Overview of Chapters 1 and 4

ACI 562 - Concrete specific code for existing buildings.
ACI 562 - works within the framework of IEBC or Stands alone.

General Questions to Answer:
1. When is ACI 562 applicable?
2. When are updates to current building code required? Clarifications in New ACI 562
3. Why the original building code need not exceed the current code.
When is ACI 562 Applicable?
Existing Concrete Members, Buildings with a certificate of occupancy, structures permitted for use

ACI 562 is the Standard of Care for Evaluation, Repairs, & Rehabilitations – public reviewed

LDP may view ACI 562 as appending ACI 318 for existing buildings
When is ACI 562 Applicable?

ACI 562 is the current Standard of Care applicable to Existing Concrete Buildings and Members.

The LDP is obligated to use ACI 562 for Evaluation, Repairs, & Rehabilitations
When are updates to current building code required?

Only a few requirements to update to current building code provisions:

1. Using ACI 562 (stand alone) if the building or elements are **UNSAFE**
2. Using IEBC (or ACI 562 alone) if the building has **Substantial** structural damage
   - A. Vertical elements of Lateral Systems
   - B. Vertical elements of Gravity Systems
When are updates to current building code required?

Only a few requirements to update to current building code provisions:

3. Using IEBC alternations or additions being considered require rehabilitation using current building code

New code – will clearly define when to use current code with ACI 562
2013 & New ACI 562:

**Repair Level I:** a structure or individual member that has a significant risk of collapse under current service loads.

Nominal Capacity ($R_n$) is significantly less than Nominal (service) Load Demand, $D_{SL}$.

Demand - Capacity ratio:

$$\frac{D_{SL}}{R_n} > 1.0 +.$$

Repair to comply with current code requirements with ACI 562
New ACI 562:

**Repair Level II:** a structure or individual member that has design strength less than strength demand.

Design Capacity ($\phi R_n$) is less than Strength Demand ($U$).

Demand ($U$) – Design Capacity ratio:

$$U / \phi R_n > 1.0$$

Repair to comply with original code requirements with ACI 562 excluding Chapter 5.
New ACI 562:

**Repair Level III:** a structure or individual member that has design strength greater than strength demand.

Design Capacity ($\varnothing R_n$) is greater than Strength Demand ($U$).

Demand ($U$) – Design Capacity ratio:

$$\frac{U}{\varnothing R_n} < 1.0$$

Repair to comply with ACI 562, excluding Chapter 5.
2013 & New ACI 562:

“Design Bases Code I”: current building code with ACI 562

“Design Bases Code II”: original building code with ACI 562 excluding Chapter 5

“Design Bases Code III”: ACI 562 excluding Chapter 5
How is the design basis code determined?

Decision Tree 1-A

Existing Concrete Structure

Has the local jurisdiction adopted IEBC or an existing building code?

YES

Use ACI 562, Chapter 4

DBC II not to exceed DBC I

NO

Use ACI 562, Section 1.3

DBC II not to exceed DBC I
How is the design basis code determined? Decision Tree 1-B

- Per IIEBC, does the lateral or gravity system have substantial structural damage?
  - Yes: DBC 1
  - No: Proceed to next step

- RL I?
  - Yes: DBC 1
  - No: Proceed to next step
How is the design basis code determined?
Decision Tree 1-C

Per IEBC, are alternations or additions being considered that require DBC I?

- NO
- YES

RL II?

- NO
- YES

DBC II not to exceed DBC I

DBC III
Why the design basis code determined need not exceed the current code - Decision Tree 2-A, Calculation Assessment

Current Code Provisions are the State of the Art Standard, which are always safe and acceptable. Exceeding these regulations is not necessary.

Which Code Current or Original to use in Evaluation and design of Rehabilitations and Repairs?

Is the original code an option?

YES

Use the Original Design Code Provisions for Demand, Capacity, and Strength Reduction Factors – determine original design demand-capacity ratio \([U/\phi R_0]_0\)

Use ASCE 7-10 for Demand and ACI 318-11 for Capacity with Strength Reduction Factors of ACI 562, Section 5.3 & 5.4 – determine “C1” demand-capacity ratio \([U/\phi R_1]_{c1}\)

NO

Strength only assessment

Seismic demand small

American Concrete Institute

Always advancing
Decision Tree 2-B, Calculation Assessment

**Decision Tree Steps:**

1. **Yes:** Are the C1 demand-capacity ratios greater than the original design demand-capacity ratios?
   - If yes, proceed to the next step.
   - If no, use ACI 318-11 & ACI 562 with ASCE 7-10.

2. **No:** e.g., Current loads less than the original design loads.
   - Use ACI 318-11 & ACI 562 with ASCE 7-10.

3. **Seismic demand not small:**
   - Use ASCE 7-10 for Demand with ASCE 41 for seismic and ACI 318-11 for Capacity with Strength Reduction Factors of ACI 562, Section 5.3 & 5.4 – determine “C2” demand-capacity ratio $[\frac{U}{\phi R_n}]_{c2}$.
Decision Tree 2-C, Calculation Assessment

**e.g. - Current loads greater than the original design loads**

**YES**
- LDP may use Original Design Provisions. Upgrades are not required, but may be prudent.

**NO**
- Use ACI 318-11 & ACI 562 and ASCE 7-10 with ASCE 41 for seismic

**Are the C2 demand-capacity ratios greater than the original design demand-capacity ratios?**

**Reduced Seismic Provisions of IEBC are excluded from this Decision Tree**