

Office of University Building Official (OUBO)

Building Safety Month Training Series

Session 5: Chapter 8 & Related Appendices – Part 3: Working Drawings

Stakeholders: GMU Facilities, Contractors, & Registered Design Professionals

OUBO Staff

Administration

David M. Kidd, P.E.
University Building Official
Email: dkidd7@gmu.edu

William (Bill) G. Miller
Deputy Building Official
Phone: 703-993-8339
Email: wmille3@gmu.edu

Donna Martinez-Vallejos
Permit Administrator
Phone: 703-993-6070
Email: dmartinb@gmu.edu

Review Engineers

Justin Biller, P.E.
Fire Protection Plan Review Engineer
Phone: 571-545-0252
Email: jbillier@gmu.edu

Tim Hagedorn, P.E.
Civil/Structural Plan Review Engineer
Phone: 571-545-0255
Email: jhagedo@gmu.edu

Kevin Kline, P.E.
Electrical Plan Review Engineer
Phone: 571-545-0253
Email: kkline7@gmu.edu

Ethan Scholl, P.E.
Mechanical Plan Review Engineer
Phone: 571-545-0254
Email: escholl4@gmu.edu

Agenda

HECO Chapter 8 & Related Appendices:

- Appendix W: HECO Manual Revision History
- Chapter 8: Project Design Standards and Requirements
- Appendix U: OUBO Electronic Document Review (EDR) Process & Document Submittal Requirements



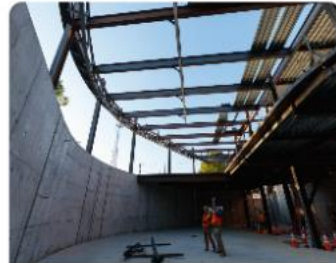
Office of University Building Official



Permits



Plan Review



Inspections



Resources

University Resources

- [OUBO e-Builder Processes](#)
- [GMU Design Standards Manual](#)
- [GMU HECO/DGS Forms](#)
- [GMU e-Builder](#)
- [GMU Facilities Planning, Design and Construction](#)
- [GMU Senior Vice President of Administration & Finance](#)
- [GMU University Leadership](#)
- [GMU Board of Visitors](#)
- [GMU Campus Maps and Directions](#)
- [GMU Capital Strategy and Planning](#)
- [Tier III Management Agreement](#)

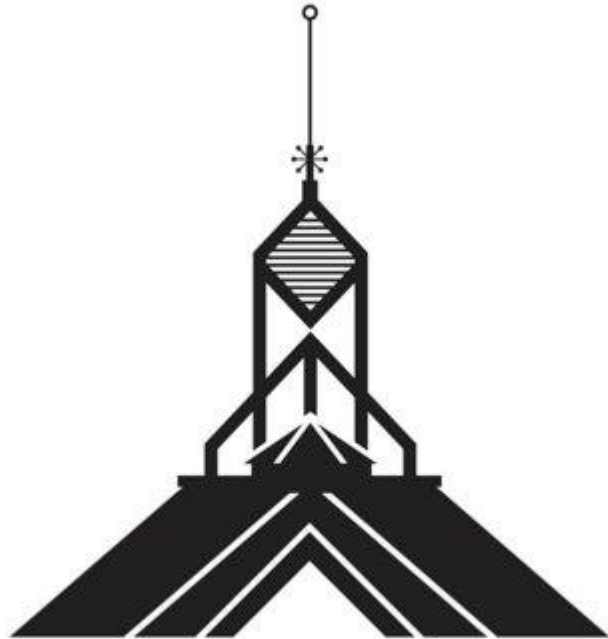


HECO/DGS Forms

[HOME](#) / [RESOURCES](#) / [HECO/DGS FORMS](#)



GEORGE MASON UNIVERSITY
Higher Education Capital Outlay Manual
2023



Vice President of Facilities

References: The Commonwealth of Virginia "Construction and Professional Services Manual" (CPSM) and the "Design & Construction Guidelines" are referenced extensively and should be readily available when using this Manual.

The most current version of these two documents are on the following websites:
<https://facilities.gmu.edu/> and www.dgs.virginia.gov

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APPENDIX W HECO MANUAL REVISION HISTORY

2016 – Original Publication
2023-Version 2.0

Revision Package – Dated February 02.03.2023
Summary of Revisions for HECO Manual Version 2.0

*** Major Revisions are notated in Red below.**

Minor formatting, editing, grammar changes or updates to Personnel Titles or Agency names are not individually notated in this Revision Package.

8.8.5 Calculations

- Added Calculation guidance and requirements for “Plumbing Calculations”, “HVAC Calculations”, “Electrical Calculations”, and “Structural Calculations.”

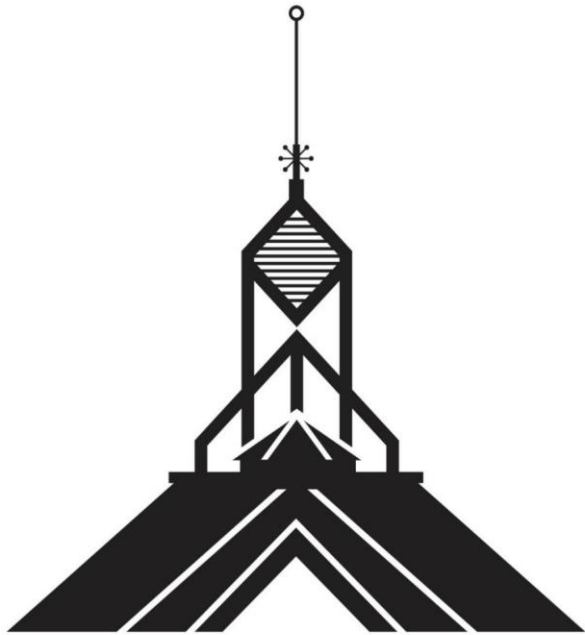
8.8.6 Submittal Documents

8.8.7 Working Drawings – Significant changes to requirements

- Content revised and requirements added...



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Chapter 3: General Terms and Conditions For Professional Services

Chapter 4: Procurement Procedures For Professional Services

Chapter 5: Basic Services and Responsibilities

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Chapter 7: Engineering and Technical Criteria

Chapter 8: Project Design Standards and Requirements

Chapter 9: Construction Procurement & Administration

Chapter 10: Special Procedures

Chapter 11: Building Official Reviews, Permits, and Approvals

Chapter 12: Project Committees

Chapter 13: Master Plans, Site, and Design Guidelines

Chapter 14: Planning and Project Approval

Chapter 15: Reports

Chapter 16: Financial Process



CHAPTER 8: PROJECT DESIGN STANDARDS AND REQUIREMENTS

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Section 8.3 Specification Standards

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Section 8.19 Fire Protection Shop Drawings

CHAPTER 8: PROJECT DESIGN STANDARDS AND REQUIREMENTS

Section 8.1 General

Section 8.2 Drawing Standards

Section 8.8 Working Drawings

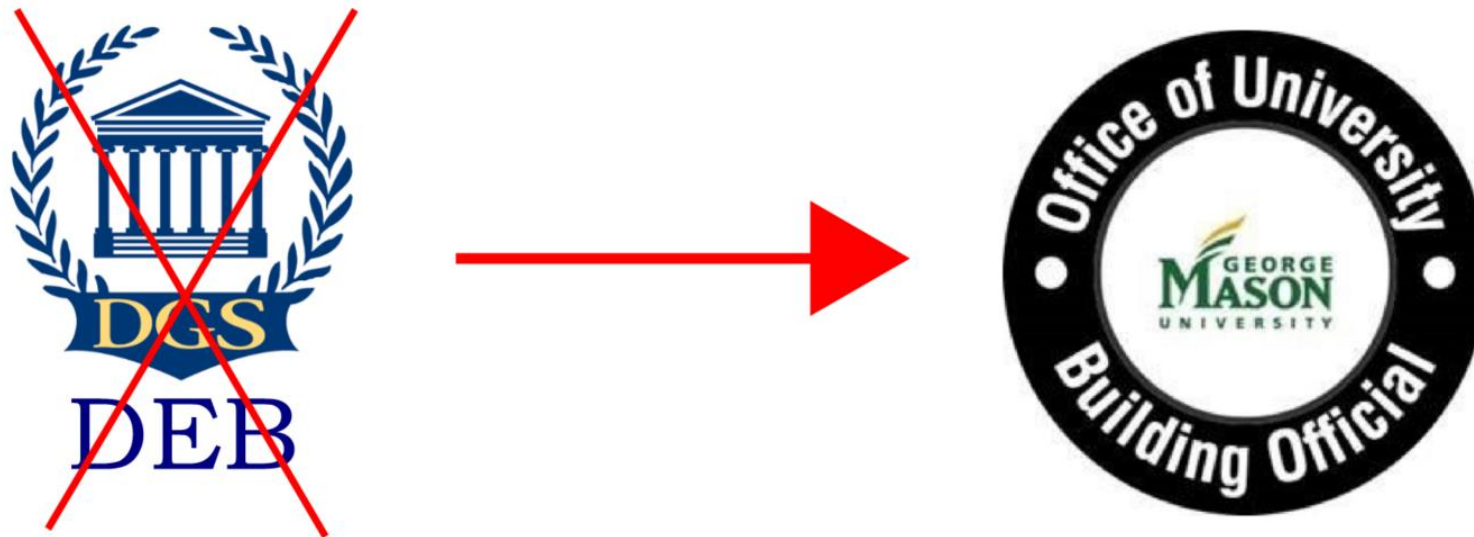
Section 8.11 Project Submission Requirements

Section 8.12 Authority Having Jurisdiction Reviews and Approvals

Section 8.19 Fire Protection Shop Drawings

CHAPTER 8: PROJECT DESIGN STANDARDS AND REQUIREMENTS

Note: Entire Section has been revised to reflect the policies/procedures of the George Mason University Office of University Building Official (OUBO) and most references to DEB have been replaced with OUBO where they are acting as the Building Official under Mason's University Management Agreement with the Commonwealth. Some Content from Chapter 7 has been moved to Chapter 8.

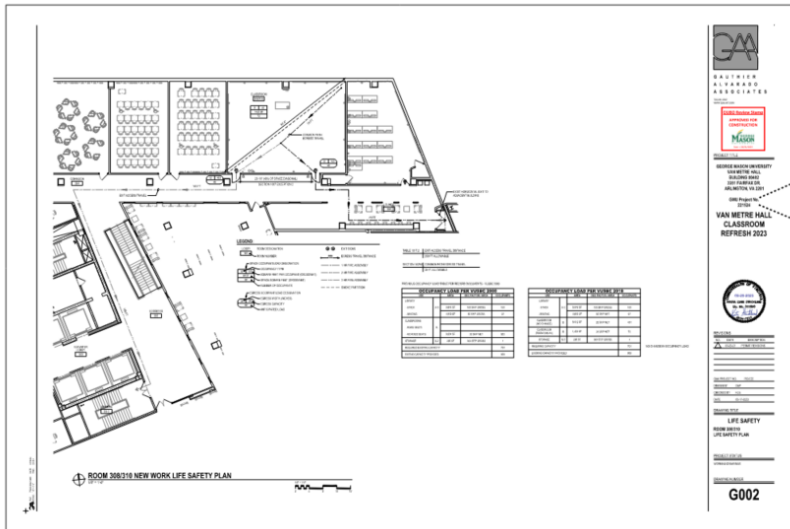


8.1.3 Project Identification on Documents

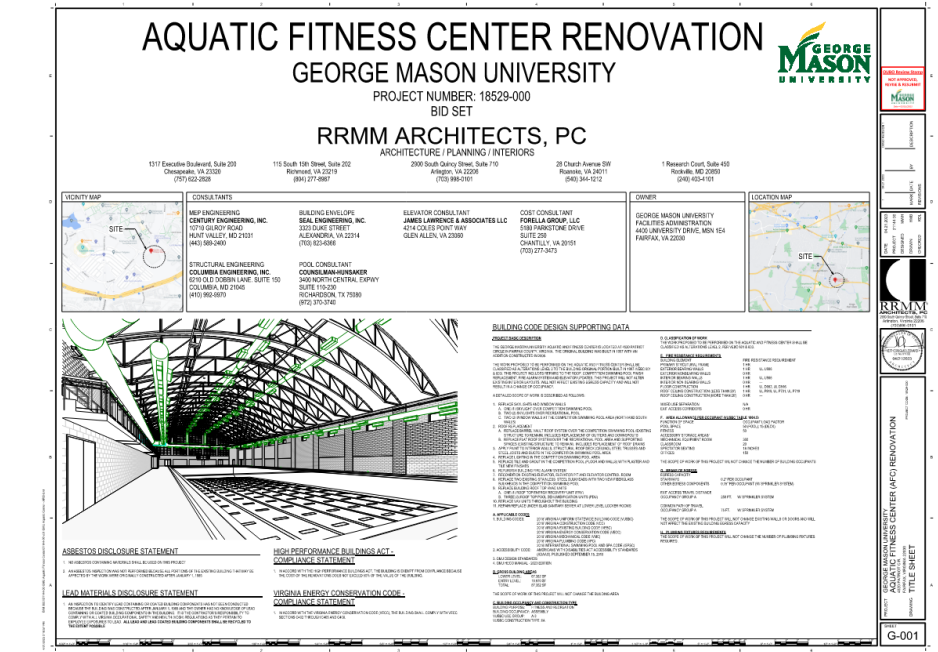
Note: Project Code, project number, project code number used interchangeably for projects within HECO and include the project number on all correspondence, i.e. email, etc.

SECTION 8.2 DRAWING STANDARDS [Note: Standard for Schematic, Preliminary, & Working Drawings.]

8.2.1 General Requirements: Title sheet(s)...



**GMU Project No.
221524**



8.2.2 Drawing Requirements & Specifications:

8.2.2.1 Arrangement of Drawings: Drawings shall be arranged in the following order with the discipline identifying character shown:

G - Title Sheet, Index, Code Compliance, and Life Safety Drawings [Previously T-Title Sheet and Index]

C - Plot and/or Site plans

C - Sanitary and Civil

B - Boring logs

L - Landscaping

D - Demolition

A - Architectural

S - Structural

FA – Fire Alarm [Previously FP-Fire Protection Information]

FX – Fire Suppression, Standpipes, and Accessories [Previously SP-Sprinkler Systems, Standpipes, and Accessories]

P - Plumbing

M - Mechanical (heating, cooling, ventilation, etc.)

E - Electrical

R - Asbestos Abatement

T–Telecom/AV

AC – Access Controls (Access Controls, Cameras, and Alarm Systems) [New]



SECTION 8.8 WORKING DRAWINGS PHASE (CONSTRUCTION DOCUMENT PHASE)

8.8.1 General Requirements:

Based on the Preliminary Design submission documents including the review and the value engineering comments and resolution thereof, the A/E shall prepare the working drawings and specifications. The working drawings Contract Documents shall set forth in detail the requirements for the construction of the entire project and include the applicable bidding information. The A/E shall assist in the preparation of the bidding forms, the Special Conditions of the Contract, and the Contract between University and Contractor, HECO-9. All drawings shall bear the seal, signature and date of the Architect or Engineer responsible for that discipline. The Specification Cover Sheet shall bear the seal, signature and date of the Architect and all Engineers.

[Plan Review – Office of University Building Official \(gmu.edu\)](http://gmu.edu)

8.8.1.1 Verification of Existing Conditions:

The A/E shall visit the site and ascertain pertinent local conditions that must be addressed in the design. As part of the required services, it is the A/E's responsibility to verify, by on-site observations of applicable existing buildings, the configurations, locations, dimensions, sizes and conditions accessible for verification. Certain assumptions are made regarding existing conditions in the remodeling and or rehabilitation of an existing building. Some of these assumptions may not be verifiable without additional exploration or investigation of the building or site. To minimize the risk during construction of uncovering conditions that are not as shown on the documents and delaying project progress, the Agency should consider and evaluate the advice of the A/E to conduct additional investigation, verifications or checks to verify.

Note: Verification of Existing Conditions required for Schematic, Preliminary, and Working Designs

8.8.5 Calculations: Calculations must be organized, indexed, numbered and submitted for each discipline involved. Design calculations should indicate assumptions, considerations and factors involved in the design and support the design shown on the plans and specifications. Provide one copy of the completed design calculations of each discipline to the University with the Contract Document submission.

Plumbing Calculations:

Include calculations for the following:

1. Domestic Water Supply Fixture Unit/Demand Calculations to support main/branch pipe sizing.
2. Domestic Hot Water Fixture Unit/Demand Calculations to support all scheduled equipment.
3. Sanitary Drainage Fixture Unit/Demand Calculations to support main/branch pipe sizing.
4. Storm Drainage Calculation (Primary & Emergency) to support roof drain, main/branch pipe sizing.
5. Fuel Gas Piping Calculation to support main/branch pipe sizing with demand
6. External Static Pressure Calculations (pipes) to support HP of motors for all pumps.

HVAC Calculations:

Include calculations for the following:

1. Heating and Cooling Load Calculations to support all scheduled equipment.
2. Ventilation (Outside Air & Exhaust) Calculations for all spaces to support all scheduled equipment.

Multiple zone RTU-3 HEAT											
<input checked="" type="checkbox"/> Show simple view											
System name and number										RTU-3 HEAT	
Condition analyzed (Impacts Ex, Vdr, Vpr and Vps)										Heating	
All zones are included in the VFP calculation										Yes	
Zone Name and Number	Occupancy Category	Zone Floor Area Az (sq ft)	Are you using default value for zone population?	Zone Population Pz (people)	Zone Air Distribution Effectiveness Zr	Zone Outdoor Airflow Voz (cfm)	Zone Discharge Airflow Vdz (cfm)	Zone Primary Airflow Vpz (cfm)	Zone Secondary Recirculation Fraction Er	Zone Primary Air Fraction	
										Ep	
163 Robotics Avian	Libraries	1,629	No	17.00	0.80	Vbz/Es	350.60	580	580	1.00	Vpz/Vdz
163A Control Room	Computer lab	165	No	5.00	0.80		87.25	100	100	1.00	1.00
							0.00				0.00

Add Rows	Delete Rows
----------	-------------

System area	Az	(sq ft)	1,794
System population	Pz	(people)	22.00
Sum of zone population	sum of Pz	(people)	22.00
Occupant diversity	D		1.00
Uncorrected outdoor air intake	Voz	(cfm)	350.28
System primary airflow (at condition analyzed)	Vpz	(cfm)	680
Average outdoor air fraction	Vz		0.51

Which method from ASHRAE 62.1 is being used to determine system ventilation efficiency (EV)?		Appendix A	
Ventilation efficiency	Ev	0.64	
Outdoor air intake flow (required by 62.1)	Voz	(cfm)	547
Outdoor air intake flow provided (measured or design)		(cfm)	680

COMcheck Software Version COMcheckWeb
Mechanical Compliance Certificate

Project Information

Energy Code: 2018 IECC
 Project Title: 210071.00 GMU Aquatics
 Location: Fairfax, Virginia
 Climate Zone: 4a
 Project Type: Alteration

Construction Site: 4520 Patriot Cir, Fairfax, Virginia 22030
 Owner/Agent: George Mason University, Facilities Administration, 4400 University Drive, MSN 1E4, Fairfax, Virginia 22030
 Designer/Contractor: Andrew Jun, Century Engineering, 10710 Citrus Rd, Hunt Valley, Maryland 21031, 4438892406, ajun@kheinfelder.com

Mechanical Systems List

Quantity System Type & Description

1 EFCU-1/ESSHP-1 (Single Zone):
 Split System Heat Pump
 Heating Mode: Capacity = 21 kBtu/h, Proposed Efficiency = 8.20 HSPF, Required Efficiency = 8.20 HSPF
 Cooling Mode: Capacity = 18 kBtu/h, Proposed Efficiency = 18.60 SEER, Required Efficiency = 14.00 SEER
 Proposed Part Load Efficiency = 0.00, Required Part Load Efficiency = 0.00
 Fan System: EFCU-1/ESSHP-1 | Elevator Machine Room -- Compliance (Motor nameplate HP and fan efficiency method) : Passes

Fans:
 FAN 1 Supply, Constant Volume, 583 CFM, 1.0 motor nameplate hp, 80.0 fan efficiency grade, 80.0 total fan efficiency, 80.0 design fan efficiency

1 PRU3/62 (Single Zone):
 Heating: 1 each - Hydronic or Steam Coil, Hot Water, Capacity = 841 kBtu/h
 No minimum efficiency requirement applies
 Cooling: 1 each - Single Package DX Unit, Capacity = 876 kBtu/h, Water-Cooled Condenser, No Economizer, Economizer exception: Heat Recovery System
 Proposed Efficiency = 18.20 EER, Required Efficiency = 12.00 EER
 Proposed Part Load Efficiency = 18.20 IER, Required Part Load Efficiency = 13.30 IER
 Fan System: PRU3/62 | Competition Pool -- Compliance (Motor nameplate HP and fan efficiency method) : Passes

Fans:
 Exhaust Exhaust, Constant Volume, 6680 CFM, 4.8 motor nameplate hp, 80.0 fan efficiency grade, 80.0 total fan efficiency, 80.0 design fan efficiency
 Exhaust Exhaust, Constant Volume, 6680 CFM, 4.8 motor nameplate hp, 80.0 fan efficiency grade, 80.0 total fan efficiency, 80.0 design fan efficiency
 Supply Supply, Constant Volume, 33000 CFM, 25.0 motor nameplate hp, 80.0 fan efficiency grade, 80.0 total fan efficiency, 80.0 design fan efficiency
 Supply Supply, Constant Volume, 33000 CFM, 25.0 motor nameplate hp, 80.0 fan efficiency grade, 80.0 total fan efficiency, 80.0 design fan efficiency

1 PRU3 (Single Zone):
 Heating: 1 each - Hydronic or Steam Coil, Hot Water, Capacity = 725 kBtu/h
 No minimum efficiency requirement applies
 Cooling: 1 each - Single Package DX Unit, Capacity = 791 kBtu/h, Water-Cooled Condenser, No Economizer, Economizer exception: Heat Recovery System
 Proposed Efficiency = 22.10 EER, Required Efficiency = 12.00 EER
 Proposed Part Load Efficiency = 22.10 IER, Required Part Load Efficiency = 13.30 IER

Project Title: 210071.00 GMU Aquatics
 Data filename: Report date: 05/18/23
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- Refrigerant System Calculations to prove compliance with Table 1103.1 of the 2018 IMC.
- External Static Pressure Calculations (ducts) to support HP of motors for all fans.
- External Static Pressure Calculations (pipes) to support HP of motors for all pumps.
- Smoke Control System Calculations to support all scheduled equipment.
- Hydronic and steam piping expansion and anchoring.
- Fuel oil supply and storage sizing.
- Energy Conservation Calculations.
- Include calculations for the following:
 - ASHRAE 90.1 compliance check (applicable where using ASHRAE 90.1 as the proposed Virginia Energy Conservation Code compliance path).
 - Energy Code Compliance documentation (COMcheck or equivalent).
 - Energy Model Output Reports when required by Performance Compliance Path.
 - Building envelope thermal resistance and U-values.

Electrical Calculations:

- COMCheck verification
- Demand load for all switchboard, panelboards, and feeders to multiple loads in a tabular form.
- Voltage drop calculations
- Photometrics of emergency lighting along the entire path of egress, at the same scale as the floor plan provided in the working drawings. NOTE: If egress paths are not indicated on the plan, it will be assumed that the lighting levels for the entire room or area will need to meet the required illumination levels required by the VCC.

Structural Calculations:

- Calculations for every structural member are not required. Structural calculations for members representative of the various types of structural elements should be submitted. If submitted, computer printouts shall clearly indicate the individual member being analyzed or shall be accompanied by diagrams labeled with member numbers corresponding with the printout.
- The A/E shall be responsible for storing the complete set of calculations.

Project Title: George Mason
 Engineer: Joe Novotny
 Project ID: 15C14.249
 Project Descr: Verizon Wireless

Printed: 2 MAR 2022, 6:21PM
 File: C:\projects\George Mason\15C14.249\15C14.249.dwg
 Software: AutoCAD LT 2014, RIBBON, RIBBON TOOLS, RIBBON TOOLS (2)

Concrete Column

DESCRIPTION: Building Column A-9 - Second Floor to Third Floor

Code References
 Calculations per ACI 318-14, IBC 2018, CBC 2019, ASCE 7-16
 Load Combinations Used: IBC 2018

General Information
 Fc: Concrete 28 day strength = 4.0 ksi
 Es: Steel = 3,122.0 ksi
 Density = 150.0 pcf
 β = 0.850
 Y - Main Rebar = 60.0 ksi
 E - Main Rebar = 29,000.0 ksi
 Allow. Reinforcing Limits: 47%/41% Bar Size
 Min. Rebar = 1.0 %
 Max. Rebar = 8.0 %

Overall Column Height = 16.0 ft
 End Fixity = Top Fixed, Bottom Fixed
 Brace condition for deflection (buckling) along columns:
 X-X (width) axis: Unbraced Length for buckling ABOUT Y-Y Axis = 16.0 ft, K = 1.0
 Y-Y (depth) axis: Unbraced Length for buckling ABOUT X-X Axis = 16.0 ft, K = 1.0

Column Cross Section
 Column Dimensions: 16.0in Square Column, Column Edge to Edge
 Rebar Edge Cover = 1.50in

Column Reinforcing: 4 - #8 bars @ corners.

Applied Loads
 Column self weight included: 4,268.67 lb-ft Dead Load Factor
 AXIAL LOADS:
 Slab Weight (78 pcf): Avail Load at 16.0 ft above base, D = 17,550 k
 Superimposed Dead Load (20 pcf): Avail Load at 16.0 ft above base, D = 4,500 k
 Floor Live Load (120 pcf): Avail Load at 16.0 ft above base, L = 27.0 k
 Third Floor Reaction: Avail Load at 16.0 ft above base, D = 35,430, LR = 6,750, W = 40,980 k

DESIGN SUMMARY
 Load Combination: +1.2D+0.50L+0.50L+W+1.69H
 Location of max. above base: 15.853 ft
 Maximum Stress Ratio: 0.249: 1
 Ratio = (Pu²/2Mu)²/3 + (Ph)²/2(Mu)²/3
 Mu x = 131.951 k-ft φ* Mu x = 545.61 k-ft
 Mu y = 0.0 k-ft φ* Mu y = 0.0 k-ft
 Mu z = 11.878 k-ft φ* Mu z = 48.789 k-ft
 Mu Angle = 90.0 deg
 Mu at Angle = 11.878 k-ft φ Mu at Angle = 48.694 k-ft
 Pu & Mu values located at Pu-Mu vector intersection with capacity curve
 Column Capacities:
 Primary: Nominal Max. Compressive Axial Capacity: 1,049.26 k
 Primary: Nominal Min. Tension Axial Capacity: k
 φ Pu, max. Usable Compressive Axial Capacity: 545.61 k
 φ Pu, min. Usable Tension Axial Capacity: k

Maximum SERVICE Load Reactions:
 Top along Y-Y: 0.0 k
 Top along X-X: 0.0 k
 Bottom along Y-Y: 0.0 k
 Bottom along X-X: 0.0 k

Maximum SERVICE Load Deflections:
 Along Y-Y: 0.0 in at 0.0 ft above base for load combination
 Along X-X: 0.0 in at 0.0 ft above base for load combination
 General Section Information: φc = 0.650 β = 0.850 φ = 0.80
 ρ: % Reinforcing: 1.234 % Rebar #, Dia:
 Reinforcing Area: 3.100 in²
 Concrete Area: 256.0 in²

MARK SIZE SYMBOL LIST MARK SIZE

MATERIAL STRENGTH

GRADE Fy Fu GRADE Fy Fu

TOWER DESIGN NOTES

- Tower is located in Fairfax County, Virginia.
- Tower designed for Seismic Risk II, per ASCE 7-16, Section 22.4.2.
- Tower designed for a 112 mph basic wind in accordance with the IBC-2021.1 Standard.
- Tower is also designed for a 30 mph basic wind with 1.00 in. ice for consideration to increase in thickness with height.
- Deflections are based upon a 60 mph wind.
- Tower Rise Column: I
- Topographic Category: I with Crest Height of 0.0 ft
- TOWER RATING: 70.5%

ALL REACTIONS ARE FACTORED

MAX. CORNER REACTIONS AT BASE

DOWN: 17852 lb
 SHEAR: 14181 lb

UP/LIFT: 8913 lb
 SHEAR: 1193 lb

AXIAL: 82272 lb

SHEAR: 5817 lb
 MOMENT: 17850 lb-ft

TORQUE: 412 lb-ft
 30 mph WIND - 1.0000 in ICE

AXIAL: 28187 lb
 SHEAR: 22064 lb
 MOMENT: 178532 lb-ft
 TORQUE: 3161 lb-ft
 REACTIONS - 112 mph WIND

COLUMBIA ENGINEERING, INC. CLIENT: RDM SHEET: Z
 8210 Old Dobbin Lane, Suite 100
 Columbia, Maryland 21046 SUBJECT: GCU Aquatics JOB NO: 22-047
 www.columbiainc.com SK/ML/SLT BY: RDM DATE: 1/26/22

3) Gravity Loads
 1) Skylight DL = 7 PSF (Est. 0.125/psf2/psf Emit)
 2) Snow Loads
 $P_s = 0.7 C_e C_p I_g = 19.25 \text{ PSF} \rightarrow \text{Use } 20 \text{ PSF}$
 $C_e = 1.0$ (Surface B, Partially Exposed)
 $C_p = 1.0$
 $I_g = 1.1$ (Risk II)
 $P_g = 25$
 Pn does not apply since $\theta = 31^\circ$
 3) Roof Live Load = 20 PSF

4) Loading Diagram - Recursion Skylight

DL = 7 PSF
 LL = 20 PSF
 SL = 20 PSF
 + VL = 17 PSF
 - WL = 25 PSF
 + WL = 27 PSF
 - WL = 24 PSF

Reaction Envelope: P = 675 lb
 (See RRM Elements)
 V = 720 lb
 M = 1401 ft-lb



Title Sheet(s)

1. Project Identification: Appropriation Act number, Project Code.
2. Activity or function(s) to be performed in the facility
3. Edition (year) of the USBC on which the design is based
4. Part of the USBC (Part I VCC or Part II VEBC) on which the design is based.
5. For designs based on Part II (VEBC), classify work as repairs, alterations (clarify Level 1 or Level 2), change of occupancy, addition, historic building or moved building.
6. Applicable accessibility standards
7. VCC Construction Type
8. (Use) Group(s) per VCC. For mixed-use occupancies, indicate which Groups are separated and non-separated
9. Other major code(s) used as a basis for design
10. Asbestos Disclosure Statement and Lead Disclosure Statement
11. Dig Notice- add "Contact Miss Utility at 811, 1-800-552-7001, or <http://www.missutilityofvirginia.com> no less than 72 hours prior to excavation and do not disturb the soil until dig ticket has been processed."
12. Points of Contact- Include owner representatives, construction managers, utilities, and communications contractors as appropriate
13. The applicable High Performance Buildings Act Compliance Statement
14. The applicable Virginia Energy Conservation Code Compliance Statement
15. Location and vicinity maps noted to show project location.
16. Tabulation of floor areas (new and renovated), total area, total building volume.
17. Tabulation of units: Number of parking spaces, auditorium seats, bedrooms etc. Listing of applicable codes with dates.
18. Building Purpose/Occupancy.
19. Use Group(s) per USBC.
20. Type of construction and USBC Type #
21. Occupancy Load(s) per USBC.
22. Design Floor Live Loads.
23. Professional seal(s) of the architect(s) and engineer(s) responsible for the design.
24. Index of drawings.
25. The uniform date of the completed construction documents
26. Final Delegated Design List (as approved by the Agency)
27. Structural Observations: When required by the VCC, list the specification sections that require Structural Observations as determined by the Agency's structural observer. (Refer to Section 8.15.1)
28. Statement documenting whether the local emergency public safety personnel utilizes public safety wireless communications.

8.8.7 Working Drawings:

Shall show or provide the following information (in addition to items required for preliminary submission):

[Note: **Highlighted** text indicates additional Working Drawings requirements]

1704.6 Structural observations.

Where required by the provisions of Section 1704.6.1, 1704.6.2 or 1704.6.3, the owner or the owner's authorized agent shall employ a *registered design professional* to perform structural observations. Structural observation does not include or waive the responsibility for the inspections in Section 110 or the *special inspections* in Section 1705 or other sections of this code.

Prior to the commencement of observations, the structural observer shall submit to the *building official* a written statement identifying the frequency and extent of structural observations.

At the conclusion of the work included in the permit, the structural observer shall submit to the *building official* a written statement that the site visits have been made and identify any reported deficiencies that, to the best of the structural observer's knowledge, have not been resolved.



Site Plans (site/improvement plan & composite utility plan minimum requirements for new construction and additions):

1. Based on approved comprehensive Master Plan.

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2. Scale and north arrow.
3. Existing and new contours affected by the proposed work.
4. Floor and pavement elevations.
5. Applicable boundaries with survey computations.
6. Dimensioned relationship of new work to boundaries and existing structures.
7. FEMA floodplain designation(s). Show floodplain boundaries. Show the base flood elevation for sites in the 100-year or 500-year floodplain.
8. Location of test borings.
9. General parking and accessible parking.
10. Accessible routes.
11. Pedestrian traffic routes.
12. Demolitions: structures, walks, utilities, trees, etc.
13. Proposed landscaping (planting materials).
14. Existing and new utilities: storm sewers, sanitary sewers, water supply, gas, steam distribution pipes and tunnels, electric and telephone poles and lines, and hydrant locations with data on fire flow test.
15. Profile of all utilities and any roads over 100 feet in length.
16. Site improvements such as fencing, lighting, etc.
17. Typical paving section of each type and thickness required.
18. Identify/show special earthwork recommended and construction considerations noted in soils report.
19. Archaeology Features.
20. Protected Natural Features.

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Demolition Drawings:**For total building demolition, provide:**

1. Plan of building with length & width dimensions.
2. Elevations (drawn or photographic) and cross section of building to be demolished.
3. Details of termination of demolition, underpinning, etc.

For interior / selective demolition, provide:

1. Floor plans showing existing partition, etc., and showing or describing existing material /construction to be removed.
2. Information or estimates for bidding for work to be removed.

Architectural Drawings:**Floor Plans (for each floor):**

1. Plans of each floor at a minimum 1/8" = 1'-0" preferred (but not less than 1/16" = 1'-0").
2. Show room/space numbers assigned by Planning & Design.
3. Overall dimensions.
4. If the work is an addition, show the relationship of new to existing spaces.
5. Distinguish new from existing construction.
6. Show demolition on the architectural plans or separate plans.
7. Indicate asbestos locations regardless of who removes it or how it is removed.
8. Indicate all openings, entrances, delivery areas.

9. Indicate accessible route and identify ADA required features.
10. Show scale and north arrow.

Reflected Ceiling Plans:

1. Ceiling tile / grid layout
2. Light fixture locations
3. Sprinkler head locations
4. HVAC diffuser and grille locations
5. Coffers, drop soffits, changes in height or materials
6. Space numbers
7. Speakers and smoke detectors

Roof Plan:

1. Plan(s) of each roof at a minimum 1/8" = 1'-0" preferred (but not less than 1/16" = 1'-0").
2. All proposed and existing drains, including auxiliary drains.
3. Roof slope: 1/4" per 1'-0" to drains minimum (unless waived for re-roofing).
4. All new and existing equipment.
5. All significant roof penetrations and structures.
6. Identification of materials on existing roofs.
7. Typical roofing section identifying materials.
8. Access to roof.
9. Indicate direction of slope (high to low) with arrows.

Exterior Elevations:

1. Scale (1/16" = 1'-0" minimum).
2. All openings: windows, doors, louvers, vents.
3. Percentage of glass vs. gross wall area.
4. Floor elevations (above sea level). Coordinated with Site Plan elevations.
5. Identification of all major finishes.
6. All stairs, ramps, and railings.
7. Rooftop equipment, vents, stacks, penetrations, and structures.
8. Expansion and control joints.
9. Grade at the face of the building wall.
10. Subsurface construction (dotted in).
11. Existing and new work clearly distinguished.

Building Cross Sections (Scale: 1/16"=1'-0"minimum):

1. One longitudinal and one transverse section minimum.
2. Show all floor levels / elevations on sections.
3. Indicate ceilings in proper relation to floors.
4. Method and extent of insulating exterior envelope.

Detail Sections (Scale: 3/4" = 1'-0" minimum):

1. One section minimum for each type of wall construction.
2. Identify all major materials and components.
3. Identify insulation and note "R" value.

Note: Listed as 'Wall Sections' on Preliminary Drawings



4. One section with dimensions and details for each stair configuration.

Details:

1. Typical window, door and special opening details shall be drawn at a minimum 1-1/2" = 1'-0" scale.
2. Interior and exterior details, including special doors, windows, woodwork and other decorative work.
3. Toilet plans and elevations shall be drawn at a minimum 1/4" = 1'-0" scale.

Finish Schedule:

1. Indicate proposed finishes for all spaces. Note those existing finishes to remain.
2. Give ceiling heights of interior spaces.
3. Show (or specify) all finishes, textures, colors, etc., required to be provided by the Contractor.
4. Use University assigned room numbers.

Door Schedule:

1. Doors numbered to University standards, type, size, material, hardware set number and fire rating if required.
2. Provide door type elevations, frame details, head details, threshold details, and access control details

Window Schedule:

1. Type, size, material and lintel requirements.
2. Elevations of each window type.

Furnishing/Equipment Plans:

1. Show outline of all major equipment to approximate scale.
2. Show outline of all built-in furnishings to scale.
3. Provide elevations, sections and details as necessary to describe built-in equipment, casework and furnishings included in the work of this contractor.

Structural Drawings:

1. Unless indicated otherwise below, all structural steel connections shall be designed and supporting calculations provided in the construction documents except for standard shear connections found in the AISC Manual of Steel Construction as adopted by the current building Code.
2. Show design live loads, wind loads, and seismic criteria used for design of structural systems per USBC Section 1603.
3. Design procurement criteria and typical details for engineered systems such as Cast- In-Place Post-Tensioned Concrete, Precast Concrete Components, Steel Joists and Joist Girders, Pre-Engineered Metal Structures, and Shop / Prefabricated Wood Components described in Chapter 9 may be required to be provided by the contractor. In this case, the structural drawings shall include complete loading information as well as all other performance or size constraints for the components.

4. Structural drawings shall include plans, with defined gridlines, at the same scale as the architectural plans. Details and sections shall be at a scale of not less than $3/4" = 1'-0"$.
5. The plans, details and specifications shall completely define the structural system and any special conditions for the project.
6. Foundation Plan indicating type & sizes.
7. Foundation details with improvement criteria for bearing strata and other special requirements.
8. Floor Framing Plans of each level indicating type of system, and member sizes/depths and column spacing and all penetrations.
9. Roof Framing Plan.
10. Typical Section(s) of floor and roof systems identifying materials, thicknesses, depths. Provide appropriate details to define structure.
11. Details of connections to existing buildings, if applicable.
12. Underpinning and temporary support of existing structures shall be designed to extent possible with available information. Design criteria and load information to be provided for completing the design by the Contractor for review by the A/E.
13. Typical details for openings in floors and walls with limitations clearly noted.

Code Compliance & Life Safety (G) Plans:

Life Safety Plan and Calculations

Provide the following as a minimum on the construction G drawings to demonstrate compliance with the code:

1. Applicable edition of USBC and other applicable codes, including accessibility standards.
2. For existing buildings, compliance with the VEBC shall first be established. The work performed on an existing building or structure must be classified on the construction drawings as repairs, alterations, change of occupancy, addition, historic building or moved building, as further defined in the VEBC. Alterations to be further classified as Level 1 or Level 2.
3. Use Group(s) per VCC. For mixed-use occupancies, indicate which Groups are accessory and/or incidental, separated and non-separated as further defined in the VCC.
4. Construction Type per VCC.
5. Indicate type and extent of fire protection sprinkler system and fire detection/fire alarm systems.
6. Tabulation of square footage per floor and total building area including new SF, existing SF to be renovated, other existing SF and total building volume (cubic feet).
7. Tabulation of units: Number of auditorium seats, bedrooms, etc.
8. Calculations to support the indicated design occupant load on a use and function, and floor by floor basis. Include the design occupant load for the functions of the rooms and spaces in accord with VCC Table 1004.5.
9. Indicate paths of means of egress, paths of exit access, travel distances and common paths of travel. Indicate specific locations where access controls or security locking systems will be provided within means of egress paths.

10. For projects that will have partial, phased occupancy, indicate locations and construction of temporary barriers, fire resistance ratings of temporary barriers, locations of temporary exit signage, locations of temporary means of egress emergency lighting and the temporary exit access patterns at each floor for each substantially completed phase.
11. With reference symbols, identify each new and existing, if known or available, fire resistance rated structural element and change in element design (including wall, floor, ceiling, and other vertical or horizontal elements). Indicate rating of all fire resistance-rated assemblies, smoke barriers, and smoke partitions. Provide a matrix that defines the “fire-resistance rating requirements” for building elements (VCC Table 601) including exterior walls, fire walls, fire barriers, shaft enclosures, fire partitions, smoke barriers and horizontal assemblies. Matrix shall indicate the listed design assemblies proposed to achieve the required fire resistance ratings as demonstrated below. Include copies of each listed assembly.

ELEMENT	RATING	DESIGN REFERENCE	DETAIL LOCATION
Columns	2 hours	UL# XXXX	3/S-2
Floor-Ceiling Assembly	2 hours	IBC Table XXX, Item X.x	4/S-7
Elevator Shaft	2 hours	UL# XXXX	Partition Type 2/A-4.2
Top of Elevator Shaft	2 hours	UL# XXXX	5/S-7
Use Group Separation	1 hour	IBC Table XXX, Item X.x	Partition Type 4/A-4.2
Etc.			

12. Completely show the continuity of vertical fire resistance rated assemblies, with reference symbols. Distinguish new walls from existing walls and new construction from existing construction.
13. Identify the extent of horizontal fire-rated floor/ceiling and roof/ceiling assemblies, with reference symbols.
14. Provide drawings that clearly define the locations and extent of the application of applied fire-resistant materials.
15. Buildings assigned to Risk Category III or IV shall require special inspections to be performed for through-penetrations, fire dampers, smoke dampers, membrane penetration firestops, fire-resistant joint systems and perimeter fire barrier systems. The aforementioned systems are critical to maintaining the integrity of fire rated construction, including fire walls, fire barriers, fire partitions, smoke barriers and horizontal assemblies. Define the validation test required of the special inspector to include as-built drawings identifying each approved agency system.
16. Indicate locations of all portable fire extinguisher cabinets.
17. Indicate whether the building is designated as an “essential facility” for purposes of compliance with VCC Chapter 16.
18. Indicate the seismic design category.
19. Calculations in support of the indicated Construction Type, based on Group, allowable height and allowable area, and permitted or required height and area modifications.
20. Calculations to support the indicated design occupant load on a use and function and floor by floor basis.
21. Calculations to demonstrate and support the indicated capacity of the egress components throughout the building.



22. Define the UL (or equivalent) through penetration firestop assemblies for all utilities penetrating fire rated construction. When penetrating a fire resistance-rated assembly a fire rated penetration assembly is required. When penetrating a floor assembly, the through penetration assembly generally requires both F-ratings and T-ratings (limited exceptions under USBC). **A table of typical listed assembly(ies) for the project is required to be provided with construction drawings with deferred submittal required in the specifications** – as an alternate for non-capital projects, designer can provide typical firestop assembly details with further detail provided in specification and required deferred submission. Engineering Judgments should be limited and be identified as early in the project as possible to eliminate issues near the completion of the project. Refer to specific guidelines for submission of Engineering Judgments (EJs).

Specifications must include the required fire test response characteristics (flame spread index, smoke developed index, critical radiant flux, etc.) for all interior finishes.

Fire Suppression (FX) Plans:

The A/E shall confirm complete project specific drawings and specifications that define a code compliant fire suppression system. User's programmatic requirements which may supplement or provide additional levels of protection above the minimum requirements of the code shall be included in the design. Changes to the design during the construction phase of the project shall be submitted to the Office of the University Building Official (OUBO) for review and approval. The A/E shall assure that code compliant fire suppression system(s) is provided through the review of the fire suppression shop drawings and the observation of the progress and quality of the work. The A/E shall confirm that the fire suppression system(s) is complete and code compliant. It is the responsibility of the A/E to provide a project specific design. **Performance criteria do not meet the intent of this section.**

Systems covered:

Fire Suppression Systems – Water-based: Fire Sprinkler/Standpipe

Fire Suppression Systems – Alternate Automatic Systems

Fire Pump Design Supporting Material

Smoke Control/Management Systems

Spray-Applied Fire-Resistant Materials (SFRM) and Fire Resistant Coatings

Fire Protection Openings and Fire/Smoke Dampers

[Fire-Safety-Review-Tips.pdf \(gmu.edu\)](#)

[Fire-Sprinkler-Review-Tips.pdf \(gmu.edu\)](#)



Fire Alarm, Detection and Signaling System (FA) Plans:

The A/E shall provide complete project specific drawings and specifications that define a code compliant fire alarm system. User's programmatic requirements which may supplement or provide additional levels of protection above the minimum requirements of the code shall be included in the design. Changes to the design during the construction phase of the project shall be submitted to the Office of the University Building Official (OUBO) for review and approval. The A/E shall assure that code compliant fire alarm system(s) is provided through the review of the fire alarm shop drawings and the observation of the progress and quality of the work. The A/E shall confirm that the fire alarm system(s) is complete and code compliant. It is the responsibility of the A/E to provide a project specific design. **Performance criteria do not meet the intent of this section.**

Systems covered:

Fire Detection and Alarm Systems In-Building Emergency Communications System

[Fire-Alarm-Review-Tips-1.pdf \(gmu.edu\)](#)



Access Controls (AC) Plans:

Shop drawings shall be submitted to the Office of the University Building Official (OUBO) for work elements including the following: a) electric trim b) electric latches, c) electric locks, d) other electronic controls (card keys, access buttons, proximity sensors etc.), even if used as an overlay on mechanical door hardware.

Provide the following as a minimum to demonstrate code compliance:

1. Building floor plans defining the locations and components of the access control hardware proposed.
2. Door hardware details and elevations defining the locations of all associated access control hardware.
3. A copy of the door hardware (mechanical hardware) shop drawings for the doors where the access controls are to be provided.
4. A sequence of operations demonstrating compliance with the requirements of the VCC regarding **Doors, Gates and Turnstiles**.
5. Documentation demonstrating that each of the access control components are listed for the intended use and that per the manufacturer's documentation the specific components are compatible with each other.
6. A description of how the elements interface with the building's fire alarm system.

Other security measures including cameras, contact switches or other security items which do not affect means of egress are not required to be included.

Plumbing Drawings:

1. For renovation projects, provide (here or on cross-referenced demolition plans) plans showing demolition in sufficient detail that the work may be bid from the drawings.
2. Provide plans of each floor (with space names and numbers) noting fixture locations and types.
3. Provide plumbing fixture schedule(s) showing designations, connection sizes, and mounting heights.
4. Provide plans showing layouts and sizes of sanitary DWV piping, cold condensate drainage systems, floor drains, acid waste systems, neutralizing tanks, etc.
5. Provide plans showing roof drains and areas served by each in square feet, piping and sizes. Show downspout boots and connections to foundation drains.
6. Provide plans showing domestic hot and cold water systems, including piping sizes, domestic water heaters with expansion and storage tanks, backflow preventers, water hammer arrestors, water meters, relief devices, and valves including pressure reducing, isolation and balancing.
7. Provide plans showing fuel gas piping sizes, layout, and connected load.
8. Provide plans showing layouts and sizes of compressed air piping, air compressors, air dryers, drains, etc.
9. Provide plans showing deionized water systems.
10. Provide plans showing location, sizes, and types of Water Heaters/Heat Exchangers, Storage Tanks, Flues, etc.

11. Provide plans with location of water supply and distribution, sanitary drainage, storm drainage, sprinkler services, and fuel gas services to the building.
12. Provide riser diagrams for sanitary DWV, domestic hot and cold water, storm drainage, fuel gas, deionized water, and compressed air. Risers shall be designated and keyed to the plans. Show room numbers where the outlets/inlets occur, and show drainage fixture units at the base of each riser. Show sizes of water hammer arrestors.
13. Provide details of hookups at water heaters, air compressors, etc., and roof drain installation.
14. Provide schedules of water heaters, pumps, air compressors, air dryers, storage tanks, heat exchangers, and drains.

Mechanical (HVAC) Drawings:

1. For renovation projects, show demolition in sufficient detail that it may be bid from the drawings.
2. Provide plans of each floor (with space names and numbers) showing double line duct layouts, all airflow (supply, return, outdoor air, exhaust) quantities, equipment locations, and layouts.
3. Provide plans of each floor (with spaces names and numbers) showing chilled water, heating hot water, steam, and condensate piping layouts and piping sizes. Show provisions for expansion. (This may be shown on ductwork plans where congestion is not a problem.)
4. Provide layouts of mechanical equipment and fan rooms to a scale not less than twice that of the floor plans. Show equipment, ducts, piping, etc. to coordinate the installation in tight areas. Show access and service space requirements such as that required for tube, coil, and fan removal.
5. Provide plans showing locations and sizes of fans, pumps, compressors, air handling equipment, dampers, etc.
6. Provide plans showing central heating and cooling plants, distribution piping, equipment, anchors, expansion joints, etc.
7. Provide riser diagrams for all major duct systems and piping systems.
8. Provide schematic diagrams of chilled and heating water, steam, and condensate piping.
9. Provide schedules for all mechanical equipment, steam traps, air devices, etc. showing sizes, capacities, ID #, HP, CFM, electrical characteristics, locations, features, etc.
10. Provide drawings showing control schematics, automation points, etc.
11. Provide sections as required to clearly show the work in 3 dimensions.
12. Show the building loads (in BTU or pounds of steam per hour) to include transmission plus infiltration, outside air, domestic hot water, and kitchen, laundry and hospital hot water and outside air loads that are supplemental to those mentioned where applicable.
13. Indicate the sensible and total air conditioning load of the building in tons. Also show the outside air portion of the cooling load in tons.
14. Provide details as necessary to show fittings for ducts.

Electrical Drawings:

(Power and lighting plans may be combined if the combined drawing clearly conveys required information.)

Provide plans depicting the following:

1. In renovation work or existing buildings, show existing electrical equipment, devices and lighting fixtures, etc., both to be removed and to remain. Provide sufficient detail so that work may be bid from the drawings.
2. Plans shall show all casework, furniture, mechanical equipment and other equipment that impacts the electrical design.
3. Plans shall list, in kVA, the total electrical load and the total load on any generators. Indicate the largest motor size, in horsepower.

Lighting Plans:

1. Lighting plans for each floor showing fixture location, type, and lighting level (calculated, in foot-candles).
2. Photometric plans of normal, egress, and emergency lighting along the entire path of egress, at the same scale as the floor plans. NOTE: If egress paths are not indicated on the plan, it will be assumed that the lighting levels for the entire room or area will need to meet the required illumination levels required by the VCC.
3. Provide Lighting Fixture schedule on the drawings. Schedule to include the following, at a minimum: fixture type, lamp and ballast information, reflector, lens and louver information, mounting method.

Power Plans:

1. Power distribution plans showing location of incoming service (transformers and primary switches), generators, main switchgear, motor control centers, and panel boards.
2. Service entrances, main control panels, and backboards for communications, fire alarm, EMCS and other pertinent systems.
3. Plans for each floor showing locations, and mounting heights, of receptacles, telephone and data outlets, switches, disconnect switches, motor starters and other devices.

Site Plan:

1. Electrical site plan showing: electrical and telephone/data/CATV services, both new and existing; new and existing site lighting and their associated circuitry; location of transformers, primary switches, generators; circuitry to chillers, cooling towers, etc.
2. Details of duct banks, equipment pads, manholes, lighting pole bases

Schedules, Risers, etc.:

1. Provide control diagrams, panel board schedules, motor control center schedules, distribution panel and main switchgear schedules, and riser diagrams for power, telephone, security and other systems.
2. Sizes of all overcurrent protective devices, relays, CTs, PTs, starters and disconnects

APPENDIX U

OUBO ELECTRONIC DOCUMENT REVIEW (EDR) PROCESS DOCUMENT SUBMITTAL REQUIREMENTS

BACKGROUND

The purpose of the OUBO Electronic Document Review (EDR) process is to facilitate the document submittal and review processes.

Electronic Submittals:

The submission of electronic documents to the OUBO for review is required.

Shop Drawing Submittals:

Shop Drawings shall be submitted to the OUBO for review as electronic documents through the EDR process.

PROCEDURE

To make the electronic submittal process effective, efficient and economical, the following are required:

Electronic Drawings:

Submit the drawings in searchable vector PDF format, flattened, and generated from the source program (i.e. AutoCAD, Revit) and combined into a single electronic document.

DO NOT SUBMIT FILES IN ZIPPED (.zip) FORMAT.

Text shall be PDF text elements (Real Text, Truetype) and recognizable as text in all documents. It is important for the PDF documents submitted to contain recognizable text. This recognizable text allows the documents to be “pre-processed” creating bookmarks and detail links that facilitates navigation by the reviewer and allows the review to be completed in a timely manner. Graphic programs such as AutoCAD typically produce text as vector characters. However, these characters can be converted to recognizable text when the PDF is created. See the links at the end of this Appendix for more details.

OUBO standard symbols shall be provided for all elevations, sections and details. Text includes all standard symbols referencing sections, details, enlarged plans or other relevant information. When images are inserted, such as photographs or UL listings for example, add the text standard symbol below the image, when the image must be referenced to another sheet or detail.

Provide a unique sheet number, to include the discipline for the work (i.e. A1.00), for each drawing in the set (including all volumes- do **not** use the same sheet number in multiple volumes, such as T1.0.)

The sheet title block and sheet number shall be in a consistent location on all sheets and across all disciplines.

SECTION 8.11 PROJECT SUBMISSION REQUIREMENTS

8.11.1 Electronic Documents Submission:

The submission of electronic documents to the OUBO for review is required. Refer to Appendix U–ELECTRONIC DOCUMENT REVIEW (EDR) PROCESS DOCUMENT



A 2" H X 2" W area shall be reserved in a consistent location in the title block of ALL drawings for the OUBO ELECTRONIC APPROVAL STAMP. This area shall be completely blank on all sheets with exception of the borderline. This is applicable to all sheet sizes.

Drawings shall be generated at a defined scale (i.e. $\frac{1}{4}'' = 1'$, $\frac{1}{2}'' = 1'$, etc...) to allow reviewers to calibrate the drawings for measuring distances and calculating areas for code and cost review. Each sheet shall illustrate a typical graphic scale. If more than one scale is used on a sheet, an independent graphic scale shall accompany the applicable detail.

Project Manual:

Submit the Project Manual as a single document in searchable PDF format generated from the source program (i.e., not scanned). DO NOT SUBMIT FILES IN ZIPPED (.zip) FORMAT.

Document shall include "bookmarks" to facilitate locating document sections.

A 2" H X 2" W area shall be reserved in a consistent location on the project manual cover for the OUBO ELECTRONIC APPROVAL STAMP. This area shall be completely blank with exception of the borderline.

Other documents:

Submit other supporting documentation (such as calculations, cost estimates, etc.) in PDF, Word, or Excel format.

Submit comment responses in Excel format.

OTHER REQUIREMENTS

Responsible Design Professional's Electronic Seal and Signature:

The responsible design professional (RDP) shall electronically seal, sign and date each drawing and each volume of the Project Manual on the cover page or first page (or applicable pages if an RDP is responsible for parts of the specifications) of the project manual table of contents.

Electronic seals, signatures, and dates shall comply with Section 3.13.

Security:

Some digital signature software affects the document security and limits the OUBO's ability to process the documents. Document security must allow the OUBO to electronically mark-up drawings and the Project Manual, and to add or remove sheets.

Page Orientation:

All drawings shall be set to landscape orientation with the top of the page at the top of the monitor. A north arrow shall be included on all plans. Other submittal types (project manuals, calculations, cost estimates etc.) may be set to either landscape or portrait orientation with the top of the page at the top of the monitor. Batched documents are preferred.

MANDATORY REQUIREMENTS FOR ACCEPTANCE

[18VAC10-20-760. Use of seal. \(virginia.gov\)](http://18VAC10-20-760.virginia.gov)



While all of the requirements of Appendix U apply, submittals that fail to meet certain requirements will not be accepted. These mandatory requirements for acceptance are:

Drawings:

1. Submitted in searchable, PDF format with drawings **combined into a single document** or volumes. (No .zip files.)
2. Text shall be recognizable as text in all documents.
3. Each drawing shall have a unique sheet number (to include the discipline for the work), including all volumes of drawings.
4. The title block and sheet number shall be in a consistent location on all sheets.
5. Document security must allow the OUBO to electronically mark-up drawings.

Project Manual/Narrative:

1. Submitted as a single document or volumes in searchable, PDF format. (No .zip files.)
2. Text shall be recognizable as text in all documents.
3. Document security must allow the OUBO to electronically mark-up drawings.

Calculations:

1. Submitted as separate files organized by trade.

The links below are provided as a reference for use in creating PDF documents with recognizable text:

AutoCAD:

<https://knowledge.autodesk.com/support/autocad/learn-explore/caas/sfdarticles/sfdarticles/How-to-create-selectable-and-searchable-text-in-a-PDF-from-AutoCAD.html>

Bluebeam:

<https://support.bluebeam.com/articles/autocad-pdfs-dont-contain-searchable-text/>

<https://support.bluebeam.com/blog/ocr/>

Revit:

<https://knowledge.autodesk.com/support/revit/learn-explore/caas/CloudHelp/cloudhelp/2018/ENU/Revit-DocumentsPresent/files/GUID-8B7424DD-C07A-4FD7-B4DB-5F7F6F14D8E8-htm.html>

Note: Choose a PDF print driver that will convert to recognizable text. See additional information on PDF print drivers below:

<https://knowledge.autodesk.com/support/revit/troubleshooting/caas/sfdarticles/sfdarticles/Revit-PDF-export-print-options.html>

<https://knowledge.autodesk.com/support/revit/learn-explore/caas/CloudHelp/cloudhelp/2018/ENU/Revit-DocumentsPresent/files/GUID-33DAC17F-8E51-4E46-B4C7-1F9DDC54068C-htm.html>

SECTION 8.12 AUTHORITY HAVING JURISDICTION REVIEW AND APPROVALS

Prior to the submissions to the University Building Official and other State Agencies, the University Project Manager shall review the documents to ensure that they meet the functional and operating requirements of the project.

8.12.1 General: Reviews are performed as a service ~~to~~ of the University and does not relieve the its A/E, or its Consultant from compliance with all codes, laws, rules, regulations, directives and standards applicable to the project whether or not cited in the review. See Section 8.13, Quality Control/Quality Assurance, for A/E requirements pertaining to this before providing Contract Documents and subsequent submittals.

When the Building Official is satisfied that the documents are in conformance with all requirements, a Building Permit, will be issued by the Building Official or his or her designee. Final approval of the working drawings / bid documents is based on the understanding that the A/E has complied, or certifies that it will comply, with the foregoing and with all review comments concerning these requirements prior to printing the documents for release to bidders.



8.12.3 Review Comments: The OUBO will transmit its review comments to the University Project Manager in one of the following ways:

1. By eBuilder: Within 1 week after receipt of written comments from all applicable disciplines from the University Project Manager, the A/E shall provide a written response to all comments, preferably by eBuilder with the response noted below the review comment. All issues in dispute shall be resolved before proceeding to the next phase.
2. By a meeting/conference: at OUBO or A/E office where the comments are discussed, and critical issues resolved. This method may be required by the University where it is expedient to identify the general types or nature of deficiencies, especially if a resubmittal will be required. The proposed actions and decisions reached in the meeting will be accurately recorded in writing by the A/E and distributed to all meeting participants within five (5) workdays after the meeting.



Office of University Building Official
 4400 University Drive, MS 1E4, Fairfax, Virginia 22030
 Phone: 703-993-6070

Project Name = 221454 - 0402 Van Metre Krasnow Lab 259A

Drawing Set Date = 04/10/2023

OUBO Review Comments

OUBO Notes:

1. Responses to all review comments shall be provided with any submission for review. Submitted documents will not be reviewed until responses to all review comments have been provided.
2. Please reach out to any Reviewer with questions as needed. Contact information for each reviewer has been provided.
3. Complete construction drawings shall be provided with resubmission. Additional comments may be generated during subsequent reviews by the OUBO. Refer to 2018 VCC Section 109 for more information.

<u>Reviewer Name</u>	<u>Contact Information</u>
Justin Biller	Cell = 571-545-0252 Email = jbiller@gmu.edu
Kevin Kline	Cell = 571-545-0253 Email = kkline7@gmu.edu
Ethan Scholl	Cell = 571-545-0254 Email = escholl4@gmu.edu
Tim Hagedorn	Cell = 571-545-0255 Email = jhagedo@gmu.edu

<u>Sheet/Page</u>	<u>Type</u>	<u>Comments</u>	<u>Reviewer</u>	<u>Response</u>
Drawings				
G-001	Reviewer Questions	Signed/Sealed/Date Drawings required at Working Drawing Submission. Refer to GMU HECOM section 8.2.2.11 & 8.2.2.12 for additional information. Typical all sheets.	Kevin Kline	
G-002	Fire Safety	Please indicate the classification of work, per VEBC section 103.9.	Justin Biller	



8.12.8 Review Times: The review times published on the OUBO Plan Review website ([Plan Review – Office of the University Building Official \(gmu.edu\)](http://gmu.edu)) will be the goal for the project, exclusive of holidays, unless the submissions are obviously incomplete, (in which case the documents will be returned to the A/E).

The Art and Architectural Review Board receives presentations from the University at its normal monthly meeting (usually the first Friday of each month) and makes recommendations to the Governor; see Appendix L.

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- 5 days – Schematic, Small Projects
- 10 days – Preliminary Reviews
- 15 days – Construction Drawings and first submittal of Shop Drawings

[Plan Review – Office of University Building Official \(gmu.edu\)](http://gmu.edu)



SECTION 8.19 FIRE PROTECTION SHOP DRAWINGS:

Refer to chapters 7 and 8 of this manual for the OUBO submission guidelines for additional information related to various fire protection systems. Fire protection shop drawings and product submission data shall be reviewed and approved by the A/E of record. When the submission, with any added notations is satisfactory to the A/E, the A/E shall provide a “sealed” statement, attached to the reviewed shop drawings indicating that the fire protection shop drawings (working plans, product data and calculations as applicable) satisfy the requirements of the project contract documents and the code (cite the applicable NFPA and USBC Sections).



Office of University Building Official

Training

[HOME](#) / [TRAINING](#)

- [Fire Protection Part I](#)
- [Fire Protection Part II](#)
- OUBO HECO Training Session 1: [OUBO Charter, HECO Chapter 11, OUBO Website Introduction & e-Builder](#)
- OUBO HECO Training Session 2: [HECO Chapter 7 & Related Appendices](#)
- OUBO HECO Training Session 3: [HECO Chapter 8 & Related Appendices – Part 1](#)
- OUBO HECO Training Session 4: [HECO Chapter 8 & Related Appendices – Part 2](#)

[Training – Office of University Building Official \(gmu.edu\)](#)



MAY 2023 BUILDING SAFETY MONTH

Building Safety Month is an international campaign celebrated in May to raise awareness about building safety.

For more than 42 years, Building Safety Month has reinforced the need for the adoption of modern, regularly-updated building codes, and helps individuals, families and businesses understand what it takes to create safe and sustainable structures.

Mason's Office of University Building Official is hosting the following online training from 11:30 a.m. to 12:15 p.m. :

- May 10, 2023 OUBO Charter, HECO Chapter 11, OUBO Website Introduction & e-Builder
- May 16, 2023 HECO Chapter 7 & Related Appendices
- May 18, 2023 HECO Chapter 8 & Related Appendices - Part 1
- May 23, 2023 HECO Chapter 8 & Related Appendices - Part 2
- May 25, 2023 HECO Chapter 8 & Related Appendices - Part 3
- May 31, 2023 **OUBO e-Builder Process Overview**

RSVP BY EMAILING OUBO@GMU.EDU

OUBO CONTACT INFORMATION

703-993-6070

oubo@gmu.edu

oubo.gmu.edu





QUESTIONS?

Learn More at OUBO.GMU.EDU

1 BUILDING PLANNING & DESCRIPTION

- NEW CONSTRUCTION
SHELL BUILDING
LEASABLE SPACE BUILD-OUT (SBO)
CHANGE OF OCCUPANCY
SUBSTANTIAL IMPROVEMENT
OTHER

MIXED OCCUPANCY
SINGLE OCCUPANCY
SEPARATED USE
NON-SEPARATED USE

TYPE OF CONSTRUCTION
HEIGHT LIMITATION
FRONTAGE INCREASE CALCULATIONS ARE SHOWN ON SHEET:

BUILDING VALUATION
BUILDING NUMBER
ADDRESS
CITY, ST.
ZIP CODE
SUTE
CALL CENTERPOINT ENERGY AHEAD OF TIME AT 713-267-4400 TO OBTAIN AN ADDRESS

GROSS LOCATED IN FLOODPLAIN: YES NO
GROSS SQUARE FOOTAGE: SQ FT
ESTIMATED COST OF CONSTRUCTION \$

T.D.L.E.#
TEXAS DEPARTMENT OF LICENSING AND REGULATIONS
TELEPHONE: (512) 463-6599 TOLL FREE (IN TEXAS): 800-803-4202
FAX: (512) 475-2671 RELAY TEXAS-TELD: 800-735-2969

SHELL BUILDING PERMIT #
CIVIL PROJECT #
PUBLIC UTILITIES: YES NO
OSRF: YES NO PROJECT PERMIT #

LIST BELOW THE PURPOSE/USE OF THE BUILDING OR AREA BEING REVIEWED. INCLUDE DETAILS ON THE PRODUCTS/MATERIALS BEING STORED/BARRICATED AND NOTE HOW THEY ARE BEING PACKAGED.

2 OCCUPANCY TYPE AND LOAD

OCCUPANCY CLASSIFICATION TYPES
Table with 5 columns: A-1, A-2, A-3, A-4, A-5, B, B-1, B-2, B-3, B-4, B-5, U

RESIDENTIAL BOARD AND CARE OCCUPANCIES REFER TO THE HARRIS COUNTY CODEBOOK OF THE SAME NAME AND ALSO COMPLETE THE RESIDENTIAL BOARD AND CARE CERTIFICATION FORM

BREAK DOWN AREAS AND OCCUPANT LOADS PER FLOOR
Table with columns: OCCUPANCY CLASSIFICATION, SPECIFIC USE, SQUARE FOOTAGE, SF PER OCCUPANT, DESIGN OCCUPANTS

TOTAL

3 MEANS OF EGRESS

Table with columns: MEANS OF EGRESS, # OF REQUIRED EXITS, # OF EXITS PROVIDED, SHEET #

MINIMUM CLEAR WIDTH SHOWN ON:
EGRESS WIDTHS ARE SHOWN ON:
ACCESSIBLE AREAS OF REFUGE & 2-WAY COMMUNICATIONS SHOWN ON:

EXIT SIGNS/EGRESS ILLUMINATION
REQUIRED AND SHOWN ON:
EXTERIOR MEANS OF EGRESS LIGHTING PROVIDED: YES NO

EXIT TRAVEL DISTANCE
OCCUPANCY TYPE, MAX TRAVEL DISTANCE, PROVIDE TRAVEL DISTANCE, SHEET #

ELEVATORS
Table with columns: OCCUPANCY TYPE, MAX TRAVEL DISTANCE, PROVIDE TRAVEL DISTANCE, SHEET #

NEW EXISTING
ELEVATOR KEYBOX LOCATED IN LOBBY? YES NO

4 FIRE PROTECTION & LIFE SAFETY SYS.

ALL FIRE PROTECTION PLANS SHALL BE SUBMITTED FOR REVIEW AFTER BUILDING PERMIT HAS BEEN ISSUED I.E. FIRE ALARM, SPRINKLER SYSTEM, FIRE ALARM SYSTEM, STANDPIPE, FIRE PUMP ROOM, AND FIRE PROTECTION WATER SUPPLY SYSTEMS

NOTIFICATION PER 903.4.2.1
ALL SPRINKLERS SHALL COMPLY WITH MONITORING AND OCCUPANT NOTIFICATION PER 903.4.2.1

FIRE DEPARTMENT ACCESS TO SPRINKLER CONTROL:
SPRINKLER RISER ROOM OR POST INDICATOR VALVE SHOWN ON:
FDC SHOWN ON:
SUPPRESSION SYSTEM PROVIDED

STANDPIPE SYSTEM & HOSE CONNECTIONS
PROVIDED AS NOTED ON: TYPE OF SYSTEM PROVIDED: CLASS 1, 2 OR 3

FIRE ALARM & DETECTION SYSTEMS
FIRE ALARM SYSTEM (DEFERRED SUBMITTAL)
NOT REQUIRED PER SECTION 907
EMERGENCY VOICE EVACUATION
OTHER:

HVAC & AIR DISTRIBUTION SYSTEM CONTROLS
SMOKE DETECTORS PROVIDED TO SHUT DOWN UNITS OVER 2,000 CFM PROVIDED ON:
NO HVAC UNITS OVER 2,000 CFM
FIRE SMOKE DAMPERS IN THE BUILDING SHOWN ON:
NO FIRE SMOKE DAMPERS IN THE BUILDING

SMOKE CONTROL SYSTEMS
SMOKE & HEAT VENTILATION
CALCULATIONS PROVIDED AS NOTED ON:
NOT REQUIRED PER SECTION 910

NOTE: WHERE AREAS OF THE BUILDING ARE EQUIPPED WITH EARLY SUPPRESSION FAST RESPONSE (ESFR) SPRINKLERS, AUTOMATIC SMOKE AND HEAT EXHAUST SHALL BE INSTALLED PER MANUFACTURERS SPECIFICATIONS, MEETING LOCAL JURISDICTION REQUIREMENTS.

5 FIRE-RESISTANCE RATE CONSTRUCTION

SHOW DETAILS OF FIRE WALLS OR FIRE BARRIERS MEETING HORIZONTAL WALLS AND ROOF DECKS
FIRE-RESISTANCE RATING REQUIREMENTS

Table with columns: BUILDING ELEMENTS, ROOMS REQUIRED, JOISTS PROVIDED, U/L OR BC STANDARD USE & DESIGN DETAIL SHOWN ON

6 WATER SUPPLY (FOR FIREFIGHTING)

GROSS SIZE OF BUILDING IN SQUARE FEET (INCLUDE ALL OVERHANGS UNDER ROOF)
PUBLIC WATER SUPPLY WITH FIRE HYDRANTS
NAME OF THE MUNICIPAL UTILITY DISTRICT
NUMBER OF HYDRANTS WITHIN 400 FT (NON-SPRINKLER) OR 600 FT (SPRINKLER) OF BUILDING

REQUIRED GPM: DURATION:
75% REDUCTION? YES NO
WATER SOURCE FOR RURAL AREAS WITHOUT FIRE HYDRANTS

DESIGN SPECIFICATIONS AND LOCATIONS SHOULD MEET MINIMUM REQUIRED WATER SUPPLY FROM THE FIRE FLOW CALCULATOR
DESIGN SPECIFICATIONS AND LOCATIONS SHOULD MEET MINIMUM REQUIRED WATER SUPPLY FROM THE FIRE FLOW CALCULATOR

7 FIRE LANE ACCESS

FIRE LANE LAYOUT PLAN, WHICH SHALL INCLUDE THE SUE PLAN, THE FIRE LANE & FIRE HYDRANTS IS SHOWN ON:
FIRE LANE WILL BE APPROVED CONCEPTUALLY DURING THE CIVIL REVIEW PROCESS.

8 INTERIOR FINISH

Table with columns: OCCUPANCY GROUP, EXIT ENCLOSURES AND EXIT PASSAGEWAYS, CORRIDORS, ROOMS AND ENCLOSED SPACES, SHEET #

9 STORAGE: STANDARD & HIGH PILED

PRODUCTS BEING STORED:
STORAGE PACKAGING (I.E. PALLETS, RACKS, SOLID PILED, DRUMS, CARBOARD BOXES, WRAPPED IN PLASTIC, ETC.):
MAXIMUM HEIGHT OF COMMODITY:

HAZARDOUS MATERIALS
DOES THE BUILDING HAVE HAZARDOUS MATERIAL USE OR STORAGE? IF YES, THEN PROVIDE ALL MSDS SUMMARY AND MSDS REPEATS:
IF YES, DO THE QUANTITIES EXCEED THE MAXIMUM ALLOWABLE PER IFC 2018? IF YES, YOU WILL BE REQUIRED TO PROVIDE THE FOLLOWING:
CODE ANALYSIS BY FIRE PROTECTION ENGINEER TO SHOW COMPLIANCE WITH IFC 2018, CODES AND REFERENCED STANDARDS SHOWN ON SHEET(S)

11 SPECIAL CONDITIONS

ATTRIBUTE PER 404 IFC 2018? YES NO
HIGH RISE BLDG PER 405 IFC 2018? YES NO
ANY FUEL STORAGE TANKS PER 5704 IFC 2018? YES NO
CRITICAL FACILITIES (HARRIS COUNTY REGULATIONS AND AMENDMENTS) YES NO
HEALTH DEPARTMENT APPROVAL REQUIRED FOR ALL ESTABLISHMENTS THAT SERVE/PREPARE FOOD AND BEVERAGES FOR THE PUBLIC OR HAVE REFRIGERATED FOOD STORAGE.

COMMENTS & NOTES

A COPY OF THESE APPROVED CONSTRUCTION PLANS MUST BE KEPT AT PROJECT SITE FOR THE FINAL INSPECTION OF THE BUILDING

REVIEWER'S STAMP

THE PROJECT KNOWN AS
(MUST BE THE NAME OF BUSINESS/DBA IF BUILDING IS FOR A SPECIFIC COMPANY)

WAS ACCEPTED BY HARRIS COUNTY FOR THE PURPOSES LISTED BELOW:

REVIEWER'S SIGNATURE BLOCK
PERMIT OFFICE

THE PROJECT WAS REVIEWED, HOWEVER, THIS DOES NOT MEAN THE ENTIRE PROJECT, INCLUDING ALL SUPPORTING DATA AND CALCULATIONS HAVE BEEN COMPLETELY CHECKED AND VERIFIED. THESE DRAWINGS ARE SIGNED, DATED AND SEALED BY A PROFESSIONAL ENGINEER ARCHITECT LICENSED TO PRACTICE IN THE STATE OF TEXAS, WHICH THEREFORE CONVEYS THE PROFESSIONAL RESPONSIBILITY AND ACCOUNTABILITY. THIS ACCEPTANCE DOES NOT RELIEVE ANY PARTY FROM COMPLYING WITH ANY OTHER LEGALLY ADOPTED REGULATION OR ORDINANCE RELATED TO LAND DEVELOPMENT.

CERTIFICATION
I, _____, A LICENSED PROFESSIONAL ENGINEER/ARCHITECT IN THE STATE OF TEXAS DO HEREBY CERTIFY THAT THE INFORMATION PRESENTED ON THIS SHEET IS TRUE AND CORRECT TO THE BEST OF MY KNOWLEDGE. I AM/AM NOT A DESIGNER OF RECORD FOR THIS PROJECT. THE PROJECT CONSISTS OF DRAWING SHEETS _____ THROUGH _____ ENGINEERING FIRM _____ FIRM# _____

DATE: SHEET NO(S): DESCRIPTION: REVIEWER: COUNTY P.E.:

HARRIS COUNTY (IFC 2018) FIRE CODE DESIGN AND COMPLIANCE REVIEW SHEET VERSION 8.0 (SEP 2019)

Table with columns: REVISIONS (DO NOT USE THIS BLOCK UNTIL AFTER PERMIT IS ISSUED), DATE, SHEET NO(S), DESCRIPTION, REVIEWER, COUNTY P.E., FIRE CODE REVIEW, SHEET NUMBER, OF

