission.

END OF SECTION

DIVISION 04 – MASONRY

04 00 00 MASONRY

04 01 00 MAINTENANCE OF MASONRY

04 01 20 MAINTENANCE OF UNIT MASONRY

04 01 20.51 UNIT MASONRY MAINTENANCE

1. **NOTE**: Where acceptable products are indicated it is not necessarily intended to limit those products to only those manufacturers listed. However, if the design professional specifies other products from other manufacturers those products must be equal in every way, to those acceptable products listed in this standard.
2. No brick sills.
3. No exposed rowlock courses on top of brick walls or parapets.
4. The University Executives may participate in brick selection.
5. Avoid brick with face color different from body of brick; "flashed" finishes, rug faces, or other characteristics which will not weather well.
6. Where masonry is exposed to view use only concave tooled joints.
7. Use standard gray mortar color unless otherwise approved by the University in the design phase of the project.
8. The mason shall use recognized industry practices for installation of masonry and avoidance of excessive mortar droppings in cavity wall construction. The use of products, such as Mortar Net, do not give license for sloppy. Excessive mortar droppings are unacceptable and will be cause for wall tear down and replacement.
9. Do not specify or permit the application of colorless coatings (sealers) on brick masonry without Design Professional and University approval. Only penetrating sealers using silanes or silaxane are acceptable for consideration
10. The design and construction of concrete and brick masonry shall conform to NCMA (National Concrete Masonry Association) and BIA (Brick Institute of America) unless otherwise noted herein and including requirements for cold and hot weather construction.
11. Upon delivery to the project site, masonry units shall not be stored in direct contact with the ground and shall be covered to the extent possible.
12. Required test data shall be submitted and approved by Design Professional and University before for brick is delivered.
13. An exterior wall mock-up panel, minimum of 8-foot long x 7-foot high, shall be erected on site prior to the start of masonry work. Mock-up(s) shall include entire wall system construction with all components and sub-assemblies including any stone or brick accent features, and shall include one (1) window opening including lintel..
14. In addition to other items included in this standard, the Design Professional shall insure that the following requirements are contained in the Project Specifications and/or Construction Drawings:
    A. Masonry materials stored on site shall be kept off ground and kept dry.
    B. Furrowing of bed joints is not permitted.
    C. Brick are to be laid with buttered full head joints only. "Slushing" of head joints is prohibited.
    D. Bed joints are to be back beveled to minimize mortar droppings into the drainage cavity.
    E. Do not cut off any mortar protusions on the inner face of the brick wythe allowing mortar to drop to the base of the drainage cavity.
    F. When grout filled collar joints are required any mortar protrussions into the cavity, from either face of masonry wythe, are to be butterd smooth prior to installing grout or mortar fill.
    G. Excessive mortar droppings in the drainage cavity are not permitted, regardless of whether a mortar dropping control system, e.g. mortar net, is used at the base of the cavity.
    H. Collar joints are to be completely filled, including the brick cores. "Slushing" is not permitted. Mason shall insure the mortar/grout fill is properly consolidated eliminating voids and channels.
    I. Overlap in base flashings shall be a minimum of 6-inches.
    J. In metal or wood stud construction where a water-resistant sheet membrane or building wrap, e.g. Tyvek, is used the membrane shall overlap masonry thru-wall flashings by a minmum of 8-inches.
    K. Mortar is to be used within 2 hours of initial mixing. No mortar is to be used after it has begun to set.
    L. At lintels and sills, flashings shall be turned up at ends creating end dams. Turn-up a minimum of 2-inches.

M. Any flashings that are cut or pierced are to be removed and replaced.
N. If freshly laid masonry is distrubed, the disturbed units shall be removed, all mortar shall be removed, place fresh mortar and replace removed disturbed masonry units.
O. Masonry wire ties shall extend at least halfway into the bed joint of the exterior wythe of masonry and shall have no less than 5/8-inch cover to the exterior face of the struck bed joint.
P. Where masonry is exposed to view use only concave tooled joints.
Q. An exterior wall mock-up panel, minimum of 8-foot long x 7-foot high, shall be erected on site prior to the start of masonry work. Mock-up(s) shall include entire wall system construction with all components and sub-assemblies including any stone or brick accent features, and shall include one (1) window opening including lintel.
R. The approved mock-up panel will establish the basis for acceptable quality of the masonry work. Additonal mock-ups may be required, at Contractor expense, until quality of finished product is approved by the University and the Design Professional.
S. The mock-up panel is to be constructed on site, at a location so as to allow it to remain in place until the completion of all masonry work for the project. If it becomes necessary to move the mock-up panel, the Contractor shall do so in such a manner so as to maintain the structural integrity of the panel, causing it no damage, and shall pay for all associated costs of the move.
T. The mock-up panel shall be protected sufficiently to prohibit the panels degradation due to weather.

04 01 20.52 UNIT MASONRY CLEANING

1 The mason shall keep brick clean of excess mortar droppings, smears and stains while laying brick. Dry brush clean or use clean water as necessary.
2 Use of muriatic acid is strictly prohibited. Cleaners such as SureClean by Prosoco or NMD 80 by Eaco Chem are acceptable and when used in accordance with brickmanufacturer's recommendations.
3 Sand finished brick are to be cleaned by brush and bucket method using only water & non-acid based detergent.
4 Pre-wet and rinse masonry areas to be cleaned.
5 Provide 20 square foot test area and obtain approval from Architect and Owner prior to commencement of cleaning.

6 When cleaner is applied with pressurized sprayer, pressure shall not exceed 50 psi and spray nozzle shall be minimum 25° fan shaped sprayer.
7 Thoroughly rinse surfaces using maximum pressure of 500 psi and spray nozzle shall be minimum 25° fan shaped sprayer.

04 05 00 COMMON WORK RESULTS FOR MASONRY

04 05 13 Masonry Mortaring

1 Mortar specifications shall comply with ASTM C-270-10 except as noted:
A. Use of calcium chloride, for any purpose, shall be explicitly prohibited in the contract documents.

04 05 19 MASONRY ANCHORING AND REINFORCING

04 05 19.13 CONTINUOUS JOINT REINFORCING

1 **Single Wythe:** 9 GA x 9 GA hot dipped galvanized truss consisting of two or more parallel longitudinal deformed rods weld connected to a continuous diagonally oriented cross rod which
forms a truss design. The cross rods are electrically butt welded to deformed side rods in a single plane.
Acceptable Products: DA3100 Truss by Dur-O-Wall;
#120 Truss by Hohmann & Barnard Inc.

EXCEPTION: Where the project's structural design calls for numerous locations of full height vertical reinforcing in masonry walls, as part of an engineered wall system, hot dipped galvanized ladder style reinforcing shall be used.
Acceptable Products: DA3200 Truss by Dur-O-Wall;
#220 Ladder by Hohmann & Barnard Inc.

Multiple Wythe Adjustable: 9 GA x 9 GA hot dipped galvanized truss type is designed to tie multiwythe masonry walls and provide joint reinforcement in the back-up masonry wall while allowing for adjustability between wythes. Adjustability is provided by rectangular eyes or tabs with restraint bar of 3/16-inch wire which are welded to one longitudinal rod at 16 inches on center. Pintles or Ties of 3/16-inch wire are engaged in the eyes or tabs and laid in the bed joint of the veneer. Finish shall be hot dipped galvanized in conformance with ASTM A153 –Class B2, 1.50 ounce.

Acceptable Products: DA3700 Dur-O-Eye by Dur-O-Wall;
#170 Truss Lox-All by Hohmann & Barnard Inc.

EXCEPTION: Where the project's structural design calls for numerous locations of full height vertical reinforcing in masonry walls, as part of an engineered wall system, hot dipped galvanized ladder style reinforcing shall be used.

Acceptable Products: DA3600 Ladur-Eye by Dur-O-Wall;
#265 Ladder Lox-All by Hohmann & Barnard Inc.

04 05 19.16 MASONRY ANCHORS

1 A**nchoring to poured concrete framework:** Use minimum 26 GA stainless steel dovetail anchor slot. 1-inch x 1-inch with foam filler. Use dovetail triangular ties, hot dipped galvanized, with 12 ga. dovetail clip with 3/16 - inch diameter wire tie.

Acceptable Products: DA100 Dovetail Anchor Slot with #DA-720 Tie by Dur-O-Wall;
#305 Dovetail Slot with #315 Tie by Hohmann & Barnard Inc.

2 **Anchoring to metal and wood stud framework**: Use 12 GA. Hot-dipped galvanized plate with leg to accommodate insulation at specified thickness. Minimum 3/16-inch diameter wire pintile hook. For attachment to metal studs, use only stainless steel self-tapping sheet screws.

Acceptable Products: DA213 by Dur-O-Wall;
HB200 Veneer Anchor by Hohmann & Barnard Inc.

3 **Anchoring structural steel column framework**: Use 3/16-inch hot dipped galvanized column flange wire ties Acceptable Products: DA980 F/RP or F/P by Dur-O-Wall;
#351 or #352 Wire Column Tie by Hohmann & Barnard Inc.

4 Corrugated metal ties are prohibited.

04 05 23 MASONRY ACCESSORIES

04 05 23.13 MASONRY CONTROL AND EXPANSION JOINTS

1 Expansion Joint: In veneer masonry, for use below horizontal relief angles and vertical joints enclosed cell neoprene filler strip complying with ASTM D 1056, Grade RE41 with minimum 50% compression. Minimum 3/8-inch thick x 3-inch depth.

Acceptable Products: DA2015 Rapid Expansion Joint by Dur-O-Wall;
NS Closed-Cell Neoprene Sponge by Hohmann & Barnard Inc.

2 Control Joint: For concrete masonry, use extruded rubber compound complying with ASTM D 2000, 2AA-805.

Acceptable Products: DA2000 series Rubber Control Joint by Dur-O-Wall;
RS Series Rubber Control Joint by Hohmann & Barnard Inc.

3 Termination Bars: 1/8-inch thick 304 stainless steel for anchoring cavity wall base flashings to backup substrate.

04 05 23.16 MASONRY EMBEDDED FLASHINGS

1 Flashing used at base of cavity walls, window sills, door and window heads, horizontal relief angles and other locations used for cavity wall drainage shall be a two-part system consisting of the following:

A. Flexible Sheet Flashing:
   I. 24-inch wide, 60-mil thick, uncured EPDM self-adhering membrane installed in accordance with manufacturer's instructions.
   II. Extend flexible sheet flashing to within no more than 1-inch of exterior face of brick veneer, overlapping and adhering to the stainless-steel drip edge flashing.

III. Flexible flashing to extend up vertical face of backup substrate, using full width of sheet and terminated at the top of the flexible flashing sheet with a termination bar.
IV. Caulk top edge of termination bar.

B. Drip Edge Flashing:

I. Use .018-inch thick stainless steel. Horizintal leg (in joint) shall run back to within ½-inch in interior face of brick wythe (cavity side).
II. Exposed drip leg shall be 3/8 to 1/2-inch in length and bent downward at a minimum of 15 degrees, but no greater than 45 degrees.
III. All joints to be soldered over entire length of joint.

04 05 23.19 MASONRY CAVITY DRAINAGE, WEEPHOLES AND VENTS

1 Weeps and Vents:

A. Weeps: Hohmann & Barnard Inc.,#342 W/S rectangular plastic weep with stainless steel screen and cotton wick, spaced no greater than 16-inches apart. Locate at base of cavity walls, shelf angles, door and window heads.

B. Weeps: 3/8-inch tube spaced 16-inches apart. For use below stone sills, headers and water tables where application of #342 weeps are not practical or possible.

C. Vents: : #343W Weep Vent by Hohmann & Barnard Inc., spaced no greater than 32-inches apart. Locate at top of cavity walls, and top of all other portions of cavity walls that are not continuous.

2 Mortar dropping collection device for masonry cavity walls: Provide product manufactured from polyester/polyethylene mesh and using recycled polyester. Shape is to be trapezoidal (dovetail) to enhance drainage. Material will not oxidize, rot, promote mold or fungus, or react with other common building materials such as mortar, cement, asphalt, modified bitumen, PVC, copper, or galvanized metal, thereby ensuring long-term performance for all materials. Acceptable product is Mortar Net (http://www.mortarnet.com/).

04 21 00 CLAY UNIT MASONRY

04 21 13 BRICK MASONRY

1 Face Brick: Conforming to ASTM C-62 shall be Grade SW, type FBS or better as standard of quality. Face brick shall be 3-core brick only. Brick with pencil or frogged cores are not permitted.

2 The Design Professional shall submit, for University review, the following:

A. Initial test report submittals from brick manufacturers. Test report must be for the product manufactured in the most recent 12-month period. Supplied by Manufacturer. Architect to provide submittals to Owner during design for approval during design development phase.

B. Contractor to provide final test report submittal for actual product manufactured for specific project during submittal phase of project.

C. All tests, stated above, shall be laboratory tests conducted in accordance with ASTM C-67.

D. All test reports shall be submitted to the University in the format shown at the end of this Section. NO EXCEPTIONS. Failure to comply will result is reports be returned as unacceptable.

3 For compressive strength, and absorption determinations, at least ten individual brick shall be selected for lots of 1,000,000 brick or fraction thereof. For larger lots, five additional specimens shall be selected from each additional 500,000 brick or fraction thereof. Additional specimens are taken at the discretion of the University.[1]

4 Test reports shall delineate the following criteria with associated results meeting minimum and maximum values as stipulated below:

A. Efflorescence Rating: "No Efflorescence".

B. Minimum Compressive Strengths (SW):

I. Individual Brick; 2500 psi

II. Average of 5 brick; 3000 psi

C Maximum Water Absorptions:

I. 5 Hr. Boil:

a. Individual Brick; 20.0%

b. Average of 5 brick; 17.0%

II. Maximum Saturation Coefficients:

a. Individual Brick; .80 (waivers not allowed)

b. Average of 5 brick; .78 (waivers not allowed)

5 The University will not accept a brick that does not comply with the maximum saturation coefficients above even though the brick may satisfy ASTM C-216's "absorption alternate".

6 Maximum Permitted Intial rate of Absorption (IRA):

A. Ideally IRA's for selected brick will range from 10 grams/min/30si to 15 grams/min/30si but in no event shall exceed 30 grams/min/30si, all when tested in accordance with ASTM C-67; Laboratory Test.

B. When different brick are used to achieve architectural accents and the different brick are laid together in the same wall panel, the variance between the IRA's of the different brick, when comparing them to the ratio of the high IRA to the low IRA, shall not exceed the ratio of 1.15.

C. Wetting of brick is to be expressly prohibited in the Architect's specifications.

7 Architectural Effect: Where face brick is detailed with either projected or recessed coursing for accent and/or shadow lines the brick course immediately below the recessed course shall be solid brick (no coring) and the bed joint of the recessed brick shall be sloped out to the face of the outer brick course at a minimum of 15 degrees to allow water to shed away for the face of the recessed brick course. The same shall apply to a projected course of brick except that the projected brick may be cored units. (See Illustration 1)

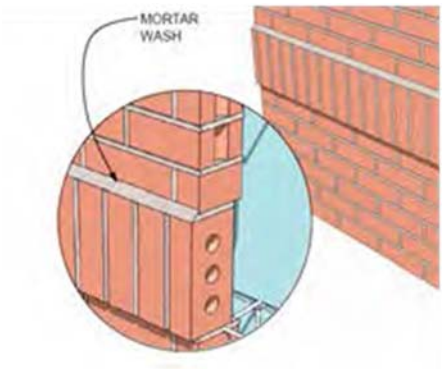


Illustration 1

[1] ASTM C-67 4.2.1

8 All brick provided and installed for the project shall be free of efflorescence, and the Architects specifications shall explicitly state this requirement.

04 22 00 CONCRETE UNIT MASONRY

1 All concrete masonry units shall conform to ASTM C-90.
2 All concrete masonry used below grade shall be normal weight (125#/c.f. or more).
3 All concrete masonry units used for interior or exterior load-bearing and/or for the exterior envelope of the building shall be a minimum of medium weight (105 to less than 124 #/c.f.).
4 Other concrete masonry used, and not included in items 1 or 2 above, may be light weight (less than 105 #/c.f.)
5 Concrete block used in the interior of a building and exposed to view shall not be "wall washed" with lighting.

04 40 00 STONE ASSEMBLIES

04 43 00 STONE MASONRY

1 Indiana limestone conforming to ASTM C-568 Standard Specification for Limestone Building Stone, ASTM C-97, Test Methods for Absorption and Bulk Specific Gravity of Building Stones, ASTM C-99
Test Method for Modulus of Rupture of Building Stone, ASTM C-170, Test Method for Compressive Strength of Building Stone and the Indiana Limestone Handbook.
2 Dry or wet cast architectural cast stone are not acceptable products.
3 When limestone is used as window sills, outer face of stone is to overhang face of veneer masonry by minimum of 1-1/2-inches and have grooved or concave drip on underside of overhang.

BRICK TEST REPORT FOR GRAND VALLEY STATE UNIVERSITY

All test results conducted in accordance with ASTM C-67-09 Standard Specification for Facing Brick (Solid Masonry Units made from Clay or Shale)

COMPANY INFORMATION:		Report Date:	
Company Name			
P.O. Box			
Street Number			
City, State, Zip Code			

PLANT INFORMATION		Brick Grade:	SW
Plant Name		All brick to be Severe Weather (SW)	
Plant Location		Brick Type:	
Report #		All brick shall be FBS or FBX	
Product Code and/or name			
Lot No. or Code			

	Sample						
Absorption	#1	#2	#3	#4	#5	Avg. of 5	Test Date
Speciman Identification							
24 hr. Submersion in cold water (%)						#DIV/0!	
5 hr. Submersion in boiling water (%)						#DIV/0!	
Saturation Coefficient (Ratio of 24 Hr. to 5 Hr.)						#DIV/0!	

ASTM C-216-09 (4 - Table 1) Physical Properties: For SW brick the maximum water absorption by 5-hr boiling is 17.0% for average of five (5) brick and 20.0% for an individual brick.

ASTM C-216-09 (4 - Table 1) Physical Properties: For SW brick the maximum saturation coefficient is .78 for average of five (5) brick and .80 for an individual brick.

Compressive Strength	#1	#2	#3	#4	#5	Avg. of 5	Test Date
Speciman Identification							
psi						#DIV/0!	
Mpa						#DIV/0!	

ASTM C-216-09 (4 - Table 1) Physical Properties: For SW brick the minimum compressive strengths are 3,000 psi (207 Mpa) for the average of brick and 2,500 psi (172 Mpa) for an individual brick

Efflorescence	#1	#2	#3	#4	#5		Test Date
Speciman Identification							
N.F. Indicates "Not effloresced"							

Initial Rate of Absorption (IRA)	#1	#2	#3	#4	#5	Avg. of 5	Test Date
Speciman Identification							
g/min/30si						#DIV/0!	

Maximum IRA shall not exceed 30g/min/30si. Ideal range 10 to 15 g/min/30si

rev. 09-10-2014

Issue Date: Apr. 2010

The above form is available in MS Excel Format upon request.

END OF SECTION

DIVISION 05 – METALS

05 50 00 METAL FABRICTIONS

05 59 00 METAL SPECIALTIES

1. Guard posts, where required, shall be in accordance with Standard Detail 05.001 in Appendix C of this manual.

END OF SECTION

DIVISION 06 – WOOD, PLASTICS AND COMPOSITES

06 00 00 WOOD, PLASTICS AND COMPOSITES

06 10 00 ROUGH CARPENTRY

06 11 00 WOOD FRAMING

1 Provide wood blocking as substrate for anchoring devices to drywall surfaces (wood or metal stud framing) such as, but not necessarily limited to, the following:
   A. door stops
   B. magnetic door holds
   C. toilet room accessories (See Division 10)
   D. wall mounted telephones

2 Blocking is not required for marker or tack boards.

06 40 00 ARCHITECTURAL WOODWORK

06 40 23 INTERIOR ARCHITECTURAL WOODWORK

1 All work shall be in conformance to the Architectural Woodwork Institute (AWI) standards. Enrolment into the Quality Certification process is not required.

2 Stained wood trim: When applying stained finished wood trim, such as chair rails, cove moldings, base or casings, Contractor is to use care to get proper match of grain density at joints to avoid light/dark visual contrast as a result of differentiating wood grain density each side of joint.

06 41 00 ARCHITECTURAL WOOD CASEWORK & COUNTERTOPS

1 High-density particleboard constructed counter tops should be of 1 piece construction (no joints) with integrated back splash.

2 Where sink counters are provided that are handicapped accessible, the counter construction shall be in conformance with Standard Detail 06.001 in Appendix C of this manual.

3 No black laminate shall be used for finish counter surfaces.

4 Use only standard metal hardware on all cabinetry. Hinges shall allow full 180-degree swing on cabinet doors.

5 Use solid surface materials in all wet applications.

06 42 00 WOOD PANELING

06 42 16 WOOD VENEER PANELING

1 When designing wood panel interior wall finishes the Designer shall take into account building humidity conditions. Panel joints shall be designed to allow movement based upon humidity conditions without causing unsightly open joints or buckling of panel joints.

06 65 00 PLASTIC FABRICATIONS

06 65 00 PLASTIC TRIM (CHAIR RAIL)

1 Install in classrooms with drywall finish. Rails can be wood, plastic or other approved synthetic material. Coordinate height with furniture plans to protect wall surface against chair backs, desks and/or tablet arms. Architect to take thickness of chair rail into account when calculating aisle width.

END OF SECTION

DIVISION 07 - THERMAL AND MOISTURE PROTECTION

07 00 00 THERMAL AND MOISTURE PROTECTION

07 05 00 COMMON WORK RESULTS FOR THERMAL AND MOISTURE PROTECTION

1 Any sloping roof shall have the underside of deck, on which membrane rests, ventilated to outside. Insulation to be below ventilated space.
2 Built up roofing shall use fiberglass felts.
3 Include vapor barrier, if required by roof design and roof material selection.
4 For sloped roofs, provide a minimum 40-mil thickness ice shield under roofing shingles. For roof slopes of 4:12 or greater extend ice shield, using standard widths as required, to overlap interior side of exterior wall by 24 inches minimum and for roof slopes less than 4:12, 36 inches minimum.
5 On sloped metal roofs use snow fence style design to control slide-off. Use of individual "snow jacks" or clips is prohibited. Avoid roof designs at building entrances that allow snow and ice to slide-off or drop onto entry walks below.
6 All "flat roofs" shall be designed so as to provide positive drainage and prevent ponding of water. Ponding of water is defined as water that remains on roof surface after 48 hours. Roof surfaces should try to provide a minimum of ¼" per foot of slope to roof drain locations. This is particularly critical at saddles and valleys
7 New "flat roof" installations shall require a one (1) week flood testing period with report to the University upon completion of the test. If any leaks are discovered the report shall identify the locations of the leaks and apparent cause, remedies taken to resolve, or when remedies will be performed, and when retest is scheduled to be conducted. When leaks are discovered a retest shall be performed and this procedure shall be repeated until the one week test period passes with no leaks. The cost of the first flood test shall be included in the roofing contractors bid. The costs of any and all retests shall be borne solely by the roofing contractor.
8 For LEED approved roofs, membrane roofs shall be any LEED acceptable color other than white. Review with Owner during design development.

07 10 00 DAMPPROOFING AND WATERPROOFING

07 13 00 SHEET WATERPROOFING

1 For below grade application, preferred product is Carlisle CCW MiraDRI 860/861 with CCW protection board. If foundation drains are used, use CCW MiraDRAIN 6000/6200 drainage board in lieu of CCW Protection Board.
2 Bituthene 3000, with compatible protection and/or drainage boards, is an approved alternative product.

07 20 00 THERMAL PROTECTION

07 21 00 THERMAL INSULATION

07 21 13 BOARD INSULATION

1 Roofing insulation to conform to Michigan Energy Code. The University prefers installation in **2 layers** -for example; two 1" layers, rather than one 2" layer.
2 Roofing and roof insulation to conform to FM wind resistance requirements for this area.

07 21 26 BLOWN INSULATION

1 Provide minimum R-50 for blown-in attic insulation.
2 Provide adequate attic insulation to prevent excessive ice dams at roof eaves.

07 30 00 STEEP SLOPE ROOFING

07 31 00 SHINGLES and SHAKES

07 31 13 ASPHALT SHINGLES

1 Roofing shingles shall be nailed with minimum .080 shank diameter; 1-1/4" long galvanized roofing nails.
STAPLING IS STRICTLY PROHIBITIED.

07 40 00 ROOFING AND SIDING PANELS

07 41 00 ROOF PANELS

07 41 13 METAL ROOF PANELS

1 On all sloped metal roof panel applications provide continuous snow fencing to prohibit snow slide-off. Style and location of snow fencing is to be reviewed and approved by the University. Individual clips of "snow jacks" are prohibited. Roof design shall not allow roof slopes coming down toward or over paths of building entry or exit.

07 42 00 WALL PANELS

07 42 13 METAL WALL PANEL

1 Metal wall panels shall be selected from the manufacturer's standard colors.

07 50 00 MEMBRANE ROOFING

07 53 00 ELASTOMERIC MEMBRANE ROOFING

07 53 23 ETHYLENE-PROPYLENE-DIENE-MONOMER ROOFING (EPDM)

1 Single ply membrane roofing to be 60 mil EPDM, ballasted or fully adhered.
2 Roofing and roof insulation to conform to FM wind resistance requirements for this area.
3 Warranty for EPDM systems shall be;
- A. By the roofing contractor, a two (2) year material and labor workmanship warranty,
- B. Manufacturers ten (10) year full system warranty,
- C. Manufacturers twenty (20) year for the membrane material
- D. "Full system" means membrane, flashings, counter flashings, adhesives and sealants, insulation, recovery board, fasteners, fastener plates, fastening bars, metal edging, metal termination bars and any other products utilized in the installation.
- E. The warranty period shall commence starting from the date of substantial completion for the entire principal project.
- F. Shall include all parts, labor and material required for the replacement and installation of failing system components.

4 When vegetated roofing is utilized, in conjunction with elastomeric membrane roofing, a single warranty for the complete system installation shall be provided. See Section 07 55 63 (4.0) for warranty requirements.

07 55 00 PROTECTED MEMBRANE ROOFING

07 55 63 VEGETATED ROOFING

The following is an outline guide to describe the desired outcome the University expects for a vegetated roofing installation and is not intended to represent all technical information that would otherwise be required for a complete specification and therefore is NOT to be copied by the Architect and used as the entire specification for this application.

PART 1: GENERAL

1.1. SCOPE
- A. Provide equipment, materials, tools, and labor necessary to deliver, hoist and install vegetated roofing modules. Modules shall include growth media and plants. This work shall also include edge treatments, custom shaping of modules, and installing paver stones or ballast, slip sheet/root barrier and irrigation system.
- B. The vegetated roof shall be part of a total roofing installation, contracted and warranted as such.

1.2 SUBMITTALS
- A. Product data for vegetated roofing systems.
- B. Planting mix design indicating species.
- C. Shop Drawings: Indicating layout of modules, pavers, irrigation, and square footage.
- D. Warranty: Submit manufacturer warranty and ensure that forms have been completed in Owner's name and registered with manufacturer.
- E. Maintenance instructions for inclusion into owner's manuals.

1.3 QUALITY ASSURANCE
- A. Installation shall be per the manufacturer's requirements and no deviation should be made from the manufacturer's specifications.
- B. Once the installation is completed, an inspection is to be conducted by a Technical Representative of the installer to verify that the vegetated roof system is installed properly to standards.

1.4 DELIVERY, STORAGE, HANDLING, PROTECTION
- A. Vegetated roof system is to be delivered in good condition free from shipping damage.
- B. Vegetated roof system is to be kept out of the sun if plastic wrapped to prevent overheating.
- C. Vegetated roof system is to be installed on the roof top within 4 hours of delivery.
- D. On the job site, Vegetated roof system is to be handled to prevent damage to the system and all roofing components.
- E. System shall not exceed the load capacity of the roof deck when placing vegetated roof system on the roof.
- F. During installation, protect the roof deck and membranes with appropriate material such as plywood sheeting. Never scrape or puncture slip sheet or membranes. Keep roof surfaces free of soil, grit, or debris at all times with broom.
- G. Transport carts (if used) are to have pneumatic tires, to be wheeled about only upon protective plywood sheeting, and to be loaded so as not to exceed weight capacity of roof deck.

PART 2: PRODUCTS

2.1 PRODUCTS

A. Maximum 1.5 foot x 2 feet outside diameter, 4 inches tall finished product. May allow for growing soil above the container edge. Soil height from container bottom is approximately 4-inches.
B. Saturated weight with mature vegetation not to exceed 30 lb. per square ft.
D. Module color: Black
E. Pre-vegetated at a Nursery, the Nursery is to execute the following:
   i. Module is to be filled with soil and appropriately settled either by mechanical vibration or flooding with water. Any settled soil is to be replaced so that soil extends to top at time of planting and maintaining the full4-inches of planting depth.

2.2 GROWING MEDIUM

A. Growing medium is an engineered blend of inorganic and organic components based upon German FLL granulometric guidelines, modified so as to contain ecologically sustainable levels of organic content.

2.3 PLANTS

A. Per specifications and consisting of highly drought resistant ground covers; selected according to their USDA hardiness zone classification and shall include, but not necessarily limited to, grasses, perennials and ground covers.
B. Module is to be filled with plants as specified. Plants are to be grown to maturity with coverage of no less than 95% soil coverage when delivered to the project site. When modules are installed, coverage is adequate to diminish the visual appearance of a grid.

2.4 ACCESSORIES

A. Pavers/Ballast
   i. To be of compatible size, design and appropriate weight.
B. Edging: L-shaped, 4.5-inch x 3.5-inch, minimum 0.025 with black painted aluminum with perforations for drainage. Painted finish shall be Duraflex electrostatically applied and baked on paint, meeting requirements of AAMA 2603. Acceptable product: "Geoedge" by Permaloc Corporation or approved equal.
   i. If edging is attached to modules, use 10-16 x l-inch wafer head self-tapping screws in gray spex finish.
C. Provided minimum of one (1) wall hydrant for watering.
D. Irrigation System (when required and dependent on area of vegetated roof)
   i. System to be used only to keep vegetation in optimal condition during prolonged periods of heat and drought and to optimize the evaporative cooling effect of vegetation during such weather events.
      a) Function: fully automatic.
      b) Controls:
         1) Automatic rain sensor.
         2) Irrigation controller shall be outdoor-type.
         3) All sprinklers will have matched precipitation on the same zone.
      c) Piping:
         1) Subterranean irrigation
      d) Valves:
         1) A master valve shall be installed on the mainline after the backflow device.
         2) All valves to be covered by a 6" valve box.
         3) All wire connections to be waterproof, UL approved.
         4) To be a manual drain type. Install automatic freeze protection drain valves on all main and lateral piping.
   ii. Irrigation System Maintenance
      a) System to be blown out with compressed air no greater than 60 psi annually in fall prior to reaching freezing temperatures.

PART 3: EXECUTION

3.1 PREPARATION OF ROOF SURFACE

A. Slip sheet/root barrier, specified by architect and approved by manufacturer, of 40-60 mil. thickness with overlapped and effectively bonded seams to ward against root penetration and to keep waterproofing layer safe and clean from soil duringinstallation.
B. Install slip sheet/root barrier in accordance with manufacturer's recommendations.
C. All surfaces to be smooth, free of debris, soil, and grit prior to placing modules.
D. All materials to be tested water tight and free draining prior to module placement. The required roof flood test is to have been successfully completed prior to installation of the vegetated roof system.
E. All surfaces to be maintained clean and free of debris, soil, and grit during installation process via use of broom. Never walk upon such materials as they may damage membranes.

3.2 INSTALLATION SEASON

A. Module Installation to be conducted when plants are:
   i. Properly adapted and acclimatized to local weather conditions.
   ii. When weather is above 35° F and there is no ice on the roof and soil is unfrozen.

3.3 LAYING (PLACING) MODULES

A. Vegetated roof system installation to follow behind installation of slip sheet/root barrier, irrigation system, pavers, ballast, and edging.
B. Vegetated roof system installation to be conducted in strict accordance with installation guidelines.
C. Vegetated roof system installation to be conducted in accordance with green roof design.

D. Vegetated roof system to be placed directly on top of appropriate slip sheet/root barrier.
E. It is recommended that any custom cutting/fitting be oriented on the high side (top), or sides of the roof. It is recommended that the cut side of the module be set tight against the edging or toward the side of an intact module so as to prevent soil spillage. If custom cutting must be done on the low, draining, side of the roof, it is imperative that no filter cloth be inserted as it could impede drainage. It is best to orient the cut side against another module, facing upstream.
F. After installing modules, they should be immediately watered so as to thoroughly moisten the media from top to bottom. Water shall be of suitable quality for plant growth and irrigation system or hoses and sprinklers may be used for such purpose. Note: it takes approximately 1 inch of water, or 1 gallon per module to moisten each module thoroughly.
G. Walkway pavers shall not be installed along roof edge. Pavers, forming walkways or runways that can be used by personnel, shall be a minimum of 6-feet from roof edge as measured from the paver's closest edge.

3.7 MAINTENANCE

A. The Contractor shall provide annual maintenance for the vegetated roof for a period of two (2) years commencing from the date of substantial completion for the entire principal project.
B. The Contractor shall replace all dead and/or dying plants during the maintenance period. (see also: 4.0 Warranty).
C. All maintenance to be performed per manufacturer's instructions.
D. Documentation
   i. Record all green roof maintenance events. Include name of person, date and activity.
   ii. If fertilizer, record type and amount applied per 1000sf
   iii. If soil test, record lab
   iv. If irrigation, record duration and quantity
E. Annual Maintenance
   i. Soil Testing and Fertilization: Annually, between the dates of April 1st & 15th of each year, administer a soil test for PH and fertility levels.
      a) Maintain pH in the range of 6.5 to 8.0. When indicated, apply a single springtime application of Nutricote 14-14-14, Type 180 (180 day release period), at 20lbs per 1000sf. Follow the Nutricote labeled directions for application rate. All applications of fertilizer are the sole responsibility of the applicator.
F. Irrigation
   I. Watering
      a) when needed as a "temporary" management tool under the following conditions:
         1) Periods of 75 degree weather, with less than 1" of rainfall persisting for 4 weeks or longer.
         2) In areas of reflected light, such as next to south facing walls, more frequent irrigation should be applied to keep the soil from becoming excessively dry.
         3) Limit fall season watering to only periods of prolonged wind and drought.
G. Inspections and Plant Care Protocol: Conduct the following twice per month during the entire growing season
   I. Conduct hand weeding during the twice monthly inspection. Pull all weeds, never allow any weed to flower, set seed and complete its life cycle.
   II. Any displaced soil should be immediately replaced.
   III. Roof drains should be cleared of any debris, pebbles, leaves, etc.
   IV. Immediately remove debris or trash.

3.8 ACCEPTANCE

A. Conduct post-installation inspection to determine acceptance of vegetated roof system. Inspection to be made by General Contractor's Representative or by Owner's Representative upon General Contractor's request; five working days' notice required.
B. Upon acceptance, Owner assumes responsibility for module/plant maintenance after the initial two (2) year warranty and maintenance period.

3.9 CLEANUP

A. During installation, keep all work surfaces clean and free of grit, dirt, or debris. Use broom not blower, do not sweep soil under modules or slip sheet. Following installation, remove all excess materials and tools from job site. Ensure that any damage that occurs as a result of installation is appropriately and immediately repaired.

4.0 WARRANTY

A. Warranty for EPDM-Vegetated roofing systems shall be;
   i. By the prime roofing contractor, a two (2) year material and labor workmanship warranty,
   ii. Membrane manufacturers ten (10) year full system warranty,
   iii. Membrane manufacturers twenty (20) year for the membrane material,
   iv. Vegetated roofing "module" shall be warranted for twenty (20) years with no exceptions or conditions in regard to how modules are placed with or without edging, parapets, ballast or similar conditions of installation
   v. All plantings shall be warranted for a period of two (2) years
   vi. Membrane manufacturers "Full system" means membrane, flashings, counter flashings, adhesives and sealants, insulation, recovery board, fasteners, fastener plates, fastening bars, metal edging, metal termination bars and any other products utilized in the installation.
   vii. In the case of a membrane roofing workmanship or system failure the warranty shall include material and labor costs for the removal and replacement of the vegetated roofing as necessary to facilitate the membrane rood repair and shall include replacement of modules and/or plant material damaged as a result of the repair work.
   viii. The warranty period shall commence starting from the date of substantial completion for the entire principal project.
   ix. Shall include all parts, labor and material required for the replacement and installation of failing system components.

07 70 00 ROOF AND WALL SPECIALTIES AND ACCESSORIES

07 72 00 ROOF ACCESSORIES

07 72 33 ROOF HATCHES

1 Provide roof hatch access door, manufactured by SafePro, L.P. or equal.

2 Provide hold-open arm with vinyl grip.

3 For safety and added security, provide interior lock provision for Owner supplied padlock.

4 Provide roof hatch fall protection safety rail system and ladder extension by SafePro L.P., or equal. Include wrap around self-closing gate mounted on heavy duty non-pinch hinges acting as ladder extension.

5 Provide walkway pads as a means of access for maintenance personnel to, and around roof-mounted equipment, which will protect roofing. Protective walkway pads shall be a minimum of 30" wide, and 60" wide around roof top equipment.

07 84 00 FIRESTOPPING

1 Subject to compliance with through penetration firestop systems (XHEZ), joint systems (XHBN), and perimeter firestop systems (XHDG) listed in Volume 2 of the UL Fire Resistance Directory; provide products of the following manufacturers as identified below:

Hilti, Inc., Tulsa, Oklahoma
800-879-8000, www.us.hilti.com

END OF SECTION

DIVISION 08 – OPENINGS

08 01 00 OPERATION AND MAINTENANCE OF OPENINGS

1. All fire rated doors and windows shall comply with N.F.P.A. 80 Standard for Fire Doors and Fire Windows.
2. All multiple leaf exterior doors shall be provided with a keyed removable mullion with an IE74 Best cylinder. Vertical rod panic devices are not permitted.
3. Doors at stairs, fire separation doors, departmental office entries, private offices, conference rooms, classroom and lab entries and other heavily used locations shall have glass lights. Doors to faculty offices may or may not to have glass lights. Confirm requirement with Facilities Planning project manager.
4. Doors should swing against a wall whenever possible. If not possible an overhead stop is required.
5. Use doors, where ever practicable, that are standard height not requiring custom fabrication of door and/or frame. Doors in excess of 7'-2" in height are prohibited unless approved by the University.
    a. Doors in excess of 3'-0"x7'-2" shall have (4) heavy duty ball bearing hinges.
6. All exterior doors require an audible door prop alarm that is connected to the Security Management System (SMS) unless otherwise approved by the project manager.
7. When door alarms are required on doors with standard non-electrified hardware configuration, alarmed panic devices shall be used and shall be per hardware schedule. DETEX devices are not acceptable.
8. When door alarms are required on doors with electrified card access hardware configuration, alarming mechanism shall be door prop alarms. See Section 28 1000.
9. The contractor shall furnish BEST 7-pin interchangeable cores. GVSU will combinate cores. Contractor shall furnish and install 1E74 BEST Cylinders wherever required by the Project. DISCARD set screw and plastic disk included with cylinder. See Appendix C, Standard Detail 08.001. The University will install final BEST 7-pin interchangeable cores.
10. Entry vestibule door automatic operators shall be adjacent to electronic card access and sequenced unless the two sets of doors are configured 90 degrees to each other or separated by 10'-0" or more in length. All vestibule doors shall have interior push buttons for interior & exterior doors. Review sequencing with project manager during design development.
11. Push pads for barrier free accessibility shall be mounted **no higher than 36-inches** from finish floor and/or sidewalk to the centerline of the push pad.
12. Exterior doors--heavy-duty metal and heavy-duty hinge straps--welded corners. Provide weather stripping (magnetic type) and bottom/threshold sweep.
13. Double access doors shall be provided into maintenance and mechanical equipment spaces provided with removable key secured mullion.
14. Janitor, docking and loading doors shall have an armor plate installed on the inside of the door for additional protection.
15. See Section 08 71 00 for hardware specification requirements.

08 10 00 DOORS AND FRAMES

08 12 00 METAL FRAMES

08 12 13 HOLLOW METAL FRAMES

1 Hollow metal frames shall be welded type. Knockdown frames may be permitted, with University approval, for residential buildings only.

2 Frame installation shall conform to current ANSI A250.11; Recommended Erection Instructions for Steel frames. SDI web link is: http://www.steeldoor.org/pdfs/A250_11.pdf

3 Frame installation tolerance shall not exceed 1/16" for square, plumb, alignment and twist, in conformance with current ANSI A250.11. See Figure 1.

4 When installed on masonry coat inside of frame with waterproof coating.

5 When providing knock down frames wrapping around drywall, use anchor adjusting screws and base anchors as shown in Figures 2 and 3, from ANSI A250.11-2001.
All exterior door frames shall be prepped, with conduit in frame and to be located above finished ceiling, and mortar box for strike to accommodate future electronic access hardware. Additionally, these same doors are to be prepped for EPT hinge and installation of future "door prop open" alarms, installed as integral part of electronic access systems.

08 14 00 WOOD DOORS

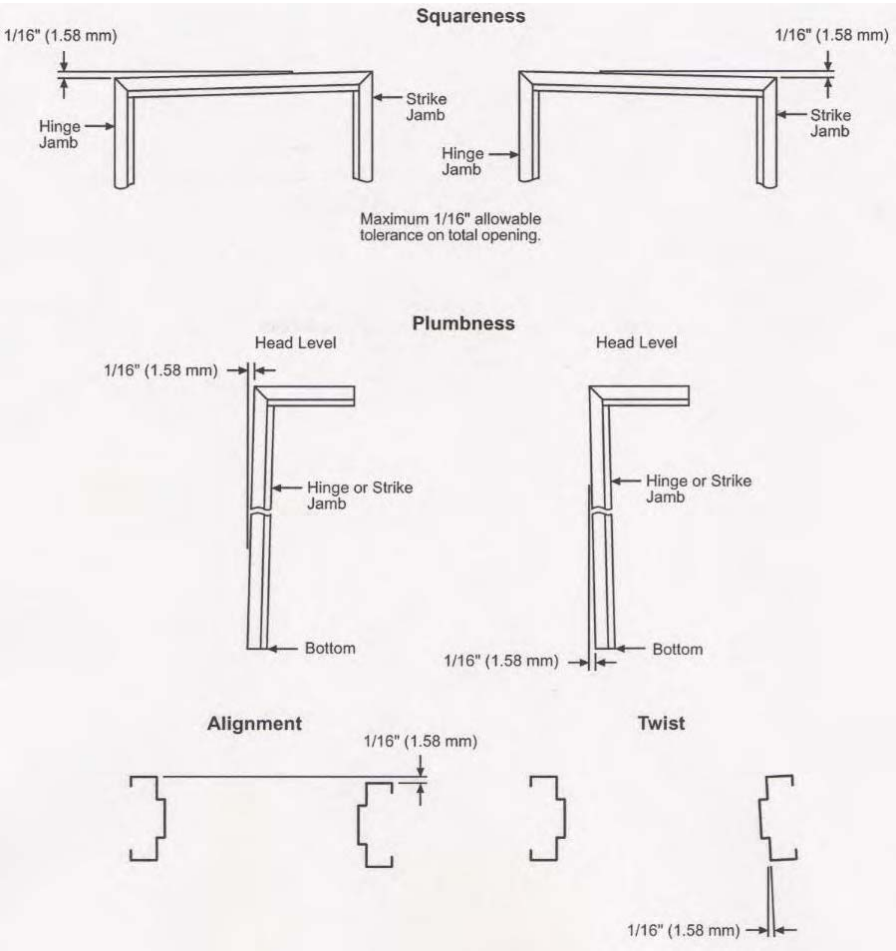
08 14 16 FLUSH WOOD DOORS

1 If wood veneered finished doors are used, specify minimum AWI Premium Grade door construction and veneer. Use combed rift cut veneer finish.

08 14 23 CLAD WOOD DOORS

1 Doors to be solid core wood with plastic laminate, except where code labeling requires other construction or as otherwise approved in writing by the University.

FIGURE 1



REFERENCE ANSI A250.11-2001 STANDARD.

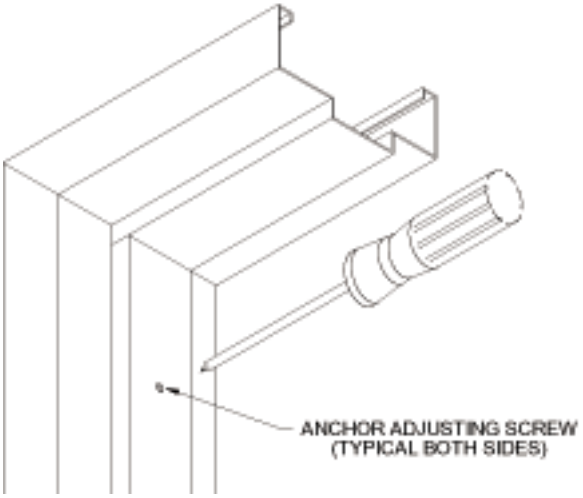


FIGURE 2

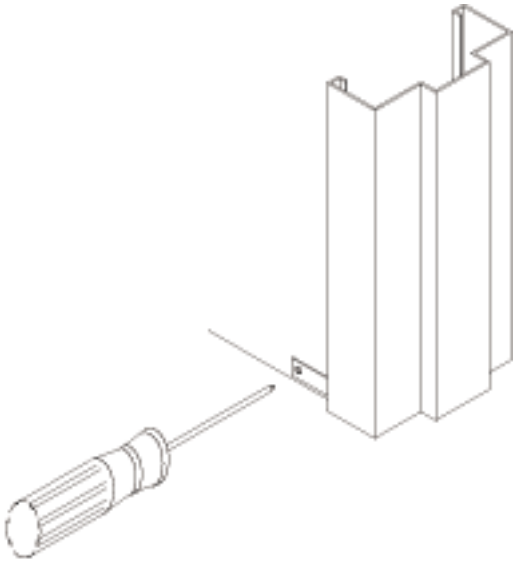


FIGURE 3

08 17 00 FRP DOORS

08 17 43 EXTERIOR FRP FLUSH DOORS

1 Special-Lite FRP Sand-Stone or Pebble-Grain texture flush doors.

08 30 00 SPECIALTY DOORS AND FRAME

08 31 00 ACCESS DOORS AND PANELS

08 31 13 ACCESS DOORS AND FRAMES

1 All access doors and panels that are accessible off public spaces regardless of what specification division such doors and panels may fall under, shall be provided with BEST 1E74 cylinders prepared to receive the University's BEST interchangeable cores. Access door locations are, but not necessarily limited to, the following:
   A. Attic or roof access.
   B. Access to valves.
   C. Access to fire dampers.
   D. Access to concealed HVAC equipment.
   E. Access to all types of concealed controls.
   F. Access to elevator sprinkler valve
   G. Access to Telecom/Data conduit stubs and wire pulls located above inaccessible ceilings. (See Section 27 05 00 for other requirements)

2 Access doors and panels in other non-public spaces including student dorm rooms and apartments can have simple turn latch to secure access panel door.

3 Access panels shall not be obstructed by cabinets, counters, appliances or other building fixtures.

08 33 00 COILING DOORS AND GRILLES

08 33 13 SIDE & OVERHEAD COILING DOORS AND GRILLES

1 All side and overhead coiling doors and grilles shall be prepped for, and furnished with, BEST 1E74 cylinders for locking. This also includes key switches if any of these doors or coils are electrically operated.

08 36 00 PANEL DOORS

08 36 13 SECTIONAL OVERHEAD DOORS

1 All sectional overhead doors shall be prepped for, and furnished with, BEST 1E74 cylinders for locking. This also includes key switches if any of these doors are electrically operated.

08 40 00 ENTRANCES, STOREFRONTS AND CURTAIN WALLS

08 41 00 ENTRANCES AND STOREFRONTS

08 41 13 ALUMINUM-FRAMED ENTRANCES AND STOREFRONTS

1 Exterior glazed doors: Doors to be wide stile heavy duty, minimum of 4 ½" wide. Approved manufacturers are Kawneer Tuffline 500, Tubelite Monumental Series, Vistawall Rugged Entry Systems-Rugged WS, and Special-Lite SL-16. Center rail style is preferred.
2 Use of vertical rod panic devices, coordinators and other devices are not acceptable.
3 All panic devices are to rim type, Von Duprin 98 or 99. Doors should swing against a wall whenever possible. If not possible an overhead stop is required.
4 Minimum door size to be 3'-0" x 7'-0".
5 Design criteria; thermal break type, accommodate movement due to temperature differential of 180 deg F; wind load 35 psf in, 30 psf out; mullion deflection 1/240 mass; thermal resistance R 2.27; air infiltration 0.06 cfm/sf at 1.57 psf differential pressure; condensation resistance CRF 45.
6 Door pulls shall be recessed or thru-bolted offset pulls.
7 Entrances shall be designed so that wind forces on the doors are taken into consideration.

08 70 00 HARDWARE

08 71 00 DOOR HARDWARE

1 The architect shall consult with Allegion, PLC to develop the hardware schedule. Once developed, the hardware schedule shall be submitted to the GVSU Project Manager for review with the lock shop before inclusion into the project specifications. Subcontractor submittals shall also be reviewed by GVSU before final approval.

Allegion, PLC
505 Cherry St. SE #301
Grand Rapids, MI 49503
Contact: Tim Kaye timothy.kaye@allegion.com M: (734) 904-5921

2 Contractor is responsible for supply and installation of all hardware other than BEST cores. Owner will supply & install cores.
3 Acceptable hardware to be Best 43H series, Yale 8800 series, Schlage L9000 series, heavy duty mortise type with lever handles. Furnish with IE74Best cylinders. The cylinder must be matched with the hardware to assure proper function.
4 The University will furnish and install construction cores and supply keys for the Contractor's use during construction. The University's lock shop will remove construction cores when they install final cores. Contractor is responsible for returning all keys issued to the University at project completion.
5 Closers: All closers to be surface type through bolted. GVSU to approve series. Change method of attachment to allow only through bolting and no screw attachment regardless of door style and/or material.
6 Review coat hook locations with Project Manager during design development.
7 Electric door operators are to be used at building entrances on door used for barrier free accessibility. Coordinate with Electrician for power requirements. Operators shall be installed no higher than 36" A.F.F.
8 Owner shall have opportunity to review hardware schedule prior to bid. Final door layout to be reviewed by GVSU to determine the likelihood of doors being blocked open to support ease of pedestrian movement. Based upon this review, automatic door hold-open device shall be integrated into the hardware system.
9 A hardware pre-installation meeting is required. The manufacturer, hardware suppliers, general contractor, and qualified installers are required to attend. Individuals who do not attend this mandatory meeting shall perform no hardware installation.
10 Punch list and final acceptance of hardware shall include review of all operations by the warranty holder. A/E to arrange a walk-through with GVSU staff.
11 Refer to Section 28 10 00 for Electronic Access.

12 KEYING:

A. Hardware vendor develops hardware schedule shop drawing submittal and provides two (2) copies to the University, in addition to those provided to Architect/Construction Manager.

B. GVSU provides combinated cores and cuts keys for final keying prior to completion of construction, unless otherwise directed by the University.

08 79 00 HARDWARE ACCESSORIES

08 79 13 KEY STORAGE (KNOX BOX)

1 Provide, at entrance of each building, Knox Box model #4430, recessed mounted (black). Depending on building, additional Knox Box locations may be required at other points of building entrance. Verify additional location requirements with University representative.

0880 00 GLAZING

08 81 00 GLASS GLAZING

1 Window glass to be insulating type. Outer pane may be coated or tinted. Color of tint shall be reviewed with GVSU during schematic design. Avoid custom glass colors that are not readily available or subject to discontinued use.

END OF SECTION

DIVISION 09 – FINISHES

09 05 00 COMMON WORK RESULTS FOR FINISHES

1 When sheet vinyl or linoleum is used the layout should avoid seams. If seams are unavoidable they shall be heat welded seams with matching color.

09 20 00 PLASTER AND GYPSUM BOARD

09 21 00 PLASTER AND GYPSUM BOARD ASSEMBLIES

1 Gypsum board finishing shall conform to the following schedule and be in accordance with the Gypsum Associations GA-214-96 Standard.
- A. Level 1 finish: when above finished ceilings and concealed from view.
- B. Level 3 finish: when scheduled to receive heavy or medium textured finishes.
- C. Level 4 finish: Use in offices and other areas that receive lower public traffic and visibility.
- D. Level 5 finish: for all walls and ceilings to receive painted finish, lightly textured finish and/or wall coverings. Use in corridors and other high public traffic area.

2 Drywall MUST continue to ¼" above floor substrate. No gaps between floor and drywall that will show thru base material and provide inadequate backing for base material.

3 In corridors use abuse resistant gypsum panels. Acceptable products are:
- A. National Gypsum 5/8" Hi-Abuse Wallboard. Type X available where required for fire rating.
- B. Georgia-Pacific 5/8" ToughRock abuse resistant gypsum board. Type X available where required for fire rating.
- C. Continental 5/8" Protecta AR 100, Type X available where required for fire rating.

4 In spaces where wall standards are secured to walls and used to support shelving, storage bins or other furniture components, use abuse resistant gypsum panels. Acceptable products are:
- A. National Gypsum 5/8" Hi-Impact Wallboard. Type X available where required for fire rating.
- B. Continental 5/8" Protecta HIR 300

5 Wall standards must be fastened to wallboard using metal molly or butterfly anchors.

6 Popcorn or other spray applied textures on ceiling or walls are not acceptable except for ceilings in common spaces of housing units. In such case, brushed, knock down textured finishes are acceptable.

09 30 00 TILING

1 Where hard tile is used, a cleavage membrane shall be used at control joints in concrete floor substrate.

09 30 16 FLOOR TILE

1 When floor tile is used for flooring, epoxy grout shall be specified. Also, two coats of sealer shall be specified. One coat applied to tile prior to installation of epoxy grout and the second coat applied after grout is installed and tile are cleaned, prior to turn over of space to the Owner.

2 Wall tile in restrooms shall extend up and align with the tops of mirrors.

3 Dark colored grout is to be used for cleanability. Avoid light grout colors.

4 12"x24" tiling on walls must be approved by GV Project Manager. This size tile is difficult to finish smooth.

09 50 00 CEILINGS

09 51 00 ACOUSTICAL CEILINGS

09 51 23 ACOUSTICAL CEILING TILE

1 12'x2' exposed T grid. Avoid concealed spline type and use only with University approval. Tile can be factory finished to provide 2 x 2 or 1 x 1 appearance.

2 Where edges are field cut, paint or touch-up cut edges to match finish color of tile.

3 Avoid ceiling layouts that cause small slivers of ceiling to be cut at wall lines. Minimum panel at walls should not be less than six (6) inches.

4 Limit styles in any one building to a maximum of three (3).
5 Use of colored ceiling tile other than white is to be approved by GV Project Manager.

09 60 00 FLOORING

09 65 00 RESILILENT FLOORING

PART 1: General

A. Architect shall incorporate the proper specification for moisture testing prior to flooring installation to meet manufacturer's requirements.

09 65 19 RESILIENT TILE

1 Vinyl Composite Tile (VCT): 12" x 12" x 1/8", Armstrong "Standard Exelon Imperial Texture". Avoid imitation travertine or other type with dirt pockets.
2 Stair treads: Avoid carpeted stairs. If resilient flooring is used, use heavy-duty (1/4" thick at nosing) rubber treads with abrasive strips.
   A. Use one-piece tread/riser wherever possible.
   B. Use only raised round or hammered tread patterns.
3 Luxury Vinyl Tile: The following Manufacturers/Styles are approved for use.
   A. Roppe Northern Timbers
   B. Shaw Unveil
4 Final wax or acrylic coats will be applied by Owner. Contractor is to provide clean, washed tile surfaces ready to receive final Owner applied coating.
5 BBT Shall not be used.

09 67 00 RESINOUS FLOORING

09 67 23 RESINOUS/EPOXY FLOORING

1 Resinous flooring applications shall be limited. Use of resinous/epoxy flooring must be approved by GVSU Project Manager.
   A. Acceptable products:
      i. Armor Shield
      ii. Florock
      iii. Dura-A-Flex, Inc.
      iv. Stonhard

09 68 00 CARPETING UPDATE TO NEW COMPANY/PRODUCT NAMES

1 Rolled Carpet: Tandus Powerbond
   A. Must use seam sealer: Moisture Penetration by Impact at seams @ 10 psi. No penetration after 10,000 impacts. The British Spill Test IS NOT an acceptable measurement for moisture barrier.
   B. Must meet LEED criteria.
2 Carpet Tiles:
   A. Approved manufacturers are: J&J Kinetex, Tandus, Interface, Shaw, Milliken
   B. Use of carpet tiles must be approved by Project Manager.
   C. Carpet tiles must carry a 15 year warranty.
   D. Must meet LEED criteria.
3 Cove Base: Use 4" vinyl base. Materials other than vinyl must be approved by the GV Project Manager.
   A. Do not use small sections.
   B. Do not use metallic base.
   C. No preformed corners.

09 70 00 WALL FINISHES

09 72 00 WALL COVERINGS

1 Use of specialty wall coverings is prohibited.

09 90 00 PAINTING AND COATING

09 91 00 PAINTING

PART 1: GENERAL

A. This standard provides guidance concerning the specific preferences of Grand Valley State University for new construction and maintenance painting.
B. Surfaces to receive field finishing will be identified per project documents.
C. For Capital Projects, the architect shall prepare materials, finish, and color schedule to the university representative.
D. Draw-downs are to be provided to the university representative for approval prior to project start.

PART 2: PRODUCTS

A Subject to compliance with requirements, provide one of the following listed products for painting. Product must be a university approved "Laker White." All others are prohibited. (Listed in no particular order).
B. All prime coating is to be white in color and coincide with one of the above approved manufactures. Alkyd or oil base paints are preferred as a primer on metal for field applications as long as it meets LEED VOC requirements.`
C. Masters Paint Institute (MPI) Standards: Provide products that comply with MPI Standards and that are listed in the *MPI Approved Product List*.
   i. All GVSU products (above) have LEED credentials with an MPI rating of #43.

Standard Paint Wall Primary Color:

i. PPG Paints (Basis of Design)
Laker White
Ultrahide 150
Low VOC
Low Lustre, 1433-0100G Series

ii. Benjamin Moore
Laker White
Super Hide
Zero VOC Interior
Semi-Gloss 358

iii. Sherwin Williams
Laker White
SuperPaint
Interior Latex
Semi-Gloss

iv. O'Leary Paint
Laker White
Pro-Tech
5800 LINE
Latex-Satin Finish

Standard Paint Wall Accents:

*Eggshell Finish

Standard Paint Color		Sherwin Williams	PPG (Painters Supply)
SP-2	Light Gray	SW 7071 "Gray Screen"	6-4310XI/01: BX-15/EX-2/LX-24
SP-3	Med Gray	SW 9162 "African Gray"	6-4310XI/01: BX-2Y+41/CX-7/DX-3
SP-4	Dark Gray	SW 7075 "Web Gray"	6-4310XI/01: BX-8Y/CX-41/FX-5
SP-5	Light Brown	SW 7037 "Balanced Beige"	6-4310XI/01: BX-26/CX-45/HX-40
SP-6	Med Brown	SW 7039 "Virtual Taupe"	6-4310XI/01: BX-3Y+14/CX-3Y+17/FX-36/WX-27
SP-7	Dark Brown	SW 7040 "Smokehouse"	6-4310XI/01: BX-3Y+10/CX-2Y+41/FX-32/WX-3Y+12
SP-8	Light Blue	SW 6242 "Bracing Blue"	6-4310XI/01: EX-1Y+47/HX2Y+22/LX-1Y+12/WX-2Y+13
SP-9	Med Blue	SW 6243 "Distance"	6-4310XI/01: BX-2Y/EX-3Y+24/HX-4Y+17
SP-10	Dark Blue	SW 7602 "Indigo Batik"	6-4310XI/01: BX-2Y+19/EX-4Y/MX-31/WX-2Y+43
SP-11	Burnt Orange	SW 6615 "Peppery"	6-4310XI/01: FX-4Y+43/OX-6Y+28

PART 3: APPLICATION

A. Apply paints to the substrate according to manufacturer's written instructions. Use techniques best suited for paint and substrate indicated. Do not paint over dirt, rust, scale, grease, moisture, scuffed surfaces, or conditions detrimental to formation of a durable paint film.
B. Touch-up painting requires a "corner-to-corner" policy. For any defect or discoloration in a wall, the wall must be fixed and then painted (as a whole) from floor to ceiling and corner to corner. Simple touching-up of a wall defect with paint is prohibited, unless directed otherwise by your GVSU representative/manager.
C. Do not apply succeeding coats until the previous coat has cured as recommended by the manufacturer. Sand between applications where sanding is required in order to product an even, smooth surface. Finish coats shall not be applied prior to construction or project completion and should only be applied when all dust generating work and risk of wall damage is minimal.
D. Spraying of paint is prohibited on Grand Valley State University property.
E. Final coat shall be free of defects such as scratches, scuffs, sheen variations, touch-ups and non-uniform in appearance. Defects in wall finishes are to be judged and determined at the sole discretion of the University. Fixing and repainting of affected areas are to be performed by the painter, to the satisfaction of, and at no additional cost to, the University.
F. The painter is responsible for protecting existing university surroundings when work is facilitated around university owned property. If not protected adequately and the university owned property is painted or spilled on, to any degree, the property is to be replaced at the painter's expense.
G. Do not reduce, thin, or dilute coatings or add materials to coatings. Mixing of manufacturer products listed above is prohibited.
H. Damaged surfaces that are shop-primed shall be touched-up with alkyd or oil base paints only. Minimum of (2) two coats.

END OF SECTION

DIVISION 10 – SPECIALTIES

10 00 00 SPECIALTIES

1. Specify materials and products that contribute to meeting the requirements of applicable LEED requirements.

10 10 00 INFORMATION SPECIALTIES

10 11 00 VISUAL DISPLAY SURFACES

10 11 16 MARKER BOARDS

1 Products by Claridge, Polyvision, Egan Visual, Cig Jan or Platinum Visual are acceptable. Surface to be white Porcelain Semi- matte Institute Type A. Furnish with markers, marker tray, map rail at top, aluminum trim, in longest possible lengths. Maximum length of a single board is 16 feet, which also is a standard board for classroom use.
2 If marker board is to be longer than 16 feet, the boards shall be installed with a butt-joint without fame materials at the seams.
3 Contractor to install backing as necessary for any installations.

10 11 23 TACK BOARDS

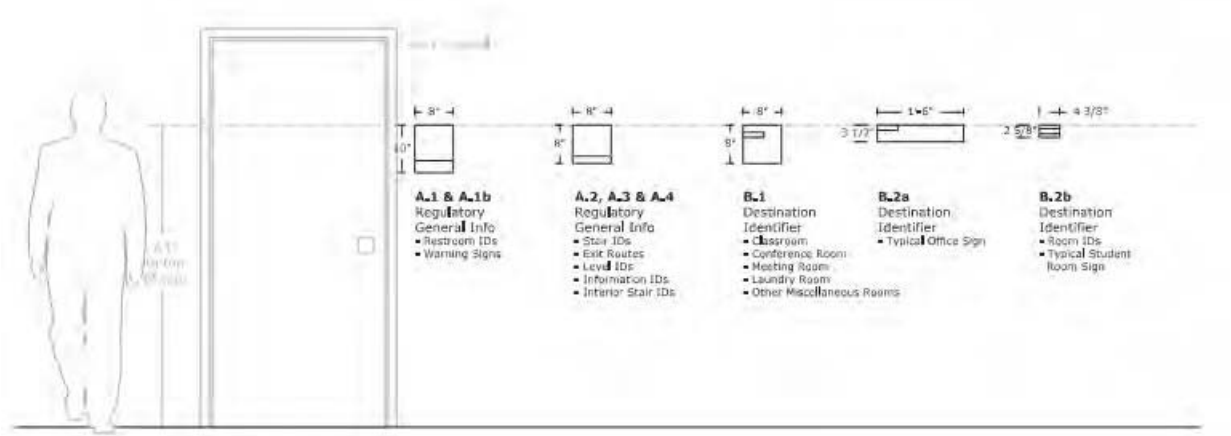
1 Cig-Jan with Type II vinyl fabric covering. Tack boards to have aluminum frames. Designer to review and select fabrics with owner during Design Development.
2 Affidavit must be supplied showing that boards meet Michigan School Fire Safety Rules.
3 Faculty office door tack boards shall be frameless with fabric wrapped edges.

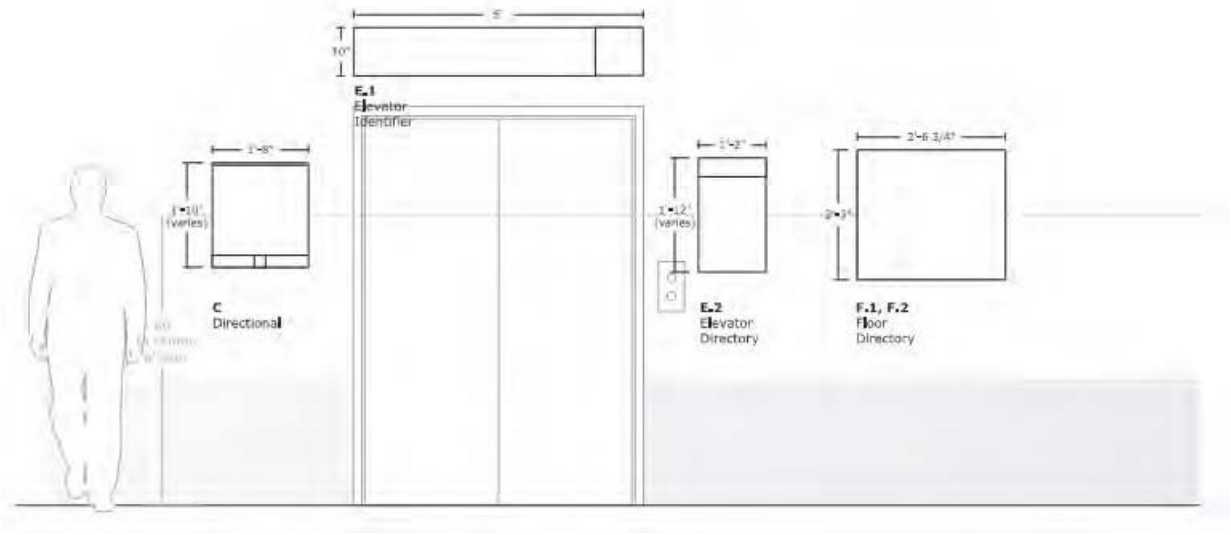
10 11 30 PROJECTION SCREENS

1 Classrooms and Labs (confirm need in labs): Provide 16:10 Format; 92”W x 57.5”H projection screen attached to wall and manually operated. Install screen(s) as tight as possible to ceilings 10’ or less height. Provide blocking in wall for screen mounting brackets. Use Da-Lite Model B w/CSR with Matte White finish and #6 wall brackets.
2 Case Rooms: Provide (2) 16:10 Format; 92”W x 57.5”H projection screens recessed into ceiling and electrically operated. Use Da-Lite Tensioned Advantage Electrol with Da-Mat finish. Provide individual button controls for each screen, place both controls adjacent to each other. Do not install keyed controls.
3 Coordinate larger screen sizes with GVSU IT if room dimensions require it.
4 Contractor to install backing for projector screen brackets.

10 14 00 SIGNAGE

1 Interior Signage: Furnished and installed by GVSU. A **c**ost line item is carried in the Owner’s project budget
2 Campus and Building Signage: Furnished and Installed by GVSU. A cost line item is carried in the Owner’s project budget.
3 Directories: GVSU Project Manager to review building design with sign department to coordinate directory locations. These locations should be labeled on construction drawings. GVSU will coordinate purchase and installation of interior signs and directories.
4 Signs: Typical Interior Signage Locations are shown below. Designer must keep these areas clear of furniture, fixtures & devices and show typical sign locations on plans. All sign types and locations to conform to ADA. When developing construction budgets, include all cost of signs. Please contact the Facilities Planning department for the most recent signage standards. These standards must be adhered to during design.





10 20 00 INTERIOR SPECIALTIES

10 21 00 COMPARTMENTS AND CUBICLES

10 21 13 TOILET COMPARTMENTS

1 No ceiling hung partitions. Use floor mounted with overhead brace.
2 Floor-to-Ceiling restroom partitions shall be Bradley Bradmar Solid Plastic (HDPE) – Series 700
3 Confirm color with GVSU Project Manager

10 21 16 SHOWER AND DRESSING COMPARTMENTS

1 Modular shower units to be, one-piece acrylic. Provide grouted sub-base in void beneath shower floor, if any, and if not expressly prohibited by manufacturer's installation instructions.
2 Modular tub/shower combination unit to be one-piece acrylic. Provide grouted sub-base in void beneath shower floor, if any, and if not expressly prohibited by manufacturer's installation instructions.

10 26 00 WALL AND DOOR PROTECTION

1 Corner guards: Should be used on exposed drywall, plaster or wallpapered corners in heavy traffic areas and around elevator entrances. Review corner guard material and finish with Owner.

10 28 00 TOILET, BATH & LAUNDRY ACCESSORIES

10 28 13 TOILET ACCESSORIES

10 28 13.13 COMMERCIAL TOILET ACCESSORIES

1 Liquid Soap Dispenser (Allendale & Pew Campuses): Owner furnished, Contractor install. Show locations on drawings. Secure to mirrors with double stick adhesive, furnished with dispensers. If full vanity length mirrors are not used, secure to drywall, into back-blocking. If back- blocking not installed, secure to drywall with metal mollies using #10 screws. If on concrete block, anchor directly with 3/16-inch Tapcons. No plastic anchors. Coordinate specific model # and color with GV Project Manager for insertion into the Toilet Accessory Schedule in the Construction Documents.

2 Hand Towel Dispenser: Owner furnished, Contractor install. Contractor to install blocking in wall for the dispenser. Secure to drywall, into back-blocking. If back-blocking not installed, secure to drywall with metal mollies. If on concrete block, anchor directly with Tapcons. No plastic anchors. Coordinate specific model # and color with GV Project Manager for insertion into the Toilet Accessory Schedule in the Construction Documents.

3 Toilet Tissue Dispenser: Owner furnished, Contractor install. Contractor to install back-blocking in wall for dispenser. Secure to drywall, into back-blocking. If back-blocking not installed, secure to drywall with metal mollies. If on concrete block, anchor directly with Tapcons. No plastic anchors. Coordinate specific model # and color with GV Project Manager for insertion into the Toilet Accessory Schedule in the Construction Documents.

4 Shelves with coat hooks are to be installed outside toilet stall area. (Non-residential only, but does include public toilets in residential facilities.) EMCO #33 shelf system

5 Purse shelves to be installed in toilet stalls in the women's restrooms and unisex toilets. (Non-residential only, but does include public toilets in residential facilities.) Bobrick Folding Utility Shelf (B-287)

6 All women's and gender inclusive restrooms shall include a sanitary napkin disposal box, supplied and installed by contractor.

7 Wall Mounted Mirrors: Mirrors shall be Bobrick Glass Mirror with Stainless Steel Angle Frame. Series B-290. Each restroom shall also include a full height wall mirror:

8 Baby Changing Tables: All restrooms shall include (1) Koala Kare KB110-SSWM horizontal wall mounted stainless steel baby changing station.

9 Prefer independent trash containers rather than built-in type. Provide location for container in room. GVSU to furnish container.

10 Janitor's closets are to be equipped with a Bobrick Model B-239x34 Utility Shelf with Mop/Broom Holders and rag Hooks. See Appendix C, Standard Detail #10.001

10 40 00 SAFETY SPECIALTIES

10 44 00 FIRE PROTECTION SPECIALTIES

1 Fire Extinguishers:

A. 5 lb., 3A40BC, UL and/or FM rating in all areas except individual student housing units and commercial kitchens.

B. 2-1/2 lb., 1A10BC, UL and/or FM rating in individual student housing units.

C. 1 Liter, Class K, UL and/or FM rating in commercial kitchen areas.

2 Provide fire extinguishers in accordance with NFPA 10. Extinguishers in corridors and other public spaces are to be in fully recessed cabinets. Wall thickness must account for cabinet depth. Surface mounted installations are acceptable for mechanical rooms, laundry rooms, storage areas, janitor's room commercial kitchens in food service areas and other non-public building supports areas. Student apartment extinguishers are mounted in the base cabinet below the kitchen sink and the cabinet sidewall next to the cabinet door.

3 Provide fire extinguisher cabinets without locks.

4 Each building shall be furnished with at least one Knox Box. Model No. 4430. Knox Box shall be located at main entrance to building. Additional boxes may be required. Confirm with University representative.

10 50 00 STORAGE SPECIALTIES

10 55 00 POSTAL SPECIALTIES

10 55 13 CENTRAL MAIL DELIVERY BOXES

1 Where interior aluminum mailboxes are required, the contractor shall provide and install room number labels in each box. Label font to be Bold Arial 24 point.

2 Specify/Provide locking boxes that accept Best 7-Pin cores only.

10 56 00 STORAGE SPECIALTIES

10 56 16 FABRICATED WOOD STORAGE SHELVING

1 Where shelving is secured directly to gypsum wallboard, anchors shall be metal mollies or butterfly anchors.

2 Standard shelving components shall comply with the following:

A. Knape & Vogt shelf standard; #82 white in 78-inch length.

B. Knape & Vogt shelf bracket; #182 white in 10.5-inch length.

C. 12" deep one-piece LEED qualifying non-formaldehyde white melamine shelves with black PVC edges.

END OF SECTION

DIVISION 11 – EQUIPMENT

11 10 00 VEHICLE AND PEDESTRIAN EQUIPMENT

11 12 00 PARKING CONTROL EQUIPMENT

11 12 23 PARKING METERS

1 GVSU has integrated an online parking metering system and no longer installs physical parking meters.
2 Metered spaces shall be coordinated with the Grand Valley Project Manager and Public Safety.

11 31 00 RESIDENTIAL APPLIANCES

11 31 01 RESIDENTIAL KITCHEN AND LAUNDRY APPLIANCES

1 Appliances are to be Energy Star rated when available for the specific appliance for any given manufacturer. This requirement shall apply to appliances also used in non-residential applications.
2 Review appliance selections with Owner during design development.

END OF SECTION

DIVISION 12 - FURNISHINGS

12 10 00 ART

1 Artwork will be furnished and installed by the University. Coordinate art locations with the University so other items that may interfere and conflict with artwork locations e.g. thermostats, fire pulls, strobes and alarms, are coordinated and positioned properly.
2 As a general rule, art must be kept a minimum 24" from latch side of any door. See Division 10 for typical sign locations.

12 20 00 WINDOW TREATMENTS

12 21 00 WINDOW BLINDS

12 21 13 WINDOW BLINDS

1 TWF (Triangle Window Fashion) Express 1" aluminum horizontal blind
2 Bali Apartment 1" aluminum mini blind
3 .008-inch thick in #376 Navajo White is University standard window covering.
4 On student housing projects, every apartment window shall be installed with blinds

12 24 13 WINDOW SHADES

1 Mecho
2 Draper

12 30 00 CASEWORK

12 36 00 COUNTERTOPS

12 36 61 SIMULATED STONE COUNTERTOPS

12 36 61.16 SOLID SURFACE COUNTERTOPS

1 Counter-tops in wet areas shall be a solid surface. If solid surface is installed on a wood substrate, the wood substrate shall be exterior grade material and water resistant to avoid delamination or failure of substrate due to direct contact with water as a result of University maintenance or other causes.
2 Do not specify solid surfaces that require sealers or additional regular maintenance.
3 Limit solid surface tops to high abuse or high moisture areas. Review solid surface locations with GV Project Manager.

12 40 00 FURNISHINGS AND ACCESSORIES

12 46 00 FURNISHING ACCESSORIES

12 46 33 WASTE RECEPTACLES (WORK ROOMS & CONFERENCE ROOMS)

1 Under counter trash and recycling receptacles shall be of the roll-away type. Architect shall design receptacle counters to an appropriate height based on use with the trash receptacle make and model used as a basis of design clearly listed. Acceptable manufacturers include:
A. Vestil Manufacturing: Model TH Series
B. Toter EVR-II Series
C. Approved equal
2 All trash and recycle containers will be supplied and placed by GVSU. Architect shall clearly indicate locations of all recepticals on the Construction Documents.

12 48 00 RUGS AND MATS

12 48 13 ENTRANCE FLOOR MATS AND FRAMES

1 Design permanent entryway systems at least six feet long and ADA compliant, whichever is greater, in the primary direction of travel to capture dirt and particulates from entering the building at all entryways that are directly connected to the outdoors. Qualifying entryways are those that serve as regular entry points for building users. Acceptable entryway systems include permanently installed grates, grilles, or slotted systems that allow for cleaning underneath. In addition to permanent entryway systems, provide the following supplemental materials:

A. Loose-laid Walk-off Mats: Two (2) sets of loose-laid interior walk-off mats shall be included in the construction cost. Such mats shall be placed at all building vestibule areas as well as interior space immediately within the entrance doors into the building's main interior. Confirm final locations with Owner. Loose-laid walk-off mats to be "Water Hog, Premier Fashion"; Color: Grey Ash, however other manufacturer's standard colors can be considered, with University approval. Product comes with diagonal pattern, fashion border and cleated rubber backing.

B. Modular matting, used as finish floor surface within an entry vestibule, shall be Tandus Abrasive Action II Powerbond. Confirm color choice, from manufacturer's standard colors with University.

12 50 00 FURNITURE

12 51 00 SYSTEMS FURNITURE

1 Architect shall provide GVSU with a basic systems furniture layout in AutoCad format that shows the design intent for GVSU to share with our furniture designer. Once a final furniture layout is completed, it shall then be incorporated into the final Constructin Documents.

2 Power and Data locations for systems furniture shall be laid out by the electrical engineer per these Design Standards.

12 90 00 OTHER FURNISHINGS

12 93 00 SITE FURNISHINGS

12 93 13 BICYCLE RACKS

1 Bike Racks: Review bike rack selection with GVSU Project Manager prior to specification.

2 Locate racks near main building entrances.

3 Bike racks shall be installed on cured concrete only using 1/2"x4" SS Hilti coil anchors.

12 93 23 TRASH AND LITTER RECEPTACLES

1 Trash Containers: Provide space for containers at each building entrance. GVSU Standard is:

A. Plexus Litter Receptacles by Landscape Forms. 20-inch diameter, 30-gallon, with side opening, surface mounting and without ash sand pan lids; Color: Grotto. See Appendix C, Detail 12.002.

B. Anchor to cured concrete or other paved substrates.

i. Anchors to be new 3/8"x3" SS Hilti coil anchors per manufacturer's recommendations.

C. Location to be approved by GVSU.

D. Specify containers to have an additional third mounting tab.

2 Ash Urn: Buttler Ash Receptacle by Forms and Surfaces; Model #SUBUT-MDS, Medium pole mount or SUBUT-MDW Medium wall mount. Color: Black. See Appendix C Detail 12.001.

3 All GVSU buildings are now totally non-smoking and University policy only allows smoking 25 feet or further away from a GVSU building (This means from any point from the building and not just the building entrance). Ash Urns are to be located accordingly.

12 93 43 SITE SEATING AND TABLES

1 Site Benches: GVSU standard is Landscape Forms Plexus straight-backed seat (for straight run) surface mounted support, grid seat and back, length as required for numbers of seats used. (maximum of 5 seats per length) Powder coat Color: Grotto. See Appendix C, Detail 12.003.

A. Surface mounted benches shall be installed using new1/2"x4" SS Hilti coil anchors per manufacturer's recommendations.

2 Standard Site Tables: GVSU standard is Landscape Forms Carousel Table; with six (6) metal grid seats; Steelhead perforated tabletop with umbrella hole. Freestanding support. Table top color: Grotto. Seat and support color; Grotto. See Appendix C, Detail 12.004.

3 ADA Site Tables: GVSU standard is Landscape Forms Carousel Table; with five (5) metal grid seats; Steelhead perforated tabletop with umbrella hole. Bolt down using 1/2"x4" SS Hilti coil anchors. Table top color: Grotto. Seat and support color; Grotto. See Appendix C, Detail 12.005.

4 Table Umbrellas: GVSU standard is Landscape Forms Equinox Umbrella; 96" dia. x 97" high with stand. Plain edge cover. Fabric color: #4608 Jet Black; Powder coat color; grotto. Umbrella pole shall have a tag plate indicating the area that the umbrella is to be installed. This is so after the umbrella is stored for the winter, it is can be properly located when placed for the season. See Appendix C, Detail 12.006.

END OF SECTION

DIVISION 14 – CONVEYING EQUIPMENT

14 20 00 ELEVATORS

1 Rock clauses are to be specifically prohibited in the Project Manual. Elevator sub-contractor's bid must be based on conditions as defined in soil boring reports included in projectmanual.

2 Card access when used in elevators shall comply with the following:

A. Elevator sub-contractor's bid shall include all necessary wiring and other elevator components to coordinate with installtion of card access and:

B. must be cooridnated with Elevator supplier to insure complete proper operational installation when complete.

C. Must have restrcition for access to basementlevel.

D. Each elevator shall include a keyed switch to allow the use of a GVSU brass key. Keyed switch is to be prepped to receive Univsersity's BEST core system. Core is supplied byUniversity.

3 Phone lines will be provided to equipment by GVSU IT. Provided phone line will ring down automatically to a GVSU #. Do not program car phone to dial. Contact GVSU operator @ 616-331-5000 for line installation.

4 Elevator sprinkler control valve box shall be prepped for and furnished with a BEST 1E74 cylinder. (Also see Section 08 3113)

14 24 00 HYDRAULIC ELEVATORS

1 Hydraulic elevators, when used in housing facilities, shall be specified with oil cooler. Elevator needs to handle maximum load during student move-in and move-in without shut downs due to oil overheating.

2 Regardless of the specific manufacturer used for any elevator required installation or renovation for any project, the pump, valve and controller unit shall be furnished by Motion Control Inc. and be installed by the elevator equipment contractor.

14 28 19 ELEVATOR EQUIPMENT

1 New elevators shall be supplied with an emergency battery lowering kit. In the event of a power outage, the elevator shall automatically lower to the main floor and open the doors allowing passengers to exit the elevator.

END OF SECTION

DIVISION 21 – FIRE SUPPRESSION

21 00 00 FIRE SUPPRESSION

21 05 00 COMMON WORK RESULTS FOR FIRE SUPPRESSION

1 Locate all water-filled lines in heated spaces. If this is not possible, use dry-charged system. Risers shall not be located in front of, or in close proximity to, outside air louvers or ducts.

2 Use recessed heads with 2-piece adjustable escutcheon so system does not have to be shut down to change a ceiling tile.

3 Prior to final bid documents, review sprinkler head selection with GVSU.

4 Consultant is responsible for proper design of fire suppression systems. Consultant is responsible for verifying capacity of municipal water systems and any requirements for booster pumps and back-up generators that may be required for booster pumps, supporting the fire suppression system as a result of verified inadequate water pressures for the specific building system design.

5 Consultant is required to coordinate design of fire suppression system with University, the University's Office of Public Safety and Allendale Fire Department. Coordination shall include, but is not necessarily limited to, location and signing of fire system risers, location of shut-off and post indicator valves.

6 Use post indicator valves (PIV's) for exterior shut-off for all new construction projects in Allendale per Township requirements or where otherwise required by code.

7 All piping is to be labeled and color-coded according ANSI Z535.1-1991 Safety Color Code and ANSI A13.1-1981 Scheme for Identification of Piping Systems. Pipe markings must effectively communicate the contents of the pipes and give additional information if special hazards (such as extreme temperatures or pressures) exist, ie. "Steam 100 PSIG". Arrows shall indicate direction of flow. Label placement shall insure that labels can be easily read based upon label elevation and viewing angle of individual. Labels, at a minimum, shall be placed near valves (within 6 feet max.), where change in direction occurs, on entry/re-entry points thru walls and floors, and on straight segments with spacing between labels that allows for easy identification.

8 Mechanical pipe joints shall be permitted only for piping over 2-inches in diameter and may be used for any system. Use of mechanical pipe joints shall be limited to accessable ceiling areas.

- Acceptable manufacturers:
  - Victaulic

9 Testing of backflow preventers is required.

10 An 11"x17" diagram of the fire protection and alarm systems shall be posted by the appropriate subcontractor in the fire control room for any new or modified systems.

END OF SECTION

DIVISION 22 – PLUMBING

22 00 00 PLUMBING

22 05 00 COMMON WORK RESULTS FOR PLUMBING

22 05 01 GENERAL REQUIREMENTS

1 Avoid water-filled plumbing on outside walls or in unheated areas.
2 Provide for exterior hose bibs (located so that a 50-foot hose can be used to provide water to lawn areas) at an accessible height on the building. Place bibs so that they are accessible from established paths.
3 Shut-off valves located on the building exterior, flush with grade, shall have an 18"x18"x3" thick concrete pad surround. Pour concrete flush with valve cover. Paint valve cover blue. See Appendix C, Standard Detail 22.001.
4 Plumbing installed for service sinks located in Janitors Closets shall be provided with Watts Series 800M4QT anti-siphon pressure vacuum breakers on both hot and cold water supplies. See Appendix C, Standard Details #22.002a,b,c & d.
5 Valve tag schedules, to be provided as part of project closeout documentation, shall properly list and identify all valves and locations. Use room numbers as one possible benchmark for valve location. Generic locations, such as "First Floor" are not acceptable. An example of acceptable identification is "First floor, south wing corridor, above ceiling, adjacent to room 104".
6 All piping is to be labeled and color-coded according ANSI Z535.1-1991 Safety Color Code and ANSI A13.1-1981 Scheme for Identification of Piping Systems. Pipe markings must effectively communicate the contents of the pipes and give additional information if special hazards (such as extreme temperatures or pressures) exist, ie. "Steam 100 PSIG". Arrows shall indicate direction of flow. Label placement shall insure that labels can be easily read based upon label elevation and viewing angle of individual. Labels, at a minimum, shall be placed near valves (within 6 feet max.), where change in direction occurs, on entry/re-entry points thru walls and floors, and on straight segments with spacing between labels that allows for easy identification.
7 Mechanical pipe joints such as Vitaulic, Groove-Lok, etc, shall be permitted in dry fire protection systems and in mechanical rooms only. Under no circumstances shall this type of piping be permitted above classroom, laboratory, office, auditorium, theatrical or otherwise publicly occupied spaces.
8 Provide temperature transmitter for domestic hot water system, connected to University Energy Management System (EMS) to monitor both supply temperature and storage tank temperature and alarm when temperature is below either the Code required minimum or minimum established by the U.S. Department of Energy.
9 Access panels: See 08 31 00.
10 Use post indicator valves (PIV's) for exterior shut-off for all new construction projects in Allendale per Township requirements or where otherwise required by code.

22 05 19 METERS AND GAUGES FOR PLUMBING PIPING

1 Water Meter: University will purchase, from Allendale Township, the required water meter(s) for the project. The Contractor is responsible for obtaining meter(s) from Allendale Township and installing meter(s) along with all other components necessary and required for a complete installation.
2 Require that Contractor obtain Township documentation and certification and deliver to the Commissioning Authority.
3 See Appendix C, Standard Detail 22.003 for a sample water/irrigation meter detail. The detail and pipe sizes are diagramitacle and for general use only. Final design must be approved aby Allendale Township or the City of Grand Rapids prior to issue of construction documents.

22 05 23 GENERAL DUTY VALVES FOR PLUMBING PIPING

1 Specify proper valve stem orientation.
2 Provide ball valves on 2" or smaller pipe. Provide butterfly valves on 2 ½" or larger pipe. Do not provide gate valves.
3 Provide isolation valves at all pieces of equipment for maintenance and service.
4 Each restroom fixture to have shut off on hot and cold water.
5 Each restroom facility to have separate shutoffs.
6 Locate valves where they can be reached for service, in hallways and public spaces wherever possible. Do not place valves in classrooms, offices or other related spaces where emergency service may be disruptive to activities occurring within the room. Where access panels are provided, placement shall allow clear and direct access to valves with no obstructions, i.e.; ductwork, piping, conduit, etc.
7 Install check valves in hot and cold water supply, which serve janitor sinks and laundry rooms.
8 Label all values in plumbing systems. Provide a listing of the labels at close out.
9 Tempering Valves: Shall be Powers series tempering valve. No exceptions without University authorization.

22 06 00 SCHEDULES FOR PLUMBING

22 06 10 SCHEDULES FOR PLUMBING PIPING AND PUMPS

1 Pumps: Bell and Gosset pumps shall be the sole supplier for heating, cooling and any other type of water recirculation application.
2 Variable frequency drives shall be Dan Foss or ABB. Drives shall include a control card that will communicate, seamlessly, to the University's HVAC controls. The drives shall have a harmonic distortion that is less than three (3%) percent.

22 07 00 PIPING INSULATION

22 07 19 PLUMBING PIPING INSULATION

1 Piping insulation shall conform to code requirements. If PVC elbows and fitting covers are used, the PVC cover must be reinforced against collapse.

22 08 00 COMMISSIONING OF PLUMBING

1 Require the arrangement for and payment for pump manufacturer's representative to perform pump alignment, lubrication and start up. Require a written report, prepared by the manufacturer's representative, to the design engineer, the Commissioning Authority, and the Owner. This is a required submittal.

22 10 00 PLUMBING PIPING AND PUMPS

22 11 00 FACILITY WATER DISTRIBUTION

1 Wells: If a well is approved for a project, the well must be tested for water flow, water quality, chemical content, and performance. Non-performing wells will be rejected.
2 Water Mains: Specifications shall require the contractor to follow the current Allendale Charter Township Standard Construction Requirements in regards to the procedures to flush newly constructed water mains which can be found in Section 02660 of the Township's Standard Construction Requirements.

22 14 00 FACILITY STORM DRAINAGE

1 Any roof drains, downspouts or leaders exposed to outdoor temperatures shall be heated in such a way as to prevent freezing and buildup of ice formations.

22 40 00 PLUMBING FIXTURES

22 42 00 COMMERCIAL PLUMBING FIXTURES

1 Require low-flow urinals. Require low-flow water closets, shower heads, faucets for sinks and lavatories, metering faucets, and replacement aerators.
   A. Waterless urinals shall NOT be specified.
2 Faucets: single or double lever type is acceptable: They shall be chrome finish over solid brass body with a 1 piece replacement valve and service friendly. Plastic body valve construction is not acceptable.
3 Vanity sinks to be attached to counters; not just caulked.
4 Individual tubs or tub/shower combination units shall be set in mortar bed, except with expressly not required by the manufacturer.
5 All drain sealing compounds shall be clear or white silicone. Plumbers putty is NOT to be used.
6 Water Coolers: Elkay EZH20 Cooler Kit / LZSTL8WSLK

END OF SECTION

DIVISION 23 – HEATING, VENTILATING AND AIR CONDITIONING

23 00 00 HEATING, VENTILATING AND AIR CONDITIONING

23 05 00 COMMON WORK RESULTS FOR HVAC

23 05 01 GENERAL REQUIREMENTS

1 See Appendix G for approved manufacturers.
2 Design systems that require zero use of CFC-based refrigerants for new systems; complete a comprehensive CFC phase-out conversion when reusing existing systems.
3 Design HVAC and Refrigeration systems with refrigerants with no or very little ODP (Ozone-Depleting Potential) and GWP (Global Warming Potential).
4 Require the development and implementation of an Indoor Air quality (IAQ) Management Plan with flush-out procedures as listed in this credit for the preoccupancy phase.
5 Setpoints shall be as listed in the Building Setpoints Table and notes in Appendix C Standard Detail 23.004.
6 Access doors and panels: See Section 08 31 00 of these Standards.
7 GVSU Facilities Engineering and HVAC departments will participate in selection of systems. The design consultant or contractor shall alternate their basis for design of their HVAS design for each project with respect to major pieces of equipment such as chillers, AHU's, packaged rooftop units, etc. For example, if a project is based on Trane equipment, then the next project designed by that firm shall be based on another firm, such as York. Specifications must be written to not sole source any manufacturer.
8 On large new projects investigate potential for limited capacity stand-alone cooling (possible direct-fired natural gas chiller).
9 Air handlers to have variable frequency drive and shall include a control card that will communicate, seamlessly, to the University's HVAC controls. The drives shall have a harmonic distortion that is less than three (3%) percent. Each air handler to have fresh air measurement.
10 Filter outside air **prior** to any air reading stations with poly-foam filter with access panel suitable for cleaning filter and air station.
11 Where practical, heat recovery systems shall be used when building type requires large amounts of exhausted air.
12 Piping shall be properly grounded.
13 AHU's supply/return pipes, a vent on both lines give the ability to vent air in low velocity lines. The supply and return lines should be vented in all high points of piping, and/or prior to a vertical drop. Vents shall be one-half inch (1/2") ball valves with plugs.
14 AHU and other equipment shall not be used for storage of tools and construction equipment at any time during the project.
15 AHU; provide properly installed condensate drains to prevent build up of condensate in drain pans. See Appendix C, Standard Detail 23.001.
16 Valve tag schedules to be provided as part of project closeout documentation and shall properly list and identify all valves and locations. Use room numbers as one possible benchmark for valve location. Generic locations, such as "First Floor" are not acceptable. An example of acceptable identification is "First floor, south wing corridor, above ceiling, adjacent to room 104".
17 Mechanical designs should avoid utilization of roof top equipment. When unavoidable, architectural treatments shall be used to provide visual screening of any roof top equipment.
18 All closed loop heating and cooling systems shall be treated with corrosion inhibitor.
   A. Hot Water Heat Loops: Provide treatment chemical based on nitrite-borax-tolytriazole formulation. Product should provide nitrite as nitrite of 500-600 ppm when used at a rate of 5 gal/1000 gallons of water treated. Tolytriazole as azole to be 50+ ppm in the system. System pH should be buffered in 9.5-10.5 range. (This does not apply to systems with aluminum components)
      i. Approved for use: ENERCO
   B. Cold Water Cooling Loop: Provide treatment chemical based on KML, Inc BWT-22
      i. Approved for use: KML Specialty Chemicals
   C. See Appendix C, Standard Detail 23.003 for general filter installation instructions and diagram.

19 All piping is to be labeled and color-coded according to current ANSI Z535.1-1991 Safety Color Code and ANSI A13.1-1981 Scheme for Identification of Piping Systems. Pipe markings must effectively communicate the contents of the pipes and give additional information if special hazards (such as extreme temperatures or pressures) exist, ie. "Steam 100 PSIG". Arrows shall indicate direction of flow. Label placement shall insure that labels can be easily read based upon label elevation and viewing angle of individual. Labels, at a minimum, shall be placed near valves (within 6 feet max.), where change in direction occurs, on entry/re-entry points thru walls and floors, and on straight segments with spacing between labels that allows for easy identification.

20 Mechanical pipe joints such as Victaulic, shall be permitted in dry fire protection systems and in mechanical rooms as a bid alternate. Under no circumstances shall this type of piping be permitted above classroom, laboratory, office, and auditorium, theatrical or otherwise publicly occupied spaces unless authorized by the GVSU Project Manager.

21 Where the building code requires a pressurized fire-rated stair and a relief damper is incorporated in the design; the relief damper shall have two separate and distinct components. One component shall be a motorized relief damper operated by the stair pressurization controls. This motorized damper shall be mounted so that it is accessible from the stair for maintenance and testing. The second component shall be a gravity relief damper mounted on the exterior of the stair.

22 Where the building code requires a smoke removal system, a motorized damper shall be incorporated in the design. The discharge damper shall have two separate and distinct components. One component shall be a motorized damper operated by the smoke removal system controls. This damper shall be mounted so that it is accessible from the interior for maintenance and testing. The second component shall be a gravity relief damper mounted on the exterior of the building. AHU coil drains and vent connections shall be extended to the exterior of the AHU casing and clearly labeled.

23 Mechanical pipe joints shall be permitted only for piping over 2-inches in and may be used for any system. Use of mechanical pipe joints sall be limited to accessable ceiling areas.

A. Acceptable manufacturers:
   i. Victaulic

23 05 02 MECHANICAL DRAWINGS

MECHANICAL DRAWINGS

1 New piping, ductwork and equipment to be shown in heavy layer, existing to be shown in light layer. Underground piping to be shown in dashed layer with numbers/lettering system.

2 Building column lines to be shown.

3 Major equipment (AHU's, chillers, pumps, boilers, tanks, heat exchangers.) to be dimensioned off a benchmark or column line. Support details to be provided.

4 All piping and duct to be described with size and service. Provide a calculation for total fill (in gallons) for new or additional service lines such as chilled water or hot water systems. Note the capacity on the drawings.

5 All major equipment to be named and numbered and shown on schedules. Same names and numbers to be used in specifications.

6 Provide and dimension sufficient straight runs for flow meters and air measuring stations.

7 Provide unions or flanges for all mechanical equipment and instrumentation for serviceability.

8 Designate pipe slope where necessary.

9 Flow arrows shall be shown.

10 Relief devices shall point away from personnel areas.

11 Utility service pressures/temperatures properly shown.

12 Show room names and numbers.

13 AHU condensate drains to be per GVSU Standard Detail 23.001, Appendix C

14 Drawings are to have properly noted all of the following, located in a position that is legible (not on top of other drawings entities or text):

A. Duct and pipe sizes
B. Air diffusers, grilles, dampers and louver nomenclature.
C. CFM's

23 05 14 VARIABLE FREQUENCY DRIVES (VFD'S)

1 Products:

A. ABB ACH550-UH
B. Danfoss VLT FC 120

23 05 19 METERS FOR HVAC PIPING

1 Metering:
- A. Steam; EMCO turbine wheel with signal to CEMS.
- B. Chilled Water: Meters to be Yokagawa or Foxboro. Consult with GVSU energy department.
- C. Temperature indicators shall be Weiss Instruments DVUT Vari-Angle digital thermometer with transmitter.
- D. Meter specifications will vary depending on project. GVSU energy department will provide engineer with the specifications during design.
- E. Contractor is to purchase and install meters.

23 05 23 GENERAL DUTY VALVES FOR HVAC HYDRONIC PIPING

1 Specify proper valve stem orientation so that the valve stem can bevisual.
2 Provide ball valves on 2" or smaller pipe. Provide flanged butterfly valves on 2-½ " or larger pipe. Do not provide gate valves on any piping.
3 Provide isolation valves at all mechanical equipment for maintenance and service.
4 Locate and label valves where they can be reached for service, in hallways and public spaces wherever possible. Do not place valves in classrooms, offices or other related spaces where emergency service may be disruptive to activities occurring within the room. Where access panels are provided, placement shall allow clear and direct access to valves with no obstructions, i.e.; ductwork, piping, conduit, etc.
5 Label all valves in HVAC systems. Provide valve chart at close out.
6 Install labels on the ceiling grid to clearly identify the location of all valves. Labels will be provided by GVSU.

Label	Item	Letter Color
DC-#	Domestic Cold Water	Blue
DH-#	Domestic Hot Water	Red
DHR-#	Domestic Hot Water Return	Red
CWS-#	Chilled Water Supply	Black
CWR-#	Chilled Water Return	Black
HWS-#	Hot Water Supply	Black
HWR-#	Hot Water Return	Black

7 Areas to be tagged:
- A. All valves above ceiling grids.
- B. Basement main service valves
- C. Basement valves not adjacent to equipment

8 Areas where tagging is not necessary:
- A. HVAC, AHU & FCU Rooms

9 Valve Location Identification: Place colored adhesive circle on grid directly below valves to ID location.
- A. Green – Plumbing
- B. Red – Mechanical
- C. Yellow - Gas

23 05 93 TESTING, ADJUSTING AND BALANCING FOR HVAC

1 TAB contractor must be contracted by the prime contractor and shall have no affiliation, ownership, partnershipwith or otherwise with the mechanical contractor.
2 TAB contractor must be a current NEBB certified contractor. The TAB contractor shall follow all elements contained in the current version of "NEBB Procedural Standard for Testing, Adjusting and Balancing of Environmental Systems."
3 The TAB contractor shall make an application to NEBB for a "Quality Assurance Certificate of Coformance" unless otherwise approved in writing by the GVSU Project Manager.
4 Require that all test results are to be given to the GVSU Project Manager and Commissioning Authority.
5 Contractors shall not change a location of a valve, pump, alter design work, change system operating procedures, etc. unless directed by the design engineer or owner in writing. Commissioning agents do not have the authority to have system parameters modified unless approved by the owner or design engineer in writing.

6 Require the development and implementation of a Measurement and Verification (M&V) Plan consistent with International Performance Measurement & Verification Protocol (IPMVP). The M&V period shall cover a period of no less than one year of post-construction occupancy
7 After completion of balancing of systems, all sheaves should be changed to fixed sheaves (do not leave variable sheaves in place).
8 All hydronic piping to be pressure tested with notification to GVSU representative one week prior to test.
9 Require the Testing and Balance Contractor to complete work prior to occupancy or system verification by the Commissioning Authority. The Contractor is to coordinate the TAB plan with the Commissioning Authority. Testing shall be complete a minimum of two weeks prior to occupancy.
10 Provide draft report within two days of test for review by Owner.
11 Owner to be notified at least three days prior to any scheduled testing.
12 All equipment must be calibrated prior to any testing. Certifications shall become part of the report.
13 Balance reports coefficients listed.
14 Contractor to schedule a pre TAB meeting.

23 06 00 SCHEDULES FOR HVAC

23 06 20 SCHEDULES FOR HVAC PIPING AND PUMPS

1 Pumps: Bell and Gosset pumps shall be the sole supplier for heating, cooling and any other type of water recirculation application.
2 WILO pumps are acceptable for in-line 5hp pumps and below.

23 07 00 HVAC INSULATION

23 07 19 HVAC PIPING INSULATION

1 Install complete insulation of all piping, valves, terminal units and all sections. Do not leave un-insulated gaps between components.
2 Preformed fitting jackets to be Johns Manville Zeston 2000 PVC insulated fitting covers and jacketing. The fiberglass inserts shall have UL 25/50 rating and be non-combustible per ASTM E136.Straight pipe runs and pipe fittings less than 8'-0" above finish floor, use Ceelco or equal PVC jacket.
   A. On interior applications, use 30 mil thickness.
   B. On exterior applications, use 320 mil thickness.
3 Insulate all steam valves and traps with removable BLANKET Pro Insulation, inc. or equal.
   A. Use 2" for temperatures higher than 200 degrees.
   B. Use 1" for temperatures below 200 degrees.
4 Where piping insulation is to be transversed, use a metal jacket extended to 3' to each side of the centerline of travel.
5 All valve handles shall be left visible
6 Pipes containing hot water or steam may have pipe hangers in contact with pipe.
7 Pipe hangers supporting pipe with cold water may not be in contact with pipe and must use saddles, rollers, etc. with insulation supports. Insulation supports must be long enough to allow for insulation protection for expansion from startup to full operation mode.

23 08 00 COMMISSIONING OF HVAC

1 GVSU will hire an independent 3rd party commissioning agent for HAVC work. This work shall not be part of the mechanical contractor's scope of work.

23 09 00 INSTRUMENTATION AND CONTROL FOR HVAC

23 09 13 INSTRUMENTATION AND CONTROL DEVICES FOR HVAC

1 Exhaust fans will be controlled from central energy management system, (exception – housing units).
2 The entire building will be controlled through existing energy management system at each campus. Direct digital control (DDC) shall be used.
3 GVSU Energy Management will assist engineer in developing control strategy and specifications. Bid documents include but are not limited to sequence of operation, points list, product specification, graphics development, alarm and report programming.

4 Location of temperature sensors and thermostats shall be coordinated with furniture, equipment, sunlight (relationship to window locations) and prevailing breezes. Final location of all temperature sensors and thermostats must be reviewed by GVSU.
5 Thermostats shall be low voltage 24 vac.
6 Valve actuators shall be low voltage 24 vac.
7 Engineer is required to define the control system and operations on the design and construction documents. Such definitions should illustrate the operational and control expectations for the system.
8 Energy management system to be interfaced with fire alarm and lighting control systems.
9 For food service projects, all Hood/MAU/EF control wiring to be Temperature Controls Contractor. A/E firm shall provide detailed sequence of operation and hood fire protection wiring diagrams.
10 Provide 3 copies of prints identifying HVAC zones.
11 Hot water sensors shall be located and positioned so they are easily read without use of ladders.
12 All temperature gauges shall be manufactured by Weiss Instruments Inc.
13 Temperature Indicators: Use combination temperature indicator/temperature transmitter (TI/TT) Weiss Model DVUT35 with one well.
14 All walk-in coolers and freezers shall be set up with a remote temperature alarm system coordinated with the main campus BMS alarm system.
15 Control graphics to emulate the GVSU Mary Idema Pew Library.
16 An example of the proposed graphics for a floor and a zone shall be submitted for approval by the Owner at the time of submittals.
17 Demonstration of the graphics upon completion for Owner approval.

23 20 00 HVAC PIPING AND PUMPS

23 21 00 HYDRONIC PIPING AND PUMPS

1 Water Treatment: Provide chemical pot feeder in all closed looped water systems.
2 Provide ball valves on each side of control valves. Circuit setters are not to be used for isolation purposes. Valves must be accessible.
3 Provide two (2) 1-1/4" male cam-lok fittings per supply and return and to be installed across pumps and in mechanical rooms for temporary filtration. Contractor to supply pump.
4 Installation shall include a Shelco filtration/shot feeder combination system.
5 All hot water coils on AHU's to have coil pumps and 3-way valve control.
6 All chilled water coils on AHU's to have 2-way valve control.
7 For all pumps, provide shaft grounding ring and neoprene coupler.
8 Provide maintenance free, sealed bearings for all in-line pumps.
9 Coils:
   A. All coils to have 10-fins/inch maximum.
   B. Provide access panels for coil cleaning up and down stream of all coils. Size should be sufficient to allow inspection and use of cleaning equipment, except where duct can be easily removed for cleaning.
10 Coils should be located to be accessible for service in public spaces.
11 Provide high point vents and low point drains on all coils. Provides a dirt leg on all chilled water supply and return at coils.
12 Clean existing coils serving newly remodeled areas after completion of renovations. Protect all coils, during construction, from accumulation of construction dust.
13 Underground direct buried chilled water piping shall be cased piping. Carrier pipe to be ductile iron, cement lined, asphaltic seal coated. Carrier pipe insulation to be closed cell polyurethane foam pipe insulation, preformed, rigid, cellular. Casing to be PVC plastic. Provide restrained joints, no concrete thrust blocks. Acceptable manufacturers are:
   A. Perma-Pipe,
   B. Rovanco Piping Systems,
   C. Thermacor Process LP,
   D. Thermal Pipe Systems.
14 All shutoff valves to be located at floor level
15 Hydronic System Make-up Water Meter:Istec 1710 water meter, no pulse, NPT fittings, max flow rate 20 GPM, max temperature 200 degrees F.
   A. Water meters shall be visible from floor level.

23 22 00 STEAM AND CONDENSATE PIPING AND PUMPS

1 Steam Equipment: Steam traps shall be Armstrong or Spirax-Sarco.
2 All steam and condensate lines will be cleaned and/or purged prior to being put in service in so as to be free of contaminants. Contractors shall make provisions for an initial condensate discharge period of 7 days. Condensate samples must be provided to the GVSU Project Manager after this period for testing and deemed sufficiently clean by GVSU to allow final steam condensate connection to the system.
3 Steam trap piping shall be designed and fabricated in accordance with Standard Detail 23.002 in Appendix C of these Standards.
4 All new traps to be equipped with transmitter and components.

23 23 00 REFRIGERANT PIPING

1 Install a ball valve before and after each dryer and sight glass for systems 5 ton and above.
A. Shutoff valves shall be standard CYCLEMASTER Ball Valves with access port. (Model AQ or AC)
2 Fabricate using type ACR pipe.
3 Fittings to be ASME B16.22 rated and long radius.
4 Refrigerant shutoff valves and controls to be premium construction.
5 Joints shall be brazed.
6 Use silver solder and purge with nitrogen while brazing.
7 Install properly sized liquid line filter dryers and site glass with moisture indicator.
8 Evacuate and dry all circuits to a final vacuum of 250 microns or less and hold for a minimum of 24 hours. Use a quality and calibrated micron meter/gauge.
9 Insulate per Division 23 07 19.
10 Use and provide GVSU with an accurate and completed factory start up sheet.

23 30 00 HVAC AIR DISTRIBUTION

1 Require the establishment of minimum indoor air quality (IAQ) performance to enhance indoor air quality in buildings by complying with minimum requirements of sections 4 through 7 of ASHRAE 62.1-2004.

23 31 00 HVAC DUCTS AND CASINGS

1 Vents and exhaust system shall have access for cleaning; minimize turns. Provide access panels upstream and downstream of in-line fans for cleaning and service.
2 All ductwork is to be pressure tested in conformance with SMACNA Standards. GVSU Project Manager is to be notified a minimum of three (3) days prior to testing.
3 Require any ductwork that is deformed, from initial installation or due to excess static pressure due to improper installation to be replaced, resealed and retest on pressure. Contractor is responsible for all cost including rebalancing.
4 Flex duct to have a maximum run of 5'.

23 36 00 AIR TERMINAL UNITS

23 36 16 VARIABLE-AIR-VOLUME UNITS

1 Variable Air Volume (VAV) boxes and related installation shall conform to the following:
A. All boxes shall be Titus, Price, Mailer or Siemens with tool less sealed access panels. Provide access panels in bottom of VAV box ahead of coil. VAV's are to be furnished from the manufacturer with this access panel option installed.
B. All box duct runs shall have minimum 5-times (5x) duct diameter of straight run before and after the VAV box.
C. Where VAV units are installed above a non-accessible ceiling (e.g. drywall) separate service panels shall be provided in the inaccessible ceiling allowing access to the access panels required in 23 31 00 (3)(D) above. Center point of both sets of access panels SHALL BE ALIGNED.
D. Where VAV units are installed above an accessible ceiling (e.g. 2'x2' suspended acoustical), the center point of the accessible ceiling tile SHALL BE ALIGNED with the center point of the access panels required in 23 31 00 (3)(D) above.

E. A minimum clear area of 24-inches by 24-inches shall be provided at all service panel locations and shall be free of any interference caused by building structure, bridging or bracing, piping, ductwork, conduit, hangers for piping and ductwork, air distribution diffusers, light fixtures, ceiling grid and related hangers.

23 40 00 HVAC AIR CLEANING DEVICES

23 41 00 PARTICULATE AIR FILTRATION

1 Require the development and implementation of an IAQ management plan for the construction and preoccupancy phases of the building. Contractor to supply and install MERV-8 filters during construction and replace all filters with MERV- 13 filters immediately prior to occupancy.
2 Require MERV-13 or better filters for regularly occupied buildings on both return and outside air that is to be delivered as supply air prior to occupancy.
3 Allow clear area for filter removal.
4 Final air filters to be GVSU standard pleated types to meet current indoor air quality standards.
5 Install filters and access panels prior to air reading station on all outdoor air intakes that have honeycomb***.***
6 All AHU's to be clearly labeled next to the filter section indicating filter model and size.
7 Contractor is to provide and install filter media for all return registers and outside air intakes when air handling equipment is started up prior to occupancy to control dust collection in ductwork.

23 52 00 HEATING BOILERS

23 52 16 CONDENSING BOILERS

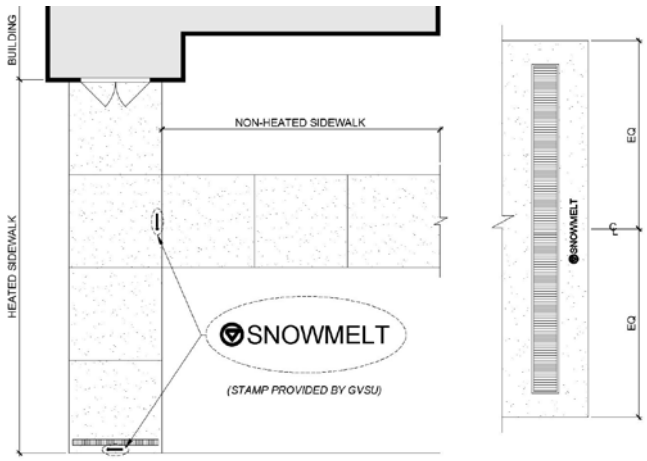
1. Condensing boilers shall be minimum 95% efficiency commercial grade.
2. Acceptable flue venting products for Fulton Pulse Boilers are:
a. Heatfab Saf-T-Vent CI Plus
b. Flue gas conduit shall be fabricated from AL29-4C stainless steel. The outer jacket shall be constructed of U30 stainless steel.
c. All flue seals shall be factory adhered with no insulation in annular air space.
d. Joints shall be fastened with a closure system that combines Heatfab tapered ends with mechanical closure system which consists of tabs and locking bands.
e. Flue vent shall be installed in accordance with Heatfab's Installation and Maintenance Instructions and with all applicable local, state and national codes.
f. Connect full size of venting to boiler connections or as specified in boiler manufacturers installation instructions.
g. Install factory furnished mufflers in accordance with boiler manufacturers installation instructions.
h. Notify Construction Manager and Architect / Engineer in advance of any planned test dates.
i. Engage Heatfab factory authorized service representative to inspect flue vent installation with manufacturer's installation requirements. Cost of factory authorized service representative inspection is the responsibility of the mechanical contractor.
j. Quantity and size of gas regulators for condensing boilers shall be in accordance with the boiler manufacturer's recommendations.

23 83 00 RADIANT HEATING UNITS

23 83 16 RADIANT-HEATING HYDRONIC PIPING (SNOW MELT)

1 All snow melt systems shall be filled with 38% inhibited propylene glycol. Access panels required in 23 31 00 (3)(D) above
2 Clean, flush and filter system prior to turning over to the University.
3 Snowmelt systems shall be designed for connection to and control by the University's BMS controls.
4 Tie into GVSU main campus sensor. No local sensors.
5 Design drawings shall call out an imbedded stamp in the concrete to clearly delineate areas covered by snowmelt.

a. Stamp to be temporarily provided by Facilities Planning and shall be returned in a clean state.
b. Stamp to be embedded on the heated side of the sidewalk where the snowmelt system ends and where heated sidewalk joins adjacent walks that are not heated. (See detail below for reference)
c. Stamp to be embedded on the center of the concrete slab and a minimum of 2" above the expansion joint OR evenly spaced between the expansion joint and the trench drain.
d. Confirm locations with the GVSU Project Manager and include on construction documents. (See below detail fro reference)



END OF SECTION

DIVISION 26 – ELECTRICAL

26 00 00 ELECTRICAL

26 05 00 COMMON WORK RESULTS FOR ELECTRICAL

26 05 01 GENERAL REQUIREMENTS

26 05 01.01 ALL UNIVERSITY BUILDINGS

1 As applicable to the work, compliance with the following currently adopted standards is required. For basis of design, all electrical conductors are to be copper.
- A. NEC (NFPA 70 & 70E), National & Michigan Electric Code
- B. AWS American Welding Society, Standards for Welding
- C. ANSI C2, National Electrical Safety Code
- D. ANSI C73, Dimensions of Attachment Plugs & Receptacles
- E. ANSI/ASHRAE/IESNA 90.1-
- F. NECA Standards for Installation
- G. NEMA Standards for Materials and Products
- H. ASTM American Society for Testing Materials
- I. ASA American Standards Association
- J. NFPA, National Fire Protection Association
- K. UL, Underwriters' Laboratories, Inc.
- L. OSHA, Occupational Safety and Health Act
- M. ADA, Americans with Disabilities Act

2 All work must comply with GVSU lockout / tag out procedures.
- A. Contractors will be responsible for lockout/tag out of the nearest source of power supplying equipment to be repaired, replaced or removed.
- B. Contractors will be responsible for the training of their employees in lockout procedures. They will also be responsible to supply their employee's with lockout equipment.
- C. Prior to shutdown of any equipment and/or power, contractors will notify the Plant Customer Service (331-3000).
- D. Any breaker, breaker panel, disconnects, switches, contractors, starter, controls and/or other electrical devices not locked out or tagged out, will be deemed in use.
- E. All personnel involved in the repair, replacement, installation, or removal of equipment will use the lockout/tag out procedure. This includes but is not limited to the locking out of: electrical, steam, gas, hydraulic, pneumatic and stored energy.

3 It is generally desired that University buildings have a watertight pin and sleeve Hubbell HBL460MI12W 3P 4W 240 volt, or Leviton 460MI12W 3P 4W 125/250 volt, un-fused circuit lock disconnect receptacle provided on the exterior of the building. Confirm need with the University on project by project basis.

4 Dedicated 20amp circuit required for all copiers, vending machines and microwaves. Vending machine outlets shall be 72”-84” AFF at each machine location. Copier circuits require #10 THHN minimum from the source and TVSS outlet.

5 Provide minimum 20 amp dedicated circuits to all copy machines and with minimum 10 gauge copper wire.

6 Provide dedicated 20A circuits with surge protected receptacles for all main computer hub network equipment and AV equipment.

7 Generators, transformers and medium voltage switches are allowed in outside areaways. All other equipment must be installed inside buildings unless otherwise approved by the project manager.

8 Provide exterior duplex receptacles with in-use covers near building entrances/exits. Verify quantities and locations with University.

9 Provide one 120volt duplex receptacle in all building entrance vestibules opposite the automatic door openers.

10 Equipment in labs or machine shops to have Master Kill Switch. Also provide keyed switch to lockout power when no faculty are present to supervise activities. Verify location and operation with project manager.

11 Classroom lighting layout shall be in conformance with Standard Details #27.003 in Appendix C of this manual.

12 Install an extra set of contacts on exterior lighting contactors. The purpose is to allow future flexibility to add circuits where desired at a future time.

13 Provide rough in for classroom and case room lighting & IT equipment. See Appendix C, Standard Details 27.001, 27.002, 27.003, 27.004 and 27.005.

14 All electrical key switches and electrical panels with locks shall be keyed alike. Reference hardware section for electrical key switches.

15 Firestopping: Provide U.L. listed firestopping assembly for all openings and sleeves through floors and firewalls. Sleeves provided for telephone, data, sound or other communication cables shall be firestopped after the respective contractor has finished their work. Only the following products, or University approved equals, shall be used:
   A. STI SpecSeal SSP100 Putty.
   B. STI SpecSeal SSB Pillows.
   C. HILTI CAJ 3320B, WJ 3200B, WL 3396b or WL 3395b floor or wall assemblies.

16 When installed outdoors, medium voltage (12,470/7,200V) electrical, telephone and data cabling are to be installed in concrete encased duct banks. Telephone and data are to be separated from electrical power.

17 All telecommunications cabling shall be kept in trays and /or conduits separate from primary or secondary power cabling. This includes any new telecommunications cabling installed in the existing utility tunnels. New cabling in tunnels shall be kept in separate trays or conduits and not laid together in trays containing primary or secondary power.

18 Provide adequate LED lighting including emergency lighting to service all equipment in mechanical, electrical, custodial and elevator rooms. Provide GFI service outlet for supplemental lighting in mechanical spaces. Provide GFI outlet within 6 feet of BMS panels.

19 Provide power at building entrances for future ADA openers or other equipment. Verify exact requirements with Project Manager.

20 On Allendale campus, all clock system wiring will be tied to a GVSU provided clock controller. Contractor is to provide an IT data drop next to the GVSU clock controller. See Appendix C, Detail 27.007. Standard Classroom clock is a Simplex #6310 9221 - Analog. Provide clocks in corridors, classrooms and conference rooms of 8 or more people. Preferred classroom location is opposite the teaching station. PoE clocks may be used with GV Project Manager approval. Review all clock locations with GVSU.

21 See Appendix C Detail 26.002 & 26.003 for typical office electrical layouts. Review with GVSU during Design Development. Solution may involve empty conduits.

22 There is a minimum of one 208V 60A fuseable 3 phase service disconnect per mechanical room.

23 Provide a GFI receptacle at shelf height in custodial rooms.

24 Roadway and major walkway lights are to be connected to the Building Management System. Concrete bases 30 inches above grade when located within paved areas; 12 inches above grade when located in lawn or landscaped areas and located a minimum of 5 feet off edge of paved surface to centerline of pole.

25 Metering: Follow CSI Master Spec 262713 – Electricity Metering.

26 Light fixtures are to be located, where practical, so as not to require scaffolding for service.

27 Oversize electrical panels by twenty percent. (Provide spare breakers, review with GVSU at Design Development). Twenty AMP minimum circuit size.

28 Lighting in all occupied rooms will be controlled by a wall switch located at ALL points of entry. If an occupied room is equipped with an automatic sensor, a wall switch will be used in addition at all points of entry.

29 Lighting Control for all common areas shall be controlled by the campus Building Management System.
   A. All conference rooms shall have motion sensors.

30 Private offices shall be locally controlled. Utilize daylight harvesting systems where practical.

31 Transformer pads shall have an 8" maintenance edge at grade and a 10" wide curb at pad elevation. Refer to Appendix C, Detail 26.001

32 Only equipment related to electrical distribution shall be allowed in electrical rooms unless approved by Owner.

33 12,470V or fiber duct banks shall be encased in concrete.

26 05 01.05 UNIVERSITY STUDENT HOUSING

1 Switching for corridor lighting in Housing Units shall be controlled by the campus Building Management System and have a manual 30 minute timer control with NO hold on override in mechanical room.

2 In Housing units provide separate 20-amp circuit for microwaves and refrigerators.

3 Consider security implications for lighting of housing developments. Review with GVSU public safety unit at design and development.

4 Exhaust Fans for Housing Unit bathrooms are to have an adjustable off delay switch set to 15 minutes. Preferred timer model (Ametek TNC-T1517-120) and install in a 2 gang box with single gang mud ring to allow for wire space.

5 Review kitchen circuitry with Owner during design development.

26 05 01.09 INSPECTIONS, ADJUSTMENTS AND BALANCING

1 Provide Owner evidence that installation has been inspected and approved by authority with jurisdiction over electrical work involved.
2 Subsequent to the installation of the electrical power and distribution system and upon the beginning of operation, Contractor shall make all necessary adjustments to equipment installed or connected by him under this Contractor so as to insure proper operation of the same. Contractor shall measure phase balance and make necessary adjustments to any portion of the electrical system that is substantially out of balance.

26 05 01.13 RECORD DRAWINGS, GUARANTEES, WARRANTIES AND BONDS

1 Provide written guarantee for all work performed under this Contract for a period of not less than one year from the date of project completion.
2 Contractor shall make all necessary alterations, repairs, adjustments, replacements during guarantee from date of acceptance of repair or replacement.
3 Provide manufacturer's warranty on all products provided.
4 The Contractor shall obtain and forward to GVSU statements concerning Guarantee and Indebtedness, and any other special warranties or requirements of the Contract Documents. All required material shall accompany Contractor's request for final payment, including all operation and maintenance data required by the Contract Documents.

26 05 13 MEDIUM-VOLTAGE CABLES

1 Conductor materials: Copper
2 High Pot test required on new primary feeders.
A. Correct malfunctioning products at site, where possible, and retest to demonstrate compliance; otherwise, remove and replace with new units, and retest.
B. Provide Owner with High Pot testing results.
C. Contact Owner for testing procedures on existing primary feeder cables.

26 05 19 LOW VOLTAGE ELECTRICAL POWER CONDUCTORS AND CABLES.

1 Conductor materials: Copper

2 Coordination: Coordinate layout and installation of cable with other installations.
A. Revise locations and elevations from those indicated as required to suit field conditions and as approved by the Architect.
3 Manufacturers: Company specializing in manufacturing products specified in this Section with minimum five years documented experience.
4 Examine raceways and building finishes receiving wires and cables for compliance with installation tolerances and other conditions. Do not proceed with installation until unsatisfactory conditions have been corrected.
5 Remove existing wire from raceway before pulling in new wire and cable.
6 Conductor Splices: Keep to minimum.
A. Install splices and tapes that possess equivalent or better mechanical strength and insulation ratings than conductors being spliced.
B. Use splice and tap connectors that are compatible with conductor material.
C. Underground splices: Where splices occur in below grade locations the following method for constructing the splice shall be followed:
i. Install splice in split bolt and tighten bolt. Split bolt to be high-strength corrosion-resistant bronze alloy
ii. First dip of assembly in 3M Scotchkote Electrical Coating,
iii. First wrap of assembly in 3M Scotch 130CX Linerless Rubber Splicing Tape,
iv. Repeat this process two (2) additional times using exact sequence of steps.
v. Finish with 4th and final dip in Scotchkote.
vi. All dips must fully encompass the wire junction and wrap back onto and over intact wire insulation.
7 Where 120 volt, 20 AMP branch circuit wiring from panelboard to first outlet exceeds 100 feet in length, increase wire size to 10 AWG.
8 Wire to wire connections in motor housings will be made with insulated multi cable connectors rated for CU wire. Examples are Polaris and Monkey Knuckles. Exclusions are fractional HP motors.
9 Use of shared neutrals is prohibited.

10 SJ and SJO cords require strain relief when hung from above.
11 Neutrals feeding panel boards are to be rated 125 percent of panel board ampacity unless directed otherwise by Owner.
12 Use of AC and APMC cable is prohibited.
13 MC cable is permitted only under the following conditions and requirements:
   A. used for branch circuitry, but once exposed must terminate to junction box or EMT conduit within 6-feet unless otherwise approved by GVSU's Electrician.
   B. may be used for light fixture connections not exceeding 6-feet in length.
   C. may not be terminated into panels without GVSU approval.
14 Flexible conduits may not be run in excess of 6 feet without GVSU approval.
15 The use of flexible metal conduit in concealed locations, walls, ceilings or on the sides or above HVAC units is prohibited unless approved by GVSU.
16 Running flexible metal conduit or sealtite conduit through metal studs shall be protected using bushings or a sleeve.
17 Flexible metal conduit, sealtite or MC cable entering a room shall utilize a junction box attached to the wall.
18 All raceways shall include a properly sized grounding conductor.
19 All low-voltage electrical power conductors used for exterior use in underground raceways (i.e. site-lighting, outdoor receptacles or other branch circuitry) shall be wired with XHHW-2 wire.

26 05 26 GROUNDING AND BONDING FOR ELECTRICAL SYSTEMS

1 Conductor Materials: Copper.
2 Underground Conductors: Bare, stranded copper except as otherwise indicated.
3 Signal and Communications: For telephone, alarms, and communication systems, provide a #4 AWG minimum green insulated copper conductor in raceway from the grounding electrode system to each terminal cabinet or central equipment location.
4 Metal Poles Supporting Outdoor Lighting Fixtures: Ground pole to a grounding electrode as indicated in addition to separate equipment grounding conductor run with supply branch circuit.
5 Ground Rods: Locate a minimum of one-rod length from each other and at least the same distance from any other grounding electrode. Interconnect ground rods with bare conductors buried at least 24 inches below grade. Connect bare-cable ground conductors to ground rods by means of irreversible compression except as otherwise indicated. Make these connections without damaging the copper coating or exposing the steel. Use 3/4-inch by 10-ft. ground rods except as otherwise indicated. Drive rods until tops are 6 inches below finished floor or final grade except as otherwise indicated.
6 Bond interior metal piping systems and metal air ducts to equipment ground conductors of pumps, fans, and electric heaters.
7 Irreversible Compression Connections: Use for connections to structural steel and for underground connections. Install at connections to ground rods and plate electrodes. Comply with manufacturer's written recommendations.
8 The entire grounding electrode system resistance shall be no greater than 5.0 Ohms between the main grounding electrode and ground. (Reference ANSI/IEEE Standard 142)
9 Deficiencies: Where ground resistances exceed specified values, and if directed, modify the grounding system to reduce resistance values. Where measures are directed that exceed those indicated the provisions of the Contract, covering changes will apply.
10 Report: Prepare test reports, certified by the testing organization, of the ground resistance at each test location. Include observations of weather and other phenomena that may affect test results. Describe measures taken to improve test results. Submit copy to Owner.
11 Provide building grounding ring "counter poise" as part of a complete building lightening protection system.
12 Provide insulated grounding conductor in all raceways.

26 05 33 RACEWAY AND BOXES FOR ELECTRICAL SYSTEMS

1 For telephone and data outlet boxes provide metal 4-inch square x 2-inch deep boxes with single gang plaster ring.
2 Use of floor boxes must be approved by GV Project Manager and submittals shall be approved by GVSU prior to being returned to the contractor.

3 Outdoors: Use the following wiring methods:
   A. Exposed: Rigid or intermediate metal conduit.
   B. Concealed: Rigid or intermediate metal conduit.
   C. Underground, Single Run: Rigid nonmetallic conduit or schedule 80 PVC.
   D. Underground, Grouped: Rigid nonmetallic conduit or schedule 80 PVC.
   E. Connection to Vibrating Equipment (including transformers and hydraulic, pneumatic, or electric solenoid or motor-driven equipment): Flexible, UL listed liquid tight metal conduit or UL listed liquid tight flexible non-metallic conduit (carflex).
   F. Boxes and Enclosures: NEMA Type 3R or Type 4.

4 Indoors: Use the following wiring methods:
   A. Main Service Feeders: Rigid steel conduit.
   B. Connection to Vibrating Equipment (including generators, dimmer racks, transformers and hydraulic, pneumatic, or electric solenoid or motor-driven equipment): Flexible, UL listed liquid tight flexible metal conduit or UL listed liquid tight flexible non-metallic conduit (carflex).
   C. Damp or Wet Locations: Rigid steel conduit.
   D. Exposed: EMT, Rigid or IMC. Where exposed to physical damage, Rigid or IMC per the NEC.
   E. Concealed: Electrical metallic tubing.
   F. Concealed in Floor Slabs: Electrical non-metallic tubing or rigid non-metallic conduit.
   G. Boxes and Enclosures: NEMA Type 1, except in damp or wet locations use NEMA Type 4, stainless steel.
   H. Final connections to all electrical or mechanical equipment mounted on "floating floors" in Mechanical Rooms: Liquid-tight flexible metal conduit or UL listed liquid tight flexible non-metallic conduit (carflex).

5 Materials:
   A. Rigid Metal Conduit (RMC)
      i. Galvanized Steel RMC: Galvanized steel, heavy wall conduit with threaded fittings, 3/4-inch trade size minimum, insulated bushings
   B. Intermediate Metal Conduit (IMC)
      i. Galvanized Steel IMC: Reduced wall galvanized steel conduit with threaded fittings, 3/4-inch trade size minimum, insulated bushings.
   C. Electrical Metallic Tubing (EMT)
      i. Thin wall, hot galvanized, steel tubing, 3/4-inch trade size minimum with insulated throat steel connector.
      ii. Fittings Steel compression or setscrew type (die cast fittings are expressly prohibited)

6 Conceal conduit and tubing, unless otherwise indicated, within walls, ceilings, and floors.

7 Conduit and tubing may be surface mounted in Mechanical Rooms.

8 Conduit and tubing running to surface mounted panelboards, automatic transfer switches, and transformers may be surface mounted.

9 Surface mounted conduit and tubing may be used where specifically approved by Architect/Engineer.

10 Keep raceways at least 6 inches (150 mm) away from parallel runs of flues and steam or hot water pipes. Install horizontal raceway runs above water and steam piping.

11 Install plastic pull line in empty raceway having not less than 200-lb (90 kg) tensile strength. Leave not less than 12 inches (300 mm) of slack at each end of the pull wire.

12 Communications and Signal System Raceways 4-Inch Trade Size and Smaller: In addition to the above requirements, install in maximum lengths of 150 feet (45 m) and with a maximum of two 90-deg bends or equivalent. Install pull or junction boxes where necessary to comply with these requirements.

13 Equipment Grounding Conductor: Install a green equipment grounding conductor in all raceways.

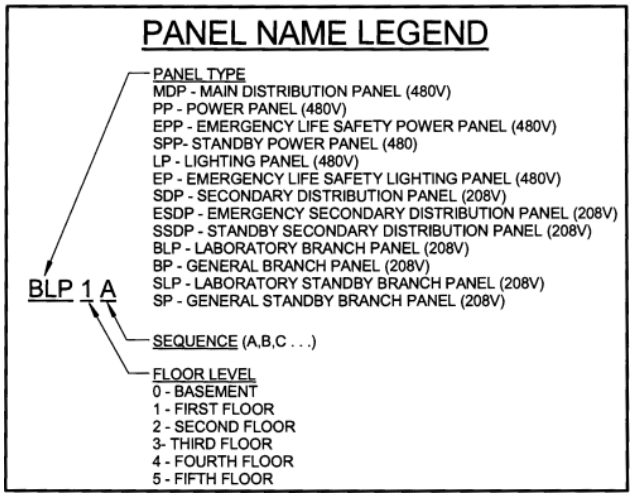
14 Flexible conduit shall be installed.

26 05 53 IDENTIFICATION FOR ELECTRICAL SYSTEMS

1 All devices to have circuits identified on back (inside) of device cover plate with permanent marker pen and also on exterior cover of j-boxes. Refer to Appendix C for circuit identification detail.

2 On all remodel jobs all legends are to be upgraded to show new circuitry and confirm existing circuitry.

3 GVSU Electrical Equipment Tags:
   A. Equipment shall be identified using the equipment abbreviations below.



Panel Label Legend		
Panel Type	**Label Color**	**Text Color**
Normal	White	Black
Life Safety	Red	White
Standby Power	White	Red
Misc. Equip.	White	Black

4 Identify high-voltage feeder conduits (over 600 V) by words "DANGER-HIGH VOLTAGE KEEP OUT" in black letters 2 inches high, stenciled at 10-foot intervals over painted orange background.

5 Identify Junction, Pull, and Connection Boxes: Label exterior of box with identity of contained circuits, voltage and source panel. Refer to Appendix C for circuit identification detail.

6 Underground Electrical Line Identification: During trench backfilling, for exterior underground power, signal, and communications lines, install continuous underground plastic line marker, located 12 inches directly above conduit. Where multiple lines installed in a common trench or concrete envelope, do not exceed an overall width of 16 inches; install a single line marker.

7 Conductor Color Coding: Provide color coding for secondary service, feeder, and branch circuit conductors throughout the project secondary electrical system as follows:

208/120 Volts	480/277 Volts	1247/7200 Volts	Phase
Black	Brown	Black	A
Red	Orange	Red	B
Blue	Yellow	Blue	C
White	Slate/Gray	N/A	Neutral
Green	Green	Bare	Ground

8 Tag or label conductors as follows:

A. Tag/identify each wire with circuit number at each wire end.

B. Provide legend indicating source, voltage, circuit number, and phase for branch circuit wiring. Phase and voltage of branch circuit wiring may be indicated by mean of coded color of conductor insulation. For control and communications/signal wiring, use color coding or wire/cable marking tape at terminations and at intermediate locations where conductors appear in wiring boxes, troughs, and control cabinets. Use consistent letter/number conductor designations throughout on wire/cable marking tapes.

C. Emergency Operating Signs: Install engraved laminate signs with white legend on red background with minimum 3/8-inch high lettering for emergency instructions on power transfer, load shedding, or other emergency operations.

9 Install equipment/system circuit/device identification as follows:
   A. Apply equipment identification labels of engraved plastic- laminate on each major unit of electrical equipment in building, including central or master unit of each electrical system. This includes communication/signal/alarm systems, unless unit is specified with its own self-explanatory
   identification. Except as otherwise indicated, provide single line of text, with 1/2-inch-high lettering on 1-1/2-inch-high label (2-inch-high where two lines are required), white lettering in
   black field. Text shall match terminology and numbering of the Contract Documents and shop drawings. Apply labels for each unit of the following categories of electrical equipment.

10 Apply circuit/control/item designation labels of engraved plastic laminate for disconnect switches, breakers, pushbuttons, pilot lights, motor control centers, and similar items for power distribution and control components above, except panelboards and alarm/signal components, where labeling is specified elsewhere. For panelboards, provide framed, typed circuit schedules with explicit description and identification of items controlled by each individual breaker.

11 Furnish and install a sign at the service entrance equipment indicating type and locations of on-site emergency power sources. Sign shall be 8 x 10-inch minimum size mounted on the face on the switchgear.

26 10 00 MEDIUM-VOLTAGE ELECTRICAL DISTRIBUTION

26 12 00 MEDIUM-VOLTAGE TRANSFORMERS

1 Manufacturers: Subject to compliance with requirements, provide products by one of the following or equal:
   A. General Electric Distribution and Control.
   B. Square D Co.; Schneider Electric
   C. Cooper Industries
   D. ABB
   E. Siemens

2 Warranty: All transformers shall have a warranty for a minimum of one (1) year from Owner occupancy.

3 Windings: Copper. Two-winding type, designed for operation with high-voltage windings connected to a 3-phase, 4-wire, 60-Hz, grounded neutral distribution system.

4 Low-Sound Level Transformers: Specify units with a sound level rating a minimum of 3 dB less than NEMA TR 1 standard sound levels for the transformer type and rating.
   A. Transformers are not to be located immediately adjacent to occupied spaces unless appropriate acoustical designs are provided to eliminate sound transfer from space containing the transformer into adjacent occupied spaces.

5 Dry type transformers shall comply with NEMA Standard ST 20, "Dry-Type Transformers for General Applications" and IEEE Standard C.57.12.01, "General Requirements for Dry-Type Distribution and Power Transformers."
   A. Enclosure: Indoor, ventilated.
   B. Cooling System: IEEE Standard C57.12.01, Class AA/FA.
   C. Insulation Class: minimum 220 deg C.
   D. Environmental Protection: Cast coil/vacuum pressure impregnation encapsulation with epoxy polyester resin (VPI).
   E. Insulation Temperature Rise: 80 deg C maximum rise above 40 deg C.
   F. Basic Impulse Insulation Level: 60 Kv
   G. Full-Capacity Voltage Taps: Four nominal 2.5-percent taps, 2 above and 2 below rated high voltage.
   H. Impedance: 5.75 percent.
   I. Accessories: Provide the following accessory items:
      i. High-Voltage Surge Arresters: Distribution Class, low-spark-over metal-oxide varistor type complying with NEMA Standard LA 1, factory installed and connected to high-voltage terminals.

6 Liquid-filled pad mounted transformers shall comply with IEEE C57.12.20, ANSI C57.12.13and ANSI C57.12.26.
   A. Insulating Liquid: Only edible seed-oil based products such as Envirotemp FR3, or University approved equal shall be used. Product shall be UL listed as NFPA 70 requirements for fire point of not less than 300 degrees C when tested according to ASTM D92. Liquid shall be biodegradable and nontoxic.
   B. Basic Impulse Levels (BIL): 95 Kv
   C. Full-Capacity Voltage Taps: Four 2.5-percent taps; 2 above and 2 below rated high voltage; with externally operable tap changer for de-energized use and with a position indicator and padlock hasp.
   D. Surge Arresters: Distribution class, one for each primary phase. Comply with NEMA LA 1. Support from tank wall within high-voltage compartment. Location of arrestor is to be on outside wall.
   E. High-Voltage Terminations and Equipment: Dead front with universal-type bushing wells for dead-front bushing-well inserts. Include the following:

F. Bushing-Well Inserts: One for each high-voltage bushing well.
G. Surge Arresters: Dead-front, elbow-type, metal-oxide-varistor units.
H. Include the following accessories:
   i. Drain Valve: 1 inch (25 mm), with sampling device.
   ii. Dial-type thermometer.
   iii. Liquid-level gage.
   iv. Pressure-vacuum gage.
   v. Pressure-Relief Device: Self-sealing with an indicator.

7 Factory Tests: Design and routine tests conform to the referenced standards.

8 Factory Sound-Level Tests: Conduct sound level tests on equipment for this Project where specifying sound levels below the standard ratings.

9 Identify transformers and install warning signs according to 26 05 53 “Identification for Electrical Systems."

10 Tighten electrical connectors and terminals according to manufacturer's published torque-tightening values. Where manufacturer's torque values are not indicated, use those specified in UL 486A and UL 486B.

11 In addition to any manufacturers standard testing procedures, the following tests, at a minimum, shall be performed on all transformers used on University projects:

A. Electrical tests, conducted in accordance with applicable ASTM standards, shall be performed for the following:
   i. Turn to turn ratio
   ii. Megger
   iii. Doble
   iv. Power factor
   v. Excitation
   vi. Impulse

B. Oil testing and analysis as follows:
   i. Shall be performed at the following internals:
      a) Prior to shipping; Performed and paid for by manufacturer.
      b) Within seven (7) calendar days upon receipt of delivery for the transformer to the job site or contractor’s warehouse, whichever is the designated initial point of delivery. Performed and paid for by Contractor.
      c) Thirty (30) calendar days after the transformer is energized and regardless of actual load placed upon transformer. Performed and paid for by Contractor.
      d) Six (6) months after transformer has been energized. Performed and paid for by Contractor.
      e) All test results shall be turned over to Owner within 1 week of test.
   ii. Dissolved gas analysis (DGA) shall be performed in accordance with ASTM D3612.
      a) Shall not have any one of the following individual combustible gases, and the total of all combustible gases that exceeds the following stated ASTM maximum levels, in parts per million (ppm):
         1) Hydrogen – 150 ppm
         2) Methane – 150 ppm
         3) Ethane – 150 ppm
         4) Ethylene – 100 ppm
         5) Acetylen – 2 ppm
         6) Carbon Monoxide – 750 ppm
         7) Total of all Combustible Gases – 750 ppm
   iii. Liquid Power Factor shall be performed in accordance with ASTM D924 and c provide the following test results:
      a) Tested at 25° C shall be greater than 2.99 ppm
      b) Tested at 100° C shall be greater than 2.99 ppm
   iv. Carl Fisher Moisture Test shall be performed in accordance with ASTM D1533 and provide the following test result:
      a) Less than 29 ppm
   v. Liquid Screen Test shall be performed in accordance with ASTM requirements and provide the following test results:
      a) Acid; ASTM 974; Not greater than 7.05 ppm.
      b) Interfacial tension (IFT); ASTM 971; Not greater than 32 ppm.
      c) Dielectric; ASTM D877; Not greater than 30 ppm.
      d) Specific Gravity; ASTM 1298; Between 0.83 and 0.89. Acceptable test result shall be within this range.
      e) Color; ASTM 1298; 3.0 or less.

C. Oil sampling, for the oil test described above, shall be obtained using the sampling method described in ASTM 3613. Retesting required as a result of the Contractor's failure to comply with ASTM 3613 shall be paid for by the Contractor.
D. All required oil tests shall be performed by SD Meyers Transformer Consultants. 1-800-444-9580 extension 3226. Test from any other lab will not be considered valid and retest will be required.
E. If any DGA test, performed at the required interval fails, additional testing will be performed as recommended by SD Meyers Transformer Consultants and all costs associated with retesting shall be paid for by the Contractor. If the recommendation of SD Meyers Transformer Consultants is to repair the transformer, it is at the sole discretion of the University to choose to repair or replace. All costs associated with the repair or replacement shall be paid for by the Contractor.
F. If, at any of the above required test intervals, the test results indicate non-compliance with the stated requirements for the Liquid Power Factor test, the Carl Fisher Moisture test, the Liquid Screen test or the Color test the transformer shall be rejected and a new transformer provided. All costs associated with providing a new transformer shall be paid for by the Contractor.
G. The project shall not be delayed as a result of the transformer failing to comply with any of the above stated requirements. The Contractor shall provide, if necessary to maintain the project's scheduled completion date, a temporary transformer(s) of KVA size and capacity that is not less then KVA specified for the new transformer. All cost associated with furnishing, installing and removing the temporary transformer(s) and any other required appurtenances and accessories shall be paid for by the Contractor.

12 Adjust transformer taps to provide optimum voltage conditions at utilization equipment throughout the normal operating cycle of the facility. Record voltages and tap settings to submit with test results.

26 13 00 MEDIUM-VOLTAGE SWITCHGEAR

26 13 13 MEDIUM-VOLTAGE CIRCUIT BREAKER SWITCHGEAR

1 Manufacturers: Subject to compliance with requirements, provide products by one of the following or equal:
A. General Electric Distribution and Control
B. Square D Co.; Schneider Electric
C. ABB
D. Siemens
E. S&C

2 Manufacturers: Outdoor transmission delivery equipment:
A. Federal Pacific, PSI/II Series
B. S&C, PMH Series

3 Primary switches (12,470 v. and 7,200 v.), in a loop system, used only for the purpose of isolation, shall NOT be fused.

4 Where a feeder line (12,470 v.) serves a fused switch for the purpose of them re-feeding two or more additional feeder lines, the switch shall be capable of controlling each feeder individually. As an example, for two buildings there may be a single cabinet but two switches. If there is a failure in one line or switch, only one building is affected.

5 Any new switchgear required for new building construction, major renovations or replacement is to be UL listed.

6 Provide Owner with photo documentation of completed terminations.

26 20 00 LOW-VOLTAGE ELECTRICAL TRANSMISSION

26 22 00 LOW-VOLTAGE TRANSFORMERS

26 22 13 LOW-VOLTAGE DISTRIBUTION TRANSFORMERS

1 Manufacturers: Subject to compliance with requirements, provide products by the following:
A. Acme Electric Corp.
B. General Electric Co.
C. ABB
D. Square D Co.
E. Siemens
F. Cutlerhammer

2 Transformers: Factory-assembled and tested, air-cooled units of types specified, designed for 60-Hz service.
3 Cores: Grain-oriented, non-aging silicon steel.
4 Coils: Continuous windings without splices except for taps.
5 Internal Coil Connections: Brazed or pressure type.
6 General-Purpose, Dry-Type Transformers:
   A. Comply with NEMA Standard ST 20 "Dry-Type Transformers for General Applications."
   B. Transformers: Two-winding type, single phase or 3-phase units using 1 coil per phase in primary and secondary.
   C. Windings: All copper.
   D. Termination Plates: Tin Plated Copper.
7 Low Sound Level Units: Minimum of 3 dBA less than NEMA ST 20 standard sound levels when factory tested according to IEEE Standard C57.12.91, "Test Code for Dry-Type Distribution and Power Transformers."
   A. Transformers are not to be located immediately adjacent to occupied spaces unless appropriate acoustical designs are provided to eliminate sound transfer from space containing the transformer into adjacent occupied spaces.
8 Features and Ratings: As follows:
   A. Enclosure: Indoor, ventilated.
9 Insulation Class: 185 deg C class for transformers 15 kVA or smaller; 220 deg C class for transformers larger than 15 kVA.
   A. Insulation Temperature Rise: 80 deg C maximum rise above 40 deg C.
10 Taps: For transformers 3 kVA and larger, full capacity taps in high-voltage winding are as follows:
   A. 15 kVA through 500 kVA: Six 2.5-percent taps, 2 above and 4 below rated high voltage.
11 Accessories: The following accessory items are required where indicated:
   A. Wall-Mounting Brackets: Manufacturer's standard brackets for transformers up to 75 kVA.
12 Dry-Type Distribution Transformers for Non-Linear Loads
   A. Provide transformers satisfying the above requirements and the following requirements. Transformers shall have a UL K-4 or UL K-13 rating as indicated on the plans. The K factor shall be based on the sum of fundamental and harmonic I_h (pu) $^2h^2$ in accordance with ANSI/IEEE C57.110-1986. Manufacturers rating K factors by average temperature rise alone shall not be acceptable. The transformer secondary neutral terminal shall be sized for 200% of the secondary phase current.
13 Factory Tests: Design and routine tests conform to referenced standards.
14 Factory Sound-Level Tests: Conduct sound-level tests on equipment for this Project where specified sound levels are below standard ratings.
15 Provide concrete housekeeping pads for all floor mounted transformers. Coordinate with Division 03310, Concrete Work.
16 Connect transformer units to conduit system using UL listed liquid-tight flexible conduit or flexible metal conduit.
17 Arrange equipment to provide adequate spacing for access and for cooling air circulation.
18 Adjust transformer taps to provide optimum voltage conditions at utilization equipment throughout the normal operating cycle of the facility.

26 24 00 SWITCHBOARDS AND PANELBOARDS

26 24 16 PANEL BOARDS

1 General use breaker panels may be installed in corridors. Review locations with GVSU. Installation should be as inconspicuous as possible. All panels are to be secured with locks. This requirement does not apply to Housing Units where panels are to be installed in separate electrical rooms.
2 When the project involves existing buildings, the Professional is to field investigate and verify existing circuit capacities.
3 Manufacturers: Subject to compliance with requirements, provide products by the following:
   A. Eaton Corp.; Westinghouse & Cutler-Hammer Products.
   B. ABB
   C. Siemens Energy & Automation, Inc.
   D. Square D Co.
4 Enclosures: Flush- or surface-mounted cabinets as indicated. NEMA PB 1, Type 1, unless otherwise required to meet environmental conditions at installed location.
5 Bus: Hard drawn copper of 98 percent conductivity.
6 Main and Neutral Lugs: Setscrew, anti-turn solderless pressure type.
7 Equipment Ground Bus: Hard drawn copper of 98 percent conductivity. Adequate for feeder and branch-circuit equipment ground conductors. Bonded to box.
8 Service Equipment Approval: Listed for use as service equipment for panelboards with main service disconnect.

9 Special Features: Include the following features for panelboards.
   A. Isolated Equipment Ground Bus: Adequate for branch-circuit equipment ground conductors; insulated from box.

10 Feed-through Lugs: Sized to accommodate feeders indicated.

11 Branch Overcurrent Protective Devices: Bolt-in circuit breakers, replaceable without disturbing adjacent units.

12 Doors: In panelboard front, with concealed hinges. Secure with flush catch and tumbler lock, all keyed alike. Keys to be turned over to Owner.

13 Circuit Breakers: Where overcurrent protective devices are indicated to be circuit breakers, use bolt-on circuit breakers, except circuit breakers 225-A frame size and greater may be plug-in type where individual positive-locking device requires mechanical release for removal.

14 Circuit breaker interrupting rating shall be 22,000 RMS symmetrical amperes at 120/208/240 volts; 25,000 RMS symmetrical amperes at 277/480 volts unless noted otherwise on plans.

15 Molded-Case Circuit Breaker: NEMA AB 1, handle lockable.
   A. Application Listing: Appropriate for application, including Type HACR for heating, air-conditioning, and refrigerating equipment.
   B. Circuit Breakers, 200 A and Larger: Trip units interchangeable within frame size.
   C. Single pole circuit breakers with handle ties shall not be used for multiple circuits.
   D. Piggyback circuit breakers shall not be used.

16 Surge protection devices shall be U.L listed and CSA certified as secondary surge arresters. They are to meet ANSI /IEEE C62-11-1987 Standards.

17 Mounting Heights: Top of enclosure 72 inches above finished floor, unless otherwise indicated.

18 Provision for Future Circuits at Flush Panelboards: Stub four 1-inch empty conduits from panelboard into accessible ceiling space or space designated to be ceiling space in the future. Stub four 1-inch empty conduits into raised floor space or below slab not on grade.

19 Provide wiring and connection for Building Management System (BMS) from metering as required by GVSU Energy Management Department. See Appendix C, Detail 27.007.

20 Termination at breaker panel shall be one wire per terminal.

21 Balancing Loads: After Substantial Completion, but not more than 2 months after Final Acceptance, conduct load-balancing measurements and make circuit changes as follows:
   A. Perform measurements during period of normal working load as advised by Owner.
   B. Perform load-balancing circuit changes outside normal occupancy/working schedule of the facility. Make special arrangements with Owner to avoid disrupting critical 24-hour services such as fax machines and on-line data processing, computing, transmitting, and receiving equipment.
   C. Recheck loads after circuit changes during normal load period. Record all load readings before and after changes and submit test records.
   D. Tolerance: Difference exceeding 20 percent between phase loads, within a panelboard, is not acceptable. Rebalance and re-check as required to meet this minimum requirement.

22 Electrical tubs shall not be altered so as to void manufacturer's warranty.

23 Splices used to extend feeders or circuits are not acceptable.

24 Infrared Scanning: After Substantial Completion, but not more than 2 months after Final Acceptance, perform an infrared scan of each panelboard. Remove fronts to make joints and connections accessible to a portable scanner.
   A. Follow-up Infrared Scanning: Perform an additional follow-up infrared scanning of each panelboard 11 months after date of Substantial Completion.
   B. Instrument: Use an approved infrared-scanning device designed to measure temperature or detect significant deviations from normal values. Provide calibration record for device used.
   C. Record of Infrared Scanning: Prepare a certified report identifying panelboards checked and describing results of scanning. Include notation of deficiencies detected, remedial action taken and observations after remedial action.
   D. All scanning shall be performed in the presence of a University representative. Failure to comply will result in the Contractor performing a re-scan in the presence of a University representative.
   E. Infrared scanning services shall be done by a qualified testing agency.

26 24 19 MOTOR CONTROL CENTERS

1 Manufacturers: Subject to compliance with requirements, provide products by the following:
- A. Allen-Bradley Co.
- B. Eaton Corp./Cutler-Hammer/Westinghouse.
- C. ABB
- D. Siemens Energy & Automation, Inc.
- E. Square D Co.

2 Wiring Classification: Class I, Type B, as defined in NEMA ICS 2.

3 Compartments: Modular, with individual doors with concealed hinges and quick-captive screw fasteners. For combination starter units provide interlocks so the disconnect means must be in the off position before door can be opened, and so door cannot be closed with the disconnect means in the on position, except by consciously operating a permissive release device.

4 Interchangeability: Construct compartments so it is possible to remove units without opening adjacent doors, disconnecting adjacent compartments, or disturbing the operation of other units in the control center. Units requiring the same size compartment shall be interchangeable, and compartments shall be constructed to permit ready rearrangement of units such as replacing 3 single units with a unit requiring 3 spaces without cutting or welding.

5 Buses shall meet the following criteria:
- A. Material: Plated copper.
- B. Neutral Buses (if indicated on plans): Full size.
- C. Equipment Ground Bus: Non-insulated, horizontal copper bus 2-inches by 1/4-inch minimum.
  - i. Horizontal Bus Arrangement: Extend main phase, neutral and ground buses with same capacity the entire length of the MCC, with provision for future extension at both A. Provide phase loss relay on all motor starters 10 HP and larger.
  - ii. Overcurrent Protective Devices: Provide types of devices with features, ratings, and circuit assignments indicated, as specified in Division 16 Section "Motor Controllers".
  - iii. Concrete pads shall be provided by the electrical contractor.
  - iv. Provide wiring and connections from metering to GVSU CEMS.

26 27 00 LOW-VOLTAGE DISRIBION EQUIPMENT

26 27 13 ELECTRICAL METERING

1 Designer to incorporate current GVSU metering specifications obtained from the Energy Department for this section. Review with Project Manager during Design Development.

26 27 26 WIRING DEVICES

1 Manufacturers: Subject to compliance with requirements, provide products by one of the following:
- A. Wiring Devices:
  - i. Arrow Hart Wiring Devices.
  - ii. GE Wiring Devices
  - iii. Hubbell Inc.
  - iv. Leviton Mfg. Co., Inc.
- B. Wiring Devices for Hazardous (Classified) Locations:
  - i. Crouse-Hinds Electrical Construction.
  - ii. Killark Electrical Mfg. Co.

2 Comply with NEMA Standard WD 1, "General Purpose Wiring Devices."

3 Enclosures: NEMA 1 equivalent, except as otherwise indicated.

4 Color: Receptacles connected to emergency power systems shall be red in color. Coordinate all other device colors with Project Manager.

5 Straight-Blade Receptacles: For general applications, use HBL 5352 duplex convenience receptacle. Heavy duty 125V, 20A. Comply with NEMA WD 1, NEMA WD 6 configuration 5-20R, UL 498 and FS W-C-596. Basis of Design Product: Subject to compliance with requirements, provide Hubbell Incorporated; Wiring Device-Kellems; HBL5361 (single), 5362 (duplex) or comparable product by one of the approved manufacturers listed in 26 27 26.1.

6 Residential, commercial, construction, trade, etc. grade receptacles are not acceptable.

7 Hospital Gradeand Construction Grade duplex convenience receptacles (125V, 20A) shall comply with NEMA WD 1, NEMA WD 6 configuration 5-20R, UL 498 supplement SD and FS W-C-596. Basis of Design Product: Subject to compliance with requirements, provide Hubbell Incorporated; wiring devices, Kellems; HBL8310 (single), 8300 (duplex) or a comparable product by one of the approved manufacturers listed in 26 27 26.1.

8 Receptacles, Straight-Blade, Special Features: Comply with the basic requirements specified above for straight-blade receptacles of the class and type indicted, and with the following additional requirements:

A. Ground-Fault Circuit Interrupter (GFCI) Receptacles: UL Standard 943, "Ground Fault Circuit Interrupters," feed-through type, with integral NEMA 5-20R duplex receptacle arranged to protect connected downstream receptacles on the same circuit. Design units for installation in a 2-3/4-inch (70-mm) deep outlet box without an adapter.

B. Isolated ground receptacles are not to be used without written consent of GVSU.

C. Receptacles in Hazardous (Classified) Locations: Comply with NEMA Standard FB 11 "Plugs, Receptacles, and Connectors of the Pin and Sleeve Type for Hazardous Locations" and UL

D. Standard 1010 "Receptacle-Plug Combinations for Use in Hazardous (Classified) Locations."

E. Toggle Switches: Quiet-type a.c. switches, NRTL listed and labeled as complying with UL Standard 20 "General Use Snap Switches".

F. Toggle Switches in Hazardous (Classified) Locations: Comply with UL Standard 894, "Switches for Use in Hazardous (Classified) Locations."

9 Key Switches: Hubbell with Hubbell Key #HBL1209 or Leviton with Leviton Key #1K1OE1.

10 Device Plates: Single and combination types that mate and match with corresponding wiring devices. Features include the following:

A. Material for Finished Spaces: 0.04-inch-thick, type 302, satin-finished stainless steel, except as otherwise indicated.

11 Wet Location Receptacle Covers: Receptacles located outdoors or those indicated as weatherproof shall be equipped with metal covers that maintain the NEMA 3R weatherproof integrity when attachment plug caps are inserted.

12 Floor Service Outlet Assemblies shall be as follows:

A. Types: Concealed service floor box, dual-service units suitable for the wiring method used.

B. Compartmentalization: Barrier separates power and signal compartments suitable for accommodating up to 4 standard wiring devices.

C. Housing Material: Stamped steel or P.V.C., suitable for concrete installation not on grade.

D. Power Receptacle(s): NEMA configuration 5-20R, except as otherwise indicated.

E. Signal Outlet: Blank cover with bushed cable opening, except as otherwise indicated.

F. Finish Trim and Door: Hinged nylon carpet/tile insert door-permitting passage of cords and cables while in the closed position. Trim color selected by Architect.

13 Multi-Outlet Assemblies shall be as follows:

A. Comply with Standard UL 5, "Surface Metal Raceways and Fittings."

B. Components of Assemblies: Products of a single manufacturer designed to be used together to provide a complete matching assembly of raceways and receptacles.

C. Raceway Material: Metal, with manufacturer's standard corrosion-resistant finish.

D. Wire: No. 12 AWG.

14 Install devices and assemblies plumb and secure with all four edges in continuous contact with the finished wall surfaces.

15 Arrangement of Devices: Except as otherwise indicated, mount flush, with long dimension vertical, and grounding terminal of receptacles on top. Group adjacent switches under single, multi-gang device plates.

16 Adjust locations of receptacles and telephone outlets to suit the indicated arrangement of partitions and furnishings.

17 Comply with Division 16, Section 05 53 " Identification for electrical systems."

26 28 00 LOW-VOLTAGE CIRCUIT PROTECTIVE DEVICES

26 28 11 DISCONNECTS

1 Subject to compliance with requirements, provide enclosed switches by one of the following:
- A. Fusible Switches:
  - i. Bussmann Div. Cooper Industries, Inc.
  - ii. Westinghouse/Cutler-Hammer Products; Eaton Corp.
  - iii. ABB
  - iv. I.T.E. Siemen
  - v. Square D Co.
  - vi. Allen Bradley Corp.

2 Enclosed Non-fusible Switch: NEMA KS 1, Type HD, with handle, lockable.

3 Enclosed Fusible Switch, 800 Amperes and Smaller: NEMA KS 1, Type HD, clips to accommodate specified fuses, handle lockable, and interlocked with cover in CLOSED position.

4 Enclosure: NEMA KS 1, Type 1, unless specified or required otherwise to meet environmental conditions of installed location.

5 Provide surface mounted (flush mounted in finished rooms) fuse switch units to be used for 125-volt circuits to small boilers, furnaces, and similar equipment. Locate box cover unit adjacent to equipment controlled unless shown otherwise on the plans. Provide box cover units manufactured by Bussmann, Series SSU/SSW/SSY/SCY.

26 28 13 FUSES

1 Manufacturers: Subject to compliance with requirements, provide fuses by one of the following:
- A. Bussmann Div., Cooper Industries, Inc.
- B. Gould Shawmut.
- C. Littelfuse, Inc.

2 Plug fuses shall be type UL 198F, Type S, dual element, time delay.

3 Use low peak fuses where possible.

4 Cartridge fuses shall comply with the following:
- A. NEMA FU 1 nonrenewable cartridge fuse, class as specified or indicated, current rating as indicated, voltage rating consistent with circuit voltage.
- B. Main Service: Class L fast acting.
- C. Main Feeders: Class J time delay.
- D. Motor Branch Circuits: Class RK1 time delay.
- E. Other Branch Circuits: Class RK5 non-time delay.

26 29 00 LOW-VOLTAGE CONTOLLERS

1 Manufacturers: Subject to compliance with requirements, provide products by the following:
- A. Allen-Bradley Co.
- B. Westinghouse/Cutler-Hammer, Eaton Corp.
- C. ABB
- D. I.T.E. Siemens
- E. Square D Co.

2 Manual motor controllers shall be quick-make, quick-break toggle action.

3 Manual controllers are to be used only for single-phase motors.

4 Magnetic motor controllers shall provide full-voltage, non-reversing, across the line, magnetic controller, except where another type is indicated:
- A. Control Circuit: 120 V. Provide control power transformer integral with controller where no other supply of 120 V control power to controller is indicated. Provide control power transformer with adequate capacity to operate connected pilot, indicating and control.
- B. Devices, plus 100 percent spare capacity. Provide primary and secondary fuse protection on transformer.
- C. Combination Controller: Switch type; fused or non-fused as indicated; quick-make, quick-break switch; factory assembled with controller and arranged to disconnect it. For fused switches, provide rejection-type fuse clips and fuses rated as indicated. Interlock switch with unit cover or door.
  - i. Where circuit breaker disconnects are indicated on drawings, units shall be NEMA AB1, motor-circuit protectors with field-adjustable short-circuit trip coordinated with motor locked-rotor amperes.

D. Provide phase loss relay on all motor starters to 10 HP and larger.
E. Pilot Lights: Push-to-test feature with long life LED bulbs.
F. Heavy Duty Hand-Off-Auto Switch: Door mounted.
G. Auxiliary contacts: Two sets.
H. Pushbutton Stations: Except as otherwise indicated, momentary-contact, start-stop units. Provide in covers of magnetic controllers for manually started motors where indicated, and connect start contact in parallel with sealing auxiliary contact for low-voltage protection.
I. Hand-Off-Automatic Selector Switches: Except as otherwise indicated, install in covers of manual and magnetic controllers of motors started and stopped by automatic controls or interlocks with other equipment. Make control connections so only the manual and automatic control devices that have no safety functions will be bypassed when the switch is in the hand position. Connect motor-control circuit in both hand and automatic positions for safety type control devices such as low- and high-pressure cutouts, high-temperature cutouts, and motor-overload protectors. Make control circuit connections to a hand-off-automatic switch or to more than one automatic control device in accordance with an indicated wiring diagram or one that is manufacturer approved.
J. Install wiring in enclosures neatly bundled, trained, and supported.
K. Provide a labeling system indicating all inter-locking control devices in each starter.
L. Schedule with Owner visual and mechanical inspections and electrical tests with at least one week's advance notification.
M. Refer to 23 05 14 for frequency drive specifications.

26 30 00 FACILITY ELECTRICAL POWER GENERATING AND STORING EQUIPMENT

26 36 00 TRANSFER SWITCHES

1 Review transfer switch requirements with Project Manager during design development.

26 33 00 BATTERY EQUIPMENT

26 33 53 STATIC UNINTERRUPTIBLE POWER SUPPLY

1 When required for I.T. equipment (typically for server farm rooms) a static uninterruptible power supply shall be provided and shall be Liebert-Emerson of proper size required to service the installed equipment.

26 40 00 SURGE PROTECTION EQUIPMENT

26 43 00 SURGE PROTECTION

26 43 05 SURGE PROTECTIVE DEVICES

1 Surge protection devices shall be supplied with service entrance equipment.

26 50 00 LIGHTING

26 51 00 INTERIOR LIGHTING

26 51 11 GENERAL

1 The Architect/Engineer shall be responsible for insuring that the location of interior light fixtures, especially those located in high ceiling spaces or stairwells and stair cases, are readily, safely and easily accessible without use of specialized equipment in order to change lamps or clean lenses in light fixtures. Floor surfaces below shall be level and horizontal to allow safe positioning of ladder to access light fixture.
2 If equipment, such as a Genie Lift, is required the floor structure at the point of location, and access to that point, shall be designed taking into consideration the added equipment weight. Access routes shall be designed with adequate width to accommodate such equipment, including turning radii and not impeding safe means of egress.
3 Review sequence of operation with Project Manager during design development.
4 Provide fusing for all fixtures.
5 Design non-emergency interior lighting to be automatically controlled to turn off during non-business hours. Require manual override capability for after-hours use.
6 The use of wireless lighting controls need to be reviewed and approved by GVSU before being allowed on a project.
7 In any space where a conduit run is made for the purpose of feeding light fixtures, the run shall be high enough to remove ceiling pads without obstruction. Fixture whips should come out of the top of the junction box rather than the side.

26 51 13 INTERIOR LIGHTING FIXTURES, LAMPS, AND BALLASTS

1 **GVSU APPROVED LAMP LIST ***
- A. All lighting shall be LED and DLC approved fixtures unless approved by GVSU
- B. LED color temperature shall be 4000K unless approved by GVSU.

2 Review all lamps with Project Manager during design development.

3 Lenses, Diffuses, Covers, and Globes: 100 percent virgin acrylic plastic or water white, annealed crystal glass except as indicated.
- A. Plastic: Highly resistance to yellowing and other changes due to aging, exposure to heat and UV radiation.
- B. Lens Thickness: 0.125 inches, minimum.
- C. Lens to be mechanically fastened to fixture.

4 TRACK LIGHTING SYSTEMS
- A. Conform to UL 1574, "Track Lighting Systems."

5 EXIT SIGNS
- A. LED type exit signs are to conform to UL 924, "Emergency Lighting and Power Equipment," and the following:
- B. Self-Powered Exit Signs (Battery Type): Integral automatic high/low trickle charger in a self-contained power pack.
- C. Battery: Sealed, maintenance-free, nickel cadmium type with special project warranty.
- D. Self-Powered Exit Signs (Luminous Source Type) Only where approved by Owner: Licensed for public use by the U.S. Nuclear Regulatory Commission. Signs have solid-state tritium gas energy source and provide legibility in total darkness at 100 feet after 10 years of service.

6 EMERGENCY LIGHTING UNITS & BALLAST
- A. Battery: Sealed, maintenance-free, lead-acid type with 10-year nominal life warranty.
- B. Lighting source shall be LED.
- C. Self-diagnostic emergency ballasts are not permitted.

7 EMERGENCY FLUORESCENT POWER SUPPLY
- A. Internal Type: Self-contained, modular, battery-inverter unit factory-mounted within the fixture body.
  - i. Test Switch and LED Indicator Light: Visible and accessible without opening fixture or entering ceiling space.
  - ii. Battery: Sealed, maintenance-free, nickel-cadmium type, with a minimum nominal 10-year life.
  - iii. Charger: Fully automatic, solid-state, constant-current type.
  - iv. Operation: Relay automatically turns 2 lamps on when supply circuit voltage drops to 80-percent of nominal or below. Relay disconnects lamp and battery automatically recharges when normal voltage is restored.

8 FINISH
- A. Fixtures are NOT to have tamper proof screws.
- B. Fixtures in areas subject to moisture and wash down should have an epoxy base paint.

9 LED drivers are to be easily accessible.

10 When installing new LED drivers or fixtures the contractor is to label the date of installation.

11 Fixtures are to be aligned and symmetrically installed.

12 Inspect each installed fixture for damage. Replace damaged fixtures and components.

13 Give advance notice of dates and times for field tests.

14 Provide instruments to make and record test results.

15 Tests: Verify normal operation of each fixture after fixtures have been installed and circuits have been energized with normal power source. Interrupt electrical energy to demonstrate proper operation of emergency lighting installation. Include the following in tests of emergency lighting equipment.
- A. Duration of supply.
- B. Low battery voltage shutdown.
- C. Normal transfer to battery source and retransfer to normal.
- D. Low supply voltage transfer.

16 Replace or repair malfunctioning fixtures and components, then retest. Repeat procedure until all units operate properly.

17 Clean fixtures upon completion of installation. Use methods and materials recommended by manufacturer.

18 Adjust aimable fixtures to provide required light intensities.

26 56 00 EXTERIOR LIGHTING

1 The Architect/Engineer and Contractor shall be responsible for insuring that lighting fixtures have the proper matched LED drivers and lamps as required by the manufacturer. Failure to comply will result in replacement of ballasts and lamps to conform to manufacturers requirements at the expense of the Architect/Engineer and/or Contractor.

2 Exterior lamps shall be LED. The basis for design for these fixtures shall be:
   A. Pole Light – Cooper, VTS Ventus
   B. Post Top – Lumecon, LDS ROF Ring of Fire.
   C. Wall Mount – Cooper, Cross tour
   D. Poles shall be Steel Square Straight poles with dark bronze finish, or match existing style and color if approved by GVSU.

3 Minimum average maintained luminance levels for parking lots shall be .5 foot-candles.[1]

4 Lighting at crosswalks shall be 1fc measured at opposite side of roadway from light pole.

5 Minimum average maintained luminance levels for roadways, excluding crosswalks, shall be 1 foot-candle.[1]

6 Minimum average maintained luminance levels for pedestrian sidewalks shall be .5 foot-candle measured at the walk surface.[1]

7 Special Warranty: Submit a written warranty signed by manufacturer and Installer agreeing to replace external parts of lighting fixtures exhibiting a failure of finish as specified below. This warranty is in addition to, and not a limitation of, other rights and remedies the Owner may have under the Contract Documents.
   A. Protection of Metal from Corrosion: Warranty against perforation or erosion of finish due to weathering.
   B. Color Retention: Warranty against fading, staining, and chalking due to effects of weather and solar radiation.
   C. Special Warranty Period: 5 years from date of Substantial Completion.

8 Sheet Metal Components: Corrosion-resistant aluminum, except as otherwise indicated. Form and support to prevent warping and sagging.

9 Housings: Rigidly formed, weather- and light-tight enclosures that will not warp, sag, or deform in use. Provide filter/breather for enclosed fixtures.

10 Doors, Frames, and Other Internal Access: Smooth operating, free from light leakage under operating conditions, and arranged to permit re-lamping without use of tools. Arrange doors, frames, lenses, diffusers, and other pieces to prevent accidental falling during re-lamping and when secured in operating position. Provide for door removal for cleaning or replacing lens. Arrange for door opening to disconnect ballast. LED driver assembly shall be modular style for quick removal and replacement.

11 Exposed Hardware Material: Stainless steel.

12 Exterior lighting is to be controlled by one of the following methods, to be agreed upon by GVSU Energy Engineer, GVSU Lighting Electrician and GVSU Project Manager. Each project will be evaluated on its own merit.
   A. GVSU EMS
   B. GVSU campus lighting control system
   C. Photo eye (Tyco model #SST-PV-IES)

13 Ground fixtures and metal poles according to Division 16 Section "Grounding."
   A. Poles: Install 8-foot (3-m) driven ground rod at each pole.
   B. Nonmetallic Poles: Ground metallic components of lighting unit and foundations. Connect fixtures to grounding system with No. 6 AWG conductor.

14 Electrical components under floating floors shall be mounted as high as practical off floor.

15 IESNA guidelines shall be used as a guide for lighting levels.

16 Designer shall take nearby existing fixtures into account when selecting new light fixtures. Review with Project Manager during Design Development.

[1] Based upon American National Standard Practice for Roadway Lighting.

Refer to division 00 03 27 for locations of electrical and data devices in offices and conference rooms.

END OF SECTION

DIVISION 27 – COMMUNICATIONS

2700 00 COMMUNICATIONS

27 05 00 COMMON WORK RESULTS FOR COMMUNICATIONS

Phone, data, CATV and classroom audiovisual systems: The OWNER will provide all cabling, components, termination and cable support hooks above drop ceiling as required.

27 05 01 GENERAL REQUIREMENTS

1 Typical IT Equipment Room Requirements:

A. Minimum room size shall be 8 ft. x 12 ft.
B. Finished floors and walls, exposed ceiling.
C. Provide minimum of one (1)-4'x8'x3/4" painted plywood panels, secured to finish walls, for component mounting.
D. Install minimum of 4 duplex receptacles. Locations and mounting heights within room to be coordinated with representative from University's IT department. Each receptacle to be TVSS, on own 20 amp dedicated circuit from a generator panel when one is available and if not available run from nearest building panelboard.
E. All IT equipment rooms to be air-conditioned 24x7. Confirm equipment heat loads with representative from University's IT department. At no time shall the maximum ambient air temperature, within the IT equipment room, exceed 78 degree F.
F. Provide minimum of (3) 4-inch diameter conduit stubs into room for each floor served, from nearest primary cable raceway. Stub minimum of 6 inches above finished floor or below finished ceiling.
   i. Provide a minimum of (1) 4" conduit to each equipment room from main room "MDF TO IDF". (Provide 4 innerducts w/pull tape in each conduit (2) 1.25" and (2) 1".)
G. Provide minimum light level of 50 f.c. at 4 feet above finished floor. Lighting layouts shall consider equipment layouts so as to avoid shadows.
H. Provide smoke detector, NOT heat detector.
I. Room sizes and quantities will vary by project. Coordinate room locations, layout and exact requirements with GVSU IT representative.

27 05 26 GROUNDING AND BONDING

1 Provide #4 Copper Ground with 10 hole busbar mounted to plywood panel within each IT equipment room.
2 Bond all conduits leaving IT equipment rooms.

27 05 33 CONDUITS AND BOXES

1 Standard Telcom/Data Drop Locations **(All Non-Residential Buildings);** Other than for exceptions noted below, all locations shall consist of a 4-inch sq., metal box with single gang plaster ring, 1-inch EMT stubbed up wall and to an accessible ceiling space. Where no accessible ceiling is available access panels (See Section 08 31 13 for other requirements) shall be provided for access to conduit stub and wire pulls to IT equipment room. When penetrating corridor walls a 1-1/4-inch EMT sleeve shall be provided to corridor. Conduit and penetration shall be sealed as required to maintain wall fire rating, if any such rating is required.

A. EXCEPTION #1: Systems Furniture Areas and Computer Labs: 4-inch sq. metal box with double gang plaster ring, 1-1/4-inch EMT stubbed up wall and to an accessible to ceiling. Where no accessible ceiling is available access panels (See Section 08 31 13 for other requirements) shall be provided for access to conduit stub and wire pulls to IT equipment room. When penetrating corridor walls a 2-inch EMT sleeve shall be provided to corridor. Conduit and penetration shall be sealed as required to maintain wall fire rating, if any such rating is required.
B. EXCEPTION #2: Science Labs: Where surface raceways are provided use standard #106 or Decora style single gang opening. Other in-wall drops to be standard as described above.4-inch sq. metal box with double gang plaster ring, 1- 1/4-inch EMT stub accessible to ceiling. Where no accessible ceiling is available access panels (See Section 08 31 13 for other requirements) shall be provided for access to conduit stub and wire pulls to IT equipment room. When penetrating corridor walls a 2-inch EMT sleeve shall be provided to corridor. Conduit and penetration shall be sealed as required to maintain wall fire rating, if any such rating is required.

2 Standard Telcom/Data/CATV Drop Locations; **All Residential (Student Housing) Buildings**: Shall consist of a 4-inch sq., metal box with single gang plaster ring, 3/4 -inch ent "smurf" tubing stubbed up wall and to an accessible corridor ceiling. Where no accessible ceiling is available access panels (See Section 08 31 13 for other requirements) shall be provided for access to conduit stub and wire pulls to IT equipment room. Conduit and penetration shall be sealed as required to maintain wall fire rating, if any such rating is required.

3 Floorboxes:
- A. CaseRooms: Steel City 665-CI w/665 CST SW BRS Cover. 2-GP GFI Brackets and 2-4MAAP Brackets. (or Wiremold RFB4 equiv.)
- B. Conf. Rooms (New Construction): Steel City 665-CI w/665 CST SW BRS Cover. 2-GP GFI Brackets and 1-4MAAP Brackets. (or Wiremold RFB4 equiv.)
- C. Conf. Room Poke-Thrus (Renovations): Wiremold 6AT w/Bronze cover. 1-68REC Duplex, 1-682A, 1-6MAAP, 1- 575CHA, 1-152CHA.

4 Standard Classroom/Case Room: See Appendix C, Standard Detail 27.001, 27.002, 27.003, 27.004, 27.005, 27.006 and 27.007.

5 Flat Panel Display: See Appendix C, Standard Detail 27.006a,b,c

6 Flip Down AV Box: See Appendix C, Standard Detail 27.005

7 Building Equipment Panel Drop Locations*:* See Appendix C, Standard Detail 27.007

8 Provide plastic bushings on all exposed conduit stub ends.

27 05 36 CABLE TRAYS

1 Provide a minimum 12" Cable Tray thru corridors for cable routing. Basket style preferred. (Do not pass cable tray thru walls, provide minimum 2-4" sleeves thru wall.)

2 Supply conduit across inaccessible ceilings in lieu of cable tray.

27 05 37 FIRESTOPPING

1 Where required the Communications Contractor shall provide U.L. listed firestopping assembly for all openings and sleeves through floors and firewalls. The following product, or equal as approved by the University, shall be used on all projects:
- A. STI SpecSeal SSP100 Putty or Hilti equivalent.
- B. STI SpecSeal SSB Pillows or Hilti equivalent.
- C. STI SpecSeal FP Plugs or Hilti equivalent.

27 05 43 UNDERGROUND DUCTS AND RACEWAYS

1 Wherever possible, underground communications cabling is to be installed in concrete encased duct banks. Communications shall be separated from electrical power.

2 All communications cabling shall be kept in trays and /or conduits separate from primary or secondary power cabling. This includes any new communications cabling installed in the existing utility tunnels.

3 New cabling in tunnels shall be kept in separate trays or conduits and not laid together in trays containing primary or secondary power.

4 Provide a minimum of 2-4" conduits from tunnel tray or existing duct bank into each new building. Provide 4 innerducts w/pull tape in each conduit 2-1.25" and 2-1".

27 20 00 DATA COMMUNICATIONS

27 21 33 DATA COMMUNICATIONS WIRELESS ACCESS POINTS

1 Wireless access point locations:
- A. Provide 4" octagon box flush in ceiling at specified locations.
- B. Center in ceiling tile or align with other devices in hard lid.
- C. Provide 1" conduit from box to accessible ceiling where necessary.

27 53 00 DISTRIBUTED SYSTEMS

27 53 13 CLOCK SYSTEMS

1 This Section includes a master clock and program system with master control unit and analog
2 An integrated, microprocessor-based system for originating and distributing time and time correction signals and for programming. Components display time at various locations. The system transmits time and program signals from a master control unit to indicating clocks, signal equipment, and remote switching devices over clock and program system wiring.
3 Wiring diagrams detailing wiring for power, signal, and control. Differentiate manufacturer-installed and field-installed wiring. Identify terminals and wiring color codes to facilitate installation, operation, and maintenance. Indicate recommended types and sizes for field-installed system wiring and show how wiring is protected from overcurrent.
4 Clocks must be compatible with existing Simplex master Clock system signals. Acceptable equipment is:
   A. Simplex Model 6310-9221
   B. Simplex Model 6410-9231
   C. PoE Digital or Analog clocks are permitted when approved by GVSU). Equipment to be approved by GV Project Manager.
5 Description: Unit serves as source of power for system clocks and provides time-correction signals to them. Unit controls programmable output circuits, both manually and automatically.
6 Time Reference Unit: Conforms to UL 863 "Electric Time Indicating and Recording Devices". Uses a quartz crystal oscillator time base to regulate system-timing functions to within a maximum deviation of plus or minus 2 seconds per month. Operates on internal, automatic recharging battery power for a minimum of 7 days when normal power is disconnected. Automatically resets system and corrects clocks upon resumption of power.
7 Microprocessor: An integral self-diagnostic program automatically checks the functioning of LEDs, switches, input keys, central processor, read-only memory (ROM), and random access memory (RAM) output circuits. A control panel display indicates failure by identifying the faulty device or circuit.
8 Lockout Codes: A minimum of 2 levels of access are available to restrict use of system operating and programming controls to authorized personnel:
   A. Level 1: Access to all user programming and control functions.
   B. Level 2: Access to review existing programs only.
9 Clock Control Function: Unit supervises and corrects individual system clocks automatically.
   A. Daylight Savings Time Correction: Programmable for automatic correction.
   B. Daylight Savings Time Correction: Programmable for automatic correction or accomplished by manual controls on front of pane.
   C. Analog Synchronous Clocks: Correct for minute and second hand synchronization at least once each hour and for hour hand synchronization at least once daily.
10 Program Control Function: Programmable to automatically activate indicated signal or relay output circuits and signal devices selectively to produce programmed signals or initiate relay operation at any minute of any day of any 365-day cycle.
11 Housing: Steel cabinet with locking front panel. When cabinet is locked, time indication is visible at front panel face. Arrange cabinet for mounting as indicate.
12 Housing: Rack mounting enclosure with time indication visible at front panel face.
   A. Clocks characteristics are:
   B. Style: 12-inch round; +/- ½-inch
   C. Back Ring: Black matte finish
   D. Bezel: Glass: Clear Acrylic
   E. White background with Roman Numeric numbers (1-12) and black hour, minute and second hands
   F. 12 hour dial
13 Connection Provisions: Plug connector.
14 Clocks are to have 2310-4003 Dials and 2310-3003 Hands, or equal style.
15 Analog synchronous clocks shall be driven by self-starting, permanently lubricated, sealed synchronous motors, and equipped with sweep second hands and correcting solenoid actuators.
16 Wire is to be stranded. Size conductors as indicated but not less than recommended by system manufacturer for runs indicated. Comply with Division 16 Sections "Raceways" and "Wires and Cables".
17 Cable for Low-Voltage Control and Signal Circuits: Twisted-pair cable, unshielded except where manufacturer recommends shielded cable.

18 Plenum Cable: Indicated and installed without raceway in plenums and plenum ceilings, cable is UL listed and labeled as suitable for use in air-handling spaces.
19 Wiring Method: Install wiring in a complete raceway system.
20 Wiring Method: Install 120 V system wiring in raceway. Install low-voltage system wiring in cable tray where practical. Use listed plenum cable for low-voltage wiring in environmental air spaces, including plenum ceilings.
21 Wiring Method: Use metal-clad cable for 120 V system wiring and jacketed cable for low-voltage system wiring.
22 Wiring within Enclosures: Bundle, lace, and train the conductors to terminal points with no excess. Provide and use lacing bars and distribution spools.
23 Splices, Taps, and Terminations: Make splices, taps, and terminations on numbered terminal strips in junction, pull and outlet boxes, terminal cabinets, and equipment enclosures.
24 Tighten connections to comply with tightening torques specified in UL 486A.
25 Identification of Conductors and Cables: Color-code conductors and apply wire and cable marking tape to designate wires and cables so they are uniformly identified and coordinated with system wiring
26 Ground clocks, programming equipment, and conductor and cable shields to eliminate shock hazard and to minimize ground loops, common mode returns, noise pickup, cross talk, and other impairments.
27 Manufacturer's Field Service: Provide services of a factory-authorized service representative to supervise the field assembly and connection of components and system pre-testing, testing, adjustment, and programming.
28 Train Owner's operating personnel in the programming and operation of the system. Train Owner's maintenance personnel in the procedures and schedules involved in programming, operating, troubleshooting, servicing, and providing preventive maintenance for the system. Provide a minimum of 4 hours of instruction.
29 Schedule training with at least 7 days' advance notice.
30 Occupancy Adjustments: When requested within 1 year of date of substantial completion, provide on-site assistance in adjusting and reprogramming to suit actual occupied conditions. Provide up to 2 visits to the site for this purpose without additional cost.

END OF SECTION

DIVISION 28 – ELECTRONIC SAFETY AND SECURITY

28 10 00 ELECTRONIC ACCESS CONTROL AND INTRUSION DETECTION

28 13 00 ACCESS CONTROL

27 13 19 ACCESS CONTROL SYSTEMS INFRASTRUCTURE

1 University standard for:
- A. Allendale campus is an on-line, hardwired card access Security Management System-Access Control system.
- B. Off-line, stand alone (battery powered) Security Management System units are only permitted where approved by the university and shall be magnetic stripe reader and dual validation reader (both magnetic stripe and keypad). Typical in student access locations.

2 The architect shall consult with Allegion, PLC to develop the hardware and access control schedule. Once developed, the hardware schedule shall be submitted to the GVSU Project Manager for review with the lock shop before inclusion into the project specifications. Subcontractor submittals shall also be reviewed by GVSU before final approval.

Allegion, PLC
505 Cherry St. SE #301
Grand Rapids, MI 49503
Contact: Tim Kaye timothy.kaye@allegion.com M: (734) 904-5921

3 Card Access for University buildings shall be as follows:
- A. Multi-Class Prox reader with pin pad shall be:
  - i. multiCLASS SE RPK40 wall switch keypad reader, Part # 921LTNNEK0007T
- B. Prox only reader shall be:
  - i. multiCLASS SE RP40 Wall switch reader, Part # 920LTNNEK0004T
- C. Installations shall be in conformance with NFPA 70 and NFPA 731.
  - i. All card readers and ADA push buttons shall be mounted at a height of 36” above finished floor.
- D. For all non-residential buildings, each exterior entrance door shall be provided with a hardwired (on-line) multi-class prox reader with pin. Where paired exterior doors are used, both leafs shall be electrified. Panic hardware shall have the capability to be dogged down.
- E. For spaces within non-residential buildings that require special security, such as computer labs, science labs, Information & Technolgy equipment and control rooms and server farms, access shall be provided with a hardwired (on-line) multi-class prox reader with pin.
- F. For residential (student houing) buildings electronic access shall be as follows:
  - i. Main entry doors into housing and doors to outdoor public patios shall be provided with a hardwired (on-line) multi-class prox reader with pin.
  - ii. Where paired exterior doors are used both leafs shall be electrified. Panic hardware does not dog down.
  - iii. Doors into student dorm rooms and/or apartments shall be furnished with a stand alone (off-line) battery operated card access unit. Unit shall be AD250 Campus Lock, Model No. AD250- MD-70-MGK -SPA-626 -BD-RH-8B-09-664-10-072-13/4 with magnetic stripe and push button key pad. Keyed emergency override cylinder shall be BEST 1E74 CC. Core is furnished and installed by the University.
    - a. The contractor shall include in their bid, the one-time licensing cost for EACH AD250 lock.
  - iv. In additon to the hardware configuration described in #3 above, every Type A accessible apartment entry door hall be provided with rough-in for future multi-class card access and LCN Senior Swing power opener. Rough-in shall include, at a minimum, all necessary conduits, boxes and door frame preparation for electric strike with EPT hinge.
  - v. Local audible door prop alarms shall be provided at all exterior doors. Prop alarm shall sound local audible alarm AND send alarm signal to main card security management.
- D. Tracks on cards with magentic stripe shall be programmed as follows:
  - i. Track 1: Offline Locks
  - ii. Track 2: Online locks
  - iii. Track 3: Reserved for existing BEST electronic locks used on campus.
- E. All components of the electronic card access system shall be on buildings emergency generator. This includes panels and door strikes.

4 Card access at doors equipped for handicap access: Card swipe will release latch and door(s) open. There should be no need to depress auto door ADA button. ADA buttons are to still be provided however. Card readers and ADA buttons are to be adjacent to one another. Cards used for this purpose shall be programmed with "Special Privileges" allowing only the disabled user to activate this operational sequence.

5 All card access points are to have a keyed emergency override.

6 Any 'powered' building entrance with double doors shall have both doors be made electronic. This is to allow for emergency lockdown of both doors possible.

7 Card access, when used in elevators:

A. must be cooridnated with Elevator supplier to insure complete proper operational installation when complete.

B. Must have restrcition for access to basement level.

C. Each elevator shall include a keyed switch to allow the use of a GVSU brass key. Keyed switch is to be prepped to receive Univsersity's BEST core system. Core is supplied by University.

8 Processes and Procedures,

A. The follwing are to be clearly described in the Professional's Project Specifications and Construction Managers Bid Division Descriptions:

i. The General Trades Contractor shall furnish and install stand alone (off-line) locks with all related hardware. Installation shall be done by a one of the following Grand Valley approved installer.

a) Automatic Equipment Sales & Service Inc.; 5110 West River Dr NE, Comstock Park, MI 49321.
b) D/A Central; 2215 29th St SE # C1 Grand Rapids, MI 49508
c) Electronic Security Systems; 3040 Charlevoix Dr Grand Rapids, MI 49546-7000

ii. The General Trades Contractor shall provide dust protection of card swipe slot or opening and keypad. Protection shall be provided immediatley after the locks are installed and remain until contstruction is substainally complete and dust and/or painting painting generating operations are completed. Blue painters tape shall be the material used for dust protection.

iii. The General Trades Contractor shall attend weekly Commissioning meetings.

iv. Installation of off-line locks shall be performed in accordance with the following steps:

a) Lock is shipped and installed with internal wire connection unplugged. Batteries are included but are not installed at intial off-line lock installation.
b) Once lock is installed place black plastic plug key in cylinder. Turning plug key and lever handle will allow access into space.
c) Protect swipe slot and keypad. See #2 above.
d) When ready to secure room, either with construction core or University permanent core, activate lock operation by the following:
1) Take cover off lock, install batteries, that are furnisghed with lock, and plug in wire connector. Replace cover.
2) Take protective tape off swipe slot and key pad.
3) Remove black plug key.
4) Install construction or permanent cores.
5) Provide PDA upload immediately following lock activation sequence. Programming is to allow for temporary contractor cards that are time limited. Coordinate time requiements with GVSU Project Manager.

v. The Access Control Contractor (ACC) shall furnish and install hardware, software and programming for the hardwired (on-line) card access system and furnish and install software and programming for the off-line system. This effort shall include, but is not necessarily limited to, the following:

a) Programming of on-line system credentials and pre-programming of off-line system credentials into the SMS system. The Univeristy will provide a "Access Rights Spreadsheet" for the ACC to use for programming. This includes programming in staff who have existing cards and will requires access to the new building(s).
b) Entering card holders,
c) Assigning ID and access credentials,
d) Assigning area access,
e) Badging of cards,
f) Production of encoded cards, preprinted with card number and GVSU logo for all offline and online locks per the quantities listed on ther University furnished Access Rights Spreadsheet, in regard to color number, coordinate with GVSU before assignment and badging.
g) Reprogramming corrections as a result of intital input errors.

h) Programming shall identify door number and lcoation descritpion; eg Door # 104; Student Apartment, First Floor, East Wing.
i) Enable "Low Power Wake-Up Box" for cards programmed for track 1 and track 2.
j) Provide PDA uploads to all off-line locks.
k) Attend weekly commissioning meetings.
l) Conform and adhere to requirements for the pre-functional and functional commissioning plans.
m) Provide a final test and inspection of all off-line locks and on-line electronic access control system. Upon successful completion if test and inspection (all elements must pass) submit completed Access Control Inspection & Testing Report (See Appendix J, to be included in Project Specifications) to University's commissioning agent, University's Project Manger and Construction Manager.
n) Testing of ALL programmed cards for properfunctionality.
o) Upon successful completion of all required testing provide the University with database (hard copy and electronically) and programmed cards.
p) Provide spare cards. Spare cards provided for the off-line system are to be pre-programmed for "All-Pass". Refer to Section 01 78 46for quantities.
q) Provide attic stock for multi-class on-line locks and related components. See Section 01 78 46.
r) Provide own computer, printer and card printer for programming and card production. Use of University computers and equipment will not bepermitted.
s) Provide Owner training.
t) If programming is completed with a newer software version that that of the University's, provide one copy of system software.
u) Provide all Owner manuals, including but not limited to, instructional manuals, maintenance instructions, component parts list and/or isometric or schematic diagrams, as-bulit drawings and warranties as part of project close-out requirements.

vi. The General Trades Contractor shall provide attic stock for the off-line locks and related componenets. See Section 01 78 46.

vii. The General Contractor shall provide, as relates to the off-line lcoks, all Owner manuals, including but not limited to, instructional manuals, maintenance instructions, componentparts list and/or isometric or schematic diagrams, as-bulit drawings and warranties as part of project close-out requirements.

28 30 00 ELECTRONIC DETECTION AND ALARM

28 31 00 FIRE DETECTION AND ALARM

1 Acceptable systems are JCI and Siemens.
2 Fire alarm systems for individual buildings are to be stand alone with separate and direct connection back to the University's Central Utilities Building (C.U.B.).
3 Review/provide for pull station protection in areas where pull stations can be tampered with. (Provide break glass or "push/pull" type devices," in locations so identified).
4 All fire alarm components shall be tested in presence of GVSU representative.
5 New fire alarm systems for the Allendale Campus shall be fully addressable at Central Utilities Building (CUB). The system shall permit the alarm to report inside the attendant booth at CUB and shall allow the alarm to be acknowledged and silenced from the computer PC located within the booth, and have a printer for producing a hard copy. The system shall also permit resetting from inside the booth.
6 New fire alarm systems for the Pew Campus shall be fully addressable at Pew Campus Security located in the Eberhard Center.
7 Fire Protection: Surge protection is to be provided at all control panels. This protection shall protect primary power, secondary power and communication lines.
8 Consultant is required to coordinate design of fire alarm system with University, the University's Office of Public Safety. Coordination shall include, but is not necessarily limited to, location of manual fire pulls and alarm panels.
A. In renovations and/or additions, fire alarm panel information must be updated to reflect any changes in room numbers or identifications as part of the project.
9 Manual fire pull stations shall be positioned in conformance with ADA and clear of any other building obstructions, such as chair rails, electrical devices or louvers, so as to allow full and proper operation of the pull.
10 Exterior cover assembly must be installed and keyed to JCI "B" key, regardless if system installed is a JCI system or not.
11 Horn and strobe devices shall be white. Pull stations shall be red.

12 Point descriptors of address points shall be reviewed and approved by GVSU Facilities Services staff prior to programming. Project to include smoke detector programming. Submittals for GVSU review shall be made no less than 90 days prior to the projects scheduled date of Substantial Completion.

13 Combination intelligent smoke/fire detectors shall have a fixed temperature point for the fire detection component. Rate of rise is NOT to be used.

14 Provide copy of smoke detector program.

15 Trouble Sequence of Operation shall be as follows:

A. Visual and audible trouble alarm indicated by device at the alarm control panel.

B. Visual only trouble alarm indicated at remote annunciator panels located in building entrance lobbies or other public spaces.

C. The system shall automatically display the highest priority event on the LCD display. The priorities shall be alarm, supervisory, trouble and monitor. The user shall be able to review each event by simply scrolling through each event using scroll keys.

D. Trouble signal transmitted to GVSU central campus monitoring.

E. Manual acknowledge function, at fire alarm control panel silences audible trouble alarm; visual alarm is displayed until initiating failure or circuit trouble is cleared. Event shall be logged into the system database with the time of the event and up to a 40-character custom user description.

16 LEVEL 1 Alarm Sequence of Operation: Actuation of any initiating device (ie. smoke detector, heat detector, manual pull, flow switch), in other than individual living unit, places circuit in alarm mode, which causes the following system operations:

A. Sound and display local fire alarm signaling devices with signal.

B. Transmit non-coded Level 1 signal to GVSU central campus monitoring.

C. Indicate location of alarm device on the fire alarm panel and on remote annunciator panel.

D. Transmit signal to building mechanical systems to initiate shutdown of fans and damper operation.

E. Transmit signal to release door hold-open devices, if provided, by zone.

17 LEVEL 2 Alarm Sequence of Operation: Actuation of a smoke device, in an individual living unit, places circuit in alarm mode, which causes the following system operations:

A. Sound and display local fire alarm signaling devices within individual living unit.

B. Transmit non-coded Level 2 signal to GVSU central campus monitoring.

C. Indicate location of alarm device on the fire alarm panel and on remote annunciator panel.

D. Actuation of heat initiating device in an individual living unit places circuit in Level 1 alarm mode, as described above.

18 Do not use conduit in attic space for smoke detector cabling if not required by code. Condensation collects inside conduit and drains down to detector causing troubles and failures. Instead, just use cable. If conduit must be used, installer to seal up end of conduit (above device box) with spray foam to prevent warm air from entering conduit.

19 In remodels, renovations and additions where devices are active, contractor must locate and safely cover devices while working in the areas. Once work is complete, contractor is responsible for removal of protective covers.

20 Contractor to provide an Alarm Report to report any fire alarms set during any construction project.

21 Fire alarm contractor shall post an 11”x17” diagram of the system in the fire control room in any new installation or existing modification.

END OF SECTION

DIVISION 31 – EARTHWORK

31 10 00 SITE CLEARING

31 11 00 CLEARING AND GRUBBING

1 Trees or shrubs shall not be removed without the approval of the owner.
2 Removal of trees and shrubs shall include the removal of stumps and roots to the extent that no root greater than one inch in diameter remains within five feet of an underground structure, utility line, under footings, or paved areas.
3 Grubbing in open areas shall include the removal of stumps and one inch roots to two feet below finish grade elevations.
4 Where new structures replace existing structures, the extent of foundation removal will be indicated on the drawings.
5 Foundations of structures, conduits, etc., shall be removed in their entirety.
6 Hazardous material removal shall be conducted prior to structural removal, as spelled out in federal, state, and local requirements.
7 All abandoned utilities within the construction boundary shall be removed from the site.
8 Disposal of existing buildings and structures, trees, dismantled equipment, etc., is the responsibility of the Contractor, with approval by the GVSU Project Manager.

31 14 00 EARTH STRIPPING AND STOCKPILLING

31 14 13 SOIL STRIPPING AND STOCKPILLING

1 Excess excavated soil materials shall be removed from the construction site and campus property.

31 22 00 GRADING

31 22 13 ROUGH GRADING

1 Construction Manager (CM) shall have the rough grade inspected for accuracy prior to final grade.
2 Grading of landscaped areas must be consistent with natural contours wherever practical.
3 Grading of all open space areas near buildings must occur so as to channel storm water flows away from the structure gradually.
4 Grading must be minimized in areas where indigenous or otherwise established vegetation is to be maintained.

31 23 00 EXCAVATION AND FILL

31 23 16 EXCAVATION

1 Clean topsoil and other clean excavated soils shall not be removed from the campus and shall be stored at a site designated by the GVSU Project Manager.
2 All testing and transportation of excavated material is the responsibility of the Contractor. All soil and appropriate testing shall be approved by the owner prior to transportation.
3 Soil that is compromised with debris, organic and inorganic, as determined by testing, shall be removed from the campus.
4 Care shall be taken to prevent soil erosion, in accordance with DEQ, storm water site management sheet and any required LEED certification.
5 If soil is needed on a project, the Contractor shall first request the use of GVSU stockpile soil through the GVSU Project Manager. If soil is unavailable from GVSU, the Contractor shall be responsible for obtaining soil from other sources.
6 The Contractor is responsible for ensuring the suitability of any soil used on the project.
7 All soils will be tested to determine the suitability of the existing soils for the proposed planting. The result of the soil test must be provided to the GVSU Project Manager.
8 When necessary to hold large piles of excavated earth on the job site, the Contractor shall be required to provide cover or adequate means of watering the soil to prevent wind erosion

31 23 23 FILL

1 Fill under interior and exterior slabs-on-grade or pavement and placed under landscaped areas shall meet current ANSI/ASTM standards.
2 Backfilling required at the building perimeter and at site structures up to subgrade elevation shall meet current ANSI/ASTM standards.

31 25 00 EROSION AND SEDIMENTATION CONTROLS

31 25 13 CONTROLS

1 Grand Valley State University is designated, by the State of Michigan Department of Environmental Quality, as an Authorized Public Agency (APA). Soil erosion and sedimentation control plan submittals are to be made to the University and not to local County/City authority. Soil erosion and sedimentation controls shall be provided in conformance with Part 91 of 1994 PA 451. The Architect/Engineer shall include in the project specifications the Checklist for Contractor's Soil Erosion and Sedimentation Control Plan included in Appendix K of this Standard. The full Design & Specification Manual can be found at:
https://www.gvsu.edu/cms4/asset/83D77566-0FCE-1482-0E85CB93ACE30B91/gvsu_sesc_2018_1217_stormwater_standards.pdf

END OF SECTION

DIVISION 32 – EXTERIOR IMPROVEMENTS

32 05 00 COMMON WORK RESULTS FOR EXTERIOR IMPROVEMENTS

1 Contractor shall be responsible for all layout and grade staking.
2 Provide dumpster enclosure in accordance with Standard Detail 32.013 in Appendix C.
3 Exposed aggregate concrete is not permitted.

32 10 00 BASES, BALLASTS AND PAVING

32 11 00 BASE COURSES

32 11 13 SUBGRADE MODIFICATIONS

1 Drives and Parking: As a minimum, all drives, parking, and walks, which can be used by trucks, must be constructed with the clay sub base sloped to a perforated doubled wall ADS N-12, or equal, under drain system. In parking areas, the drains are to be 30 to 35 ft. on center maximum, or installed per the design drawings. On drives, the drain is to be on one side, at a minimum.

32 11 16 SUBBASE COURSES

1 Sub-base material: Minimum of 12 inches, or per design drawings whichever is greater, MDOT 902.08 Granular Material Class II.

32 11 23 AGGREGATE BASE COURSES

1 Aggregate base course for standard paving: Minimum eight inches (8") MDOT 902 open-graded aggregate base MDOT 21AA Modified.) Shall comply with production gradation limits shown in Table 1 below:

TABLE 1 – STANDARD PAVING

Sieve	Gradation Limits, Percent passing
1½ inch	100
¾ inch	60 - 80
½ inch	35 - 65
#8	10 - 24
Loss by wash	6.0 max.

Crushed material: 95% minimum
Loss: Los Angeles Abrasion (MTM 102): 50% maximum
**** No porous paving is allowed.**

32 12 00 FLEXIBLE PAVING

32 12 01 QUALITY CONTROL AND ASSURANCE

1 The following sampling and testing procedures are to be followed in completing the work. All equipment requirements to perform these sampling and testing procedures shall apply.
- A. ASTM D 1559-89 Test Method for Resistance to Plastic Flow of Bituminous Mixtures Using Marshall Apparatus (Section 4.5).
- B. ASTM D 2172 Test Methods for Quantitative Extraction of Bitumen from Bituminous Paving Mixtures.
- C. ASTM D 2041 Test Method for Theoretical Maximum Specific Gravity and Density of Bituminous Paving Mixtures.
- D. ASTM D 2726 Test Method for Bulk Specific Gravity and Density of Compacted Bituminous Mixtures Using Saturated Surface-Dry Specimens.
- E. ASTM C 136 Test Method for Sieve Analysis of Fine and Coarse Aggregates.
- F. ASTM C 117 Test Method for Materials Finer Than 75-µm (no. 200) Sieve in Mineral Aggregates by Washing.
- G. ASTM E 29 Practice for Using Significant Digits in Test Data to Determine Conformance with Specifications.
- H. MTM (Michigan Test Method) 311 Determining Aggregate Gradation for Bituminous Mixture.
- I. MTM 117 Determining Percentage of Crushed Particles in Aggregates.
- J. MTM 118 Measuring Fine Aggregate Angularity.

K. MTM 110 Determining Deleterious and Objectionable Particles in Aggregates.
L. MTM 319 Determination of Asphalt Content from Asphalt Paving Mixtures by the Ignition Method.
M. MTM 313 Sampling Bituminous Mixtures.

32 12 01.13 QUALITY CONTROL (CONTACTOR)

1 Bituminous Mixture: The contractor will take random samples of loose mixture at least every 400 tons of mixture, or a sampling frequency agreed upon with the engineer. The engineer will be provided a split sample of all QC samples taken by the contractor. This sample may be taken anywhere in the production process, except behind the paver. The contractor will be responsible for establishing process quality control targets for air voids, asphalt binder content, aggregate gradation, Gmm, obtaining QC samples, and conducting QC testing in accordance with the contractor's quality control plan (QCP).
2 Each QC sample shall be identified to allow all test reports to be linked to a specific lot or sublot within the project.
3 The contractor shall maintain daily control charts and have available for review at the plant at all times. Copies of control charts shall be provided to engineer if requested. All test results shall be plotted and used in quality control decisions. When corrective action is necessary, the contractor shall notify the engineer in writing of the specific action taken, if it requires a JMF adjustment.
4 In-place Density: The contractor shall have a density gage available for quality control testing during compaction process. The contractor shall have the capability to take 6" cores from random locations throughout the paved area for acceptance testing. The contractor may take up to three informational cores from each mixture type, to help correlate the density gage. Minimum in-place density shall average 95 percent of theoretical maximum density, Gmm.

32 12 01.16 QUALITY ASSURANCE (ENGINEER)

1 Bituminous Mixture: The engineer may collect bituminous mixture (loose) quality assurance samples and provide the contractor with splits of these samples. If the criteria for the verification procedure is satisfied, the contractor's test results may be incorporated into the acceptance and payment decisions for the mixture. During the course of production, the engineer may acquire random samples at any point in the production process. These samples may be tested to determine if the mixture, the aggregate and the binder meet all of the specification requirements contained in the contract document. As the samples are collected, the engineer may assign an alphanumeric identifier to the sample and split, which can be used to trace the test results to the lot and sublot. This alphanumeric identifier may be included on all engineer test reports associated with that sample. An example is 4-2-A, which might designate the engineer's split (A) of the sample from sublot 2 of lot 4 on a project.
2 A minimum 16,000-gram sample may be taken. The sample will be divided equally for contractor and engineer testing. The following tests may be conducted by the engineer on the QA sample splits.
A. Maximum Specific Gravity, Gmm (ASTM D 2041)
B. Bulk Compacted Density (ASTM D 1559, paragraph 4.5)
C. Air Voids (calculated)
D. Voids in Mineral Aggregate, VMA (calculated)
E. Composition of the Mixture - Asphalt binder content based on calculated value using sublot maximum specific gravity (Gmm) and current JMF effective specific gravity (Gse). The retained Gmm sample may be used for gradation (ASTM C 136, C 117) and crushed particle content (MTM 117) from extracted (ASTM D 2172) or incinerated (MTM 319) aggregate, or from MTM 311.
3 In-Place Density: The engineer may identify random core sample locations for each sublot based on longitudinal and transverse measurements. The engineer will mark each core location with a paint dot, which represents the center of the core. The contractor shall drill a 6" core sample at each core location. The contractor shall notify the engineer sufficiently in advance of coring to ensure that a representative can be present to witness the coring and take possession of the core. The core density shall be calculated using the TMD from the test data obtained from that day's sample. The core samples shall be taken after final rolling.
4 As an option, when mutually agreed to by the engineer and contractor, the core samples may be waived and the density gage will be used for acceptance testing.
5 Core samples shall not be damaged during removal from the pavement. If, for any reason, a core is damaged or determined not to be representative at the time of coring, the engineer will evaluate and document the problem and determine if re-coring is necessary.
6 All previous pavement, base aggregate or bond coat material shall be sawed off the bottom of the core samples.

7 The core holes shall be filled with hot mixture and thoroughly compacted as part of the coring operation. The method of filling holes and obtaining compaction shall be agreed upon prior to production. Pavement density acceptance testing will be completed within one (1) workday after the cores were taken. Testing will be in accordance with ASTM D 2726. The test results on the compacted bituminous mixture will be used as a basis of acceptance and payment.

32 12 01.23 VERIFICATION OF QUALITY CONTROL TEST

1 General Procedure: The engineer will review the contractor's sampling and testing procedures, their test results and any engineer quality assurance test results. If, in the opinion of the engineer, sampling and testing procedures are proper, the contractor's quality control test data may be used for acceptance decisions.

2 The contractor's QC test results may be considered verified if the following criteria are satisfied:
- A. The difference between the contractor's QC test results and the JMF fall within the single test tolerance shown in Table 3, or
- B. The difference between the engineer's test results and the contractor's test results fall within the single test tolerance shown in Table 3.

3 If the difference between the contractor's QC test results, compared to the JMF, exceed the single test tolerances shown in Table 3, the engineer's test results will be used as the acceptance test. If the sublot is not verified, the contractor shall be notified and given a copy of the test results. Both the contractor and the engineer will verify that testing equipment is calibrated and operating properly, and correct testing procedures have been followed. Unless it is documented that the difference resulted from equipment or procedural problems, the engineer's test results will remain as the acceptance test of record.

4 The owner shall pay the cost of one verification test per mixture type. Any additional mixture verification testing for acceptance shall be paid for by the contractor.

TABLE 3: Bituminous Quality Assurance Testing Tolerances (+ or -) from JMF

Parameter	Single Test	Lot Average
Air Voids	1.00%	0.60%
Voids in Mineral Aggregate (VMA)*	1.20%	0.75%**
Maximum Specific Gravity (Gmm)*	0.019	0.012
Asphalt Binder Content*	0.50%	0.35%

*Parameters with Target Values
**Or less, determined by VMA Value from the 2003 Standard Specifications for Construction.
The engineer retains the authority to make necessary adjustments to the JMF to ensure compliance with the intent of the specifications.

32 12 16 ASPHALT PAVING

32 12 16.13 PLANT MIX ASPHALT PAVING

1 Roadway Bituminous materials: Shall comply with the following and Table 4:
- A. Asphalt Cement; Performance grade 64-28
- B. Bond Coat: SS-1H; 0.05 to 0.10 gallons per square yard
- C. Leveling Course: Bituminous mixture No. 3C modified in accordance with MDOT 501. Weight at 220 (approx. 2" thick) pounds per square yard. Reclaimed asphalt at 15% maximum. Air voids at 3.0% maximum.
- D. Top Course: Bituminous mixture No. 4C modified in accordance with MDOT 501. Weight at 165 (approx. 1.5" thick) pounds per square yard. Reclaimed asphalt at 15% maximum. Air voids at 3.0% maximum

TABLE 4

MIXTURE NUMBER	4C MOD.	3C MOD.
VMA% (eff. Spec. gravity)	16.0	15.0
Air Voids %*	3.0*	3.0*
Fines to binder ratio (max.)	1.2	1.2
Fine angularity min. MTM117	4.0	4.0
L.A. Abrasion % Max.	40	40
Soft Particle % Max.	6*	8
GRADATIONS – Percent passing indicated sieve		
1"	100	100
¾"	100	99-100

½"	99-100	90 max.
3/8"	90 max.	77 max.
#4	67 max.	57 max.
#8	15-52	15-45
#16	37 max.	33 max.
#30	27 max.	25 max.
#50	20 max.	19 max.
#100	15 max.	15 max.
#200	3-6	3-6
Crush (min) MTM 18	90	90
* Modified from MDOT Specs.		

2 Parking Lot Bituminous materials: Shall comply with the following and table 5:

A. Asphalt Cement; Performance grade 58-28

B. Bond Coat: SS-1H; 0.05 to 0.10 gallons per square yard

C. Leveling Course: Bituminous mixture No. 13A modified in accordance with MDOT 501. Weight at 220 pounds per square yard. Reclaimed asphalt at 15% maximum. Air voids at 2.5% maximum. Air voids at 2.5% maximum. No more than 50% of the material passing the No. 4 sieve shall pass the No. 30 sieve

i. Top Course: Bituminous mixture No. 36A modified in accordance with MDOT 501. Weight at 165 pounds per square yard. Reclaimed asphalt at 15% maximum. Air voids at 2.5% maximum. No more than 50% of the material passing the No. 4 sieve shall pass the No. 30 sieve.

32 12 36 SEAL COATS

1 Seal coat for existing parking lots: ASTM D3320 and ASTM D490. Kamark No. 152 Driveway Seal Coat or approved equal. Apply at 5 gallons per 300 square feet per manufacturer's recommendations. Existing lots receiving seal coat that are immediately adjacent to buildings must be properly closed off to pedestrian traffic to avoid tracking of sealer into buildings.

TABLE 5

MIXTURE NUMBER	13A MOD.	36A MOD.
VMA% (eff. Spec. gravity)	15.5	16.5
Air Voids %*	2.5*	2.5*
Fines to binder ratio (max.)	1.2	1.2
Fine angularity min. MTM117	2.5	3.0
L.A. Abrasion % Max.	40	40
Soft Particle % Max.	8	6*
GRADATIONS – Percent passing indicated sieve		
1"	100	100
¾"	75-95	100
½"	60-90	92-100
3/8"	45-80	65-90
#4	30-65	55-75
#8	20-50	-
#16	15-40	25-45
#30	10-25	-
#50	5-15	-
#100	3-6	-
#200	3-6	3-7
Crush (min) MTM 18	50*	60
* Modified from MDOT Specs.		

32 12 43 POROUS FLEXIBLE PAVING

1 No porous paving is allowed.

32 13 00 RIGID PAVING

32 13 10 CONTINUOUS REINFORCED CEMENT CONCRETE PAVEMENT

1 Pedestrian and medium weight vehicular walkways: Our current walk construction is 8' wide, 6" concrete. Sub-base material as defined in Section 32 11 16 of this standard. Provide fiber reinforcing in the concrete. See Appendix C, Standard Details 32.001, 32.002(a&b), and 32.003.

2 Heavy weight[1] vehicular walkways: To be 7" fiber reinforced concrete over sub-base and aggregate base materials as defined in Sections 32 11 16 and 31 11 23 of this standard. Control joint reinforcing shall be determined by the engineer based on the specific site conditions. See Appendix C, Standard Detail 32.001.

3 Do not use exposed aggregate concrete paving.

4 Shortcuts: Be aware that pedestrians take the shortest route between two points when planning walk layout. Consider potential shortcuts and provide walks to meet this need. This includes even the shortest right angle conditions. Landscape planting can in some cases prevent this but it must be extremely dense and functional winter and summer

5 ADA: We have a commitment to provide for barrier-free access to all parts of the development. Curb cuts should be a minimum of 8 feet wide at the low point to allow for snowplow blades. Review grade slopes and cross slopes for compliance. See Appendix I.

6 For sidewalks less than 1:20 slope, provide a landing for rest at intervals of no more than 70 feet or where appropriate.

32 14 00 UNIT PAVING

32 14 13 PRECAST CONCRETE UNIT PAVING

1 For snow removal, walks are accessible to trucks. In certain parts of campus, GVSU is using concrete paving brick as either edging or as complete walks and will advise as project proceeds.

2 When pavers are used they are to be placed on top of a 6-inch thick concrete pour with Kerabond/Keralastic epoxy mixture to fasten pavers to concrete.

3 Walks shall be 8 feet wide minimum. Review radius and intersections with GVSU. Snow removal by trucks and access by emergency vehicles is a consideration on GVSU sidewalks.

32 14 16 BRICK UNIT PAVING

1 Shall not be used.

32 16 00 CURBS AND GUTTERS

32 16 13 CONCRETE CURBS AND GUTTERS

1 Concrete curbing shall be per Appendix C, Standard Details 32.008, 32.009 and 32.010.

32 17 00 PAVING SPECIALTIES

32 17 23 PAVEMENT MARKING

1 Parking Stalls and related line work, roadway centerlines: Yellow waterborne paint per MDOT 920. Handicap accessible spaces shall be painted blue.

2 Cross walks, turn arrows, stop bars: White waterborne paint per MDOT 920.

3 Where pavement markings are required on concrete pavement, pavements shall be treated appropriately to accept markings.

[1] Heavy weight is for paved surfaces receiving steady and frequent vehicles with heavy loads such as semi-tractor - trailer deliveries. Some locations for use are loading docks, driveways to and from loading docks or other areas that will receive such traffic. All other locations are considered pedestrian/medium weight.

32 30 00 SITE IMPROVEMENTS

32 35 00 SCREENING DEVICES

32 35 13 SCREENS

1 Screen walls that surround trash dumpsters shall:

A. Be of adequate height to visually conceal dumpster and allow for overflowing trash.
B. To be of brick masonry on exterior with concrete block back-up, with stone or architectural concrete cap with base flashing.
C. Have solid vinyl gates, paired with gate bolts and latch to secure with University BEST pad locks.
D. Interior to be 6-inch concrete slab.
E. Interior block walls to be painted.
F. Provided with front concrete apron the width of gate opening plus two (2) feet each side beyond opening and a minimum of six (6) feet deep.

32 80 00 IRRIGATION

32 84 00 PLANTING IRRIGATION

32 84 23 UNDERGROUND SPRINKLING

1 GENERAL

1.1 SUMMARY

1.1.1 Scope of Work

A. The objective of these specifications to provide an assembled and installed automatic irrigation system, which will efficiently irrigate all areas to be covered and shall prove satisfactory in all aspects to GVSU.
B. Sprinkler lines shown on the drawings are essentially diagrammatic. Locations of all sprinkler heads, valves, piping, wiring, etc., shall be established by the contractor at the time of construction. Spacing of the sprinkler heads or quick coupling valves are shown on the drawings and shall not be exceeded without the permission of GVSU's authorized representative.
C. Unless otherwise specified or indicated on the drawings, the construction of the sprinkler system shall include the furnishing, installing and testing of: valves, gate valves, control valves, controllers, electric wire, pumps, wiring, pumps, controls and all necessary specialties. The removal and/or restoration of existing improvements, excavating and backfill, and all other work in accordance with the plans and specifications shall be included as required for a complete system.
D. All work herein specified or called for on the drawings shall be executed in accordance with all governing ordinances, laws and regulations that meet all local conditions. Additionally, any changes and/or additions in the work necessary to meet these ordinances, laws, regulations, and/or conditions will be made without additional cost to GVSU.
E. Adjustments of heads shall be made as deemed necessary and approved by Architect to assure 100% coverage for turf zones and 90% for landscape beds.
F. The Contractor shall take out all required permits, arrange for all necessary inspections and shall pay any fees and expenses in conjunction with the same as a part of the work under this contract.
G. Equipment, Tools and Labor: The Contractor shall furnish all such equipment, tools and labor necessary to pursue work in the acceptable manner, to a speedy completion. This contract is based on the contractor furnishing and using his own equipment, tools and labor which are suitable to carry out his contract in a first class manner, unless herein specified.
H. GVSU's Supervision: GVSU assumes no responsibility in the supervision and inspection of the work involved in the execution of this contract beyond insuring, to GVSU's satisfaction, that the plans and specifications are being properly interpreted. This supervision and checking will not relieve the Contractor of any responsibility for the performance of his work in accordance with the plans and these specifications.
I. The Contractor shall review existing irrigation systems located adjacent to new construction and shall discuss any anticipated impacts with the Grounds Department. The Contractor will be responsible for the continued operation of adjacent systems should adjustments be required to keep existing systems operational during construction. Operation of adjusted existing systems is required to be demonstrated prior to beginning and at the end of construction activity.

1.1.2 Award of Contract: GVSU reserves the right to accept a bid other than the lowest.

1.2 DESIGN CRITERIA

1.2.1 New irrigation system must minimize overspray onto adjacent sidewalks, roadways and buildings.

1.2.2 New irrigation system must have head to head coverage, valves and pipe sized appropriately according to zone requirements, and provide separate zones for turf and shrub beds.

1.2.3 Shade areas and north facing sides of buildings must be irrigated by zones separate from dryer areas with more sun exposure.

1.3 SUBMITTALS

1.3.1 Product Data, Shop Drawings, and Samples: Shop drawings on all equipment and systems to be furnished shall be provided for review within 30 days of contract award. (If other than specified).

1.3.2 Design Data, Test Reports, Certificates, Manufacturer's Instructions, Manufacturer's Field Reports

1.3.3 As-Built Drawings: After completion of the piping installation, the Contractor shall furnish an "as-built" drawing showing all sprinkler heads, valves, drains, and pipelines to scale. Dimensions are required for all electric valves, isolation valves, sleeves, quick couplers, mainline and wires that do not follow the mainline pipe. Instruction sheets and parts lists covering all operating equipment will be bound into a folder and furnished to GVSU in duplicate.

1.4 QUALITY ASSURANCE

1.4.1 Qualifications: Installer shall have satisfactorily installed acceptable under-ground sprinkler system(s) on at least five (5) other projects of comparable complexity. A list of these shall be provided with the proposal.

1.4.2 Regulatory Requirements & References: All work herein specified or called for on the drawings shall be executed in accordance with all governing ordinances, laws and regulations that meet all local conditions. Additionally, any changes and/or additions in the work necessary to meet these ordinances, laws, regulations, and/or conditions will be made without additional cost to GVSU.

1.5 DELIVERY, STORAGE, AND HANDLING

1.5.1 Prevent damage to system components during loading, transporting, and unloading.

1.5.2 Store system components in a dry and clean location.

1.5.3 Contractor shall arrange his material storage so as not to interfere with GVSU's operation of the job.

1.5.4 The Contractor shall provide and pay for all transportation required to deliver and remove from the site all materials and equipment, as required for all the work shown and specified.

1.6 PROJECT/SITE CONDITIONS

1.6.1 Utilities and Protection: GVSU shall make available to the Contractor all of the necessary information regarding the exact location of GVSU owned utilities, and shall mark the location of such utilities and/or any underground obstructions at the site. For utilities not owned by GVSU, it is the responsibility of the Contractor to call MISS Dig. The Contractor shall be liable for the damages to and the cost of repairing or replacing any buried conduit, cables, or piping encountered during the installation of the work, unless they were not marked or he was not previously informed of such underground utilities. If the Contractor is aware of such buried lines, he shall immediately have the incurred damages repaired at his own expense. Conversely GVSU shall be liable for the cost of replacing or repairing damages to any of those existing utilities of which the Contractor had not been previously informed.

1.7 SEQUENCING AND SCHEDULING

1.7.1 Coordinate all work with job site superintendent and all applicable trades.

1.8 WARRANTY

1.8.1 For a period of one year from date of final acceptance of the work performed under this contract, the Contractor shall promptly furnish, without cost to the Owner, any and all parts and labor which prove defective in material or workmanship.

1.8.2 A full 5-year manufacturer's warranty on all sprinkler heads, electric valves and controllers shall be provided by the Irrigation Contractor. Any of these parts proven to be defective within the 5-year warranty period shall be replaced with no cost to the owner for parts. After the 1-year labor warranty has expired, GVSU shall be responsible for the labor to replace defective sprinkler heads, electric valves and controllers.

1.8.3 In the fall following the installation, the Contractor shall winterize the system and the following spring shall put the system back into operation. Winter damage due to improper winterization is the responsibility of the Contractor.

1.8.4 It shall be the contractor's responsibility to insure and guarantee complete coverage of the areas shown on the drawings to be irrigated. He shall also guarantee the satisfactory operations of the entire system and the workmanship and restoration of the area. Adjustment of the sprinkler heads and automatic equipment will be done by the contractor, upon the completion of installation, to provide optimum performance.

2 PRODUCTS

2.1 ACCEPTABLE MANUFACTURERS

- The Toro Company
- Netafim Irrigation
- Rain Bird Corporation
- Spears
- Lasco

2.2 MATERIALS

2.2.1 All materials to be incorporated in this system shall be new and without flaws or defects and of quality and performance as specified and meeting the requirements of this system. All material overages at the completion of the installation are property of the contractor and are to be removed from this site.

2.2.2 Pipe and Fittings: Pipe sizes shall conform to those shown on the drawings. No substitutions of smaller pipe sizes will be permitted but substitutions of larger sizes may be approved. All pipe damaged or rejected because of defects shall be removed from the site at the time of said rejection.

2.2.3 Mainline Piping: Mainline piping shall be rigid un-plasticized PVC class 160 PSI working pressure extruded from high-impact virgin polyvinyl-chloride (PVC-1120) conforming to NSF Standard 14 and ASTM D-2241 for thermal plastic pipe dimension

ratio of SDR-26 and shall be marked or stamped every 5 feet to indicate brand, strength rating, size and standards. The pipe shall be homogeneous throughout and free from visible cracks, holes, foreign materials, blisters, deleterious, wrinkles and dents.

2.2.4 Lateral Piping: Lateral piping 1-1/2" and larger shall be rigid un-plasticized PVC class 160 PSI working pressure extruded from high-impact virgin polyvinyl-chloride (PVC-1120) conforming to NSF Standard 14 and ASTM D-2241 for thermal plastic pipe dimension ratio of SDR-26 and shall be marked or stamped every 5 feet to indicate brand, strength rating, size and standards. The pipe shall be homogeneous throughout and free from visible cracks, holes, foreign materials, blisters, deleterious, wrinkles and dents.

2.2.5 Later Piping: Later piping 1-1/4" and smaller shall be high-density (HD) flexible, non-toxic polyethylene made from 100% virgin polyethylene material, and all sizes shall have a minimum 100 PSI working pressure rating (ASTM D2239) conforming to NSF standard for thermoplastic pipe dimension ratio of SDR-15. All polyethylene pipe shall be continuously and permanently marked with the manufacturer's name, materials, size and schedule. Pipe shall conform to the U.S. Department of Commerce Commercial Standard CS255-63-PE-3408 or latest revision thereof. Pipe shall be suitable for potable water and shall bear the "NSF" trademark. All stainless steel screw clamps shall be used to secure joints.

2.2.6 PVC Pipe Fittings: all fittings 1-1/2" through 3" shall be Schedule 40 PVC solvent weld, type 1, meeting the requirements of STM D-2466. No saddles will be permitted. All 4" fittings shall be gasketed joint Harco PVC Class 200 meeting ASTM D1784 DR21 requirements. Bell shall be gasket joint conforming to ASTM3139 with gaskets conforming to AST F477. Fittings 6" and larger shall be Harco Ductile Iron Fittings manufactured with a grade of 65-45-12 in accordance with ASTM A-536. Fittings shall have deep push-on joints with gaskets meeting ASTM F-477 requirements. Only schedule 80 pipe may be threaded.

2.2.7 Polyethylene Fittings: All fittings 1-1/4" and smaller downstream of control valve shall be plastic or insert type fittings where applicable. All 1-1/4" fittings shall be double clamped with all stainless steel worm gear clamps. All 1" and smaller fittings shall be clamped with all stainless steel worm gear clamps or all stainless steel crimp clamps.

2.2.8 Controllers:

A. Irrigation system controller shall be type and size as indicated on the drawings.
B. The controller shall be mounted in location shown as drawings.
C. All control wire to the valves from the controller shall be 600 volt soft annealed copper, PVC insulated, UL approved type UF. Wire sizes shall be as called for on drawing. All 24V splices to be connected with water-tight 3M-DBR/Y connectors. All field splices shall be contained in a 10" box.
D. Electrical supply to the controller shall be by others.

2.2.9 Sprinkler Heads:

A. Gear Heads: Rain Bird 5004 – The sprinkler shall be of the gear driven type, capable of covering 25-50 feet radius at 25-65 psi.
B. Fixed Spray Heads – Turf: 570Z-4P-COM – The full or part circle pop-up spray sprinkler shall be capable of covering 5 – 15 foot radius at 20 – 50 psi.
C. Fixed Spray Heads – Landscaping: 570Z-12PSI-COM – The full or part circle pop-up spray sprinkler shall be capable of covering 5 – 15 foot radius at 20 – 50 psi.

2.2.10 Electric Valves:

A. The 1" remote control valve shall be a normally closed 24 volt A.C. cycle solenoid actuated globe pattern diaphragm type capable of having a flow rate of as low as .25 gpm and pressures as high as 150 psi. The 1-1/2" remote control valve shall be a normally closed 24 volt A.C. cycle solenoid actuated globe/angle pattern diaphragm type capable of having a flow rate of as low as 30 gpm and pressures as high as 220 psi. The valves shall have a flow control stem with wheel handle for regulating or shutting off the flow of water and a bleed plug for manual operation without electrically energizing the solenoid coil.

2.2.11 Valve Boxes:

A. All valves shall be protected by a two-piece valve box assembly consisting of a removable cover and box. Enclosure shall be rigid plastic material composed of fibrous components chemically inert and unaffected by moisture, corrosion and temperature changes. Manufacturer shall be NDS or Dura. Boxes shall be sized as follows:
   - Minimum of a 10" valve box and cover shall be used for all automatic valves 1-1/2" and smaller and for all manual gate valves and quick coupling valves. Lids shall be green for automatic valves, black for manual gate valves and quick coupling valves.
   - Minimum of a 12" valve box and cover shall be used for automatic valves 2" and larger.
   - Side walls to extend at least 2 inches below the bottom of the valve body; for deep mainline appropriate extensions and/or corrugated plastic tile shall be used to reach depth of valves. Valve boxes shall not bear directly on pipe.

2.2.12 Netafim Valve Boxes:

A. All valves shall be protected by a two-piece valve box assembly consisting of a removable cover and box. Enclosure shall be rigid plastic material composed of fibrous components chemically inert and unaffected by moisture, corrosion and temperature changes. Manufacturer shall be NDS or Dura. Boxes shall be sized as follows:
   - A 12" standard valve box and cover shall be used for all Netafim manifold assemblies consisting of a 1" valve, pressure regulating valve and disc filter.
   - Minimum of a jumbo valve box and cover shall be used for Netafim manifold assemblies consisting of a 1-1/2" valve, pressure regulating valve and disc filter.

- A 6" valve box and cover shall be used for all Netafim line flushing valves.

2.2.13 Quick Coupler Valve: The quick coupler valve shall be as provided for blow-out of system in fall. It is to be installed on a pre-manufactured PVC three elbow swing joint with a brass thread, specifically designed for quick coupler installation. (As indicated on drawings). Swing joint manufacturer shall be Spears or Lasco.

2.2.14 Backflow Prevention Device: Type and size as specified on drawings.

2.2.15 Booster Pump: Type and size as specified on drawings (if applicable).

2.2.16 Solvent and Primer: Solvent and primer used on PVC pipe shall meet the requirements of ASTM D-2564 and shall be approved by the National Sanitation Foundation. All solvent and primer shall be used in accordance with manufacturer's specification. Primer shall be purple in color. Solvent shall be used as is from original container. No thinner shall be added to the solvent to change its viscosity. If viscosity or consistency is unsuitable, the solvent shall not be used.

2.2.17 Swing Joints:

A. All sprinkler heads 6 GPM or less shall be attached to the piping with two-elbow joints consisting of 3/8" flexible pipe and coordinating elbows.
B. All sprinkler heads over 6 GPM shall be attached to the piping with a PVC three elbow swing joint assembly to match the inlet size of the sprinkler head. Manufacturer shall be Spears or Lasco.
C. All sprinkler heads with a 1" or larger inlet shall be attached to the PVC pipe using Spears 5807 series or Lasco one-piece swing joint assembly. Match model to inlet size of sprinkler head.

2.2.18 Spare Parts:

A. Provide ____ rotors and ____ sprays. All sprinkler heads shall be complete with nozzles. Provide (1) automatic valve of each size.

2.2.19 Netafim / Techline Products:

A. Techline CV Self-Cleaning, Pressure-Compensating Dripperline: The dripperline shall consist of nominal sized 1/2 inch low density linear polyethylene tubing, housing internal pressure compensating, self-cleaning, integral drip emitters. The tubing shall be brown in color and conform to an outside diameter (OD) of .67 inches and have an inside diameter (ID) of .57 inches. The emitter shall have the ability to independently regulate discharge rates with an input pressure of 14.7 to 70 pounds per square inch (PSI). The emitter shall have a 2 PSU check valve for no low drainage. Install Techline with dripper discharge rate and emitter spacing as specified on drawing. The dripper line must be blown out for winterization.
B. Techline Fittings: All Techline connections shall be made with approved Techline 17mm (.57") insert fittings.
C. Techline Line Flushing Valves: All Techline systems shall utilize Netafim automatic line flush valves at the end of each independent zone area or dripperline (maximum flow per valve 15 GPM). This valve shall be capable of flushing one gallon at the beginning of each irrigation cycle. The valve shall be either Netafim model TL050MFV-1, with a 1/2 inch MPT connection, or Netafim model TLFV-1 with Techline connection.
D. Techline Pressure Regulation Valve: The pressure regulator shall be a Netafim piston-type unit with an externally accessible regulation unit that can be services without removing the valve from the system. The regulator shall have a built-in indicator on ¾" high-flow and larger models that show when the proper outlet pressure is reached. It shall be capable of regulating from 15 PSI to 50 PSI using interchangeable color-coded springs. The valve model number shall be as indicated on drawing.
E. Techline Disk Filter: Each independent irrigation zone shall utilize a Techline disk filter. This filter shall utilize color-coded replacement filter rings for easy identification. The filter shall have extra-large filtration capacity for less frequent cleaning. The ¾" model shall be available with or without a manual shut-off valve. The filter model number shall be as indicated on drawing.

2.3 FABRICATION

2.3.1 Follow all Manufacturers' recommendations

3 EXECUTION

3.1 EXAMINATION

3.1.1 Each bidder should visit the site of the proposed work and fully acquaint himself with the conditions there relating to construction and labor, and should fully inform himself as to the facilities involved, the difficulties and restrictions attending the performance of the Contract. The bidder should thoroughly examine and familiarize himself with Drawings, Technical Specs, and all other bid and contract documents. The Contractor by the execution of the Contract shall in no way be relieved of any obligation under it due to his failure to receive or examine any form or legal document or to visit the site and acquaint himself with the conditions there existing and GVSU will be justified in rejecting any claim thereof.

3.2 INSTALLATION

3.2.1 Excavating and Backfilling

A. The Contractor shall do all necessary excavating and backfilling required for the proper installation of the work excepting as noted on the plans.
B. When backfilling, all backfill material shall be free from rock, large stone or other unsuitable substances to prevent damage to the pipe. All backfill material will be mechanically compacted in 6" layers as it's brought up to finish grade so as to ensure that no settling results.
C. Trenches shall be made wide enough to allow at least 6" between parallel pipe lines.
D. Maintain all warning signs, shorting, barricades, flares and warning lanterns as required by OSHA and local ordinances.

3.2.2 Minimum Grade Cover on Pipe:

PVC	¾" and 1"	Min.	12" of cover
PVC	1-1/4" to 2"	Min.	16" of cover
PVC	2-1/2" to 4"	Min.	20" of cover
Poly Lateral	All	Min.	10" of cover
Techline	All	Min.	Depth per manufacturer
Sleeving	All sizes	Min.	12" to 18" of cover

3.2.3 Rock Excavation: If rock is encountered in the alignment and depth shown on the plan, the alignment and/or depth shall be adjusted in order to avoid its excavation if at all possible. If alignment and depth adjustment cannot be made and it becomes necessary to remove the same, the Contractor shall be paid for all the additional cost incurred in the handling of it.

3.2.4 Sleeves: All piping run under roadways, sidewalks, or areas of construction shall be sleeved with Schedule 40 PVC or Class 160 to allow for repair.

3.2.5 Electrical Installation

A. The Contractor will be required to make connections to the building electrical system as is required for the proper operation of the automatic control system in accordance with National Electrical Code or local codes. Final connections shall be made by a qualified, licensed Electrical Contractor.

B. All control circuitry, whether electrical or hydraulic, passing through the wall of the building or beneath a sidewalk, road, or drive, shall be installed in a suitable sleeve; whereas in all other locations they shall be installed in the pipe trench and protected by the pipe whenever possible.

C. The joining of all underground wires shall be by the use of wire nuts, covered with 3M-DBR/Y's per installation instructions provided by manufacturer. Wire shall meet UL requirements for direct burial.

D. Sleeve control wire under paving and walks.

3.2.6 Grounding of System: Surge protection devices not effective unless there is a good grounding electrode located at each control location. This ground rod must be capable of discharging a lightning strike containing several thousand volts and from 20,000 to 100,000 amperes, still protecting the controller and solenoids from costly damage.

3.2.7 Testing and Flushing:

A. The entire system shall be tested at the normal system working pressure and upon visual inspection of the ground, should any leak be found, it shall be promptly repaired. The line shall then be retested until satisfactory.

B. Flushing: After all piping, risers, and valves are in place and connected, but prior to installation of sprinkler heads, quick coupler assemblies, and hose valves, thoroughly flush piping system under a full head of water. Maintain flushing for 3 minutes through furthermost valve. After flushing cap all risers.

C. Operation Test: at conclusion of flushing, install sprinkler heads, quick coupling assemblies, and hose valves, and test entire system for operation under normal operating pressure. Test is acceptable if system operates in a satisfactory manner, with uniform coverage of areas to be sprinkled.

3.2.8 Instructions: After completion and testing of the system, the Contractor will instruct GVSU's personnel in the proper operation and maintenance of the system.

3.3 ADJUSTING AND CLEANING

3.3.1 The contractor shall keep the premises free from rubbish and debris at all times. All unused materials, rubbish and debris shall be removed from the site.

3.3.2 Adjust all electric remote control valve pressure regulators, flow control stems and part circle heads for system balance and optimum performance.

3.3.3 The winter following final acceptance. The Contractor shall winterize/drain the system and in the following spring, put the system into operation at no additional expense to the owner. Winter damage due to improper winterization is the responsibility of the Contractor.

3.3.4 Properly replant all plant material removed during the installation.

3.3.5 Replace all permanent features disturbed by the installation of the system.

32 90 00 PLANTING

32 (91-92) 00 PLANTING PREPARATION, TURFF & PLANTS

Turf Area Preparation

1 Before any excavation is to take place on college owned property, at Grand Valley State University GVSU MissDig must be called in order to identify all utilities and avoid damage to the college property. Contact Cheryl Fischer at 616-331-3000. All non-owned GVSU utilities, contractor must call Michigan MissDig.

2 Contractor is responsible for providing appropriate traffic safety and control during the excavation process, as well as appropriate trenching and shoring safety requirements.

3 Soils that are frozen, muddy or saturated must not be worked.

4 All areas adjacent to graded areas, including lawns and paved areas must be protected from construction equipment, such as, but not limited to Excavators, Backhoes, Loaders, Bulldozers, Skid-Steer Loaders, Motor Graders, Crawlers, Loaders, Trenchers, and Scrapers.
5 Grading of paved areas, loading docks, service yards, and landscape must provide positive drainage.
6 Grading must direct water away from buildings.
7 Rough grading shall be brought to a true and uniform grade.
8 No excavation, scarification or subsoiling shall be done within the dripline of any established tree, without prior approval from Grand Valley State University.
9 For approved work within the dripline, the contractor is responsible to have any tree roots one-half or larger evaluated by the campus arborist prior to any pruning or removal.
10 Non-organic fill shall not be used in any areas that will be planted.
11 Erosion control measures are required wherever there is a possibility of displacement of soils, discharge of soil bearing water runoff, or discharge of airborne dust, to adjacent properties and walkways.
12 In turf and landscape areas, the excavation is to be filled with existing soil if the condition of the soil is acceptable to the university and the contractor. If soil is not acceptable (rocky, wet clay, peat, etc.) the excavator will be responsible for removal of the soil and backfilling the excavation with an acceptable soil.
13 Backfill using 1' lifts and compaction on each lift to avoid future settling. Every 2' the maximum density must be tested and exceed 90%. Fill with existing soil or acceptable sand to 4-6" below natural grade.
14 All irrigation piping is to be replaced or repaired according to the GVSU Irrigation Specifications. A copy is available from GVSU Project Manager or Representative. All irrigation work must be approved before piping and fittings are buried.
15 Fill to grade with screened topsoil. A sample of topsoil must be provided to the university 10 working days before excavation is completed for approval and soil testing if necessary.
16 Topsoil is to be raked level to correspond with existing natural grade.
17 Contractor is to use only an approved grass seed or a seed supplied by Grand Valley State University.
18 Seed must be evenly applied at 4-6 lbs per 1000 square feet.
19 Contractor must receive approval to use a hydro seed as an alternate to sodding.
20 Establishment blanket method of seeding is preferred. On areas where erosion is a potential problem, the contractor must use netless Futerra erosion control blanket. Straw blanket will not be allowed without permission from a GVSU representative.
21 Contractor is to apply an approved starter fertilizer (1:2:1 ratio) and applied by granular walk spreader. Starter fertilizer is to meet minimum requirement of 32% phosphorus and 16% nitrogen. Starter is to be applied at 6 lbs per 1000 square feet.
22 Contractor is responsible for repairing any areas where turf grass establishment is inadequate or where settling occurs for a time period of one year following work completion.
23 Damage: Existing landscape areas or trees designated to remain shall be the responsibility of the contractor. Repair shall return the damaged area to its original condition, or better. Severely damaged trees shall be replaced with like species of the same size. Repair/replacement of damaged materials shall be at no cost to the University.

Materials

Explanation

A. Because of the wide variety of materials on the market, it is necessary to indicate quality and rate of application of each material used for individual areas.
B. Fertilizers differ in the quantities of nutrients which they contain, in the ratios in which these nutrients are present, and in the kind of material from which each nutrient is derived. It is essential, therefore, that the rate of application, grade, and composition of each fertilizer used be indicated for each area.
C. Quantities needed are best determined by soil tests, available through Agricultural Extension Service or other agencies.

1 Fertilizers
   A. Shall be of standard to higher quality
   B. Delivered to site in original bags
   C. Product will be protected at all times prior to application against mechanical or weather damage which would prevent proper distribution.
   D. Applied at rates and in manner described

2 Seed
   A. Shall be commercial grades and shall meet requirements of (state-federal) seed laws.
   B. Seed shall be delivered at site in original containers and shall not be mixed and blended except in presence of owners or their authorized representative.
   C. Seed shall have been tested for germination and purity by accepted methods. Seed tag shall show date of germination test, germination, and purity
   D. In tabulating seed requirements, areas that are to receive different varieties or quantities should be listed separately.
   E. If a single seed species or variety is to be used, it should be individually designated by its accepted commercial (common) name.
   F. If mixtures are specified, the tabulation should show ingredients with the percentage by weight of each. Separate purity and germination minimums should be specified for each kind of seed in the mixture.

3 Mulch
   A. The most important items in mulching specifications are the kind, quality, and rate of application of the material used.

B. If local supplies of an acceptable material are available, the specifications should be adapted to provide specific directions for its use.

4 Sod
A. In specifying sod, the important items are the species and variety or mixture, the quality, the size and thickness of sod pieces, and the type of soil (mineral or organic) the sod is grown on.

5 Irrigation
A. All pipe, fittings, sprinkler heads, etc. shall be installed according to the architect's or engineer's plan, and approved by a GVSU representative.
B. Type of pipe (plastic, cement, galvanized iron, cast iron, or composition) and size (diameter) must be specified.
C. Drawings of the irrigation system, including method of constructing risers, etc., should accompany the specifications.
D. Refer to irrigation standards located separately in this book for further detail.

6 Topsoil.
A. Contractor shall provide topsoil material and installation.
B. Topsoil must be approved by Grand Valley State University prior to installation.
C. Native topsoil from the site is preferred, if available.
D. Topsoil shall be amended per the requirements of the soil test.
E. All topsoil must be screened to contain no material larger than 1.0 inches in diameter or length and shall not contain slag, cinders, stones, and lumps of soil, sticks, roots, trash, or other material.
F. Topsoil must be free from all plant material, in particular all noxious or invasive species.
G. When sub-soil is composed of heavy clays, as defined by Ottawa County (MI) Soil Survey, or is compacted (has a high soil bulk density per soil classification as defined by the Ottawa County (MI) Soil Survey) due to construction activity, the contractor shall rip the soil to a minimum depth of eighteen inches (18") prior to topsoil application.
H. The first 4" layer of topsoil must be mixed into the scarified top layer of existing soil. Additional topsoil shall be added in 4" lifts and compacted until finish grade is established.
I. Extraneous material is to be disposed of legally off from Grand Valley State University property.

7 Topsoil Mix
A. Topsoil shall be either pre-mixed or mixed off-site prior to soil testing per the following unless otherwise approved by Grand Valley State University: a) Three (3) parts sandy loam topsoil with additive as required to bring PH to 5.5-6.5 range. b) One (1) part composted organic material.
B. Where additional fill is required to bring an area to grade specifications or where the existing soil is of very poor quality, it may be necessary to use topsoil. In such cases, the specific areas to be covered should be defined and the required depth of fill specified.
C. A definite statement should be made under the quality column indicating the character and quality of the soil used.
i. Soil tests provide information on soil reaction, basic nutrient availability, and organic matter content.
ii. Textural classification, according to the United States Department of Agriculture classification system should be indicated.
iii. Aggregate structure and freedom from noxious weeds and common field weeds can be determined by an experienced agronomist or GVSU Representative prior to purchase or use.
iv. Topsoil should be natural surface soil from well-drained areas. It is desirable to have a sandy loam soil containing less than 30 percent silt and less than 10 percent clay.

8 Pesticides.
A. These include such things as sterilants, insecticides, and other pesticides.
B. Where these are used, the materials tabulation should list each one separately with definite statements of the required quality plus rate and method of application. The application of pesticides will be conducted by a (MI) DEQ certified commercial pesticide applicator.
C. The stage of construction when applying these materials should be indicated.

9 Quality and rate of application.
A. Indicated under the materials section of the specification form are self-explanatory.
B. Adherence to accepted standards provides assurances of having satisfactory materials on the job in their proper condition.
C. Where different areas are involved, provision is made in the tabulation for specifying the quality and quantity of individual materials needed for each.
D. This requires a seperate description (identification and size) of the areas under each material specified.

Lawn Establishment

Seasonal and weather limitations

1 Explanation

The desire of seeding growth is during optimum periods, and seedbed preparation only under favorable soil conditions make the inclusion of this section necessary. Continuation of work at other than specified times or conditions should proceed only with the consent of the owner, architect, or other owner designated representative.

A. Planting at times may only be done under specific conditions described and with the consent of the owner or owner designated representative.
B. All operations shall be performed only when the soil is in proper condition to permit satisfactory work, and with expressed consent of the owner or owner designated representative.

2 Planting Preparation
- A. Slopes: Shall not be greater than one (1) foot vertical to six (6) feet horizontal in grassed areas.
- B. Existing stockpile topsoil shall be free from sticks, stones, roots, clods, and any other extraneous material. All rocks and debris greater than 1" in diameter shall be removed.
- C. Imported topsoil shall be a fertile, viable, natural topsoil of loamy character obtained from a well-drained, arable site, free from sticks, stones, roots, clods, and extraneous matter. Topsoil shall be a clay loam, indigenous to the general area in which the project is located, and suitable for planting and seeding.
- D. A six-inch depth of topsoil for seeded areas and twelve inch depth for planting areas is required. The pH for all topsoil shall be within the range of 6.5 to 7.5. If the soil tests outside that range, the Contractor is responsible for supplementing the soil to achieve the appropriate pH.

3 Sodded Turf Preparation
- A. All areas not otherwise landscaped shall be sodded with solid sod.
- B. Subsoil shall be scraped to a depth of six inches where topsoil is to be placed. Cultivation shall be repeated in areas where the subsoil has been compacted by equipment.
- C. Soil must be rolled to a flat surface prior to installation of sod.
- D. Sod must be laid with no gaps; ends and sides to be butted, not stretched or overlapped. Sod strips or pads must be staggered to offset joints in adjacent courses.
- E. On slopes exceeding 3:1, sod must be laid across the angle of the slope Pin 50% of the area.
- F. Sod shall be and watered by contractor at a minimum of 1" inch per week until established.
- G. Gaps resulting from trimmed pieces shall be dressed with washed sand and seeded.
- H. Sod must be laid within twenty-four (24) hours of delivery.
- I. All sod shall be rolled immediately after installation, according to industry standards, to achieve contact with sub-grade.
- J. All newly planted areas shall be cordoned off with 18" high wooden stakes strung with yellow nylon rope until lawn is established.
- K. Rough grades to be approved by GVSU Representative.
- L. Clear site of all surface trash.
- M. Remove all materials that will hinder installation and maintenance of planted areas.

4 Turfgrass Sod Composition:
- A. Turfgrass sod shall be Kentucky Bluegrass in all locations unless otherwise specified.

5 Turfgrass Sod Quality:
- A. Turfgrass sod shall be of good quality, free of weeds, disease and insects and of good color and density.

6 Thickness of Cut:
- A. Turf shall be machine-cut at a minimum uniform soil thickness necessary for plant viability during the Harvest-Transport-Installation cycle.

7 Pad Size:
- A. Individual pieces of turfgrass sod shall be cut to the supplier's standard width and length.

8 Strength of Turfgrass Sod Sections:
- A. Standard size sections of turfgrass sod shall be strong enough to support their own weight and retain their size and shape when suspended vertically from a firm grasp on the upper 10 percent of the section.
- B. Turfgrass should be inspected and approved by GVSU prior to installation.
- C. Sod cannot be kept on the pallet for more than 24 hours. Once delivered the sod must be laid, rolled, and irrigated immediately.
- D. Site must be prepped and ready for the sod to be laid before the sod delivery arrives.

9 Grading:
- A. Tilling: After the areas to be top soiled have been brought to grade, and immediately prior to dumping and spreading the topsoil, the sub-grade shall be loosened by disking or rototilling to a depth of at least 3 to 4 inches to permit bonding of the topsoil to the subsoil.
  - i. This process must not be done under the drip line of any established tree.
- B. To prepare the soil under the drip line of any established tree, the soil must be air-spaded.
  - i. There can be no tilling under the drip line of any established tree.
  - ii. Place and spread any additional material that may be required.
- C. The Contractor shall be responsible for minor adjustments to the finished subgrade if such treatment is required in the opinion of the Owner's Representative.
- D. Hand-rake the surface, removing all of the clods and undesirable material greater than one-half (1/2") inch, from ground surface.
- E. Fill all low spots and cut irregularities to the acceptance of the Owner's Representative.
- F. Roll the entire surface evenly with a water ballast roller or other means acceptable.
- G. During the finished grading operations, all swales and additional swales that may be required to drain areas where there are existing plant materials, shall be finished.
- H. All grade adjustments shall be made so there are no areas that will have standing water.
- I. To prevent excessive weed growth in the lawn areas, the Contractor should be prepared to immediately install the lawn upon the completed and acceptable finished grade.

Sod Installation:

1 Moistening the Soil:
- A. After all grading has been completed; the soil shall be irrigated within 12 to 24 hours prior to laying the turfgrass sod. Turfgrass sod should not be laid on soil that is dry and powdery.

2 Starter Strip:
- A. The first row of turfgrass sod shall be laid in a straight line, with subsequent rows placed parallel to, and tightly against, each other.
- B. Lateral joints shall be staggered to promote more uniform growth and strength.
- C. Care shall be exercised to ensure that the turf is not stretched or overlapped, and that all joints are butted tight in order to prevent voids, which would cause air-drying of the roots.

3 Sloping Surfaces:
- A. On sloping area where erosion may be a problem, turfgrass sod shall be laid with staggered joints and secured by pegging/pinning.
- B. Mark all irrigation heads and cut turf around them. Roll Sod.

4 Fertilizers:
- A. All fertilizers shall be uniform in composition and free-flowing.
- B. Fertilizer shall be delivered to the job site fully labeled according to applicable state fertilizer laws.
- C. Fertilizer application rates shall be determined by soil tests.
- D. Fertilizer shall be distributed uniformly over the area to be sodded with turfgrass.

5 Watering:
- A. The landscape contractor shall be responsible for watering turfgrass sod immediately during and after installation up to occupancy, to prevent drying. It shall then be thoroughly irrigated to a depth sufficient that the underside of the new turfgrass sod pad and soil immediately below the turfgrass sod are thoroughly wet (usually 1 inch of water is needed).
- B. The contractor shall be responsible for having adequate water available at the site prior to and during installation of the turfgrass sod.

6 Acceptance:
- A. Acceptance shall be given by the owner upon satisfactory completion of each section or area as indicated on the drawings or as otherwise specified.
- B. Acceptance should be recorded by the party responsible for the site preparation, and it should be signed by the owner or representative.
- C. No Top-soiling or Turfgrass sod installation work should precede until this requirement is met.

7 Clean Up
- A. Clean up includes plant bed areas, lawn areas, rights-of-way adjacent to the site, buffer areas, and lay down areas.
- B. Keep all areas of work clean, neat, and orderly at all times.
- C. Keep all paved areas clean during lawn installation operations.
- D. Clean up and remove all adverse materials and debris from the entire work area prior to Final Acceptance to the satisfaction of GVSU Project Manager.
- E. All existing landscapes that are not re-landscaped through the project and are behind a construction fence will be maintained by the project GC or their subcontractor during the life of the project unless otherwise accepted by a GVSU representative.
  - i. Maintenance includes proper irrigation, weeding, mowing of turfgrass, leaf and trash removal
  - ii. The landscape should be returned to GVSU in the condition it was in the day the construction fence was installed.

Quality Assurance

A. The contractor shall bear the final responsibility for proper surface drainage.

B. Contractor will be required to regrade and reseed any areas that pond or otherwise demonstrate poor drainage.

C. Contractor shall remove topsoil that contains foreign material resulting from contractor's operation, including oil drippings, fuel spills, stone, gravel, and other construction related materials. Such materials shall be disposed of legally offsite of Grand Valley State University's property, and replaced with new topsoil.

1 Certification of Grass Seed:
- A. Text Package shall state botanical and common name, percentage by weight of each species and variety, percentage purity, germination, and weed seed.
- B. Seed shall be fresh, clean, dry, new crop seed complying with AOSA's "Journal of Seed Technology; Rules for Testing Seeds" for purity and germination tolerances within inspection date no more than three months prior to application.
- C. Seed must be at minimum 85% germination, and 95% pure seed. Seed exceeding 0.5 percent weed seed is unacceptable.
- D. For seeding, a starter fertilizer of 18-24-12 (1:2:1 ratio) at three quarters of a pound of Nitrogen per 1,000 sq. ft. shall be used.
- E. Seeding rate for newly established areas shall achieve 90% coverage prior to acceptance and will be determined on a per square yard basis.
- F. Hydro-Seeding must be approved by the owner prior to use. If approved, adjacent areas must be protected from overspray.
- G. Seeded areas that achieve less than 90% coverage shall be replaced.

2 Certification of Sod:
- A. The sod source must be identified with name, address and telephone number of supplier.

B. Sod must comply with TPL's "Specifications for Turf grass Sod Materials" in its "Guideline Specifications to Turf grass sodding".
C. Sod must be viable, of uniform density, color, and texture and strongly rooted at a minimum of ½" depth.
D. It must be capable of vigorous growth and development.

3 Soil Amendment and Fertilizers:
A. Contractor shall submit manufacturer's product certificates.
i. The amendments will be incorporated into the top 3 inches of the soil prior installation of sod or seed.
ii. All areas with plant material shall follow the soil analysis report for recommendations on fertilizer and amendments.
iii. For a sodded area, a starter fertilizer of 18-24-12 (1:2:1 ratio) is required at the rate of half a pound of Nitrogen per 1,000 sq. ft. before sod is laid.
iv. For a seeded area, a starter fertilizer of 18-24-12 (1:2:1 ratio) at the rate of three quarters of a pound of Nitrogen per 1,000 sq. ft. shall be used.

4 Protection of Existing Lawns to Remain:
A. Do not store materials or equipment, permit burning, or operate or park equipment on existing lawn areas to remain except as actually required for construction on those areas.
B. Provide barricades, fences or other barriers as necessary to protect existing lawns to remain from damage during construction.
C. Notify owner in any case where Contractor feels grading or other construction called for by Contract Documents may damage existing lawns to remain.
D. If existing lawn areas to remain are damaged during construction, Contractor shall replace such lawn areas of the same quality as those damaged at no cost to Owner.
E. Determination of extent of damage and value of damaged lawns shall rest with the GVSU representative.

5 Warranties
A. Maintenance and protection of the work is the responsibility of the contractor until Final Acceptance.
B. Maintenance consists of mowing, watering, cultivation, weeding, mulching, resetting of plants to proper grades or upright positions, keeping the plants free of insects and disease and in thriving condition.
C. The warranty requires that plants be healthy, vigorous, and thriving for twelve months from the date of Final Acceptance.
D. Dead or dying plants will be documented and removed immediately by the Contractor.
E. Final Acceptance: After Final Acceptance, Grand Valley State University will assume all maintenance of plant material of the site.

Parking lots, roadways and sidewalks

1 Backfilling of Excavation in Roadways and Parking Lots
A. Excavation must be backfilled using an approved sand screened with no stones over 2" in diameter.
B. Excavation must be backfilled using 1' lifts with compaction at each lift.
C. Compaction must be tested ever 2' and must exceed 95% of maximum density.
D. Excavation is to be backfilled until 12.5" from finished roadway or parking lot grade.
E. Sub base for asphalt will consist of 9" of a GVSU approved crushed concrete compacted to 95% maximum density. Crushed concrete is to extend a minimum of 12" past the finished edge of the asphalt in areas where asphalt rolled curb or gutter pan is used.
F. Base layer of asphalt to be comprised of 2" of 3-C grade asphalt.
G. Top layer of asphalt to be comprised of 1.5" of 4-C grade asphalt.

2 Backfilling of Excavation in Asphalt Walk Paths and Sidewalks
A. Asphalt walk paths and sidewalks will not be installed on GVSU property.

3 Backfilling of Excavation in Concrete Walks
A. Excavation must be backfilled using an approved sand screened with no stones over 2" in diameter.
B. Excavation must be backfilled with 1' lifts with compaction at each life.
C. Compaction must be tested every 2' and must exceed 95% of maximum density.
D. Excavation must be filled to within 4" of finished grade and compacted sand base is to extend a minimum of 12" beyond the finished edge of the concrete.
E. Concrete to be poured and finished according to good industry specs.

32 93 00 PLANTS

1 New Plant Warranty: All new plants shall be supplied with a warranty, which requires first year care. This care includes watering, storm damage pruning, removal of cabling or guying wire, mulching, staking, and first season perennial cut back. This warranty shall continue through 2 leaf outs and 2 leaf drops for all perennial plantings.

2 Use of the following list of plant materials may be "unacceptable" for planting in certain areas or locations around the various GVSU campuses, and will be subject to review and approval from the Grounds Supervisor, or an authorized representative of the University:
A. Azalea

B. Boxwood
C. Euonymus
D. Heather
E. Holly (blue or green)
F. Leucothoe
G. Pieris
H. Rhododendron
I. Juniper
J. Yews
K. Grafted or "specialty" plants.
L. Ground cover plants such as Bugleweed (ajuga sp.), Wintercreeper (Euonymous sp.), Ivy (Hedra sp.), Dead Nettle (Lamiastrum sp. And amium sp.), Lily-turf (Liriope sp.), Pachysandra (Pachysandra sp.), edum (Sedum sp.), and Myrtle (Vinca sp.).

32 93 33 SHRUBS

1 Shrub installation shall be in accordance with Standard Detail #32.005 in Appendix C of this manual.

32 93 43 TREES

1 Holes will be dug 3 feet larger, in horizontal diameter than the root ball of the new or transplanted tree. The shape of the hole shall be in the form of a shallow dish, allowing 2-3 inches of the root ball to be above the ground line. All burlap shall be removed to expose the root ball dirt and as much of the wire basket cut away. Once the tree is in the hole, return excavated material back around the root ball, then apply 3 inches of shredded bark mulch over excavated root ball area. Make sure that there is no
excessive amount of mulch resting up against the trunk of the tree so that butt rot does not take place. Do not fertilize the tree with a quick release fertilizer.

2 Restricted Tree Species: These species will never be planted on any campus of GVSU. These plants are Scotch pine (Pinus sylvestris), Austrian pine (Pinus nigra), European birch (Betula pendula), boxelder (Acer negundo), Ash (Franxinus sp.) and Norway Maple (Acer platanoides).

3 New Tree Size: For GVSU Allendale Campus projects tree size shall be selected so that a balanced site plan is immediately presented. For budget development, assume trees to be 3”-4” inches in diameter.

4 New plant specs: all tree stock will have a single stem, unless otherwise called for by the plan. Tree specimens will not be accepted if there is trunk wounding, broken leader(s), excessive broken branches, loose root ball, or generally in poor health. Tree size shall be selected so that a balanced site plan is immediately presented. For budget development, assume trees to be 3”-4” inches in diameter.

5 Protection: For existing, transplanted and new trees, protect root zone (1 ½ times tree height) from compaction by fencing this area around tree. When protection of this size area is not permissible protect minimum area equal to the trees drip line. See Appendix D, GVSU Bulletin #285.

6 Finishing: all trees will be staked, opposite each other, parallel with the prevailing winds (south/south west) to keep the tree from tipping over. Do not guy tree with anything that screws or punctures the tree trunk. Prune all broken branches back to the first live bud or fork if it is a very large limb. Refer to Standard Detail #32.004 in Appendix C of this manual.

7 New Tree Warranty: Warranty shall continue through 2 leaf outs and 2 leaf drops. Any replacement trees shall be warranted under the same provisions starting at from the time of the replacement planting. All trees have to be in a healthy growing state, as determined by GVSU’s arborist. Trees determined to be unhealthy shall be replaced under terms of the warranty.

32 94 00 PLANTING ACCESSORIES

32 94 43 TREE GRATES

1 Tree grate installation (where used in the City of Grand Rapids) shall be in accordance to Standard Details 32.006 & 32.007 in Appendix C of this manual.

32 96 00 TRANSPLANTING

32 96 43 TREE TRANSPLANTING

1 Tree Transplants: At all construction sites, review sites with GVSU Arborist for transplant opportunities. Tree spade should be used for removal and transplant of selected trees. For all trees, a 90-inch tree spade is required. Permanent removal of trees requires executive approval and must be discussed during initial site planning.

2 If irrigation is not present transplant trees and shrubs only from April 1 to May 30 or Sept. 1 to Nov. 25.

3 There shall be no large trees planted near building entrances. All trees need to be a minimum of 20’-30’ from all entrances. Smaller or dwarf ornamental trees can be considered for plantings close to entrances and must be approved by the Arborist. After transplanting, trees must be watered 2 times a week at the minimum, by the contractor if irrigation is

not present or if it has not rained over a half an inch that week. When trees are removed for future relocation, and stored temporarily, they should be 'heeled' in and watered on a daily basis by the Contractor. Care must be taken during digging operations to avoid damage to underground utilities. Contact GVSU Dig and Miss

4 Dig for all tree transplants and installations. Only quality stock shall be transplanted. Lesser species, usually fast growing hardwoods/softwoods, shall not be transplanted. The proposed transplant/relocation plan shall be reviewed with GVSU staff. Orientation (north/south) to be maintained at the transplant location.

END OF SECTION

DIVISION 33 – UTILITIES

33 00 00 UTILITIES

32 10 00 WATER UTILITIES

1 Fire hydrants: Local fire service provider is to be consulted on fire protection services and should be consulted for locations and type of fire hydrants, and access to building for fire fighting apparatus. Review with GVSU. The hydrant operating nut and nozzle caps shall have a 1-3/4 inch square potion one-inch high. Hydrants to be painted with Premium X-O Rust "Yellow Gloss Enamel", by TruValue Manufacturing Company and available at TruValue hardware stores.

2 Provide concrete maintenance pad around covers for shut-off valves to water located on the exterior of buildings. Refer to Standard Detail 22.001 in Appendix C of this manual.

3 University personnel shall be contacted to inspect open trench work prior to backfilling.

4 All water mains shall be run with copper tracer wire for future location detection. Wire shall run full length of all mains and primary branch lines.

5 Trace wire shall be terminated in a Quazite box at one end, minimum.

33 50 00 FUEL DISTRIBUTION UTILITIES

33 51 00 NATURAL-GAS DISRIBUTION

1 Gas service routing and loading shall be indicated on both construction and bidding documents. The Architect and/or Engineer shall confirm routing and loading requirements with D.T.E.

2 DTE Contact 616-954-4605.

APPENDICIES

APPENDIX A Reserved (Not Used)

APPENDIX B Reserved (Not Used)

APPENDIX C Standard Details

APPENDIX D GVSU Bulletin No. 285

APPENDIX E Standards Deviation Form

APPENDIX F Reserved (Not Used)

APPENDIX F Digging Procedures & Permit

APPENDIX H Area Calculations

APPENDIX I Reserved (Not Used)

APPENDIX J NFPA 731 – Installation of Electronic Premises Security Systems

APPENDIX K Checklist for Contractor's SESC Plan

END OF SECTION

APPENDIX A (RESERVED)

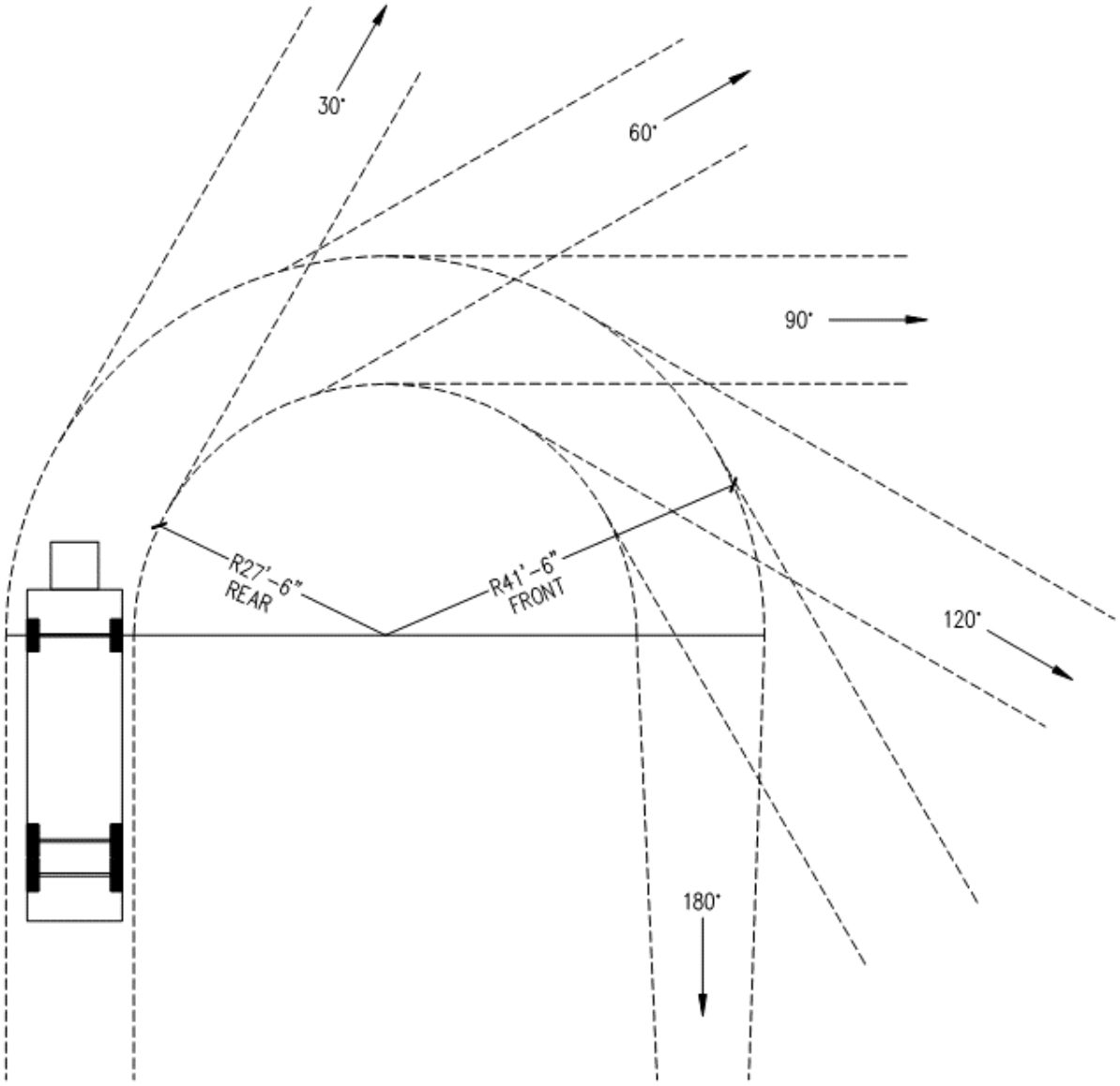
APPENDIX B (RESERVED)

Grand Valley State University

APPENDIX C

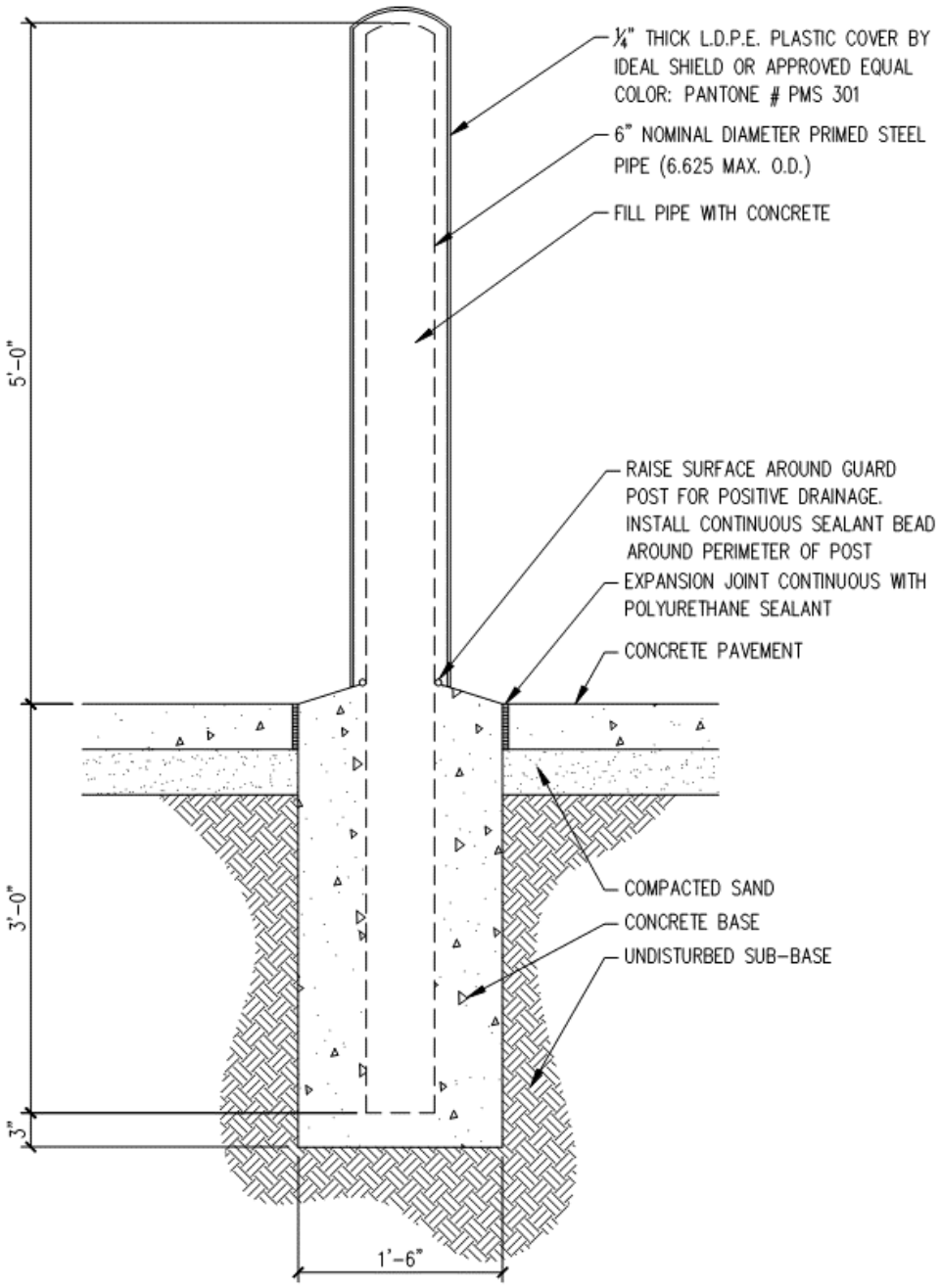
STANDARD DETAILS

(SPEC SECTION) 00.000 (DETAIL #)



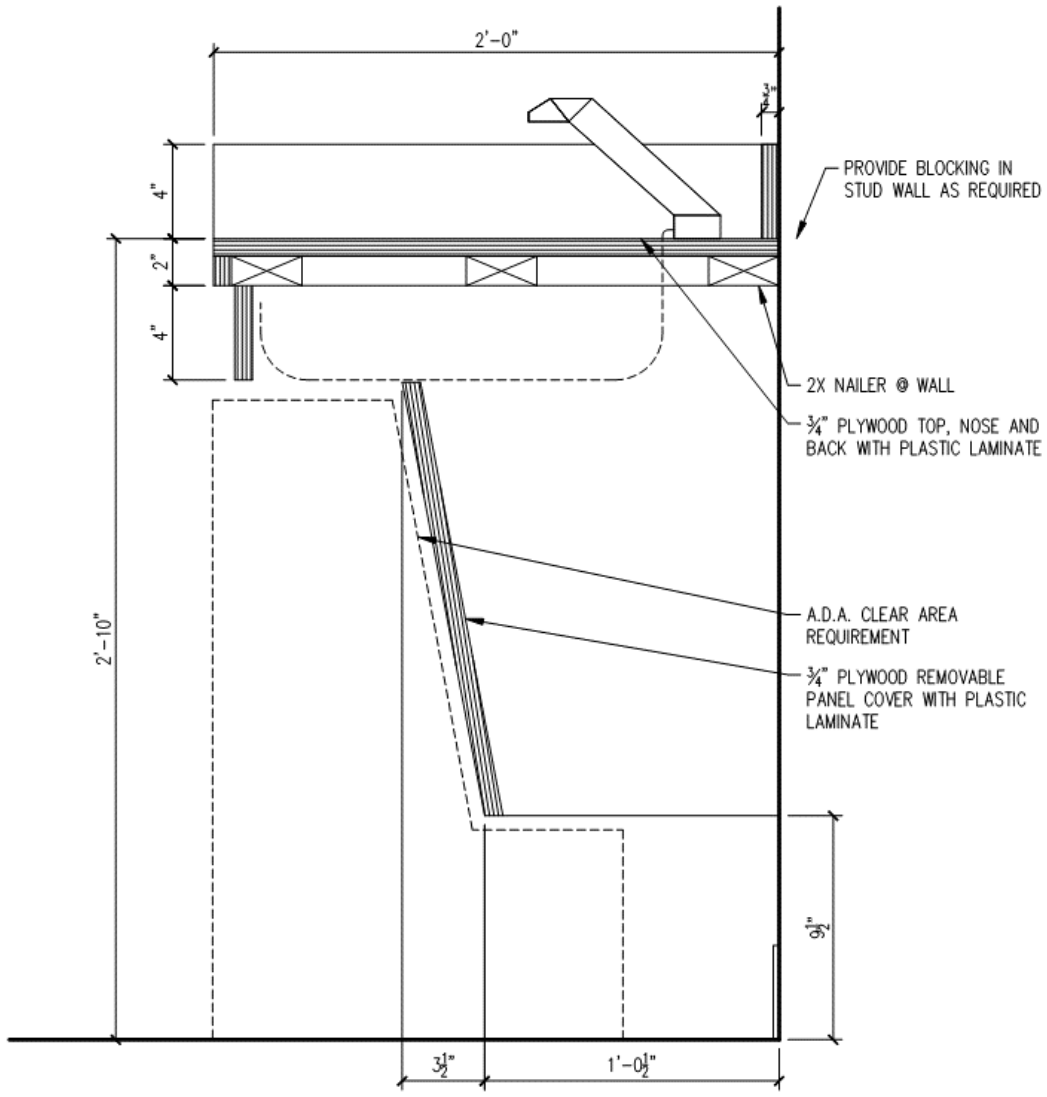
TRUCK & FIRE EQUIPMENT MIN. TURNING REQUIREMENTS

APPENDIX C NO SCALE STANDARD DETAIL # 00.001



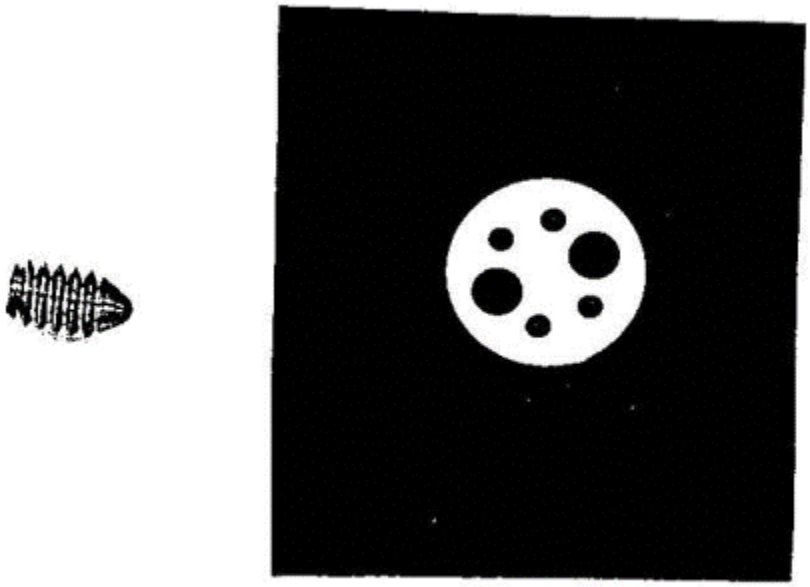
TYPICAL GUARD POST

APPENDIX C NO SCALE STANDARD DETAIL # 05.001



LOUNGE KITCHEN COUNTER DETAIL (Typically Used in Student Housing)

APPENDIX C NO SCALE STANDARD DETAIL # 06.001



THE ABOVE SET SCREW AND PLASTIC DISK THAT TYPICALLY COME WITH BEST CYLINDERS **ARE NOT** TO BE INSTALLED IN THE CYLINDER.

HARDWARE SET SCREW AND DISK - DISCARD

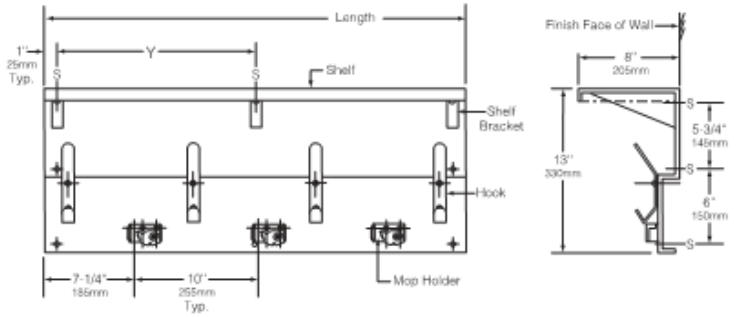
APPENDIX C NO SCALE STANDARD DETAIL # 08.001

BOBRICK

Technical Data

UTILITY SHELF WITH MOP/BROOM HOLDERS AND RAG HOOKS

B-239



STANDARD STOCK SIZES

Model No.	Length	Dim. Y	Shelf Brackets	No. of Hooks	No. of Mtg. Holes	No. of Mop Holders
B-239 x 34	34" (865mm)	NA	2	4	6	3

BOBRICK UTILITY SHELF MODEL 239 X 34

APPENDIX C NO SCALE STANDARD DETAIL # 10.001

See Section 12 93 23 for Component Specifics

"Butler Ash Receptacle" by Forms and Surfaces

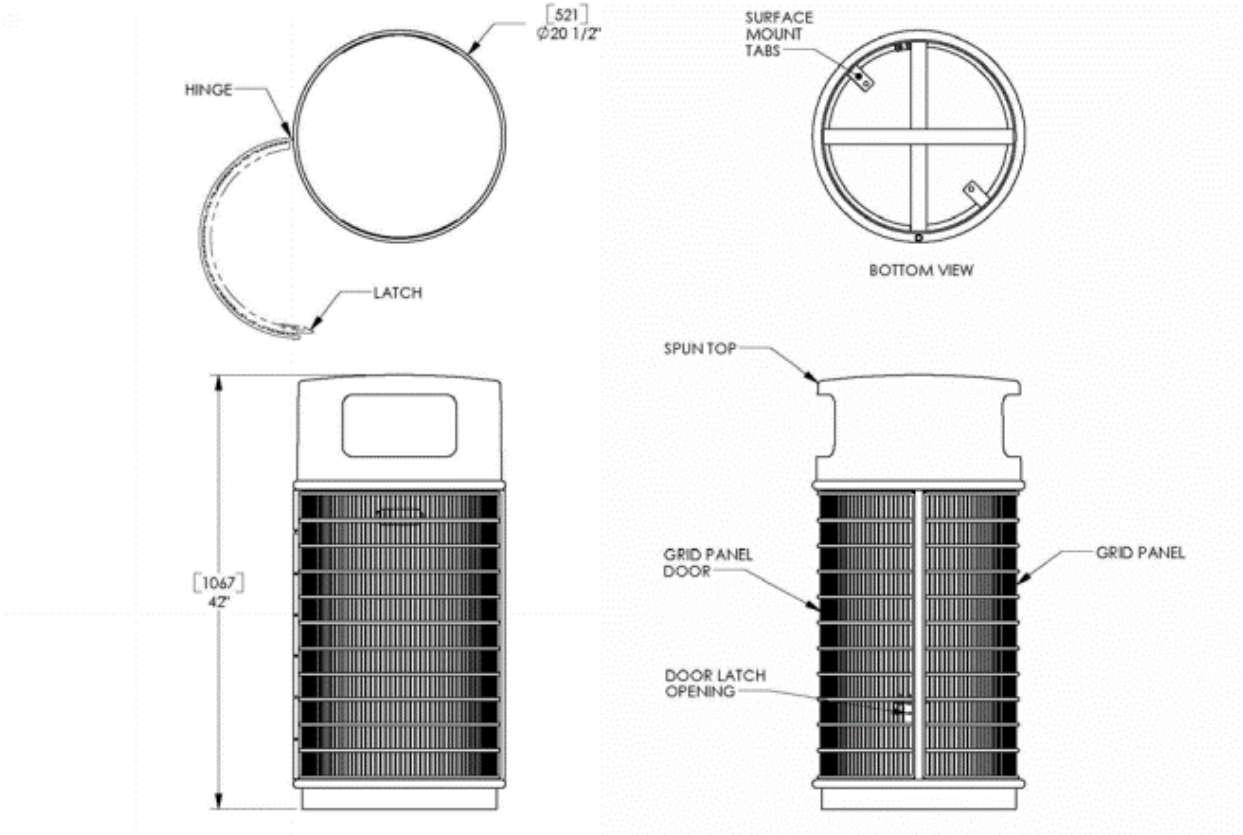
Pole Mount**:** Model #SUBUT-MDS in black. Surface mount to sidewalk or other suitable concrete surface.

Wall Mount: Model #SUBUT-MDW in black.

ASH BUTLER (Forms and Surfaces)

APPENDIX C NO SCALE STANDARD DETAIL # 12.001

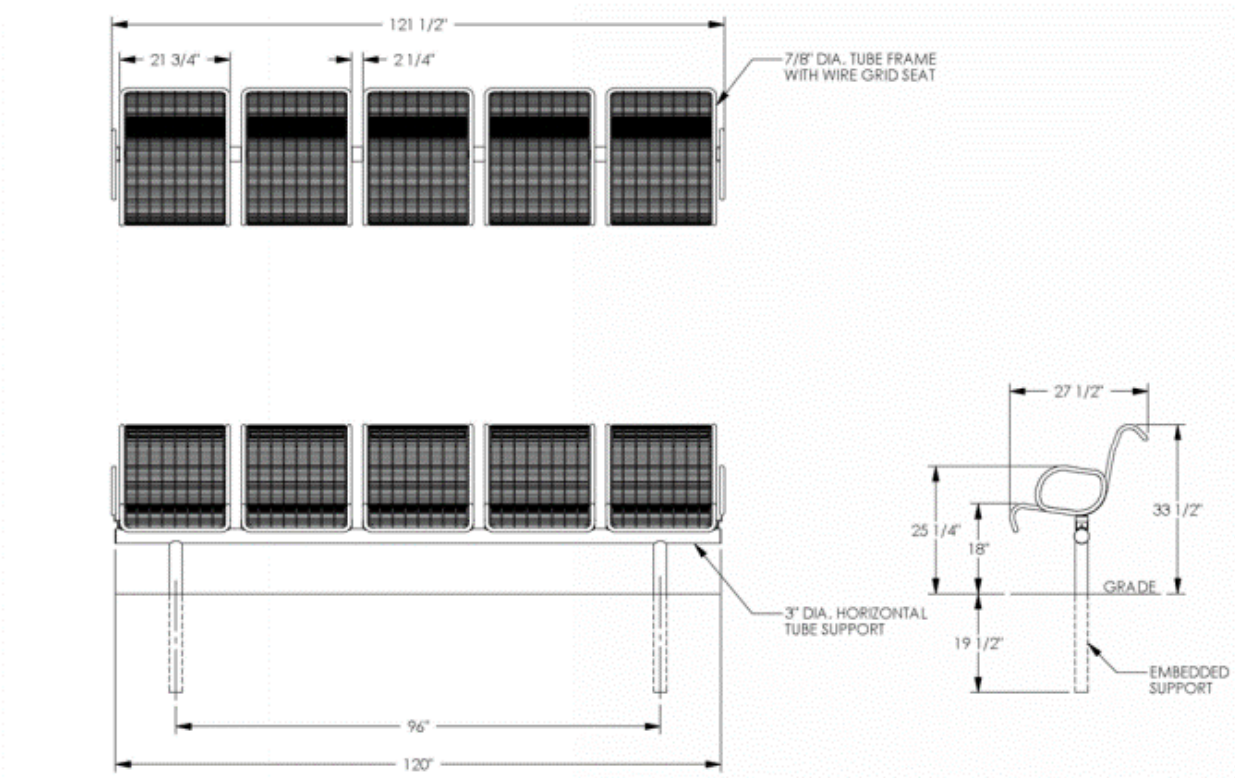
See Section 12 93 23 for Component Specifics



PLEXUS LITTER RECEPTACLE W/O ASH URN (Landscape Forms)

APPENDIX C NO SCALE STANDARD DETAIL # 12.002

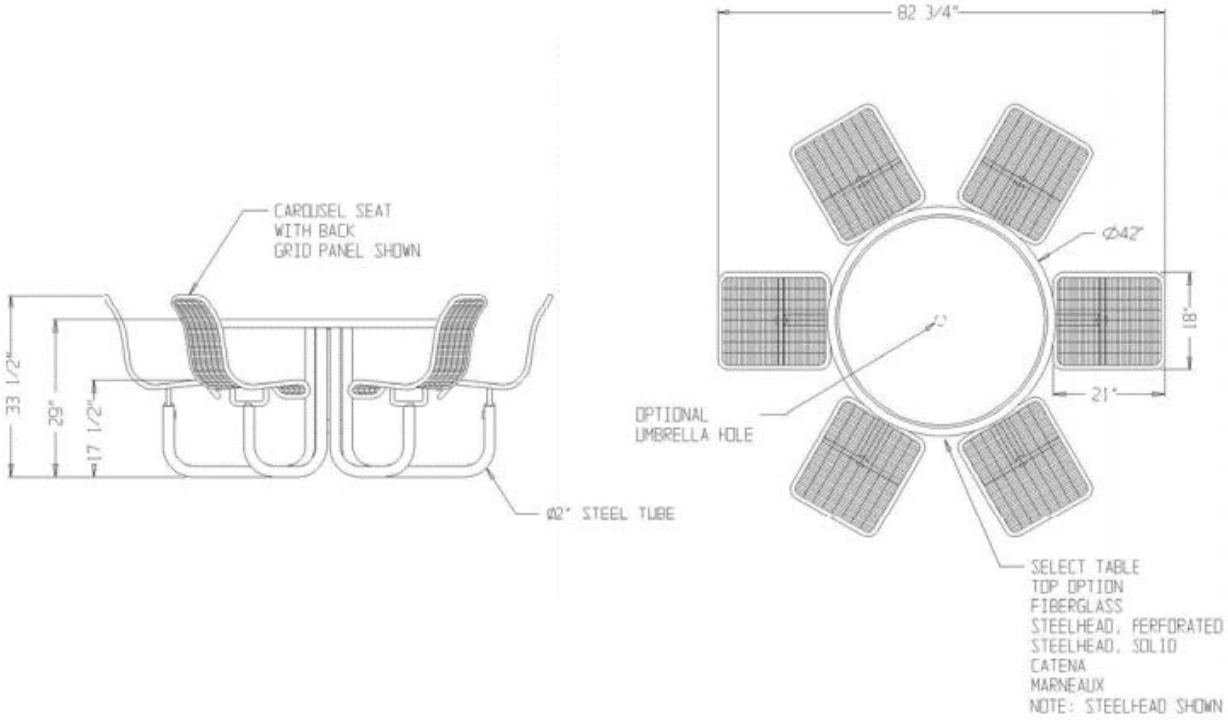
See Section 12 93 43 for Component Specifics



PLEXUS BENCH SEATING (Landscape Forms)

APPENDIX C NO SCALE STANDARD DETAIL # 12.003

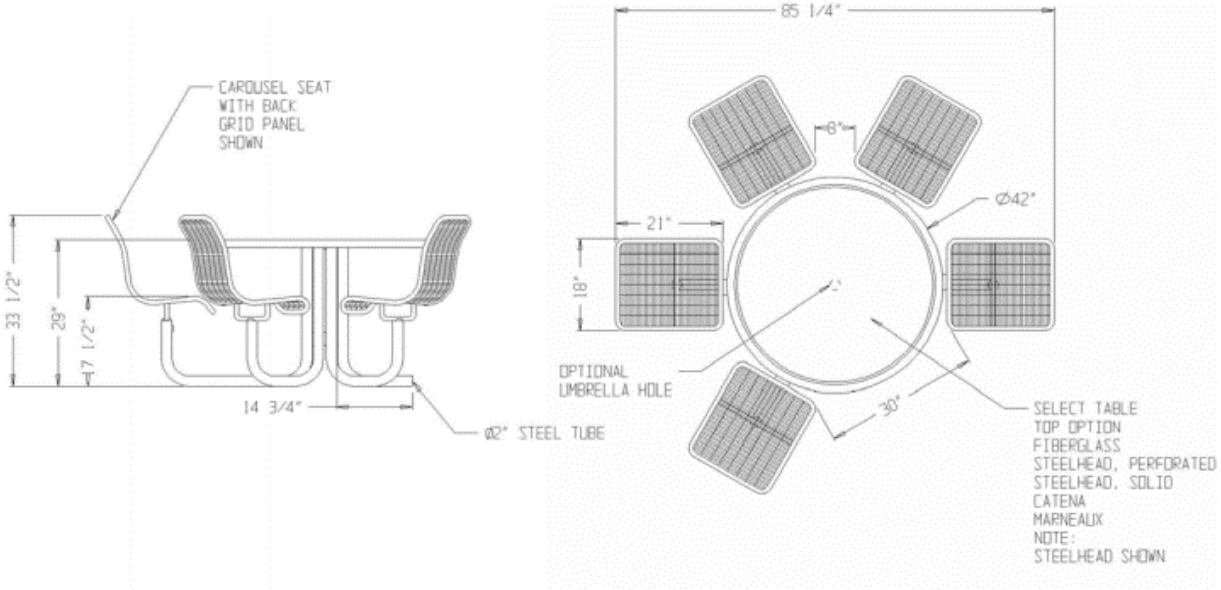
See Section 12 93 43 for Component Specifics



PLEXUS BENCH SEATING (Landscape Forms)

APPENDIX C NO SCALE STANDARD DETAIL # 12.004

See Section 12 93 43 for Component Specifics

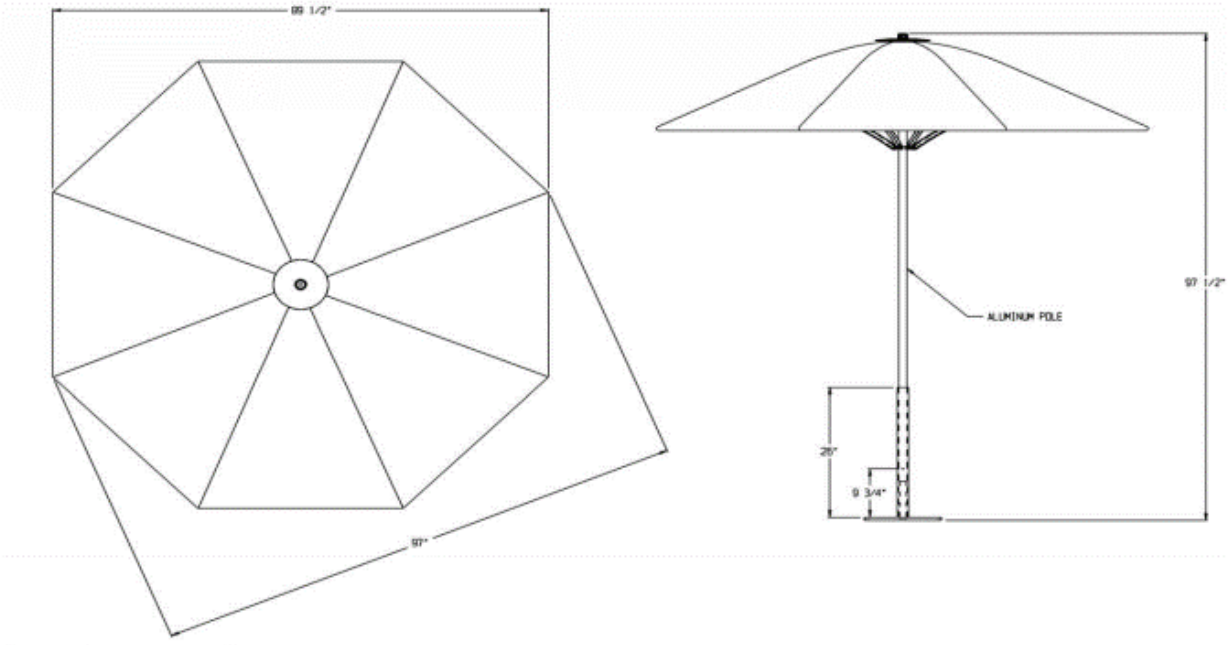


NOTE: Only the (3) seat option is ADA compliant due to clearances.

PLEXUS BENCH SEATING - ASSESSABLE (Landscape Forms)

APPENDIX C NO SCALE STANDARD DETAIL # 12.005

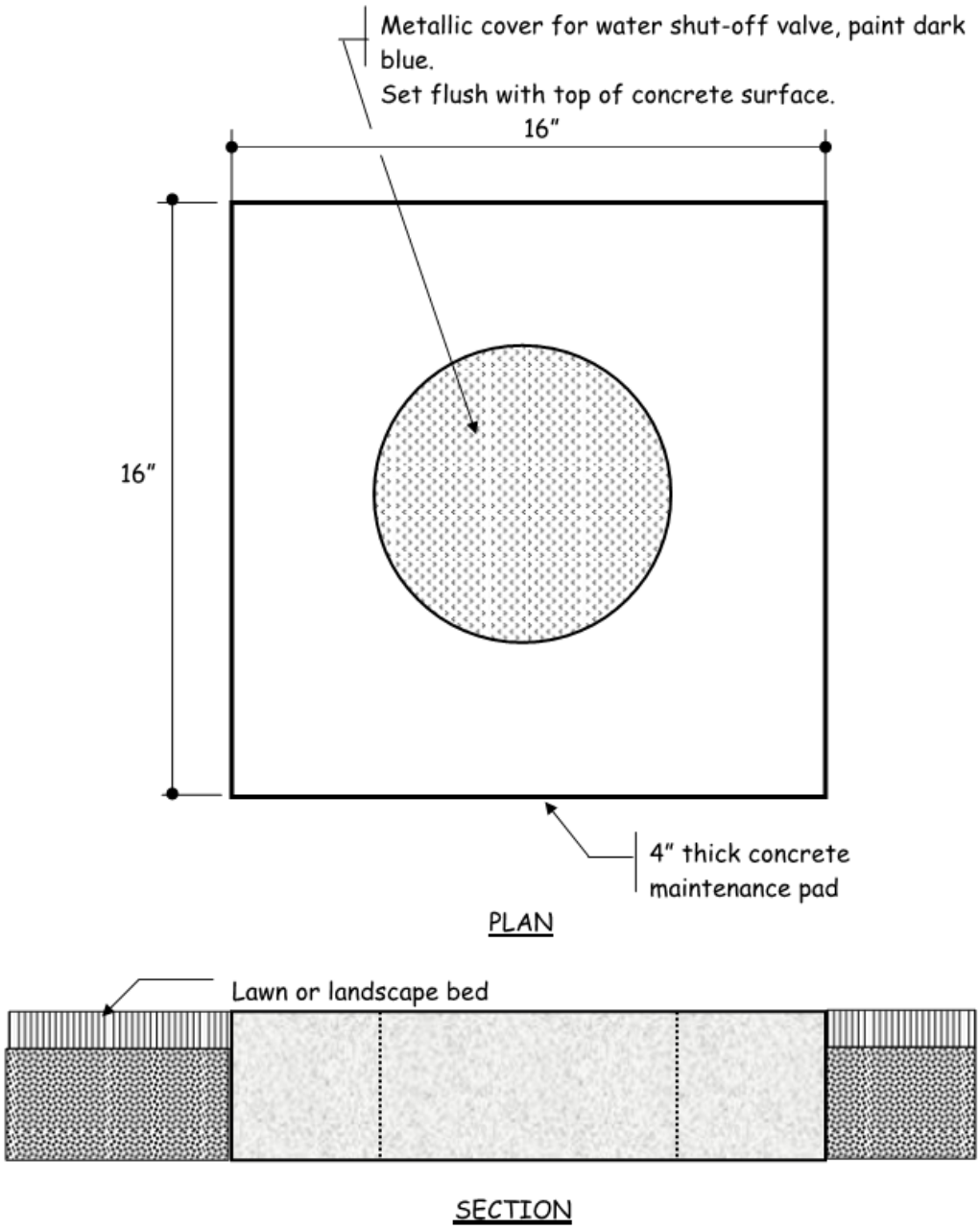
See Section 12 93 43 for Component Specifics



NOTE: Confirm if GV Project Manager wants umbrella covers.

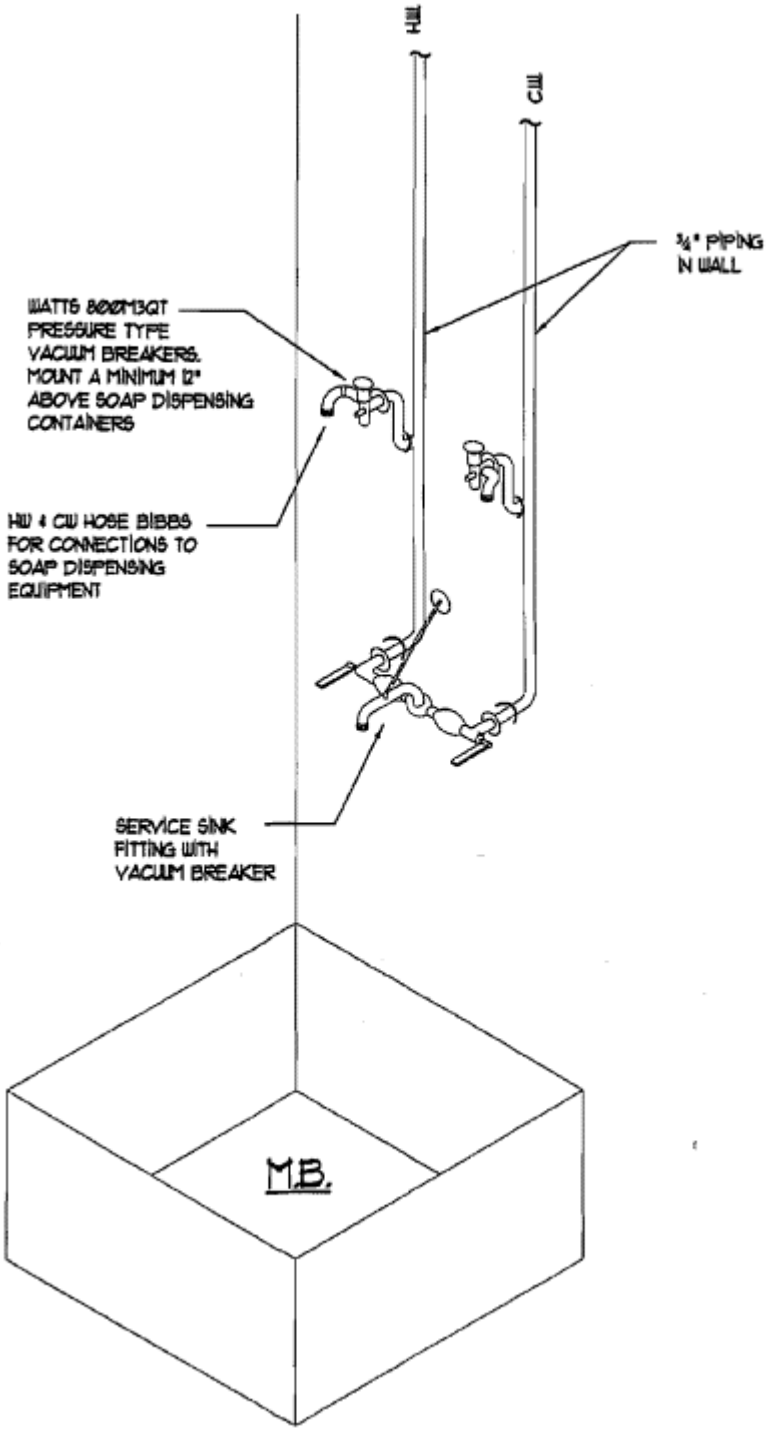
EQUINOX UMBRELLA (Landscape Forms)

APPENDIX C NO SCALE STANDARD DETAIL # 12.006



WATER SHUT-OFF VALVE MAINTENANCE PAD

APPENDIX C NO SCALE STANDARD DETAIL # 22.001



JANITOR CLOSET PIPING DETAIL

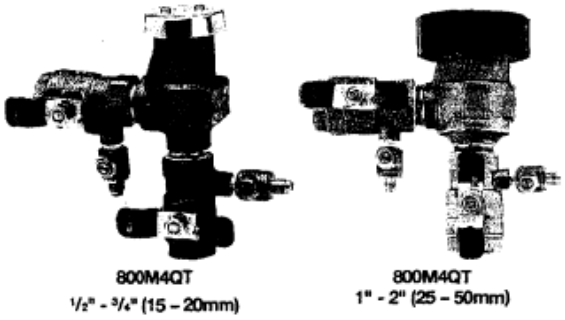
APPENDIX C NO SCALE STANDARD DETAIL # 22.002a

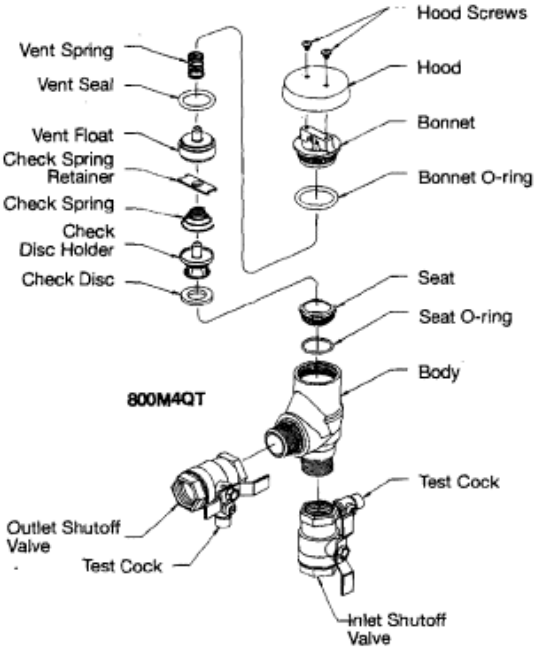
Series 800M4QT

Anti-Siphon Pressure
Vacuum Breakers

Sizes 1/2" - 2" (15-50mm)

series 800M4QT is designed to prevent back-siphonage of contaminated water into a portable water supply. The valve is ideally suitable for irrigation systems. industrial process water systems and other continuous pressure piping system applications where the water enters the equipment at or below its flood rim. The disc float and check valve are suitable for temperatures up to 140°F. The resilient sealing float o-ring and seal check disc are silicone rubber which is resistant to heat, shock and chemical attack.





Features

- Replaceable plastic seat
- Easy maintenance of internal parts
- Acetal bonnet acts as "freeze plug" to prevent body damage
- O-ring bonnet seal for less possiblility of fouling
- Silicone seat disc for durability
- Test cocks positioned for easy testing and winterization
- Compact space saving design
- Standardly equipped with tee handle quarter turn ball valve shutoffs 1/2"- 1" (15-25mm). The $1^{1/4}$ - 2" (32 - 50mm) feature lever handles
- No special tools required for servicing
- Bronze body for durability

Available Models

Suffix:

U - *Union connections (3/4" - 1" only)*

Specifications

Pressure Vacuum Breakers

An anti-siphon pressure vacuum breaker shall be installed where indicated on the plans to prevent the back-siphonage of contaminated water. This assembly is not to be used where there is a possibility that a back pressure condition may develop. The assembly will incorporate an acetal bonnet with silicone rubber O-ring seal and silicone rubber seat disc. The valve shall have replaceable seats. Check assembly shall be guided over its full stroke by 'V' notched guides. The assembly shall meet the requirements of ANSI/ASSE Standard 1020.

Watts Regulator Company Series 800M4QT

JANITOR CLOSET PIPING DETAIL

APPENDIX C | NO SCALE | STANDARD DETAIL # 22.002b

Materials

Springs	Stainless Steel
Bonnet	Celcon
Vent Disc	Silicone Rubber
Disc Holder Float	Polypropylene
Check Valve Disc	Silicone Rubber
Check Valve Seat	Noryl Plastic
Body	Bronze

Pressure - Temperature

Temperature Range: 33°F to 140° (5°C to 60°C)

Maximum Working Pressure: 150psi (10.3 bar)

Installations

This valve is designed for installation in a continuous pressure potable water supply system 12" above the highest point of the downstream piping. The valve must be installed with the supply connected to the bottom and in a vertical position. Allow adequate space for periodic inspection, servicing or testing. The valve should not be installed in an area where freezing or spillage will cause damage. Adequate drainage/freeze protection must be provided in cold weather applications. 1.5psi (.10 bar) must be exerted against the float spring to seal the float and air inlet. Do not undersize supply and discharge piping.

Important Note: Vacuum breakers are not designed, tested or approved to protect against backpressure backflow or water hammer shock. For protection against backpressure backflow, install Watts 909/009 Reduced Pressure Zone Backflow Preventer. For Protection against water hammer shock install a Watts Series 15 Water Hammer Arrestor utilizing good plumbing practice.

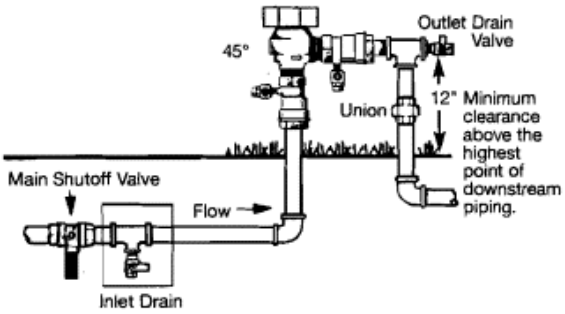
Standards

ANSI, USC Manual Section 10

Approvals

1020

Approved by the foundation for Cross-Connection Control and Hydraulic Research at the University of Southern California, Manual Section 10. (1/2" – 2" 800M4QT only)
CSA (1/2" – 2" 800M4QT only)

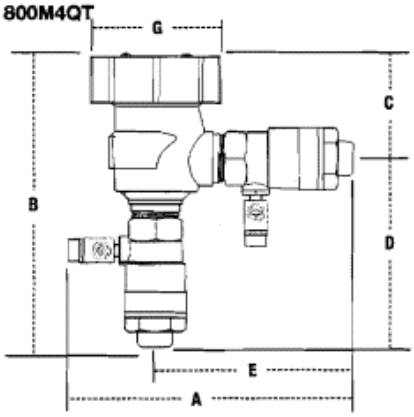


Freeze Protection Guidelines

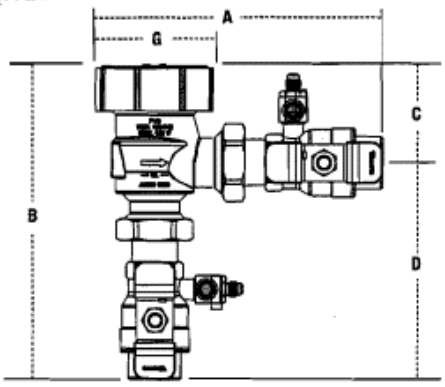
1. Close main shutoff valve.
2. Open upstream drain, test cocks and isolation ball valves to depressurize line.
3. Purge with air.
4. Leave test cocks and isolation ball valve handles in 45° angle to drain ball valves and prevent casting damage.

Dimensions – Weights

800M4QT



U800M4QT



MODEL	SIZE (DN)		DIMENSIONS												WEIGHT	
			A		B		C		D		E		G			
	in.	mm	in.	mm	in.	mm	in.	mm	in.	mm	in.	mm	in.	mm	lbs.	kg.
800M4QT	½	15	6⅛	156	6¼	159	2⁹⁄₁₆	65	3¹¹⁄₁₆	94	3⅞	98	2¼	57	4	1.8
800M4QT	¾	20	6½	165	6½	165	2⁹⁄₁₆	65	3¹⁵⁄₁₆	100	4⅛	105	2¼	57	4	1.8
800M4QT	1	25	7½	191	7½	191	2¾	70	4¾	121	4⅞	124	3⁷⁄₁₆	87	6	2.7
800M4QT	1¼	32	8⅞	225	9	229	3¼	83	5¾	146	6⅛	156	5	127	11	5.0
800M4QT	1½	40	9¼	235	9½	241	3¼	83	6¼	159	6⅜	162	5	127	14	6.3
800M4QT	2	50	10⅝	270	9⅝	245	3¼	83	6⅜	162	7	178	5	127	19	8.6
U800M4QT	¾	20	6⅜	163	7⁹⁄₁₆	192	2⅛	55	5⁷⁄₁₆	138	–	–	2¼	57	4	1.8
U800M4QT	1	25	8⁵⁄₁₆	211	9	229	2¹³⁄₁₆	71	6³⁄₁₆	158	–	–	3⁷⁄₁₆	87	6	2.7

JANITOR CLOSET VALVE SCHEDULE

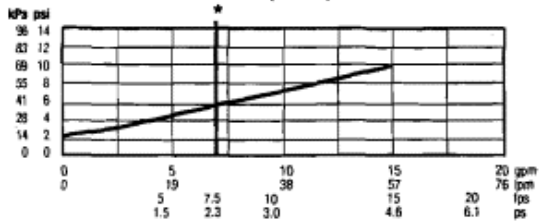
APPENDIX C NO SCALE STANDARD DETAIL # 22.002c

Capacity

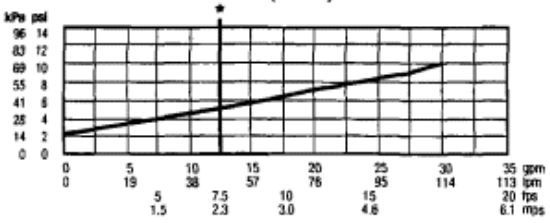
As compiled from documented Foundation for Cross-Connection Control and Hydraulic Research at the University of Southern California lab tests.

*Typical maximum flow rate (7.5 feet/sec.)

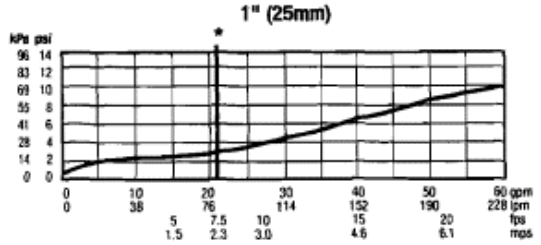
½" (15mm)



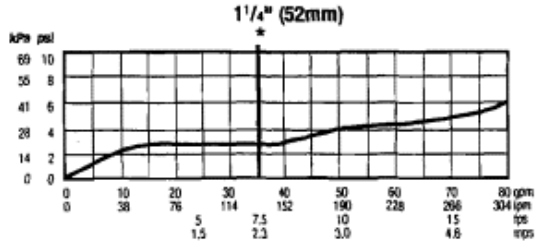
¾" (20mm)



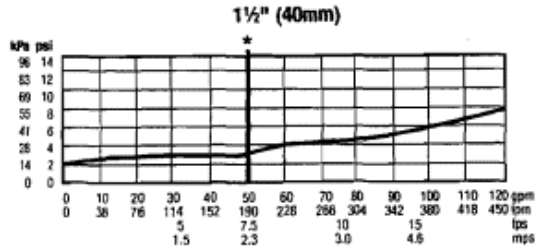
1" (25mm)



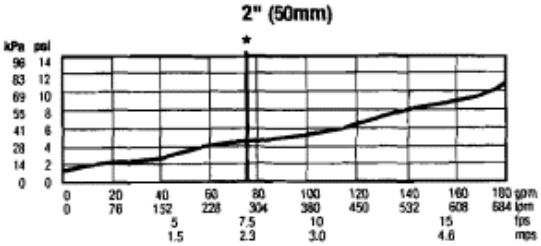
1¼" (52mm)



1½" (40mm)

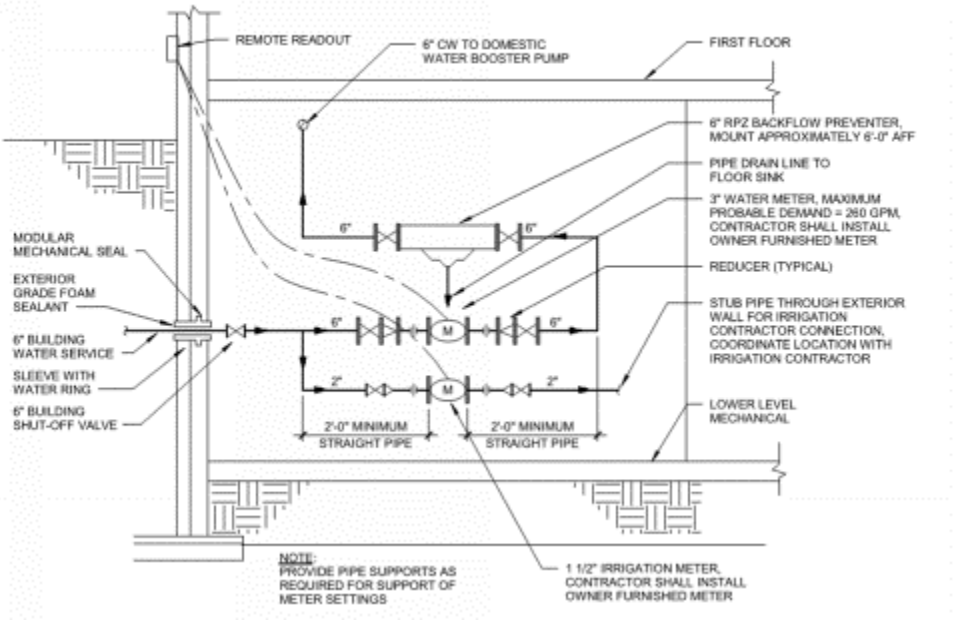


2" (50mm)



JANITOR CLOSET PIPING DETAIL

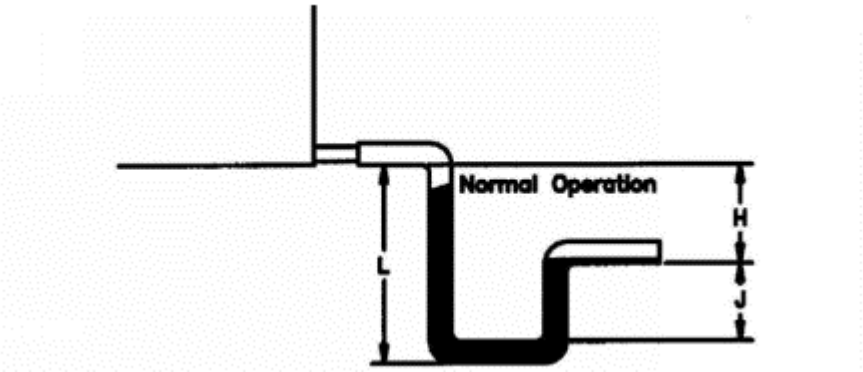
APPENDIX C NO SCALE STANDARD DETAIL # 22.002d



TYPICAL WATER AND IRRIGATION METER DETAIL

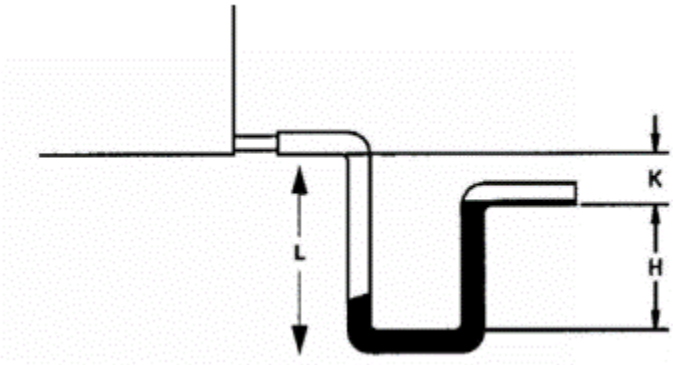
APPENDIX C NO SCALE STANDARD DETAIL # 22.003

DRAIN PIPE TRAPPING FOR MODULE UNDER NEGATIVE PRESSURE



L = H + J + PIPE DIAMETER
WHERE:
H = 1-INCH FOR EACH INCH OF NEGATIVE PRESSURE* PLUS 1-INCH
J = 1/2H
*NEGATIVE PRESSURE = TOTAL UNIT STATIC PRESSURE AT WORST CASE (LOADED FILTERS) MINUS EXTERNAL PRESSURE.

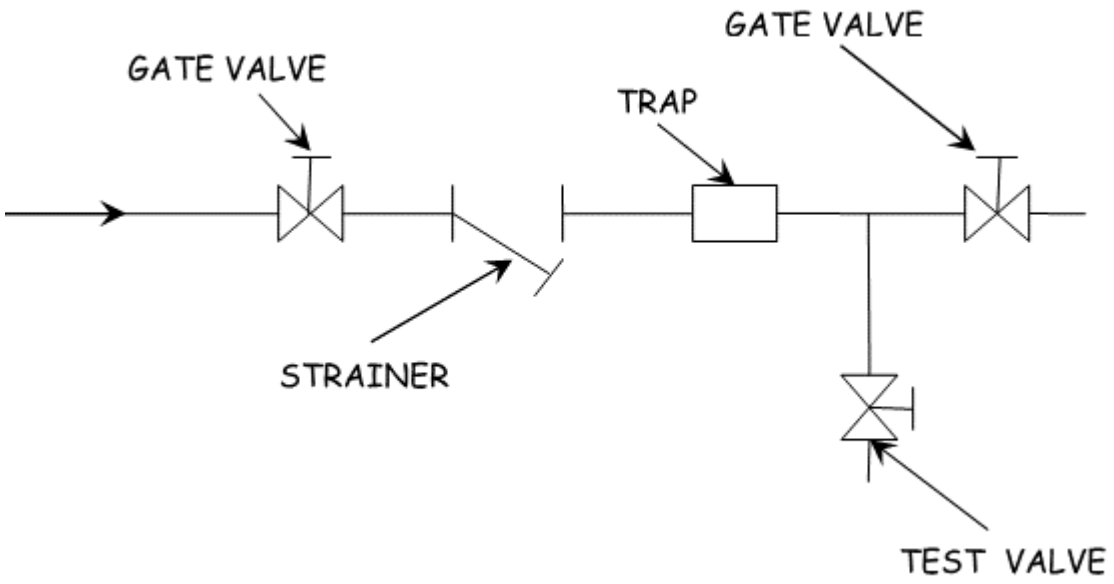
DRAIN PIPE TRAPPING FOR MODULE UNDER POSITIVE PRESSURE



L = ½-INCH MINIMUM
H = ½-INCH PLUS THE TOTAL UNIT STATIC PRESSURE AT WORST CASE (LOADED FILTERS) MINUS EXTERNAL PRESSURE.

STANDARD AHU CONDENSATE DRAIN DETAIL

APPENDIX C NO SCALE STANDARD DETAIL # 23.001



STEAM TRAP PIPING SCHEMATIC

APPENDIX C NO SCALE STANDARD DETAIL # 23.002

Choose a location where unit will be easy to clean and service. Changing of elements and housing cleaning requires draining the unit. Locate near floor drain or provide piping to floor drain.

Install filter in a position where pressure differential between inlet and outlet of filter is at least 20 psig.

Area above the filter must be clear to allow elements to be changed. Distance above filter to be at least equal to height of housing.

If filter is in full-flow configuration, provide by-pass piping to allow system to operate during service of filter.

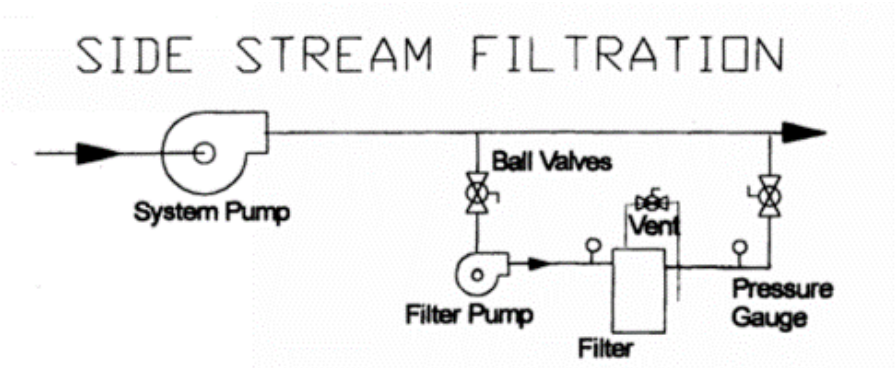
Provide isolation valves at inlet and discharge of filter to allow service. Position valves to minimize fluid loss during filter element changing.

Provide vent valve at top of filter housing if housing has outlet. Plumb vent across top of housing and down below eye level.

Provide pressure gauge on inlet and discharge side of system isolation valves.

if system is lacking a proper sample point, install one when installing filter.

Omit by-pass loop for units not in full flow configuration.



- Filter - Shelco 304 stainless steel filter housing - Holds (4) 20" filter cartridges, 50 GPM
- Filter Cartridges - 20" Shelco, 20 micron, bleached cotton string wound
- Filter Pump - Bell & Gossett 3530-S centrifugal pump, 1/2 hp, 304 SS impeller, max system pressure 125 psi.

CHEMICAL TREATMENT FILTER INSTALLATION INSTRUCTIONS

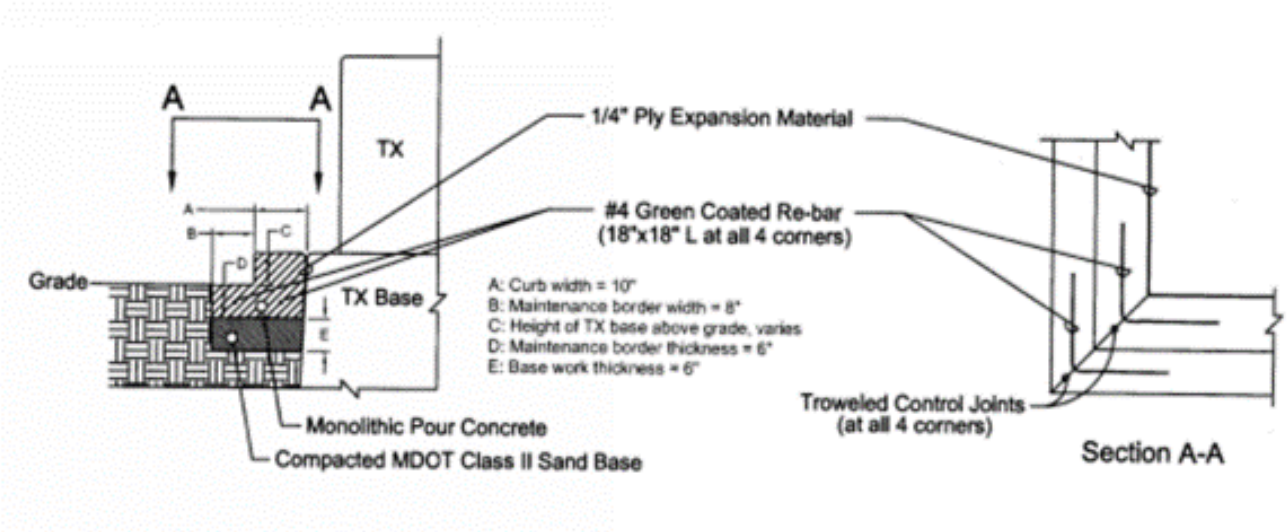
APPENDIX C NO SCALE STANDARD DETAIL # 23.003

Building (fill in)	Winter				Summer				Comments
	Type of Room				Type of Room				
	Classroom	Office	Conference	Open	Classroom	Office	Conference	Open	
Occupied	68 F	68 F	68 F	Note 6	76 F	76 F	76 F	Note 6	Hours are to be determined.
Unoccupied Standby	66 F	66 F	66 F	Note 6	78 F	78 F	78 F	Note 6	Hours are to be determined.
Unoccupied	62 F	62 F	62 F	Note 6	80 F	80 F	80 F	Note 6	Hours are to be determined.

1. Environmental sensors used by the University include CO^2 (demand based ventilation), temperature (comfort level), and occupancy (is the space in use).
2. Demand ventilation method will be used to prevent build up of CO^2 in the building.
3. Sensors used may have multiple capabilities.
4. In winter when the temperature drops below the set point the HVAC heating equipment will activate to drive the room temperature back into the set point range according to the building status occupied, unoccupied standby or unoccupied.
5. In summer when the temperature rises above the set point the HVAC heating equipment will activate to drive the room temperature back into the set point range according to the building status occupied, unoccupied standby or unoccupied.
6. To be determined. Further research/input to be provided for Open areas. Could also be multiple zones within a space.

STANDARD BUILDING SET POINTS

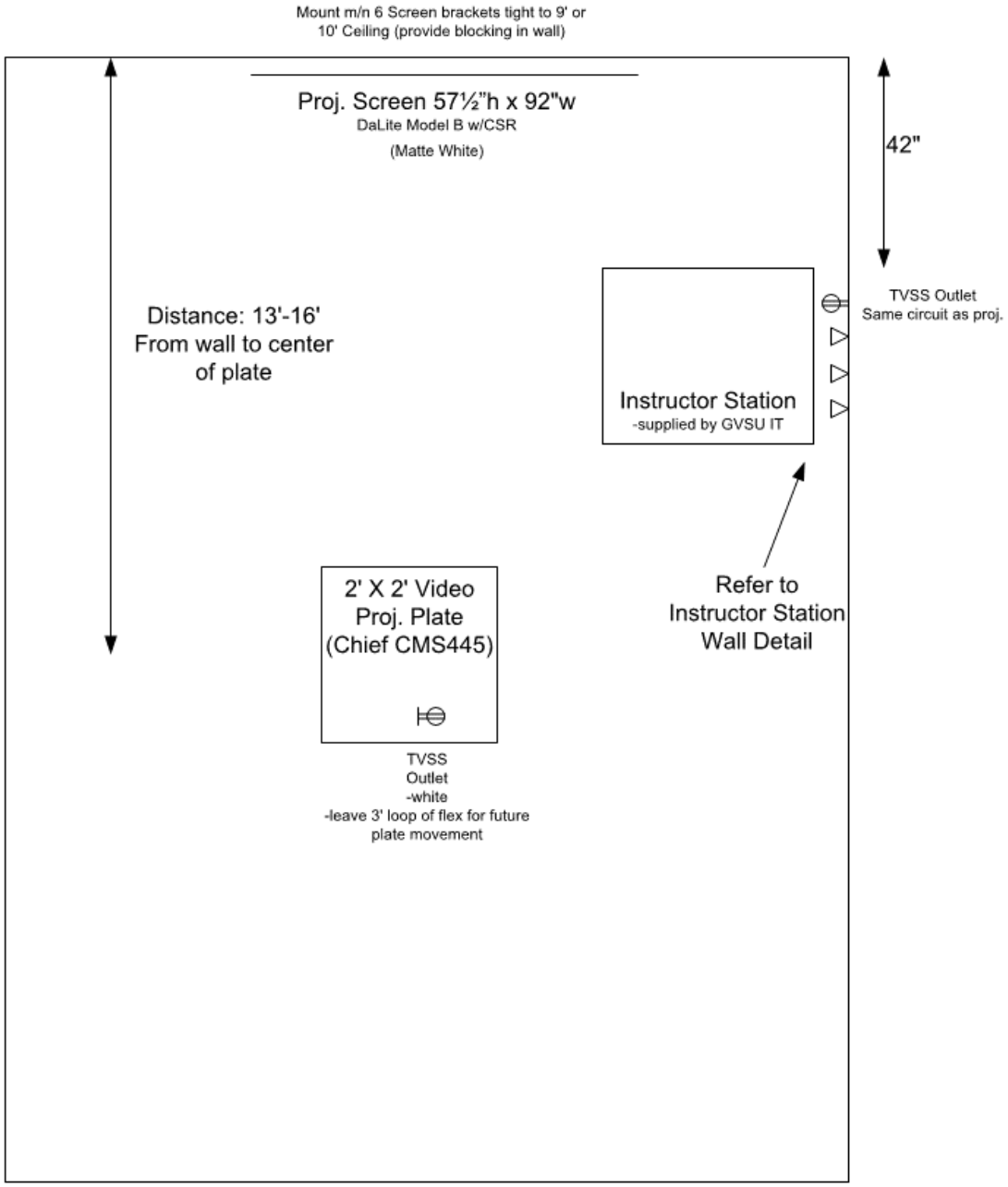
APPENDIX C NO SCALE STANDARD DETAIL # 23.004



CONCRETE MAINTENANCE PAD DETAIL

APPENDIX C NO SCALE STANDARD DETAIL # 26.001

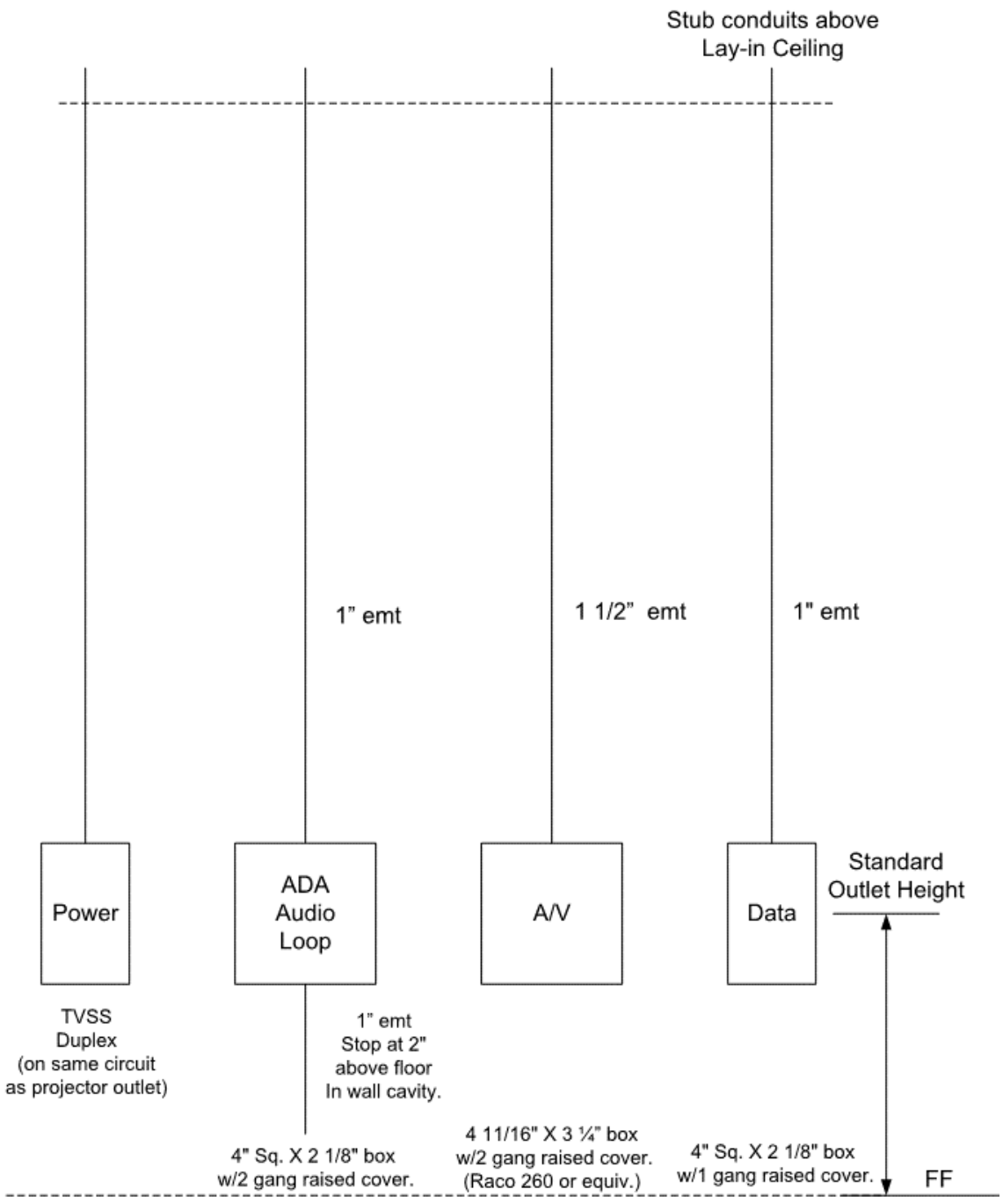
Standard Classroom
AV Equipment Locations



STANDARD GENERAL PURPOSE CLASSROOM A/V EQUIPMENT LOCATIONS

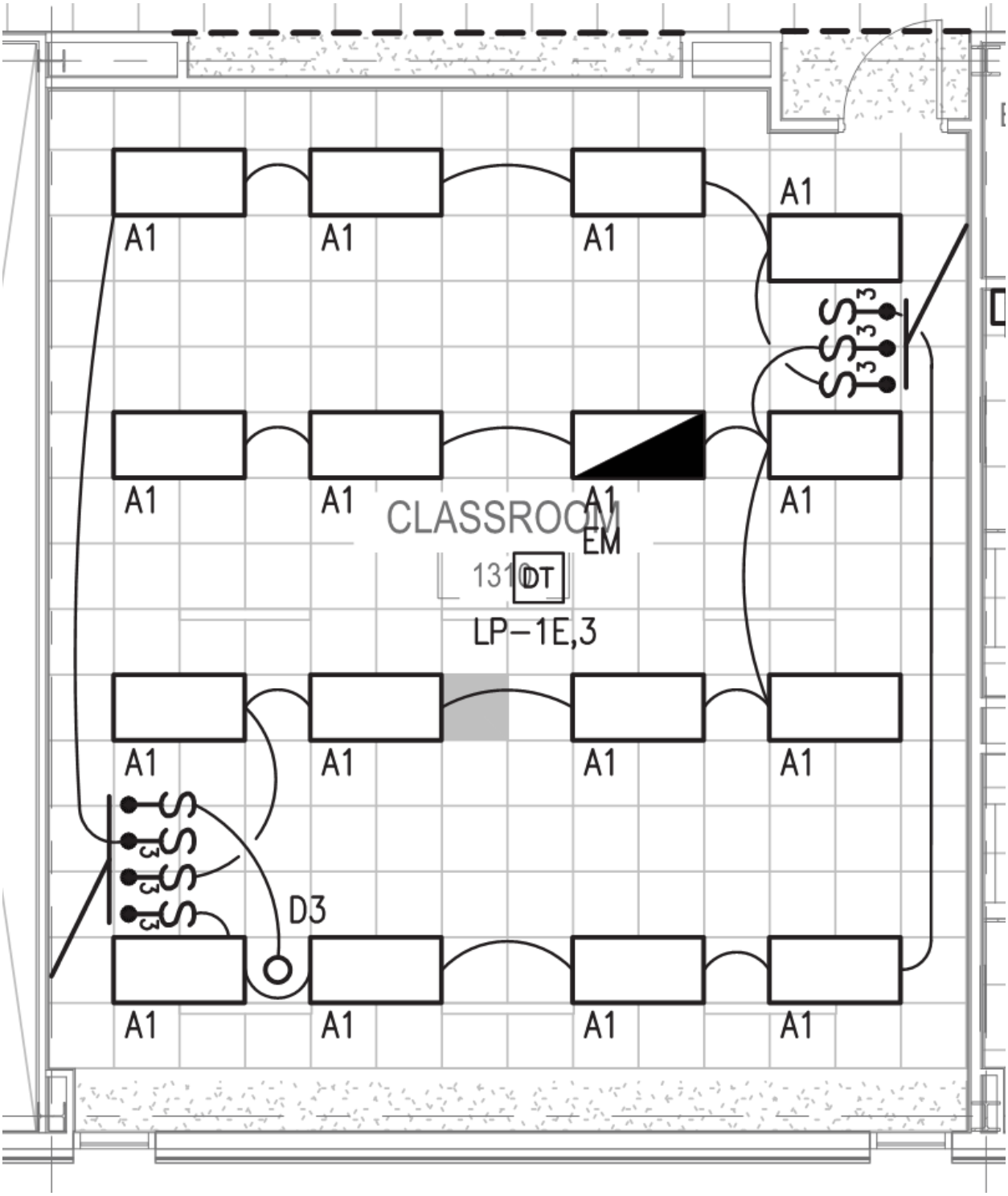
APPENDIX C NO SCALE STANDARD DETAIL # 27.001

Classroom
Instructor Station
Wall Detail



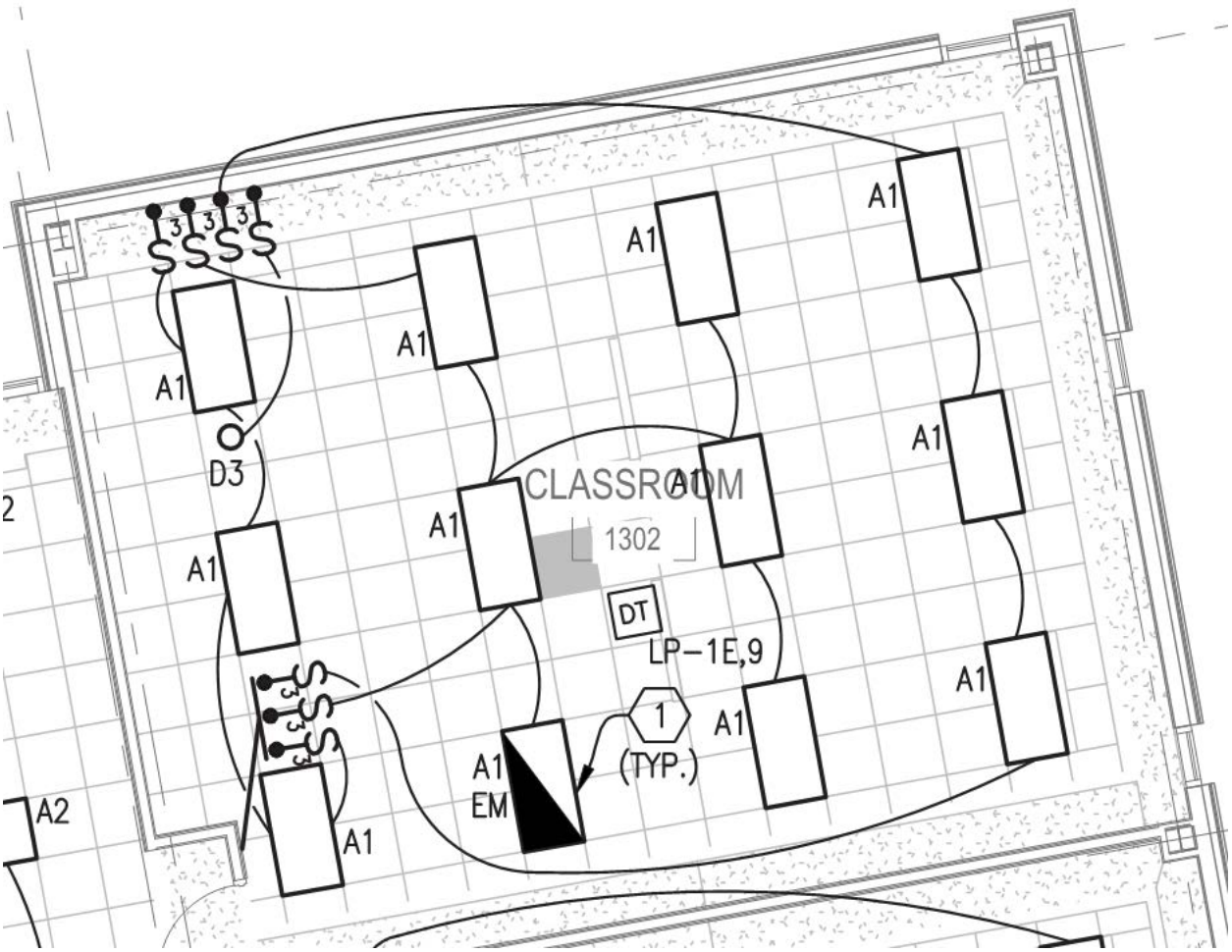
STANDARD CLASSROOM IN-WALL AUDIO-VISUAL CONDUIT and BOX DETAIL

APPENDIX C NO SCALE STANDARD DETAIL # 27.002



TYP. CLASSROOM LIGHTING - SWITCHING DETAILS

APPENDIX C NO SCALE STANDARD DETAIL # 27.003a



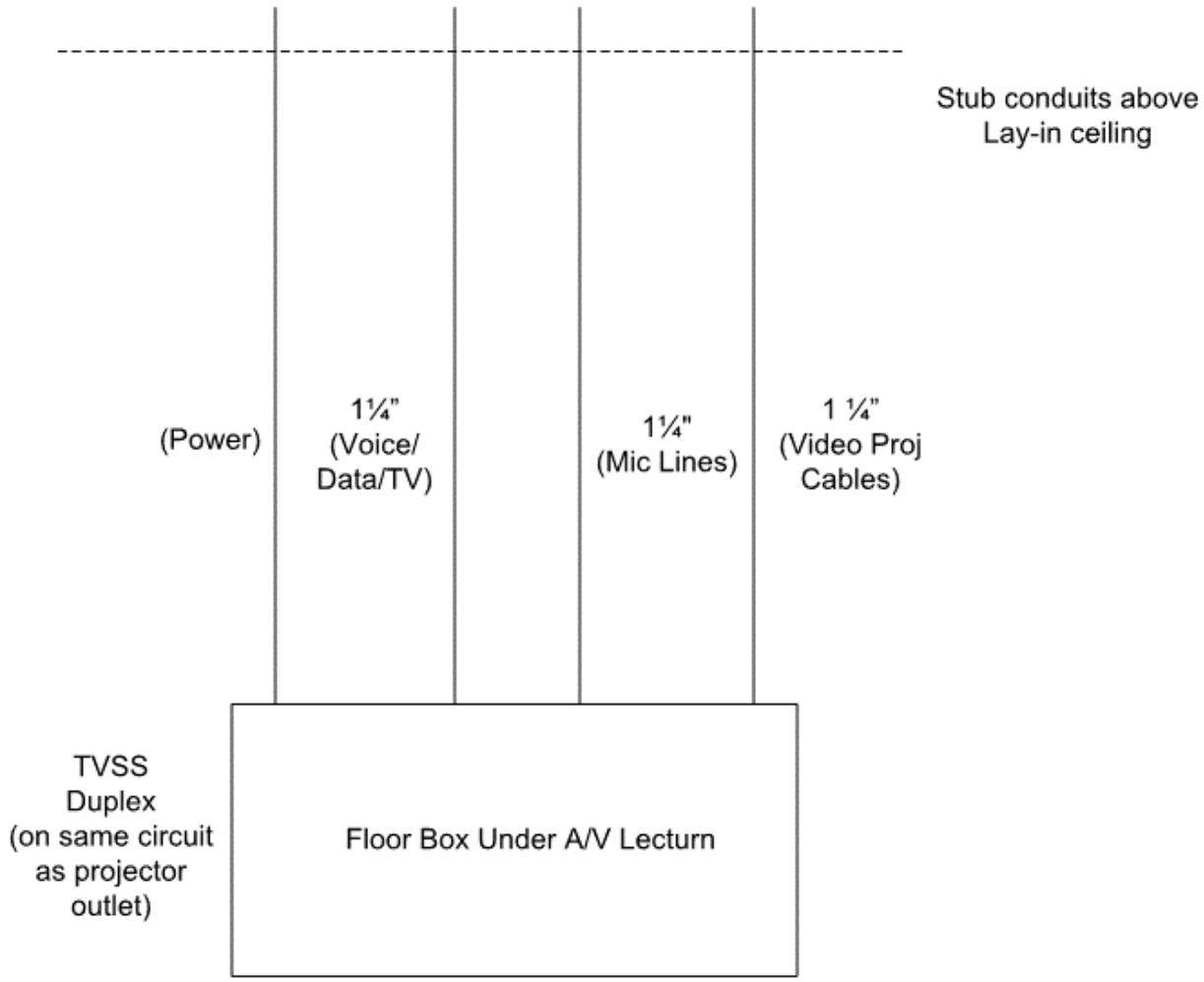
TYP. CLASSROOM LIGHTING - SWITCHING DETAILS

APPENDIX C NO SCALE STANDARD DETAIL # 27.003b

TYP. CLASSROOM LIGHTING - SWITCHING DETAILS

APPENDIX C NO SCALE STANDARD DETAIL # 27.003c

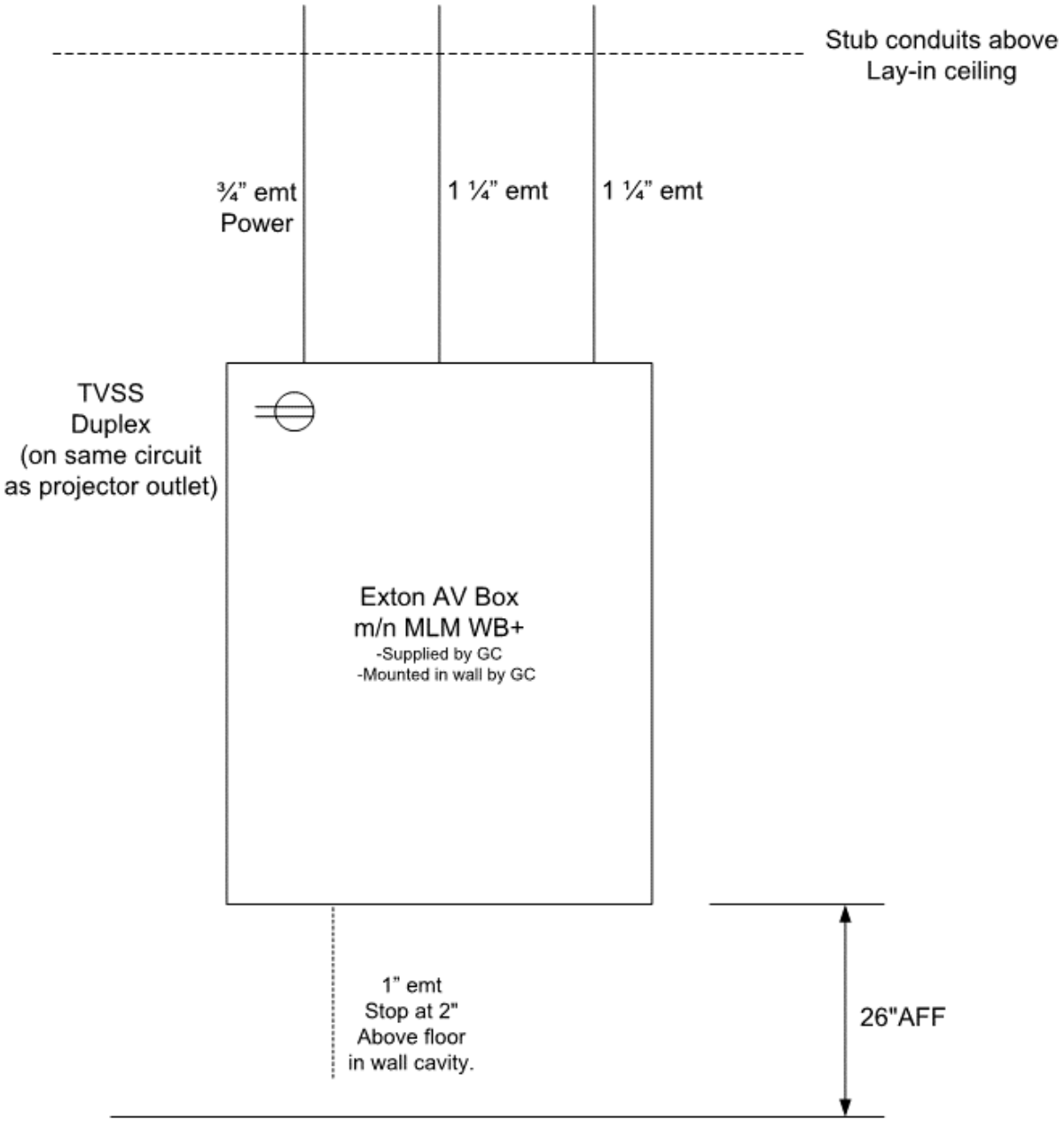
Case Room Floor Box
Detail



TYPICAL CASE ROOM IN-FLOOR AUDIO-VISUAL CONDUIT and BOX DETAIL

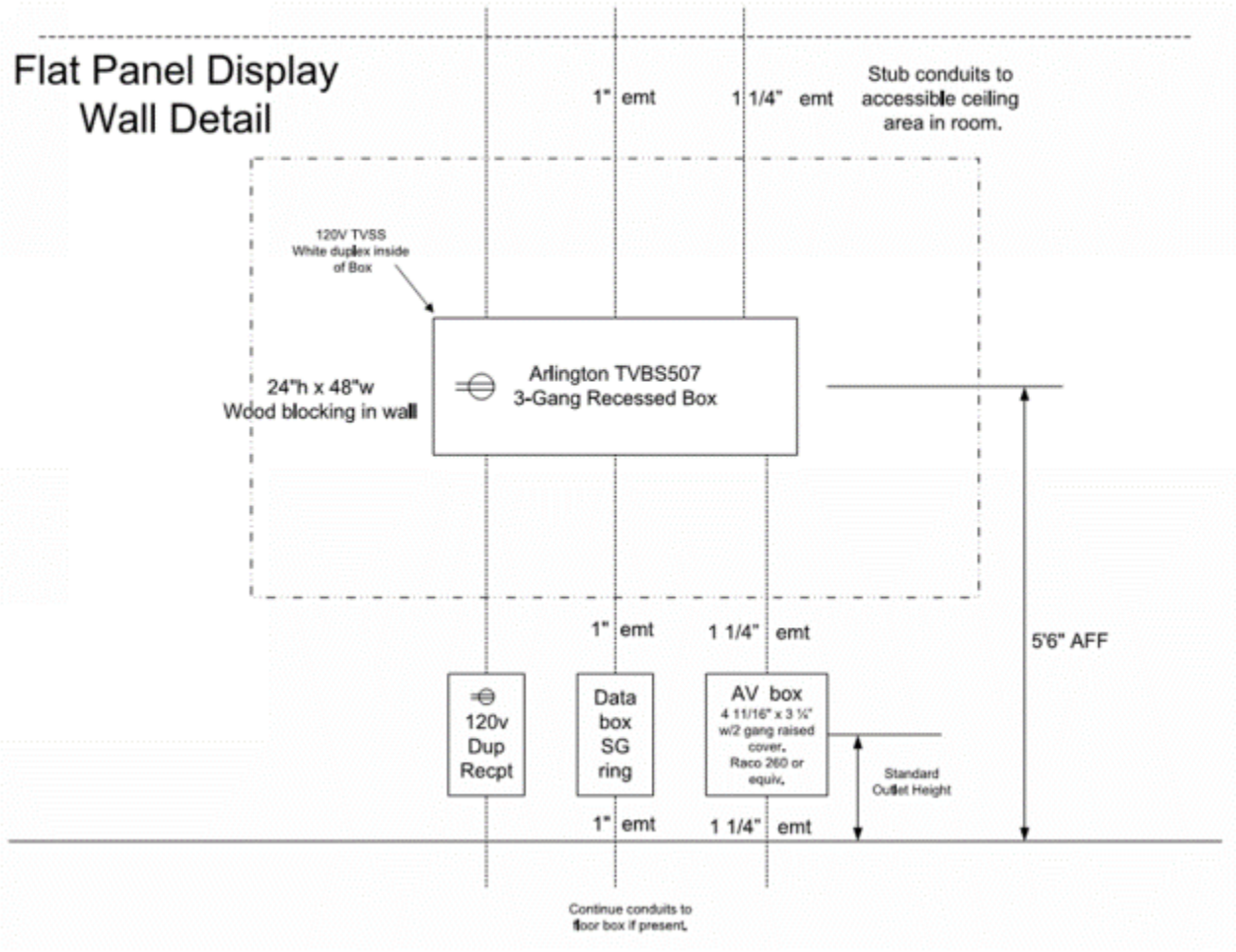
APPENDIX C NO SCALE STANDARD DETAIL # 27.004

Flip Down AV Box
Detail



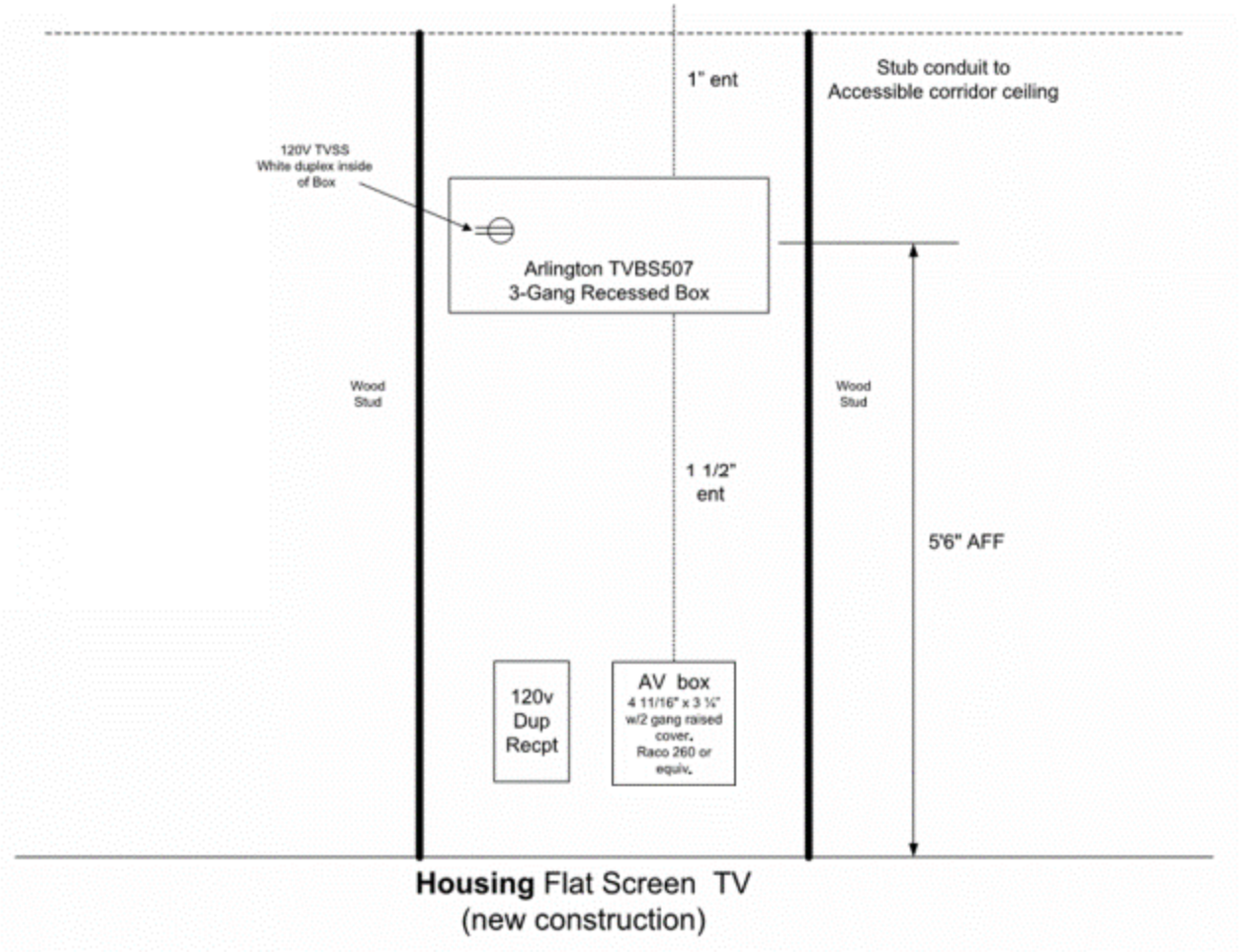
STANDARD EXTRON BOX AV DETAIL (All Locations)

APPENDIX C NO SCALE STANDARD DETAIL # 27.005



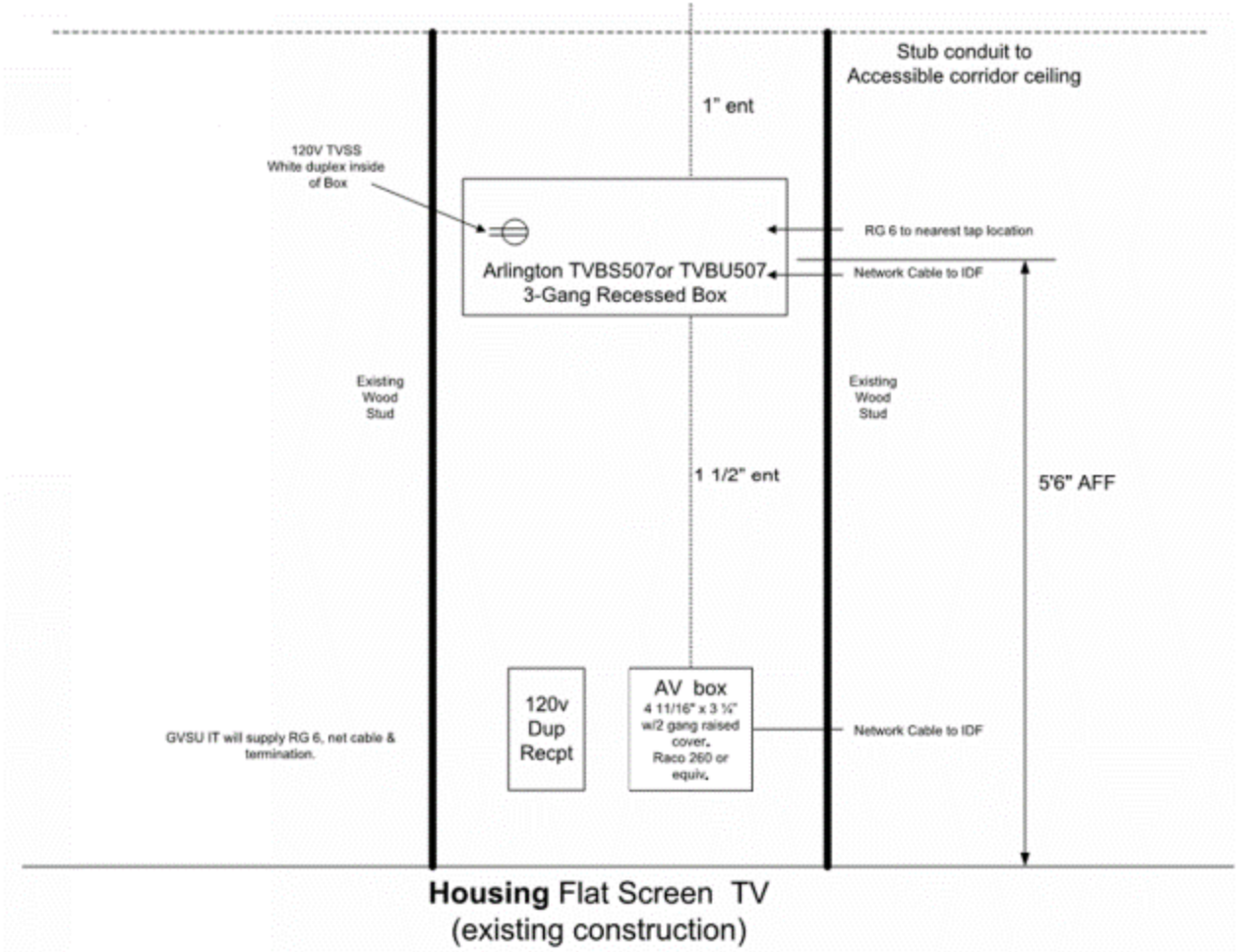
STANDARD FLAT PANEL WALL MOUNTED PREP. DETAIL (All Locations)

APPENDIX C NO SCALE STANDARD DETAIL # 27.006a



NEW HOUSING FLAT PANEL WALL MOUNTED PREP. DETAIL (All Locations)

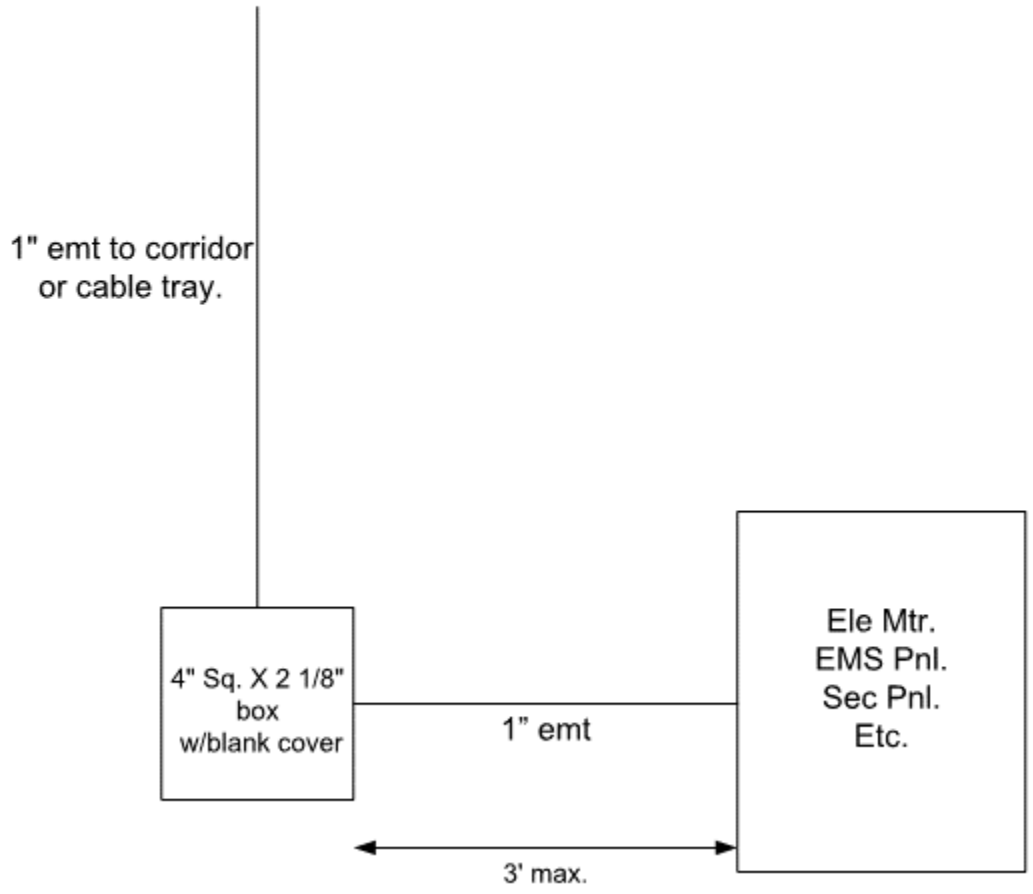
APPENDIX C NO SCALE STANDARD DETAIL # 27.006b



EXIST. HOUSING FLAT PANEL WALL MOUNTED PREP. DETAIL (All Locations)

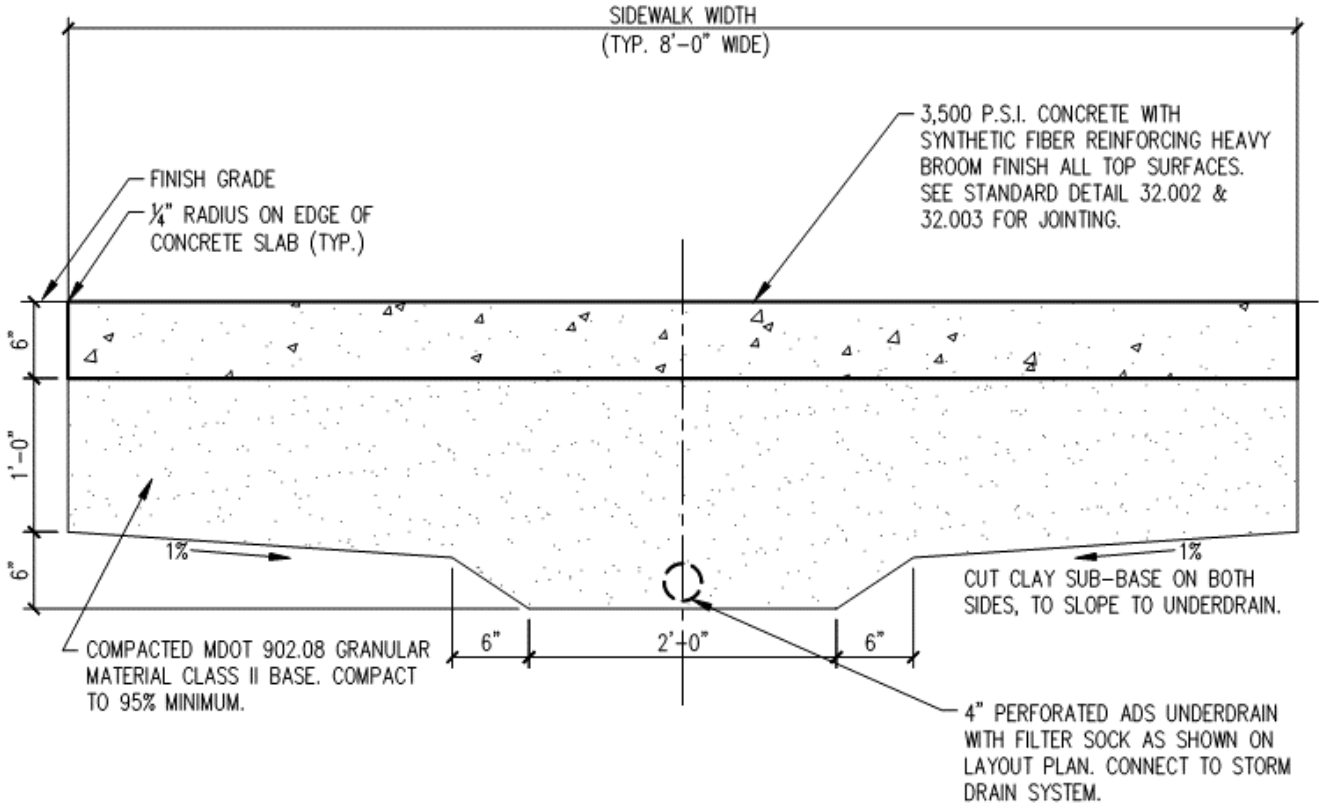
APPENDIX C NO SCALE STANDARD DETAIL # 27.006c

Data Drop to Building
Equipment Detail



BUILDING PANEL DETAIL

APPENDIX C NO SCALE STANDARD DETAIL # 27.007

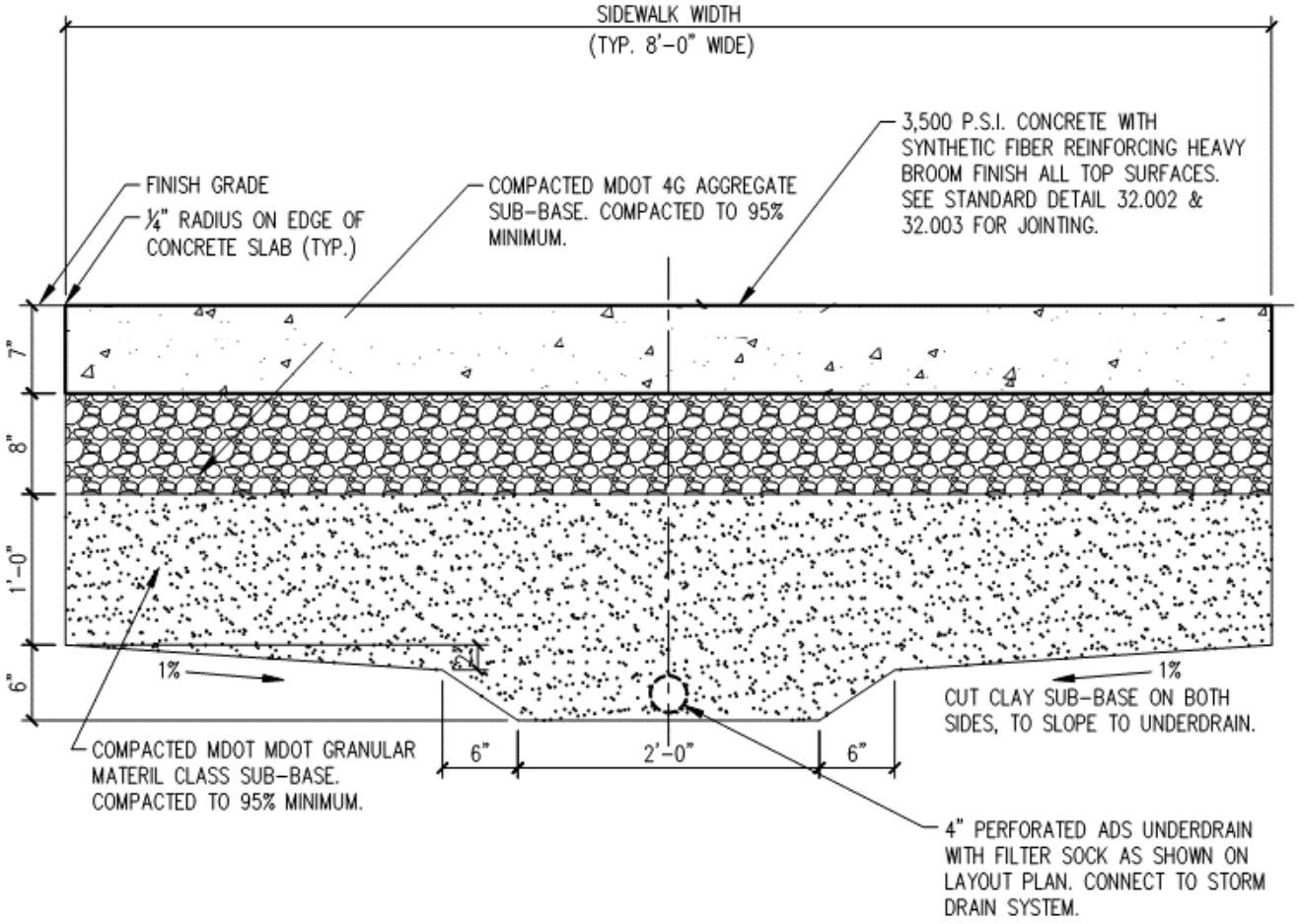


Note:

1. Heavy weight (see standard detail 32.001B) is for surfaces receiving steady and frequent vehicles with heavy loads such as semi-tractor, and trailer deliveries. Some locations for use are loading docks, driveways to and from loading docks or other areas that will receive such traffic . All other locations are considered pedestrian/medium weight.
2. Contractor to utilize existing under drainage where additional is not shown.
3. Under-drain may be located at one edge of sidewalk or in center. Cut clay sub-base to slope to 6" deep drainage trench.

CONCRETE PAVING DETAIL – PEDESTRIAN MEDIUM WEIGHT VEHICLES

APPENDIX C NO SCALE STANDARD DETAIL # 32.001a

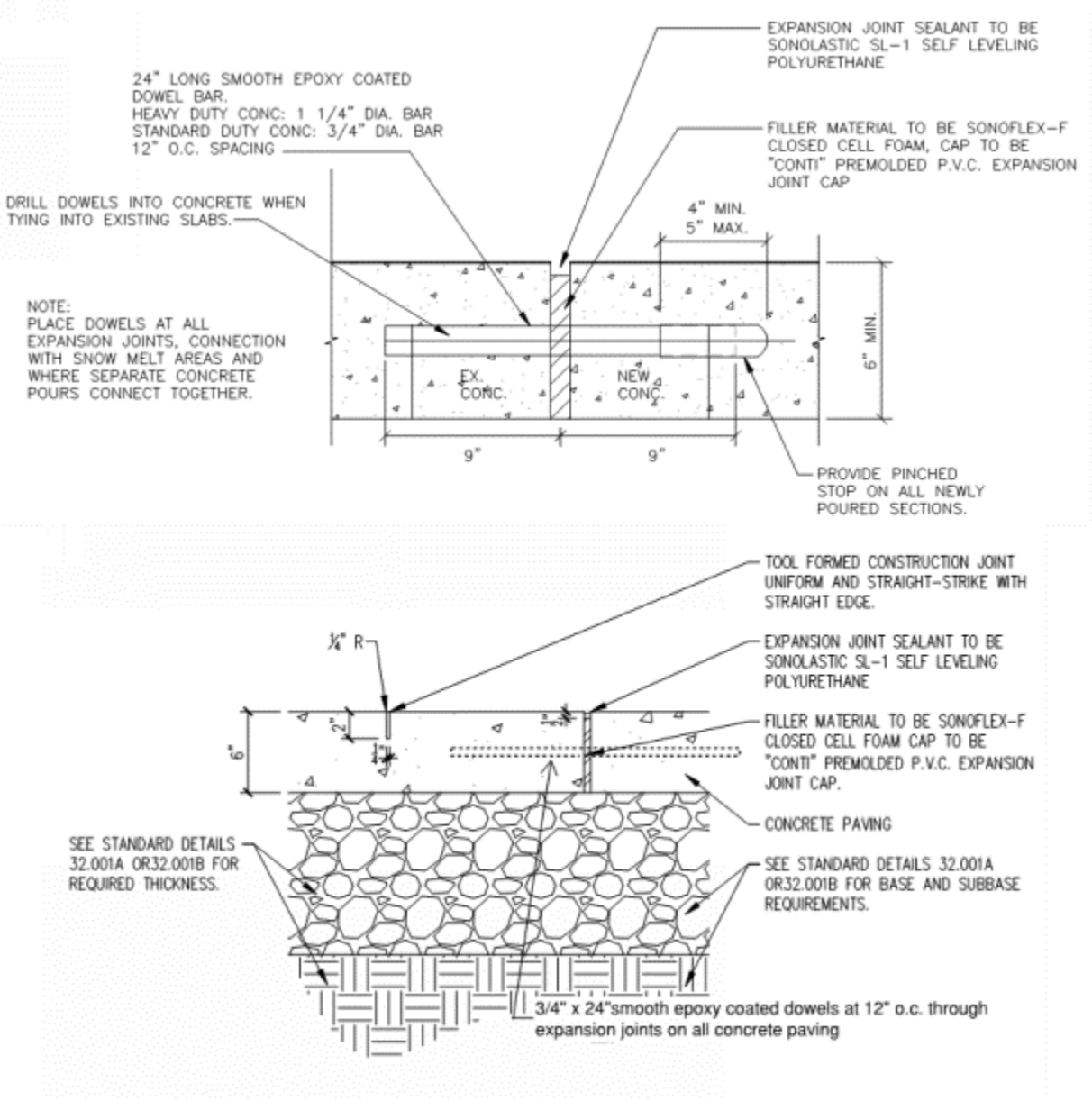


Note:

1. Heavy weight (see standard detail 32.001B) is for surfaces receiving steady and frequent vehicles with heavy loads such as semi-tractor, and trailer deliveries. Some locations for use are loading docks, driveways to and from loading docks or other areas that will receive such traffic . All other locations are considered pedestrian/medium weight.
2. Contractor to utilize existing under drainage where additional is not shown.
3. Under-drain may be located at one edge of sidewalk or in center. Cut clay sub-base to slope to 6" deep drainage trench.

CONCRETE PAVING DETAIL – HEAVY WEIGHT VEHICLES

APPENDIX C NO SCALE STANDARD DETAIL # 32.001b



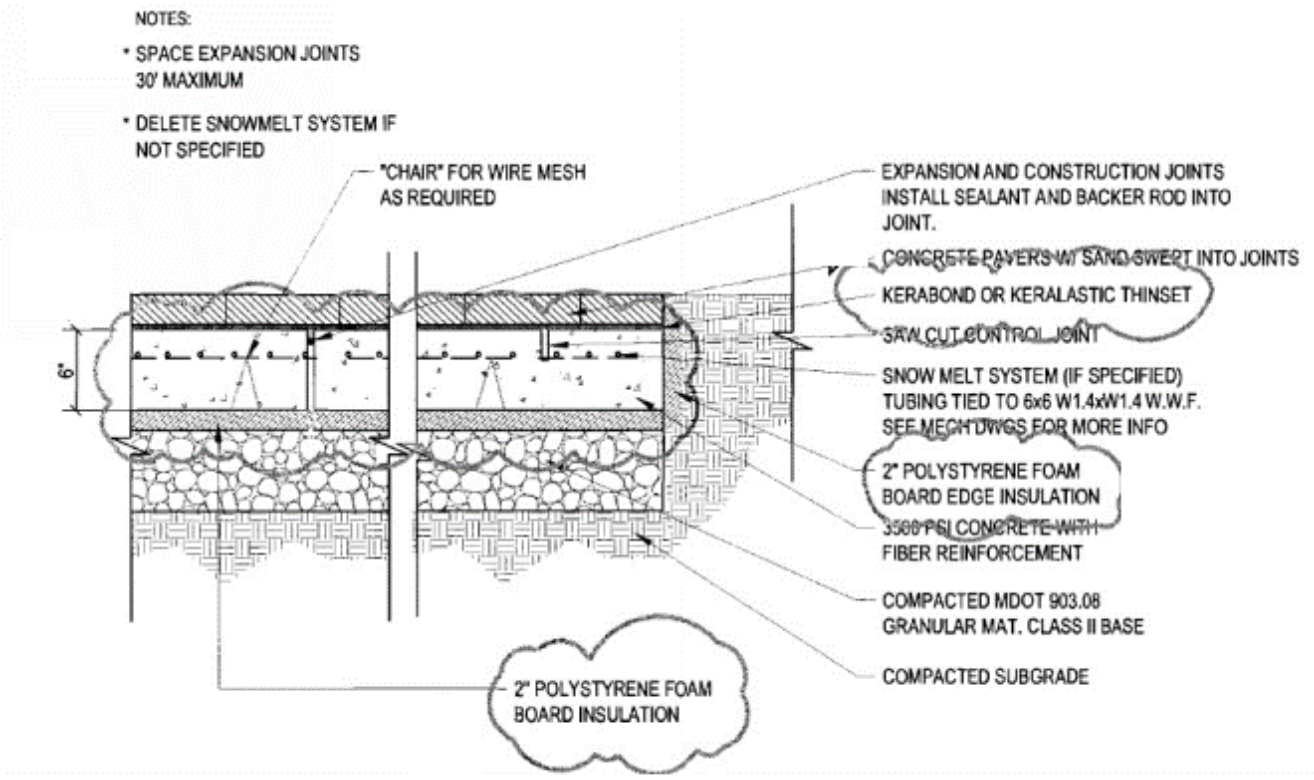
Note:

Contraction joints to be placed as per layout plan.

Expansion joints to be placed as per layout plan; 24'0.C. MAX.

CONCRETE DOWELED EXPANSION JOINT DETAIL

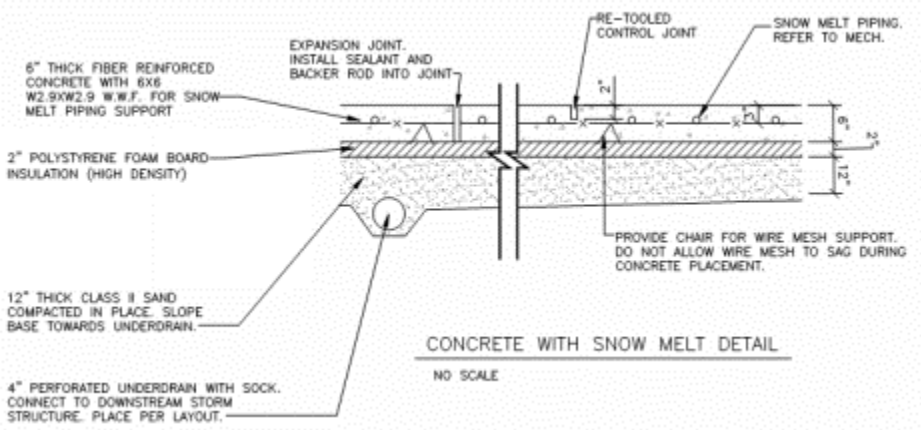
APPENDIX C NO SCALE STANDARD DETAIL # 32.002



NOTE: If snow melt system is not used, insulation can be deleted.

UNIT PAVERS ON CONCRETE BASE W/ SNOW MELT

APPENDIX C NO SCALE STANDARD DETAIL # 32.002a

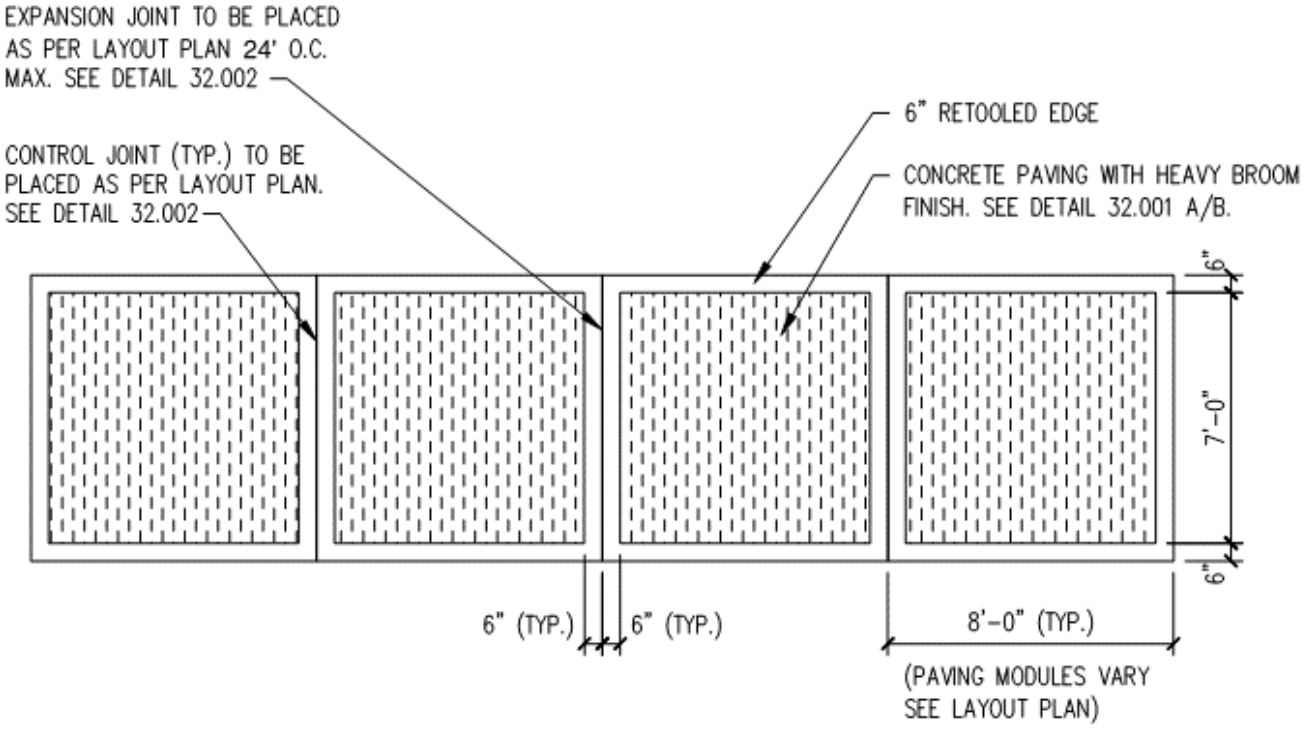


Notes:

1. Locate control joints as per layout plans.
2. Provide expansion joints every 100' o.c., unless shown otherwise.
3. Provide sealant and backer Roo into expansion joints.
4. Provide 3/4 - DIA. X 24" smooth steel dowel @ 12" o.c. Through joints at all paving joints. Wrap or twist free bar before final slab placement.
5. Confirm snow melt piping and diameter with snow melt installer.
6. Control joints shall be tooled in (not saw-cut)
7. Provide sleeves for snow melt tubing at all expansion joints.

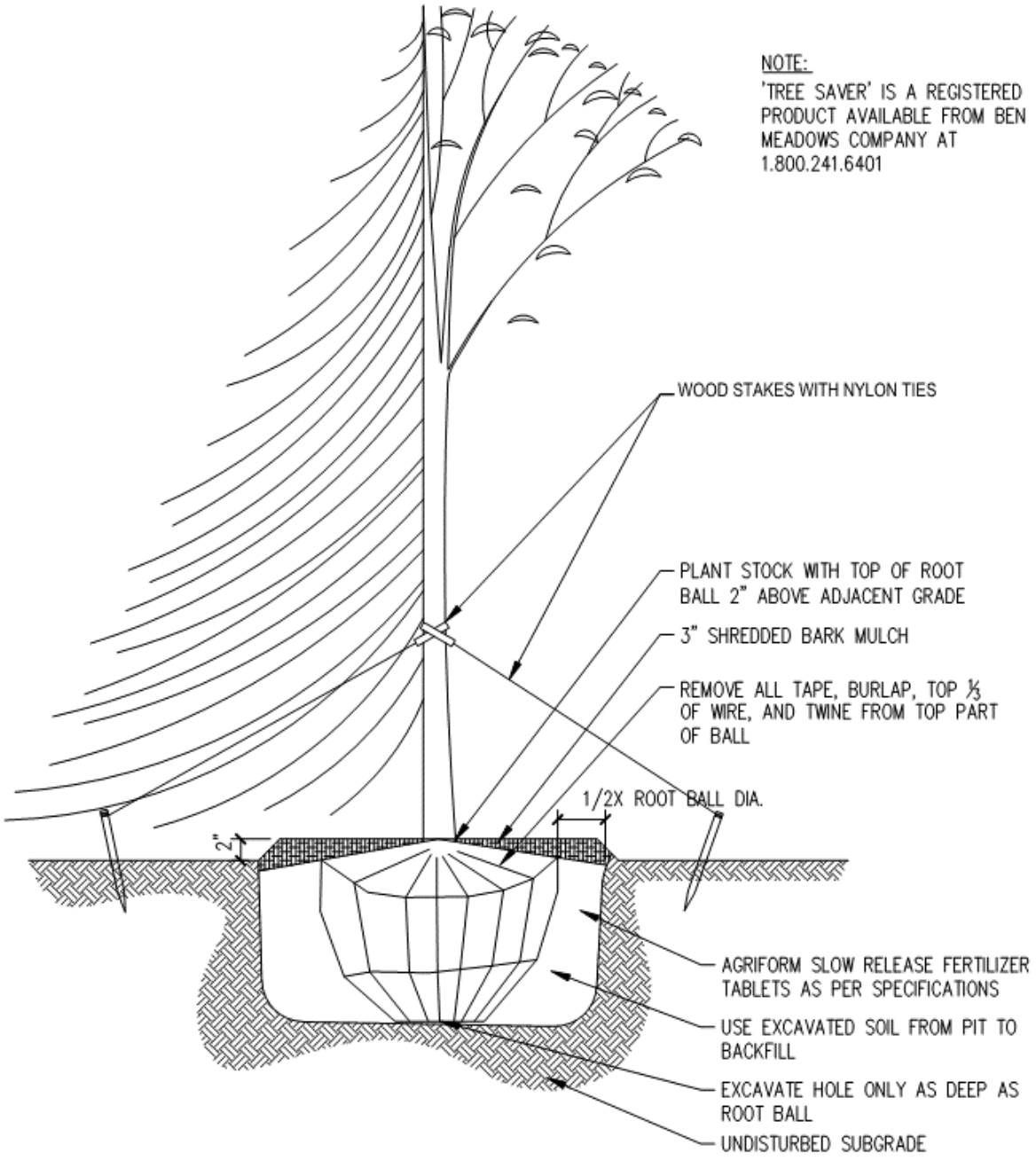
CONCRETE WALK W/ SNOW MELT

APPENDIX C NO SCALE STANDARD DETAIL # 32.002b



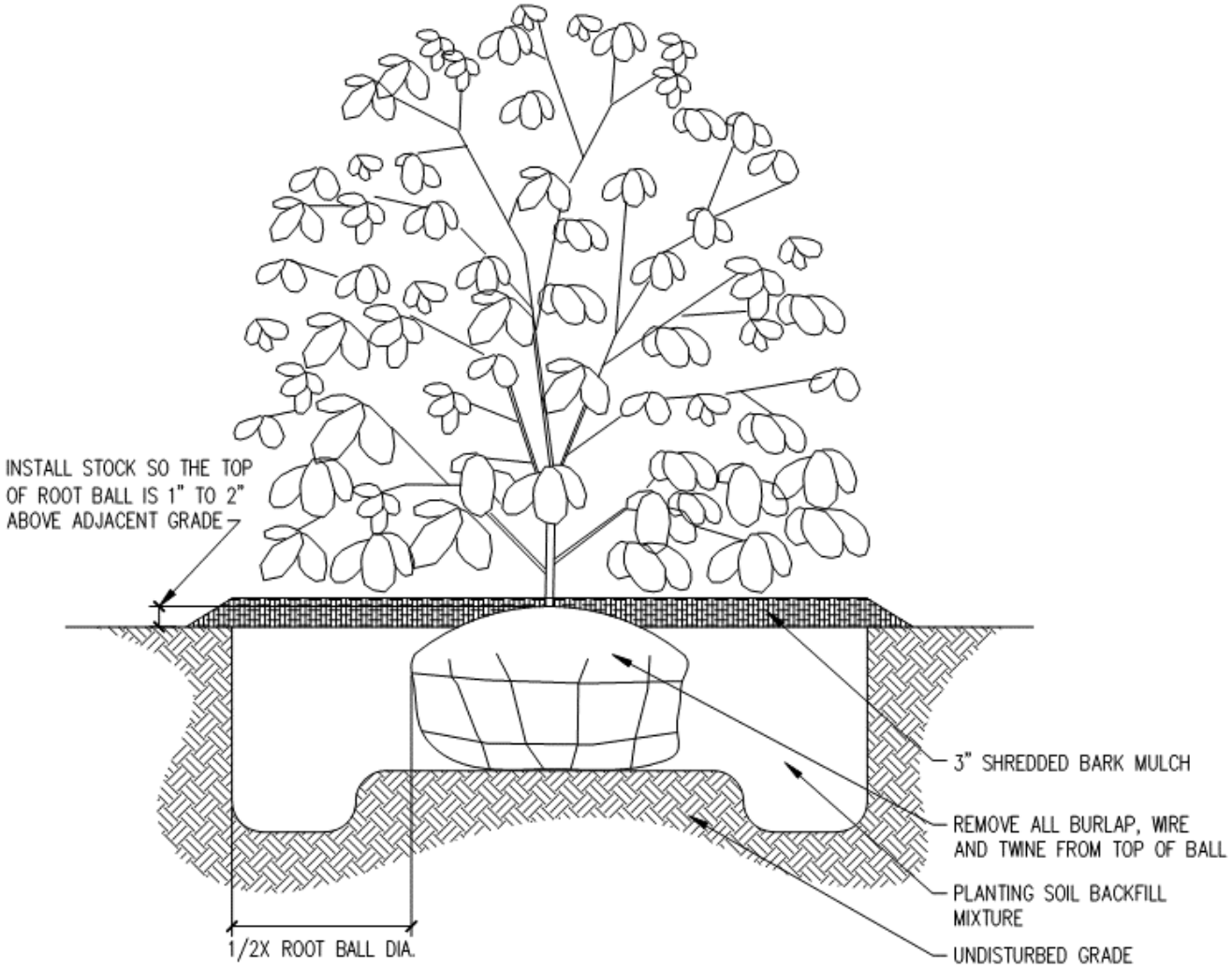
TYPICAL CONCRETE PAVING PLAN

APPENDIX C NO SCALE STANDARD DETAIL # 32.003



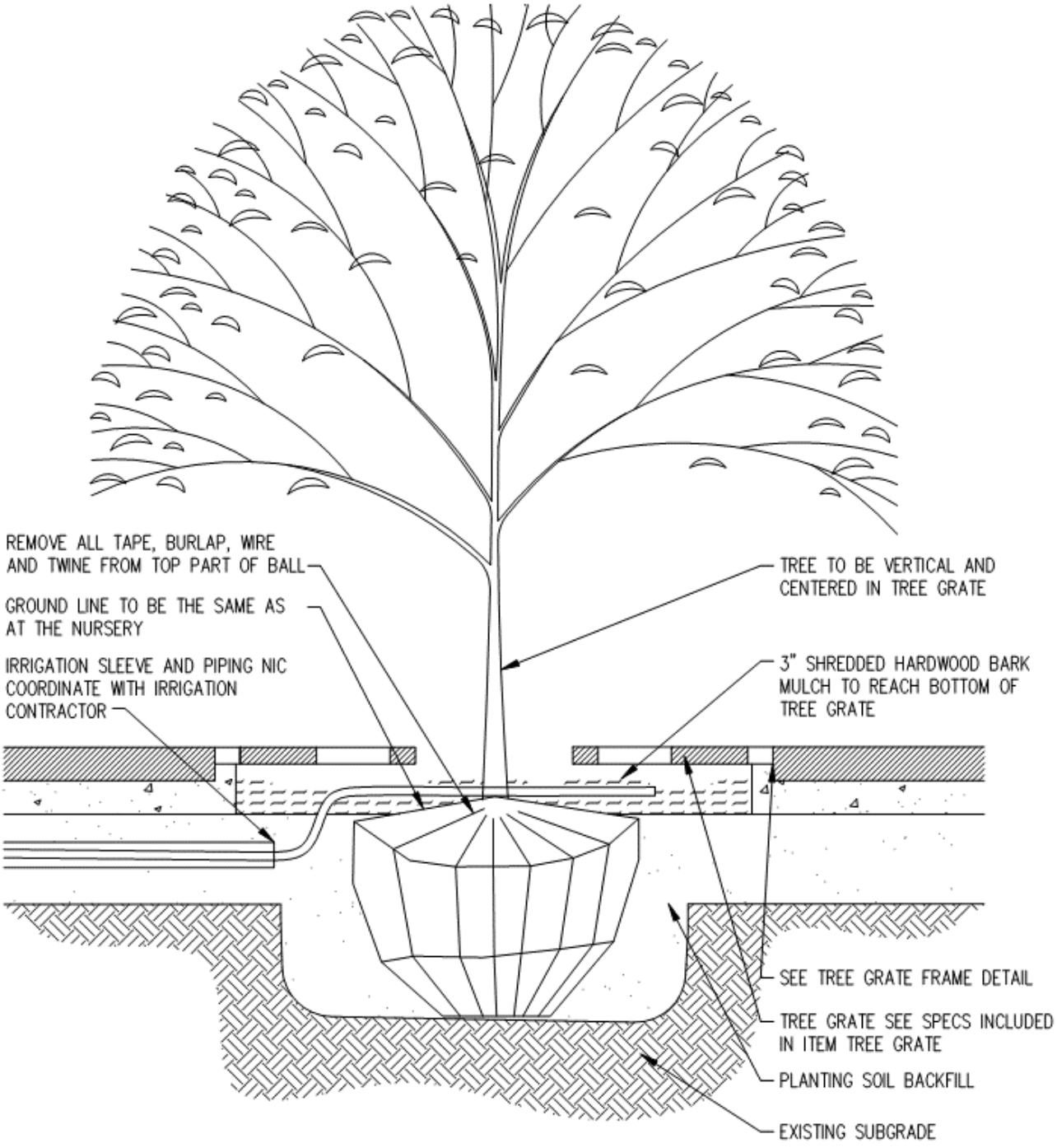
TYPICAL TREE INSTALLATION DETAIL

APPENDIX C NO SCALE STANDARD DETAIL # 32.004



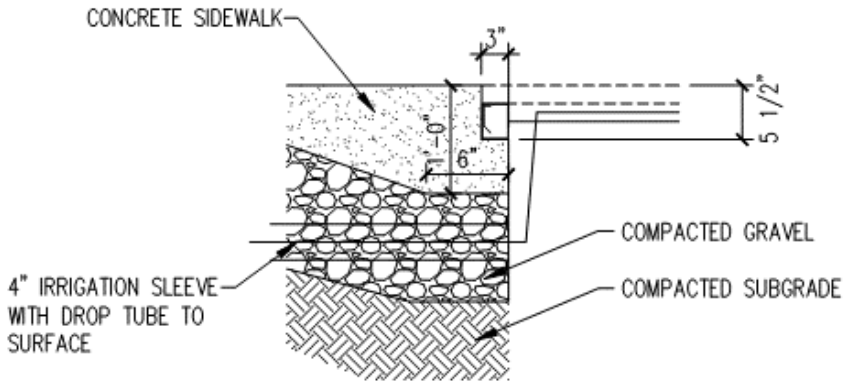
TYPICAL SHRUB INSTALLATION DETAIL

APPENDIX C NO SCALE STANDARD DETAIL # 32.005



TREE GRATE PLANTING (For use on City of Grand Rapids property)

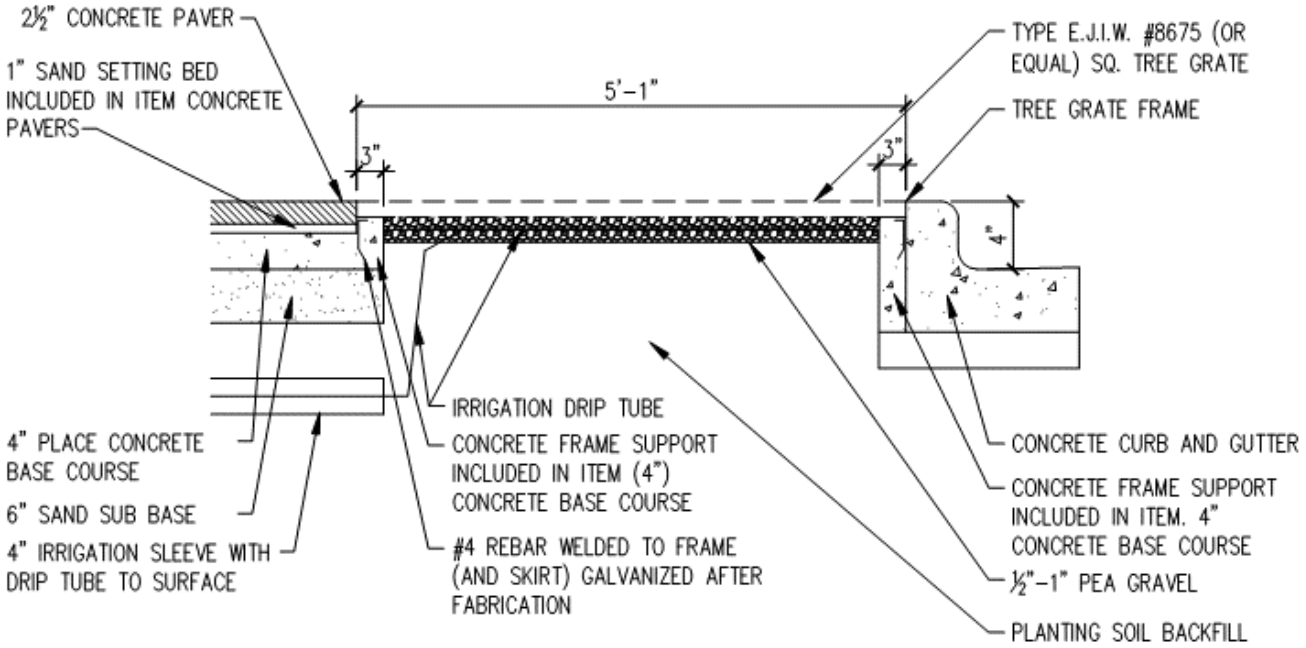
APPENDIX C NO SCALE STANDARD DETAIL # 32.006



CONCRETE TREATMENT

PAVER TREATMENT

CURB TREATMENT



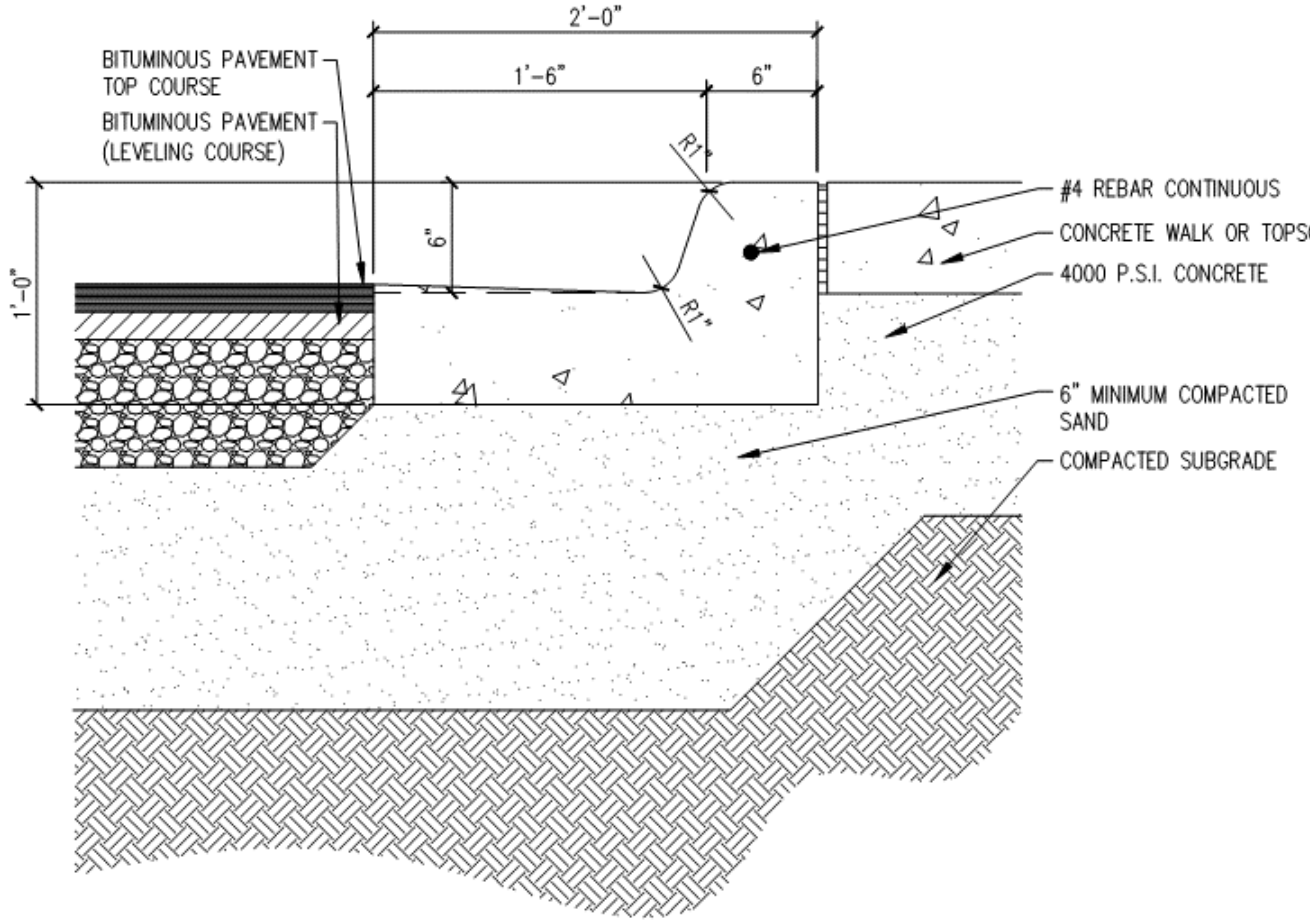
ALL ITEMS IN TREE GRATE UNLESS NOTED

TREE GRATE SECTION (For use on City of Grand Rapids property)

APPENDIX C NO SCALE STANDARD DETAIL # 32.007

PITCH GUTTER PAN TOWARD CURB OR AWAY FROM CURB IN ACCORDANCE WITH GRADING PLAN

CONTROL JOINTS AT EVERY 10' AND EXPANSION JOINTS AT EVERY 50' (TYP.)



Note:

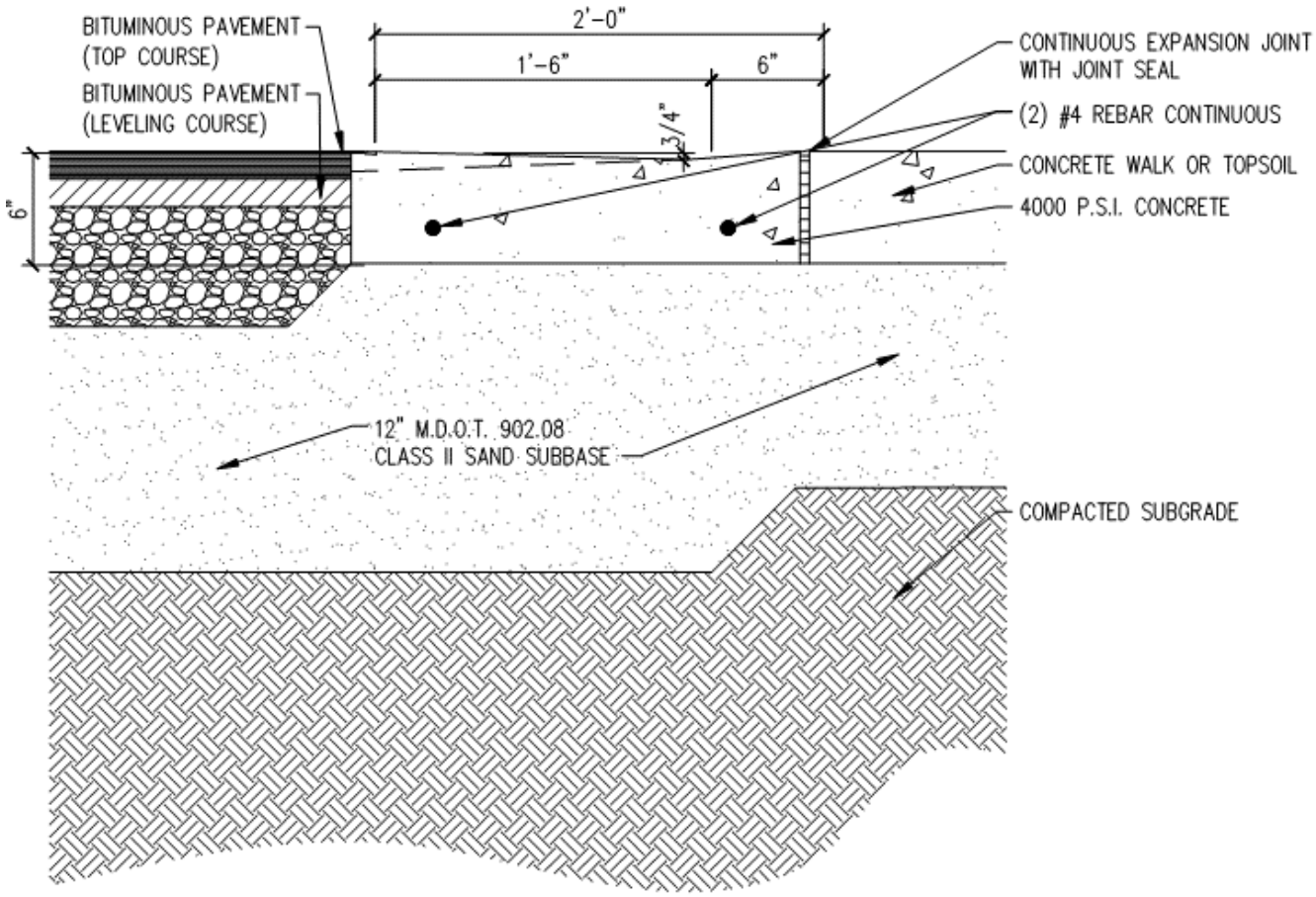
For Pew Campus projects (Grand Rapids, MI) City of Grand Rapids Standard Detail P-5

STANDARD CURB AND GUTTER

APPENDIX C NO SCALE STANDARD DETAIL # 32.008

PITCH GUTTER PAN TOWARD CURB OR AWAY FROM CURB IN ACCORDANCE WITH GRADING PLAN

CONTROL JOINTS AT EVERY 10' AND EXPANSION JOINTS AT EVERY 50' (TYP.)



NOTE:

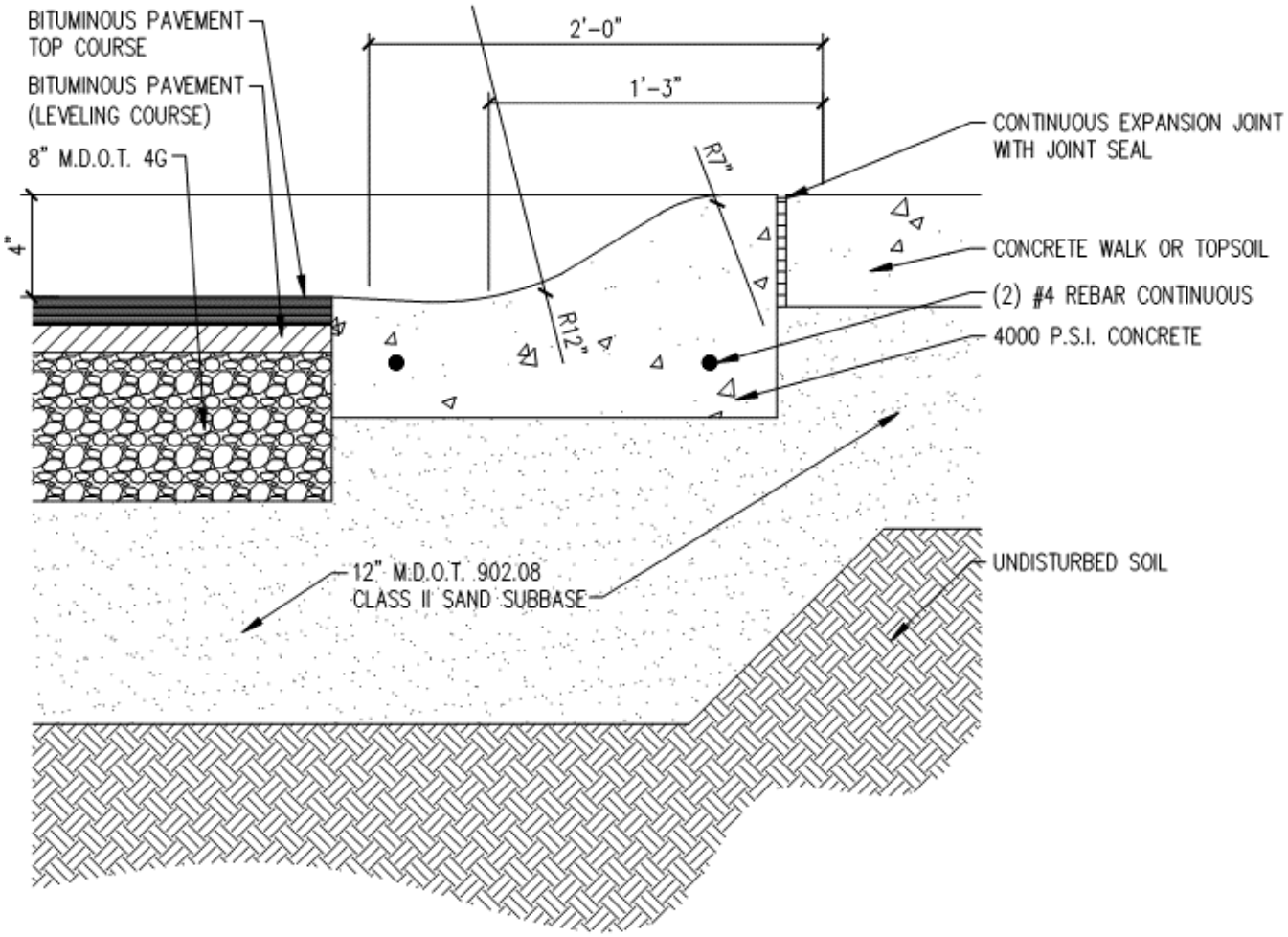
FOR PEW CAMPUS PROJECTS (GRAND RAPIDS MI) CITY OF GRAND RAPIDS STANDARD DETAIL P-5

FLUSH CURB AND GUTTER

APPENDIX C NO SCALE STANDARD DETAIL # 32.009

PITCH GUTTER PAN TOWARD CURB OR AWAY FROM CURB IN ACCORDANCE WITH GRADING PLAN

CONTROL JOINTS AT EVERY 10' AND EXPANSION JOINTS AT EVERY 50' (TYP.)

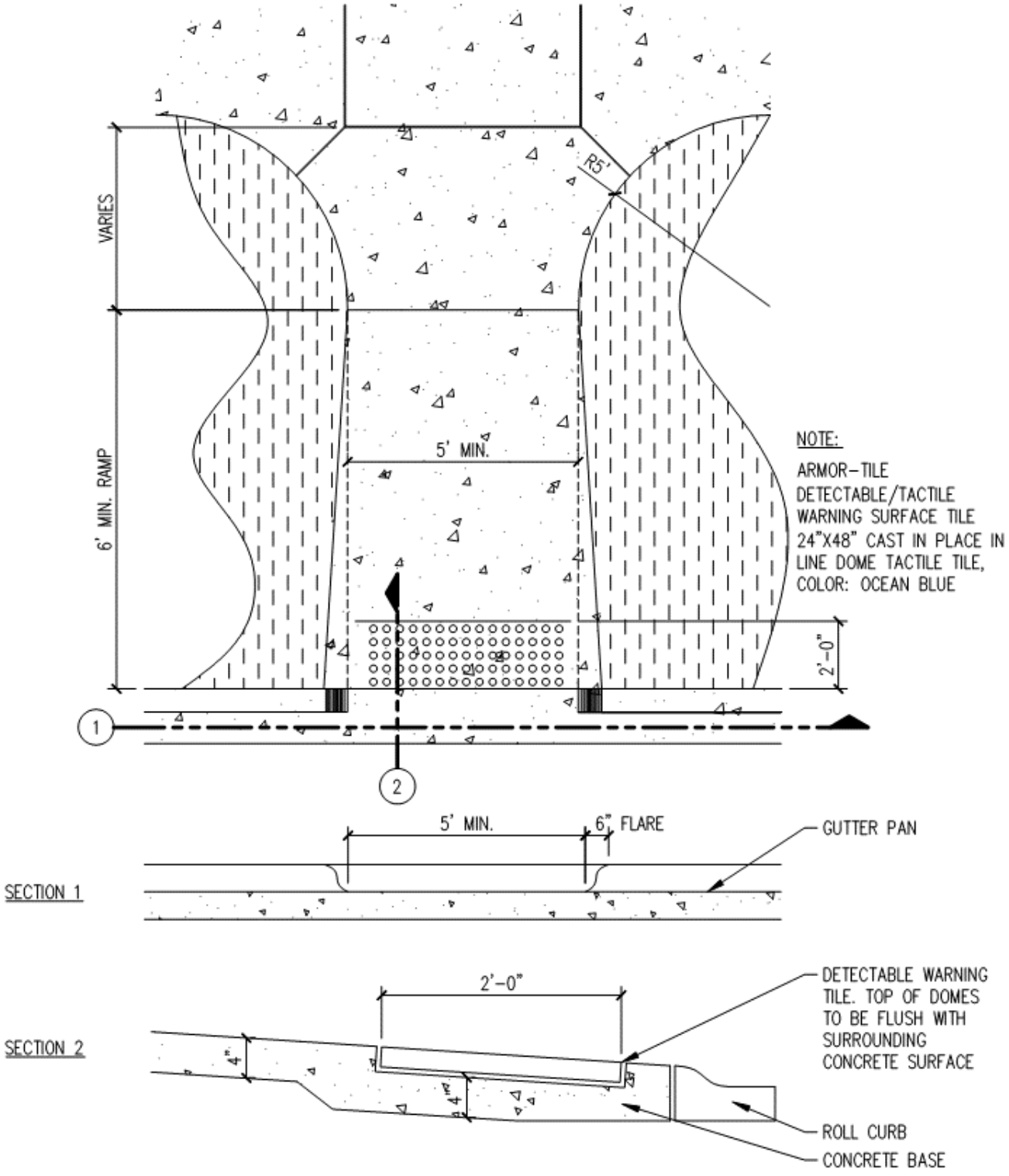


NOTE:

FOR PEW CAMPUS PROJECTS (GRAND RAPIDS MI) CITY OF GRAND RAPIDS STANDARD DETAIL P-5

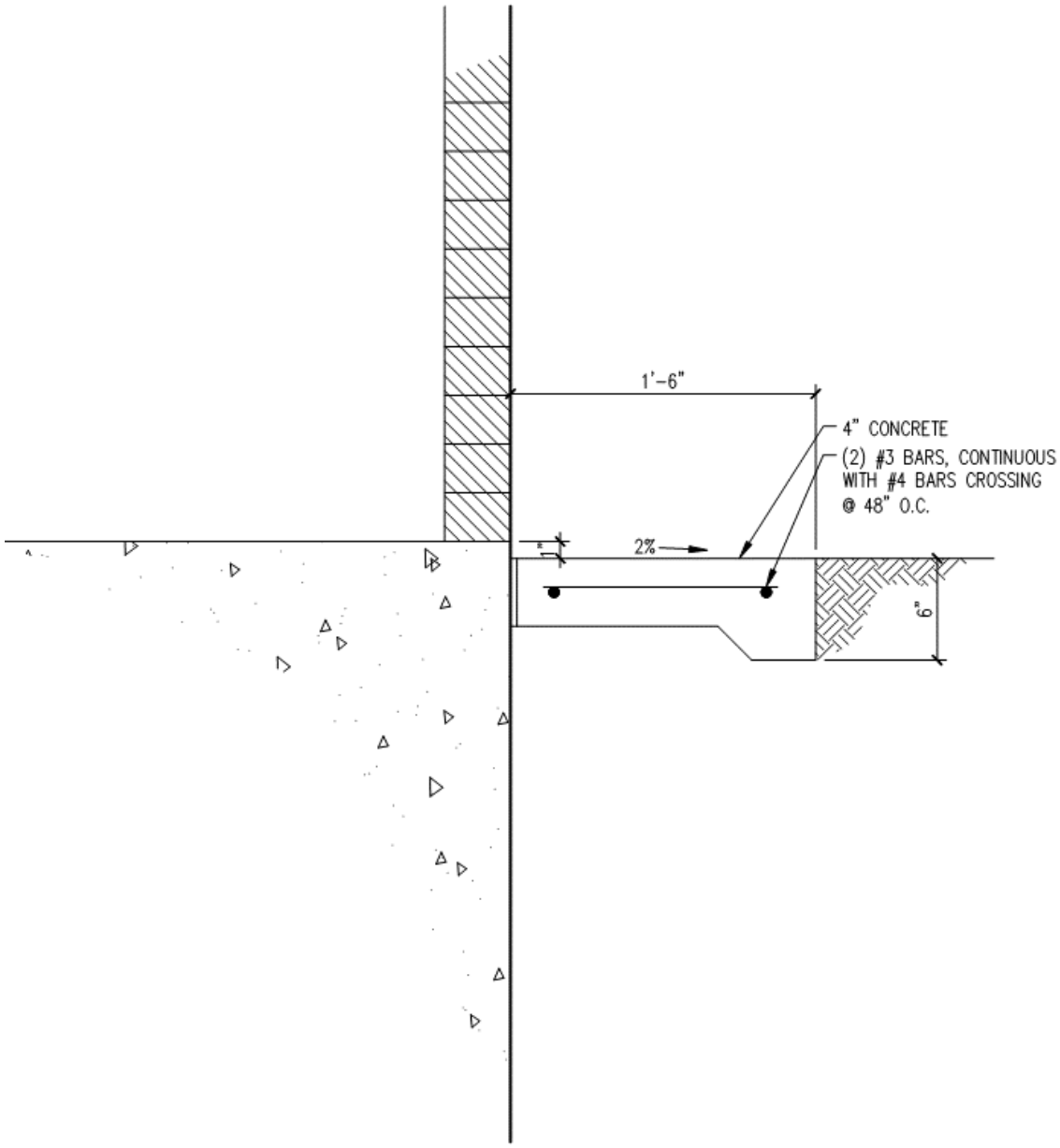
ROLLED CURB AND GUTTER

APPENDIX C NO SCALE STANDARD DETAIL # 32.010



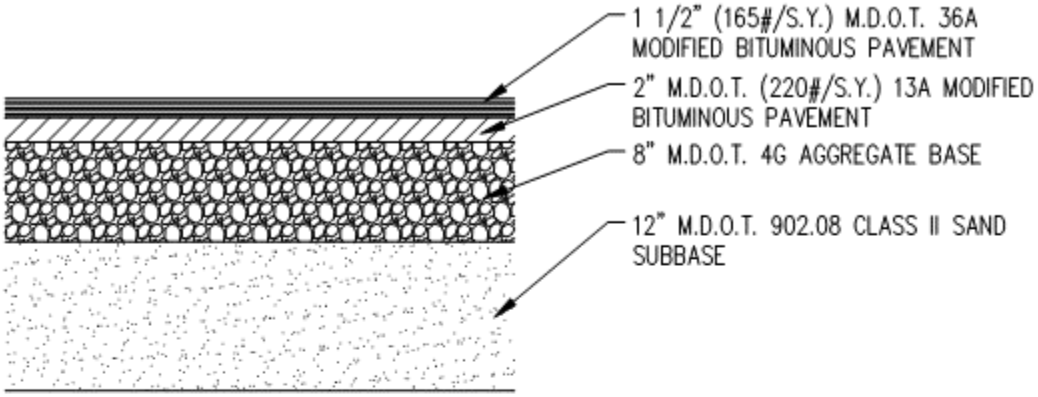
SIDEWALK RAMP DETAIL

APPENDIX C NO SCALE STANDARD DETAIL # 32.011

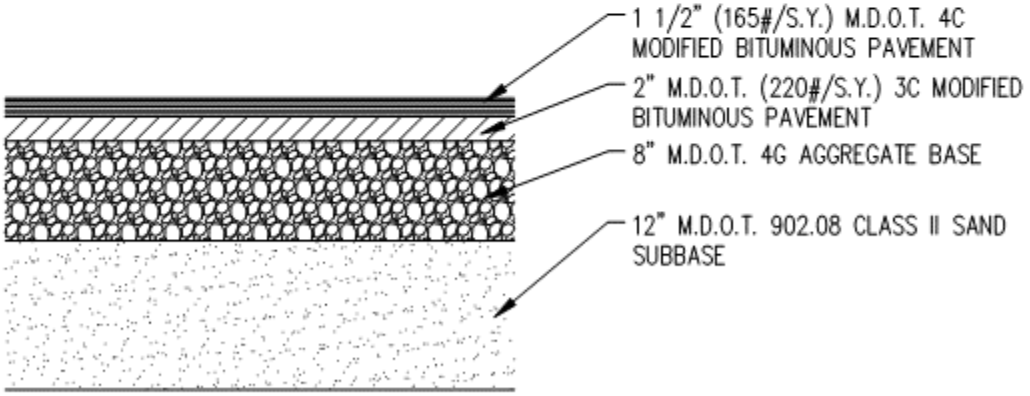


MAINTENANCE STRIP DETAIL

APPENDIX C NO SCALE STANDARD DETAIL # 32.012



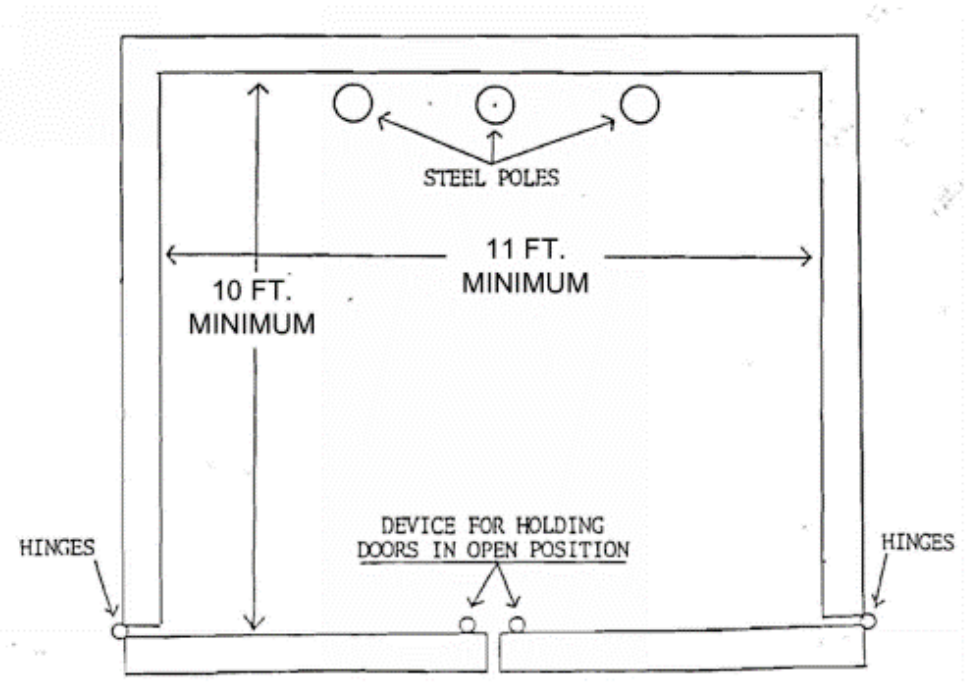
PARKING LOT SECTION

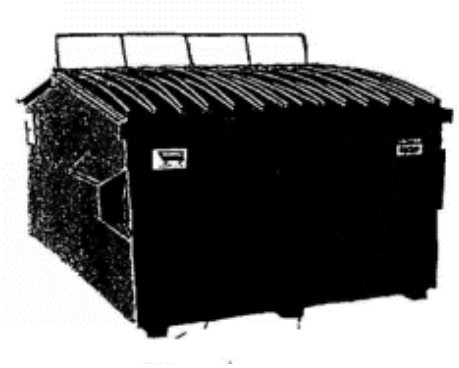


ROAD SECTION

BITUMINOUS PAVEMENT SECTION

APPENDIX C NO SCALE STANDARD DETAIL # 32.013





FL283j (8 yard capacity)

Length (OA):	**102"**
Width:	**80"**
Front Height:	**51"**
Back Height:	**51"**
Peak Height:	**61"**
Lid Size:	**36" x 58"**

19 containers per load

ENCLOSURE PLAN

1. The trucks width from outside mirror to outside mirror is 9 feet-8 inches. Mirrors are only 4 feet-8 inches from the bottom pf mirror to ground. Because of these factors enclosure doors must be hinged at the outside corner so that when they open they leave a clear 11 foot wide entry.
2. Enclosure doors must be built to swing to the outside and never inside. Some type of securing device must be installed so doors can be securely fastened in open position for servicing the container.
3. There should be 10-inch clearance between bottom of door and the concrete pavement. This is necessary to clear snow fall in winter.
4. Steel posts with guardrail should be placed 6-inches from the back of the enclosure to prevent damage when settling container back in the enclosure.
5. The concrete paving should be 12-feet in length to allow front wheels of the truck to rest on while dumping the container. The concrete paving should be minimum 7-inch thick with heavy duty welded wire mesh reinforcing. Place concrete on base materials as required in Division 32 of these standards.

TYPICAL 8 C.Y. DUMPSTER ENCLOSURE DETAIL

APPENDIX C NO SCALE STANDARD DETAIL # 32.004

Grand Valley State University

APPENDIX D

Grand Valley State University Bulletin No. 285

Construction Around Trees on Campus

Grand Valley State University Bulletin No. 285

Construction around trees on campus.

As our campuses expand, it is unavoidable that somewhere trees will be near the construction site. Our buildings are constructed in the midst of trees to take advantage of the aesthetic and environmental value of the wooded area. Wooded properties can be worth as much as twenty percent more than those without trees, and people value the opportunity to live among trees. Unfortunately, the processes involved with construction can be deadly to the nearby trees. Further, unless the damage is extreme, the trees may not die immediately, but could decline over several years. With this delay in symptom development, you may not associate the loss of the tree with the construction.

It is possible to preserve trees on building sites if the right measures are taken. The most important step is to consult our professional arborist during the planning/deployment stage. Our arborist can help you decide which trees can be saved, and can work with the builder to protect the trees throughout each construction phase.

How trees are damaged during construction

Physical injury to the trunk and crown

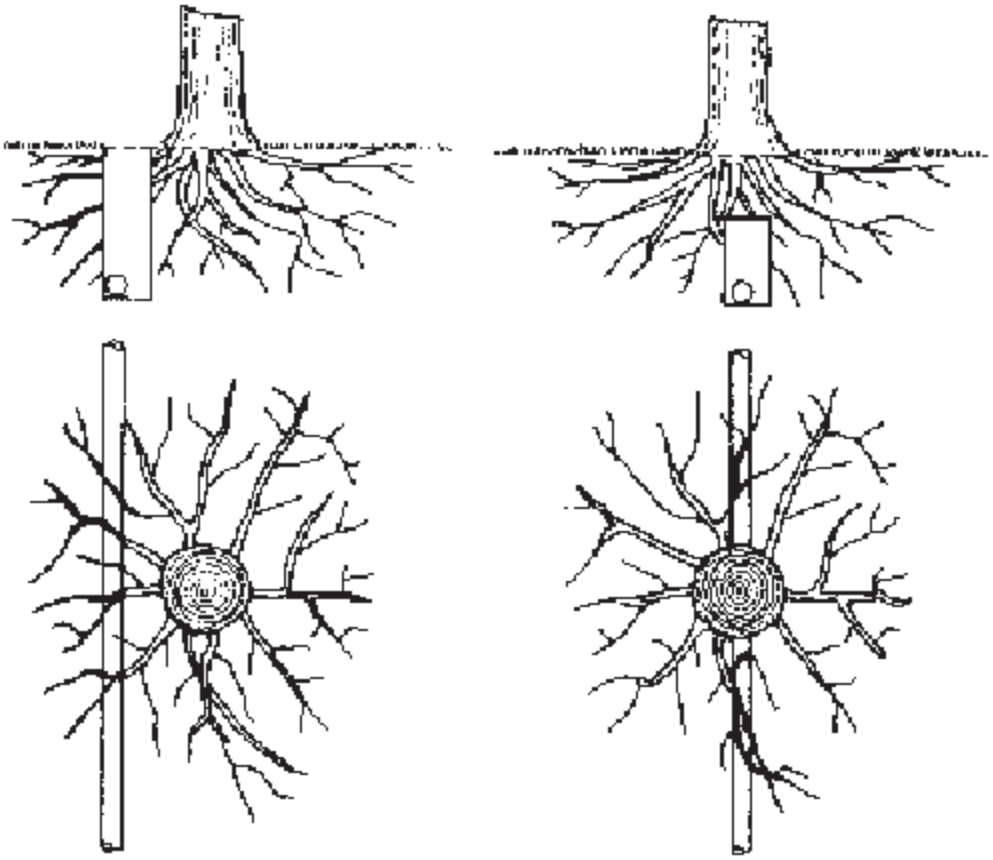
Construction equipment can injure the above-ground portion of a tree by breaking branches, tearing the bark and wounding the trunk. These injuries are permanent, and if extensive, can be fatal.

Cutting of roots

The digging and trenching that are necessary to construct a building and install underground utilities will likely sever a portion of the roots of many trees in the area. It is easy to appreciate the potential for damage if you understand where roots grow. The roots of a mature tree extend far from the trunk of the tree. In fact, roots typically will be found growing a distance of 1-3 times the height of the tree. The amount of damage a tree can suffer from root loss depends, in part, upon how close to the tree the cut is made. Severing one major root can cause the loss of 5 to 20 percent of the root system.

The roots of a tree will extend far from the trunk and will be found mostly in the upper 6 to 10 inches of soil.

Another problem that may result from root loss due to digging and trenching is that the potential for the trees to fall over is increased. The roots play a critical role in anchoring a tree. If the major support roots are cut on one side of a tree, the tree may fall or blow over.



Less damage is done to tree roots if utilities are tunneled under a tree rather than across the roots.

Soil compaction

An ideal soil for root growth and development is about fifty percent pore space. These pores, the spaces between soil particles, are filled with water and air. The heavy equipment used in construction compacts the soil, and can dramatically reduce the amount of pore space. This not only inhibits root growth and penetration, but also decreases oxygen in the soil that is essential to the growth and function of the roots. It is even more critical on our campus due to the amount of clay soil we have here. Soil compaction in this clay soil type can make it as hard as concrete for years down the road, severely hindering any roots recovering in that area.

Smothering roots by adding soil

Most people are surprised to learn that 90 percent of the fine roots that absorb water and minerals are in the upper **6-12 inches of soil**. Roots require space, air and water. Roots will grow best where these requirements are met, which are usually very near the soil surface. Piling

soil over the root system or increasing the grade will smother the roots. It only takes a few inches of added soil to kill a sensitive, mature tree.

Getting advice

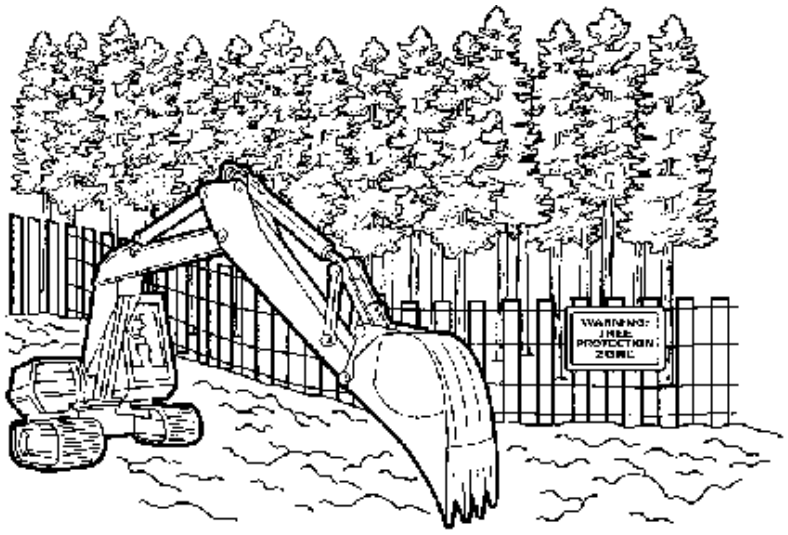
Consult our professional arborist in the early planning stage. Many of the trees on our property may be saved if the proper steps are taken. We can assess the trees on our property, determine which are healthy and structurally sound, and determine measures to preserve and protect them.

One of the first decisions is determining which trees are to be preserved, and which should be removed. We consider the species, size and maturity, location and the condition of each tree. The largest, most mature trees are not always the best choices to preserve, which means they might need extra pre-cautions during construction. Younger, more vigorous trees can usually survive and adapt to the stresses of construction better. Our arborist can advise you about which trees are more sensitive to compaction, grade changes and root damage.

Erecting barriers

Because our ability to repair construction damage to trees is limited, it is vital that the trees be protected from injury. The single most important action you can take is to set up construction fences around all of the trees that are to remain. The fences should be placed as far out from the trunks of the trees as possible. As a general guideline, allow one foot of space from the trunk for each inch of trunk diameter. The intent is not merely to protect the above-ground portions of the trees, but also the root systems. Remember that the root systems extend much farther than the driplines of the trees.

The construction personnel will be required to keep the fenced area clear of building materials, waste, and excess soil. No digging, trenching or other soil disturbance should be allowed in the fenced area.



Protective fences should be erected as far out from the trunks as possible in order to protect the root systems.

Maintaining good communications

It is important to work together as a team. We will share clear objectives with you and it is up to you to relay those objectives to your construction workers and sub-contractors. One sub-contractor can destroy our prudent efforts. Construction damage to trees is often irreversible.

We will visit the site through the construction phase and will bring to your attention any infractions that we see. Your vigilance will pay off as workers learn to take your wishes seriously. Take photos at every stage of construction. If any infraction of the specifications does occur, we will hold you liable. The photos will help you in your decision if it was your men or a sub-contractor.

Final stages

It is not unusual to go to great lengths to preserve trees during construction, only to have them injured during landscaping. Installing irrigation systems and rototilling planting beds are two ways the root systems of trees can be damaged. Remember also those small increases in grade, as little as 2-6", which place additional soil over the roots can be devastating to our trees. Careful planning and communicating with landscape designers and contractors is just as important as avoiding tree damage during construction.

Post-construction tree maintenance

Our trees will require several years to adjust to the injury and environmental changes that occur during construction. Stressed trees are more prone to health problems such as disease and insect infestations. This makes all the more important to talk to our arborist in deciding
which trees need that extra care during construction, to help then along in years to come.

Your requirements

It is your responsibility to construct barrier fencing around all trees designated by the arborist at the construction site. Amount of fencing will be determined following this guideline: allow one foot of space from the trunk for each inch of diameter at breast height (DBH). In the cases where the required amount of fencing will be restricted due to proximity to a structure, consult with the Grand Valley State University (GVSU) arborist for alternatives. Alternatives could or not include fencing, wood chips, or plywood or combination there of.

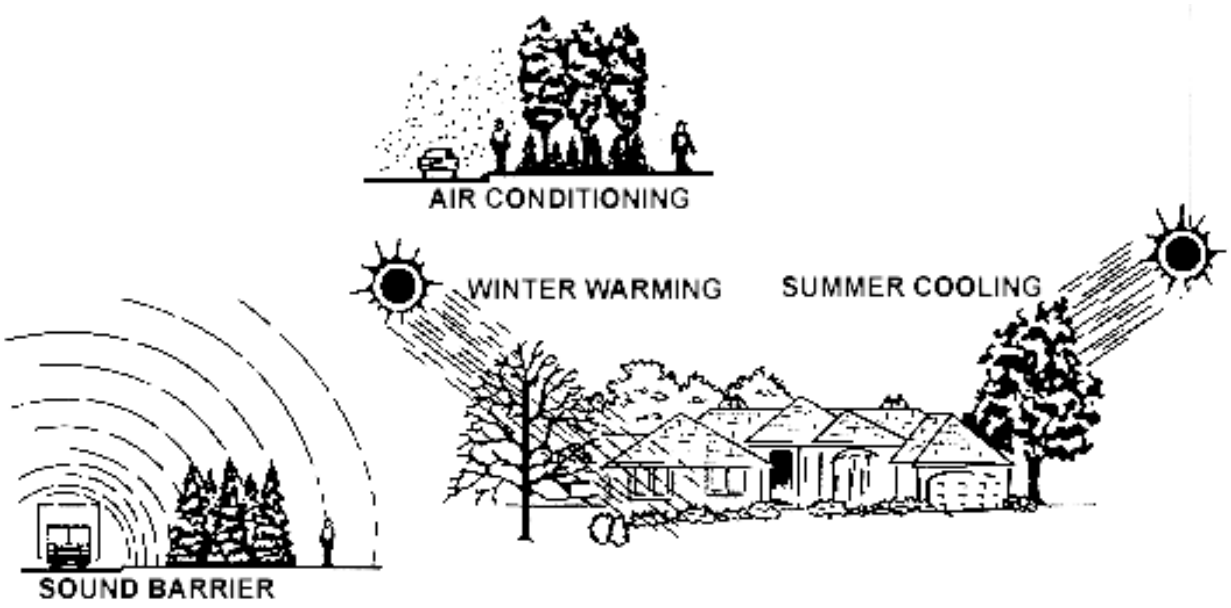
It is your responsibility that construction personnel keep the fenced area clear of building materials, waste, and excess soil. No digging, trenching or other soil disturbance should be allowed in the fenced area, nor shall parking of vehicles.

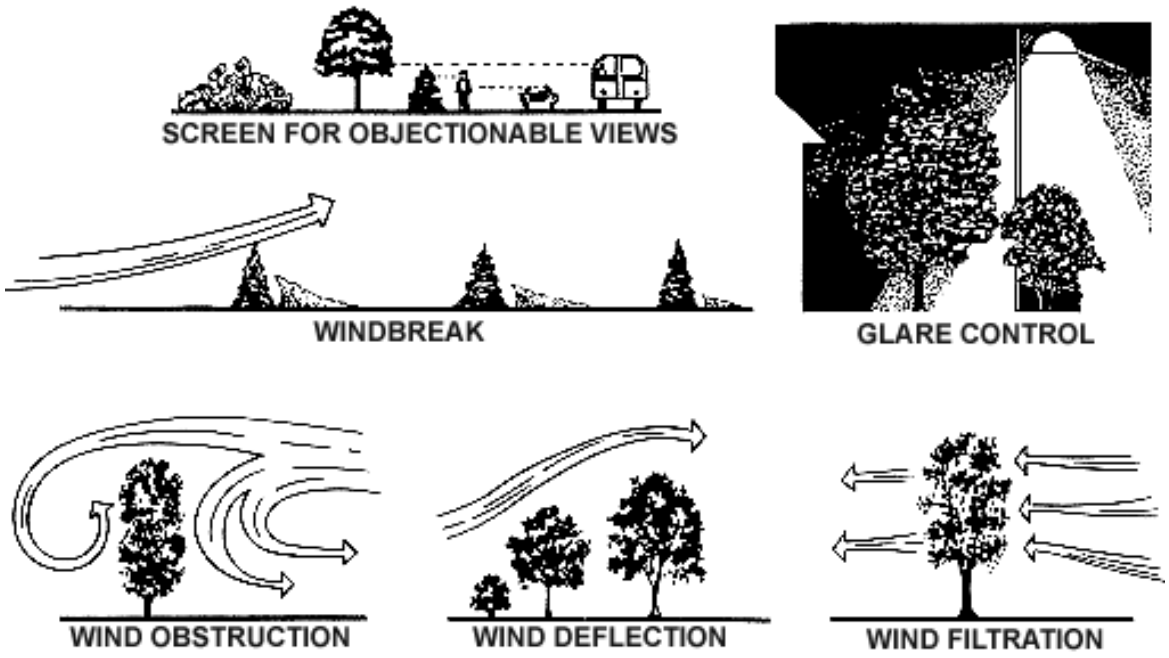
Violations of this bulletin will be noted by GVSU personnel, and a formal letter drafted and given to the general contractor for the project. The general contractor has 1 day to come into compliance with this bulletin or be fined 10% of the assessed value of said tree(s), per day that the violation exists. This violation in no way releases the contractor from further obligation if the event damages the tree. If the tree(s) becomes damaged or dies from such an event, Contractor shall be responsible for three (3) times the appraised value of the tree(s).

Four Factors in Professional Evaluation of Trees and Other Plants:

1. Tree *size*. Sometimes the size and age of a tree are such that it cannot be replaced. Trees that are too large to be replaced should be evaluated by professionals who use a specialized appraisal formula.
2. The *kind* of tree (or its classification). Choose the species for its utility and its adaptability. Tree values vary according to your region, the "hardiness" zone, and even state and local conditions. If you are not familiar with these variables, be sure your advice comes from a competent source.
   Trees which are hardy, durable, highly adaptable, and free from objectionable characteristics are worth the most. They require less maintenance; they have sturdy, well-shaped branches and pleasing foliage.
3. *Condition* of the tree, shrub or plant. The professional also will consider the condition of the plant. Obviously, a healthy, well-maintained plant will have a higher value. Roots, trunk, branches and buds need to be inspected before determining tree condition.
4. *Location* of the plant. There are functional considerations as well as aesthetic. This is where location enters into the evaluation. A tree in your yard may be worth more than one growing in the woods. One standing alone will often value higher than one in a group. A tree near your house or one which is a focal point in your landscape tends to have more value. The site, placement, and contribution of a tree help determine the overall value of the plant attributable to location.
   All of these factors can be measured in dollars and cents, and can determine the value of a tree, specimen shrubs or evergreens, whether for insurance purposes, court testimony in lawsuits, or for tax deductions.

The value of trees for their aesthetic functions is obvious. Many other less obvious functions contributing to the value of trees are illustrated here:




SCREEN FOR OBJECTIONABLE VIEWS
WINDBREAK
GLARE CONTROL
WIND OBSTRUCTION
WIND DEFLECTION
WIND FILTRATION

:

Grand Valley State University

APPENDIX E

Grand Valley State University

FACILITY STANDARDS / GUIDELINES DEVIATION FORM

GRAND VALLEY STATE UNIVERSITY

FACILITY STANDARDS/GUIDELINES DEVIATION FORM

Any proposal by the design professional, to have any product or practice deviate (modify, substitute or delete) from Grand Valley State University's Planning and Design Standards must be accompanied by this form, submitted for approval, to the University's Facilities Planning Department and the University's project manager in charge of the specific project described below.

University Project #: _____ (To be filled in by University)

Project Title: _____

CSI related section: _____

GVSU Standards related section: _____

New proposed product/practice: _____

Rationale for using new product/practice: _____

State operational benefits (if any) that accrue to the University as a result of the proposed deviation:

Estimated project cost increase or decrease: $ _____

List estimated parts, quantities and costs to be stocked in storage: _____

Failure to comply with this requirement will result in the Professional being responsible for costs associated with changes in the field, necessary to comply with GVSU's Planning and Design Standards, in accordance with Section 00 01 20 of these standards.

Signature & Date: Design Professional

Signature & Date: GVSU Approval

Grand Valley State University

APPENDIX F

Grand Valley State University

Worksite Policies

GVSU CONSTRUCTION - SAFETY REMINDERS – ALLENDALE CAMPUS

Refer to Construction Documents and (gvsu.edu/policies) *for any additional safety and policy requirements*

Fire Protection System Impairment

When work requires an existing fire prevention, protection, alarm or supervisory system shut-off, impairment or otherwise taken out of service, completely or in part, a GVSU Fire Protection System Impairment Notification Permit shall be completed. Contact GVSU Customer Service at 331-3000 for procedure.

Hot Work Permit

When work in existing buildings, new construction within an existing building and new construction that is attached to an existing building requires an open flame or work that generates heat, sparks, slag or other superheated materials, a GVSU Hot Works Permit shall be completed and submitted prior to the work commencing. Contact GVSU Customer Service at 331-3000 for procedure.

Electrical Lock-out /Tag-out

Comply with all OSHA regulations: Contractors will be responsible for lockout/tag out of the nearest source of power supplying equipment to be repaired, replaced or removed. Any breaker, breaker panel, disconnects, switches, contractors, starter, controls and/or other electrical devices not locked out or tagged out, will be deemed in use. Prior to shutdown of any equipment and/or power, contractors will notify the GVSU Customer Service at 331-3000.

Miss Dig and GVSU Miss Dig

Contractors are to contact Miss Dig for location of public utilities. For locating GVSU utilities the contractor shall follow University dig procedures and submit the required dig request form. Excavations, drilling or boring that is done within 6 feet of any utility marking are to be hand dug until marked utility is located and visually identified so that mechanical excavation can be commenced without damage to marked utility. Contact GVSU Customer Service at 331-3000 for procedure.

SDS (Safety Data Sheets)

Right-to-know: Contractor to have on hand SDS sheets on all substances used on project.

Site Safety Plan

The contractor shall develop, maintain and coordinate with its employees and its subcontractors and suppliers a site-specific safety plan and accident prevention program which shall comply with all MIOSHA, OSHA, state and local construction industry safety and health standards applicable to the site.

GVSU CONSTRUCTION - POLICY REMINDERS – ALLENDALE CAMPUS

Smoking (and Vaping) Policy
Smoking is prohibited in all indoor spaces. Smoking is prohibited within 25 feet of any GVSU building or bus stop.

Alcohol and Other Drugs Policy
Alcohol is not to be possessed or consumed during working hours. Possession and/or use of marijuana or any non-legally prescribed drug in any form is prohibited on GVSU property, regardless of state law. Those possessing, consuming or are under the influence of any intoxicating substance will be asked to leave the GVSU campus.

Weapons Policy
Possession or use of firearms or other lethal weapons are not permitted on GVSU property

Parking Permits
All vehicles parking on campus are required to have a parking permit. Contractor parking is not permitted on sidewalks, drives, handicap spaces or at building entrance or egress locations. Unless allowed by a project manager due to an emergency. Contractors must park in contractor designated spaces only.

Behavior
Negative behaviors are prohibited on campus, including but not limited to larceny or any type of assault. Any form of sexual harassment is not tolerated.

Photographs
Any Consultant, Contractor, Supplier or Vendor shall not photograph GVSU projects for marketing purposes.

Drones
GVSU approval is required for the use of any drone on GVSU property. Drone use to be in accordance with University Policy. Through contact at Public Safety

Site Access and Deliveries
Site access, haul routes and staging areas shall be designated by the University's Project Representative and as shown on the Construction Documents. Material deliveries NOT accepted at GVSU Central Receiving.

Traffic Control
GVSU approval of any traffic disruption is required 2 weeks prior to commencement of work. Traffic control personnel must be trained, properly attired, dedicated to the traffic control task, and keep traffic flowing. Provide state approved barriers and safety signage for all road closures and detours.

Dumpsters
Use of GVSU dumpsters or trash containers for disposal of waste is prohibited. Unless permission received from a project manager.

Keys/Building Access
Available at the Central Utilities Building (CUB)

Confined Space Access
Information and forms available at CUB.

GVSU CONSTRUCTION - SAFETY REMINDERS –GRAND RAPIDS AND REGIONAL CAMPUSES

Refer to Construction Documents and (gvsu.edu/policies) *for any additional safety and policy requirements*

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When work requires an existing fire prevention,protection, alarm or supervisory system shut-off,impairment or otherwise taken out of service, completely or in part, a GVSU Fire Protection System Impairment Notification Permit shall be completed. Contact GVSU Facilities Services Grand Rapids at 331-6700 for procedure.

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Dumpsters
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Keys/Building Access
Available at Facilities Services Grand Rapids located in the Bicycle Factory.

Confined Space Access
Information and forms available at Facilities Services Grand Rapids located in the Bicycle Factory.

Grand Valley State University

APPENDIX G

Grand Valley State University

List of Supplementary Mechanical Information

SECTIONS 22 00 00 and 23 00 00

(To be included in consultant's specification)

LIST OF SUPPLEMENTARY MECHANICAL INFORMATION

INSTRUCTIONS: THIS FORM, COMPLETELY FILLED IN, SHALL BE SUBMITTED TO THE ENGINEER FOR APPROVAL **WITHIN 24 HOURS** AFTER TIME OF BID OPENING.

PARTICULARS

1.01 Place an "X" in the space provided, indicating the particular manufacturer on which the Bidder's bid price is based. Select only "one" manufacturer for each type of material or equipment. In the blank space (labeled "Other") provided under each type of equipment, insert only manufacturers' names who have been approved by the ENGINEER and the UNIVERSITY by written addendum. Where no "other" is permitted as an entry, no substitutions will be considered unless approved by the ENGINEER and UNIVERSITY PRIOR to the project being released for bidding.

1.02 Insert the name of the sub-contractor and/or supplier for the various systems or equipment as required.

1.03 The following is the list of Supplementary Mechanical Information referenced in the bid submitted by:

1.04 (Bidder) _____

1.05 TO: _____

1.06 Dated _____ and which is an integral part of the Bid Form.

1.07 DESCRIPTION **SUB-CONTRACTOR/SUPPLIER**

A. Fire Protection _____
B. Insulation _____
C. Plumbing _____
D. Sheet Metal _____
E. Temperature Controls _____

1.08 MECHANICAL CONTRACTOR: _____

A. Authorized Signature _____
B. Date: _____

1.09 Mechanical Contractor Note:

A. Shop drawings and operating instructions will be required on each applicable item of equipment. It is to the Contractor's advantage to submit these for approval as soon as possible after the Contract is awarded.

22 00 00 PLUMBING

22 05 23 Manual Valves

A. Bell & Gossett _____
B. Crane _____
C. Grinnell _____
D. Hammond _____
E. Keystone _____
F. Milwaukee _____
G. Nibco/Scott _____
H. Powell _____

22 14 00 FACILITY STORM DRAINAGE

22 14 26 Roof Drains, Floor Drains, Cleanouts and Carriers

A. Josam _____
B. J.R. Smith _____
C. Wade _____
D. Zurn _____

22 14 29 Sump Pump

A. Chicago _____
B. Gould _____
C. Weil _____

22 15 00 General Service Compressed-Air Systems

22 15 19 Air Compressor

A. DeVilbiss _____
B. Ingersoll Rand _____
C. LeRoi _____
D. Quincy _____
E. Wilson _____
F. Worthington _____

22 30 00 Plumbing Equipment

22 32 00 Water Softener and Filter

A. Bruner _____
B. Culligan _____
C. Peerless _____
D. Sta-Rite/Aquamatic _____

22 33 00 Electric and Fuel-Fired Domestic Water Heaters

A. A. O. Smith _____
B. Bradford & White _____
C. Lochinvar _____
D. State _____

22 40 00 PLUMBING FIXTURES

22 40 00-A Flush Valves

A. Sloan _____
B. Zurn _____

22 41 13 Residential Plumbing Fixtures

A. American Standard _____
B. Kohler _____
C. Zurn _____

22 41 23 Wall Mounted Shower Valves

A. Bradley _____
B. Delta _____
C. Kohler _____
D. Peerless _____

22 41 39 Faucets

A. American Standard _____
B. Chicago _____

C. Delta _____
D. Moen _____
E. T & S _____

22 42 13 Commercial Plumbing Fixtures

A. American Standard _____
B. Kohler _____
C. Zurn _____

22 42 16 Stainless Steel Sinks

A. American Standard _____
B. Elkay _____
C. Just _____
D. Kohler _____
E. Other: _____

22 45 00 Wash Fountain

A. Bradley _____

22 47 00 Electric Water Cooler

A. Elkay _____
B. Halsey-Taylor _____
C. Haws _____

22 47 13 Drinking Fountain and Bottle Fillers

A. Elkay _____
B. Halsey-Taylor _____
C. Haws _____

22 52 33 Flextube Boiler

A. Bryan _____

22 66 00 Chemical-Waste Systems for Laboratory and Healthcare Facilities

22 66 53 Acid Waste Material

A. Fuseal _____
B. Lab-Line Enfield _____
C. Orion _____
D. Vulcathene-Vultite _____

23 00 00 HEATING, VENTILATION AND AIR CONDITIONING

23 05 00 COMMON WORK RESULTS FOR HVAC

23 05 03 Mechanical Pipe Fittings

A. Victaulic _____

23 05 14 Variable Frequency Drives (VFD's)

A. ABB _____
B. Danfoss-Graham _____

23 05 19 METERS AND GAUGES FOR HVAC PIPING

23 05 19-A Make-Up Water Meters

A. IFM Electronic _____
B. ISTEL with Pulse Contact _____

23 05 31 Equipment Curbs

A. Pate Company _____
B. Uni-Curb _____
C. Vent Products Co. _____

23 05 48 Vibration Isolators

A. Korfund _____
B. Peabody Noise Control _____

23 07 00 HVAC INSULATION

23 07 13 Duct Insulation

A. CertainTeed _____
B. Johns Manville _____
C. Knauf _____
D. Owens-Corning _____

23 07 16 HVAC Equipment Insulation

A. Armacell _____
B. Armstrong _____
C. CertainTeed _____
D. Johns Manville _____
E. Knauf _____
F. Owens-Corning _____

23 07 19 HVAC Pipe Insulation

A. Armacell _____
B. CertainTeed _____
C. Johns Manville _____
D. Knauf _____
E. Owens-Corning _____

23 09 00 INSTRUMENTS AND CONTROL FOR HVAC

23 09 13 Instrumentation and control Devices for HVAC

23 09 13.33 Control Valves

A. Belimo _____
B. Fisher/Emerson _____
C. IFM Electronic _____
D. Siemens _____

23 09 23 Direct-Digital Control System for HVAC

A. Distech _____
B. Siemens _____
C. Trane _____

23 09 23.12 Control Dampers

A. Greenheck _____

B. Johnson Controls _____
C. Nailor _____
D. Ruskin _____

23 09 23.13 Energy Meters (Contact GVSU Energy Dept.)

23 09 23.27 Gauges

A. IFM Electronic _____
B. Tel-Tru _____
C. Weiss Instruments _____

23 09 23.29 Thermometers

A. IFM Electronic _____
B. Tel-Tru _____
C. Weiss Instruments _____

23 20 00 HVAC PIPING AND PUMPS

23 21 00 Hydronic Piping and Pumps

A. Bell & Gossett _____
B. Grundfos (5hp & less recirculation) _____
C. ITT: _____
D. Wilo (5hp & less recirculation) _____

23 21 13 Circuit Setters

A. B & G _____
B. Tour & Andersson _____

23 22 00 STEAM AND CONDENSATE PIPING AND PUMPS

23 22 16 Steam Specialties

A. Armstrong _____
B. Maxi Therm _____
C. Sarco _____
D. SteamGuard_____

23 22 23 Condensate Pump (Prefer steam or air driven pumps)

A. Domestic _____
B. Weil _____

23 25 00 HVAC WATER TREATMENT

23 25 13 Water Treatment for Closed-Loop Hydronic Systems

A. Enerco (Heating Systems/Allendale and PEW) _____

23 25 16 Water Treatment for Open Hydronic Systems

A. Enerco (Cooling Systems/PEW) _____
B. KLM (Cooling Systems/Allendale) _____

23 30 00 HVAC AIR DISTRIBUTION

23 31 13 Flexible Duct

A. Genflex _____
B. Thermaflex _____
C. Wiremold _____

23 31 13.16 Spiral Duct

A. Eastern _____
B. Semco _____
C. Spiral Air (USA) _____
D. United _____

23 33 00 AIR DUCT ACCESSORIES

23 33 13 Manual Dampers

A. Air Balance _____
B. American Warming _____
C. Greenheck _____
D. Louvers & Dampers _____
E. Nailor _____
F. Ruskin _____
G. Safe Air _____

23 33 13.16 Fire Dampers

A. Air Balance _____
B. American Warming _____
C. Greenheck _____
D. Ruskin _____
E. Safe Air _____

23 33 13.23 Backdraft Dampers and Relief Dampers

A. Air Balance _____
B. American Warming _____
C. Dowco _____
D. Greenheck _____
E. Nailor _____
F. Ruskin _____

23 33 19 Attenuators

A. DCI _____
B. Gale _____
C. IAC _____
D. Kees _____
E. Koppers _____
F. Rinks _____
G. Semco _____
H. United Sheet Metal _____

23 34 00 HVAC FANS

23 34 00-A Utility Fans

A. Bayley _____
B. Broan _____
C. Peerless _____
D. Twin City _____

23 34 00-B Ceiling Exhaust Fans

A. Broan _____
B. Cook _____
C. Greenheck _____
D. Panasonic _____

23 34 00-C Roof Exhaust Fans

A. Cook _____
B. Greenheck _____
C. Penn _____

23 34 00-D In-Line Centrifugal Fans

A. Cook _____
B. Greenheck _____
C. Penn _____

23 34 00-E Circulating Fans

A. Leading Edge _____

23 34 23-A Unit Ventilator

A. AAF _____
B. Cook _____
C. Greenheck _____
D. Penn _____

23 34 23-B Vertical Unit Ventilator

A. Cook _____
B. Greenheck _____
C. Penn _____
D. Suburban _____

23 35 00 SPECIAL EXHAUST SYSTEMS

23 35 00-A Spray Booth

A. DeVilbiss _____

23 35 00-B Kitchen Hoods

A. Aerolator _____
B. Duo-Aire _____
C. Eonovent _____

23 35 00-C Lab Exhaust

A. Greenheck (Direct Drive Only) _____
B. Strobic _____

23 35 13 Dust Collector

A. AAF _____
B. Dustkop _____
C. Torit _____

23 35 16 Monoxide Exhaust System

A. Car-Mon _____

B. Engwald _____
C. Kent-Moore _____

23 36 00 Variable Volume Box (VAV's)

A. Nailor _____
B. Price _____
C Titus _____
D. Trane _____

23 37 00 AIR OUTLETS AND INLETS

23 37 00-A Louvers

A. American Warming _____
B. Dowco _____
C. Greenheck _____
D. Louvers & Dampers, Inc. _____
E. Ruskin _____

23 37 13 Diffusers, Registers and Grilles

A. Hart & Cooley _____
B. Krueger _____
C. Price _____
B. Titus _____
C. Tuttle & Bailey _____

23 38 00 Roof Hoods

A. Cook _____
B. Greenheck _____
C. Penn _____

23 38 16 Fume Hood Control and Valves

A. CRC _____
B. Phoenix _____
C. Siemens _____
D. TSI _____

23 40 00 HVAC AIR CLEANING DEVICES

23 41 00 Particulate Air Filtration

A. Columbia _____
B. Viledone _____

23 50 00 CENTRAL HEATING EQUIPMENT

23 51 00 BREECHINGS, CHIMNEYS AND STACKS

23 51 16 Prefabricated Stacks

A. Ampco _____
B. Heatfab _____
C. Metal Fab _____
D. Metalbestos _____

23 52 00 HEATING BOILERS

23 52 16-A Condensing Boilers

A. Endura (Fulton) _____
B. Laars _____
C. Lochinvar _____
D. Viessmann _____

23 52 39 Firetube Boiler

A. Burnham _____
B. Cleaver-Brooks _____
C. Fulton (Endura) _____
D. Hurst _____
E. Kewanee _____
F. Superior _____

23 54 00 Furnace (Residential Only)

A. Bryant _____
B. Carrier _____
C. ICP _____
D. Trane _____

23 55 00 Infrared Heaters

A. Lambert _____
B. Re-Verba-Ray _____
C. Solaronics _____

23 60 00 CENTRAL COOLING EQUIPMENT

23 62 00-A Air Cooled Condensing Units

A. AAON _____
B. Trane _____
C. York _____

23 62 00-B Packaged Compressor and Condenser Units

A. AAON _____
B. Trane _____
C. York _____

23 64 16 Centrifugal Water Chillers

A. Trane _____
B. York _____

23 64 33.13 Air-Cooled, Modular Water Chillers

A. Aermec _____
B. Trane-Multistack (Requires GVSU Approval) ____

23 65 00 Cooling Tower

A. B.A.C. _____
B. Marley _____

23 70 00 CENTRAL HVAC EQUIPMENT

23 73 00 Standard Air Handling Units

A. Trane _____
B. York _____

23 74 16 Packaged Rooftop Unit

A. Trane _____
B. York _____

23 74 23-A Packaged Indirect-Fired Make-Up Unit

A. Modine _____
B. Rapid _____
C. Reznor _____
D. Sterling _____
E. Trane _____
F. York _____

23 74 23-B Packaged Direct Fired Make-Up Air Units

A. Absolute Air _____
B. Rapid _____
C. Reznor _____
D. Trane _____

23 75 00 CUSTOM PACKAGED INDOOR/OUTDOOR HVAC EQUIPMENT

23 75 00-A Custom Air Handling Units

A. Air Flow Equipment _____
B. Govenair _____
C. Mammoth _____
D. Temtrol _____
E. Vanmar _____
F. Ventrol _____

23 80 00 DECENTRALIZED HVAC EQUIPMENT

23 81 00 DECENTRALIZED UNITARY HVAC EQUIPMENT

23 81 23 Packaged Air Conditioning Unit (Lab, Medical, or IT buildings)

A. Liebert (Base Bid) _____
B. Powerware _____

23 81 26 Split System AC Units

A. Fujitsu _____
B. Mitsubiche _____
C. Trane _____
D. York _____

23 82 00 CONVECTION HEATING AND COOLING UNITS

23 82 00-A In-Floor Heat System

A. HeatLink _____
B. Rehau _____
C. Wirsbo _____

23 82 16 Electric Heat Coil

A. Brasch _____
B. Indeeco _____
C. Runtel _____

23 82 19 Fan Coil Units

A. Enviro-Tec _____
B. Trane _____
B. York _____

23 82 33 Convector

A. Modine _____
B. Sterling _____
C. Trane _____
D. Vulcan _____

23 82 39-A Cabinet Unit Heaters

A. AAF _____
B. Modine _____
C. Sterling _____
D. Trane _____
E. York _____

23 82 39-B Gas Fired Unit Heaters

A. Modine _____
B. Reznor _____
C. Sterling _____
D. Trane _____

23 82 41 Heat Pumps

A. AAF _____
B. Fujitsu _____

23 83 16 Radiant-Heating Hydronic Piping

A. Runtel _____

23 83 19 Radiant Ceiling Heating Systems

A. Aerotech _____
B. Airtex _____

23 83 43 Snowmelt System

A. HeatLink _____
B. Rehau _____
C. Wirsbo _____

23 84 13 Humidifiers

A. Armstrong _____
B. DriSteem _____
C. Herrmidifier _____
D. Neptronic – SKE4 _____
E. Neptronic – SKS4 _____
F. Nortec

END OF SUPPLEMENT

Grand Valley State University

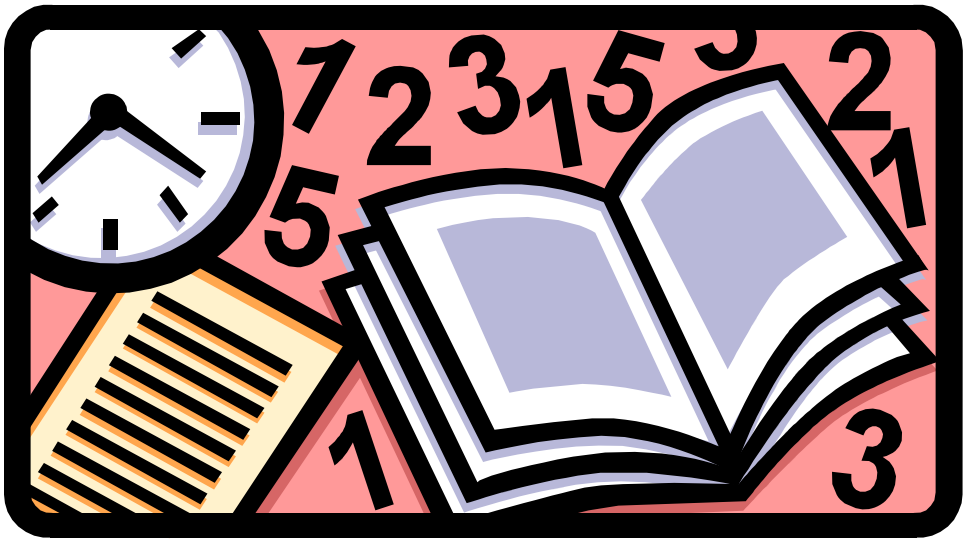
APPENDIX H

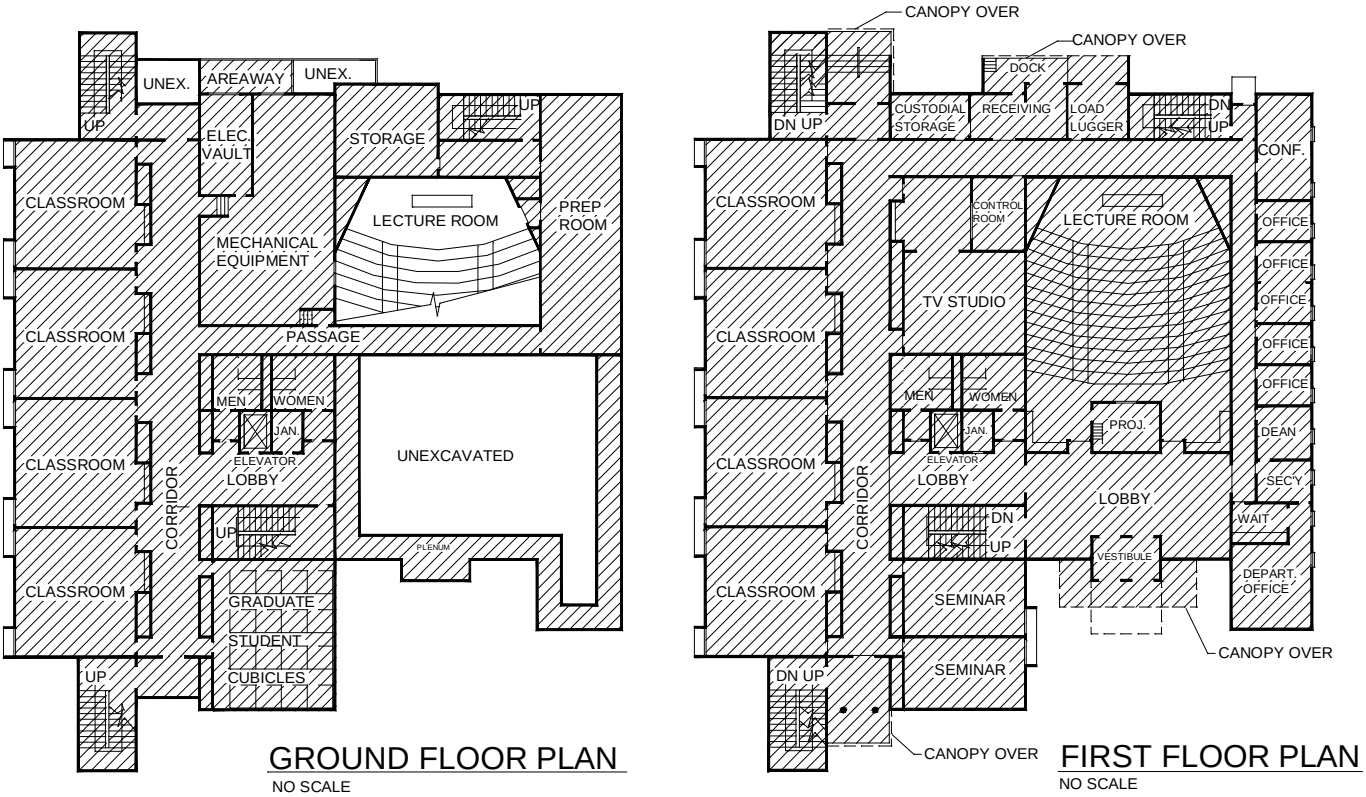
Area Calculations

STATE OF MICHIGAN
DEPARTMENT OF TECHNOLOGY, MANAGEMENT AND BUDGET
FACILITIES ADMINISTRATION, DESIGN AND CONSTRUCTION DIVISION

CAPITAL OUTLAY DESIGN MANUAL APPENDIX EIGHT

AREA CALCULATIONS – DATA SHEET(S)





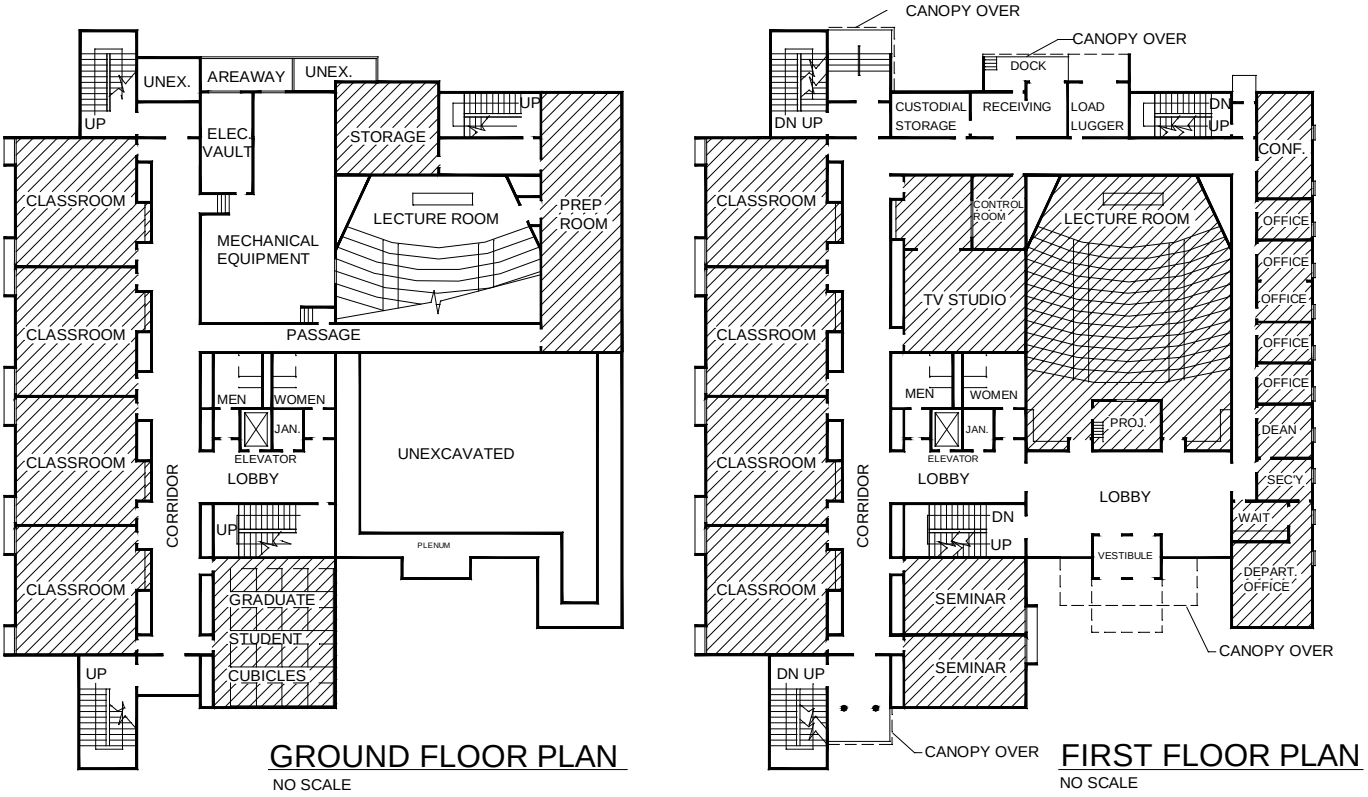
Gross Area

Definition: Gross area shall be construed to mean the sum of the floor areas included within the outside faces of exterior walls for all stories or areas which have floor surfaces.

Basis for Measurement: Gross area shall be computed by measuring from the outside face of exterior walls, disregarding cornices, pilasters, buttresses, etc., which extend beyond the wall face.

Description: In addition to floored spaces obviously covered above, gross area should include basements (except unexcavated portions), attics, garages, enclosed porches, penthouses and mechanical equipment floor, lobbies, mezzanines, all balconies (inside or outside) used for operational functions, and corridors, provided they are within the outside face lines of the structure. Roofed loading or shipping platforms should be included whether within or outside the exterior face lines of the structure.

Limitations: Open courts and light wells, or portions of upper floors eliminated by rooms or lobbies which rise above single floor ceiling height, shall not be included in the gross area, nor shall unenclosed roofed-over areas or floored surfaces with less than 6'-6" clear headroom be included, unless they can properly be designated and used as either net assignable, mechanical, circulation, or custodial areas.



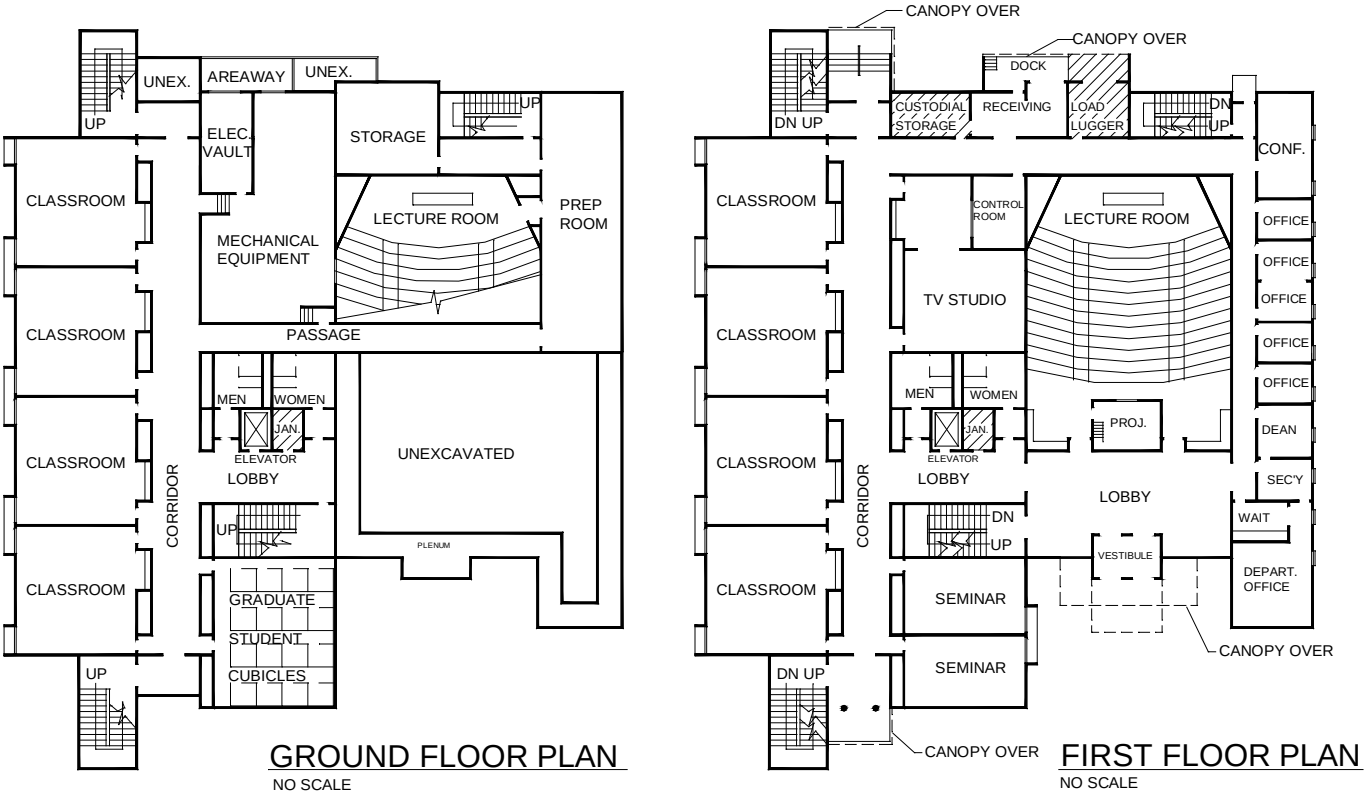
Net Assignable Area

Definition: Net assignable area shall be construed to mean the sum of all areas on all floors of a structure assigned to, or available for assignment to, an occupant, including every type of space functionally usable by an occupant (except those spaces elsewhere separately defined in custodial, circulation, and mechanical area classifications).

Basis for Measurement: All net assignable areas shall be computed by measuring from the inside finish of permanent outer building wall, to the office side of corridors and/or to permanent partitions.

Description: Included shall be space subdivisions for offices, classrooms, laboratories, seminar and conference rooms, libraries, file rooms, storage rooms, etc., including those for special purposes (e.g., auditoriums, cafeterias, TV studios, faculty and student locker and shower rooms, maintenance and research shops, garages), which can be put to useful purposes in accomplishment of the institution's mission.

Limitations: Deductions shall not be made for columns and projections necessary to the structure.



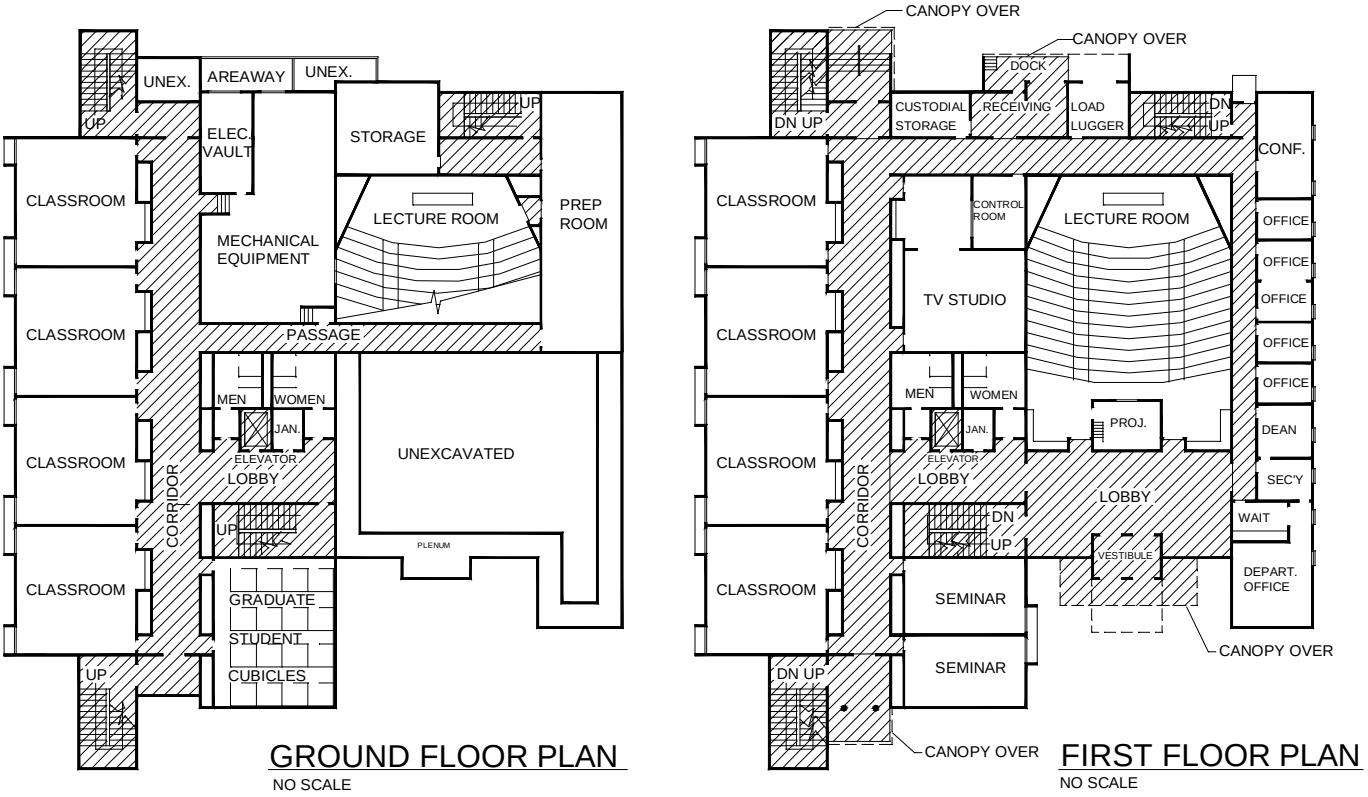
Custodial Area

Definition: Custodial area shall be construed to mean the sum of all areas on all floors of a structure used for protection, care, maintenance and operation.

Basis for Measurement: These areas shall be measured from the inside surfaces of enclosing walls.

Description: Included shall be such areas as custodial, locker rooms, janitor's closets, and maintenance rooms.

Limitations: Deductions shall not be made for columns and projections necessary for the structure.



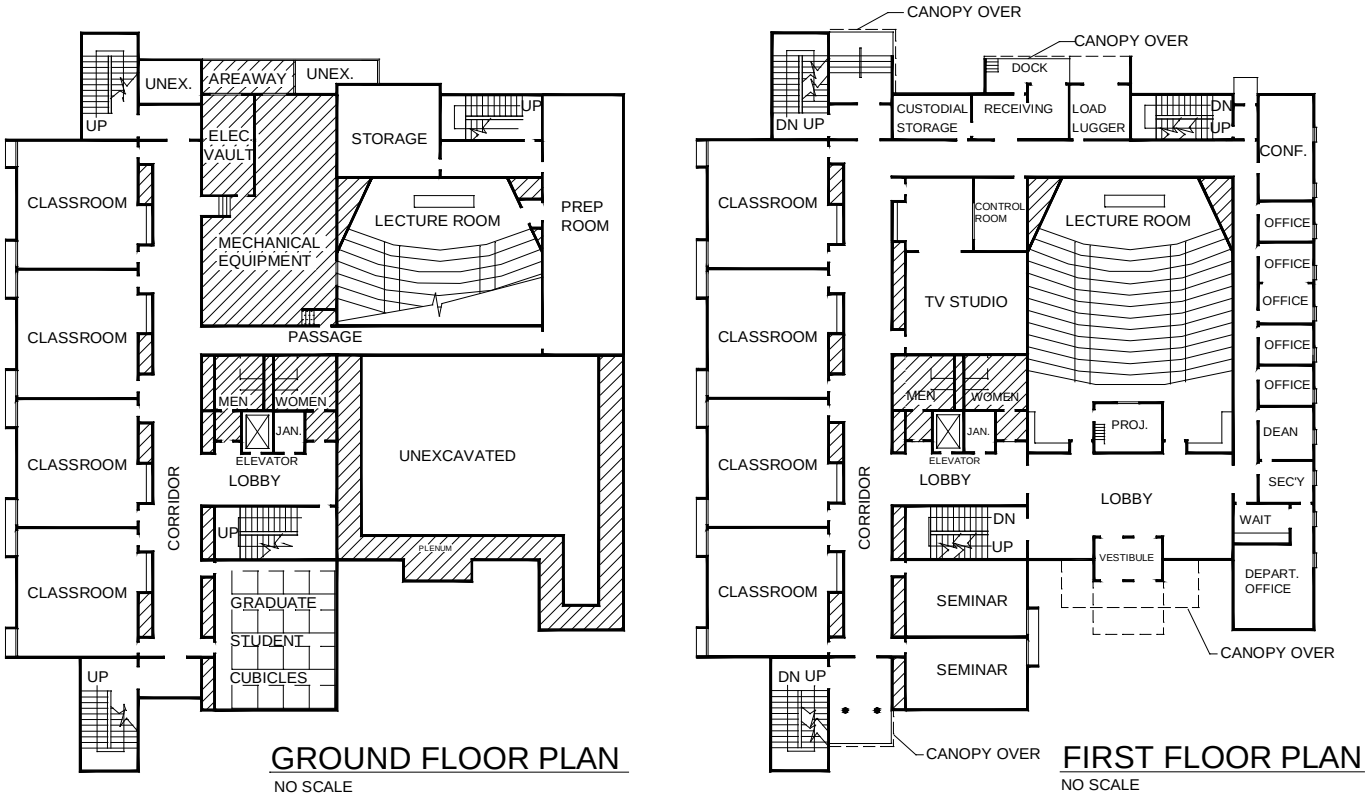
Circulation Area

Definition: Circulation area shall be construed to mean that portion of the gross area (whether or not enclosed by partitions), which is required for physical access to some subdivision of space.

Basis for Measurement: Circulation area shall be computed by measuring from the inner faces of the walls or partitions which enclose horizontal spaces used for such purposes; or, when such spaces are not enclosed by walls or partitions, measurements shall be taken from imaginary lines which conform as nearly as possible to the established circulation pattern of the structure.

Description: Circulation areas shall include, but not be limited to: corridors (access, public, service, also “phantom” for large unpartitioned areas); elevator shafts; escalators; fire towers or stairs; stairs and stair halls; loading platforms (except where required for operational reasons and thus includable in net assignable area); lobbies (elevator, entrance, public, also public vestibules); tunnels and bridges (not mechanical).

Limitations: When assuming corridor areas, only horizontal spaces required for general access shall be included, not aisles which are normally used only for circulation within offices or other working areas. Deductions shall not be made for columns and projections necessary to the structure.



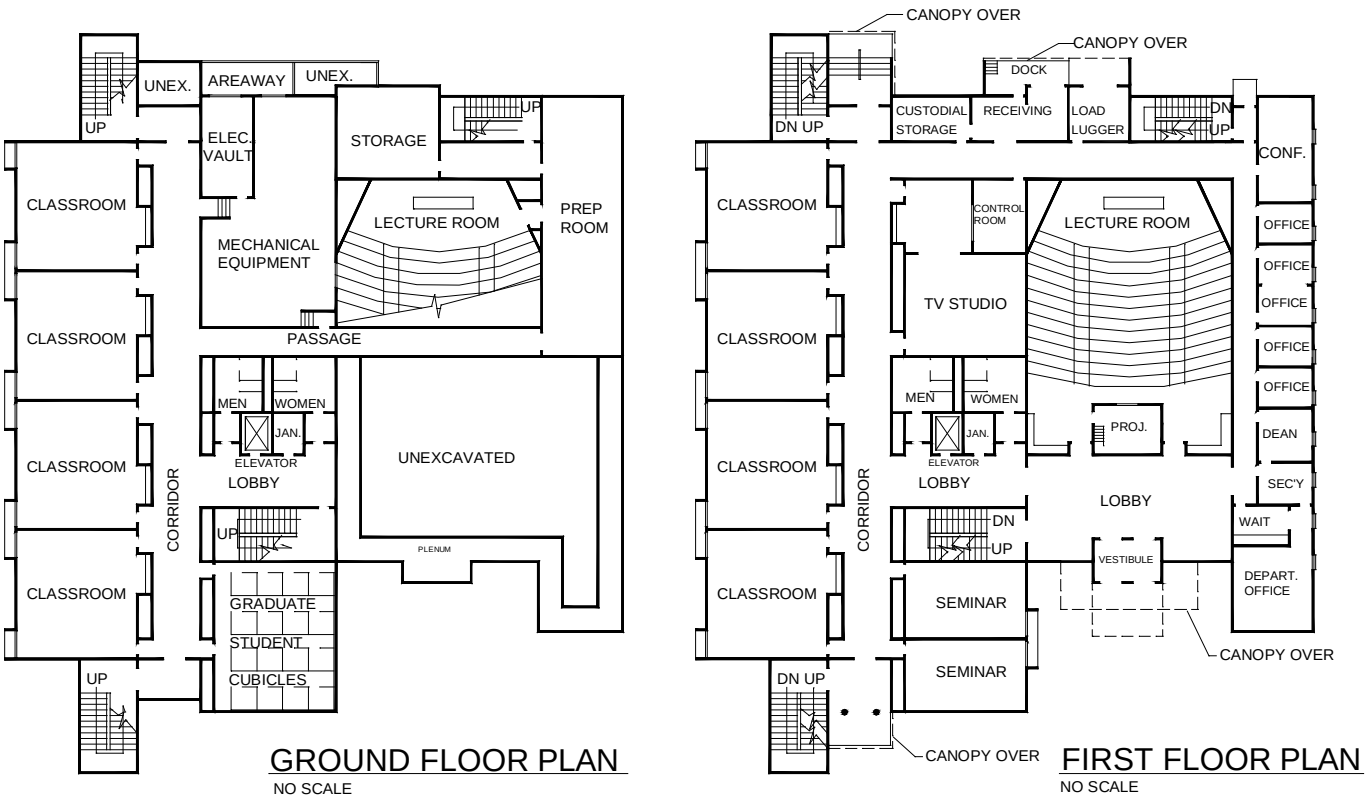
Mechanical Area

Definition: Mechanical area shall be construed to mean that portion of the gross area designed to house mechanical equipment, utility services, and non-private toilet facilities.

Basis for Measurement: Mechanical area shall be computed by measuring from the inner faces of the walls, partitions, or screens that enclose such areas.

Description: Mechanical areas shall include, but not be limited to: Air duct shafts; boiler rooms; fixed mechanical and electrical equipment rooms; fuel rooms; mechanical service shafts; meter and communications closets; service chutes; stacks; and non-private toilet rooms (custodial and public).

Limitations: Deductions shall not be made for columns and projections necessary to the structure.



Construction Area

Definition: Construction area shall be construed to mean that portion of the gross area which cannot be put to use because of the presence of structural features of the structure.

Basis for Measurement: Precise computation of construction area is not contemplated under these definitions. Some construction features are included in the computation of other areas. However, total construction area shall generally be determined by assuming it to be the residual area after the net assignable, circulation, custodial, and mechanical areas have been subtracted from the gross area.

Description: Examples of areas normally classified as construction area are exterior walls, firewalls, permanent partitions, and unusable areas in attics, basements, or comparable portions of the structure.

Computation of Construction Area:

Gross Area	34,578 Square Feet	100.0 Percent
Net Assignable Area	15,596	45.1
Circulation Area	10,385	30.0
Custodial Area	577	1.7
Mechanical Area	**4,186**	**12.0**
Construction Area	3834 Square Feet	11.2 Percent

PROJECT DATA SHEET

(If project has several phases or parts, provide a data sheet for each part, as well as a total)

SUBJECT: File No.
Department/Agency/Facility/University/Community College
Scope of Work/Project Description
City, Michigan

Enter Schematics or Preliminaries prepared by: (Enter Name of Architectural/Engineering Firm)

Estimated Cost of:

1. The structure (General, mechanical, electrical, fixed equipment, and contingencies).....$_____

   1. a. Telecommunications (incl. above) $_____

2. Services from five feet outside of the structure (Sewers, water supply, etc.) .....$_____

3. Site improvements (Roads, walks, grading, etc.) .....$_____

4. Architectural/Engineering fees, surveys, site investigations, State supervision (if applicable) etc. .....$_____

5. DTMB fee* .....$ _____

   Design and Construction cost per gross sq. ft. (1 thru 4 ÷ gross sq. ft.)... $/gross sq.ft.

6. Furnishings (Furniture, movable equipment, etc., not considered a part of the structure nor requiring fixed mechanical and/or electrical services) .....$_____

7. Other (*i.e., asbestos abatement*).....$_____

8. Total estimated project cost, bid _____ _____ .....$_____
   Month Year

   Total project cost per gross sq. ft. (1 thru 6 = 7 ÷ gross sq. ft.)..... $/gross sq. ft.

Total net square feet _____

Total gross square feet _____

Building design efficiency (ratio of net/gross) _____

Building occupant design capacity _____

Parking spaces provided _____ Ratio of occupant/parking space ___/space

* DTMB Fee: When the U/CC designates DTMB-FA to provide management and construction oversight of the project, the DTMB-FA fee is 1.5% of the authorized project cost. When the U/CC self-manages the project, the fee is 1% of the authorized project cost (with a minimum fee of $75,000 and maximum of $500,000).

ANNUAL OPERATING BUDGET

SUBJECT: File No.
Agency/Department/Facility/University/Community College
Project Name
City and State

NET AND GROSS AREAS/VOLUME

SUBJECT: File No.
Agency/Department/Facility/University/Community College
Project Name
City and State

l.	*Gross Area	_____	square feet
2.	Net Assignable Area	_____	square feet
3.	Custodial Area	_____	square feet
4.	Circulation Area	_____	square feet
5.	Mechanical Area	_____	square feet
6.	Construction Area	_____	square feet

*Ratio of net assignable area in 2. above to gross area in l. is ( ) percent.

*Volume _____ cubic feet

Net assignable area in program statement and schematic plans is from one approved by the Department of Technology, Management and Budget and Joint Capital Outlay Subcommittee. Gross area in 1. above is equal to the sum of all other areas (2. through 6.). Definitions of various areas are available from Facilities Administration, Design and Construction Division and are from Federal Construction Council, Task Group T-56, Classification of Building Areas, Washington: National Academy of Sciences--National Research Council, 1964 (copies available from the Facilities Administration, Design and Construction Division).

*Limited to three significant figures.

DESIGN AND CONSTRUCTION SCHEDULE

SUBJECT: File No.
Agency/Department/Facility/University/Community College
Project Name
City and State

Program Analysis (Month/Year)

Schematic Design (Month/Year)

Review and Joint Capital Outlay Subcommittee/
Department of Technology, Management and Budget Approval (Month/Year)

Preliminary Design (Month/Year)

Review and Department of Management
and Budget Approval (Month/Year)

Final Design (Month/Year)

Review and Department of Management
and Budget Approval (Month/Year)

Bid (Month/Year)

Review and Department of Management
and Budget Approval (Month/Year)

Award (Month/Year)

Construction Commences (Month/Year)
(add phase breakdown if appropriate)

Occupancy (Month/Year)

APPENDIX I (RESERVED)

APPENDIX J (RESERVED)

Grand Valley State University

APPENDIX K

Contractor Checklist for Soil Erosion & Sedimentation Control (SESC) Plan

CHECKLIST FOR CONTRACTOR'S
SOIL EROSIONAND SEDIMENTATION CONTROL PLAN

For projects that include earth changes or disturb existing vegetation.
GRAND VALLEY STATE UNIVERSITY
FACILITIES PLANNING DEPARTMENT
SOIL EROSION AND SEDIMENTATION CONTROL PROGRAM

PROJECT TITLE: _____

PROJECT LOCATION: _____

PROJECT FILE NUMBER: _____ **INDEX NUMBER:** _____

Prior to the start of earthwork, the Contractor must submit a Soil Erosion and Sedimentation Control (SESC) Plan to the Grand Valley State University Facilities Planning Department. The intent of the SESC Plan is to ensure that the Contractor has reviewed and understands the SESC provisions within the drawings and specifications. The following checklist will provide Contractors with assistance in creating the SESC Plan.

The SESC Plan must include:

1. ☐ A written plan or letter demonstrating:
   - ☐ The Contractor's means and methods for the implementation of SESC provisions included within the plans and specifications and compliance with the provisions of Part 91 of PA 451 of 1994, as amended
   - ☐ The Contractors plan for dust control
   - ☐ The Contractor's plan for inspection and maintenance of temporary soil erosion and sedimentation control measures
2. ☐ A map, location plan, drawing, or amended copy of the project SESC provisions or grading plan showing:
   - ☐ The locations of any stockpiles of soil associated with the project
   - ☐ The temporary SESC control measures associated with stockpiles of soil
   - ☐ The Contractor's suggested or proposed additions or relocations of any temporary or permanent SESC control measures associated with the project drawings and specifications
   - ☐ Location of site entrances, exits and vehicle routes
   - ☐ Location of site superintendent's / project manager's site trailer or office (for SESC Inspector check-in)
3. ☐ A schedule for the installation and removal of temporary control measures and the installation of permanent soil erosion and sedimentation control measures in relation to the overall construction schedule.

Submit the above items to: Grand Valley State University
Facilities Planning Department - Resident SESC Inspector
1 Campus Drive - 1201 Service Building
Allendale, MI 49401-9403

Upon approval of the Contractor's SESC Plan, an "Authorization to Proceed with Earth Change" will be issued by the Grand Valley State University Facilities Planning Department.

DEQ

Part 91, Soil Erosion and Sedimentation Control Plan

Minimum Requirements **Project:** _____

Rule 1703 Requirement	Included in Plan?*	Comments
Map with scale: 1" = 200' or less, or indication of exact distances between noted features on site plan, including site location sketch	Yes ☐ No ☐	
Legal description of property (town, range, section, quarter-quarter section)	Yes ☐ No ☐	
Proximity of any proposed earth change to lakes and/or streams	Yes ☐ No ☐	
Predominant land features	Yes ☐ No ☐	
Slope description or contour intervals	Yes ☐ No ☐	
Soils survey or written description of the soil types of the proposed exposed land area	Yes ☐ No ☐	
Description and location of the physical limits of each proposed earth change	Yes ☐ No ☐	
Description and location of all existing and proposed on-site drainage and dewatering facilities	Yes ☐ No ☐	
Timing and sequence of each proposed earth change	Yes ☐ No ☐	
Location and description for installing and removing all temporary SESC measures	Yes ☐ No ☐	
Description and location of all proposed permanent SESC measures	Yes ☐ No ☐	
Maintenance program for all permanent SESC measures and designation of person responsible for maintenance	Yes ☐ No ☐	

***If No is checked above, the plan must be revised to include the missing element prior to submittal/approval.**

Other Comments:

PROFESSIONAL SERVICES CONTRACTOR SOIL EROSION AND SEDIMENTATION CONTROL DESIGN CHECKLIST

GRAND VALLEY STATE UNIVERSITY
FACILITIES PLANNING DEPARTMENT
SOIL EROSION AND SEDIMENTATION CONTROL PROGRAM

PROJECT TITLE: _____

PROJECT LOCATION: _____

PROJECT FILE NUMBER: _____ **INDEX NUMBER:** _____

Y	N*	
☐	☐	Will this project include disturbing earth? Estimate the areas (in acres) of disturbed earth: _____acres.

Y	N	
☐	☐	Will this project disturb 1 or more acres?
☐	☐	Is this project within 500 feet of a lake, stream or wetland?

If earth change disturbs 1 or more acres or is within 500 feet of a lake, stream or wetland, please complete the remainder of this form.

Y	N	**Does this plan identify:**
☐	☐	a. Project location
☐	☐	b. Distance to lakes , streams & wetlands
☐	☐	c. Soil type
☐	☐	d. Existing & final contours
☐	☐	e. Existing, construction & final drainage patterns (including dewatering facilities)
☐	☐	f. Limits of proposed earth change
☐	☐	g. Site boundaries / property lines
☐	☐	h. Schedule/ phasing of construction and installation of SESC control measures
☐	☐	i. Location of temporary (during construction) SESC control measures
☐	☐	j. Location of permanent (post construction) SESC control measures
☐	☐	k. Provisions for maintenance of temporary controls
☐	☐	l. A manual for owner maintenance of the permenant contols

* - Soil erosion and sedimentation control measures may still be required even if the area of earth disturbance is less than one acre. Incorporate the components of the plan required to ensure that no sediment leaves the project site.

PROJECT TITLE: _____

PROJECT LOCATION: _____

PROJECT FILE NUMBER: _____ **INDEX NUMBER:** _____

Y	N	
☐	☐	m. Details for installing and removing SESC control measures

Y	N	**Does the project specification include:**
☐	☐	a. Detail SESC requirements (Reference to Part 91 without detail is not acceptable)
☐	☐	b. Require the contractor to perpare and submit a construction sequence and SESC plan **before construction begins**
☐	☐	c. Line item on bid form for: a) construction sequencing, b) installation, maintenance and removal of temporary SESC control measures and c) installation and maintenance of permanent SESC control measures.
☐	☐	d. Constructing and maintaining temporary and permanent SESC measures
☐	☐	e. Language addressing $500 per day fines and assessment of actual damage costs

Y	N	**Do the plans consider:**
☐	☐	a. Protection of the construction boundary perimeter
☐	☐	b. Protection of exposed soil and stockpiles from wind and water erosion
☐	☐	c. Protection of wetlands, streams and lakes
☐	☐	d. Inlet protection of storm water systems
☐	☐	e. Protection of exposed slopes from wind and water erosion
☐	☐	f. Vehicular tracking of soil off-site and street sweeping

Y	N	**Do the plans follow the seven basic principles of SESC?**
☐	☐	a. Design and consruct terrain features such as slopes and drainage ways to minimize the erosion potential of the exposed site based on the soil type, time of year, proximity to waterways, duration of exposure and the anticipated volume and intensity of runoff.
☐	☐	b. Minimize the surface area of unstabilized soils left unprotected and vulnerable to runoff and wind erosion.
☐	☐	c. Minimize the time that unstabilized soil areas are exposed to erosive forces (wind and rain).

PROJECT TITLE: _____

PROJECT LOCATION: _____

PROJECT FILE NUMBER: _____ **INDEX NUMBER:** _____

Y	N	
☐	☐	d. Protect and shield exposed soil areas with a cover of live vegetation, mulch, or other approved erosion resistant materials during the temporary and permanent control periods of construction.
☐	☐	e. Avoid concentrated runoff, or when unavoidable, control runoff velocities to non-erosive levels.
☐	☐	f. Eroded sediments will be trapped on-site with temporary and permanent barriers, basins or other sedimentation retention devices while allowing for the controlled discharge of runoff water at non-erosive velocities.
☐	☐	g. Implement continuous inspection and maintenance programs.

Y	N	**When site exceeds 1 acre, provide Storm Water Run-off information.**
☐	☐	a. Do the plans provide information regarding run-off volume, run-off velocities and peak discharges.
☐	☐	b. Calculations are based on the ☐ 10, ☐ 25, or ☐ 100 year storm event.
☐	☐	c. Identify method of calculating run- off volume, run-off velocity and peak discharge.