

Appendix A: Design Requirements by Phase of Work

Program Phase Requirements

General Requirements

During the Program Phase the architect shall establish general space quality standards for the Project related to such elements as lighting levels, equipment performance, acoustical requirements, security and aesthetics. The architect shall determine space specific requirements for the Project by:

- Identifying required spaces
- Establishing sizes and relationships
- Establishing space efficiency factors (net to gross)
- Documenting particular space requirements such as special HVAC, plumbing, power, lighting, acoustical, furnishings, equipment or security needs.

The architect shall prepare a final program document detailing these items and incorporating written and graphic materials to include:

- An executive summary
- Documentation of the methodology used to develop the program
- Value and Goal statements
- Relevant facts upon which the program was based
- Conclusions derived from data analysis
- Relationship diagrams
- Flow diagrams
- Matrices identifying space allocations and relationships
- Space listings by function and size
- Space program sheets including standard requirements and special HVAC, plumbing, power, lighting, acoustical, furnishings, equipment or security needs

Schematic Design Phase Requirements

General Description:

1. Scope of Work Narrative
2. Building Program.
3. List of applicable building codes on drawing title sheet.
4. Building code review with list of anticipated building code variance requests.
5. Evaluation of anticipated sustainability performance;
6. Maintainability of the facility.
7. Proposed routes of access and egress: fire access; emergency life safety egress; ADA access; pedestrian access & egress, etc.

Specification:

1. System and material narrative description in outline form.

Site:

1. Storm water management strategy.
2. Site plans that include the following:
 - Existing conditions

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- Demolition
- Building outline(s)
- Future expansion
- Site entrance
- Roads & driveways
- Parking locations
- Bike parking locations
- Loading dock location
- Waste & recycling collection location
- Walkway and stairway locations
- Emergency telephone locations
- Utility requirements
- Site utilities
- Preliminary grading plan
- Soil remediation work by Owner, if needed
- Site lighting layout concept

Landscaping:

1. Existing conditions
2. Landscaping concept
3. Existing & new irrigation zones

Structural:

1. Structural scheme
2. Written description

Building Exterior Envelope:

1. Typical elevations
2. Fenestration layout
3. Material designations
4. Overall building cross-sections
5. Roof layout
6. Energy code support information

Building Interior

1. Typical floor plans with legends
2. Demolition
3. Beginning of room numbering
4. Area use identification & area in square feet
5. Mechanical, electrical, and other service closets and rooms
6. Circulation paths
7. Area tabulations compared to program requirements
8. Show flexibility for expansion and alterations
9. Preliminary layout of major spaces with fixed equipment

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Elevators

1. Elevator locations
2. Equipment room locations

HVAC

1. One-line diagrams for each air, hydronic, steam, condensate, and all other HVAC related systems, and other materials as required to describe the fundamental design concept for all mechanical systems.
2. Indication of the amount of redundancy for all major pieces of mechanical equipment. Ex: 2 pumps with 100% capacity each, etc.
3. Major equipment locations
4. Air intake and discharge locations for major systems
5. Strategy for HVAC zoning and typical individual space zoning. Ex: VAV boxes per office = x, etc.
6. Mechanical legend
7. Special occupancy zones if any
8. Dimensioned 3 dimensional clear maintenance space to be maintained at all service points on fan coil units, filter banks, motor locations, dampers, etc shall be graphically shown.
9. General layout of mechanical rooms
10. One-line diagrams for every plumbing system (ex: domestic water, sanitary, storm, gas, etc.) and other materials as required to describe the fundamental design concept for all plumbing systems.
11. Indication of the amount of redundancy for all major pieces of mechanical equipment. Ex: 2 pumps with 100% capacity each, etc.
12. Building water supply, storm, and sanitary leads.
13. Major equipment locations.
14. Restroom locations
15. Plumbing legend

Fire Protection

1. One-line diagrams for each plumbing system and other materials as required describing the fundamental design concept for all fire protection systems.
2. Report documenting adequacy of utility system, flow, etc.
3. Location of connections to utilities
4. Location of fire pump and controller
1. Fire Alarm system description.
2. FA panel / subpanel locations.
5. Preliminary FA device and appliance location plans

Electrical Power Distribution

1. Electrical demolition
2. One-line diagrams
3. Manhole, duct bank, and building entry locations.
4. Exterior equipment locations.
5. Substation, generator, and ATS descriptions.
6. Substation, generator, and electrical room locations

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Communications, Voice, Data and Video

1. Manhole, duct bank, and building entry locations.
2. Building entrance and phone/data room locations.
3. Riser diagram.
4. Preliminary cable tray plans.
5. Communication room plan layouts

Security, CCTV and Access Control

1. System descriptions.
2. Panel locations

A/V and Special Systems

1. System descriptions
2. Panel locations

Other Graphics

1. Renderings, models, or other graphics as necessary to clearly present concept

Design Development Phase Requirements

General Description

1. Maintained and developed SD items listed above.
2. Specifics of building systems and components with three-dimensional accuracy.
3. Description of construction phasing.
4. Description of any proposed occupancy within construction area.
5. Description of water & vapor characteristics for roof & exterior walls.

Specifications

1. Outline specifications indicating features of major equipment as well as component materials (ex: 'welded schedule 40 steel pipe', etc.) with same section numbering as final specification.
2. Provide complete systems descriptions and where possible material selections
3. Specifications to conform to materials and standards set in VO Campus Construction Standards
4. List of sole-source materials and/or systems

Site

1. General dimensions and elevations
2. Permanent exterior signage
3. Parking / roadway plans and elevations
4. Vehicle and pedestrian traffic controls, as needed
5. Grading plan
6. Site lighting plan with photo metrics
7. Concept details of site fixtures and equipment
8. Utility plans, elevations, and details for tunnels, chilled water system, steam system, storm water

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system, power distribution, etc.

9. Sanitary sewer flow calculations
10. Plan to address existing hazardous / contaminated materials, as needed
11. Soil erosion and sedimentation control plan
12. Dewatering plan, as needed

Landscaping

1. Soils description and plan.
2. Planting plan.
3. Irrigation plan.

Structural

1. Foundation plan.
2. Typical floor framing plan.
3. Framing plans at unique features.
4. Main member sizing.
5. Structural sections.

Building Exterior Envelope

1. All building elevations with dimensioned heights.
2. Typical wall heights.
3. Roof and drainage plans.
4. Exterior door details.
5. Typical window details.
6. Details of unique features.
7. Expansion joint locations.
8. Large scale building cross-sections.

Building Interior

1. All floor plans.
2. Enlarged plans at elevation changes such as stairs.
3. Enlarged plans at toilet rooms.
4. Reflected ceiling plans.
5. Wall types, fire ratings, and smoke control zones.
6. Plan to address existing hazardous materials, if applicable.
7. Fixed seating.
8. Defined seating, serving, and kitchen facilities.
9. Equipment and furniture layouts.
10. Important interior elevations.
11. Details of unique features.
12. Details of fixed equipment.
13. Preliminary finish and door schedules.
14. Door and hardware schedules.
15. Informational signage.

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Elevators

1. Elevator shaft section.
2. Equipment description

HVAC

1. Overall HVAC diagram indicating air handlers, exhaust fans, duct risers, and duct mains.
2. Plans indicating shaft, chase, and recess requirements.
3. Duct layout for typical spaces.
4. Equipment schedules.
5. Equipment locations with enlarged mechanical room plan(s).
6. Indication of typical locations of fire dampers, smoke dampers, and combination fire/smoke dampers
7. Control diagrams (concept form) for all mechanical and plumbing systems. Clarification?
8. Outline of major control sequence of operation.
9. Mechanical and electrical smoke control schemes.
10. Enlarged preliminary floor plans of mechanical rooms with all components and required service areas drawn to scale.
11. Preliminary calculations.
12. Meter locations and types.
13. Utility feeds.
14. Variable Frequency Drives (VFD) for HVAC description and locations.
15. Dimensioned 3 dimensional clear maintenance space to be maintained at all service points on fan coil units, filter banks, motor locations, dampers, etc. shall be graphically shown.
16. General layout of mechanical rooms with sections both ways
17. All ducts 12" or greater in any dimension to be shown graphically full size

Plumbing/Piping

1. Design criteria for each system including set points, water quality levels, etc.
2. Preliminary piping plans (domestic & process) with indication of required service access areas.
3. Meter locations and types .
4. Back flow prevention locations.
5. Fixtures schedules
6. Equipment schedules
7. Enlarged preliminary floor plans of mechanical rooms with all components and required service areas drawn to scale.

Fire Protection (Mechanical)

1. Location of test headers and fire department connections.
2. Preliminary piping plans.
3. Enlarged preliminary floor plans of mechanical rooms with all components and required service areas drawn to scale.
4. Fire pump sizing calculations and devices when applicable.

Fire Alarm

1. Riser diagram.
2. FA panel, device, and appliance location plans

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Lighting

1. Typical interior lighting and control plans.
2. Outdoor lighting and control plans.
3. Fixture types, schedules, and cut sheets.
4. Control system and control device descriptions.
5. Photometric calculations and diagrams.
6. Dimming, daylighting, and low voltage control zones.
7. Documentation of energy code

Electrical Power Distribution

1. Manhole, duct bank, and building entry plans and details.
2. Normal power riser diagram with circuit breaker sizes.
3. Standby and Emergency power diagram with circuit breaker sizes.
4. Grounding riser diagram.
5. List of equipment on standby / emergency power.
6. Electrical load calculations.
7. Panel schedules and locations.
8. Electrical equipment location plans.
9. Typical electrical outlet location plans.
10. Plan for temporary power during construction.

Communications – Voice, Data, and Video Systems

1. Building entry and phone/data room locations, sizes, and door swings.
2. Backboard locations.
3. Raceway and grounding riser diagrams.
4. Conduit and cable tray plans with conduit and cable tray sizes.
5. Material cut-sheets.
6. Building entry and phone/data room heat loads.
7. Typical voice, data, and video outlet location plans.
8. Emergency phone locations and types (wall or pedestal).
9. Courtesy phone locations.
10. Emergency phone locations.
11. Communication room plan layouts
12. Interior elevations

Security – CCTV and Access Control Systems

1. Riser diagrams.
2. Equipment location plans.
3. Security office layout, if applicable.
4. Card access control equipment closet layout and elevations.

A/V and Special Systems

1. Riser diagrams.
2. Equipment descriptions.
3. A/V equipment location plans.
4. Clock and other equipment location plans.

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Other Graphics

1. Updated renderings, models, etc. required as appropriate for design development

Construction Document Phase Requirements (50%/95%/100%)

General Description

1. Maintained and developed SD items listed above.
2. Documentation on drawings as required by building codes; specifically to include indication of maximum allowable number of people in each room.
3. If multiple bid packages, clear indication of scope for each release.
4. Identification of construction phasing, including temporary requirements during each phase of construction.

Specifications

1. Complete specification for all divisions and trades, including draft front end documents.
2. List of items which are sole-sourced or dual-sourced and justification for not specifying three acceptable products.

Site

1. Extent of construction area.
2. Area traffic plan, if existing roads / walks are impacted.
3. Site development phasing.
4. Construction site access.
5. Staging area.
6. Construction signage.
7. Site details, including hardscapes.
8. Profiles for underground utilities.
9. Pipe sizes.
10. Connection details.
11. Local government review comments on utilities and modifications in right(s)-of-way.
12. Final photometric of site lighting.

Landscaping

1. Protection for existing trees and significant plantings during construction.
2. Soil preparation and planting specifications.
3. Guying diagrams.
4. Piping diagrams.
5. Pipe sizes.
6. Landscape and irrigation details and legends.

Structural

1. Definition of control joints.
2. Beam, column, and slab schedules.
3. Mechanical and electrical house keeping pads.
4. Foundation details.
5. Structural details and notes.

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6. Structural calculations.

Building Exterior Envelope

1. Roof-mounted equipment.
2. Roof details.
3. Exterior details.
4. Flashing details.
5. Control joint definition and details.

Building Interior

1. Dimensioned floor plans.
2. Enlarged plans.
3. Partition details.
4. Interior details.
5. Interior elevations.
6. Finish schedules.
7. Door and hardware schedules.
8. Room signage.
9. Schedule of proposed movable equipment that is NOT indicated on documents.
10. Schedule of lab fixtures (turrets, etc.), if applicable.
11. Parapet & coping details.

Elevators

1. Dimensioned plans.
2. Sections and details of hydraulic cylinder, if applicable.
3. Description of shaft sump pits.
4. Elevator car and equipment support details.
5. Description of controls and fixtures.
6. Door and frame details.
7. Interior Details including lighting.

HVAC

1. Detailed piping and duct design with all sizes indicated.
2. Floor plans with all components and required service access areas drawn to scale. On the plans, indicate ducts sizes and air flow quantities relative to each room, including CFM in and out of all doors. Indicate location of control panels.
3. Lab air valves and volume control boxes. Provide a schedule that indicates the control sequence that applies to each room.
4. Detailed and enlarged floor plans of mechanical rooms with all components and required service areas drawn to scale.
5. Enlarged cross-sections through mechanical rooms and areas where there are installation/coordination issues (tight space, zoning of utilities, etc.). Indicate required service access areas.
6. In common mechanical space, indication of space zoning by system.
7. Connection to fire alarm and campus control systems.
8. Equipment details, including structural support requirements.
9. Penetration and sleeve details.
10. Installation details.

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11. Duct construction schedule indicating materials and pressure class for each duct system; either on drawings or in specifications.
12. Detailed controls drawings, including clear differentiation of trade responsibility for control, fire, and control power wiring.
13. Detailed sequences of operation including the initial values for all control loops that will result in attainment of the required design criteria, as well as alarm set points and time delays. Final values establishment during system commissioning.
14. Design calculations.
15. Dimensioned 3 dimensional clear maintenance space to be maintained at all service points on fan coil units, filter banks, motor locations, dampers, etc shall be graphically shown.
16. Detailed layout of mechanical rooms with sections both ways
17. All ducts 12" or greater in any dimension to be shown graphically full size

Plumbing and Piping

1. Water riser diagram, including assumed fixture counts per floor connection. (May not be required for 1 to 2 story buildings; project decision.)
2. Waste and vent riser diagrams including assumed fixture counts per floor connection. (May not be required for 1 to 2 story buildings; project decision.)
3. Foundation drains; unless identified in Architectural.
4. Detailed piping design with all pipe sizes indicated.
5. Typical plumbing details, including structural support requirements .
6. Water heating piping details.
7. Penetration and sleeve details.
8. Design calculations. (May not be required; project decision.)

Fire Protection (Mechanical)

1. Fire protection service entrance details.
2. Fire protection plans (including header and riser layout) with indication of any required service access areas.
3. Detailed piping design with all major pipe sizes indicated.
4. Location of all sprinkler zone valve and drain connections.
5. Zoning extents, for areas where the contractor will size the piping.
6. Typical sprinkler installation details, including structural support requirements.
7. Penetration and sleeve details.
8. Design calculations. (May not be required if a design-build system; project decision.)

Fire Alarm

1. Detailed FA panel, device, and appliance location plans including duct detectors, fire/smoke dampers, sprinkler flow and tamper switches, monitor and control modules, door hold-opens, door lock releases, etc.
2. Strobe light candela ratings.
3. General notes on conduit and wire sizes.
4. Details of connections to HVAC, fire pump, fire suppression, door hold-open, and door lock systems.
5. Detailed sequence of operations .

Lighting

1. Interior and exterior lighting plans, including control systems and devices, lighting panels, switching, and circuiting.

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2. Lighting control system and wiring diagrams.
3. Installation details, including structural support details.
4. Normal lighting photometric calculations.
5. Emergency lighting photometric calculations.
6. Final fixtures cut sheets.
7. General notes on conduit and wire sizes for lighting branch circuits

Electrical Power Distribution

1. Details of power service to the building.
2. Power plans, including primary cable raceways, feeder conduits, electrical loads, duplex and special receptacles, and circuiting.
3. Standby and emergency power system plans, controls, and details.
4. Connections to other building systems, including fire alarm and HYAC systems.
5. Details of non-standard electrical installations.
6. Conduit and wire sizes for services, feeders, and special branch circuits.
7. General notes on conduit and wire sizes for 10 amp single phase branch circuits.
8. Notes identifying locations of separate and shared neutrals.
9. MCC elevations.
10. Grounding details.
11. Roof and floor penetration details.
12. Design Calculations

Communications – Voice, Data and Video Systems

1. Detailed voice, data, and video outlet locations.
2. Details of telecommunications services to the building.
3. Floor box schedule.
4. Conduit, outlet box, and floor box installation details.
5. Power outlet locations in the building entry and phone/data rooms.
6. Communication room plan layouts
7. Interior elevations

Security – CCTV and Access Control Systems

1. Detailed equipment location plans.
2. Equipment schedules.
3. Concealed and exposed raceways.
4. Wiring diagrams.
5. Installation details.

A/V and Special Systems

1. Detailed Equipment location plans.
2. Equipment schedules.
3. Wiring diagrams.
4. Installation details including cabinets, hangers, and connection boxes.

Other Graphics

1. Updated renderings, models, or other graphics required only as appropriate for construction document preparation.