Restoration of Foundation Failures (Seismic Affected Buildings)

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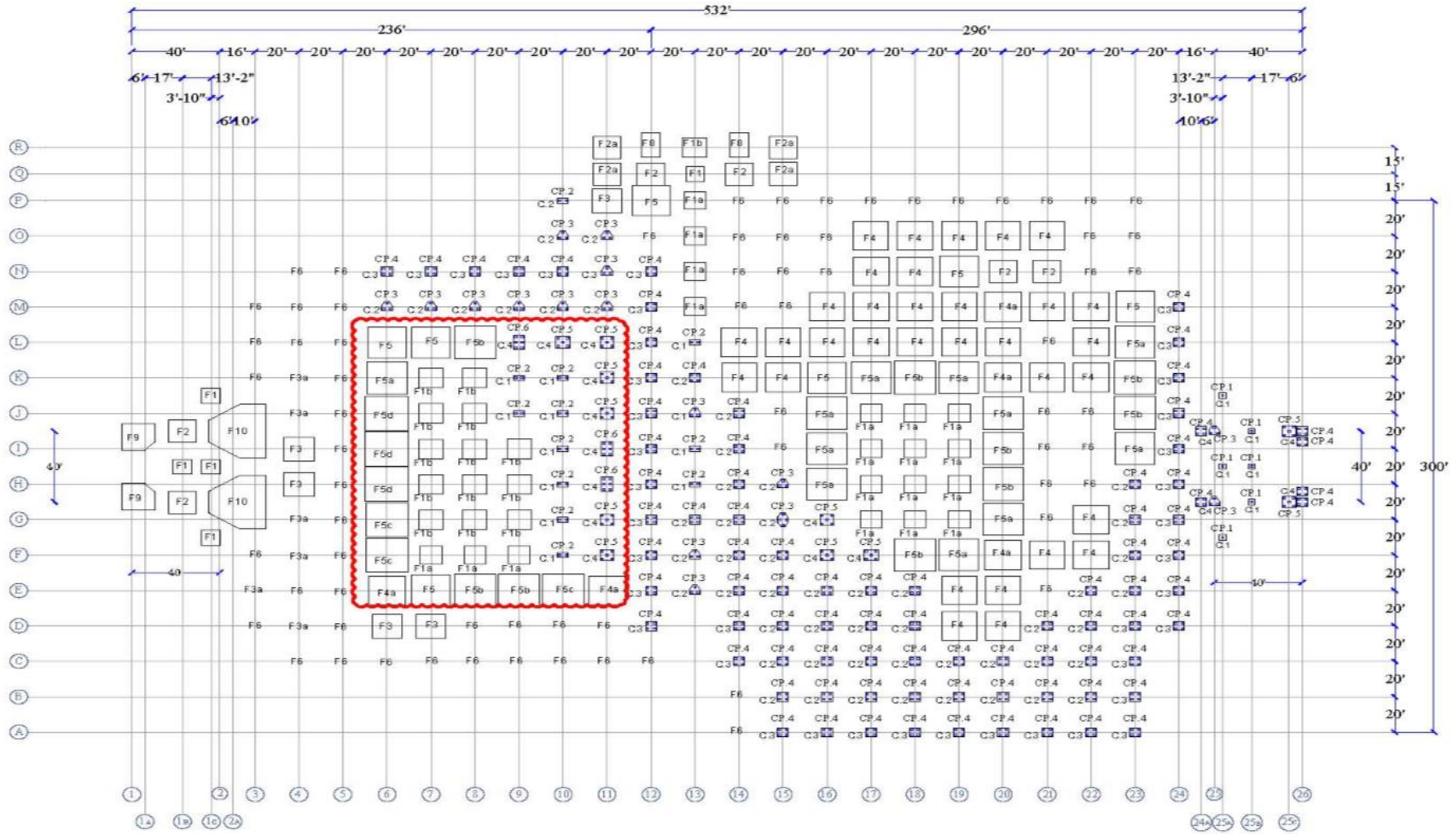
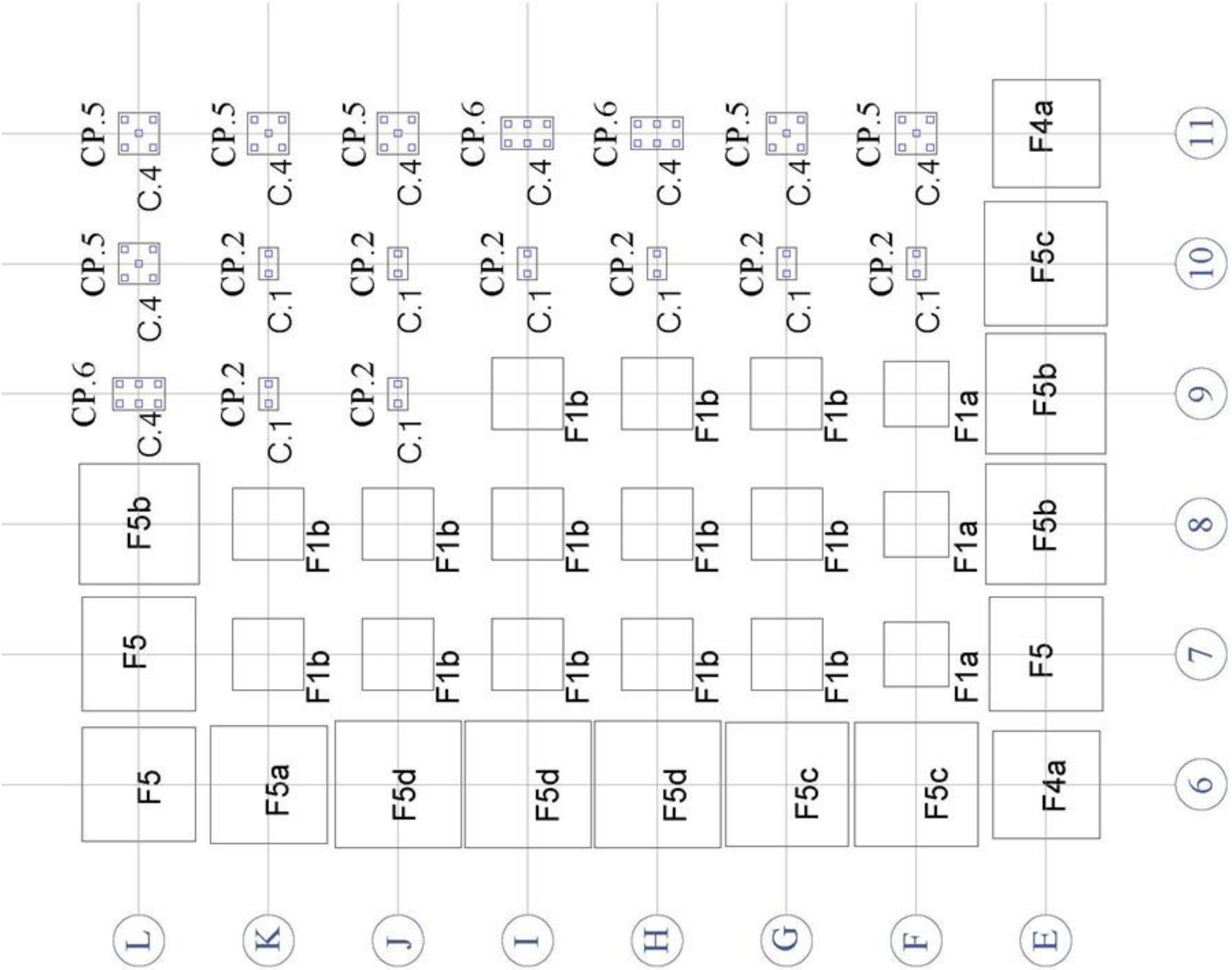
Case 1

Pile Cap and Footing Plan for Seismic Affected Building

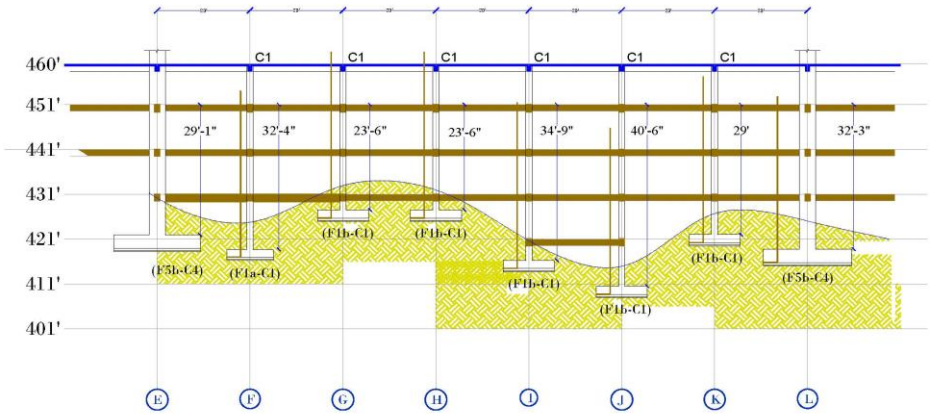




Pile Cap and Footing Plan
for
Seismic Affected Area

Seismic Affected Floor, Level Check and Foundation Check

GRID -8



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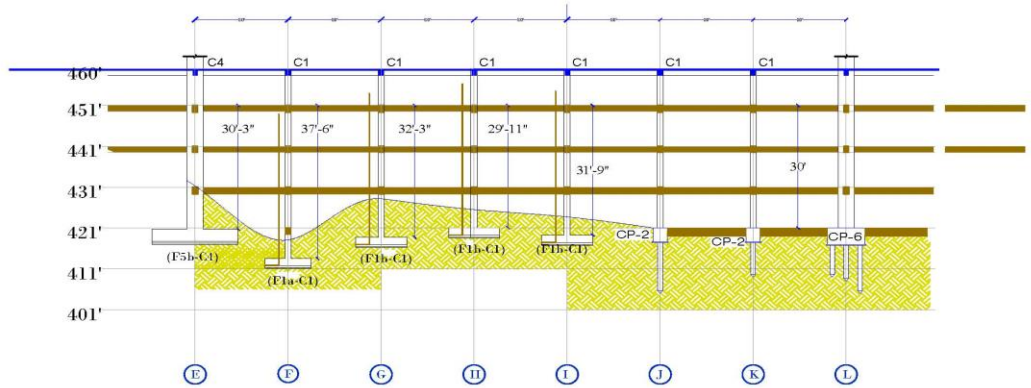

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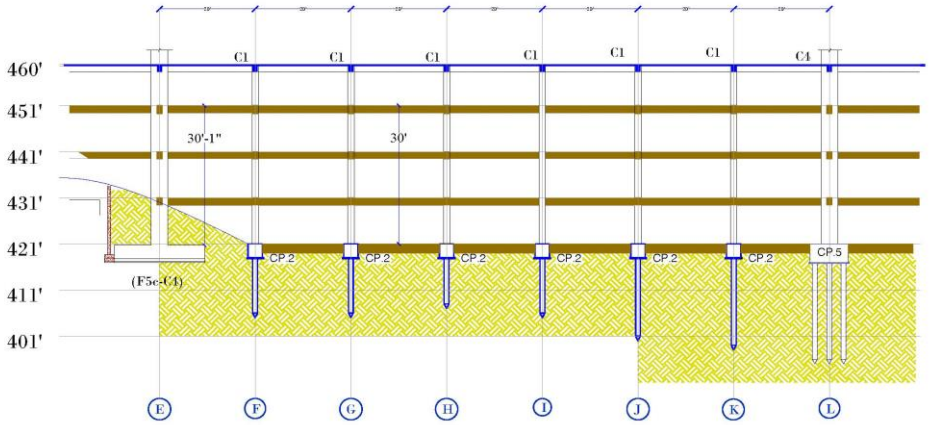

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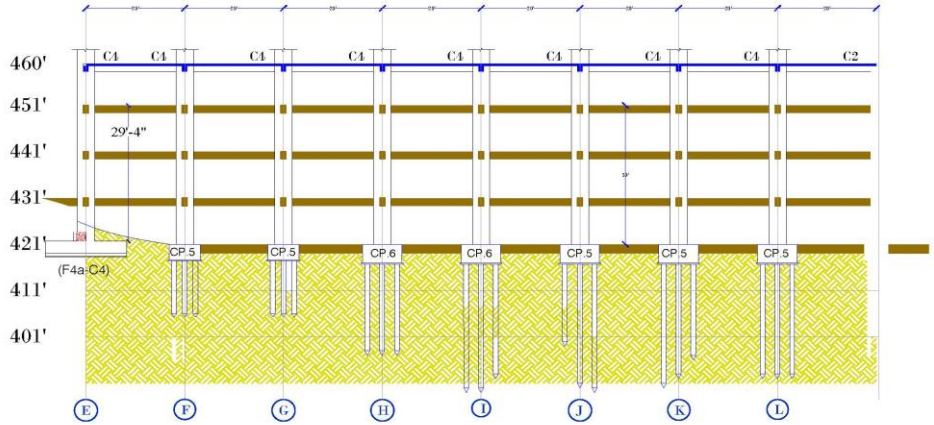
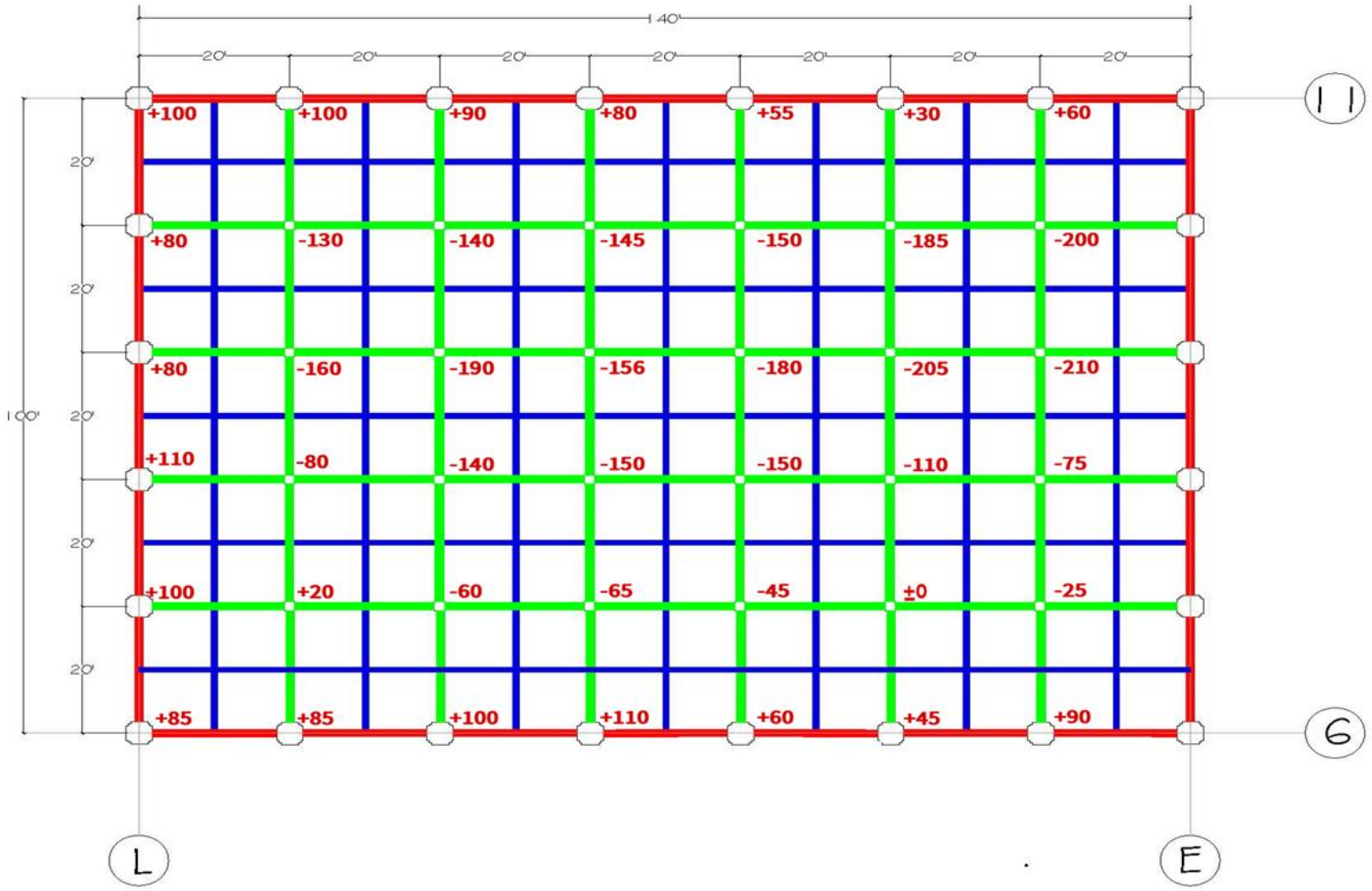
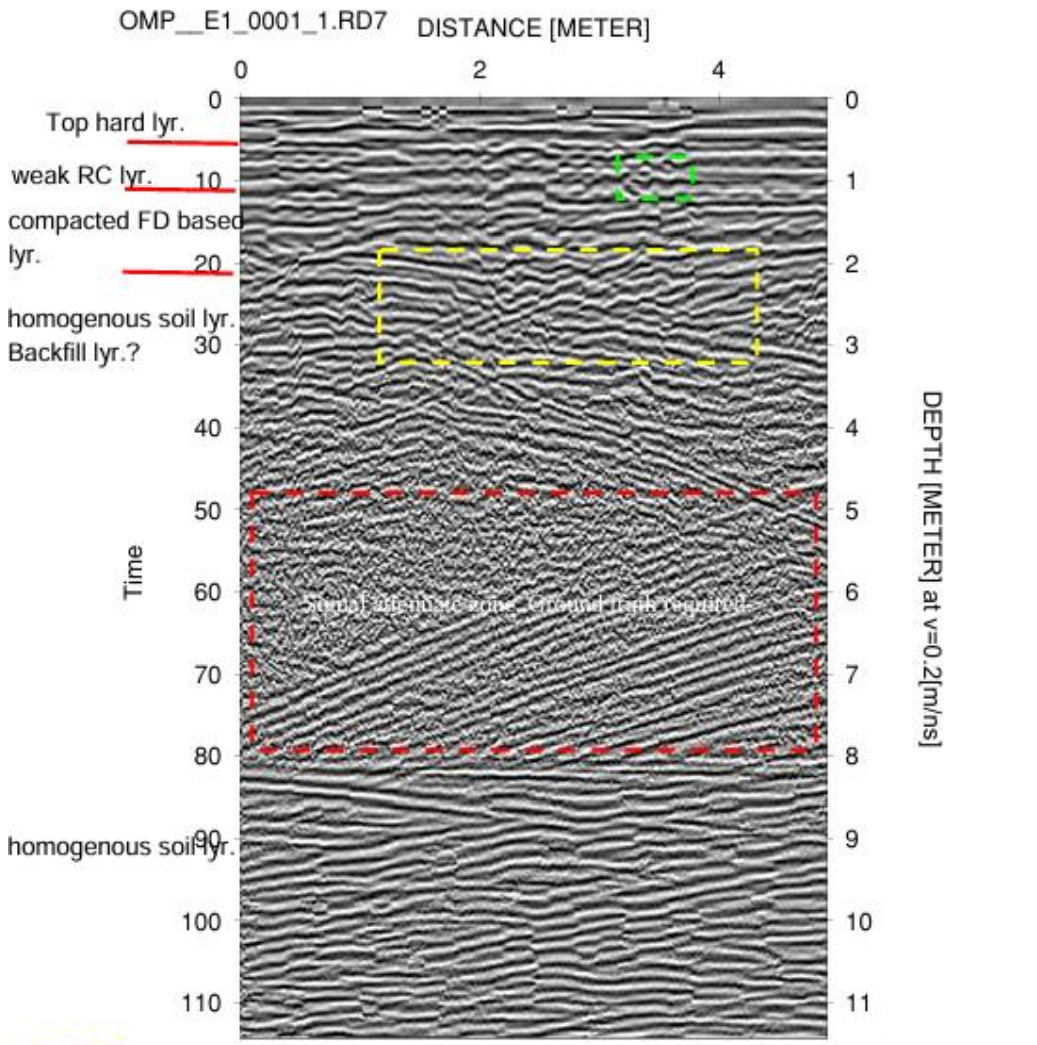


Floor Level Checking



TYPE	SIZE
FB.2	10" x 14"
FB.3	14" x 24"
FB.4	16" x 24"

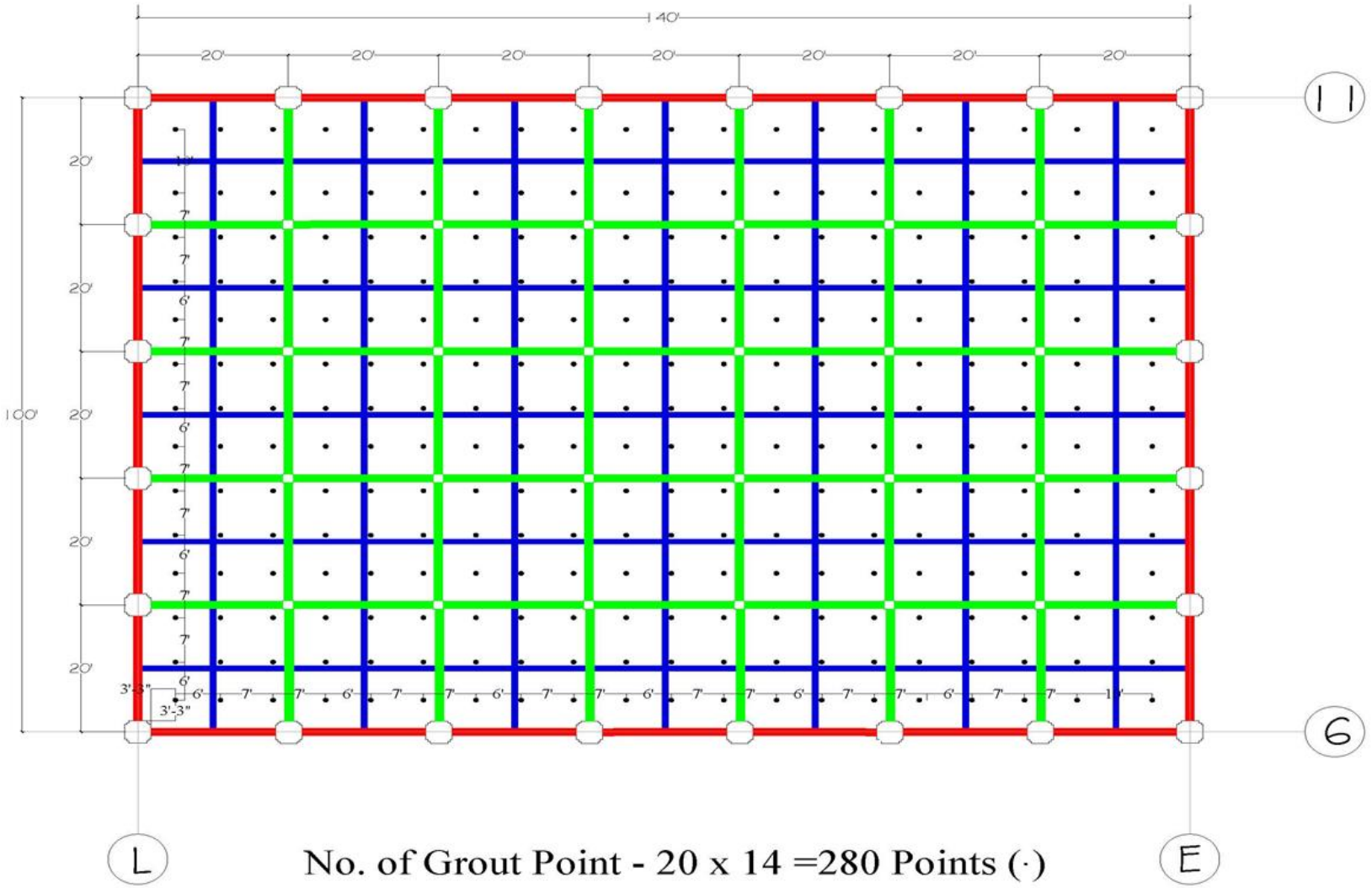
Under Ground Condition Check by Using Ground Penetration Rader



Sand Filling and Compacting with Water

Drilling for Grout Point

Tentative Grouting Points



No. of Grout Point - 20 x 14 =280 Points (·)

Grout Depth - 6 meters

TYPE	SIZE
FB.2	10" x 14"
FB.3	14" x 24"
FB.4	16" x 24"

Date : 15.7.202

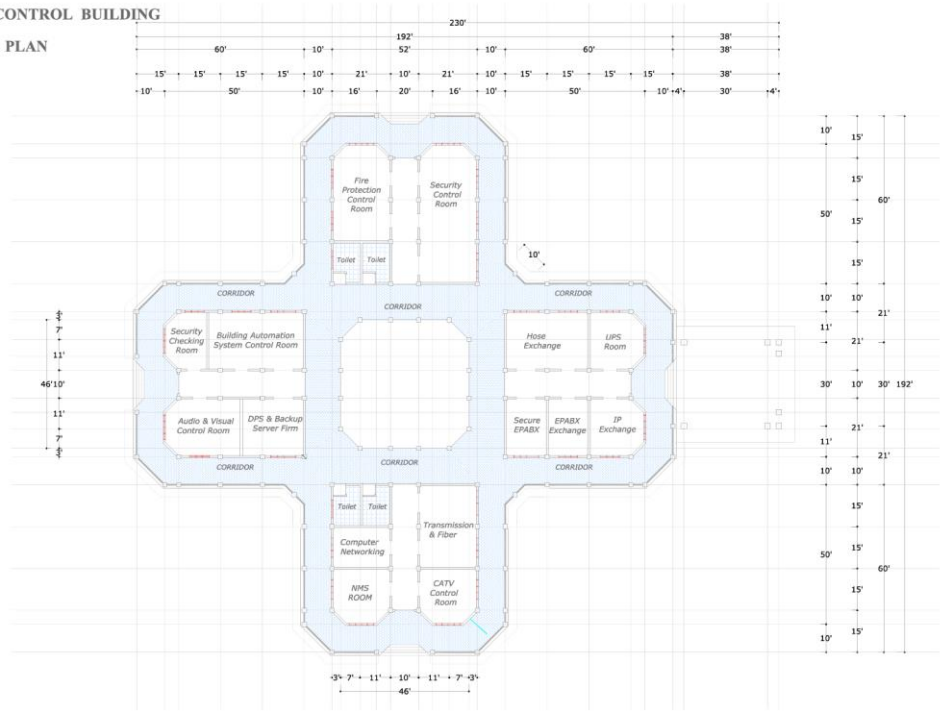
Restoration Process of Foundation Failure (Case 1)

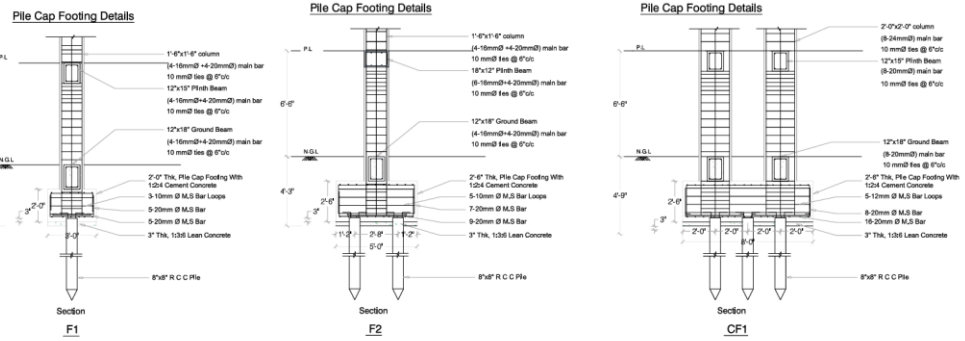
1. Check the Level Differences
2. Check the Foundation Conditions
3. Fill with Sand and Compaction made by Water
4. Soil Improvement up to - 20' by Compaction Grouting
5. Floor Leveling by Filling with Cellular Light-Weight Concrete

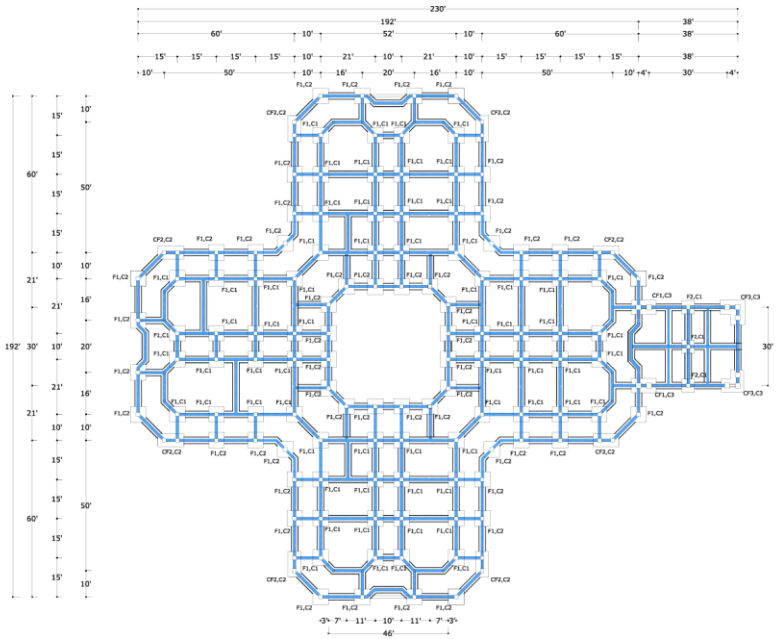
Case 2

MAIN CONTROL BUILDING

FLOOR PLAN







F1 (6'-0"x6'-0"x1'-6")
(16mmØ@6" c/cSpacing upper layer)
(24mmØ@6" c/cSpacing lower layer)

F2 (5'-0"x5'-0"x1'-6")
(16mmØ@6" c/cSpacing upper layer)
(24mmØ@6" c/cSpacing lower layer)

CF1 (9'-6"x5'-6"x1'-6")
(16mmØ@6" c/cSpacing upper layer)
(24mmØ@6" c/cSpacing lower layer)

CF2 (10'-0"x5'-0"x1'-6")
(16mmØ@6" c/cSpacing upper layer)
(24mmØ@6" c/cSpacing lower layer)

CF3 (9'-6"x5'-6"x1'-6") +(5'-6"x4'-0"x1'-6")
(16mmØ@6" c/cSpacing upper layer)
(24mmØ@6" c/cSpacing lower layer)

C1 (1'-6"x1'-6") (4-16mmØ + 4-24mmØ)

C2 (1'-6"x1'-6") (4-16mmØ + 4-24mmØ)

C3 (2'-0"x2'-0") (8-24mmØ)

Conditions of Short Columns (Between Ground Level and Plinth Level)

SHORT COLUMN NO K-21

SHORT COLUMN NO O-18

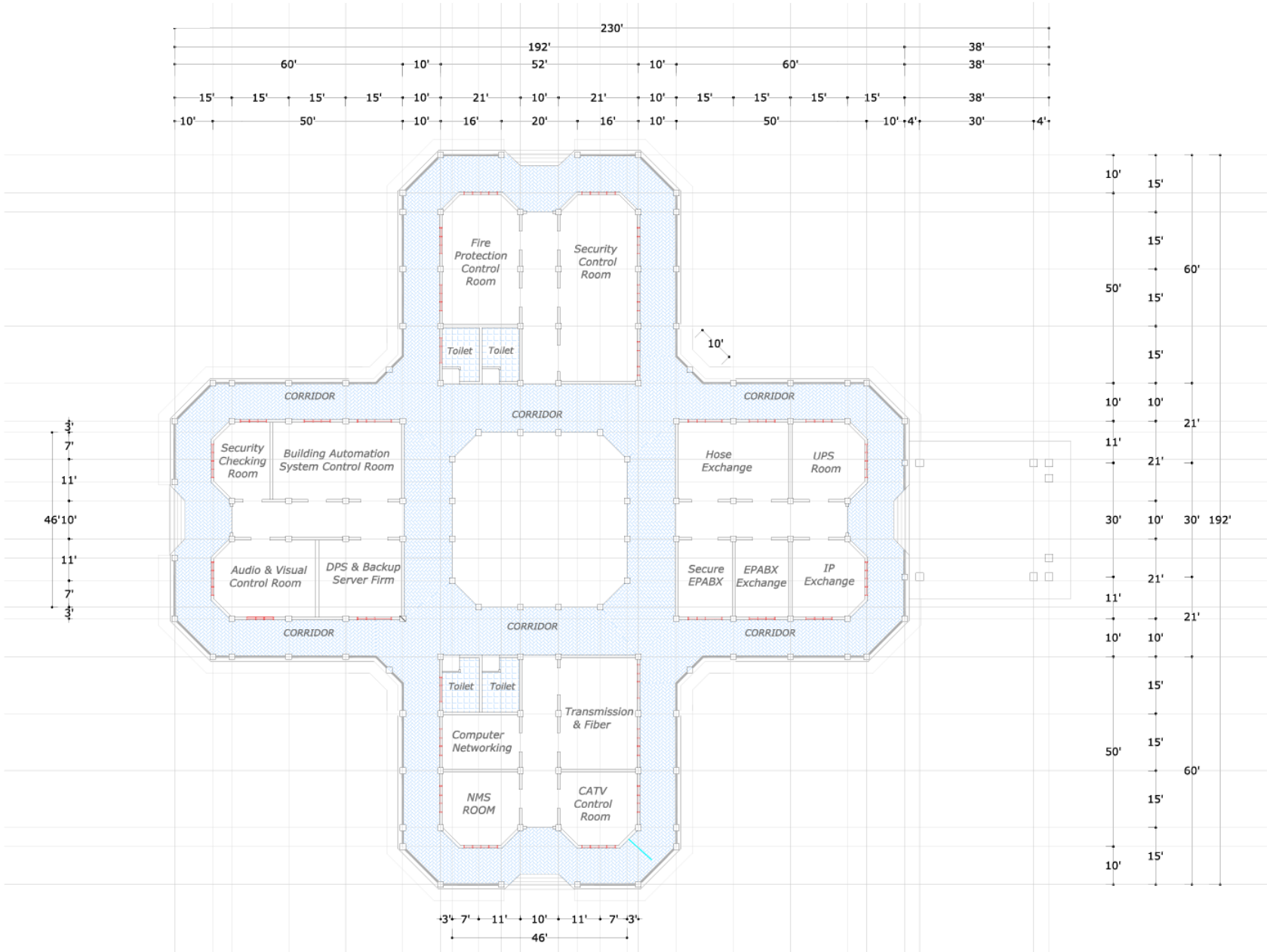
SHORT COLUMN NO P-21

SHORT COLUMN NO E-7

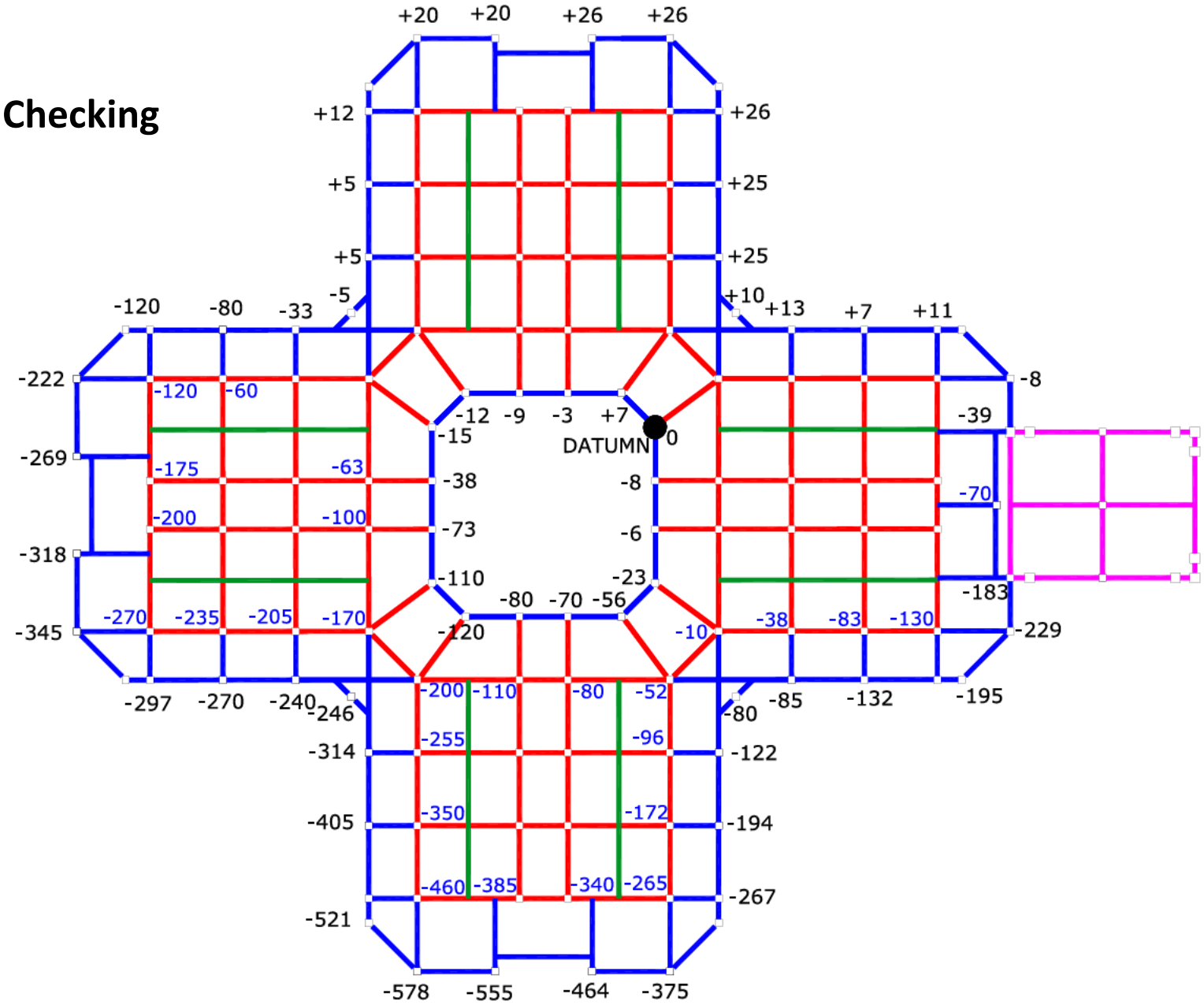
SHORT COLUMN NO E-9

SHORT COLUMN NO E-15

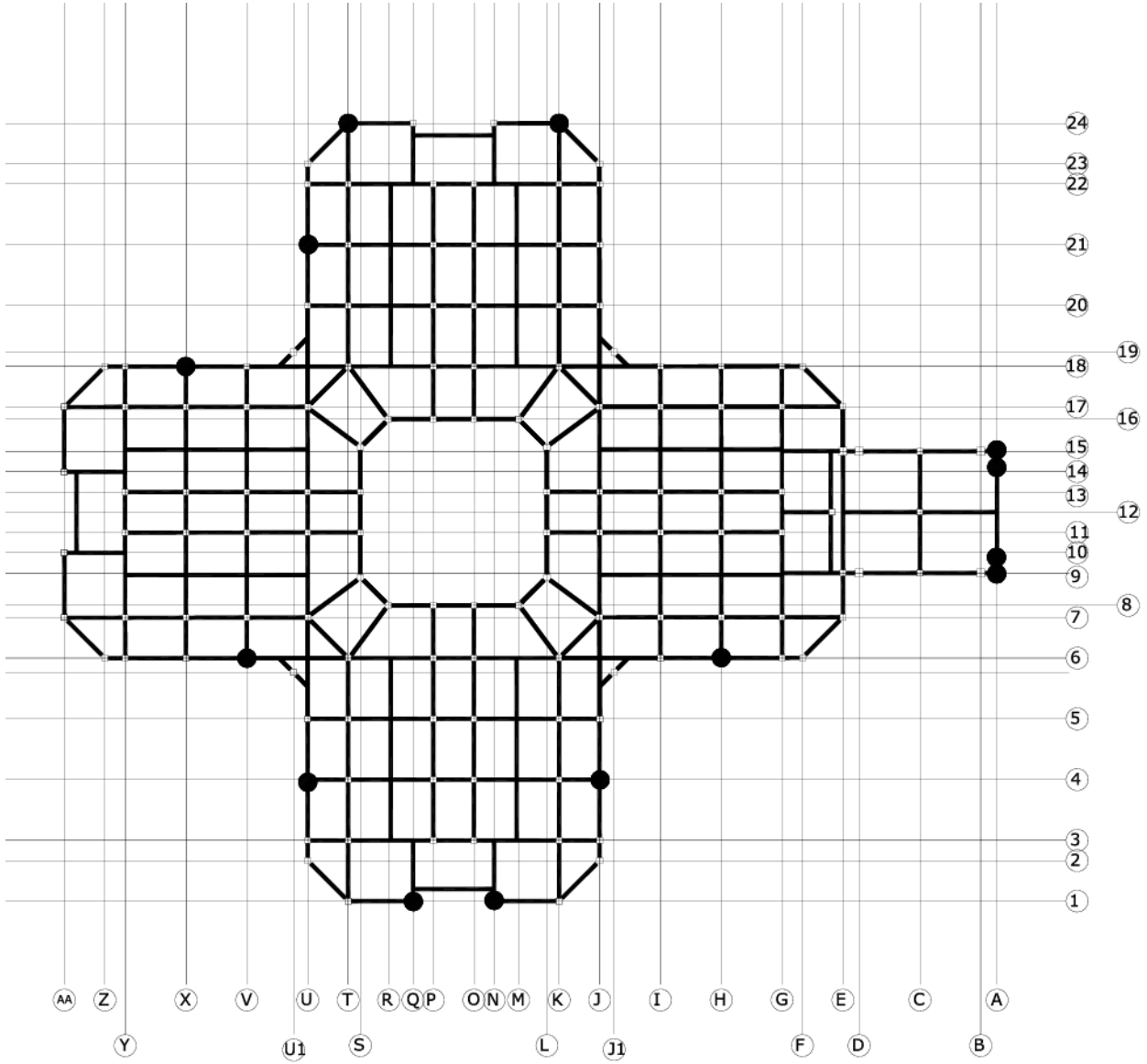
Floor Plan

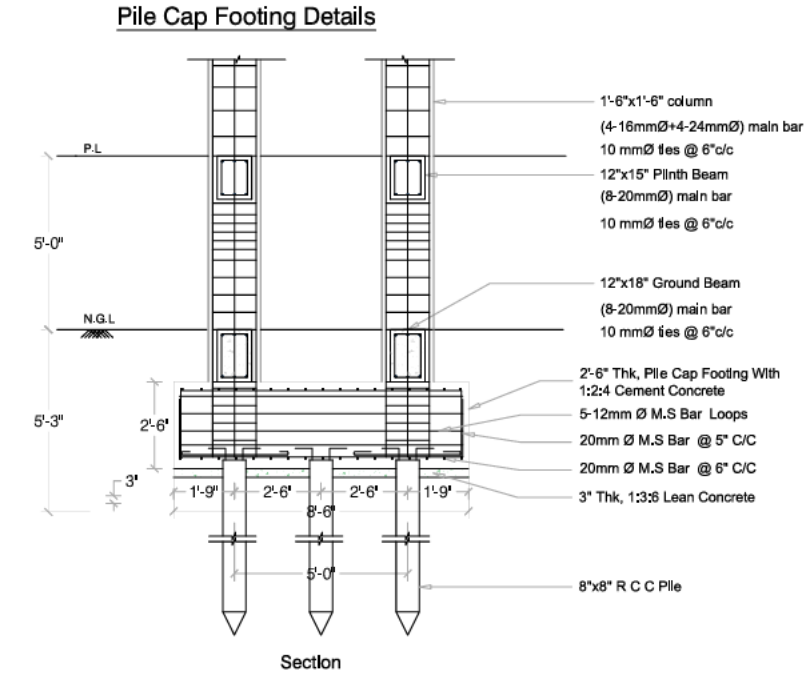

230'
192'
38'
60'
10'
52'
60'
38'
15'
21'
50'
16'
20'
4'
30'
Fire Protection Control Room
Security Control Room
Toilet
CORRIDOR
Security Checking Room
Building Automation System Control Room
Hose Exchange
UPS Room
Audio & Visual Control Room
DPS & Backup Server Firm
Secure EPABX
EPABX Exchange
IP Exchange
Transmission & Fiber
Computer Networking
NMS ROOM
CATV Control Room
46'
192'

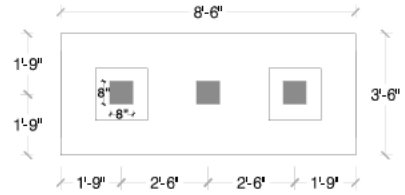
Floor Level Checking



Checking Points for Piles under Pile Cap)







Conditions of Piles Under Pile Cap

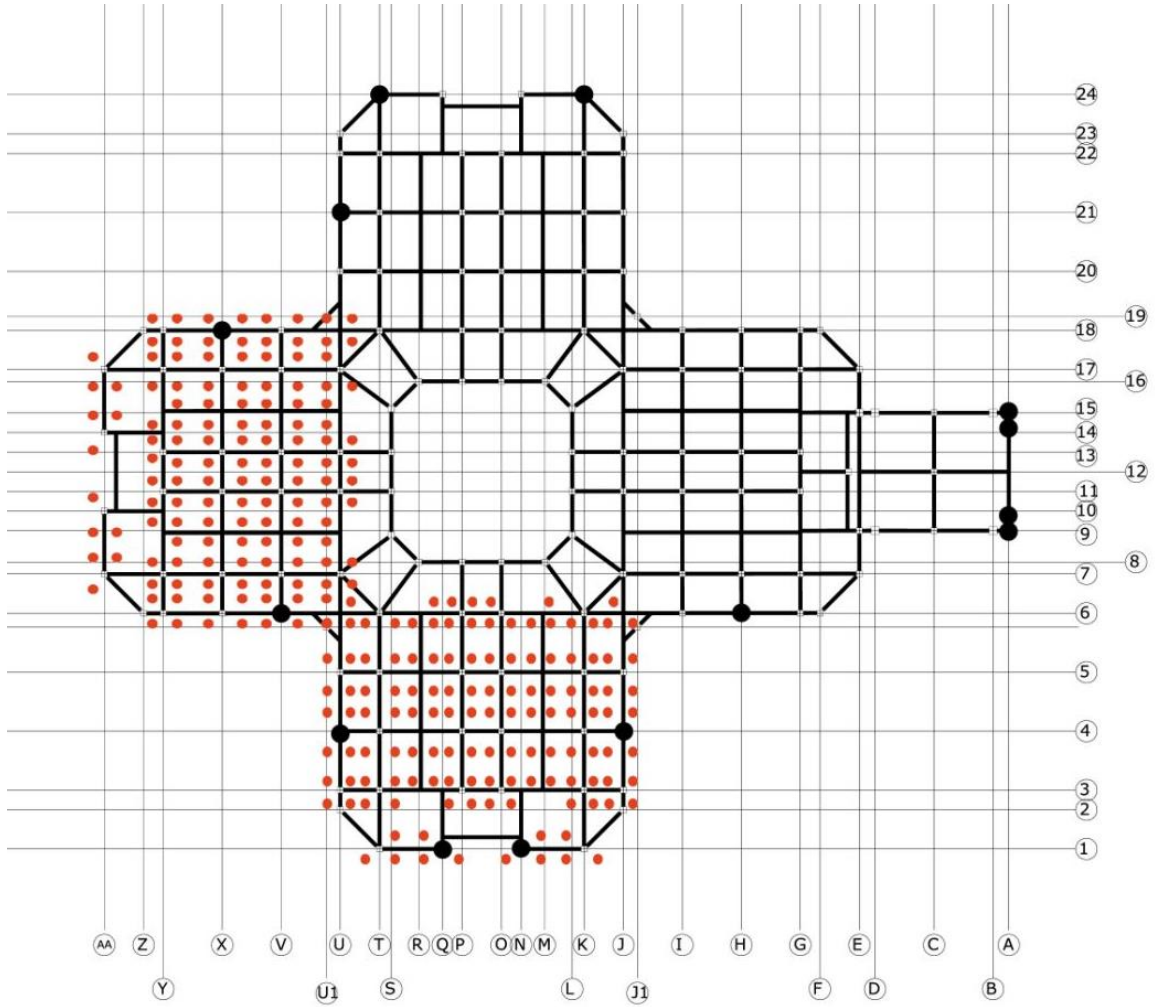
PILE CAP U-4

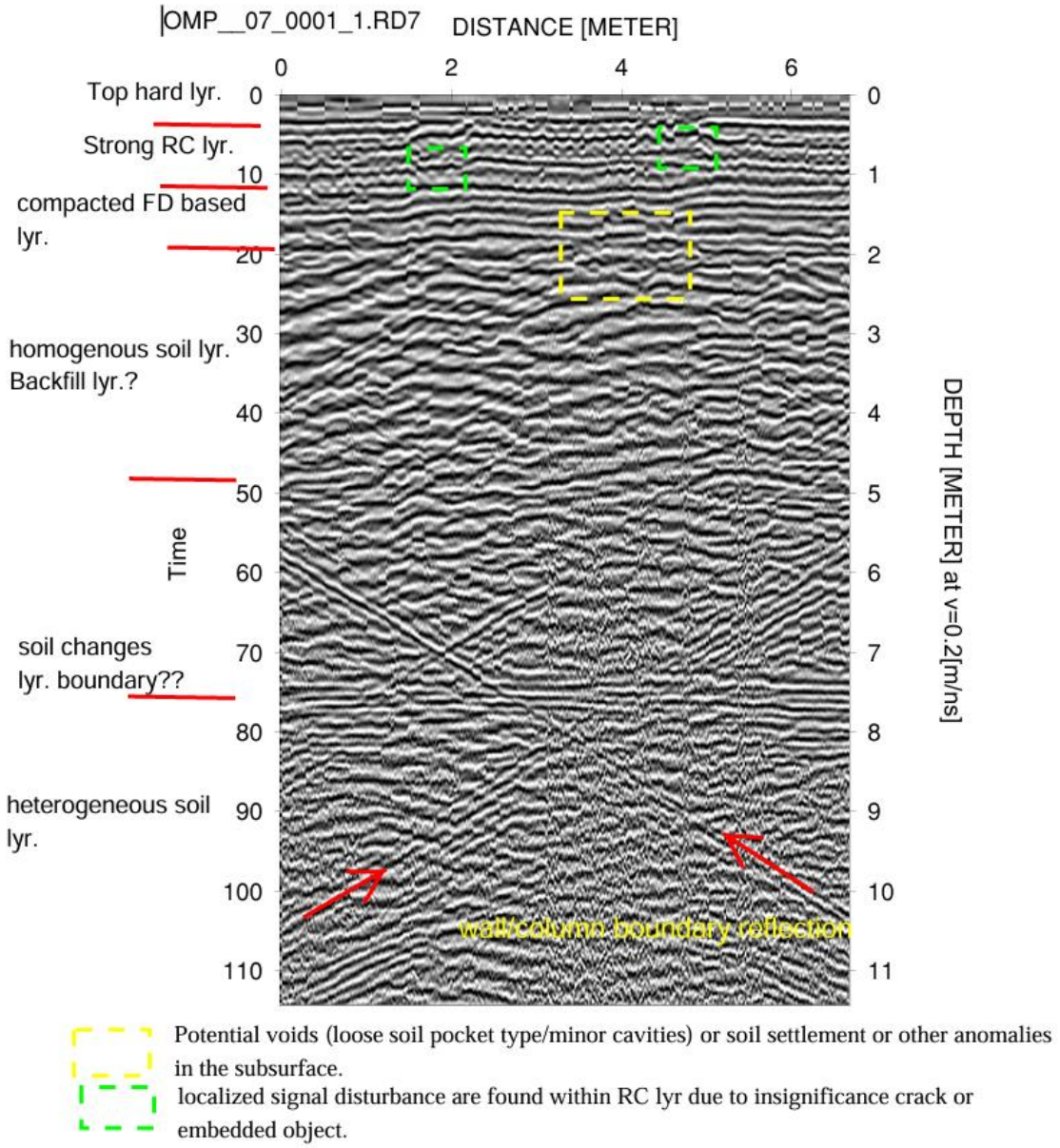
PILE CAP N-1

PILE CAP Q-1

PILE CAP V-6

Tentative Grouting Points





Numbers of Grout Points = Around 250 Points

Grout Depth = 3 m

Restoration Process of Foundation Failure (Case 2)

1. Check the Level Differences
2. Check the Short Column Conditions (Between Ground Level and Plinth Beam)
3. Check the Foundation Conditions
4. Supporting with H Column to Plinth Beam
5. Soil Improvement up to - 10' by Compaction Grouting
6. Restoration of Short Columns
7. Floor Leveling by Filling with Cellular Light-Weight Concrete (Might Not Get Required Absolute Level)

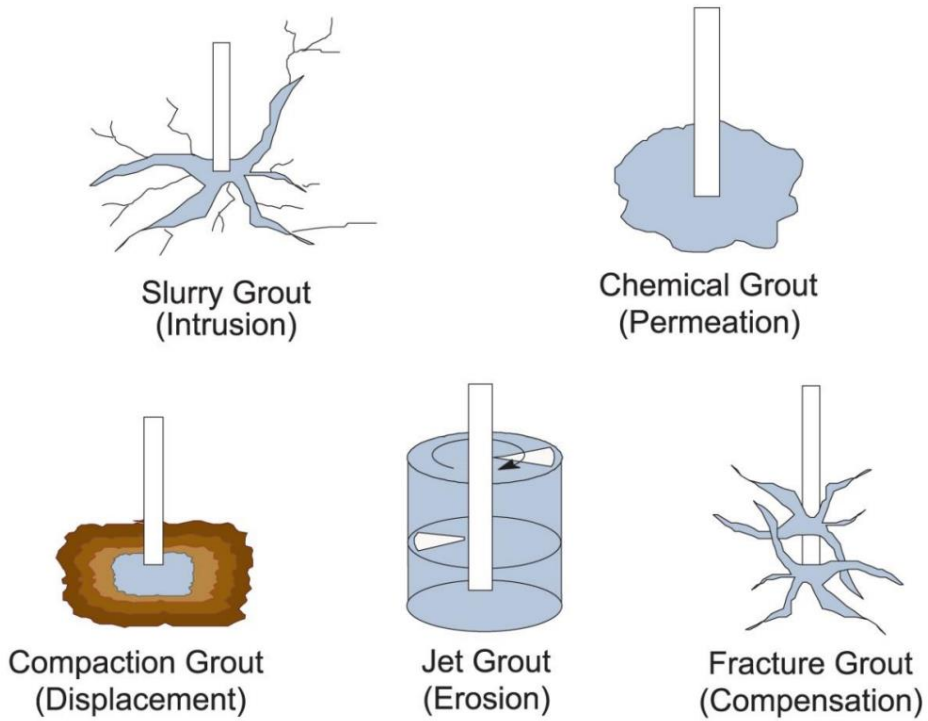
Grouting techniques

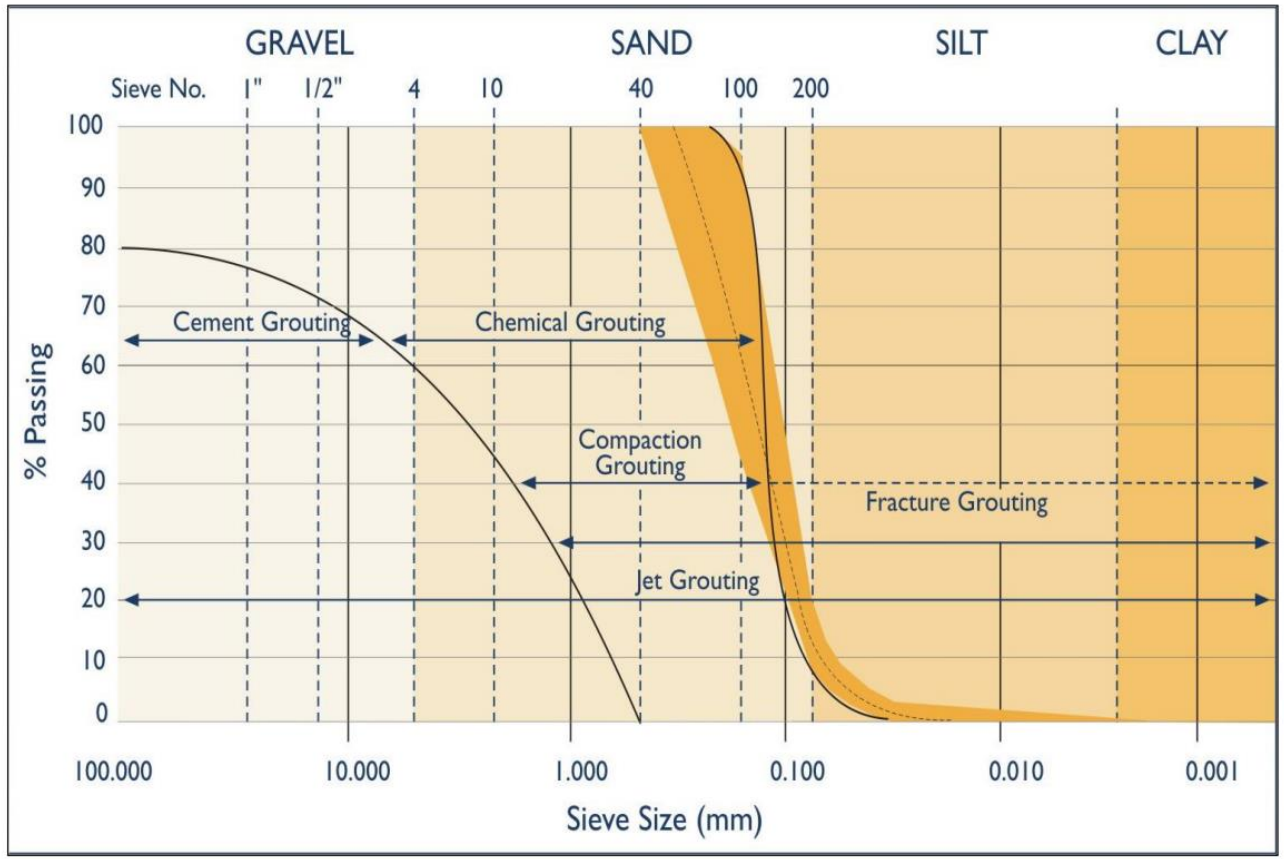
Grouting techniques for ground improvement involve injecting a fluid material (grout) into soil or rock to enhance its strength, stability, and impermeability. Various methods exist, including

1. Permeation grouting,
2. Jet grouting,
3. Compaction grouting,
4. Chemical grouting, and
5. Fracture grouting

each tailored to specific soil conditions and project requirements. These techniques are crucial for supporting structures, controlling seepage, and mitigating geotechnical hazards.

Grouting Types



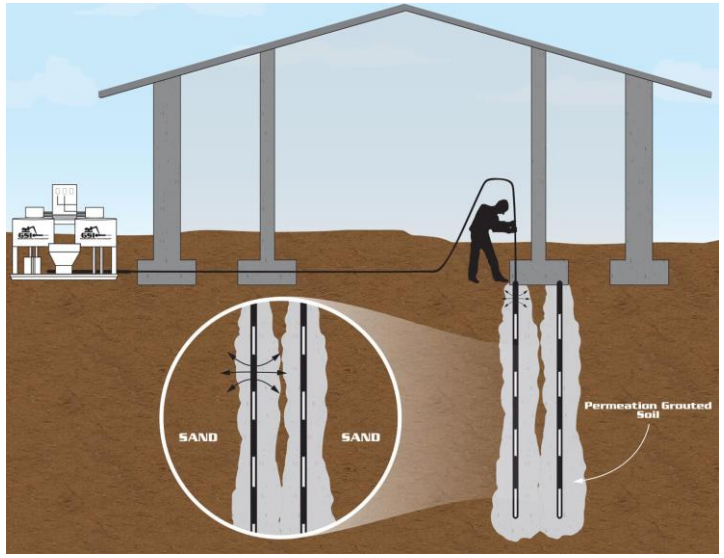


1. Permeation Grouting:

This technique involves injecting a low-pressure grout (typically a cement-based or chemical grout) into the soil's pore spaces to fill voids and improve its strength and impermeability.

It's effective for stabilizing loose or granular soils, controlling groundwater, and sealing leaks.

Example: Microfine cement grouts can be used to fill fine cracks and fissures in sandy soils.

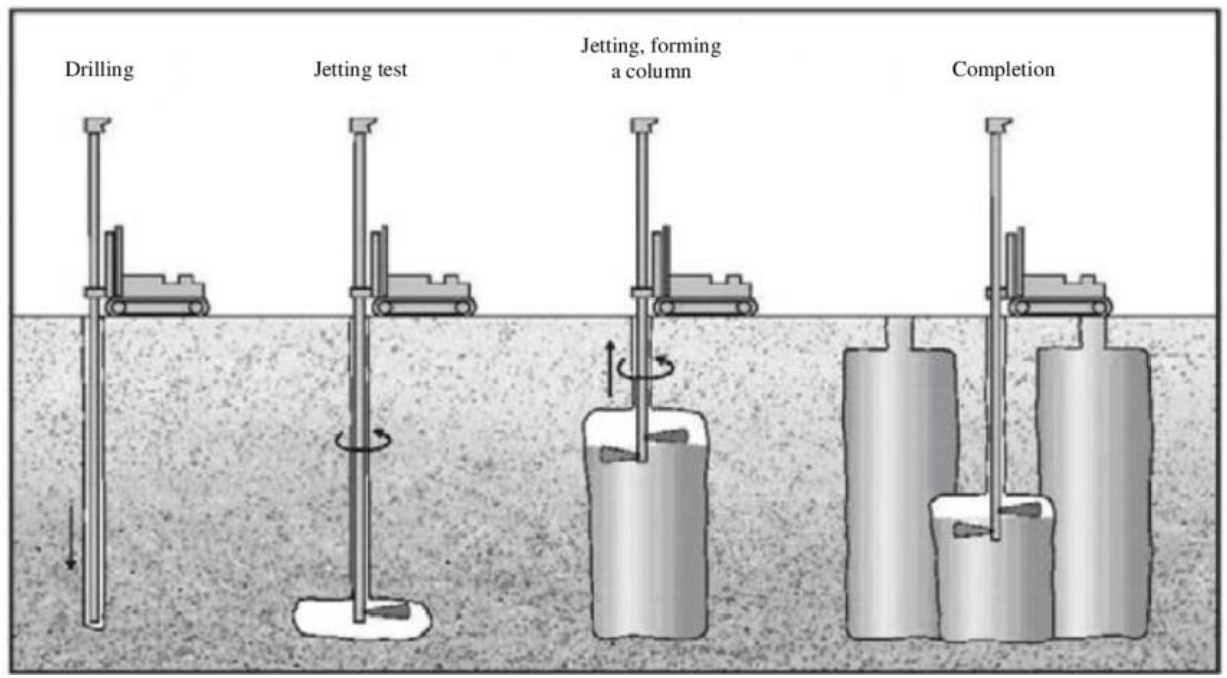


(c) Permeation grouting

2. Jet Grouting:

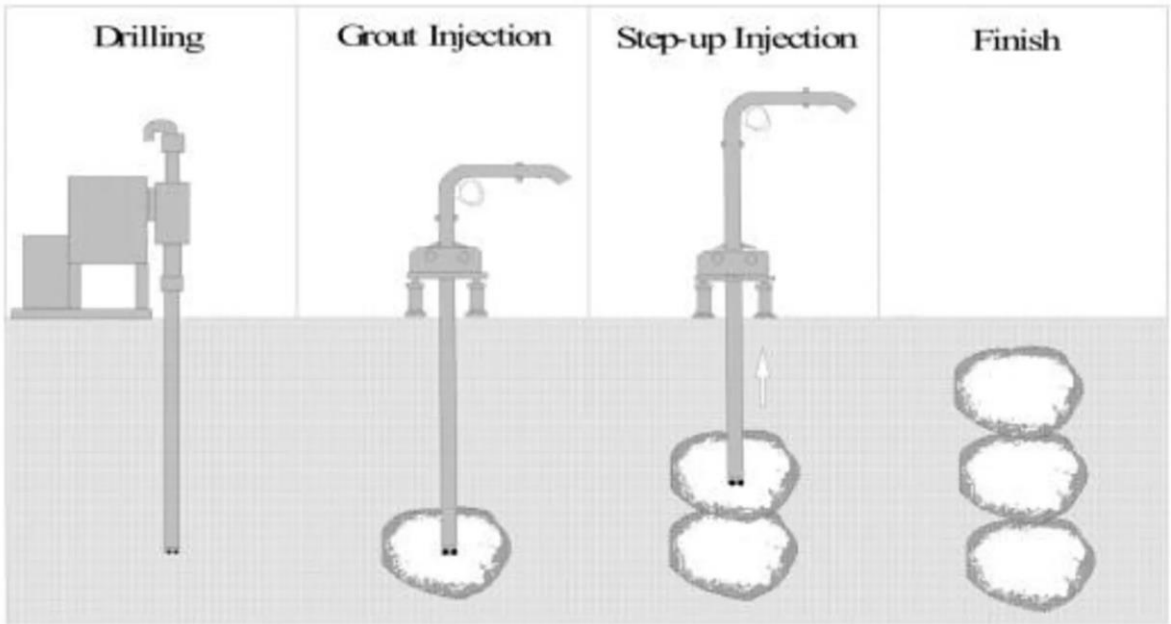
Jet grouting uses high-pressure jets of grout to erode and mix with the existing soil, creating soilcrete columns or panels with enhanced strength and stiffness. It's versatile and can be used in various soil types, including cohesive and granular soils.

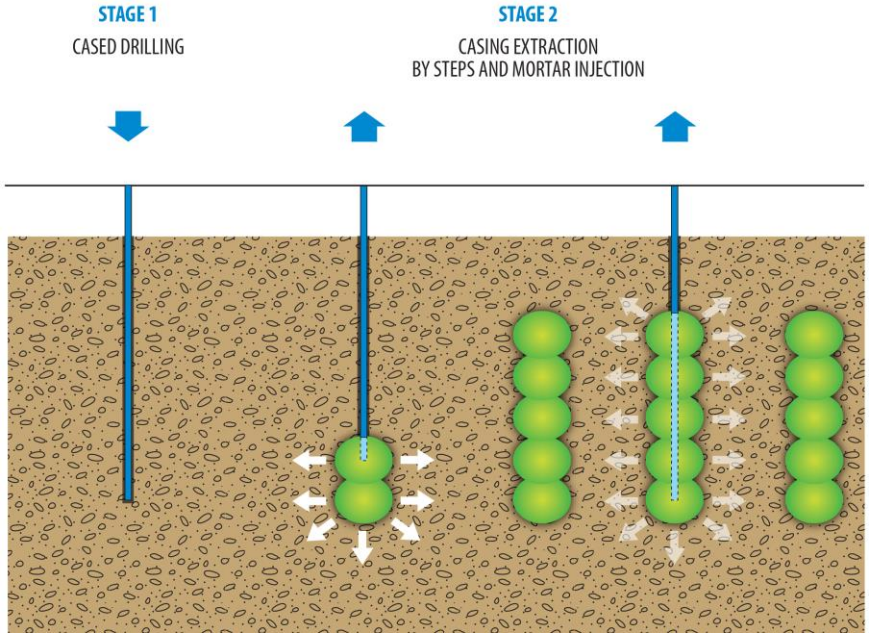
Example: Jet grouting is often used for underpinning structures, creating underground walls, and stabilizing slope



3. Compaction Grouting:

- This method involves injecting a stiff, low-mobility grout into the ground to displace and compact the surrounding soil.
- It's effective for stabilizing loose or collapsible soils, controlling settlement, and mitigating liquefaction risks.
- Example: Compaction grouting can be used to stabilize sinkhole-prone areas or improve the bearing capacity of foundations.





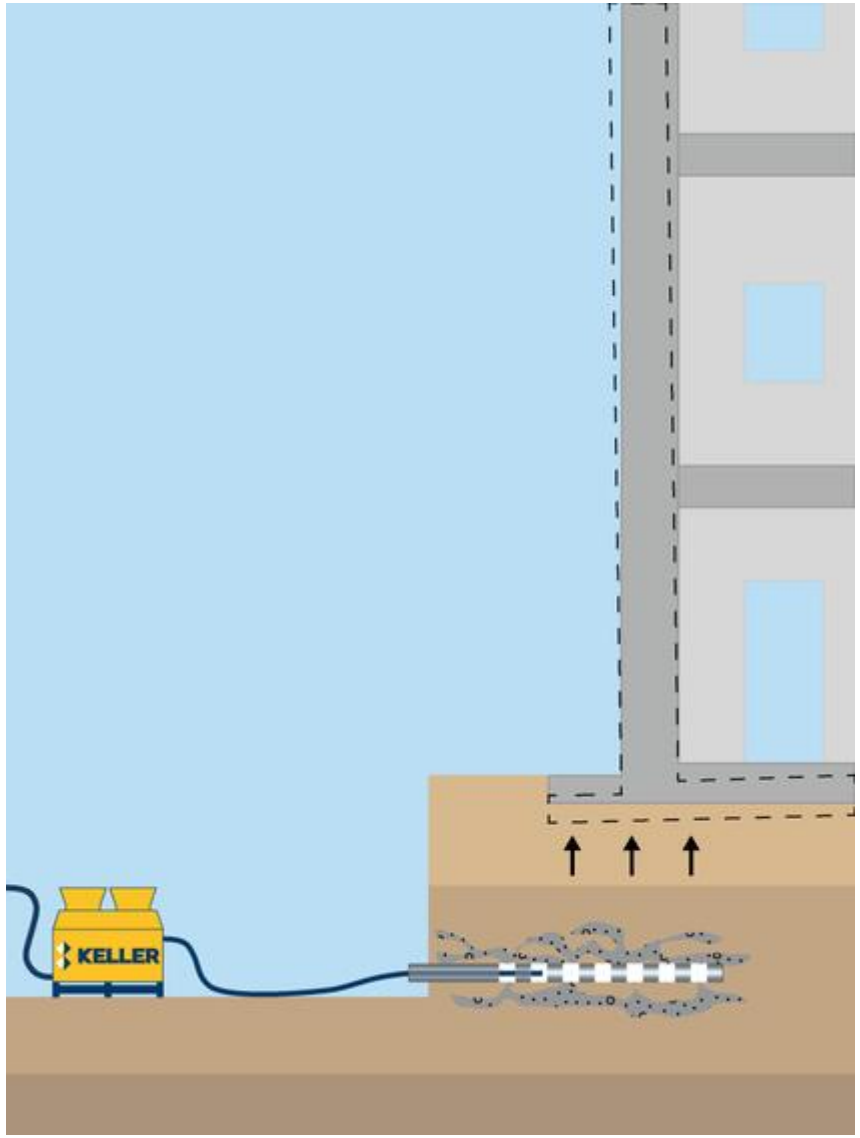
4. Chemical Grouting:

This technique involves injecting chemical grouts, such as sodium silicate or acrylamide, into the soil to solidify it.

It's often used in situations where cement-based grouts are not suitable, such as in fine-grained soils or where low viscosity is required.

Example: Chemical grouting can be used to stabilize slopes, control groundwater, and create impermeable barriers.

5. Fracture grouting, also known as **compensation** or **fracture grouting**, is a technique where a cement slurry grout is injected into the soil to create and fill fractures, lifting overlying soil and structures. This process is often used to address settlement issues, re-level structures, or stabilize soil during tunneling. It can be an effective solution when conventional methods are unsuitable.



Thank You and Discussions are Welcome