

DELIVERABLES – 05/03/04

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CONSTRUCTION DOCUMENTS

Complete construction drawings shall be prepared in approved version of AutoCAD. They shall be developed from the approved design development drawings and embody adequate architectural, landscape architectural, civil, structural, mechanical, and electrical drawings showing details, dimensions, notational information and other data to ensure that the construction contractor has a complete understanding of all elements of work. All drawings shall be complete, cross-referenced, meet all requirements of NPS-10 and NPS CAD

standards, and coordinated between disciplines. This list is an outline of minimum drawing requirements. It is the A/E's responsibility to provide full and adequate drawings for each specific project.

Drawing Minimums

- Standard cover sheet (with park map and project location map)
- Index sheet (may be included on cover sheet)
- General:
 - Overall site plan showing total project:
 - Contractor staging areas (construction storage, field office, construction camp) with adequate space or sequencing needs
 - Construction limits
 - Construction access
 - Datum information, survey control
 - Monuments and benchmarks with coordinates and elevations
 - Property lines with bearings, easements, utility corridors and setbacks
 - Unique construction requirements
 - Sheet index, symbol legend and abbreviations list
 - Existing conditions plan:
 - Contours and spot elevations
 - Benchmarks with coordinates and elevation
 - Property lines with bearings, easements and setbacks
 - Buildings and other structures
 - Site features: roads, parking, structures, walks, steps, walls, etc.
 - Utilities, above and below ground, shown to scale (transformers, pull boxes, manholes, inlets, lift stations, propane tanks, septic tanks, culverts, etc.) include spot elevations for each, invert elevations for all below ground structures
 - Existing vegetation
 - Boring data
 - Construction Limits
- Civil Engineering
 - Utilities plans:
 - Existing conditions (as base)
 - Geotechnical testing areas, boring locations, percolation test holes
 - Water pumping, treatment, storage, and distribution system layout, size of components, profiles, material callouts
 - Wastewater collection, treatment, and disposal system layout, size of components, profiles, material callouts
 - Construction Limits
 - Road and Parking Layout:
 - Plan and profile
 - Road and parking cross-sections

Road and parking centerline stations, bearings, distances, and curve data

Intersections and other site radii identified with radius and coordinates

Control point and radius point tables

Storm water structure layout and details

System process and flow diagrams

Project details:

Details to include trenching details, thrust blocks, water/sewer line crossings, silt fence, sewer cleanouts, manholes, valves and boxes, curb stops, fire hydrants, air release valves, sewage air release valves, irrigation details, pressure relief valves, meters and boxes, pressure regulators, check valves and boxes, backflow preventors, septic tanks, absorption trenches, distribution boxes, piping connections, water well details, lift station details, storm water details, storage tank details, etc...

- Landscape Architecture

Demolition Plan (if required):

Structures

Plant material (tree protection, plants to be removed or salvaged)

Utilities (identified for removal or abandonment)

Storm water protection

Site furnishings

Clearing and grubbing

Rock outcrops

Construction Limits

Site Plan:

Existing conditions

Storm water protection

Site features: roads, parking, structures, walks, steps, walls, etc.

Utilities shown to scale (lighting, transformers, pull boxes, manholes, inlets, lift stations, propane tanks, septic tanks, culverts, etc.)

Sections and elevations identified

Site elements and details identified

Construction Limits

Site layout plan:

Existing conditions (as base)

Monuments and benchmarks identified with coordinates and elevation

Roads, parking, walks and service areas:

- Coordinates for building and site layout (identify location of point – foundation, finish wall. . .)

- Coordinates for all corner points of walks, parking, walls, and site features (identify location of point – foundation, face of curb. . .)
- Control point, corner point, and radius point tables
- Dimensioned traffic markings
- Dimensioned walks, steps, walls with footings, terraces, drainage and utility structures, and site elements

Buildings and structures:

- Finish floor elevations noted
- Roof overhangs, footings

Outdoor lighting

Above and below ground utilities (culverts, utility boxes to scale)

Construction Limits

Grading plan:

Existing conditions

Existing contours and spot elevations

Proposed grading:

- Proposed contours (maximum 2' contour interval with each 10' interval in heavier pen weight and labeled)
- Spot elevations at all change in gradient, at all corners of walks, walls, parking, drainage inlets and outlets, and all site elements
- Spot elevations at top and bottom of walls, steps and ramps
- High points, low points, swale centerlines
- Storm water protection elements
- Finish floor elevations at each access point of structures

. Tree and vegetation protection

. Utility systems

. Construction Limits

Planting/Revegetation/Irrigation plan

Plant list with quantities and symbols

Details and cross-sections

Site Details:

Paving, finishes

Erosion control (Storm water protection)

Accessibility

Stairs, handrails, ramps

Site furnishings

Typical and special construction details

Site Elevations:

Entrances

Exterior materials with major site elements

Dimensions

Site Sections:

Typical sections

Stairs

Site Walls

Material changes/connections, paving (curb/walk)
Key site elements

Sign Plan

Traffic signs (park wayfinding and MUTCD)
Accessible signs
Interpretive signs and waysides
Pedestrian and trail signs
Unique construction signs

- Architectural

General Sheet

Architectural symbol legend
Materials legend
Abbreviations list

Demolition Drawings with legends

Floor Plans
Roof plans
Elevations
Building Sections

New or Adaptive Use Drawings

Building Floor Plans:

- Spaces individually delineated and labeled
- Section cut references
- Enlarged layouts of special spaces (dimensioned)
- Dimensions (verified with structural)

Building Roof Plan:

- Drainage design with slope indicated
- Roof slope
- Dimensions

Building Elevations:

- Entrances, window arrangements, doors
- Exterior materials with major vertical and horizontal joints
- Roof levels
- Dimensions

Building Sections (One longitudinal and one transverse):

- Floor to floor dimensions with elevation targets
- Stairs and elevators
- Typical ceiling heights

General roof construction details

Roof and Window details referenced to plans and schedules

Typical and special construction details

Interior elevations

Reflected ceiling plans

Room finish, hardware, door and window schedules

Equipment layout

Keynotes contain full note, not specification number

CONDOC type notes are not acceptable
Keynote Legend shall be on the same sheet as keynote reference

- Structural

- General Notes

- Applicable Codes and Standards

- Listing of design loads in accordance with IBC 2000, Section 1603

- Listing of all structural materials used, including material strengths

- Diaphragm fastening requirements

- Requirements for special inspection IBC 2000, Chapter 17

- List of abbreviations

- Symbols legend

- Standard Details

- Standard details applicable to the project

- Control joint details

- Reinforcing steel splice length schedule

- Lintel schedule(s)

- Foundation Plan

- Fully dimensioned foundation plan (references to the architectural drawings for foundation dimensions are unacceptable) including:

- Overall building dimensions
 - Column gridlines
 - Location of foundation elements with respect to column gridlines
 - Location of slab edges
 - Location of control joints
 - Location of slab recesses
 - Location of elevator pits
 - Location of footing and foundation wall steps
 - Location of foundation wall masonry ledges
 - Size of all foundation elements
 - Foundation wall thickness
 - Top of footing elevations
 - Masonry ledge elevations
 - Top of wall elevations
 - All required section cuts

- Floor Framing Plan

- Fully dimensioned floor framing plan (references to the architectural drawings for framing dimensions are unacceptable) including:

- Overall building dimensions
 - Column gridlines
 - Location of framing elements with respect to column gridlines
 - Top of beam elevations
 - Size and spacing of framing members
 - Locations of openings for floor penetrations
 - Size and direction of span of roof sheathing or decking

- Camber requirements
- All required section cuts

Roof Framing Plan

Fully dimensioned roof framing plan (references to the architectural drawings for framing dimensions are unacceptable) including:

- Overall building dimensions
- Column gridlines
- Location of framing elements with respect to column gridlines
- Top of beam elevations
- Size and spacing of framing members
- Locations of openings for roof penetrations
- Size and direction of span of roof sheathing or decking
- Camber requirements
- All required section cuts

Details

Foundation Details

- Footing/foundation wall details showing relationship to floor structural system
- Piling/pile cap details showing relationship to floor structural system

Floor Framing Details

- Connection Details
- Loading diagrams for special load cases for steel bar joists
- Column and base plate schedules for steel buildings
- Column and beam schedules for concrete buildings

Roof Framing Details

- Connection Details
- Loading diagrams for special load cases for steel bar joists
- Column and base plate schedules for steel buildings
- Column and beam schedules for concrete buildings
- Prefab wood truss profiles with loading diagrams for all load cases

- Mechanical

Mechanical floor plans (HVAC, plumbing, and fire protection), with all cross-references between sheets

Enlarged scale mechanical plans for mechanical rooms where all necessary plan information cannot be conveyed at a smaller drawing scale

Site mechanical plan (if applicable, with all features drawn to scale)

Detail drawings showing major mechanical details and sections, including all piping and ductwork connections to mechanical equipment

HVAC system schematics and flow diagrams

Mechanical symbols and abbreviations legends

Mechanical equipment schedules

Plumbing fixture connection schedule

Plumbing isometrics or riser diagrams for water systems and drain, waste, and vent (DWV) systems for each restroom, plumbing stack, or other groups of plumbing fixtures where all information cannot be shown on plan sheets

HVAC control schematics and sequences of operation

- Electrical

- Electrical floor plans, with all cross-references between sheets

- Enlarged scale electrical plans for critical spaces where all necessary plan information cannot be conveyed at a smaller drawing scale

- Site electrical plan showing routing with transformers, generators and vaults drawn to scale

- Detail drawings showing major electrical details and sections, including conduit routing to major electrical equipment

- Branch circuiting for all electrical devices

- Electrical symbols and abbreviations legends

- Panelboard and light fixture schedules

- Fire alarm matrix, riser and device location plans

- Lightning protection plans

- Telecommunication plans

- Security system plans

- Control wiring diagrams

Specifications and Product Information

A complete set of specification material including technical specifications, general requirements, contract bid schedules, list of required submittals, and a table of contents shall be prepared in accordance with the NPS "Guide for Specifiers" which prescribes, in part, that technical specifications shall be written in accordance with the Uniform System developed by the Construction Specifications Institute. The NPS Division 1 guideline specifications shall be edited to meet requirements of this job; other divisions may be from other sources. Include all supplemental design reports (soils, hazmat, etc.) with final specifications submittal.

Class A Estimate

The Class A estimate is based on complete quantity take-offs from completed construction drawings and specifications. Comply with bid schedule/Unifomat II (Level 2)/CSI Masterformat work breakdown structure. Submit unit costs for each bid item identifying the cost of equipment, materials, labor, and total for the work referenced. Prepare cost estimates using either an estimating software program or in MS Excel spreadsheet format. Format cost estimate with bid schedule. Support information includes:

- Final construction drawings and specifications
- Estimate based on complete quantity take-offs
- Final Bid Schedule or Price Schedule
- Show contractor's overhead and profit as well as general conditions as a separate cost item on the estimate
- Show General Requirements (General Conditions) costs in detail, not as a percentage of direct costs
- Total mark-ups (add-ons or escalations) at the end of the estimate for items such as overhead/profit, taxes, bonds, and location factors and do not allocate in each bid item

Product File

Submissions shall be bound, indexed, and shall include a table of contents and narrative, as necessary, to explain all work.

Construction Submittals

Use NPS template to prepare a list of submittal requirements for the final project.

O&M Requirements

Use NPS template to prepare summary of operation and maintenance (O&M) requirements

Design Calculations

Provide all design calculations used to arrive at the final design. Submissions shall be bound, indexed, and shall include a table of contents and narrative, as necessary, to explain all work.

- HVAC Design Calculations and Data:
 - Building U value calculations for each conditioned building, demonstrating compliance with ASHRAE 90.1
 - Heating and cooling load calculations for each building, including summaries of all input data, zoning maps, and any assumptions that were made
 - Outside air (ventilation air) calculations
 - Exhaust air calculations
 - Psychometric calculations
 - Heating, cooling, humidifying, and ventilating equipment sizing calculations
 - Pump and fan static pressure calculations and selection curves
- Plumbing Design Calculations and Data
 - Water service and sanitary sewer service capacity calculations for each building
 - Roof drain and drain leader calculations for each building, as applicable
 - Domestic water heater capacity calculations
 - Fuel gas system capacity calculations for each building, if applicable
- Fire Protection Design Calculations and Data
 - Hydraulic calculations for all fire sprinkler systems

- Hydrant flow test data, if applicable
- Fire pump and jockey pump capacity calculations, if applicable
- Pressure tank capacity calculations, if applicable
- Electrical Design Calculations and Data
 - Electrical service calculations for each building
 - Fault current calculations and load summary
- Water/Wastewater Calculations and Data
 - Utility sizing calculations
- Structural Design Calculations and Data
 - Final structural calculations including:
 - Structural design criteria
 - References to applicable code sections (IBC, ACI, AISC, etc.)
 - References to applicable portions of the structure
 - Dead load calculations
 - Snow load calculations
 - Roof/floor live load calculations
 - Wind load calculations
 - Seismic load calculations
 - Gravity system calculations
 - Lateral system calculations
 - Connection design calculations
 - Foundation system calculations
- Earthwork Design Calculations and Data
 - Cut/fill calculations

Constructability Analysis

Use NPS template to complete the constructability checklist for the final project.