

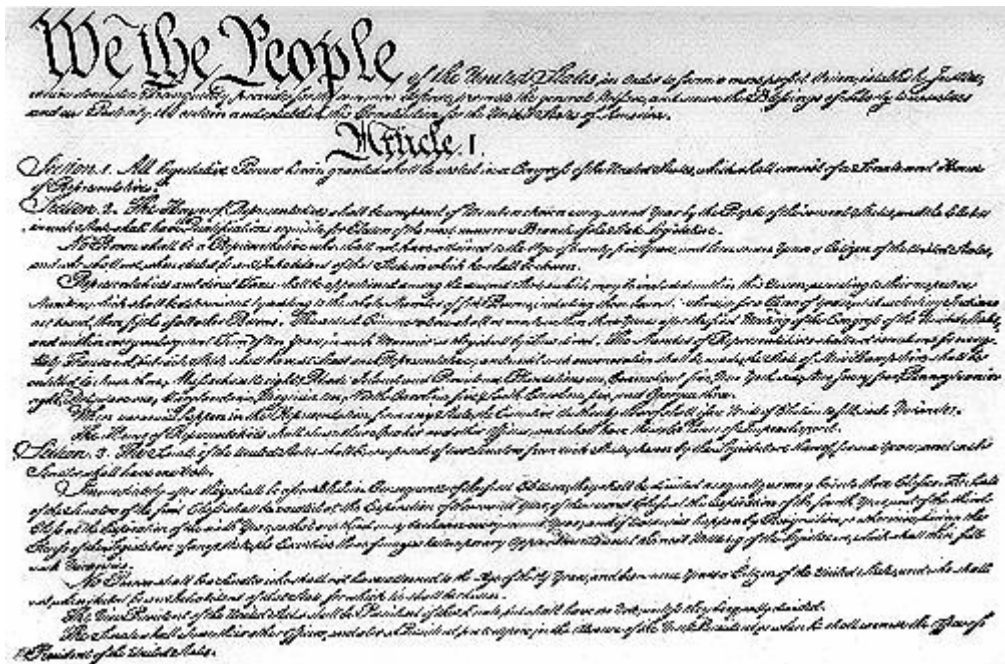
CONSTRUCTION DOCUMENTS AND SERVICES

NCARB ARCHITECTURAL REGISTRATION EXAM REVIEW SESSIONS JUNE 1 AND 3, 2004

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A. CONSTRUCTION LAW

1. Constitutions -- Federal and State



2. Legislative enactments -- laws passed by government bodies

3. Administrative regulations adopted by government agencies

4. Licensing boards

5. Court decisions (precedents)

a. Federal courts

1) General Jurisdiction:

a) Diversity of Citizenships - such as between citizens of different

states, or between United States citizens and those of another country. To ensure fairness to the out-of-state litigant, the Constitution provides that such cases may be heard in a federal court. An important limit to diversity jurisdiction is that only cases involving more than \$75,000 in potential damages may be filed in a federal court. Claims below that amount may only be pursued in state court.

- b) Admiralty
- c) Bankruptcy
- d) Actions involving the United States
Violations of Federal Criminal Statutes

2) Appellate Courts

- a) U.S. Supreme Court - decides only the following types of cases:
 1. raising issues involving the Constitution, federal law, or treaties
 2. cases affecting ambassadors
 3. maritime cases
 4. controversies in which the United States is a party
 5. controversies in which two or more states are parties
 6. controversies involving residents of different states
 7. controversies in which residents of the same state make a claim on land in another state
- b) Circuit Court of Appeals
94 U.S. Judicial Districts are organized into 12 regional "circuits"
7th Circuit includes Illinois, Indiana and Wisconsin
Illinois has three districts – Northern (Chicago and Rockford), Central (Peoria, Urbana, Springfield and Rock Island), and Southern (Benton and East St. Louis)

3) Trial Courts

- a) Federal District Courts (1 or more per state)
- b) Specialized Courts
 - i. Court of Claims
 - ii. Tax Court
 - iii. Patent Court

b. State Courts

1) Trial Courts

- a) Circuit Courts (also called "Superior" or "District" - judge presides,

jury in certain cases (Illinois has 22 judicial circuits)

- i. Criminal cases
- ii. Personal Injury
- iii. Commercial
- iv. Domestic (divorce, custody, adoption)
- v. Probate
- vi. Review of determinations of government agencies

2) Appellate Courts

- a) State Supreme Court
- b) Appellate Courts (Illinois has five districts)

3) Subordinate Courts

- a) Municipal Courts
- b) Small Claims Courts (“Pro Se”)
- c) Justices of the Peace or Magistrates – sometimes called “fee officers”): civil and small claims, marriages, and some minor criminal cases – Illinois has no JPs or Magistrates

B. TYPES OF LAW

1. Contract Law (enforceable agreement between parties)
 - a. “Contract” is an agreement between two or more parties, and must have the following characteristics:
 - 1) A real agreement (meeting of the minds)
 - 2) Lawful
 - 3) Valid consideration (exchange)
 - 4) Legal competence of parties
 - 5) Lawful form (architectural and construction contracts may be oral)
2. Tort (disputes between parties who have no contractual relationship)
 - a. This could involve cases where a person is injured by the design of a building

C. GOVERNMENTAL REGULATIONS

1. Licensing Laws
2. Zoning Laws
3. Environmental Protection Laws
 - Federal EPA
 - State EPA
4. Building Codes
 - BOCA (BOCA/National Building Code), ICBO (Uniform Building Code), SBCCI (Standard Building Code) – Joined to form the International Code Council (ICC) in 2000 (ICC publishes the “International Code Series”)
5. Accessibility Codes
 - ADA Guidelines
 - Federal Accessibility Codes
 - Fair Housing Amendments Act
 - State Accessibility Codes
 - Local Accessibility Codes (such as Chicago’s)
6. Flood Plain Regulations
7. Design Controls
 - Design Review Commissions
8. Historic Preservation Laws
 - State Historic Preservation Agencies
 - Local Historic Preservation Commissions
9. Protective Covenants
10. Highway access regulations
 - Federal DOT
 - State DOT
11. Storm water discharge regulations
12. Site Easements
13. Hazardous Materials regulations
 - a. Asbestos

- b. PCB's
 - c. Lead based paint
 - d. Mold (?)
14. Landscape ordinances

D. CONSTRUCTION "DELIVERY" METHOD

- 1. Traditional – Design-Bid-Build - General Contractor
- 2. Negotiated General Contract
- 3. Separate contracts for trades hired by Owner
- 4. Construction Management
- 5. Design-build
Contractor-led
Architect-led
- 6. "Build to Suit"
- 7. Turn-key
- 8. Fast track or "Scope"

E. PEOPLE INVOLVED IN CONSTRUCTION PROJECT

- 1. Owner
- 2. Real Estate Consultant/Agent
- 3. Financial Agent
- 4. Construction Consultant
- 5. Architect

6. Engineer(s): Civil, Structural, Mechanical, Electrical, Fire Protection, Refrigeration, Acoustical, Geotechnical
7. Interior Designer
8. Landscape Architect
9. Builder

F. ARCHITECTS' ROLES WITHIN A TYPICAL ARCHITECTURAL OFFICE


1. Principals, partners or officers
2. Project architect / studio head
3. Project manager
4. Project designer
5. Technical coordinator / job captain
6. Production team
CADD Drafter
7. Specifications writer
8. Cost estimator
9. Architect's Representative (construction observer)
10. Other roles within a typical architectural office
 - a. Marketing specialist
 - b. Computer Manager or Information Technology Manager
 - c. Accounting - bookkeeper
 - d. Receptionist
 - e. Librarian/Archivist
 - f. Intern

- g. Documents Manager
- h. Clerk of the Works (obsolete in most states)

G. PROJECT MANAGEMENT

1. Become aware of, and pursue new work
2. Analyze effort and personnel needed for a project
 - a. Historical experience with other projects of similar type
 - b. Sheet count method
 - c. Rule of thumb method (% of construction cost & work backwards)
 - d. Time computation method – break project down into many small tasks and figure how many hours it would take for each and how much you would pay a person per hour to do that task
3. Calculate fees based on one or more of the methods outlined above
4. Make a proposal and negotiate an agreement with Owner
5. Prepare Agreements between Owner and Architect (B141 or B151)
 - first published 1888 by the American Institute of Architects (AIA) – current edition is 1997
 - B141 is a two-part form, B151 is former B141, single form.

[review [B141 Part 1](#) and [B141 Part 2 Agreement Forms](#), [B151 Agreement Form](#) and [G606 Amendment Form](#)]


 - a. Architect's Basic Services
 - Schematic Design
 - Design Development
 - Construction Documents
 - Administration of the Construction Contract
 - Cost estimates
 - Structural, Mechanical, Electrical, Plumbing and Civil engineering

- b. Additional Services
 - 1) Contingent Additional Services
 - 2) Optional Additional Services
- c. Owner's Responsibilities
- d. Construction Cost definition and responsibility
(this is used to determine whether the Architect will need to redesign after bids come in over the budget, and to determine compensation on a project that does not go on to construction, where compensation is calculated as a percentage of construction cost)
- e. Use of Architect's drawings
- f. Mediation, Arbitration and Litigation
- g. Termination and Suspension of services
- h. Payments and Compensation
- i. Other Conditions which could be added to Agreement
 - 1) Limitation of liability to amount paid in fees
 - 2) Dispute resolution methods other than mediation – could name mediator
 - 3) Responsibility for code compliance
 - 4) Schedules
 - 5) Fast track

In order to minimize construction problems and change orders, the Architect's standard practice requires the completion of detailed contract documents (working drawings and specifications) prior to bidding and entering into firm construction contracts. However, the Owner may choose to accelerate the completion of the work so that it is completed in a shorter time period than would normally be required. The Owner understands that if construction or furnishings contracts are let prior to the completion of final working drawings and specifications, there may be increases in cost and change orders

caused by the inability to coordinate Construction Documents, and the inability to make various decisions until after early bids are received and some construction undertaken. The Architect has no responsibility for these increases in cost or change orders.

- 6) Completion of services requirement
 - 7) Deviations from the construction documents
6. Schedule project within office
 7. Hire consultants
[\[review C141\]](#)
 8. Hire architects
 9. Assign personnel to project
 10. Periodically check progress in house
 11. Purchase special equipment or insurance which may be necessary
 12. Prepare and update office personnel manual

H. FACILITIES AND OTHER OVERHEAD ITEMS

1. Office Space
2. Utilities (telephone, Internet service, power, heating, air conditioning)
3. Equipment (work tables, desks, lights, book shelves, telephones, photocopy, fax, computers, printers, software, digital camera)
4. Technical library
5. Automobiles
6. Supplies

7. Insurance
 - a. General Liability
 - b. Professional Liability
 - c. Workers' Compensation
 - d. Office Contents Insurance
 - e. Automobile insurance
 - f. Disability insurance
 - g. Health insurance
 - h. Key man life (Partners)
 - i. Important Papers Insurance

I. RECORDS

1. Job Numbers
 - a. Whenever it is necessary to spend time on a new project whether it is only for making a proposal, or even a non-billable type of project, a job number should be opened. This facilitates storage of records and allows future analysis of time spent on various types of activities in the office.
 - b. Job numbers are six digit numbers beginning with the four digits of the year in which the job was first worked on, e.g., "200401." For archival purposes, all six digits should always be used, since job numbers would repeat every ten years if they are not. The last two digits are the sequential numbering of the projects, beginning with 01 for the first and allowing up to 99 projects.
2. General Office Records
 - a. Standard AIA documents (blanks) – note that more firms are subscribing to AIA's electronic documents service – cost is about \$500 per year for unlimited use, or *al a carte* at about \$0.75 per "unit" of use – for instance, a B151 Owner-Architect Agreement is about 30 units

- b. Blank time card forms
 - c. Blank travel reimbursement forms
 - d. Supplies catalogues
 - e. Job Applicants forms
 - f. General Promotional files
 - g. Photographs and slides of past projects
 - h. Leads for promotion
 - i. Promotional brochure originals
3. Financial files
- a. Financial files are stored in chronological order by job number, and contain the signed contract and any changes, and all invoices and statements.
 - b. Invoices and Statements are numbered with a six digit number, beginning with the four digits of the year. The last two digits are the sequential number of the invoice, starting with the first of the year with 01.
 - c. Other financial records which will be filed for the firm are the following:
 - 1) Accounts payable
 - 2) Accounts receivable
 - 3) Bills Paid
 - 4) Chronological Records of Invoices
 - 5) Reimbursable expenses summary sheets and other records
 - 6) Corporation Records (certificates, FEIN #, licenses, etc.)
 - 7) Insurance records
 - 8) Insurance Certificates
 - 9) Payroll Taxes
 - 10) Retailer's Resale license
 - 11) Time Cards
 - 12) Historic Financial Data
 - 13) Checks (blank)
 - 14) Checks (reconciled)
 - 15) W2's
 - 16) 1099's
4. Job Records:
- a. All paper records should be stored in a central file under the job number for the life of the project in the office. Avoid duplication of files. Every job should be provided with at least one regular sized or 3" wide Pendaflex suspension folder labeled with the six digit job number in the upper left

hand corner of the tab and the job name. The following is a list of types of records which may be stored in this Pendaflex folder. If the project warrants it, several individual manila file folders may be used for each of these categories. Every manila folder used in the file should have the four digit job number in the upper left corner of the tab and the name of the job and filing sub-category also on the tab. The following list is the preferred order for filing:

- 1) Job correspondence originals filed in chronological order
- 2) Project schedules
- 3) Job Meeting Memoranda
- 4) Code Analysis
- 5) Fire and Life Safety Analysis
- 6) Elevator analysis
- 7) Energy analysis
- 8) Lighting Report
- 9) Acoustical Report
- 10) Other Misc. consultant's reports
- 11) Outline specifications
- 12) Testing procedures specifications (surveys, subsoil tests)
- 13) Subsoil investigation reports
- 14) Project specifications originals
- 15) Addenda
- 16) Calculations (structural, MEP, etc.)
- 17) Pre-condition survey information
- 18) Pre-bid meeting memoranda
- 19) Contractor's proposals
- 20) Bid matrices
- 21) Bulletins
- 22) RFIs (Requests for Information)
- 23) Change Orders
- 24) Construction Meeting Memoranda
- 25) Field reports
- 26) Submittals and submittal log
- 27) Statements of Application
- 28) Guarantees
- 29) Maintenance Instructions
- 30) Punch List Originals
- 31) Concrete, soils, steel, etc. construction testing reports
- 32) Mechanical balancing test reports and system commissioning information
- 33) Post-occupancy evaluation report
- 34) Litigation records

- b. Computerized documents (other than drawings)
- 1) There shall be one original copy and a backup copy of every computer file used on active projects.
 - 2) Hard disks in the computer should not be used for long term storage of computer files. They shall contain only software programs and files in progress.
 - 3) Back up of files in progress shall be made on CD's daily and shall be stored in dust-proof "Backup" storage boxes according to project number. Backup files shall be used only in cases where the original file has been damaged.
- c. Drawings
- 1) The following information is based on *CAD Layer Guidelines*, Second Edition, Michael K. Schley, ed., published in 1997 by the American Institute of Architects in Washington, D.C.:

All drawings which are created must be assigned a sheet number. The sheet number is also the drawing file name. Every project will likely have the same drawing names and thus the same file names. This can be confusing if you are working on more than one project (which is typical), so you have to be careful that you do not use a drawing from one project and save it over the same name in another project. You can easily separate drawings for different projects by saving them to a different folder for each job.

The first letter of a sheet number indicates the discipline name. Thus, a typical drawing sheet number would look like this: A101. This would be the first architectural drawing sheet, usually the site plan or the basement floor plan. Sheets should be numbered consecutively within a series from 01 to 99. The sheet number should appear in the lower left corner of the drawing.

Sheets in a bound set should be organized in the following sequence:

C = Civil

L = Landscape

A = Architectural

S = Structural

M = Mechanical

P = Plumbing

Q=Equipment (freezers, refrigerators, etc.: premanufactured items that are built-in and need to be connected to water, sewer, electricity or gas)

F = Fire Protection (fire sprinklers, standpipes, fire extinguishers)

E = Electrical (power and lighting)

T = Telecommunications (telephone, cctv, cable, wired computer network, intercom, sound, and security)

I = Interior Furnishings

Drawing numbering sequence is as follows:

100 series: plans and reflected ceiling plans (plotted at $1/4" = 1'-0"$ or $1/8" = 1'-0"$ scale)

200 series: elevations (plotted at $1/4" = 1'-0"$ or $1/8" = 1'-0"$ scale)

300 series: sections (plotted at $1/4" = 1'-0"$ or $1/8" = 1'-0"$ scale)

400 series: large scale "blown up" plans, elevations and sections (usually plotted at $1/4" = 1'-0"$, $1/2" = 1'-0"$ or $3/4" = 1'-0"$ scale)

500 series: details (plotted at $3/4" = 1'-0"$, $1\ 1/2" = 1'-0"$, $3" = 1'-0"$ scale, half size or full size)

600 series: schedules and diagrams (no scale)

- 2) Current project originals of active jobs should be stored in flat files in the drawer(s) designated for the project.
- 3) Printed copies of originals of active jobs for record purposes shall also be stored in the flat files.
- 4) Topographic drawings, shop drawings, etc. too large to fit into the central file, shall be stored in the flat files.

d. Computerized drawings

- 1) Drawings shall be kept in folders on the computer corresponding to job number and name. Thus, a drawing file number could look like this:

C:\200303 Alpha Delta Phi Fraternity\Drawings\Design\A101.DWG

This number indicates that the job number is 200303 (i.e. the 3rd job in the year 2003), the phase of the project is design, discipline is Architectural, and the sheet number in series is number 101. Plotted drawing would be numbered A101.

- 2) Drawings shall be created and edited on the computer fixed disk, with backup stored on CD-Rom disks. At end of the day, each drawing

created or edited is copied from the fixed disk to CD-Rom. Each CD-Rom is given the date copied from the hard drive.

- e. Models and color and material sample boards.
 - f. Special items used for projects are stored during their currency in the studio. After the project is completed, they shall be placed in archival storage or returned to the Owner.
 - g. Photographs
 - h. Job photographs taken prior to design and during construction should be labeled and stored with the written documents in the central file.
 - i. Promotional photographs shall be stored in the photograph drawer of the promotional file cabinet.
 - 1) Slides shall be labeled with name of project and other pertinent information.
 - 2) Photographs shall be placed in a sheet protector with label on back, and filed in a manila folder with the name of the job on it.
5. Archive procedures
- a. When the job is complete and all contractual obligations have been satisfied, or when the project has been terminated for any reason, the documents should be archived.
 - b. Hard copy documents in the central file should be put into transfer containers in the next available open space. Each transfer case shall receive a sequential number and the location of this case shall be recorded in the job database for future access. The cases may be located in offsite storage.
 - c. All computerized files for a project (originals of drawings and written documents) shall be “backed up” onto CD-Rom disks. The disks shall be stored in sequential order along with all other disks in the dust-proof storage boxes in the computer disk storage area of the office.
 - d. Drawings shall be rolled into reasonably sized rolls and placed in brown paper wrappers and labeled on the outside with the number and name of the job. Each drawing roll shall receive a sequential number and the location of this roll shall be recorded in the job database for future access.

The rolls may be located in offsite storage.

J. PRELIMINARY WORK: ZONING ORDINANCE ANALYSIS

1. Contact the city zoning authority in area of jurisdiction where building will be built. Make contact with responsible persons and meet to introduce the project.
2. Analyze zoning requirements
 - a. Building use restrictions
 - b. Maximum building area
 - c. Maximum height
 - d. Maximum building bulk (Floor Area Ratio – “FAR”)
 - e. Set back requirements
 - f. Parking requirements
 - g. Accessible Parking Requirements
 - h. Loading dock requirements
 - i. Signs

K. PRELIMINARY WORK: BUILDING CODE ANALYSIS

1. Contact the city building department and state code authorities in area of jurisdiction where building will be built. Make contact with responsible persons and meet to introduce the project.
2. Determine construction type based on programmed area and assumed height of building. (following is from IBC)

Type I: Fire resistive: concrete or fireproofed steel

Type II: Non-combustible: concrete or steel, fireproofed or not, depending on level of protection required

Type III: Combustible: concrete, masonry, steel or wood, fireproofed or not depending on level of protection required (normally "ordinary" construction, wood joists and rafters with masonry bearing walls)

Type IV: Heavy timber, minimum sizes of beams and decks, no concealed members; non-combustible exterior wall

Type V: Combustible: normally wood frame construction

3. Determine height and area limitations based on construction type selected.
4. List fire resistance ratings for all structural and building elements.
5. List use group classification (building occupancy type).
6. Calculate building population based on code requirements.
7. Determine exit requirements based on required width of each type of exit element calculated using the number of occupants each element will serve.
 - a. Main exit width.
 - b. Maximum travel distance to exits.
 - c. Minimum number of exits for each area of the building as well as the building itself.
 - d. Building compartmentalization requirements, for horizontal exits, high rises, or fire separation demising walls.

8. Corridors

- a. No dead end corridors longer than 20 feet
- b. Maximum of 100 feet travel distance to at least one exit from every room
- c. Maximum of 150 feet travel distance to at least one exit from every point

9. Stairs

- a. Exit stairs must exit directly to outside
- b. Stair locations.
- c. Stair widths based on population served by each stair.
- d. Stair tread and riser requirements and proportions.
- e. Stair railings
 - 1) Size: Stairs should be min. 44" wide by model codes. (Note that ADA requires a 48" wide stair in non-sprinklered buildings where there is an area of rescue assistance).
 - 2) Structural requirements
 - 3) Return to walls
 - 4) Extension requirements
 - 5) Height
 - 6) Encroachment into stair width allowance
- f. Door encroachment allowance onto stair landings.

10. Ramps

- a. Maximum slope and run.
- b. Minimum width.

- c. Railings
 - d. Landings
11. Doors.
 - a. Door swing direction
 - b. Minimum width
 - c. Door ratings
 - d. Special hardware requirements (panic hardware, knurled handles, closers).
 12. Fire resistive requirements.
 13. Occupancy separation.
 14. Maximum area.
 15. Fire wall requirements.
 16. Fire ratings on special walls, doors and windows.
 17. Flame spread requirements.
 18. Fire protection requirements.
 - a. Sprinkler requirements, spacing of heads, water supply.
 - b. Standpipe requirements, spacing, design, water supply.
 - c. Fire extinguishers.
 19. Fire alarm system.
 - a. Smoke detection system.
 - b. Heat detection system.
 20. Smoke purge or evacuation ventilation system.
 21. Light and ventilation requirements

- a. Natural light and ventilation requirements
- b. Mechanical ventilation requirements
- 22. Emergency power supply requirements.
- 23. Exit sign lighting.
- 24. Emergency lighting system.
- 25. Mechanical ventilation requirements.
- 26. Plumbing fixture requirements.
 - a. Number of WC's, urinals, and lavatories required (from plumbing code).
 - b. Accessible toilet stall requirements.
 - c. Water fountain requirements (from plumbing code)
- 27. OSHA (Occupational Safety and Health Administration) requirements.
 - a. Stairs (Width, slope, railings, landings, toe plates).
 - b. Ramps (width, slopes, railings)
 - c. Balconies and openings in floors (railings).
 - d. Ladders.
- 28. Safety glazing requirements for human impact loading.

L. PRELIMINARY WORK: ACCESSIBILITY ANALYSIS

1. Based on the Americans with Disabilities Act Guidelines (1991)
2. 30" x 48" areas of rescue assistance (spaces for wheelchairs) in at least one exit stair landing at the upper floors. Provide one space for every 200 people on a floor. Increase stair width serving these areas to 48." Note that if building is provided with a supervised fire sprinkler system, you do not have to provide these areas.
3. Where there is a change in level, provide a ramp with maximum 1:12 slope. Provide landings every 30 linear feet of ramp length. Provide railings on both sides of every ramp with handrail extensions at top and bottom.
4. All landings on ramps are 60" long. Where ramp makes a 90 degree turn, make sure landings are 60" square.
5. Provide min. 18" wall space on latch side of doors.
6. Minimum door width: 36" (32" clear plus stops, door thickness and hinge offset)
7. Provide one 5' x 5' toilet stall along with a 5' diameter turning area in each toilet room.
8. Accessible parking stalls should be shown 12 feet wide. By ADA requirements 1 in 8 stalls have to be 16 feet wide for van parking.

M. PRELIMINARY WORK: FIRE AND LIFE SAFETY ANALYSIS

1. More than code requirements
2. Analyze how people can safely exit in an emergency
3. Determine method of alerting authorities of an emergency
4. Smoke evacuation systems
5. Integrated alarm systems
6. Property protection systems

N. PRELIMINARY WORK: OUTLINE SPECIFICATIONS

1. Project program
2. List of room or space areas and adjacencies
3. Functional grouping
4. Owner constraints
5. Governmental constraints
6. Site restrictions
7. Site work
8. Selective demolition
9. Clearing and grubbing
10. Water system
11. Site sanitary and storm sewage system
12. Site Power
 - a. Transformers
 - b. Underground or aerial service
13. Site telephone
14. Grading and surface drainage
15. Site retaining walls and other structures
16. Driveways and parking lots
17. Paving
18. Site lighting

19. Landscaping
20. Signage
21. Structure
 - a. Standards to be used
 - b. Design criteria
 - c. Foundation design
 - d. Superstructure and framing system
 - e. Fireproofing of structural elements
22. Exterior walls
 - a. Wall material and backup
 - b. Insulation
 - c. Windows
 - d. Entrance doors
 - e. Service doors
 - f. Finishes
 - g. Penthouse walls and/or visual screens
 - h. Testing program
 - i. Maintenance program, including window washing
23. Roofs
 - a. Slope
 - b. Deck material
 - c. Roofing material

- d. Insulation
 - e. Skylights
 - f. Balconies
 - g. Mechanical room waterproofing
 - h. Below grade waterproofing
 - i. Testing program
 - j. Maintenance program
24. Interior finishes
- a. Floors (by area)
 - b. Base (by area)
 - c. Walls (by area)
 - d. Ceilings (by area)
 - e. Window treatment
 - f. Stairs types and finishes
25. Special equipment or furnishings
- a. Auditorium chairs or other systems
 - b. Kitchen equipment
 - c. Library equipment
 - d. Laboratory equipment
 - e. Executive areas
26. Conveying systems
- a. Elevators

- b. Dumbwaiters
 - c. Escalators
 - d. Automatic delivery systems
 - e. Mail chutes
 - f. Load levelers
27. Furnishings
- a. Custom furniture and millwork
 - b. Standard furniture
28. Heating, Ventilating and Air conditioning
- a. Standards to be used
 - b. Design criteria
 - c. Heating system
 - d. Air conditioning and refrigeration system
 - e. Air distribution
 - f. Toilet exhaust
 - g. Control system
29. Plumbing
- a. Domestic water system
 - b. Piping
 - c. Pumps
 - d. Hot water heater
 - e. Roof drainage system

- f. Sanitary drainage system
- g. Plumbing fixtures
 - 1) Water closets
 - 2) Urinals
 - 3) Showers
 - 4) Tubs
 - 5) Mop basins
 - 6) Slop sinks
 - 7) Sinks
 - 8) Lavatories
 - 9) Drinking fountains and water coolers
- 30. Fire protection system
 - a. Sprinklers
 - b. Standpipe and hose cabinets
 - c. Pumps
 - d. Fire extinguishers
- 31. Electrical
 - a. Power
 - b. Lighting
 - c. Fire alarms
- 32. Telephone and communications
 - a. Telephone systems

- b. Security systems
 - c. Intercom and P/A systems
 - 33. Lightning protection systems
- O. Construction Documents (also known as "Contract Documents," or at some stage "Bid Documents.")
- 1. What Contract Documents are used for:
 - a. Bidding
 - b. Contract preparation
 - c. Construction
 - d. Permits
 - e. Appraising and financing
 - 2. Meaning of the term (contract documents)
 - 3. Items which make them up, traditionally:
 - a. Drawings
 - b. Specifications
 - c. General Conditions
 - d. Supplementary Conditions
 - e. Special Conditions
 - f. Agreement between Owner and Contractor
 - g. Addenda
 - h. Change Orders

4. Who prepares Contract Documents
 - a. What Licensing laws require
 - b. Architect and his consultants
 - c. Structural Engineer
 - 1) Structural engineers are "exempt" from architectural act in Illinois
 - 2) Structural engineers are permitted to "stamp" drawings after their review in Illinois
 - d. "Spec. writer" (typically for housing rehab; does not usually fall under architectural act, unless Environmental Barriers Act is triggered)
 - e. Owner
 - f. Interior designer
 - g. Interior Decorator
 - h. Space Planner/Facilities Manager
 - i. Landscape Architect
 - j. Contractor (shop drawings)
 - k. Supplier (shop drawings)
5. What are "scope" documents?
 - a. Used in "fast track" projects
 - b. Ultimately become complete contract documents
6. What are "construction" documents, and "bid" documents
7. Need for accuracy and completeness
8. Legal liabilities of person who prepares contract documents
9. Time required to prepare them

10. Quality assurance issues in preparation and in use
 - a. Errors
 - b. Omissions
 - c. Assignment of responsibility for errors and omissions
 - d. Design change
 - 1) Construction or building related
 - 2) Owner requested
 - 3) Required design change (error which causes additional work)
11. The use of a contractor's proposal as contract documents (not permitted)
12. The use of contract documents in monitoring the Work during construction.
13. Perfection of performance under contract documents

P. DRAWINGS

[review typical set of drawings]

Q. PROJECT MANUAL

[review project manual example]

1. Index of Documents
2. List of Drawings
3. Invitation to Bid
4. Instructions to Bidders
5. General Conditions (A201) – first published in 1911 – the current edition is from 1997 and is the 15th edition
[review A201]
 - a. Definitions

- b. Owner's responsibilities
- c. Owner's Right to stop work
- d. Contractor's responsibilities
 - 1) Review of Contract Documents and Field Conditions
 - 2) Supervision
 - 3) Labor and Materials
 - 4) Warranties
 - 5) Taxes
 - 6) Permits
 - 7) Allowances
 - 8) Construction Schedules
 - 9) Documents and Samples
 - 10) Cutting and Patching
 - 11) Cleaning up
 - 12) Indemnification
- e. Architect's Responsibilities
 - 1) Administration of the Construction Contract
- f. Claims and disputes
 - 1) Mediation
 - 2) Arbitration
- g. Subcontractors
- h. Construction by Owner

- i. Changes
 - j. Time
 - k. Payments
 - l. Partial Occupancy and Use
 - m. Final Completion
 - n. Safety
 - o. Insurance and Bonds
 - p. Correction of the Work
 - q. Termination
6. Supplementary Conditions (also “Special Conditions”)
[review Supplementary Conditions example]
7. Forms
- a. Form of Contract (A101)
[review A101]
 - b. Guarantee form
 - c. Certificate of Insurance form
[review Certificate of Insurance Form]

8. Technical Specifications

[review specifications section example]

a. CSI Format

- in existence in 16 division format since 1964
- MasterFormat 04 to be published in the Fall of 2004

- **Division 01: General Requirements**
- **Division 02: Existing Conditions** (*formerly Site Work – moved to divisions 31, 32 and 33*)
- **Division 03: Concrete**
- **Division 04: Masonry**
- **Division 05: Steel**
- **Division 06: Wood**
- **Division 07: Roofing & Insulation**
- **Division 08: Doors and Windows**
- **Division 09: Finishes** (*interior finishes*)
- **Division 10: Specialties** (*for example, signs, toilet accessories*)
- **Division 11: Equipment** (*for example, kitchen equipment*)
- **Division 12: Furniture**
- **Division 13: Special Construction** (*for example, greenhouses*)
- **Division 14: Conveying Equipment** (*elevators, escalators, lifts*)
- **Division 15: Mechanical and Plumbing** (*this division is deleted and moved to divisions 21, 22, and 23*)
- **Division 16: Electrical** (*this division is deleted and moved to divisions 26, 27 and 28*)

- **Division 21: Fire Suppression** (*blue colored divisions identify new or relocated divisions under MasterFormat 04*)
 - **Division 22: Plumbing** (formerly Division 15)
 - **Division 23: Heating, Ventilating and Air Conditioning** (formerly Division 15)
 - **Division 26: Electrical** (formerly Division 16)
 - **Division 27: Communications** (formerly Division 16)
 - **Division 28: Electronic Safety and Security** (formerly Division 16)
 - **Division 31: Earthwork** (formerly Division 02)
 - **Division 32: Exterior Improvements** (formerly Division 02)
 - **Division 33: Utilities** (formerly Division 02)
- b. Materials research
- c. Check on product availability
- d. Check on product accessibility

R. COST ESTIMATE

1. UniFormat organization for cost estimates:
 - 1 - Foundations
 - 2 - Substructures
 - 3 - Superstructure
 - 4 - Exterior Closure
 - 5 - Roofing
 - 6 - Interior Construction

- 7 - Conveying
 - 8 - Mechanical
 - 9 - Electrical
 - 10 - General Conditions (insurance, bonds, unemployment taxes, overtime, professional services, schedules
 - 11 - Specialties (Furniture, millwork)
 - 12 - Site work
2. Provide estimates at various stages of the project
 3. Owner may require redraw at Architect's expense if bids come in over budget

S. QUALITY ASSURANCE AND DOCUMENT CHECKING

T. BIDDING AND NEGOTIATION

1. Prepare "bid documents"
2. Invitation to bid
[review Invitation to Bid example]
3. Advertisement for bids
4. DodgeScan reports
5. Addenda
[review example of an addendum]
6. Questions during bidding
7. Pre-bid conference(s)
8. Bid bonds -- necessity for most public work
9. Bid due date and time

10. Bid opening -- public or private
11. Bid analysis
12. Bulletins (after bidding and prior to contract being signed)
13. Negotiation for price
14. Recommendation and selection of contractor -- architect's responsibility
15. Insurance certificate
[review Certificate of Insurance Example]
16. Building permit
17. Schedule of values
18. Substitutions
19. Contractors list of sub-contractors -- approval by architect
20. Contractor's sworn statement
21. Recapitulation of work to be done not allowed
22. Errors in contract documents
23. Pre-construction meeting
[review pre-construction meeting example]
24. Unit prices
25. Changes to contract after signing contract
 - a. Request change proposals from contractor
[review change proposal form]
 - b. Analyze change order proposal
 - c. Negotiate for price
 - d. Recommend change to Owner

- e. Prepare Change Order forms -- Owner, Architect and Contractor to sign
[review change order form]

U. MONITORING CONSTRUCTION ACTIVITIES

1. Types of construction projects
 - a. Traditional Design-Bid-Build (General Contractor)
 - b. Separate contracts
 - c. Design-build (Contractor or Architect led)
 - d. Turn-key
 - e. Fast track
 - f. Scope
2. Construction scheduling methods
 - a. Bar chart
[review project schedule bar chart]
 - b. CPM (critical path method)
[review project schedule critical path chart]
 - c. Software: Primavera *SureTrac* or Microsoft *Project*
3. Architect's role during construction
 - a. Owner's agent
 - b. Impartial judge of performance of both Owner and Contractor under terms of Construction Contract
4. Architect's normal tasks during construction
 - a. Organize and lead pre-construction meeting
[review pre-construction meeting agenda]

- 1) Introduce of key members of teams.
- 2) Review status of contract.
- 3) Request Performance and Labor and Material Payment Bond.
- 4) Request Certificate of Insurance and indemnifications.
- 5) Schedule weekly job meetings.
- 6) Outline communication procedures.
- 7) Request job schedule.
- 8) Outline payment requests and payout procedures.
- 9) Discuss location for temporary office, water, power, lighting, telephone, sewer & toilet facilities.
- 10) Discuss working hours.
- 11) Discuss deliveries and storage.
- 12) Discuss safety of the public.
- 13) Cold weather protection.
- 14) Request submittal schedule.
- 15) Discuss substitution procedures.
- 16) Discuss submittal procedures.
- 17) Note special items for early submittal:
 - i. Brick samples
 - ii. Custom metal color samples
 - iii. Door shop drawings
 - iv. Hardware Schedule
 - v. Windows, shop drawings & custom color samples
 - vi. Millwork shop drawings
 - vii. Color stain samples for millwork, doors, and trim
 - viii. Furniture & Equipment submittals
 - ix. Ductwork shop drawings

- 18) Note known long lead items: special angled corner bricks, doors, hardware, windows, glass, imported stone.
 - 19) Schedule pre-construction meetings on special work:
 - a) Masonry
 - b) Roofing
 - c) Ceramic tile
 - 20) Discuss modifications, proposals, and change order procedures.
 - 21) Explain final inspection and job close-out procedures
- b. Organize and lead regular job meetings and write job meeting memoranda
 - c. Provide supplemental information to Contractor
 - d. Interpret and enforce Contract Documents
 - e. Periodically observe progress of construction and write observation memoranda
 - f. Review work for compliance with Contract Documents
 - g. Organize and monitor Owner's testing program for concrete, soils, steel, fasteners, etc.
 - h. Review and certify pay requests from general contractor
[review pay request form]
 - i. Review partial release of liens from general contractor, subcontractors, and major material suppliers
[review waiver of lien]
 - j. Monitor Contractor-prepared construction schedule
 - k. Review shop drawings, samples, mock-ups, technical literature and other submittals from Contractor
 - l. Prepare drawings and all other necessary information for change orders as required – issue Certificate of Substantial Completion
[review Certificate of Substantial Completion]

- m. Make final inspection and prepare punch list
 - n. Prepare documents for final acceptance and close-out
 - o. HVAC Commissioning
5. Post-construction occupancy evaluation
 6. How often to inspect -- "periodically" usually interpreted as once a week
 7. Construction means and methods
 8. "Stopping the work"
 9. Who to talk to if you see a problem
 10. Field memoranda and records
 11. Avoiding field changes
 12. "Keep a civil tongue"
 13. Contractors like to hear nice things too
 14. Keeping up the morale of the construction crew
 15. Monitoring time schedules: using gentle persuasion
 16. Requiring work to be uncovered
 17. Requiring work to be taken down or redone
 18. Trade jurisdiction disputes
 19. Coordinating with other inspectors (city, lender, state, user, OSHA)
 20. Safety measures on the job site
 21. Cleanliness on the job site

END OF OUTLINE "CONSTRUCTION DOCUMENTS AND SERVICES"