



Construction Documents and Services Study Notes

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Notes and References based on:

Kaplan 2011 Study Guide

ARE Review Manual Second Edition

AIA Sample Contract Documents provided though NCARB website

PLEASE NOTE: (my hold harmless clause) 😊

These study notes reflect what I thought was important to retain from the references.

These study notes are not intended to replace or supersede any study aid book available.

These study notes are to be used as reference only, they do not guarantee a “PASS” grade for the Construction Document and Services NCARB exam.

There may be errors and omissions within the document, so do verify.

Not intended for sale.

- **Acronyms**

TQM	Total quality management
PNC	Preferred Noise Criteria: level of outside noise tolerable by a receiver
STC	Sound Transmission Class: deals with airborne sound impact on floors and walls
IIC	Impact Isolation Class: deals with sound isolation impact on floors and ceilings
NRC	Noise Reduction Coefficient: compares absorptive capabilities of acoustical materials
ICC	International Code Council
IBC	International Building Code
UBC	Uniform Building Code
BOCA	Building Officials and Code Administrators International
SBCCI	Southern Building Code Congress International
NFPA	National Fire Protection Association
ASTM	American Society for Testing Materials
ANSI	American National Standards Institute
ADA	American with Disabilities Act
LEED	Leadership in Energy and Environment Design
ASHRAE	American Society of Heating, Refrigeration, and Air Conditioning Engineers
IDM	Initial Decision Maker
ADR	Alternate Dispute Resolution
OSHA	Occupational Safety and Health Act
GMP	Guaranteed Maximum Price
CSI	Construction Specification Institute
AAA	American Arbitration Association
FF&E	Furniture, Furnishings, and Equipment
AHJ	Authority Having Jurisdiction – submits to AHJ for the issue of a building permit

- **AIA Series List**

- A series – O/C**

- A101** – Standard Form of Agreement between Owner and Contractor- Stipulated Sum

- A201** – General Conditions of the Contract for Constructions

- A305** – Contractor’s Qualification Statement

- A310** – Bid Bond

- A312** – Performance and Payment Bond

- A511** – Guide for Supplementary Conditions

- A701** – Instruction to Bidders

- B series – O/A**

- B101** – Standard Form of Agreement between Owner and Architect

- B101 exhibit A** – Initial Information

- C series – A/Ct**

- C 401-** Standard Form of Agreement between Architect and Consultant

- D series – A/industry**

- D101-** Methods of Calculations the Area and Volume of buildings

E series – digital data**E201- Digital Data Protocol exhibit****G series – A/off & project forms**

G602 – Geotechnical Services Agreement – it is used by the owner to request a proposal from a geotechnical engineer for geotechnical services. If the proposal is acceptable, this document can be used as the basis for an agreement between the owner and the engineer for both pre-construction and construction services.

G612 – Owner’s Instruction to Architect – assist the architect in dealing with the owner on matters of insurance, and documents the owner’s instruction about insurance coverages and limits. It is in a checklist format and it can be used by the owner and the owner’s insurance agent to decide which bonds and insurance will be required, as well as the limits of coverage.

G701 – Change Order– See definition

G702 – Application and Certificate for Payment – identifies the project and parties, and summarizes the status of payment under the contract

G703 – Continuation Sheet – it is a continuation sheet for G702. Used by the contractor to provide a detailed breakdown of the various component of the work and the scheduled value for each component for which payment request is made

G704 – Certificate of Substantial Completion – See definition

G705 – List of Subcontractors – filed by the contractor to the architect. It records the various subcontractors performing work on the project

G706 – Contractor’s Affidavit of payment of debts and claims – see Party Responsibilities

G706 A – Contractor’s Affidavit of release of liens – see Party Responsibilities

G707- Consent of surety to final payment – see Party Responsibilities

G707 A – Consent of surety to reduction in or partial release of retainage – see Party Responsibilities

G709 – Proposal Request – used by the architect to outline the work anticipated for a change order

G710 – Architect’s Supplemental Instructions – enable the architect to order minor modifications to the work not affecting contract time or contract sum

G711 – Architect’s Field Report – used to inform the owner and contractor of the architect’s observation at the site

G712 – Shop Drawing and Sample Record - used by the architect to document the receipt and return of submittals

G714 – Construction Change Directive– See definition

G715 – Supplemental attachment for Accord Certificate of Insurance – See Insurance

G804 – Register of Bid Documents – used by the architect to list information about bid deposit, lists who received a bid set to facilitate addenda distribution

G807 – Project Directory – used by the architect as a format for information about the architect staff, consultants, and contractors hired by the owner

G809 – Project Data – used by the architect to record basic information about a project, such as project location

G810 – Transmittal Letter – used by the architect to record what was sent to whom and when it was sent

- **DEFINITIONS**

- **Fiduciary:** party to whom another party entrust property for safe keeping.
- **Indemnification:** also called Hold Harmless Clause, is a contractual obligation whereby one party agrees to guarantee another party against loss or damage from specified liabilities.
- **Schedule of Values:** a statement furnished to the architect by the contractor reflecting the amounts to be allotted for the principal divisions of the work. It serves as a guide for reviewing the contractor’s periodic applications for payment.
- **Record Drawing:** they show field changes that occurred during construction, which may vary from the information shown in the working drawings. They are not as-built drawings. A201 does not cover the preparation of record drawings, if they are required, generally by the owner; the procedures are usually indicated in Division 01 of the specifications. Field changes should be recorded by the contractor on a set of

record prints at the site. These notations should be transferred onto a permanent reproducible medium by the contractor. If the owner wants the architect to do it, it will be considered a Change in Services.

- **Substantial Completion:** according to A201 – it is the stage in the work when the work or designated portion of the work is sufficiently complete in accordance with the contract document so that the owner can occupy or utilize the work for its intended use.
 - Procedure:
 - The contractor decides the point of substantial completion and is required to prepare a punch list that identifies all the remaining work required by the contract documents, as well as defective and damaged work that must be replaced or repaired. – failure of the contractor to include an item of remaining work on the punch list does not alleviate his/her responsibilities
 - Once the architect receives the punch list, he/she must inspect the work to determine whether it is in fact substantially complete. At that time he architect and owner may add items to the list to be corrected
 - If the architect agrees with the contractor that work is substantially complete, the architect prepares the Certificate of Substantial Completion (see definition)
- **Certificate of Substantial Completion (G704):** a document prepared by the architect stating that the work is substantially complete, thereby establishing the date of substantial completion. It generally fixes the time within which the contractor must complete the unfinished work in the punch list. It also defines the responsibilities of both the owner and contractor for the provision of security, maintenance, heat, utilities, and liabilities for damages to the work, responsibility to provide insurance while the contractor completes the work on the punch list. This document has to be signed by the owner, architect, and contractor.
- **Retainage:** provisions for retainage are normally found in A101. It is the process by which the owner withholds money from the contractor as protection against the contractor's potential failure to complete the work according to the contract documents. It can also be used by the contractor's surety company to help pay for completing the work in the event of a default by the contractor. For that reason retainage should not be reduced or released without the written consent of the surety (G707A). If no retainage is stipulated in the contract documents, the owner cannot arbitrarily withhold a part of a payment to the contractor, unless the architect certifies that work is not being properly performed and that the contractor is not entitled to the amount requested in the application for payment.
- **Quality control:** It involves carefully checking the work (a contract, a set of drawings, a design sketch) before it is distributed to the user (owner, contractor, and drafter).
- **Quality Assurance:** it is a supplement to quality control. It requires that in designing, documenting, and constructing a building, the proper resources and scrutiny are applied to each part of the process.
- **Total Quality Management (TQM):** it is developed in response to the limitations of quality assurance. Quality Control + Quality Assurance + All aspects of service → customer satisfaction (the client, the user, the public, and the profession)
- **Statute of Limitations:** an ordinance which specifies the period of time within which legal action must be brought in order to obtain legal relief for damage and injury
- **Liquidated Damages:** It is included in the Owner/Contractor agreement. It is an amount of money stipulated in the contract that is chargeable against the contractor as reimbursement for damages suffered by the owner because of the contractor's failure to fulfill contractual obligations, such as the failure to achieve substantial completion on time or for bonus payments for early completion of the Work. Liquidated damages are not a penalty to be inflicted on the contractor. If liquidated damages are to be assessed

because delayed construction will result in actual loss to the owner, the amount of damage due for each day lost should be provided for in the Supplementary Conditions of the contract.

- **Mechanics' Lien / Lien:** It is a claim against someone's property, not the on the person's other assets. It provides security that labor and materials supplied to construct buildings will be paid in the event of non-payment to those who furnished labor and materials (i.e. subcontractors, and material suppliers). It forces the sale of the owner's property in order to satisfy a claim for payment. Clear title to the property cannot be obtained until the claim is settled. Mechanics' Lien is not permitted on public projects, for that reason, the Miller Act requires labor and material bonds to be acquired by the contractors.

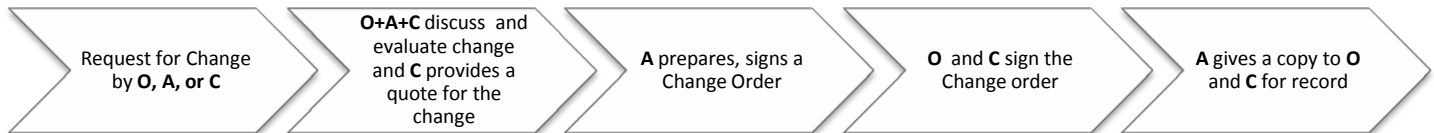
→ In order to protect the owner against mechanics' lien:

1. Retainage: by withholding a small percentage of the money owed to the contractor as the construction progresses, the owner will have funds to pay for labor and materials if the contractor fails to make payments. Retainage should never be reduced or released without the written permission of the surety company. AIA G707A
2. Labor and material bond: the owner may request the contractor to purchase a labor and materials bond, which guarantees payment for labor and materials if the contractor fails to pay them. AIA A312
3. Affidavit and releases of liens: Contractor must submit those in order to get final payment, and in some cases progress payments. AIA G706A

- **Changes in the work:**

→ General Rule: if changes involve additional or reduced cost or time, they must be documented by the issuance of a change order. Other changes, not involving adjustments in cost or time, can be ordered by supplemental instructions – G710.

→ Legend: **O** is the Owner / **A** is the Architect / **C** is the contractor



- The architect may authorize minor changes or modifications in the work that will not affect contract time or contract cost. He/she may also absorb the expense for his/her services as a courtesy to the owner. The architect can use AIA form G710 for that purpose – Architect's Supplemental Instructions.
- In case of major changes, the architect should submit a proposal to the owner for the cost of the additional services anticipated in connection with those changes, before performing them. Upon receipt of the notice, the owner must provide written approval for the architect to proceed.
- In the case where major changes must be performed, the architect is obligated to notify the owner. The owner must give prompt notice if he/she does not want the service performed. If no notice is received, the architect will proceed with the additional service and the owner must pay for the additional services.
- If the contractor refuses to perform a change in the work, because he/she claims that it is outside of the scope of the contract documents, the architect should review the situation with the owner and the owner's attorney
- The architect must keep a record and document all the reasons for changes, and when appropriate provide them to the owner and the contractor
- **Change order and Construction Change Directive:** used to accommodate requirements and conditions not provided for in the contract documents. B101 requires the architect to prepare them for the owner's approval and execution in accordance with the contract documents. The architect has no independent authority to make changes that affect either the contract sum or contract time.

- **Change Order (G701):** a written order to the contractor, prepared by the architect and signed by the owner, contractor, and architect (if A201 requires), which states their agreement upon a change in the Work, the extent of the adjustment, if any, of the Contract Time, and/or the amount of the adjustment, if any, of the Contract Sum. When a change order is agreed to by both the contractor and the owner, it becomes a contract modification.
 - Change orders usually have no effect on the validity of performance and labor and materials payment bond for the project. However, increases in the contract sum may result in increased bond premium costs to the contractor
 - In A312, Surety is not required to be notified when change orders are issued; it is usually the contractor's responsibility to notify the surety.
- **Construction Change Directive (G714):** It is a document prepared by the architect and signed by the owner and architect, which authorizes a change in the Work, the Contract Sum, or Contract Time. In the absence of total agreement on the terms of a change order by the contractor, a construction change directive is used, if the owner still wants to proceed with the change. If the construction change directive is signed by the owner and architect, the contractor is obligated to perform the work described in it. If the contractor approves of the contract time and/or sum for the work requested in the construction change directive he/she must sign it before commencing the work. Once it is signed, it becomes a contract modification. If the contractor is not in agreement with the contract time and/or sum for the work requested in the construction change directive, he/she does not sign, but he/she is obligated to perform the work. In this case, the next step will be for the architect to adjust the contract sum accordingly. - see method below.
 - Methods for adjusting the contract sum:
 1. Base cost on a mutually accepted lump sum
 2. Base cost on agreed Unit prices
 3. Determine cost based on an acceptable fixed or percentage fee
 4. The architect determines cost by monitoring the contractor's actual expenditures of time, materials, and overhead
 - When the owner and contractor still cannot agree on the construction change directive amount found using the different methods to adjust the contract sum, the cost of the work is determined by the architect, using method #4 above. The architect must base his/her determination on the estimate value of the work, plus a reasonable allowance for the contractor's overhead and profit. If the architect's determination is not mutually acceptable, either party may request arbitration. Same procedure applies for determining the change in contract time.
 - When time is of essence, the architect can use a construction change directive to authorize the contractor to proceed immediately even though a change in contract sum and time may result. It must be signed by the owner and later can be signed by the contractor, once he/she approves the proposal for additional time and cost. Once signed by all three the construction change directive will become a change order
- **Alternates:** changes to specific parts of the drawings or specifications that allow an owner to tailor bid proposals to fit the available funds, or to allow choice between alternative materials or equipment. Alternates may be additive (added to the base bid) or deductive(deducted from the base bid)
- **Unit Cost:** cost of the work is determined by unit prices when the quantity of a particular type of work is unknown or varies from that shown in the contract documents. All unit prices should be quoted as either additions to or deletions from the contract.
- **Agent:** someone who is authorized to act on behalf of another party, the principal

- **Negligence:** failure to meet the ordinary standard of care expected of an architect under the same or similar circumstances as those associated with actual allegations of negligence in a specific case
- **Area/Volume Estimate:** it is a type of cost estimating, used primarily during the Schematic Design (SD) phase because of the lack of details available, to determine a preliminary cost estimate based on cost per square foot [area] and cost per cubic foot [volume].
 - **For Example:** (1) calculate the buildings area or volume[10,000sf'], (2) select an appropriate **unit cost** based on the cost of a similar project with about the same square footage, number of stories, etc. [\$20,000.00], (3)include a contingency of 10-20% to the cost[\$4,000.00] = \$ 24,000.00. So at SD, the estimated cost for this 10,000 sf' project is \$24,000.00.
 - **Note:** **Unit Cost** varies in relation to the project's: Size, Perimeter, Height, Number of stories, Site conditions, Type of construction and finish, Mechanical equipment, Time and place of construction (if unfamiliar, seek help)
- **Subsystems Estimate:** it is a type of cost estimating, used when more details become available in a project, usually during the Design Development (DD), and Construction Documents (CD) phase. It deals with a project's functional units or assemblies and enables comparisons between different conceptual solutions during those design phases.
 - **For Example:** Exterior Closure, Foundation, Substructure are some of the major systems found in a construction project. Let's take Exterior Closure which has a subsystem called Exterior Walls. Under Exterior Walls there are also different systems. From the selection, the architect can compare cost, provided in \$/sf', for exterior cladding systems, such as precast concrete and anodized aluminum finish. By adding all the systems found in a typical construction, the architect can make a more detailed cost estimate, and even compare two or more estimates.
- **Detailed Estimate:** it is also called *Quantity and Cost Method / Labor and Material Method*. It is a type of cost estimating that is usually a change in services in respect to the architect, as it requires a more in depth research on cost. For that reason, architects usually hire cost estimating consultants to provide that service. It requires a detailed calculation of the amount of each type of material, and labor necessary to produce the required construction. Costs per unit of material and labor are applied to the calculated quantities to arrive at the total direct cost of the construction work. Indirect costs must also be added.
 - **For Example:** a project needs 20 doors (quantity) and each doors cost \$80.00(unit price) which totals \$1,600.00. The materials necessary to install the doors will cost \$5.00/each = \$100.00 (materials). 4 workers will be needed to install those doors at \$20.00/each = \$80.00. Add all of these amounts to get the total direct cost \$1,780.00 to have 20 doors in a project. To that amount, **indirect cost** must also be added.
 - **Indirect Costs** include:
 - 1) **The contractor's overhead** – insurance, payroll taxes and benefits, general and administrative expenses
 - 2) **General conditions costs** – project signs, drawings and photos, permits, repairs, clean up, engineering surveys and inspections, tests, repairs
 - 3) **Contingency amount** – construction escalation and unforeseen conditions
 - 4) **Contractor's profit** – as a percentage of total direct construction costs
- **Bar Graph Scheduling:** It indicates the starting and finishing dates of major phases of the work. However, it does not indicate the relationship between the sequences of activities or the dependency of an activity on the completion of the previous activity. It is superior to CPM as a means of visual communication, and inferior to CPM as a management tool.

- **CPM – Critical Path Method of Scheduling:** it is a planning and management tool used in construction planning & scheduling. The completed CPM diagram is known as the **network diagram**, which must be continuous, with no gaps or discontinuities. It requires the contractor to analyze the job logically from start to finish far better than any verbal description or *bar graph*. **The most effective method to save on construction time is to reduce the critical path time →reducing critical activities reduces the whole construction schedule.**
 - **Activities:** divide the project into concise tasks
 - **Event:** is a moment when a preceding activity has been completed and the following activity may begin
 - **Milestone events** Important points of the construction process
 - **Interface events:** events common to two separate network diagrams
 - **Path:** a diagram has several paths, from start to finish, and each has a varying total time duration
 - **Critical Path:** the total project time established by the path with the longest total required time. Usually shown as a heavy line.
 - **Critical activities:** activities along the critical path. If a critical activity is delayed, it will delay the completion of the project.
 - **Float paths:** all paths in the network, other than the critical path. It is the difference between the critical path and any other path. It is a measure of the extra time available for an activity or group of activities. This extra time allows for delays to occur in one or more activities along the path. As long as the float time is not exceeded, no delay in project completion time will result
 - **Contingencies** : provide allowance for project delays caused by weather or other unforeseen events
 - To convert activity time working days into Calendar Days, multiply the working days by 7 and divide by 5

Components of a Network Diagram:

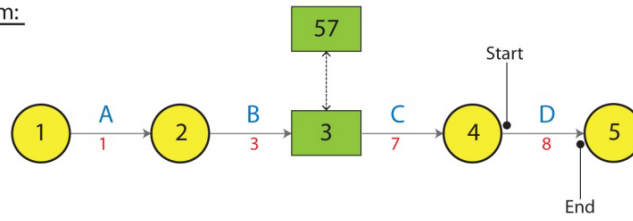
② Events OR Nodes

■ Interface Events

Letter Activity

→ Start and End of an Activity

Activity Time in working days



Critical Path:

Event = ① ④ ⑤

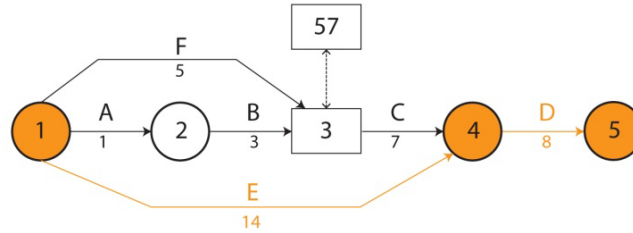
Activity = E and D

Critical Activity Time:

14 + 8 = 22 working days

Note: the path with the longest activity time is called the critical path.

In this case, the longest activity time is 22 working days or 31 calendar days



Calculate a Float Path:

Path 1:

Event = ① ② ③ ④ ⑤

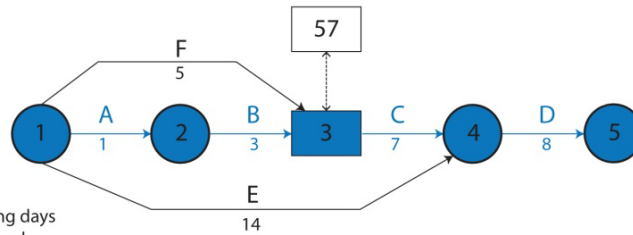
Activity = A, B, C and D

Activity Time = 1 + 3 + 7 + 8 = 19

Float Path 1:

(Critical Path) 22 - 19 (Path 1) = 3

Note: this path can be delayed for 3 working days or 5 calendar days without affecting the timely completion of the project



Path 2:

Event = ① ③ ④ ⑤

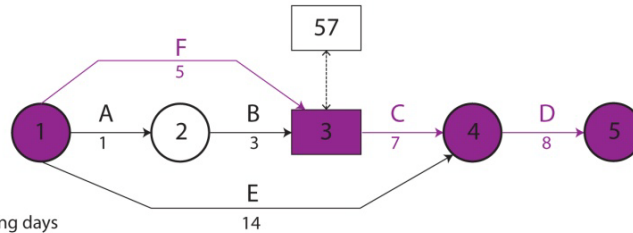
Activity = F, C and D

Activity Time = 5 + 7 + 8 = 20

Float Path 2:

(Critical Path) 22 - 20 (Path 2) = 2

Note: this path can be delayed for 2 working days or 3 calendar days without affecting the timely completion of the project



- **Fast-Track Scheduling:** it is a technique to save an overall time in completing an entire project by combining the architect/engineer schedules with the builder's construction schedule. It requires close coordination, staged bidding, and it is typical to hire a construction manager to supervise the construction process to establish a degree of control over cost and time, and establish responsibility. Oversights and corrections are to be expected; they are an integral part of fast-track scheduling. Note: fast-track scheduling is considered to be an additional service for the architect.

- **A201 vs. Division 01**

1. General Conditions (A201) – a duty is established in A201

- It is general and covers items that are common to every project. For that reason it needs to be tailored to the needs of a specific project by *supplementary or special conditions* to cover unique situations.
 - Supplementary conditions: pinpoints what is unique to a project. Modify the standard contract forms to accommodate the legal, physical, or climatic conditions of the specific project.
 - Special Conditions: used when supplementary conditions must be further extended by governmental agencies requirements, local laws, etc.

- It is part of the Owner- Contractor agreement (A101)
- It defines the responsibilities and the relationship between the Owner, Architect, and Contractor
- It has legal and contractual purpose for constructing a project
- 2. General Requirements (D01)- **a means to discharge that duty is defined in D01**
 - Establish administrative procedures and his found in the specifications
 - Specific to a project
- **Typical Project Manual** contains technical information and other documents related to legal and procedural requirements assembled by architect or CM_A (construction manager as advisor)but **architect is most directly responsible for**
 1. Title Sheet
 2. Signature Sheet
 3. Table of Contents
 4. Instruction to Bidders (AIA - A701)
 5. Bid Forms
 6. General Conditions of the Construction Contract (AIA- A201) & Supplementary Conditions (AIA - A511) & in some cases , Special Conditions
 7. Proposed Owner – Contractor Agreement (AIAI - A101)
 8. Sample forms (AIA - A312 – G702 – G703 – G704 – G707 – G707A)
 9. List of drawings
 10. Index to Specification
 11. Specifications (1-49/2010 edition)
- These become **Contract Documents** when owner-contractor agreement (A101) is signed
 1. Contract Forms
 - a) Owner –Contractor Agreement (A101)
 - b) Performance and Payment bond (A312)
 - c) Certificate of Insurance (G715)
 2. Conditions of the contract
 - a) General Conditions (A201)
 - b) Supplementary Conditions (A511)
 - c) Special Conditions (in some cases)
 - d) Other Conditions
 3. Drawings
 4. Specifications
 5. Addenda (issued prior to the execution of A101 – during the bidding process)
 6. Modifications of the Contract (if necessary and issued after the execution of A101)
 - a) Change Order
 - b) Construction change directive signed by the contractor

→ **Note:** unless specified in the Owner/Contractor agreement, the contract documents shall not include any documents relating to the bidding documents – see below
- **Bidding Documents:**
 1. Bidding Requirements

<ol style="list-style-type: none"> a) Instruction to bidders b) Solicitation to bidders <ul style="list-style-type: none"> – Invitation to bidders 	<ul style="list-style-type: none"> – Advertisement to bidders c) Supplementary instruction to bidders d) Bid forms
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- e) Supplements (Sample bidding forms, information available to bidders, prequalification forms and contract forms)

2. Contract Forms

- a) Owner- Contractor Agreement
- b) Performance Bond
- c) Payment bond
- d) Certificates

3. Conditions of the contract

- a) General Conditions
- b) Supplementary Conditions
- c) Special Conditions (in some cases)

4. Drawings

5. Specifications

- 6. **Addenda** (issued prior to receipt of bids/bid date)

- **Construction Documents** are prepared by Architects and consultants and they are primarily consisted of:

1. Drawings

- Physical relationship between materials, products, and equipments. (size, quantity-implicitly, dimension, location, configuration)
- Typical sequence of drawings:
Title sheet, site and landscape, architectural, structural, mechanical, plumbing, fire protection, electrical, and other special consultant's sheets

2. Specifications

- Compiled by CSI (construction specification institute). They are part of the contract documents and they are legal documents. Complementary to drawings. They describe in writing the requirements for quality, desired performance, technique and method of installation. They are organized in Divisions, Sections, and Parts (general, material, execution). Specifications take precedence over drawings if there is an inconsistency or ambiguity, only if specifically mentioned in supplementary conditions. If not, the contractor must ask the architect for clarification in writing.
 - General: deal with the scope of the section. It describes related work, definitions, quality control, submittals, and guarantees/warranties
 - Material: lists and describes the materials, products, and equipments to be used
 - Execution: details the manner in which products and materials will be installed and work performed

- Division
 - Section
 - a. General
 - b. Material
 - c. Execution

- **Master Specifications: master format 2010**

- | | |
|--|--|
| <ul style="list-style-type: none"> 1. Division 00 –procurement and contracting requirements 2. Division 01 – general requirements 3. Division 02 – existing conditions 4. Division 03 – concrete 5. Division 04 – masonry 6. Division 05 – metal | <ul style="list-style-type: none"> 7. Division 06 – wood, plastics, and composites 8. Division 07 – thermal and moisture protection 9. Division 08 – openings 10. Division 09 – finishes 11. Division 10 – specialties 12. Division 11 – equipment |
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| 13. Division 12 – furnishings | 22. Division 26 - electrical |
| 14. Division 13 – special construction | 23. Division 27 – communication |
| 15. Division 14 – conveying equipment | 24. Division 28 – electronic safety and security |
| 16. Division 15-20 – reserved | 25. Division 29 – 30 – reserved |
| 17. Division 21 – fire suppression | 26. Division 31 – earthwork |
| 18. Division 22 – plumbing | 27. Division 32 – exterior improvement |
| 19. Division 23 – HVAC | 28. Division 33 – utilities |
| 20. Division 24 – reserved | 29. Division 34 – transportation |
| 21. Division 25 – integrated automation | 30. Division 35 – waterway & marine construction |

- **Types of specifications**

- 1. **Proprietary specification**

- Defines the use of desired materials, products, systems, and equipments by their trade names and model numbers.

- 1.1. **Open proprietary specification**

- Names several (usually 3) acceptable materials, products, or systems. Contractors may use any one of them. They are most often used on public-funded projects because they promote competition. If the specs include an *approved equal clause*, the contractor is allowed to substitute to products of equal quality and performance if reviewed and approved by the architect. The architect approves based on aesthetics intent, impact on cost, compliance with codes, etc.

- 1.2. **Closed proprietary specification**

- Requires a particular brand or trade name for one product, and do not permit substitution.

- 2. **Reference specification**

- Refer to quality standards established by recognized testing authorities or by federal government such as UL (Underwriters' Laboratories), ASTM (American society for testing and materials), and ANSI (American national standards institute). They are usually used in conjunction with other types of specifications.

- 3. **Performance specification**

- Define products or systems by describing desired end results that are performance oriented. It is used when new, unusual products are required or when innovation is necessary.

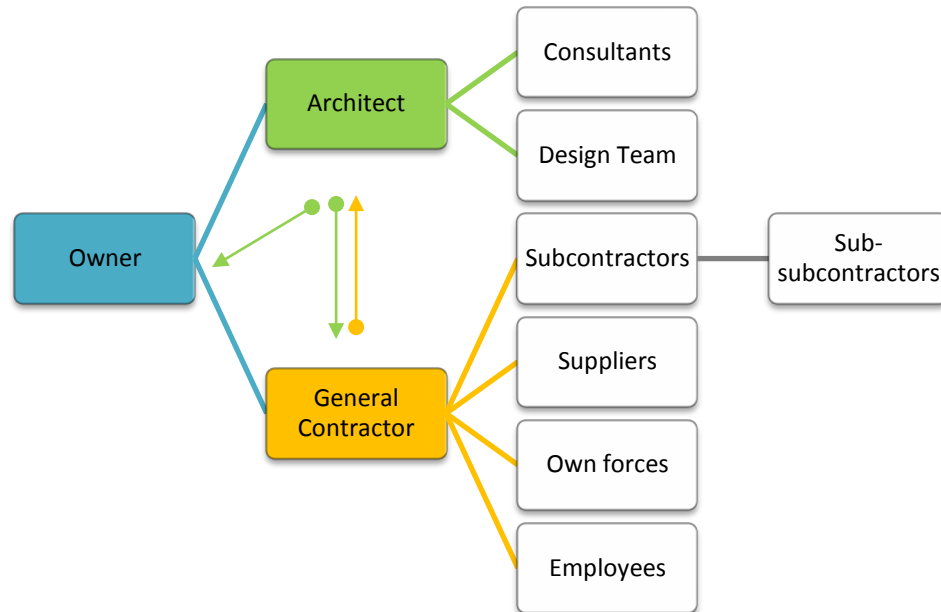
- 4. **Descriptive specification**

- They describe all components and products, their arrangement and method of assembly, physical and chemical properties, arrangement and relationship of parts, and numerous other details and requirements. This specification must be avoided if possible due to substantial liability.

5. Cash allowance specification

- They are used when full information on levels of quality has not been determined or are not available at the time bids are solicited. Cash allowances may be used for the purchase and delivery of the product only.

Party Responsibilities



- **Owner rights & responsibilities – A201/A101/B101 [B102/B201]**
 1. Principal obligation → pay the contractor. The owner has to pay the contractor the whole Contract Sum through *Progress Payments* based on *Application for Payments* submitted by the contractor and the *Certificate of Payment* issued by the architect.
 2. The owner implicitly promises that contractors will have access to the construction site.
 3. The owner shall furnish the contractor, within 15 days after receipt of a written request by the contractor, information necessary and relevant for the contractor to evaluate, give notice of, or enforce mechanic's lien rights – see definition
 4. Upon request, by the bidder, contractor or architect, the owner must provide evidence that funds are available to make payments for the Work if:
 - a) the owner fails to make payments
 - b) the work materially changes the contract sum
 - c) there are concerns about ability of payment
 5. The owner must provide the contractor with as many copies of the drawings and specification as are reasonably necessary during the construction period.
 6. The owner can hire more than one contractor at the same time → separate prime contractors, multiple prime contracts
 7. The owner may suspend Work
 8. The owner has the right to order the contractor to stop work; he/she is the only one who can do so.

9. The owner may require the contractor to provide bonds assuring that the Work will be performed in accordance with the contract documents.
10. The owner according to A201 must purchase *property insurance* unless otherwise specified in the contract docs in the supplementary conditions (for example: the owner may ask the contractor to purchase the property insurance, but the owner will still be responsible for payment).
11. The owner will act as a trustee as a fiduciary to the proceeds paid by insurance companies to the contractor.
12. The owner may purchase *Loss of Use insurance* – see insurance for definition.
13. The owner must inform the insurance companies and make necessary insurance changeover arrangements prior to occupying any portion of a project.
14. The owner has to obtain the surety consent before any portion of the retainage is released to a contractor or reduced.
15. Upon making final payment, the owner waives all claims against the Contractor except those arising from:
 - a. Liens. Claims, security interests or encumbrances arising out of the Contract and unsettled
 - b. Failure of Work to comply with requirements of Contract Documents
 - c. Terms of special warranties required by the Contract Documents
16. The owner is responsible to order soil investigations and other test in regards to the construction site.
17. The owner is recommended by A201 to hire and pay the geotechnical consultants necessary for testing the soil at the construction site.
18. In the event of a default or failure of payment by the contractor, the owner must still pay the contract amount to the contractor.
19. The owner is responsible for stipulating which types of insurance coverage and the limits of coverage the contractor must carry for the project in the contract documents.
20. The final decision about insurance must be made by the owner on the basis of professional insurance advice.
21. The owner is required to file with the contractor a copy of each policy that includes insurance coverages required of the owner before an exposure to loss occurs.
22. Unless otherwise indicated in the contract documents, the owner shall secure and pay for necessary approvals, easements, assessments, and charges required for construction, use or occupancy of permanent structures, or for permanent changes in existing facilities. He should also provide surveys describing physical characteristics, legal limitations, and utility locations for the site of the project and legal description of the site.
23. The owner has the right to carry out the work. If the owner wishes to exercise this right he must notify the contractor. If the contractor fails to respond, the owner can proceed to have the work done by others. The owner must issue a change order to deduct from the contract amount the cost of such work performed by others.
24. If within 10 days of written notice to continue work, the contractor does not commence or correct the work, the owner has the right to carry out the work himself. A change order will reflect the price reduction to the contractor and preapproved by the architect.
25. The owner can assume “Contractor” responsibilities and liabilities once he carries out work.

26. The owner may order changes in the work within the general scope of the contract documents, by the issuance of a construction change directive, if the change will affect contract time and/or contract sum (see definition)
27. The owner, after notifying the contractor and the surety within 7 days written notice, terminate the contract with the contractor
28. The owner may terminate or suspend -in whole or in part- a contract at his own convenience and without cause. In either case, the contract sum should be paid and adjusted accordingly.
29. The owner may terminate the contract if the contractor:
 - 1) Repeatedly refuses or fails to supply enough properly skilled workers or proper materials
 - 2) Fails to make payment to Subcontractors for materials and labor with respect to the Contractor-Subcontractor agreement
 - 3) Repeatedly disregards applicable laws, statutes, ordinances, codes, rules, and regulations, or lawful orders of a public authority
 - 4) Guilty of substantial breach of a provision of the contract documents
30. When the owner terminates the contract for one of the reasons provided in (28), the contractor shall not be entitled to receive further payment until the work is finished

▪ **Architect rights & responsibilities –A201/ B101 [B102+B201]**

1. Architect's basic services are:
 - 1) Schematic Design Phase Services
 - 2) Design Development Phase Services
 - 3) Construction Document Phase Services
 - 4) Bidding or Negotiation Phase services
 - 5) Construction Phase Services
 - 6) Customary Structural / Mechanical / Electrical engineering services, using consultants
2. During the construction administration phase, the architect must: *(the 3 most important requiring proper administrative procedures)*
 - 1) Evaluating the work through observations
 - 2) Inspecting the work at substantial completion and final completion
 - 3) **Processing Submittals**
 - 4) **Evaluation and preparation of change orders**
 - 5) **Certification of payment application**
3. The architect shall provide, to the owner, as part of his basic services, either bidding services, or negotiation services during the bidding process, not both.
4. Additional services required by the owner or additional services arising during the course of the project with prior approval from the owner, should be listed in the Owner/Architect agreement, and the architect should be compensated for them.
5. Extensions of the architect's Construction Phase services exceeding the time limit set in the owner/architect agreement as additional services shall be compensated by the owner
6. To avoid delay, and as an additional service with prior approval of the owner, to the extent the architect basic services are affected, the architect will provide Construction Phase services 60 days after the date of substantial completion or

after the anticipated date of substantial completion identified in Initial Information (AIA B101 – Exhibit A), whichever is earlier.

7. The architect is an intermediary between the owner and contractor
8. The architect represents the owner's interest in determining when the work is, or is not, in accordance with the contract documents.
9. The architect assumes primary responsibility and liability to the owner for the accuracy and completeness of the work of the architect's consultants.
10. According to A201, the architect has the primary role in settling disputes and claims, if chosen to be the IDM – initial decision maker. The architect has initial responsibility for judging whether the contractor and the owner are fulfilling their respective contractual responsibilities. A201 requires that both the owner and contractor to ask the architect for an initial determination when disputes arise, excluding those arising of claims for hazardous materials, emergencies, and the owner as fiduciary.
11. In regards to IDM, the architect cannot be held liable for the consequences of any decisions made in good faith, regardless of whether the decisions favor the owner or the contractor.
12. The architect has the final decision for aesthetics, if consistent with the intent of the contract documents.
13. The architect shall never act unilaterally – act on behalf of one party- concerning general, supplementary, and special conditions.
14. The architect only advises on technical matters within their training and experience, in regards to construction contracts.
15. The architect does not prepare construction contracts or apply the law to specific contractual matters.
16. The architect can advise clients to use AIA forms
17. The architect and consultants owns drawings and specifications
18. The architect should not advise owners on the legal sufficiency of required affidavits, waivers, or release of liens in construction contracts; this is the responsibility of the owner's legal advisors.
19. The architect must promptly review, approve, and take appropriate action on shop drawings the contractor submits, only to determine if shop drawings conform to the design concept and information given in the contract documents. Usually 10 days.
20. The architect should not review shop drawings unless they contain a stamp of approval by the contractor.
21. The architect must review the contractor's schedule of values (if contract is based on a stipulated sum or GMP) to determine that appropriate values are assigned to each portion of the work.
22. The architect must review the contractor's application for payment prior to submitting a certificate of payment to the owner – G702. Within 7 days of receipt.
23. The architect has the right to nullify all or part of previous certificates for payment if it is necessary to protect the owner against :
 - Defective work that has not been corrected
 - Claims, or likelihood of claims by third parties
 - A contractor's failure to pay subcontractors
 - Evidence that contract work cannot be completed for the unpaid balance of the contract sum
 - Damage to the owner or another contractor

- Evidence that the contract work cannot be completed on time
 - Contractors persistent failure to comply with contract documents
24. The architect should not review or enforce safety programs and procedures. He/she is not responsible for site safety. However, it is the architect's responsibility to inform the owner, warn the contractor, or other responsible parties about the hazards, so they can be corrected.
 25. The architect has no legal responsibility to enforce OSHA- safety.
 26. The architect can reject work that does not comply with the requirements of the contract documents.
 27. The architect shall have the authority to require inspection or testing of the work whether it is fabricated, installed, or completed.
 28. The architect should never give insurance advice.
 29. The architect can assist the owner's insurance agent in determining which and how much insurance is appropriate for the project – G612
 30. Construction Administration (CA)
 - The words "supervision" and "inspection" should not be used to describe the architects services during construction administration
 - The architect is the owner's agent and is authorized to act on behalf of the owner, whose identity should be disclosed, only to the extent set forth in the contract documents.
 - The architect should provide administration of the contract between the owner and contractor.
 - Legal and insurance advice should never be provided by the architect to the owner.
 - The architect should not get involved in how the contractor performs work, only whether the work performed meets the requirement of the contract documents.
 - The architect should avoid direct contact with subcontractors and suppliers except in accordance with the contract documents.
 - If the owner requires extensive site visits, the architect may assign one or more of his/her staff as project representative(s)⇒ this will be considered as a change in services and the architect must be compensated for that service.
 31. The architect can be called as a witness in any ensuring arbitration proceeding. Witness services are considered to be a change in services that must therefore be compensated.
 32. The architect should provide all the necessary information, requirements, and limitations of the project to the consultant in a timely manner- within 14 days.
 33. The architect must consult with the consultant for the portion of the work concerned before providing clarifications or interpretations on submittals, change orders, and construction change directives.
 34. The architect and consultants are required to prepare cost estimates; it is part of their basic services.
 35. The architect attempts to be accurate but makes no warranties to the owner that cost or estimate will not vary from original set budget by the owner. The cost estimates represent his/her best judgment.

36. The architect must study the owner's program and budget for the project to determine if they are reasonably related.
37. The architect shall provide updated estimates as the design process progresses at every design phase
38. If the owner's budget cannot be exceeded, the architect must have the authority to control and decide quality and scope of the project
39. An architect must prepare a **design time schedule** that encompasses all phases of production, from initial conceptual planning to the start of construction, based on experience and judgment. Usually using a bar graph
40. The architect may establish certain criteria for the contractor's scheduling requirements (found in Division 01 of the specifications), to contribute to a project's timely completion:
 - 1) All dates be established for ordering and delivery of materials, for submittals, and for testing;
 - 2) Scheduling to be done according to the CPM method;
 - 3) Schedule to show time allotted for each activity as well as cost, crew size, and equipment requirements for each activity;
 - 4) Subcontractors provide input related to their scope of work;
 - 5) Schedule to be updated monthly by the contractor to reflect the actual progress and current status.
41. The architect will prepare Change Orders and Construction Change Directive and, authorize minor changes in the work, with the owner's approval.
42. Upon request of the owner, the architect as part of his construction administration phase, within a year after the date of substantial completion and without compensation, conduct a meeting with the owner to review the facility operations and performance.
43. Termination or suspension of owner/architect agreement:
 - 1) The owner fails to make payment; the architect may suspend his services with seven days notice to the owner. In this case the architect has no liability to the owner for damage or delay due to the suspension of the services. The architect shall be compensated the amount owed, and expenses incurred during the time of suspension, before resuming services.
 - 2) If the owner suspends the project, the architect should be compensated for services rendered prior to that point. The architect shall be compensated the amount owed, and expenses incurred during the time of suspension, before resuming services.
 - 3) If the owner suspends the project for more than 90 total days, the architect may terminate the contract within 7 days notice, if the architect was not the cause of the termination
 - 4) If either party fail to substantially perform in accordance with the agreement though no fault of the party initiating the termination, either one may terminate the contract within 7 days notice
 - 5) The owner may terminate the contract with the architect upon seven notice for his own convenience and without cause
44. At time of termination, the architect must be compensated for services performed prior to termination, reimbursable expenses due, and termination expenses-including the architect's anticipated profit. Once contract is terminated, the owner cannot use the instrument of service of the architect or consultant, unless the

owner pays a fee to the architect and consultant, as granted in the owner / architect agreement.

- **Contractor rights & responsibilities – A201/ A101**

1. The contractor is responsible for construction means, methods, techniques, sequences, procedures, and for safety precautions in carrying out the work.
2. Prior to construction work commencement, the contractor must prepare a progress schedule, to show how the work is to be completed within the contract time using the CPM method, bar chart method, or other required by the contract documents.
3. The contractor must submit a schedule of values (if contract is based on a stipulated sum or GMP) before the first application for payment is issued to be reviewed by the architect. The schedule of values will be used as a basis to review the contractor's application for payment.
4. The contractor is obligated to perform the work in accordance to the contract documents.
5. The contractor must return or account for all sets of drawings and specifications to the architect upon project completion.
6. The contractor may be required by the owner to purchase property insurance. If such a provision is specified, it will be found in the supplementary conditions. The owner will still be responsible to pay the contractor the sum spent for purchase of that insurance.
7. The contractor may be required to purchase and maintain insurance prior to starting construction work and certificates of these insurances (if using an AIA form, they could be listed on the Certificate of Insurance G715) must be provided to the owner, such as: (for definitions of these insurances, see the table)
 - (1) Worker's compensation insurance
 - (2) Liability insurance
 - (3) Personal injury insurance
 - (4) Property damage insurance
 - (5) Automobile insurance
 - (6) Contractual liability insurance
 - (7) Products and completed operations coverage-usually
8. Along with the application for final payment, the contractor must submit:
 - (1) Affidavits to the owner that all debts arising out of the project for the owner or the owner's property may be liable have been satisfied. AIA G706 – Contractor's Affidavit of payment of debts and claims can be used for that purpose.
 - (2) Written consent of the surety to final payment – AIA G707 – Consent of Surety to Final Payment.
 - (3) Other data such as receipts and waivers that an owner may require to demonstrate that there are no outstanding obligations related to the project.
9. Along with the application for final payment, the contractor may also be required by the owner to submit a waiver and release of liens from him and the subcontractors. G706A - Contractor's Affidavit of release of liens.
10. If the contractor is unable to get a release of lien form a subcontractor, the contractor can furnish a bond to the owner to indemnify the owner in the event a lien is filed.

11. Together with each application for payment – progress and final, the contractor must warrant to the owner that the owner will obtain title to materials and equipment free and clear of liens and claims.
12. The contractor must review, approve, and promptly submit shop drawings required by the contract documents to the architect.
13. The contractor is responsible for errors and omissions in shop drawings.
14. If shop drawings contain deviations from the requirements of the contract documents, the contractor must call them out to the architect's attention in writing and those deviations must be approved in writing by the architect before they become effective. If not, the contractor will be liable.
15. The contractor decides when a project is substantially complete.
16. The contractor, within a year after the date of substantial completion, must correct defective work not in accordance with the requirements of the contract documents without additional compensation.
17. The contractor is required to maintain record drawings of all changes to the construction documents.
18. At the construction site, the contractor and subcontractors have the responsibility for OSHA compliance.
19. The contractor is responsible for initiating, maintaining, and supervising all safety precautions and programs in connection with the performance of the contract – this responsibility extends to all employees, other persons who might be affected by the work, and the work itself (on-site, off-site, adjacent of site).
20. The contractor shall not make advance payments to suppliers for materials or equipment which have not been delivered and stored at the site, except with the owner's approval
21. The contractor must also provide bonds if required by the contract documents.
22. A contractor must prepare a **construction schedule** for a project to:
 - (1) Coordinate the numerous trades and subcontractors
 - (2) Use equipment efficiently
 - (3) Order, and store materials
 - (4) Use materials in a logical sequence, and
 - (5) Record accurate time schedules and costs. Generally, a construction schedule is based on the contractor's experience, tempered with judgment, and the consideration of a number of factors. To create the construction schedule, the contractor may use several methods of scheduling: (1) **CPM** – critical path method, (2) **Bar graphs**, (3) **Fast-Track scheduling**- see DEFINITION
23. It is the contractor's responsibility to provide for the sequencing and scheduling of the different construction trades based on union rules and his professional judgment.
24. The contractor may make substitutions only with the consent of the owner after the evaluation by the architect and in accordance with a change order or construction change directive.
25. In the case of concealed or unknown conditions found by the contractor, he/she should promptly inform the architect. The architect after evaluation must answer within 21 days of notice and provide written notice to both, contractor and owner of his/her findings and reasons. If not O.K. ADR (Alternative Dispute Resolution)
26. The contractor is required by A201 to give a broad warranty/guarantee to the owner about the quality of the work

27. After the work has been performed, the contractor is required to assemble documents and warranties and forward them to the architect. The responsibility and procedure are defined in A201 and Division 01

▪ **Consultant rights & responsibilities – C401, A201**

1. The consultant is only responsible for his/her portion of the Work.
2. The consultant is responsible and required to coordinate their own work with that of the architect and other consultants.
3. The consultant is responsible for means and methods used in performing its services.
4. Communication with the owner or contractor shall be forwarded through the architect, except as authorized by the architect.
5. The list of other consultants retained by the architect and the sub consultants retained by the contractor shall be provided in the agreement.
6. The consultant can identify a representative that cannot be replaced without the architect's approval.
7. The consultant can recommend, to the architect, other services that will benefit the project.
8. The consultant should provide as many copies of work portion as necessary to the architect and other consultants.
9. The consultant is not responsible for the acts or omissions of the architect, architect's other consultants, contractors, subcontractors, or other persons performing any of the work, but he/she should notify the architect if he/she becomes aware of acts or omissions in the services or information provided by the architect or other consultants.
10. The consultant must submit a schedule for the performance of services to the architect prior to starting the work.
11. The consultant should maintain insurance for the duration of the agreement required by the agreement.
12. If provisions in the prime agreement (Owner/Architect) are inconsistent with a provision in the Architect/Consultant agreement, the provision in C401 will prevail.
13. The consultant is an independent contractor and not an employee, agent, or partner of the architect.
14. If additional services may arise as the project proceeds, the consultant should notify the architect. Without the architect's approval and written consent, the consultant cannot proceed with the additional services. If approved, he/she must be compensated.
15. The consultant can visit the site for a number of times stated in the agreement. If it is exceeded, it will considered has an additional service, and he/she should be compensated.
16. The consultant must prepare and submit to the architect an estimate for his/her portion of the work. This estimate must be updated according to the prime agreement at every design phase or as stated in the agreement.
17. Consultant's responsibility = Architect's responsibility in regards to cost estimates ⇒ they cannot guarantee cost.
18. (Consultant gives cost estimate to Architect for his/her portion of the work)+ (architect also prepares an estimate) ⇒ architect provides both cost estimates to the

owner for review – a copy of all cost estimates sent to the owner must be provided to the consultant by the architect.

19. Consultants cooperate and agree with the architect to decide what proportion of the construction budget must be allocated to their portion of the work.
20. If the bid amount for the consultant's part > budget allocated for the consultant's work ⇒ Architect can require that consultant modify drawings & specifications without additional charge in order to comply with budget.
21. The consultant is entitled to compensation -for basic, additional services, and reimbursable expenses- by the architect for all services rendered and has no more responsibilities once part of Work he/she was responsible for is accomplished and on budget.
22. Either party (architect/consultant) can terminate this agreement.
23. Either party can terminate this agreement if the Prime agreement (owner/architect) is terminated. In this case the architect should notify the consultant promptly.

- **Bond vs. Insurance**

- A bond is essentially a guarantee. There is no expectation of loss with a bond

- An insurance company anticipates the possibility of loss and is written with the exception that events will occur to cause a loss

- **INSURANCE**

- In **A201**, insurance requirements are general. For that reason, insurance requirements must be modified in supplementary conditions to establish specific project insurance requirements and limits of coverage – AIA A511- Guide to supplementary conditions can be used
- **Certificate of insurance G715** – is a memorandum that outlines the types and limits of insurance coverages carried by the contractor for the project. This certificate must be provided to the owner before the work commences
- **Subrogation:** procedure by which an insurance company, after it pays the loss of its insured, can attempt to recover this amount from the other party who may have actually caused the loss. A waiver of subrogation clause is found in A201, which precludes the parties -and the property insurance company - from seeking to recover any money from each other for any loss covered by property insurance

May be purchased by the Owner and can be purchased by the contractor at the owner's request. A201 requires the owner to purchase it. The insurance is equal in amount to the total value of the project. 2 types: all risk & named peril.

PROPERTY /builder's risk insurance

It includes fire and property damage insurance for a project during construction. It covers temporary structures, materials, equipment, and supplies. Usually covers tools and equipment located within 100ft of project site, as well as property in transit or stored off-site. It must include riders for extended coverage (theft, vandalism, malicious mischief). It does not cover flood and earthquake

	<p>damage.</p> <p>The insurance will be cancelled if the owner occupies all or part of a project prior to substantial completion without the insurance company's consent.</p>
BOILER AND MACHINERY insurance	<p>May be purchased by Owner if required by the contract documents or by law</p>
LOSS OF USE insurance	<p>May be purchased by Owner. It protects against financial losses arising out of delays or other events that prevent the owner from using a project when and as intended, such as repairs, fire, replacing damaged property, etc.</p>
WORKERS' COMPENSATION insurance	<p>May be purchased by the Contractor, and architect. A201 requires the contractor to purchase it.</p> <p>By law, all employers must carry this insurance to protect employees in case of job-related injuries. It covers the liability of the employer, architects, consultant, and contractor to the employees for injury or sickness as a result of their employment. The premiums for the insurance are included in the contractor's overhead costs and are therefore reflected in the bid prices</p> <p>The employer who is required to pay the worker's compensation insurance premium is given immunity from a separate lawsuit by the worker who collects the insurance benefit after an injury. However, the worker is not precluded from suing any other party who might have been responsible for the injury. They are called <i>third party suits</i>.</p>
General LIABILITY insurance	<p>May be purchased by the contractor, owner, architect, and consultant. A201 requires the contractor and owner to purchase it.</p> <p>It protects from claims for damages for bodily injury, sickness, disease or death of the contractor's employee or any other person. <i>Professional liability/errors and omissions, is a form of liability insurance.</i></p>
PROFESSIONAL LIABILITY / errors and omissions insurance	<p>May be purchased by Contractor, Architect, and Consultant.</p> <p>Covers the liability of insured professionals against claims caused by errors, omissions, or negligence to meet the standard of care expected from a professional. This coverage does not provide for intentional wrongful acts</p>
PERSONAL INJURY insurance	<p>May be purchased by the contractor.</p> <p>It covers libel, defamation of character, slander, false arrest</p>
PROPERTY DAMAGE insurance	<p>May be purchased by the contractor.</p> <p>It covers property other than construction work itself, which may be damaged by construction activities except XCU: explosion, collapse,</p>

	<u>underground damages caused by mechanical equipment-unless added by endorsement</u>
AUTOMOBILE LIABILITY insurance	May be purchased by contractors, architect, and consultants. It covers claims for damages arising out of the use of an owned, non-owned, or hired automobile.
CONTRACTUAL LIABILITY insurance	May be purchased by the contractor. It covers liability assumed by contract. It is primarily Indemnification/hold harmless clause, wherein contractors agree to old owners and architects harmless from damages arising out of specified events
PRODUCTS AND COMPLETED OPERATIONS COVERAGE insurance	May be purchased by the contractor. It covers claims for bodily injury or property damage arising from accidents that may occur after the construction work has been completed and turned over to the owner

→ **BONDS**

BOND/SURETY BOND	Provided by surety companies that guarantee that the contractor will fulfill the contractual duties to the owner A bond involves the surety, the principal – contractor, and the obligee – owner.
AIA A312 - PERFORMANCE BOND	A surety bond obtained by the contractor guaranteeing to the owner that the contractor will perform the work in accordance with the contract documents. Performance bond amount is normally 100 % of the contract documents. The decision to eliminate the requirement for a performance bond should be made by the owner only after consultation with his/her attorney and/or advisors
AIA A312 - PAYMENT BOND	A surety bond guaranteeing to the owner that obligations arising out of the contract documents will be paid or satisfied
AIA A310 - BID BOND/bid deposit	A bid bond is furnished by a bidder as part of his/her submission to guarantee 2 things, they usually represent 5 to 10 % of the bid amount: (1) the bidder will enter into a contract with the owner at the price and on the terms stated in his/her bid (2) the bidder will provide a performance and labor and material payment bond to guarantee that the work will be properly carried out and paid for. If the bidder fails to do these things, the surety or bonding company is liable for any extra costs
AIA A312 - LABOR AND MATERIAL PAYMENT BOND	A surety bond obtained by the contractor guaranteeing to the owner that the contractor will pay for all labor (subcontractors, suppliers) and materials used for the project. It protects the

owner from claims arising from unpaid contractor's bills after final payment has been made and provide a means to discharge mechanics' liens that maybe filed after the completion of the project. It is a clear alternative to filing a lien in an attempt to collect from the owner

COMPLETION BOND

A surety bond obtained by the contractor or owner, which guarantees that the project will be completed free of liens

▪ **ADDITIONAL NOTES:**

- The architect generally establishes requirements for the construction schedule (see architect responsibilities), while the contractor prepares the actual schedule of construction (see contractor's responsibilities)
- Laws in effect in a project location may supersede specific contractual provisions in the construction contracts. OK to have provisions for the parties involved in the contract but not for the government or other third parties.
- **Sustainability provisions** are found in **Division 01** general requirements and the materials description of the specifications.
- **Close-Out procedures** are found in **Division 01** general requirements
- A201 extends rights and responsibilities from owner to contractor to subcontractor and from owner to architect to consultant.
- **Job Fabrication:** built and installed on site. Ex. Concrete
- **Shop fabrication:** built in a factory, installed on site. Ex: elevators, structural steel
- **Manufactured:** bought and delivered to site. Ex: plumbing fixtures, lighting fixtures
- Winds acting on buildings create moments, lateral forces, vertical forces, and torsion
- Any changes to the bidding documents made during the bidding process should be reflected in an addenda issued by the architect. The addendum become part of the contract documents upon execution of the contract
- Pre-Bid Conference/Pre-Bid Meetings inform bidders about special and unique features of a project. At this meeting, the architect and owner can go over the instruction to bidders, outline the bid documents and highlight unusual provisions, conduct site tours, notification on future addenda, and record questions from bidders. All answers to questions must be formalized in an Addendum that will later become part of the contract documents.
- **Pre-construction meetings** is scheduled with the selected general contractor to review the contract documents, and to establish administrative procedures
- **OSHA** applies to employers who are legally responsible for the workplace safety of their employees. OSHA enforcement is the government's responsibility. The contractor and subcontractor must comply with OSHA at the construction site. Reference to OSHA compliance in the supplementary conditions or elsewhere in the contract documents is recommended to be omitted.
- The terms supervision and inspection to describe the architect's services during the construction phase should be avoided and never be used because of potential professional liability problems. There are no single word to describe all the services customarily performed by an architect during the construction phase

- Before an architect is to be found liable for negligence, all of these factors must be present:
 1. Plaintiff must allege and prove that there was a legal duty owed by the architect
 2. The architect breached that duty
 3. The breach of that duty was the proximate cause of actual injury or damage suffered by the plaintiff
- Whether an arbitration is binding or not varies by state
- The arbitrator is not required to give any reasons for his/her decision
- There is no legal requirement in A201 that the parties involved must agree to arbitration
- If there is not agreement to arbitrate, the dispute or claim must be dealt with in court
- Alternates, Unit Prices, and Allowances, if any, should be added to the contract sum.
- Unit prices should not be added to determine the lowest bidder during the bidding process
- If the owner wants to occupy the projects prior to substantial completion, the owner needs the approval of the contractor and the insurance company
- If the owner wants to occupy the project after substantial completion, the owner needs the approval of the architect, the contractor, and the insurance company
- Estimates are not guaranteed because of the different factors that affect cost.
- Cost is affected by price of materials and equipment, labor cost, bidding environment, the laws of supply and demand, legal and administrative requirements, location of the project, complexity of the project, construction schedule, quality of materials and methods,
- To control cost, the architect must consider initial cost, installation cost, and long-term cost
- Life-Cycle Costs include: (1) **Operational Costs**, (2) **Maintenance Costs**, (3) **Taxes**, (4) **Financing**, (5) **Replacement**, (6) **Renovation**
- **Labor costs** is major factor and often represents **50% of the total construction cost**
- Construction cost calculation does not include the architect's/consultant's fees, land fees, and other costs associated with the project. Instead, it includes elements designed, specified, selected, and labor and materials provided by the owner.
- Cost estimates should be updated at every design phases as more information are known and become available
- The owner's budget is considered to be the fixed limit of construction cost or direct cost.
- Project's Budget includes the direct cost of a project which is the basis of the architects cost estimating, amounts for contingencies, land acquisition, professional fees for the architect, engineers, and consultants, insurance, financing, construction taxes, and the owner's legal fees, staff, and fees for outside consultants, demo, sit work, landscaping, FF&E, and special equipment.
- The superintendent shall represent the contractor on site, and communications are as binding as if given to the contractor
- The selection and replacement of a Subcontractor or superintendent need the approval of the owner and the architect
- Prior to start of construction, the contractor should submit:
 - (1) A construction schedule for the work – CPM, Bar graph-
 - (2) Schedule of Values - (if contract is based on a stipulated sum or GMP)
 - (3) Submittal schedule.
- Whatever changes occur after contract execution will constitute a G701 or G714

- Multiple Prime Contracts SCENARIO: Contractor A delays the project. Contractor A pays Owner for delay caused. Owner pays Contractor B for start delay resulting in a G701
- Hazardous Materials or Human remains: the contractor must stop work in the affected area and notify the owner and architect. The owner must then hire or contact the necessary agency to fix the problem. The contractor can resume work upon the owner's instruction. Request for adjustment for the Contract time and contract sum may be made by the contractor.
- Uncovering and correction of work:
 1. Scenario 1: work is covered by contractor contrary to architect request or contract requirements ⇒ contractor must uncover replace and pay for all expenses incurred by doing so. No change in contract time will be allotted
 2. Scenario 2: work is covered, architect has not requested to examine prior to covering, but now wants to see the work and needs it to be uncovered:
 - a. Work is good = prepare a change order, the owner pays
 - b. Work is bad = contractor pays, unless caused by the owner or a separate contractor (in that case the owner pays)
- Acceptance of nonconforming work: the owner may accept nonconforming work. However, the contract sum payable to the contractor will be reduced to reflect that work whether or not final payment has been made
- At the time of substantial completion, the retainage may be reduced because the risk to the owner for incomplete or incorrect work is also reduced at that point
- The issuance of the certificate of payment is not a guarantee by the architect that the contractor has properly performed the work.
- Claims in process, but not yet agreed to by the owner and contractor, do not affect the contract sum
- B101 and A201 do not contain specific requirements for the architect to maintain project files but all parties of the project expect the architect to maintain copies and organize documents. There are several AIA forms that can be used to enable the architect to organize key project information such as G705 – List of Subcontractors, G804 – Register of Bid Documents, G807 – Project Directory, G809- Project Data, G810 – Transmittal Letter (see AIA series list)
- Architect's full time project representative vs. Clerk of the works:
 1. **Architect's full time project representative**: the owner may authorize the architect to hire, as a change in services, such a representative to provide a higher degree of monitoring of the progress of the work. The representative is expected to be at the site whenever work is in progress.
 2. **Clerk of the works**: a person employed by the owner to check on matters at the site and to maintain records of the progress of construction
- If there are discrepancies between the terms of warranties required by the specifications and the terms of the warranties provided by the contractor, the owner's attorney should resolve this matter with the contractor. The architect, in this situation, just receives from the contractor, and forwards to the owner.
- The law does not hold the architect liable simply because a design does not work or because it could have been executed differently and avoided the problem. The test of liability is whether the architect was negligent by not meeting the ordinary standard of care in proceeding with the design.

- The responsibility of maintenance shifts from the contractor to the owner at substantial completion
- Reflected Ceiling Plans or RCP's require the GREATEST level of coordination between the architect and its consultants
- An RCP contains information relating to: (1) architecture, (2) HVAC devices, (3) lighting fixtures, (4) sprinkler heads, and (5) fire protection equipment
- The primary purpose of building codes fire safety regulations is to provide for life safety and enable occupants to safely evacuate a building

▪ **Days**

Calendar Days	Represent 7 days a week
Architect and Contractor total days to process Submittals	"Reasonable time" stated in agreement, usually 10 days or 2 weeks
Date of Commencement or Contract Time begins	1. Date of signing the O/C agreement 2. Date stated in O/C agreement 3. Issuance by owner of a formal <i>Notice to Proceed</i>
Contract Time ends	Date of Substantial completion written on the Certificate of Substantial Completion issued by the architect and signed by the contractor, owner, and architect
Cause: additional cost, time delays, unknown/ concealed conditions, or other contractual conflicts Concerned party must Initiate Claim for requesting a change in Contract Sum, Contract Time	Within 21 days of occurrence
Time Limits for Claims	The owner, architect, and contractor can revisit a previously disputed and resolved claim 10 years after the date of substantial completion
Respond to a Claim under IDM dispute resolution	Designated IDM- usually the architect according to A201- has 10 days within the day of receipt of the claim to respond
Period covered by each Application for Payment	1 calendar month ending on the last day of the month or as stated in the agreement
Contractor to submit an Application for payment to the architect – G702	Submit 10 days prior to the date established in the schedule of values - (if contract is based on a stipulated sum or GMP)
Days allotted to the architect and owner for processing each Progress Payments:	"Reasonable time" stated in agreement, but generally 14 days total <u>In A201</u> – the architect has 7 days, after the receipt of the contractor's application for payment, to issue to the owner a certificate of payment, and a copy to the contractor, or notify the contractor and owner reasons for withholding certification in whole or in part <u>In A201</u> – the owner must pay the contractor within the time provided in the contract documents, or within 7 days after the date established in the contract documents for payment, and shall notify the architect when payment is sent to the contractor

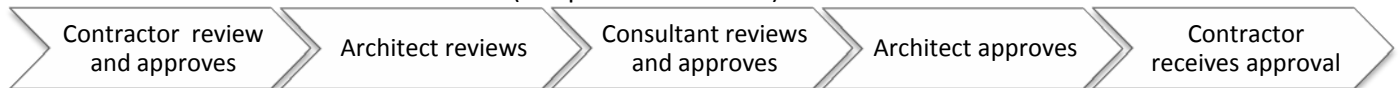
	<u>In A101</u> : the owner must pay the contractor within the time provided in the contract documents, usually 10 days within receipt of the certificate of payment, and shall notify the architect when payment is sent to the contractor
Days allotted for the Contractor to process payment to Subcontractors	7 days after receipt of payment from the Owner. The Subcontractor also has 7 days to pay the sub-subcontractors.
Days allotted to the architect and owner for processing the Final Payment:	<p>“Reasonable time” stated in agreement, but generally 37 days total</p> <p><u>In A201</u> – the architect has 7 days, after the receipt of the contractor’s application for payment, to issue to the owner a certificate of payment, and a copy to the contractor, or notify the contractor and owner reasons for withholding certification in whole or in part</p> <p><u>A101</u>: the owner must pay final payment to the contractor no later than 30 days after the issuance of the architect final Certificate for Payment, or as the days stated in the contract</p>
Warranty Period	begin at substantial completion and last 1 year
Required project Inspection by the architect	Twice: (1) substantial completion, (2) final completion
Bidder’s allotted time for bid preparation	2 weeks minimum
Mechanic’s Lien	Required to be filed within 30 to 90 days, depending on the jurisdiction, after the last work is performed or materials are installed
Suit to enforce a bond	2 years from the date on which final payment is due
Insurance Policies	Insurance company must provide for 30 days written notice to the owner before the underlying insurance policies can be cancelled or allowed to expire
Owner provide requirements and limitations of the project to architect	Within 15 days after the architect’s request
Owner wants to terminate contract with the contractor	7 days notice prior to termination
Contractor and Architect request information for Mechanic’s lien rights from the owner	15 days upon request
Consultant request project information from Architect	Within consultant’s request, the architect has 14 days to ask the owner to provide the information and send it to the consultant
Days allotted to the architect for payment to the Consultant	The architect must pay the consultant within 10 days from receipt of the consultant’s billing
Budget cost to be adjusted upward	If bidding or project negotiation has not commenced within 90 days after submission of contract documents by the architect to the owner, to account for changes in the level of prices in the construction industry.
All Design Phases	7-12 months typically
Clients review & approval between phases	1week to 1 month typically
Schematic Design (SD)	1-2 months typically but it may take longer
Design Development (DD)	2-4 months typically

Construction Documents (CD)	3-7 months typically
Bidding/Negotiation	3-6 weeks typically
Construction Administration	Varies typically
Convert working days to calendar days	Multiply the days by 7 and divide by 5
Owner and Architect review and approval of proposed Subcontractors and Superintendents	14 days
Owner and Architect review and approval for replacement of Representative, Subcontractors and Superintendents	10 days prior to date of notice
Contractor may <u>terminate the O/C contract</u>, through no fault of the contractor and others performing work under the contract, within 7 days notice to the owner, and recover payment for work executed, overhead profit, damages, and cost incurred due to termination, if:	<ol style="list-style-type: none"> 1) <u>Work has stopped for 30 consecutive days</u> due to: <ol style="list-style-type: none"> a. Court order to stop work b. Act of government to stop work c. The architect has not issued a certificate for payment and has not notified the contractor of the reason for doing so d. The owner has not made a payment to the contractor within the time stated in the contract documents e. The owner failed to provide, upon the contractor' request, reasonable evidence of his/her financial arrangements to fulfill his/her obligations under the contract documents 2) <u>Work has stopped for 120 total days in any 365 day period</u> due to repeated suspensions, delays, or interruptions of the entire work by the owner for convenience 3) <u>Work has stopped for 60 consecutive days</u> because the owner has repeatedly failed to fulfill his/her obligations under the contract documents dealing with the progress of the work
Contractor may <u>stop work</u>, within 7 days notice, until payment for the amount owed has been received, if: (this will in turn affect contract time and contract cost)	<ol style="list-style-type: none"> 1) The architect does not issue a certificate for payment within 7 days after the receipt of the contractors application for payment 2) The owner does not pay the contractor within 7 days after the established date in the contract documents the amount of the payment owed for the work or awarded by a binding dispute resolution

▪ **Submittals**

- Before construction begins, the contractor must submit to the architect a submittal schedule. If he/she fails to submit the schedule, the contractor shall not be entitled to any increase in contract sum or extension of contract time.
- Submittals must be approved by both, Contractor and Architect.

- They show how the contractor intends to perform the work called for by the contract documents
- Prepared by contractors, subcontractors, sub-subcontractors distributors, suppliers, or manufacturers.
- The contractor must review, put a stamp of approval – approve- (all materials, field measurements, and field construction criteria – dimension, quantities, installation, and performance of equipment or systems related to the submittals have been verified), and submit the required submittals to the architect.
- The architect is responsible for reviewing the submittals only for the limited purpose of checking for conformance with information given and the design concept expressed in the contract documents.
- The architect is responsible for preparing proper specifications for submittals.
- The architect’s approval of a specific item shall not indicate the approval of an assembly of which the item is a component.
- If professional design services are required to be provided by the contractor, the architect should only review such submittals that bear the professional’s seal and signature.
- If the contractor submits shop drawings for items for which shop drawings are not required by the specifications, the architect should return them to the contractor without review.
- The contractor must call the attention of the architect to deviations, (and revisions by the contractor) and the architect must give specific written approval before the contractor is permitted to deviate from the requirements of the contract documents. If the contractor has deviated from the submittal requirements of A201, the architect may reject either the submittals or the subsequent non-conforming work.
- The contractor is responsible for errors and omissions on submittals.
- Submittal for work designed by a consultant to the architect, the consultant must review and take action: (see procedure below)



- The contractor is responsible for the distribution of the approved submittals to the subcontractors and suppliers.
- The contractor is responsible for coordinating the work of the various subcontractors and suppliers including coordination of their submittals.
- The architect and contractor must process submittals within a reasonable time. In general 10 days or 14 days.
- If no action has been taken by the architect within the reasonable time, the contractor will consider it to be approved.
- The architect must maintain records to log dates when submittals are received from the contractor, and when these are returned. These record should indicate the action taken by the architect: approved, approved as corrected, revise and resubmit, or not approved – AIA G712- Shop Drawings and Samples Record
- The architect should retain copies of each submittal with the project records. At project completion, the architect must check with the owner before disposing of them.
- Shop Drawings, Samples, Product Data, and other submittals are not part of the contract documents

- Submittals consist of:
 1. **Shop Drawings:** They graphically indicate the fabrication and installation of a particular element for a portion of the Work. Shop Drawings are not part of the contract documents. An approved shop drawing does not take precedence over the contract documents. Shop drawings are not a means for the architect to change the design that will affect cost and/or time. However, minor revisions are acceptable
 2. **Samples:** are representative of a material's color, texture, finish, workmanship, etc., and establish physical standards for future work.
 3. **Product Data:** provide specific information about a product's performance in the form of charts, brochures, diagrams, or instructions.

- **Site Visits**

- Site Visits are Observations
- Site visits are part of the architect's construction contract administrative basic services during the construction phase. The amount of visits is usually decided beforehand in the contract agreement, if exceeded, it will be considered as a change in services, and must be therefore compensated for the additional visits.
- The architect must visit the site at intervals appropriate to the stage of construction to become familiar with the progress and the quality of the portion of the work to determine if the work performed is in accordance with the contract documents, and keep the owner informed of deviations from the contract documents, as well as deficiencies and defects observed.
- In order to inform the owner and contractor of the architect's observation at the site, it is essential that a field report be prepared for each visit – AIA G711 Architect's Field Report.
- During the construction phase, the architect's principal function is to advise the owner whether the contractor is performing the work according to the contract documents.
- The contractor is obligated to provide the architect access to observe the work on site, in fabrication, or off-site

- **Testing and Inspection**

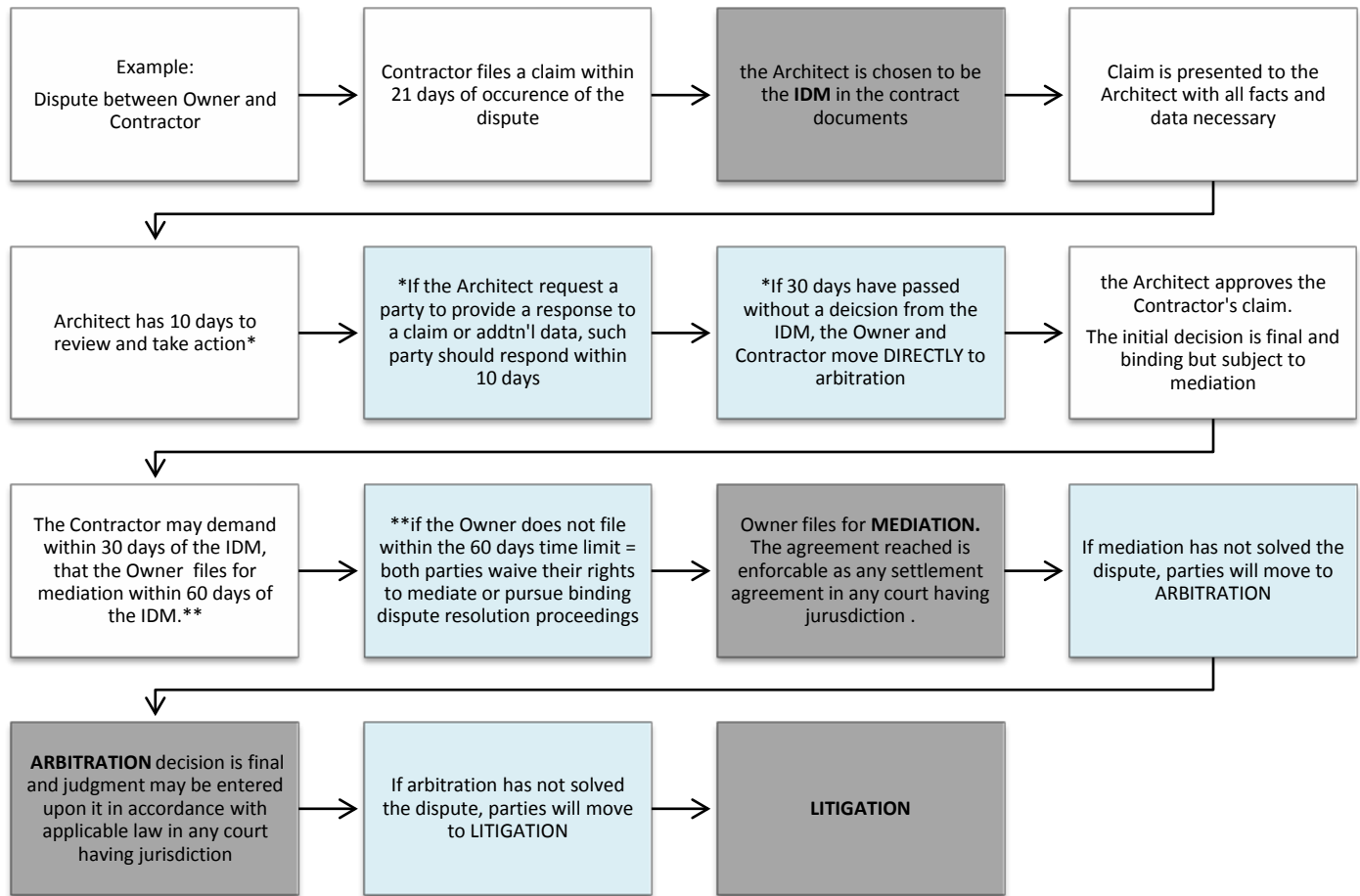
- If an inspector requires testing that is not required by the contract documents, the contractor may be entitled to a change order for contract time, and/or contract sum.
- Routine testing and inspection are required by the contract documents and are not usually observed by the architect.
- Additional testing and inspection are directed by the owner's prior approval. If the architect, owner, or other public authority determines that work requires additional testing or inspection, the architect must obtain written permission from the owner before ordering the contractor to proceed with the test or inspection ⇒ after the inspection, if work is good, owner pays; if work is bad ⇒ contractor pays.
- Soil report should be made available to the contractor for use and evaluation, but it should not be incorporated into the contract documents by the architect.
- Whether subsurface conditions result in more or less work, the owner pays only for what is required by the existing conditions ⇒ subsurface conditions are worse than anticipated, the owner increases the contract sum; subsurface conditions are better than anticipated, the owner reduces from the contract sum.

▪ **Disputes**

→ **ADR (Alternative Dispute Resolution) ⇒ IMAL : IDM / MEDIATION / ARBITRATION / LITIGATION)**

→ Action to be taken by IDM- Initial Decision Maker:

1. Request additional supporting data from the claimant or response with supporting data from the other party
2. Reject the claim in whole or in part
3. Approve the claim
4. Suggest a compromise
5. Advise the parties that the IDM is unable to resolve the claim



▪ **PAYMENTS**

→ **Payment for Stored Materials**

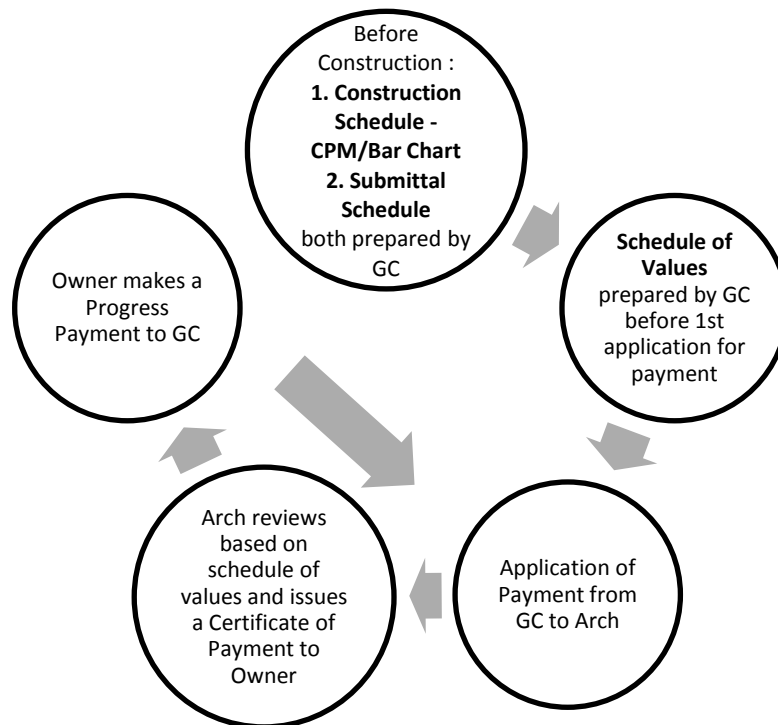
1. A201 requires that payment be made for materials and equipment stored on site, unless otherwise provided. If payment is not to be made for materials and equipment stored on site, it should be stated in the supplementary conditions of the contract
2. A201 also states that if payment is to be made for materials and equipment stored off-site. Additional written approval must be secured from the owner

3. A201, also states that for on-site and off-site stored equipment and materials, the owner can require written documentation to protect the owner's title and interest in such property once payment is made
4. Whenever the architect has concerns about payment for stored materials, or any changes are made to the provisions of stored materials in A201, the matter should be referred to the owner and his/her attorney.
5. If the owner will be paying for on-site and off-site materials and equipment, conditions of payment should be provided in the supplementary conditions

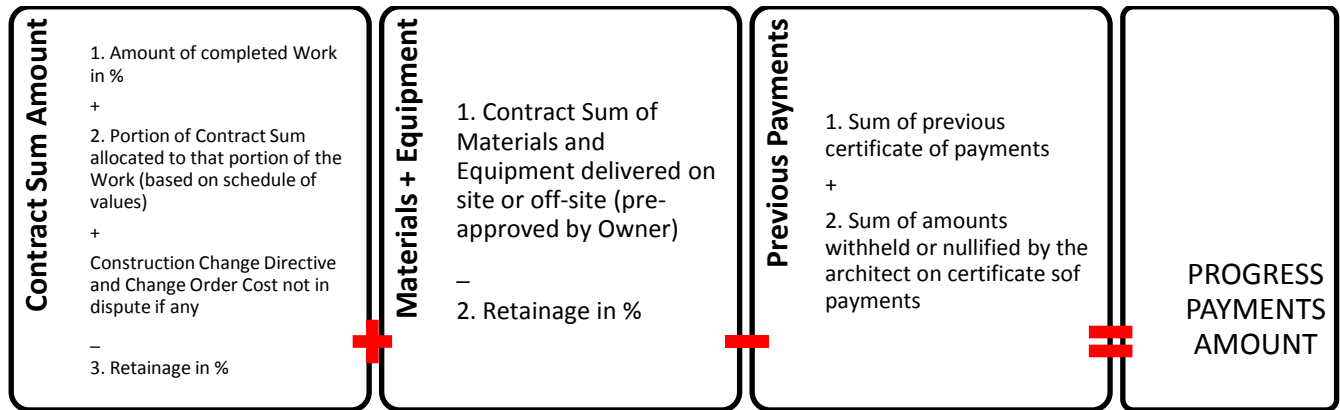
→ **Progress Payments**

1. Each application for payment (G702) shall be based on the Schedule of Values - (if contract is based on a stipulated sum or GMP)
2. Application for payments will show the percentage of completion of each portion of the Work at the end of the period covered by the application for payment (usually 1 month)
3. Progress payments can be modified by:
 - Adding a sum sufficient to increase total payments to the full amount of the contract sum, upon substantial completion;
 - Adding a sum sufficient for final completion of the work, delayed through no fault of the contractor;
 - Subtracting an amount, if the architect find Work to be incomplete;
 - Subtracting an amount if retainage is released to the contractor with the consent of the surety;
 - Subtracting an amount if there are unsettled claims.

→ **Typical Process diagram for making progress payments**



→ Calculation of progress payments



→ Final Payment

1. Final payment is due at Final Completion of the project
2. At final payment the contractor should be paid the unpaid balance when:
 - The contractor has fully performed the work according to the contract documents
 - The architect has issued the final certificate of payment

- **What to look for when checking construction documents?**

1. **Structural Integrity:** provide for the ability of the project to withstand *lateral forces* (wind- detail corners in preventing from moment stresses and openings from suction-, earthquake – building configuration-, soil pressure, soil expansion) and *vertical forces* (gravity loads, wind, soil characteristics- hydrostatic pressure + frost + wet soil + differential settlement+ high water table)
2. **Water and moisture control:** prevent water penetration at roofs, horizontal and vertical surfaces above and below grade level, and protect the project from flooding, by using methods such as wet/dry flood proofing method, flashing, sealants – width-to-depth ratio-, subsurface drains, vapor barrier, positive drainage, gravel, etc.
3. **Environmental consideration:** provide materials that resist decay and corrosion (electrolytic galvanic action), prevent insects from entering the building (termites), prevent sick building syndrome, specify environmentally conscious materials and products. Hazardous materials should not be specified (PCB, asbestos, VOC, Lead, coal tar, etc.)
4. **Thermal Control:** provide for the control of heat gain and heat loss (insulation, sunshades, siting, landscaping, choice of building materials, location of openings on ext. walls, allow for thermal expansion and contraction, provide expansion joint – at major changes-, as well as control joints – controls cracking in a structure's weak points)
5. **Acoustical control** – provide for the control and absorption of outside and inside noise (PNC, STC, IIC, and NRC) considering sound source, path, and receiver, by using porous materials, airtight openings, discontinuity of structural frames, etc.

6. **Dimensional tolerances** – where precision is not an issue, provide for dimensional tolerances. If it is an issue, specify it in the specifications. More precision = longer construction + higher cost
 7. **Maintenance and durability** – specify materials that can be easily maintained (quantity of labor, accessibility) and durable (life-cycling of building)
 8. **Aesthetics** - where needed and necessary, require compliance with the aesthetics of the project through the use of shop drawings, product data, samples, visual mockups, and performance mockups – mockups are used when a material is being used for the 1st time-.
 9. **Compliance with codes and regulations** – it is imperative for documents to comply with codes and regulations to provide minimum standards of building design for the protection of person and property.
- A building must be designed to be structurally safe and meet the requirements for fire protection and life safety (NFPA 101), as well as the requirements for barrier-free provisions (ANSI, ADA – not a code, it is a civil rights legislation). The model codes are: IBC, UBC-west-, BOCA-east-, SBCCI-south – for codes to be enforced they must be adopted by the enforcing agency of the federal, state, or local government.

- **Architect's design decisions are affected by:**

1. **Cost**
2. **Function**
3. **Aesthetics**
4. **Time**
5. **Sustainability** – LEED certification is considered an additional service for the architect
 - 5.1. Level and quality of Sustainability is rated by the LEED system. LEED's goal is to introduce new sustainable approaches and technologies to the construction industry. It is comprised of 6 categories: (1) sustainable sites, (2) water efficiency, (3) Energy and atmosphere, (4) materials and resources, (5) indoor air quality, (6) innovation and design practice. In order for a project to be LEED certified, the design decisions have to improve the building's performance against an established standard in percentages.
 - 5.2. It is important to educate and explain to the client, the project team, and bidders, the benefits, requirements and characteristics of sustainable design, in order to avoid misunderstandings, and unnecessary additional fees from bidder, contractor, and consultants
 - 5.3. Sustainability affects:
 - a) Cost → life-cycle costing considerations (initial cost, operating cost, maintenance cost, residual value, replacement cost) and matrix costing considerations (balancing aesthetics, budget and function)
 - b) Function → environmental impact and energy efficiency
 - c) Aesthetics → balance function + cost + aesthetics = better reputation for sustainability
 - d) Time → may result in longer construction process and construction

- **Design-Award-Build** (Design-Bid-Build)



→ DIAGRAM LEGEND:

- **Orange:** (O)Owner
- **Blue:** Architect Basic Services: Preliminary Design(PD), Schematic Design(SD), Design Development(DD), Construction Documents(CD), Construction Administration(CA),Bidding Process (BID)
- **Red:** (GC)General Contractor selected (awarded)
- **Red:** (Sub)General Contractor suggests to the Owner and Architect a subcontractor for approval
- **Yellow:** (\$)Construction Cost is determined

→ Standard method of construction

→ Used when the owner wants to participate in design process

→ Design decisions are made before getting a GC (general contractor) involved

→ Steps:

1. Owner hires the architect to develop PD to CD phases
2. Architect prepares bidding process
3. Owner awards a construction contract to the lowest bidder or other at his own discretion
4. Subcontractors and suppliers are selected
5. Cost of construction is determined
6. Construction Administration begins with the architect as the owner’s agent
7. Project completed

→ Advantages:

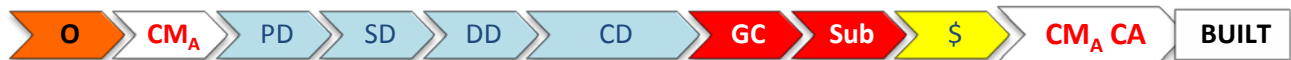
1. Owner participates in the design process
2. Cost is accurately based on complete sets of documents
3. Clear separation between design and construction responsibilities
4. Construction scheduling is simple

→ Disadvantages:

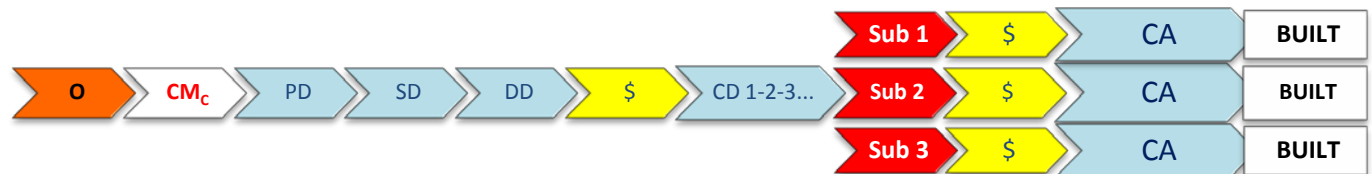
1. Long time to complete CD phase before being able to establish an accurate cost and for construction to begin
2. GC experience and knowledge of pricing and constructability is not available during the design phases

- **Construction Management (CM)**

CM delivery method 1: Construction Manager as advisor CM_A:



CM delivery method 2: Construction Manager as constructor CM_C:



→ DIAGRAM LEGEND:

- **Orange:** (O)Owner
- **Red Letters:** (CM_A) (CM_C) Construction Manager as Advisor administers / Constructor

- **Blue:** Architect Basic Services: Preliminary Design(PD), Schematic Design(SD), Design Development(DD), Construction Documents(CD), Construction Administration (CA)
- **Red:** (Sub)- CM_C suggests subcontractors for owner approval
- **Yellow:** Construction Cost is determined (\$)

→ Owner can address cost and constructability early during the design process

→ Fast track scheduling method is used to have a shorter construction time period

→ Owner hires a CM_A or CM_C to facilitate administrative services, constructability, and address cost throughout the design phases, bidding process, and construction

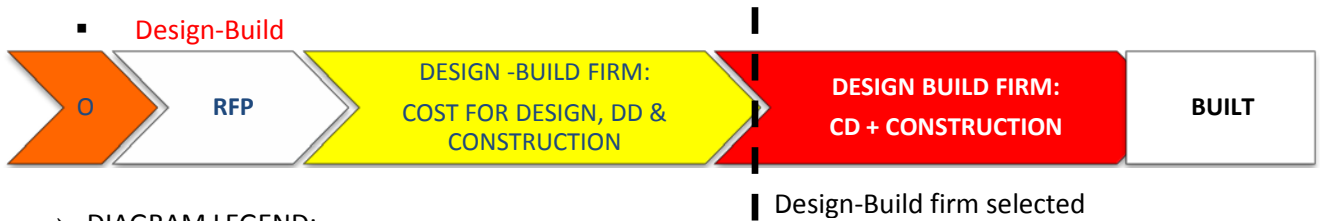
- CM_A: construction manager as agent/advisor - administers design contracts, acts as the owner's representative to the design team, manages the construction contracts, as well as non-construction activities on the site. He/she has no financial responsibility
- CM_C: construction manager as constructor – vendor relationship with the owner. He/she has a financial responsibility to the construction project. He/she is brought into the project before the design phases are completed to help with constructability
- 3 types of contract cost:
 1. **Stipulated Sum or Fixed Price Contract:** guaranteed cost for construction before the start the start of construction and CM_C services. Once the cost is agreed upon, the owner is obligated to pay the amount. However, the construction cost may be revised by change order (see definition)
 - ⇒ Construction cost (\$7,000) is greater than fixed price (\$5,000) = owner does not pay the difference in cost amount (\$2,000), CM_C is responsible resulting in financial loss
 - ⇒ Construction cost (\$4,000) is less than fixed price (\$5,000) = owner does not receive the savings amount (\$1,000), CM_C keeps it resulting in a profit
 2. **Cost Plus a Fee Contract:** actual cost of construction (materials + equipment + lowest Sub bids + CM_C own labor) and negotiated fee for CM_C services. This type of contract is often used when the owner wants to select a specific contractor for his/her capabilities, rather than bidding the project competitively. It usually includes a GMP (see below).
 3. **Guaranteed Maximum Price (GMP):** highest cost of the construction project guaranteed by the CM_C
 - ⇒ Construction cost (\$6,000) is less than GMP (\$10,000) = savings go to the owner (\$4,000). Sometimes, the owner shares the savings with the contractor as an incentive to perform the work for less than the GMP.
 - ⇒ Construction cost (\$13,000) is greater than GMP (\$10,000) = CM_C is responsible to pay the amount over (\$3,000) and absorb the loss

→ Advantages:

1. Cost is determined before CD's are completed
2. Ability to use staged bidding which equates to a faster completed project
3. CM is hired early in the design process to resolve constructability before construction which equates in less cost for construction

→ Disadvantages:

1. Additional cost for hiring a CM
2. Complicates relationship between design and construction team
 - ⇒ Coordination and relationship might not be well designed resulting in conflicts
 - ⇒ The use of fast-track scheduling which calls for multiple bidding and multiple prime contracts will create a complex situation



→ DIAGRAM LEGEND:

- **Orange:** (O) Owner
- **RFP:** owner issues a Request For Proposal to select design-build firms
- **Yellow:** Design-Build firms submit proposals to the owner that provide the design of the project and the cost for design development and construction
- **Red:** Design-Build firm develops provides construction documents and builds the project

→ Single entity responsible for design construction

→ Types of design-build firms

⇒ Company which has construction and design staff

⇒ Construction Company hires an architect

⇒ Development Company hires an architect and construction staff

⇒ Joint venture comprised of an architect firm, construction firm, and developer firm

→ Steps:

1. Owner issues a request for proposals to selected firms
 - ⇒ The owner can have an architect do the conceptual design and include it in his/her request for proposals which may reduce cost when hiring a design-build firm
2. Selected firms submit proposals and cost for design, design development, and construction to the owner
3. Owner selects a firm
4. Chosen firm designs, develops documents, and build the project

→ Advantages:

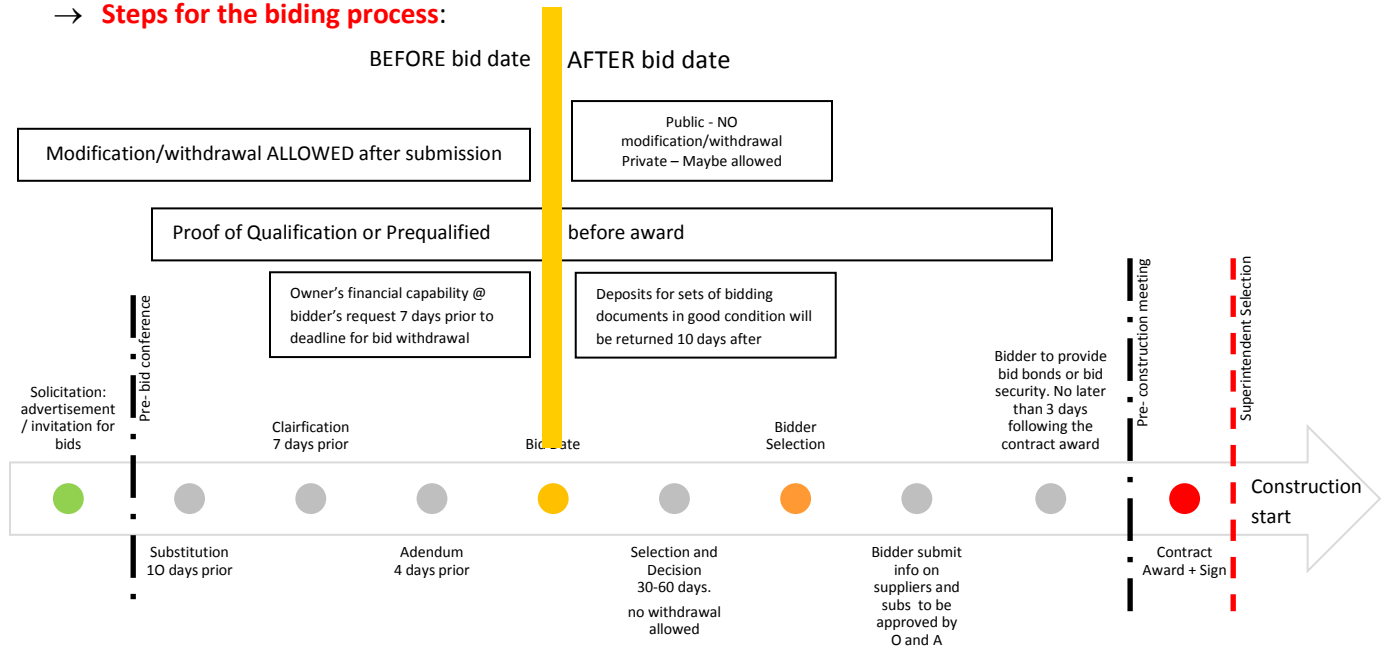
1. One firm is responsible for design and construction
2. Cost is determined early in the process
3. Conflicts between designer and constructor are minimized
4. Facilitates fast-track construction

→ Disadvantages:

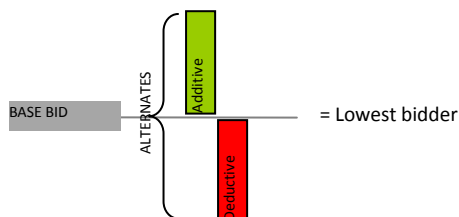
1. Owner's input is minimized in the design of the project
2. Owner has no representative to protect his/her interest but can hire one outside of the selected firm
3. Any design change would likely require a change order that the owner will have to pay for
4. Dispute may arise regarding the scope of the work
5. Quality issues may arise and be difficult to address if the owner's decision to select a firm was solely based on the lowest bid

- **Bidding**
- Construction contracts may be awarded to (1) the lowest bidder based on cost, (2) to a GC or CM based on qualifications, (3) to a GC or CM based on qualifications and a fee proposal – see construction management delivery method-.
 - **Affect Bid Amount**
- Factors that affect the **bidding environment**:
 1. Law of supply and demand for products and services:
 - ⇒ \underline{S} greater than \underline{D} will result in lower bid cost
 - ⇒ \underline{D} greater than \underline{S} will result in higher bid cost
 2. labor rules and construction method:
 - ⇒ Not enough skilled labor or unusual construction methods not specific to a locale, will result in higher bid cost
- Factors that affect **time allotted for bidding**:
 1. Project size
 2. Project complexity
 3. Number of similar projects being bid at the same time
 4. Access to sets of contract documents
- Bidding documents must clearly state the **length of the construction period** and provide for ample time for the completion of construction in order to reduce inefficiency, reduce delays in the construction progress, and reduce the bid amount- direct result of liquidated damages. See p. 125 in Kaplan.
- **Unusual requirements** must be specified in supplementary conditions, and be explained during the pre-bid conference by the architect to avoid misunderstandings, and substitutions. If answers to questions are still needed, they must be formalized in an addendum to become part of the bid documents
- **Ambiguous documents and arbitrary requirements** will result in interpretations and affect bid prices. Bidding documents should provide for provisions for those situations where more than one interpretation is possible.

→ **Steps for the bidding process:**



- In one or more newspapers, publish an advertisement to bidders (usually used by public agencies), or the architect recommends contractors, the owner concurs and an invitation to bidders is sent to the selected contractors (usually used on privately financed projects) – both should be included in the project manual for information and record purposes
- Each bidder implicitly states by submitting a bid that:
 1. Understand the bidding documents
 2. Visited the project site
 3. Become familiar with the local conditions
 4. Bid is based without exception on the information provided in the bidding documents
- Bidding documents are normally issued only to prime contractors and not to subcontractors
- Addendum to substitutions proposed by a bidder, once approved by the architect, should be issued- by the architect- to all bidders to be included as a basis for bid prices. All bidders have to attest and list in the bid form that they have received the addendums and included them in their bid prices
- If there are discrepancies in the bid amounts between the numerals and words, the words will prevail.
- If a bidder lists qualifications or exclusions to their bids, they have violated the bidding requirements, the owner can reject the bid, rebid, or award the contract and adjust the contract sum if necessary- not allowed on public projects.
- Waive for informalities and irregularities: possible on private work, impossible on public work
- **Low bidder is determined by: the sum of the base bid + cost of additive alternates + credit of deductive alternates**



- Unit cost cannot be used to determine the lowest bidder
- In case of errors in bid amount, the GC may absorb additional cost or refuse to enter into contract. In the latter case, GC will lose the bid security
- Supplier and subcontractor selection:
 1. Bidder submits a list and information of proposed suppliers and subcontractors
 2. Owner and the architect review the list*
 - *If there are objections:
 - ⇒The contractor may (1) withdraw the name and propose a substitution and adjust the bid price accordingly
 - ⇒The owner may (1) accept the substitution with modified price, (2) or disqualify the bidder. Bid security will not be forfeited to the bidder
 3. Owner and architect approve, proposed suppliers and subcontractors may not be substituted after the contract award unless with written consent of the owner and architect
- It should be stated in the advertisement or invitation to bid whether a bid bond or bid security is required, and if so, in what form. A bid security may be stated as a fixed sum or as a percentage of the bid price
- If 2 or more bids for designated portion of the work have been suggested, the bidder can state that he/she wants both or nothing without having to forfeit the bid security
- Bid security should not be forfeited to the owner in the event that the owner fails to give proof of financial capability upon bidder's requests
- Bond requirements and amount stated in bidding documents, they should be included in the base bid.
- Bond requirements after receipt of bids and before contract execution, they should be included in the bid to determine the contract sum
- **Bids in Excess of the Budget**
 - If the architect agrees to meet the owner's budget, and the lowest bid, or negotiated proposal exceeds that amount, the owner can:
 - 1) Increase the budget and accept the bid amount
 - 2) Rebid or renegotiate the project within a reasonable time
 - 3) Abandon the project terminate the architect's contract
 - 4) Cooperate with the architect o reduce scope, quality, or both of project and rebid it in the new form**
 - 5) Implement some other course of action to be determined
- ** If (4) is chosen – the architect without additional charge should modify the drawings and specifications as necessary to comply with the owner's budget
- **Project Completion**
 - At project completion, the contractor has the obligation to assemble documents and warranties to forward to the architect
 - The contractor may be required to submit G706 and G706A, which in that event should be forwarded by the architect to the owner for review by the owner's legal counsel. In the event that the architect has reason to believe these documents are not in order, or if the owner's

attorney informs the architect that these documents are not proper, final payment should be withheld.

- At project completion, the contractor is required to keep the premises clean and orderly or “broom clean”. The contractor must remove all waste materials, rubbish, the contractor’s tools, construction equipment, machinery, and surplus materials. – If the architect wants to add to these requirements, he/she can do so in the supplementary conditions, or Division 01 of the specifications.
- At project completion, the architect is required to forward certain documents to the owner as part of the architect’s services related to closing out the project:
 - 1) Inspect the project to determine: Date of substantial completion and the Date of final completion
 - 2) Forward to the owner the written warranties provided by the contractor, for the owner’s review and records
 - 3) Issue a final Certificate of Payment based upon final inspection
- At project completion, when the contractor has fulfilled his contractual requirements, his obligations are over. Except for the defective work that may appear within a year after substantial completion and any liability for breach of contract until the expiration of the statute of limitations.
- Services provided after the completion of a project by the architect are considered additional services.

- **ADA**

- **Acronyms**

- **(ADA / ABA) 2004:** **ADA** - Americans with Disabilities Act / **ABA** - Architectural Barriers Act Accessibility Guidelines
- **ICC / ANSI A117.1:** **ICC** - International Code Council / **ANSI** - American National Standards Institute - Accessible and usable Buildings and Facilities
- **CABO / ANSI A117.1:** **CABO** - Council of American Building Officials / **ANSI** - American National Standards for Buildings and Facilities Providing Accessibility for Physically Handicapped people

- **ADA General Information:**

- Became a law in 1992
- It is a civil rights legislation
- It is not a national building code and does not depend on inspection for its enforcement, building owners must comply with its requirements or be liable for civil suits
- Other local and federal laws also govern accessibility; they all follow most of the standards set forth in ICC/ANSI A 117.1 or CABO/ANSI A117.1 The main differences among the standards are in the scoping provisions, which set how many accessible elements must be provided

- **Definitions**

- **Barrier-Free Provisions:** regulations which provide accessibility to buildings and sites for persons with disabilities
- **Accessible Route:** continuous unobstructed path connecting all accessible elements and spaces in a building or facility. The standards for accessible routes are designed to accommodate a person with a severe disability who uses a wheelchair, and are also intended to provide ease of use for people with other disabilities. The accessible route includes: Corridors, floors, ramps, elevators, lifts, and clear floor space at fixtures.
- **Area of refuge:** an area where people unable to use stairways can remain temporarily while waiting for assistance
 - Area of Rescue Assistance:
 1. A portion of a stairway landing within a smoke proof enclosure
 2. A portion of an exterior exit balcony located immediately adjacent to an exit stairway when the balcony complies with local requirements for exterior exit balconies
 3. A portion of a one-hour fire resistive corridor located immediately adjacent to an exit enclosure
 4. A vestibule located immediately adjacent to an exit enclosure and constructed to the same fire resistive standards as required for corridors and openings
 5. A portion of a stairway landing within an exit enclosure which is vented to the exterior and is separated from the interior of the building with no less than 1-hr fire-resistive doors
 6. When approved by the appropriate local authority, an area or room which is separated from other portions of the building by a smoke barrier

7. An elevator lobby when elevator shafts and adjacent lobbies are pressurized as required for smoke proof enclosures.

- **Clear Floor Space:** the minimum unobstructed floor or ground space required to accommodate a single stationary wheelchair – 30”x48”
- **Detectable Warning:** surface feature built in or applied to a walking surface or other element to warn of hazards on a circulation path. They consist of truncated domes and 24” continuous detectable warning surfaces.
- **General Notes:**
 - Very important: the ADA states that alterations to qualified historic buildings or facilities shall comply with the requirements of the applicable ADA sections – including elevators and accessible routes- unless it is determined that compliance with the requirements would threaten or destroy the historic significance of the building.
 - Bathroom Tub Access:
 1. Side Approach, wheelchair floor area should be parallel to the tub
 2. Front approach, wheelchair are should be perpendicular to tub
 - In toilet rooms; clear floor area, turning space, and accessible route may be overlapped to accommodate requirement.
 - Floor Surface must be stable, firm, and slip resistant.
 - If a carpet is used on floor surfaces, it must have a firm cushion or backing or no cushion and a level loop, textured loop, level cut pile, or level cut/uncut pile texture with a maximum pile height of ½”. Carpets must be securely attached to the floor and have trims along all lengths of exposed edges
 - Handrails are not required for ramps adjacent to assembly areas
 - Round doorknobs are not permitted on doorways of accessible routes
 - Protruding objects should never reduce the clear width required for an accessible route or maneuvering space
 - Signage and Alarms must be provided in both visual (flashing lights) and audible (sound level) alarm systems
 - Permanent rooms and spaces must be identified with uppercase lettering signs. If pictograms are used, they should be accompanied with the equivalent verbal description placed below the pictogram. Signage in both cases must be mounted on the wall adjacent to the latch side of the door
 - Directional and informational signs can have uppercase or lowercase lettering
 - The international symbol for accessibility must be provided on parking spaces, passenger loading zones, accessible entrances, and toilet and bathing facilities when not all are accessible. Building directory and temporary signs do not have to comply
- **Some of the ADA Requirements**

Accessible Route

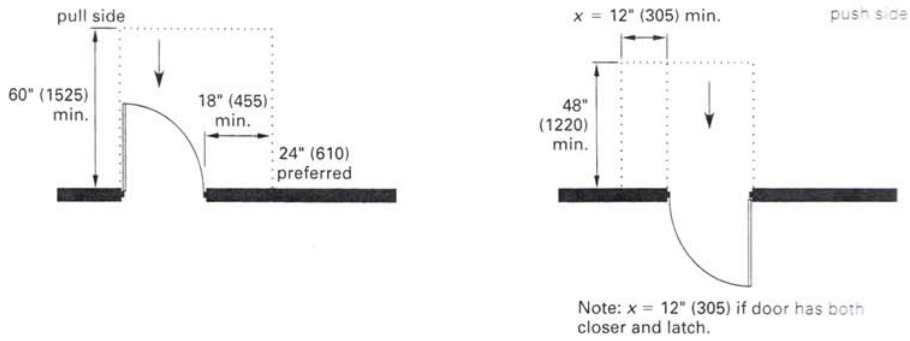
Passage width for 1 wheelchair and 1	48” min
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ambulatory person	
Floor area required for one stationary wheelchair	30"x 48" (2'-6"x 4'-0")
For wheelchair maneuver to make a 180° turn In place of this, a T-Shaped space may be	60" (5'-0"x 5'-0")
T-shaped Space	
Minimum clear width for accessible route	36" (3'-0") continuously
Minimum clear width at passage point	32" (2'-8") clear Note: the passage point cannot be more than 24" (2'-0") long
Minimum passage width for two wheelchairs	60" (5'-0")
If accessibility route is less than 60" (5'-0") wide	Passing spaces minimum 60"x 60" space (5'-0"x 5'-0") must be provided at intervals not to exceed 200'
Turns in corridors and around obstructions <u>Note:</u> – figure (a) if obstruction is 48" or greater treat as an accessible route 36" wide – if obstruction is less than 48" optional (b) configurations	<p>(a) 90° Turn</p> <p>(b) Turns around an Obstruction</p> <p>NOTE: Dimensions shown apply when x < 48 in (1220 mm).</p> <p>(b) 180 degree turn (Exception)</p>
Accessible route slope	Up to 5% or 1:20 (1" rise for every 20" of distance) Note: slopes greater than 1:20 is considered a ramp. No cross slope of an

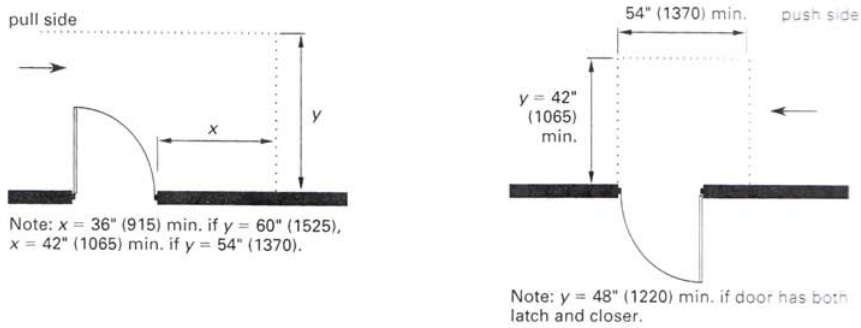
accessible route shall exceed 1:50

Doorways

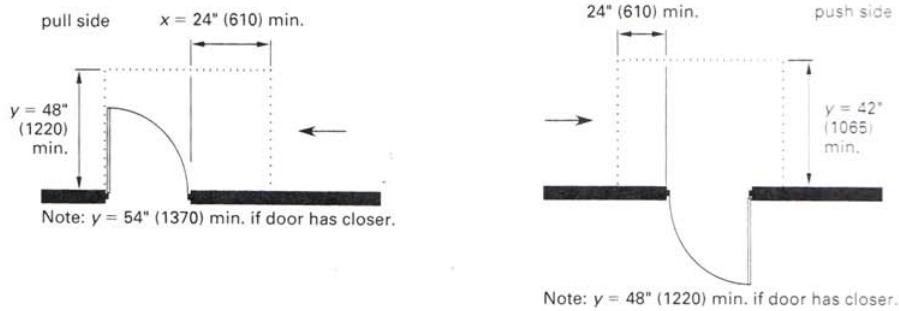
Doors Minimum clear opening width	32" with door opened at 90° Exception: doors not requiring full user passage may have a clear opening of 20". Note: clear width is measured from the face of the doors and the opposite stop
32" Doorway Maximum Depth	24" max. Note: if the doorway depth is greater than 24" provide a 36" clear door opening
Accessible door hardware	Mounted 48" max. above finished floor
*Changes in levels	Levels
Maneuvering Clearance at doors: Front Approach/ Pull Side Space required	60" min.
Maneuvering Clearance at doors: Front Approach/ Pull Side Distance from Latch to Pull Side	18" min / 24" preferred
Maneuvering Clearance at doors: Front Approach/ Push Side Space required	48" min.
Maneuvering Clearance at doors: Front Approach/ Push Side Distance from Latch to Push Side	12" min.



(a) front approaches—swinging doors

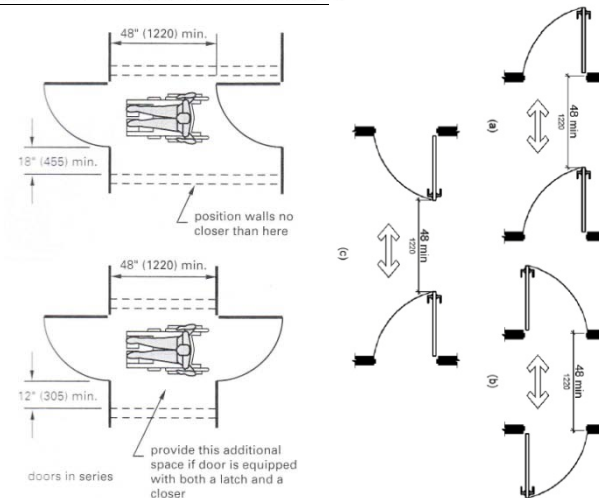


(b) hinge side approaches—swinging doors



(c) latch side approaches—swinging doors

Minimum Clearance at doors in series 48" :

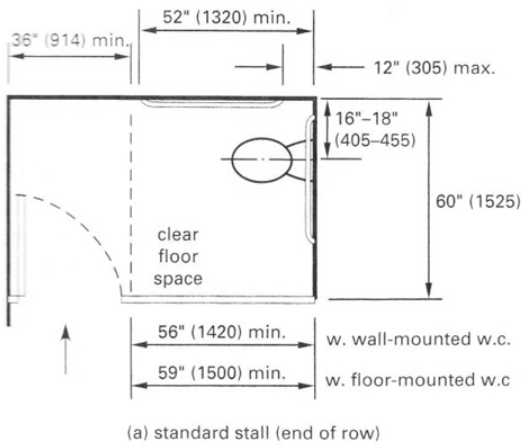
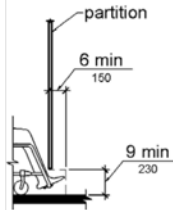


If 48" clearance for 2 doors in a series is not provided	Door must be automatic
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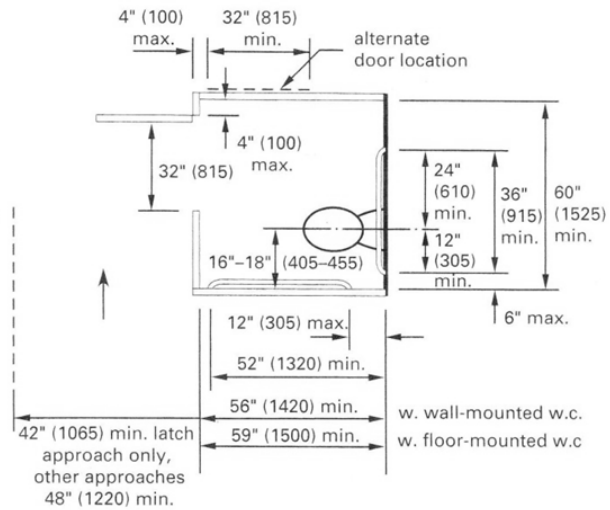
Toilet Rooms

Provide Ambulatory toilets	1 for every 6+ toilet stalls or water closets + urinals
Toilet Stall Door clear opening	32" min. in most cases and must swing out
Mirror	Bottom of mirror should be at 40" max
Sink Depth	17" or greater
Grab bar height	33" to 36" above the floor

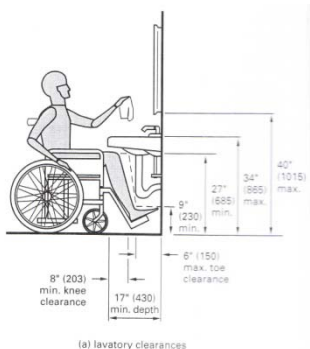
Toe clearance at front partitions and at least one side partition



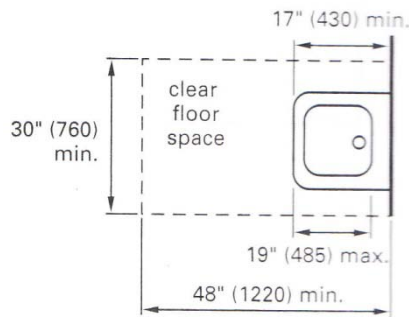
(a) standard stall (end of row)



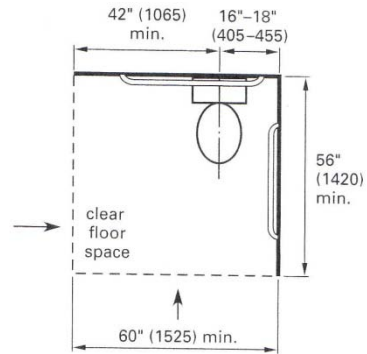
(b) standard stall



(a) lavatory clearances

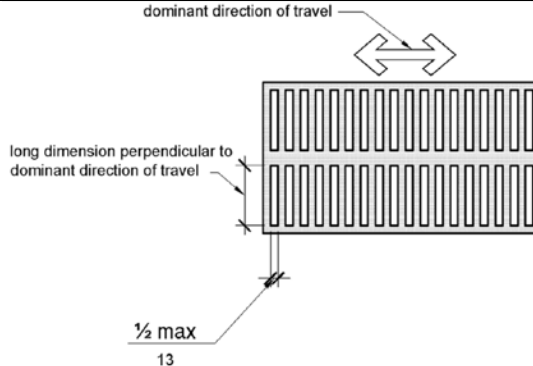


(b) clear floor space at lavatories



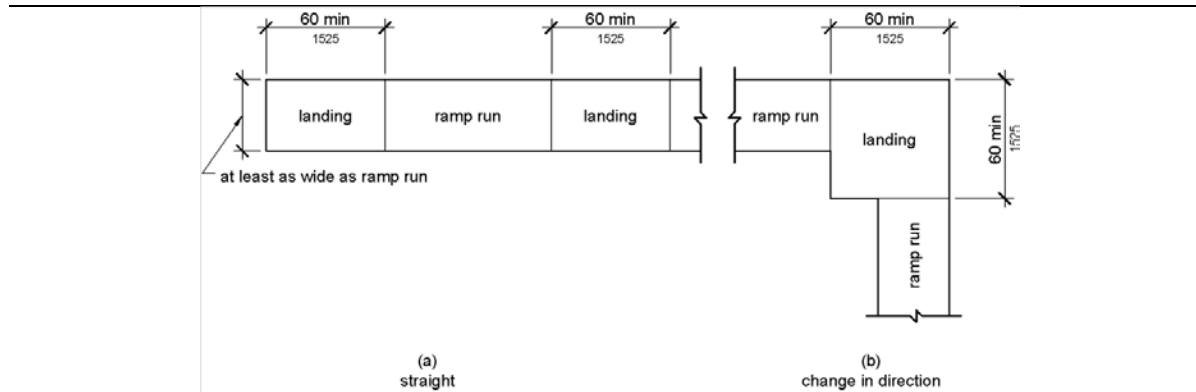
Floor Surfaces

Change in level less than ¼"	May be vertical without edge treatment
Change in level between ¼" and ½"	Must be beveled with a slope no greater than 1:2
Change in level greater than ½"	Must be a ramp
Opening Clearance	Openings in floor or ground surfaces shall not allow passage of a sphere more than ½ inches. Elongated openings shall be placed so that the long dimension is perpendicular to the dominant direction of travel.



Ramps

Maximum Ramp slope	1:12 (1" rise for every 12" run)
Maximum Rise for any ramp	30" (2'-6")
Changes in elevation greater than 30"	Require a level landing before the next ramp starts
If 1:12 slope is not possible	Use 1:10 slope with a maximum rise of 6" or Use 1:8 slope with a maximum rise of 3"
Minimum Ramp Width and length	36" with landings or at least as wide as the widest ramp leading to them
Minimum landing lengths	60"
When ramps change direction at a landing, the landing	60" square
Need for handrails on both sides of ramps	Rise greater than 6" or Lengths greater than 72"
Top of Handrails	34"-38" above the ramp surface
Handrail Extension	12" min. beyond the top and bottom of a ramp segment
Edge protection	Extend floor or ground surface of ramp 12" min. beyond the inside face of a handrail
Ramp length	No more than 30' without a landing

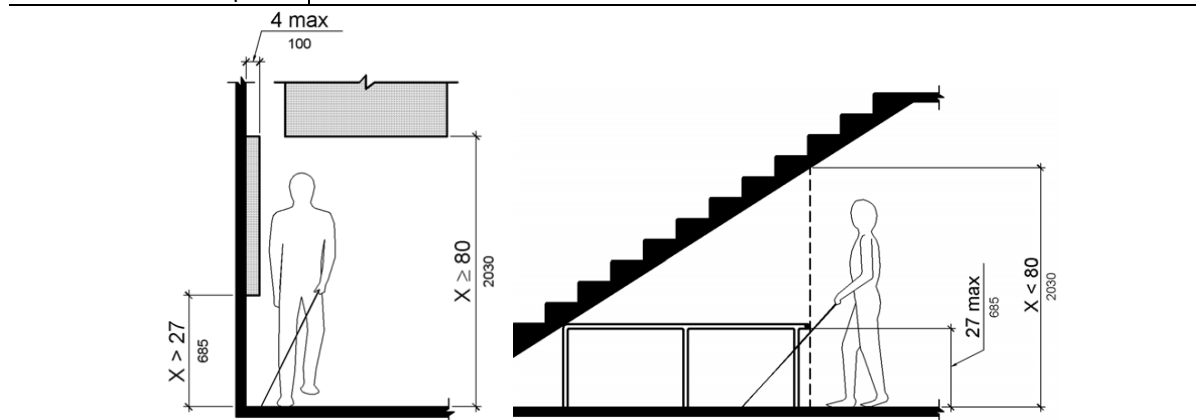


Stairs

Maximum Riser height and tread depth	Riser: 4" min. to 7" max / Tread: 11" min. measured from riser to riser Note: open risers are not permitted
Stairway Handrails continuous	provide on both sides and 34"-38" above stair nosings
Stairway Handrails not continuous	Extend 12" min. beyond the top riser and 12" plus the depth of one tread beyond the bottom riser
Gripping width	1 1/4" to 2"
Space between handrail and wall	1/2" min
Stairway part of accessible route in an unsprinkled building	Provide 48" clear between handrails

Protruding Objects

27" or below, above the floor	Project any amount
Higher than 27" above the floor	4" max.
Headroom in walks, halls, corridors, passageways, aisles, or other circulation spaces	Vertical clearance of 80" (6'-8") Note: if vertical clearance is less than 80" provide a guardrail or other barrier must be provided, for example under a stair



Seating

Quantity of accessible Seating area in public or common areas	1% to 5%⁺ fixed or built-in seating or tables of the total amount of seating and tables
Companion seat to be provided next to wheelchair area	1
Space requirements for wheelchairs seating spaces in series	48" x 66" or 60" x 66"

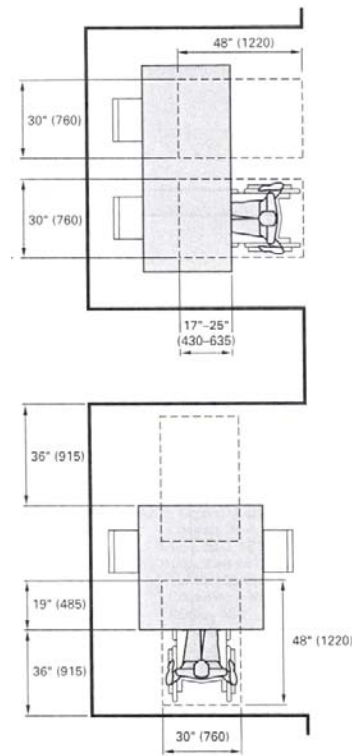
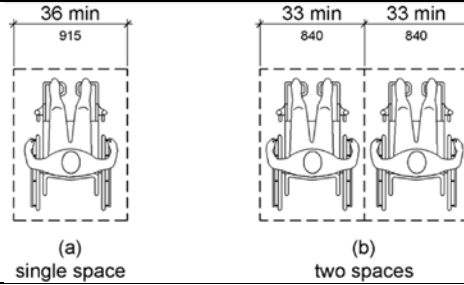


Table 56.1

Minimum Number of Wheelchair Spaces for Assembly Areas

capacity of seating in assembly areas	number of required wheelchair locations
4 to 25	1
26 to 50	2
51 to 300	4
301 to 500	6
over 500	6, plus 1 additional space for each total capacity increase of 100

Figure 56.18 Minimum Clearances for Seating and Tables

Elevators

Elevator Side approach Floor Buttons Height	54" max. above floors
Elevator Front approach Floor Buttons Height	48" max. above floors
Emergency Buttons	Grouped at the bottom of the panel with the centerline of the group at 35"

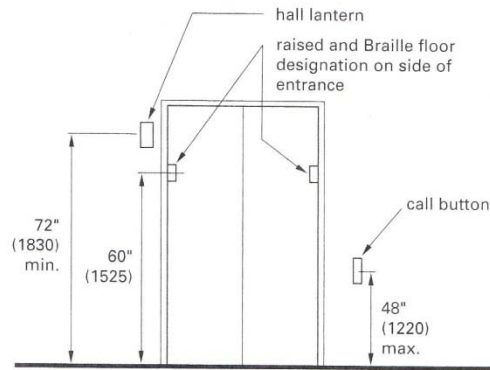
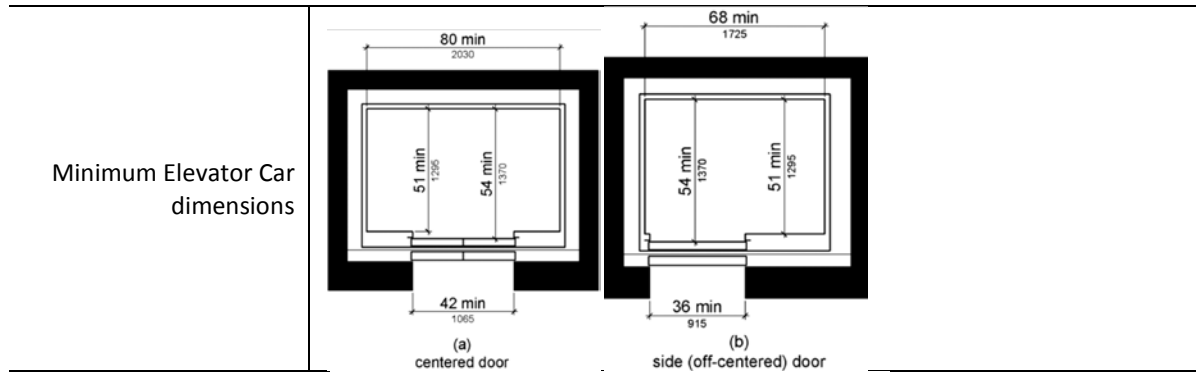
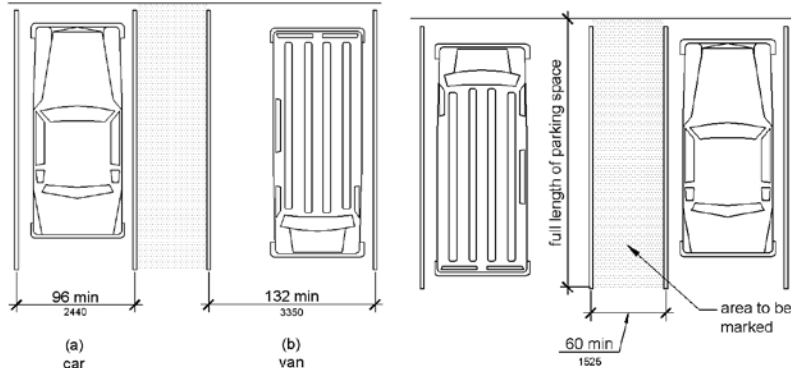


Figure 56.19 Elevator Entrances

Parking Spaces




Access aisle	60" wide min. x full length of the parking spaces they serve
Car parking space width	96" wide min.
Van parking width	132" wide min. or 96" wide min. if access aisle is 96" wide min.



Passenger Loading Zones	60" wide x 240" long / 5' x 20'
Passenger Loading Zones Vertical Clearance	114" min (9'- 6")

Symbols

International Symbol of Accessibility	
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Telecommunication Device for the Deaf TDD Symbol		
Access for hearing loss symbol		
Volume Control Telephone		

▪ MEANS OF EGRESS

▪ Definitions and Notes

▪ Occupancy Group Table

Group	Occupancy	Subgroup occupancy / Examples
A	ASSEMBLY	A-1:Theaters / A-2: Restaurants / A-3: Libraries / A-4:Arenas / A-5: stadiums
B	BUSINESS	Office, education above 12 th grade, etc.
E	EDUCATIONAL	High school
F	FACTORY and INDUSTRIAL	F-1: factory moderate hazard / F-2: factory low hazard
H	HAZARDOUS	See code
I	INSTITUTIONAL	I-1: group home / I-2:hospitals / I-3: jails / I-4:daycare infants
M	MERCANTILE	Mall, retail, etc.
R	RESIDENTIAL	R-1: hotels / R-2: apartments / R-3: bed and breakfast / R-4:small assisted living
S	STORAGE	See code
U	UTILITIES	See code

- **Public Way:** any street, alley, or similar parcel of land essentially unobstructed from the ground to the sky that is permanently appropriated to the public for public use and has a clear width of no less than 10 feet.
- **Occupant Load Factor:** the amount of floor area ,net – space actually used or gross – includes stairs, corridors, toilet rooms, mechanical rooms, closets, and interior partition thickness, presumed to be occupied by one person
- **Accessory Occupancy:** a space or room that is an accessory to a main occupancy but that does not exceed 10% of the floor area of the main occupancy. It does not need to be separated from the main occupancy with a fire barrier. Ex: a small gift shop in a hospital

- **Incidental accessory occupancy:** a space or room, not exceeding 10% of the floor area of the story where it is located, which is incidental to a main occupancy and has the same qualification has the nearest main occupancy, but must be separated from the main occupancy by a fire barrier. Ex: linen collection room on the same floor as hotel rooms.

- **Occupant Load:** number of people that a building code assumes will occupy a given building or portion of a building. The IBC requires that occupant load be established by taking the largest number determined by one of the three methods:
 1. **Actual number of people** the space or building is designated to accommodate, typically used where fixed seating exist.
 - Ex: auditorium has 150 seats = occupant load 150
 2. Determine the occupant load **using a load factor** as given in the code. Calculation: Divide the area in sf by the occupant load factor.
 - Ex: restaurant is 2500 ft^2 and the occupant load factor is 15 ft^2 , divide 2500 by 15, equals 166.67 or 167 persons.
 3. The third method requires that the occupant loads should be **cumulative as occupants exit through intervening spaces to an ultimate exit**
 - Ex: office is 3700 ft^2 with a load factor of 100 ft^2 , 2 classrooms each 1200 ft^2 with a load factor of 20 ft^2 . First the office, divide 3700 by $100 = 37$ persons. Second Classrooms, 2 classrooms, $1200 + 1200 = 2400 \text{ ft}^2$, divide 2400 by $20 \text{ ft}^2 = 120$ persons. Total occupants is $120 + 37 = 157$ persons

- **Means of Egress:** continuous and unobstructed path of vertical and horizontal egress travel from any point in a building or structure to a public way. It consists of 3 parts:
 1. **The exit access:**
 - Portion of the means of egress that leads to the entrance of an exit. The exit access does not provide a protected path of travel but travel distance is measured and regulated.(see definition below) - (aisles, rooms, spaces, corridors, doorways, hallways, intervening rooms, and ramps)
 2. **The exit:**
 - Portion of the means of egress that provides a protected (1 or 2hr rating) and fully enclosed path of egress, from all interior spaces, between the exit access and exit discharge. Travel distance is not an issue once the exit has been reached. (door, exit stair enclosure, exit passage ways, horizontal exits)
 3. **The exit discharge:**
 - Portion of the means of egress between the termination of an exit and a public way

- **Common Path of Egress Travel:** portion of an exit access that the occupants are required to traverse before two separate and distinct paths of egress travel to two exits are available. If the common path of egress travel is greater than 75 feet provide 2 exits, except in H occupancy group. Sometimes, the common path of egress travel can be extended to 100 feet, if certain conditions are met, such as a fully sprinklered building.

- **Exit access travel distance:** it is the distance that an occupant must travel from the most remote point in the occupied portion of the exit access to the entrance to the nearest exit. Because exit access areas are not protected, the code limits how far someone must travel to safety. Travel distances are based on the occupancy and whether or not the building is sprinklered.

- **Determine Number of Exits:** the number of exits depends on the occupant load, the occupancy type, the limitations of the common path of egress travel, and specific requirements for large occupancy loads.
 - Up to the maximum occupant load of the code: at least 1 exit
 - More than the maximum occupant load of the code: at least 2 exits
 - Common path of egress travel more than limits of travel in code: 2 exits
 - Between 501 and 1000: 3 exits
 - More than 1000: at least 4

- **Separation of Exits:** use the one-half diagonal distance rule
 - 2 exits are required in a non-sprinklered building, the distance between the doors must be equal or greater than $\frac{1}{2}$ of the maximum overall diagonal dimension of the building or are to be served
 - 2 exits are required in a sprinklered building, the distance between the doors must be equal or greater than $\frac{1}{3}$ of the maximum overall diagonal dimension of the building or are to be served
 - 3 or more exits are required, 2 must conform to the one-half diagonal distance rule, and the third and additional exits must be at a reasonable distance apart, so that if one is blocked, the others will be available

- **Width of Exits:** the minimum width in inches of exits is determined by multiplying the occupant load served by a .03 factor for stairways or a .02 factor for egress components other than stairways. If the minimum width is less than the minimum width given in the code, use the larger of the two. If a greater width is specified in the code, the larger number must be used.
 - Ex: an office has an occupant load of 157; the minimum width of the corridor will be determined by $157 \times .02 = 31.4''$ or 32'' clear width. But elsewhere in the code, it says that when the occupant load is greater than 50, provide a 44'' corridor. Therefore, 44'' should be used for the corridor clear width.

- **Corridors:** they must be fire- resistance rated and extend from the floor to the underside of the structural slab above or to the underside of a fire-resistive ceiling. There are four exceptions.
 1. Half of the required egress in group E lead to the exterior at ground level
 2. Corridors in a dwelling unit or a guestroom in group R
 3. Corridors in open parking garages
 4. Group B occupancies that require 1 exit by other provisions in the code
 - If a corridor is fully sprinklered, in group A, B, E, F, M, S, and , U occupancies, it does not need to have a fire rating, this principle extends to the doors along the corridor
 - A corridor must be continuous to an exit and must not pass through intervening rooms.
 - Dead end corridors are limited to 20 feet but there are three exceptions; where two of them allow for a 50 feet long corridor depending on the occupancy group, and the third, allows for a corridor longer than 20 feet, if the length is less than 2.5 times its width at the narrowest point.
 - Opening requirements in a 1hour fire rated corridor

Doors | 20 minutes fire rating / smoke and draft control seals/ self-closing/automatic closing by actuation of a smoke detector

Glass	UL Listed / ¼ hour fire protection rating / cover a maximum of 25% of the wall except if the glass is fire-resistance rated
Duct	Provide a fire damper with a 20 minutes fire rating

- **Exit Corridor minimum width: 44" (3'-8").**
 - Doors and handrails cannot project in a corridor more than 7" into the required width when fully open
 - Project horizontally from either side of the corridor a max. of 1 ½" for trims and other decorations, and 3 ½" for handrails.
 - Find exceptions for the exit corridor width in the table below, and verify with requirements from the ADA.

Access to MEP equipment	24"
All occupancy group, occupant load less than 50	36"
Within a dwelling unit	36"
E occupancy serving 100+ occupant load	72"
I occupancy for healthcare care centers for ambulatory patients	72"
I-2 occupancy for bed movement	96"

- **Egress Doors** should be (1) readily distinguishable, (2) readily recognizable, (3) cannot be covered with mirrors or other reflective materials, and (4) cannot be concealed fabrics, decorations, or similar materials.
 - Egress Door size: 36" wide with a clear width of 32"min., and 80" high min. The maximum width of swinging doors is 48"
 - Egress doors must be pivoted or side-hinged
 - **Egress doors must swing in the direction of travel when the area served has an occupant load of 50 or more or is a group H occupancy**
 - Egress doors must not swing into a required travel path, they can be recessed to avoid this problem
 - Egress doors must not swing into a required travel path more than 7"
- **Exit Stairways:** they must be completely enclosed because vertical shafts provide the most readily path for fire and smoke spreading upward from to floor.
 - Exit stairways that do not need to be enclosed, if:
 1. In Group H and I occupancy, a stairway is serving an occupant load less than 10 not more than 1 story above or below the level of exit discharge
 2. In Group R-2 and R-3 occupancy, a stairway is serving and is contained within a single residential dwelling unit, or in an R-1 guestroom
 3. Other than in Group H and I, up to 50% of the number of egress stairway is serving only one adjacent floor
 - Requirements for Fire Rating in exit stairways. Note: stories include basement, not mezzanines

4+ Stories	2-hour rated wall	Doors: 1 ½ hour
1-4 Stories	1-hour rated wall	Doors: 1 hour

– Requirements for all exit stairways

Occupant load > 50	44" wide or as wide as determined the .03 factor, whichever is greater
Occupant Load < 50	36" wide
Handrail Projection into required width	4 ½"
If accessible by ADA	48" between handrails
Stair risers	4" to 7"
Stair tread	No less than 11"
Nosing Radius	½" radius max.
Nosing Space	1 ¼" max.
Landing	No less than the minimum width of the stair in the direction of travel but no more than 48" if it is a straight run
Distance between landings	12' measured vertically
Intermediate handrails	Stair is wider than 60" or 5'-0"
Provide handrails on both sides except if	<ol style="list-style-type: none"> 1. Aisle stairs have a center handrail 2. Stairs inside dwelling units 3. Spiral stairways 4. Aisle stairs serving seating only on 1 side 5. Single change in elevation where the landing depth on each side is greater than what is required for landings, in decks, patios, and walkways 6. Single risers in group R-3 occupancy at an entrance or egress door 7. Single risers within dwelling units of R-2 and R-3 occupancy
Top of Handrail	34" to 38" above the nosing of the treads
Handrail Extension beyond top riser	12"
Handrail Extension beyond the bottom riser	Depth of one tread Ex: if tread is 11", the handrail will extend 11" beyond the 11" tread
Handrail Configurations	Perimeter Dimension: 4" min and 6 ¼" max. It may be greater than 6 ¼" if it has a graspable finger recess on both sides
Guards	Should be provided for any walking surface 30" above the ground and must be 42" high min. and designed such that a 4" diameter cannot pass through any opening up to a height of 43"

- **High-Rise Buildings:** for the purpose of the means of egress. They are required to be provided with:
 1. Automatic sprinkler system
 2. Smoke detectors and alarms
 3. Communication systems
 4. Central control stations for fire department use
 5. Smoke control for exit stair enclosures
 6. Standby power systems

- **BUILDING CODES**

- **General:**
 - Building codes are written to protect the health, safety and welfare of the public.
 - Building codes are written on the basis of the “least acceptable risk” – minimum level required for building and occupant safety
 - Building codes are generally adopted by local governments

- **Approved Standards and testing:** All approved materials and construction assemblies referenced in building codes are required to be manufactured to accepted methods or tested approved by agencies according to standardized testing, such as: ASTM International, NFPA, ANSI, industry trade groups such as ASHRAE, or by a Nationally Recognized Testing Laboratory (NRTL), such as UL

- **Construction types** are classified into: Type I, II, III, IV, and V. Type I buildings are most fire resistant, while type V are the least fire resistant. Type I and II are noncombustible. Types III, IV, V are considered combustible.

- **Allowable Floor Area and Height:** it is determined based on construction type. The concept is the more hazardous the building, the smaller it should be. The table provided in the code can be used in one of two ways. If the occupancy group and construction type are known, simply find the intersection of the row “occupancy” and the column “type”, read the permitted area or height, and then increase the areas according to the percentages allowed for sprinklers and perimeter space.
 - Situation 1: program and occupancy are known, the architect must determine the construction type to meet the client size needs
 - Situation 2: the architect must design for an occupancy different than the original occupancy, if the existing building is too large, the project will be unfeasible, unless significant steps are taken such as including a sprinkler system or adding a fire wall
 - Situation 3: require floor space of a project exceeds that allowed by the code and for the construction type the architect wants to use. In this case, the architect can subdivide the building into smaller portions with fire walls.

- **Location of a building on a property** – 2 choices:
 1. Follow the code for setback requirements from the property line, which includes provisions for the exterior bearing wall required fire-protection rating and limitations on openings

2. Allow for a greater setback than required from the code to diminish the limitations on openings and fire-protection rating for lower cost or other reasons.
- **In combination with occupancy type, building types limits the area and height of buildings.**
 - **Types of Construction assembly tests:**
 1. **ASTM 119** – building construction and material: evaluates an assemblies ability to prevent the passage of fire, heat, and hot gasses for a given amount of time; they assemblies are given a rating according to time: 1-4-hr rating, and for doors and other assemblies 20/30/45 minute rating
 2. **NFPA 252** – door assemblies: evaluated the ability of a door assembly to resist the passage of flame, heat, and gases
 3. **NFPA 257** – window and glass block assembly: prescribes specific fire and hose stream test procedures to establish a degree of fire protection in units of time
 - **Types of Finish materials in building construction tests:**
 1. **ASTM E84** / Steiner Tunnel Test – surface burning characteristics of building materials: test samples in a narrow chamber that has a controlled flame at one hand. The result is a materials flame spread rating. Class A (I), B (II), C (III). Class A (I) is the most fire resistant.
 2. **NFPA 265** / Room Corner Test: sometimes required in addition to the ASTM E84 test for textile interior finishes or instead of it. It determines the contribution of interior textile to fire growth using a 8'W x 12'L x 8'H 3-wall room
 3. **NFPA 286** – evaluating contribution of wall and ceiling interior finish to room fire growth: it evaluates materials other than textiles and addresses displacement during the ASTM E84 test.
 - **Fire partition:** wall assembly with a 1-hour fire resistance rating that, in most cases, provides a continuous barrier from the floor to the underside of the floor or ceiling above, or to the ceiling of a fire-resistance rated floor/ceiling or roof/ceiling assembly. Example: corridor walls
 - **Fire Barrier:** it offers more protection than a fire partition. It is a vertical or horizontal assembly that is fire-resistance rated and is designed to restrict the spread of fire, confine it to limited areas, and/or afford safe passage for protected egress. Example: stairways.
 - **Fire Wall:** it is a fire- resistance rated wall that is used to separate a single structure into separate construction types or to provide for allowable area increases by creating what amounts to separate buildings even though they are attached. They need to have a fire-resistance of 2 to 4 hour and must extend continuously from the foundation to or through the roof. Example: wall separating row house units.
 - **Smoke Barrier:** continuous vertical or horizontal membrane with a minimum fire- resistant rating of 1 hour that is designed and constructed to restrict movement of smoke. It is a passive form of smoke control.