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**PRELIMINARY DESIGN PHASE**

## 1.0 GENERAL

### 1.1 ADMINISTRATIVE

1.1.1 Complete the following

a) Develop project Scope of Work using Procedure FMEP-P-0210
b) Define project deliverables
c) Develop project schedules and budgets

### 1.2 GEOTECHNICAL ENGINEERING

1.2.1 Determine the need for and perform, if applicable, geotechnical testing of site conditions
a) Test borings
b) Test pits
c) Soil bearing value
d) Ground corrosion and resistivity tests
e) Evaluation of subsurface material and conditions
f) Reports and professional recommendations

## 2.0 WALKDOWN AND SURVEY

Perform a field survey and site walk down of the as-built condition for all physical and operational conditions and parameters associated with systems and equipment, including but not limited to HVAC, water and steam systems, electrical power systems, and instrumentation and control systems. The Lead Engineer for the Scope of Work will take the information obtained from the walkdown and survey and place into specifications, drawings, and calculations, as required to support the engineering effort..

## 3.0 PLANS AND DRAWINGS

### 3.1 PRELIMINARY ARCHITECTURAL PLANS

3.1.1 Preliminary building plans and/or diagrammatic layouts

a) Show options, Flexibility and expandability
b) Show requestors work flow
    1) Human
    2) Vehicular
    3) Material flow patterns
c) General space allocations
d) Special facilities and equipment

3.1.2 Fire evacuation and other life safety requirements

3.1.3 Adjacency

    b) Buildings
b) Major utilities

3.1.4 Special Architectural requirements

**PRELIMINARY DESIGN PHASE**

3.1.5 Block layouts of mechanical spaces

3.1.6 Block layouts of electrical spaces

3.1.7 Block layouts of communications spaces

3.1.8 Room data sheets

**3.2 PRELIMINARY HVAC PLAN**

3.2.1 Present Conditions

3.2.2 Block load calculations to identify utility requirements

a) Chilled Water
b) Steam

3.2.3 Design conditions

a) Outside air temperature and relative humidity
b) Inside air temperature and relative humidity.
c) Air changes
d) Room pressurization flow direction

3.2.4 Analysis of preliminary HVAC systems

a) Energy source
b) Energy conservation
c) Heating and ventilating
d) Air conditioning

3.2.5 Special HVAC Requirements

**3.3 PRELIMINARY FIRE PROTECTION PLAN**

3.3.1 Present conditions

3.3.2 Requirements for fire protection

3.3.3 Block layouts for fire protection system

a) Evacuation plans

**3.4 PRELIMINARY PLUMBING PLAN**

3.4.1 Locate existing connections for all required services.

3.4.2 Special plumbing requirements

**3.5 PRELIMINARY ELECTRICAL PLAN**

3.5.1 Locate existing connections and load capacity

**PRELIMINARY DESIGN PHASE**

a) Power
b) Communications
c) Fire alarm system
d) Security System

3.5.2 Special electric requirements

3.5.3 Requirements for lighting

3.5.4 Requirements for electrical system

3.5.5 Requirements for communications systems

3.5.6 Determine the need for lightning protection.

**3.6 PRELIMINARY DIRECT DIGITAL CONTROL SYSTEM**

3.6.1 Locate existing DDC system

a) Determine expandability

3.6.2 Locate existing Scientific Alarm System

a) Determine expandability

**4.0 PRELIMINARY DESIGN REVIEW**

**4.1 REVIEW**

4.1.1 Submit all drawing, plans, documents, calculations, etc. for review

4.1.2 Attend review meetings as necessary to answer questions

4.1.3 Respond in writing to all comments from Scope of Work development phase.

**INTERMEDIATE DESIGN PHASE**

## 1.0 SITE/LANDSCAPE

All Site plans and drawings shall:

a) Be a minimum of 90% complete
b) Be coordinated with similar activities in other disciplines
c) Address all remarks from Preliminary Design Phase

## 1.1 SITE PLANS

1.1.1 Complete Site Plan

a) Existing site information
b) Dimension major site features
c) Building footprint
    1) Grade elevations at each building corner
    2) Grade elevations at entrances, and critical areas
    3) First floor elevations
    4) Overall dimensions
d) Key design elements
e) Major landscaping
f) Utility lines
g) Complete plan for drainage and grading.
h) Vehicular access routes
    1) Profile and alignment of all new roads
i) Pedestrian access routes
j) Parking
    1) All striping
    2) All unique spaces
    3) Dimensions
k) Walks
    1) Dimensions
    2) Paving joints
l) Curbs
    1) Dimensions
m) Service areas
    1) Dimensions
n) Complete erosion control and storm water management plan
    1) Submit to State Agencies as necessary.
o) Complete contours
    1) Grading at all altered areas.
p) Construction marshaling information
    1) Locate and outline staging area.
    2) Locate temporary utility hookup.
    3) Locate Field office (Trailer).
q) Indications of phasing
r) Limits of work
s) Indication of future surrounding improvements

**INTERMEDIATE DESIGN PHASE**

t) Location of Signage
    1) Location(s) of construction sign
u) Security measures

1.1.2 Planting and Landscape plan

a) Location of all trees, shrubs, and lawns
b) Planting list

1.1.3 Utility plot plan

a) Existing utilities and their connections.
    1) Sewer
    2) Contaminated waste
    3) Chilled water
    4) Condenser water
    5) Steam
    6) Condensate
    7) Domestic water
    8) Gas
    9) Compressed air
    10) Electric
    11) Communications
    12) Other

## 2.0 ARCHITECTURAL/STRUCTURAL

a) All Architectural/Structural plans and drawings shall:
    1) Be a minimum of 90% complete
    2) Be coordinate with similar activities in other disciplines
    3) Address all remarks from Preliminary Design Phase
b) Entire project site on one sheet for reference
c) Reference and coordination symbols
    1) Enlarged plan bubbles
    2) Section indications
    3) Exterior elevation keys
    4) Interior elevation keys
    5) Wall type indications
d) All dimensions
    1) Overall
    2) Column grid
    3) Locating dimensions
        a) Partitions
        b) Openings
        c) Equipment

### 2.1 ARCHITECTURAL PLANS

2.1.1 Demolition plan

2.1.2 Floor plans of each level

**INTERMEDIATE DESIGN PHASE**

a)All room names
b) Room numbers
c) Accurate door size, and swings
d) Safety and protective elements
    1) Fire extinguishers
    2) Fire hoses
    3) Lead linings
    4) Radio frequency shielding
e) Fixed equipment
f) Portable equipment
g) Plumbing fixtures placed and identified
    1) Sinks
    2) Showers
    3) Tubs
    4) Toilets
    5) Toilet stalls
    6) Eyewash
    7) Safety showers
    8) Any item requiring plumbing.
h) Construction dimension

## 2.2 STRUCTURAL PLANS

2.2.1 Structural floor plans for each level and roof

a) Final column reference lines
b) Structural system dimensions
c) Size bearing walls
d) Major bracing locations
    1) Bracing type
    2) Dimensions
e) Indication of typical bay
f) Sizing of major components
g) Column sizes
h) All framing members sized
        1) Girders
        2) Beams
        3) Joists
        4) Open web joists
        5) Concrete joists
        6) Waffle slab
        7) Space frames
        8) Lintels
        9) Type, extent, and direction of framing
        10) Reference structural items to schedule
i) Slabs

2.2.2 Structural foundation plans

a) Size of caissons
b) Size of footings
c) Size of foundation walls

**INTERMEDIATE DESIGN PHASE**

d) Size of grade beams

2.2.3 Structural notes

2.2.4 Column schedules

2.2.5 Correlation with architectural and mechanical features

2.2.6 Critical coordination clearances

**2.3 ARCHITECTURAL ROOF PLAN**

2.3.1 Materials

2.3.2 Elevations

2.3.3 Slopes

2.3.4 Drains

2.3.5 Other penetrations

**2.4 ARCHITECTURAL REFLECTED CEILING PLANS**

2.4.1 Suspended ceiling grids

2.4.2 Lighting fixtures

2.4.3 Diffusers

2.4.4 Registers

2.4.5 Sprinkler heads

2.4.6 Ceiling-mounted equipment

2.4.7 Exit signs

2.4.8 Ceiling modifications for oversized equipment

2.4.9 Wall-mounted items

2.4.10 Shelving and special features

2.4.11 Bulk heads

2.4.12 Beams and other limiting factors

2.4.13 Ceiling Elevations

**2.5 ARCHITECTURAL ENLARGED PLANS**

**INTERMEDIATE DESIGN PHASE**

2.5.1 Special spaces

2.5.2 Stairs

## 2.6 ARCHITECTURAL INTERIOR ELEVATIONS

2.6.1 Coordination utility cross-section

a) Corridors
b) Mechanical rooms
c) Utility placements

2.6.2 Utility discipline zones

a) Coordination with existing structural
b) Coordination with new structural

## 2.7 ARCHITECTURAL INTERIORS

Interior space allocation and utilization plan

a) Establish the final scope relative to interior construction
    1) Special interior design features
    2) Furnishings
    3) Equipment selections
    4) Materials
    5) Finishes
    6) Colors
b) Equipment Schedules
    1) Dimensions
    2) NIH number
    3) Quantity
    4) Remarks
        a) Floor mount
        b) Other
    5) Current location
    6) Proposed location
    7) Utilities required
    8) Power requirements
    9) Scientific alarm
        a) Alarm set-points
    10) Emergency generator

## 2.8 ARCHITECTURAL EXTERIOR ELEVATIONS

Building exterior elevations

a) Indicate all surface materials for all areas
b) Openings (doors and windows)
c) Roof pitches

**INTERMEDIATE DESIGN PHASE**

## 2.9 ARCHITECTURAL SECTIONS AND DETAILS

2.9.1 Building sections

a) Set floor to floor dimensions
b) Establish floor elevations
c) Set interstitial space details dimensions

2.9.2 Construction

a) Typical wall sections
    1) At window
    2) At solid wall
    3) At parapets and roofs
    4) At finished grades and footings
b) Roof, wall and floor penetrations

2.9.3 Construction sections

a) Typical stairways
b) Typical elevator shaft and machine room
c) Utility coordination cross sections

## 2.10 STRUCTURAL SECTIONS AND DETAILS

Details

a) Reinforcing.
    1) Size
    2) Spacing
    3) Elevation of reinforcing
    4) Type
    5) Depths
b) Foundation details
    1) Dimensioned foundation details
c) Typical framing details
d) Sub-drainage
e) Water proofing
f) Damp-proofing
g) Large openings
i) Nonstandard beam to column framing
j) Concrete stairs
k) Exterior wall construction
l) Anchors and ties
m) Elevator shaft details
n) Vibration isolation details
o) Large mechanical equipment and anchorage
p) Typical framing details
q) Standard structural steel connections
r) Sump pump systems
s) Reference to appropriate schedules

**INTERMEDIATE DESIGN PHASE**

## 3.0 MECHANICAL - HVAC

All HVAC plans and drawings shall:
a) Be a minimum of 90% complete
b) Be coordinated with similar activities in other disciplines
c) Address all remarks from Preliminary Design Phase.

### 3.1 HVAC PLANS

3.1.1 Complete design

3.1.2 Mechanical plan drawings

a) Legend
b) Plan showing Ducts
c) Indicate size of all ductwork
    1) Main and branch lines
d) Indicate insulation/moisture prevention
e) Fire dampers
f) Smoke dampers
g) Balancing dampers
h) Location of all equipment
i) Indicate smoke detectors
    1) Within ducts
    2) In air-handling units
j) Special or complex ductwork
k) Required space for equipment
l) Required chases and clearances
m) Acoustical and vibration control

3.1.3 Wind analysis and laboratory exhaust plume

3.1.4 Walk-in coolers, freezers, cold rooms

a) Refrigeration systems
b) Schematic piping
c) Wiring diagrams
d) Automatic controls

### 3.2 HVAC SECTIONS

a) Drawing sections
b) Through equipment rooms
c) Typical ductwork

### 3.3 HVAC DETAILS

3.3.1 Details of unique conditions

3.3.2 Details of system connections

3.3.3 Details of system configurations

**INTERMEDIATE DESIGN PHASE**

3.3.4 Exhaust stack detail

3.3.5 Humidifier detail

3.3.6 Coil piping detail

3.3.7 Air handling unit elevation detail

Steam condensate piping

**3.4 HVAC SCHEDULES**

Equipment schedules

a) Air conditioning
b) Ventilation units
c) Refrigeration elements
d) Cooling towers
e) Fans
f) Pumps
g) Heat recovery system
h) Humidification
i) De humidification
j) Reheat system
k) Exhaust blowers
l) VAV terminal
m) Terminal units
n) Air balance and Room pressurization
o) Other

**4.0 MECHANICAL - PLUMBING**

All Plumbing plans and drawings shall:

a) Be a minimum of 90% complete
b) Be coordinated with similar activities in other disciplines
c) Address all remarks from Preliminary Design Phase.

**4.1 PLUMBING PLANS**

4.1.1 Plumbing system plan drawings

a) Create legends
b) Show location and size of equipment
    1) Pumps
    2) Tanks
    3) Other
c) Locate piping
d) Indicate size of pipes
e) Plumbing Fixtures
g) Indicate insulation/moisture prevention
i) Indicate piping system
    1) Steam

**INTERMEDIATE DESIGN PHASE**

2) Water
3) Special water (De-ionized)
4) Sewer
5) Specialty gases (systems or tanks)
6) Chilled water
7) Condenser water
8) Hot water
9) Waste
10) Vent
11) Process air (oil free)
12) Compressed air
13) Vacuum outlets
14) Other

4.1.2 Riser diagrams

**4.2 PLUMBING DETAILS**

4.2.1 Detailing

a) Unique conditions
b) Vibration isolation engineering

4.2.2 One line flow and control diagrams

a) Chilled water
b) Condenser water
c) Hot water
d) Steam piping (including low quantities)
e) Air conditioning steam.
f) Specialty systems

4.2.3 Schedules

**5.0 <u>MECHANICAL – FIRE PROTECTION</u>**

All Fire Protection plans and drawings shall:

a) Be a minimum of 90% complete
b) Be coordinated with similar activities in other disciplines
c) Address all remarks from Preliminary Design Phase.

**5.1 FIRE PROTECTION**

5.1.1 Plan drawings

a) Create legends
b) Indicate existing systems
c) Show location and size of equipment
d) Locate piping
e) Indicate size of pipes
f) Equipment layouts

**INTERMEDIATE DESIGN PHASE**

5.1.2 Ceiling plan drawings

a) Sprinkler locations

## 6.0 DIRECT DIGITAL CONTROL (DDC) SYSTEM

All DDC plans and drawings shall:

a) Be a minimum of 90% complete
b) Be coordinated with similar activities in other disciplines
c) Address all remarks from Preliminary Design Phase.

### 6.1 DDC PLANS

Plan drawings

a) HVAC control
    1) New and/or existing systems
    2) Complete plans and equipment layouts
    3) Required space for equipment
b) Scientific Alarming
    1) New and/or existing systems
    2) Complete plans and equipment layouts
    3) Required space for equipment
    4) Cardkey alarming

### 6.2 DDC DETAILS

6.2.1 Complete control diagrams with legend

a) Air Conditioning systems
b) Exhaust systems
c) Refrigeration systems
d) Heating systems

6.2.2 DDC Specifications shall include a complete Sequence of Operations for the HVAC systems

6.2.3 Complete Scientific Alarm system diagrams

a) Device identification (NIH number)
b) Cold-box panic alarms
c) Hi and Low alarm set-points

6.2.4 Utility alarming

a) Hi, med and low pressure steam
b) Air compressors and vacuum system
c) Etc.

6.2.5 Fireman's shutdown switch for HVAC equipment.

**INTERMEDIATE DESIGN PHASE**

## 7.0 ELECTRICAL

a) All Electrical plans and drawings shall:
    1) Be a minimum of 90% complete
    2) Be coordinated with similar activities in other disciplines
    3) Address all remarks from Preliminary Design Phase
b) Complete design.

## 7.1 ELECTRICAL PLANS

7.1.1 Plan drawings indicating location of

a) Transformer vaults
b) Overhead and underground
    1) Power lines
    2) Utility and communication lines
c) Pad-mount transformer location
d) Auxiliary power system connection
e) Engine generator sets
f) Unit substations
g) Other major equipment

7.1.2 Floor plans

a) Room numbers
b) Room titles
c) Area functions
d) Lighting fixtures
e) Outlets for power
f) Layouts for special systems
g) Panel-board locations

7.1.3 Scaled ceiling plans for each space

a) Location of lighting fixtures
b) Type of lighting fixtures
c) Light fixture schedules

7.1.4 Identify special features

a) Telephone connections
b) Data connections
c) LAN locations
d) Under-floor raceways
e) Occupancy sensors
f) Power outlets
g) Exit lights
h) Fire alarm/Life safety systems
i) Signal system devices
j) Cardkey Security system
    1) In and out card readers

**INTERMEDIATE DESIGN PHASE**

2) Door alarms
3) Door strikes
4) Raceway layout

7.1.5 Finalized layouts of components where space is critical

7.1.6 Laboratory planning module

7.1.7 Electrical site plan details

a) Service entrance locations
b) Initial distribution diagram for power
c) Communications Systems
d) Signal systems

7.1.8 Details for site electrical work and special systems

7.1.9 Plot plan with primary feeder location showing access to the project

**7.2 ELECTRICAL SCHEDULES**

Panel-board schedule

a) Power circuits
b) Lighting circuits

**7.3 ELECTRICAL DIAGRAMS**

7.3.1 One-line diagrams of electrical system

a) High-voltage circuitry or transformation required
b) Emergency power
c) Fire alarm
d) Layout of major components in all electrical equipment rooms
e) Complete sizing of major components
f) Emergency/UPS.
g) High-voltage systems
h) Primary transformers
i) Emergency generator

7.3.2 Riser diagrams for

a) Electrical distribution
b) Auxiliary power distribution
c) Fire alarm
d) Card-key Security
e) All low-voltage systems

**8.0 <u>SPECIFICATIONS</u>**

Specifications

**INTERMEDIATE DESIGN PHASE**

a) Complete table of contents
b) Complete project “marked up” specifications sections

## 9.0 SUPPORT DOCUMENTATION

### 9.1 GENERAL

9.1.1 All reports and other documentation will

a) Be a minimum of 90% complete
b) Be coordinated with similar activities in each discipline
c) Address all remarks from the Preliminary Design Phase

9.1.2 Catalog of Significant materials, for each section shall include:

a) Equipment
b) Material List
c) Cut sheets

9.1.3 All primary code criteria developed, addressed and documented.

### 9.2 SITE

Site construction document design report

a) Establishment of final scope
    1) Relationships
    2) Form
    3) Size
    4) Appearance
b) Analysis/description of Complete design solutions
c) Coordination with USAG
    1) Verify location, sizing and timing of all the required interfaces
    2) Provide schedule confirmation of any utility work
d) Site safety plan
e) Storm-water management report
f) Erosion/sediment control report
g) Review planting plan against master plan
h) Concept plan for drainage and grading
i) Demolition requirements

### 9.3 ARCHITECTURAL

9.3.1 Architectural report

a) Upgrade basis of design

9.3.2 Area analysis

### 9.4 STRUCTURAL

**INTERMEDIATE DESIGN PHASE**

9.4.1 Basis for design report

a) Coordination with piping systems that require support
b) Laboratory vibration analysis
c) Final structural design criteria
d) Comparative cost analysis of at least two structural systems

9.4.2 Critical coordination clearances

9.4.3 Structural report

a) Final structural system
b) Design codes
c) Identification of design stresses
d) Allowable foundation bearing capacity
e) Compaction requirements
f) Completed computations
g) Boring logs
h) Girder diagrams
    1) Live loads
    2) Uniform loads
    3) Concentrated loads
    4) Reactions
    5) Girder material
    6) Stresses

9.4.4 Special condition

a) Shoring/underpinning of adjacent structures

9.4.5 Schedules

a) Slabs
b) Beams
c) Columns

**9.5 HVAC**

Design report

a) Sizing calculations for ducts and piping
b) HVAC load calculations
c) Calculations for fan pressures and pump heads
    1) Fan and Pump curves
d) Calculations for required sound attenuation of major fans.

**9.6 PLUMBING**

9.6.1 Design report

a) Equipment selections based on manufacturer's catalog data

**INTERMEDIATE DESIGN PHASE**

b) Sizing calculations
1) Piping mains and principal branches
2) Condensate tank
3) Feed-water heater capacities
4) Feed-water storage capacity
5) Other

c) Capacity, discharge pressure, and Net Positive Suction Pressure (NPSH)
1) Condensate transfer pumps
2) Pressure reducing valves
3) Safety valves
4) Oil tanks and pumps
5) Gas systems
6) Blow-down systems
7) Other

9.6.2 Coordination with structural for support of piping

**9.7 FIRE PROTECTION**

Fire Protection Design Report

a) Sizes and capacities of major components

**9.8 ELECTRICAL**

9.8.1 Electrical design report

a) Electrical analysis
b) Lighting calculations
c) Load calculations
d) Short circuit calculation
e) Voltage drop calculations

9.8.2 Establishment of the final scope

9.8.3 Overall building connected load requirements

9.8.4 Agreement from USAG on design development drawings

**10.0 <u>REPORTS</u>**

**10.1 ENERGY REPORTS**

Review energy study

**10.2 ESTIMATED COST**

Revised Cost analysis

a) Itemized breakdown
1) Mechanical

**INTERMEDIATE DESIGN PHASE**

2) Electrical
3) Architectural
4) Structural
5) Equipment
6) Fire protection
7) DDC system
8) Other

b) Revised cost based on general square foot cost

c) Equipment
1) Use of owner-furnished material/equipment
2) Special manufacturing requirements
3) Delivery requirements
4) Storage requirements
5) Manufacturer's plans and details for installation

**10.3 SCHEDULE REPORTS**

10.3.1 Revise Project schedule diagram with phases of development

a) Update long lead items
1) Delivery dates and status

10.3.2 Revise Construction schedule in bar chart form

a) Bar chart
1) Long lead items delivery times
2) Scheduling
3) Phasing
4) Optimum construction efficiency

10.3.3 Occupancy schedule

**11.0 REVIEW**

**11.1 REVIEW**

11.1.1 Submit all drawings, plans, documents, etc. for review

a) Copy of submittal letter to MDE for Erosion Control and/or Storm Water Management plans.

11.1.2 Attend review meetings as necessary to answer questions.

11.1.3 Respond in writing to all comments from Preliminary Design Phase

a) Return copies of Preliminary Design Phase comments, plans, mark-ups, etc.

11.1.4 Provide phasing and commissioning requirements.

**FINAL DESIGN PHASE**

## 1.0 GENERAL

A commissioning plan needs to be completed which will include the engineered bases and parameters needed to make the system functional. The commissioning plan is to contain items such as settings, set points, ranges, dead bands, accuracy, testing requirements, etc.

## 2.0 SITE/LANDSCAPE

All Site documentation will

a) Be 100% complete, final design
b) Be coordinated with similar activities in other disciplines
c) Address all remarks from Intermediate Design Phase

### 2.1 SITE PLANS

21.1 Vicinity Plan

2.1.2 Existing Site Plan

2.1.3 Site Plan

a) Existing site information
b) Dimension major site features
c) Building footprint
d) Key design elements
e) Major landscaping
f) Utility lines
g) Final plan for drainage and grading.
h) Vehicular access routes
i) Pedestrian access routes
j) Parking
k) Walks
l) Curbs
m) Service areas
n) Staking plan
o) Final contours
p) Construction marshaling information
q) Indications of phasing
r) Limits of work
s) Indication of future surrounding improvements
t) Locate signage
u) Security measures

2.1.4 Planting and Landscape plan

a) Location of all trees, shrubs, and lawns
b) Complete planting list
c) Planting details

**FINAL DESIGN PHASE**

2.1.5 Utility plot plan.

a) Existing utilities and their connections
b) Final trunk sewers
c) Water distribution loop
d) Gas distribution mains
e) Location arrangement of water treatment equipment

## 3.0 ARCHITECTURAL/STRUCTURAL

All Architectural/Structural documentation will

a) Be 100% complete, final design
b) Be coordinated with similar activities in other disciplines
c) Address all remarks from Intermediate Design Phase

### 3.1 ARCHITECTURAL PLANS

3.1.1 Demolition plan

3.1.2 Floor plans of each level

a) Indication of art work
b) Signage location
c) All walls dimensioned
d) All doors and windows located and sized

3.1.3 Roof plan

31.4 Exterior Elevations

3.1.5 Reflected ceiling plans

3.1.6 Floor covering plan

a) Material type
b) Graphics
c) Patterns

3.1.7 Enlarged plans

3.1.8 Fire protection egress plan

3.1.9 Lab modules

3.1.10 Schedules

a) Door
b) Window
c) Finish

3.1.11 Building Sections

**FINAL DESIGN PHASE**

3.1.12 Construction Details

**3.2 STRUCTURAL PLANS**

3.2.1 Structural floor plans for each level and roof

a) Column reference lines
b) Final dimensions
c) All bracing
d) Sizing of all components
e) Special provisions for installation or removal of equipment

3.2.2 Structural foundation plans

a) Locate grades
b) Locate clean out manholes
c) Locate trenches
d) Locate area wells
e) Locate and dimension all elevator pits
f) Locate elevation of bottom of footing
g) Indicate concrete member
    1) Dimensions
    2) Size
    3) Spacing
    4) Reinforcing
h) Locate finished and unfinished spaces
i) Pipe sleeves through footings
j) Pipe sleeves through below grade walls
k) Caissons
    1) Bottom elevation
    2) Bell size
l) Elevations
m) Top of slab elevations.
n) Top of steel elevations

**3.3 ARCHITECTURAL INTERIORS**

3.3.1 Interior space allocation and utilization plan

3.3.2 Interior elevations

Signage location

3.3.3 Signage location

3.3.4 Construction details

Any unique condition not previously covered

3.3.5 Installation plans

**FINAL DESIGN PHASE**

a) Furniture
b) Equipment.

3.3.6 List of new and reused items

a) Number
b) Cross referenced to details
c) Cross referenced to specifications

**3.4 STRUCTURAL DETAILS**

3.4.1 Sections and details

3.4.2 Critical coordination clearances

b) Details

c) Clarification of lengths or arrangement of reinforcement
d) Any condition not previously addressed

3.4.4 Schedules

a) Schedule for reinforcing bar
b) Column schedule

3.4.5 Structural notes

3.4.6 Correlation with architectural and mechanical features

**4.0 MECHANICAL**

All Mechanical documentation will

a) Be 100% complete, final design
b) Be coordinated with similar activities in other disciplines
c) Address all remarks from Intermediate Design Phase

**4.1 MECHANICAL PLANS**

4.1.1 Complete Construction Documents for HVAC, Plumbing, Fire Protection and the Direct Digital Control System

a) Symbols legend sheet
b) Plans
c) Elevations
d) Sections
e) Notes
f) Details
g) Riser diagrams.
h) Schedules
i) Control diagrams
j) Completed calculations

**FINAL DESIGN PHASE**

4.1.2 Sanitary

a) Invert elevations for sewage system
b) Legends
c) Notes
d) Details
e) Site plan
f) Sized equipment
g) Profiles greater than 60 m
    1) Original grade
    2) Finished grade
    3) Manholes
    4) Inlets
    5) Pipe size
    6) Road and walk crossings
    7) Elevations of other pertinent utilities

## 5.0 ELECTRICAL

All Electrical documentation will

a) Be 100% complete, final design
b) Be coordinated with similar activities in other disciplines
c) Address all remarks from Intermediate Design Phase

### 5.1 ELECTRICAL DRAWINGS

5.1.1 Floor plans

5.1.2 Ceiling plans

5.1.3 Plot plan

5.1.4 Electrical distribution plan

5.1.5 Riser diagrams

5.1.6 One line diagrams with size and fault currents

a) For all switchgear
b) For all switchboards
c) For all panel boards
d) Feeder sizes
e) Transformer sizes

5.1.7 Schematics

5.1.8 Wiring Diagrams

5.1.9 Connection Diagrams

**FINAL DESIGN PHASE**

## 6.0 SPECIFICATIONS

Final Specifications

a) Final table of contents
b) Final project specifications sections

## 7.0 SUPPORT DOCUMENTATION

### 7.1 GENERAL

a) All reports and other documentation will:
   1) Be 100% complete, final report
   2) Be coordinated with similar activities in each discipline
   3) Address all remarks from Intermediate Design Phase
b) Final Catalog of Significant materials, for each section shall include:
   1) Equipment
   2) Material List
   3) Cut sheets

### 7.2 SITE

Final schedules

### 7.3 ARCHITECTURAL

Final schedules

### 7.4 STRUCTURAL

7.4.1 Final schedules

7.4.2 Final design calculations

### 7.5 MECHANICAL

7.5.1 Final schedules

7.5.2 Final design calculations

7.5.3 Final Fan and Pump curves

### 7.6 ELECTRICAL

7.6.1 Final schedules

7.6.2 Final design calculations

### 7.7 ESTIMATED COST

Final Cost analysis

a) Itemized breakdown

**FINAL DESIGN PHASE**

1) Mechanical
2) Electrical
3) Architectural
4) Structural
5) Equipment
6) Fire protection
7) DDC system
8) Other

b) Final cost based on general square foot cost

c)Equipment

1) Use of owner-furnished material/equipment
2) Special manufacturing requirements
3) Delivery requirements
4) Storage requirements
5) Manufacturer's plans and details for installation

**7.8 SCHEDULE REPORTS**

7.8.1 Revise Construction schedule in bar chart form

a) Bar chart

1) Long lead items delivery times
2) Scheduling
3) Phasing
4) Optimum construction efficiency

7.8.2 Long lead items

a) Update Delivery dates and status

7.8.3 Occupancy schedule

**8.0 FINAL REVIEW**

**SUBMISSIONS**

a) Submit all drawings, plans, documents, equipment specifications etc.
b) Attend review meetings as necessary to answer questions.
c) Respond in writing to all comments from Intermediate Design Phase
d) Phasing or commissioning requirements
e) Provide copies of drawings and specification marked "FOR BID PURPOSES ONLY" or "APPROVED FOR CONSTRUCTION" as applicable.

**9.0 BID PROCESS**

**IF WORK IS TO BE PERFORMED BY OUTSIDE CONTRACTOR**

a) Assist as necessary in preparation of:

1) Invitation for bids

b) Issue responses to bidders questions.
d) Provide design clarifications
e) Issue corrections in the form of revised drawings and/or specifications

1) All changes to drawings shall be "Bubbled".

**FINAL DESIGN PHASE**

2) All changes to specifications shall be “Highlighted”.
   a) Strike out deleted text
   b) Bold new text