

Object of technical transfer

- ◆ Engineers working in Communication & Works of AJK or Works & Services of NWFP (Our counterpart)
- ◆ Contractor's engineer who is in charge of those BHU construction
- ◆ Participants of Workshop

Then what's Technique they need ?

The Technical Cooperation Project
for
Designing Prototype Seismic
Resistant and Barrier-free BHUs
at Langarpur in AJK
and
at Attar Shisha in NWFP

Curriculum 1

Excerpt

(Brainstorming)

Incident or Accident?

Why was this wall collapsed?



The foundation was shallow

- How they had to do?

New Construction

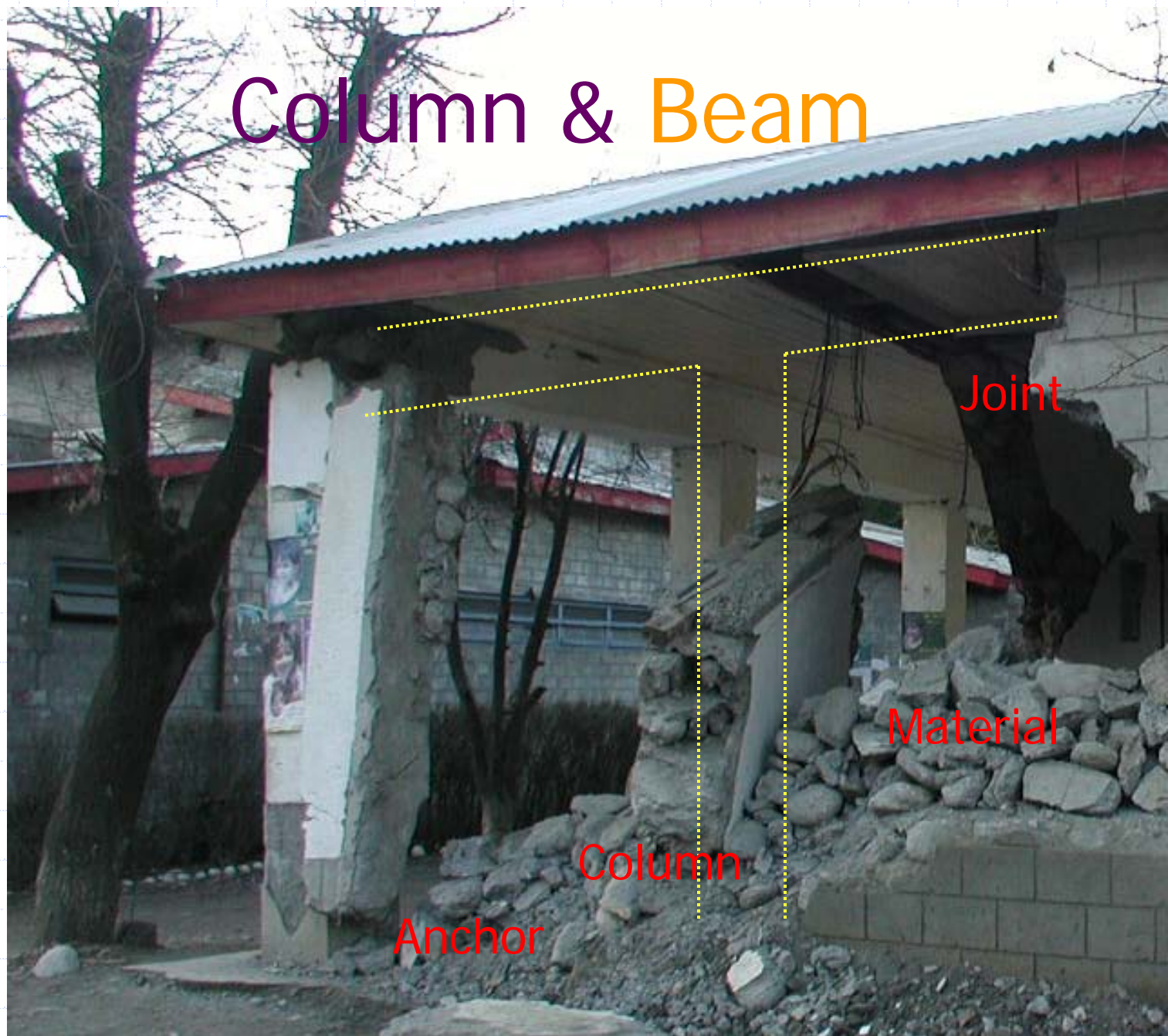
◆ New structure Veranda



- ◆ How do you think this structure
- ◆ Is it correct ?



Column & Beam



Rigidity / Stiffness



Seismic force concentrates the part of the high stiffness at first

Rigid wall



Why
remain?

Small room is so rigid

Limitation of strength

◆ After Generation of Crack
what's happen?



**Rigid joint became the pin joint
And.....?**



Is gable of saddle roof weak?

◆ Why ?



How to avoid?

1. Beam??

2. Material

3. Roof Shape

**Rectangular
hipped roof**

What is difference of each collapsed buildings?



Block masonry



Rock masonry



What is wrong?

- And why it was happened?



They knows Basic Engineering!

Rust steel bar exposed from slab

◆ Then why were such mistake or careless caused on progress and result?

Cut wall reinforcement

Dumper on reinforcement

Clarify, nothing any special quakeproof engineering at site

Many quakeproof engineering like as seismic isolator, rubber spring, vibration proofing foundation, But

- ◆ Nothing any special quakeproof engineering at site
- ◆ Faithfully ensuring learnt thing is the quakeproof engineering at site
- ◆ At site, specified work is executed on specified way.

But why they could not use their knowledge?

The background image shows a scene of significant structural failure. On the left, a large, dark, curved mass of earth or rock has slid down a slope, partially burying a building. To the right, a portion of a building with a corrugated metal roof remains standing, but its base is surrounded by a large pile of rubble, including bricks, concrete, and debris. A wooden door is visible on the right side of the building. The sky is overcast and grey.

The Technical Cooperation Project

Designing Prototype Seismic
Resistant and Barrier-free BHUs
at Langjapura in Andhra Pradesh
and
at Attar Sindh in NWFP

Curriculum 2

(Lecture)

Engineer's role in Stability of Land

Engineer's work at the commencement

- ◆ Grasp of designer design intention
- ◆ Grasp of process
- ◆ Grasp of construction condition
 - Grasp of situation around the vicinity of site
 - Grasp situation of site
 - ◆ Soil test, Topographic Survey
- ◆ Establishment of system for Surveillance
 - Organization
 - Quality control
 - System of Meeting, Report, etc.
- ◆ Etc.

Grasp of situation around the vicinity of site


Observation Item

- ◆ **Adjoining cliff or mountain**
- ◆ **Peripheral nature of soil**
- ◆ **Retaining wall**
- ◆ **Water flow**
 - **River (Record of flood, The highest water level)**
 - **Flow of water at torrential rains**
 - **Amount of spring water**
- ◆ **Slope stability**
- ◆ **Trees**

Adjoining cliff or mountain

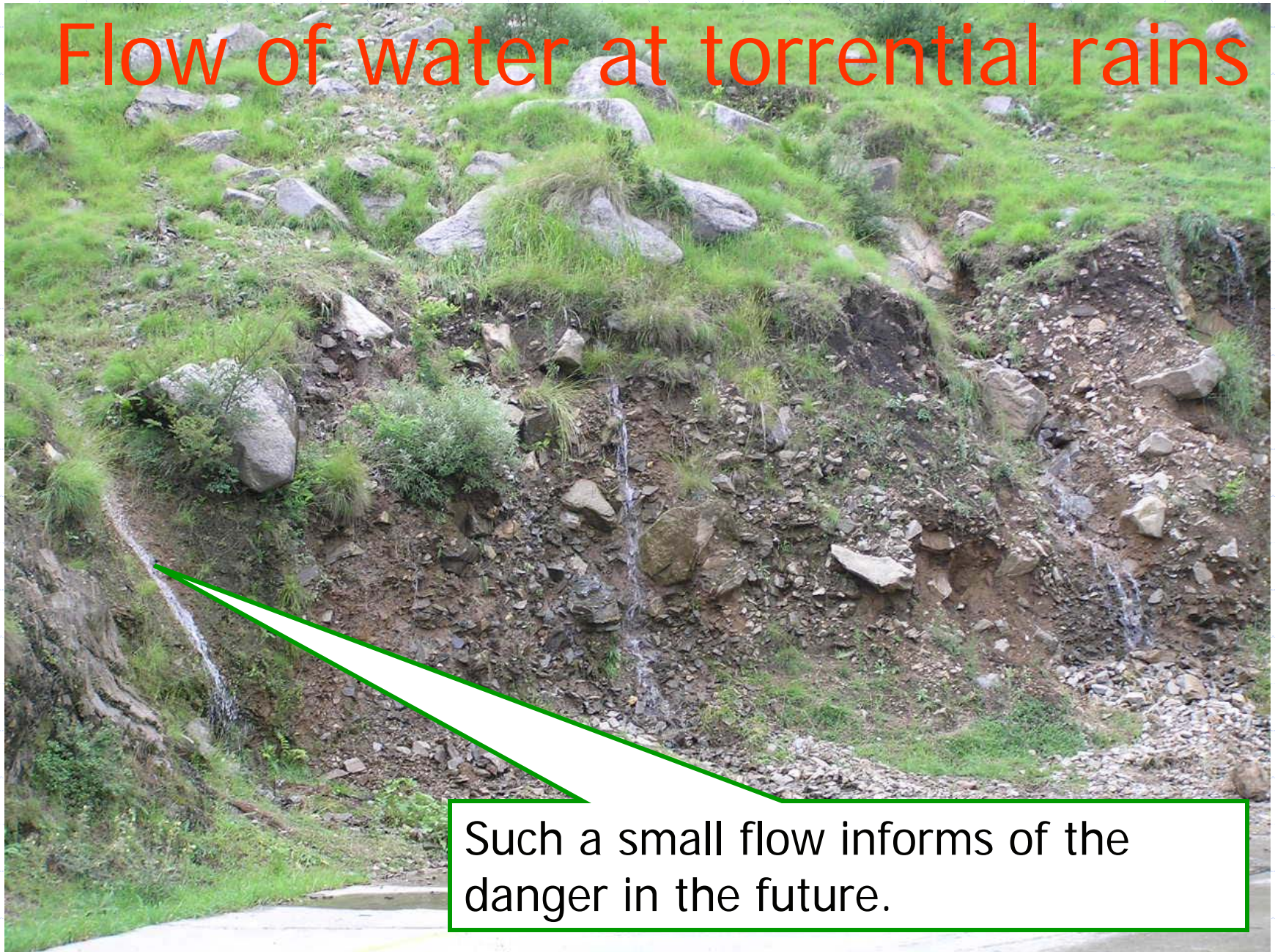


Wrong Land Reclamation



Who judged that hardening of this soil is steady?
If something happen what will they ask to Engineer?

Flow of water at torrential rains



Such a small flow informs of the danger in the future.

Retaining wall

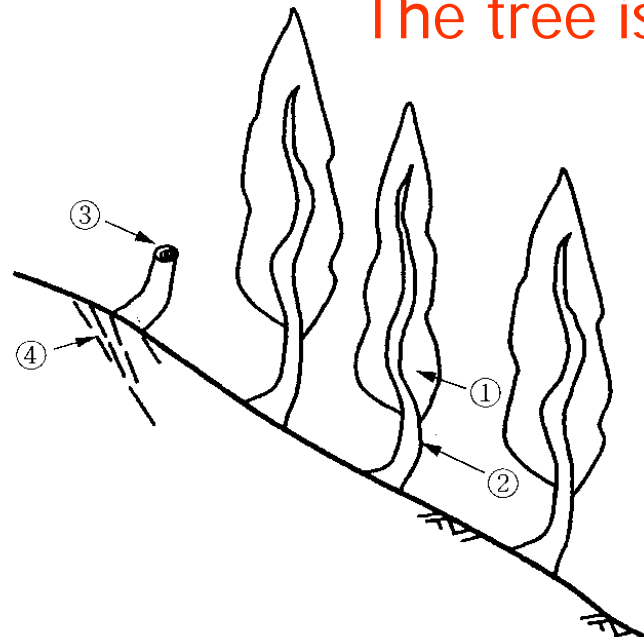


Who's responsibility ?

Trees

Signs of the landslide are shown.

The tree is curved.



The annual ring of the tree does not become a concentric circle.

④その他、地表クラックや根の異常な張りなど



Swedish weight sounding test



This ground survey is most simple way



General method of surveying ground and satisfaction rating

requirement test method	Standard Penetration test	Swedish weight Sounding test	Cone Penetrometer Etc.	Plate bearing test	Hand Auger
Search cost cheap	X	⊙	⊙	X	⊙
Investigation period short	X	⊙	⊙	X	⊙
5m depth Possible	⊙	⊙	△	X	X
Soil nature can be judged	⊙	△	X	X	⊙
Light and small	X	⊙	⊙	X	⊙
Handling easy	X	⊙	⊙	X	⊙

Necessary Engineering

- ◆ Problems have come up to the surface
 - Lack of the technique of quality control
 - A lot of sites at the same time
 - Lack of Basic information of site management
- ◆ Site management engineering
- ◆ So what kind of Site management engineering shall be needed for making seismic-resistant building

Management Control Item

&
New Material

**Site management
teaching material**

Excerpt

For seismic resistant Building

Material of a less management
control item

Role of Surveillance Engineer

◆ Elements of Site Management

- Time and Quality
- Safety

◆ Role of Site Surveillance Engineer

- Control of Time and Quality

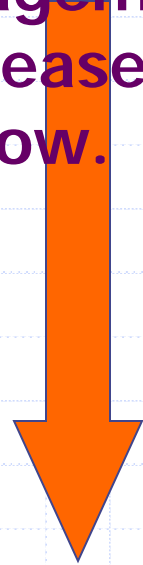
◆ Final Responsible Person for Quality

Site

Management control item

- ◆ Concrete Work
- ◆ Reinforcement
- ◆ Hollow Block work
- ◆ Finishing work
- ◆ Steel Structure Work
- ◆ ETC.

The management item decreases by going below.



Management control items of Reinforcement

Example

- ◆ Number, Size, Type, Strength (of each part)
- ◆ Splice (Position, Length, Hook of each part)
- ◆ Shape of Hook (180° , 135° , 90°)
- ◆ Compression Splice & Tension Splice
- ◆ Anchorage (Dowel)
- ◆ Thickness of Protection cover concrete
- ◆ Spacer, Bolster, Chair
- ◆ Etc.

Many Mistake on Reinforcement 1

What is wrong?



Many Mistake on Reinforcement 2

◆ Why such mistakes were happened?



Distance, to effect partially

Reinforcement become structure together with concrete!



Distance, to effect to building

Many Mistake on Reinforcement 3

What is Management control item?

Not phenomenon but influence

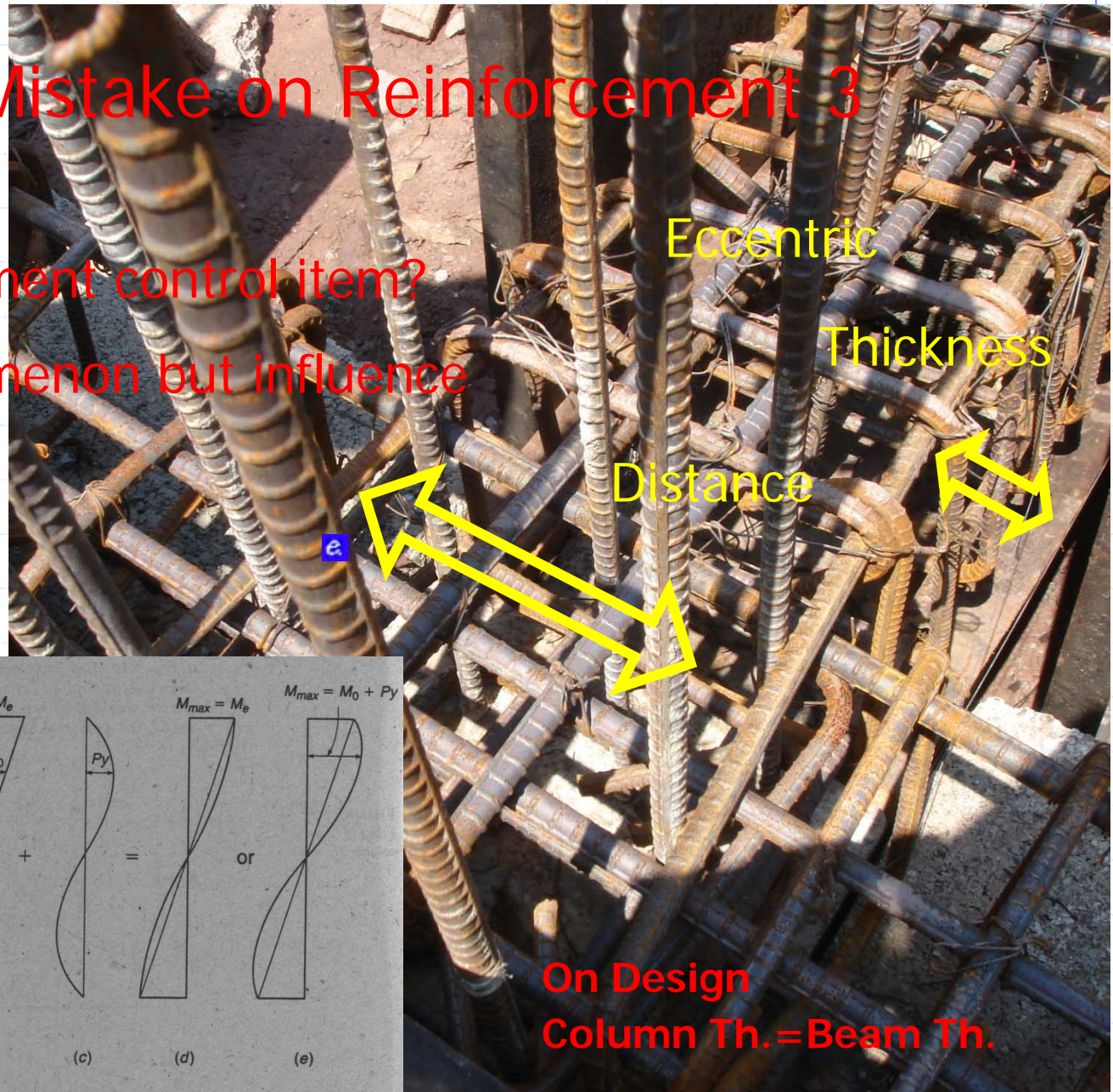
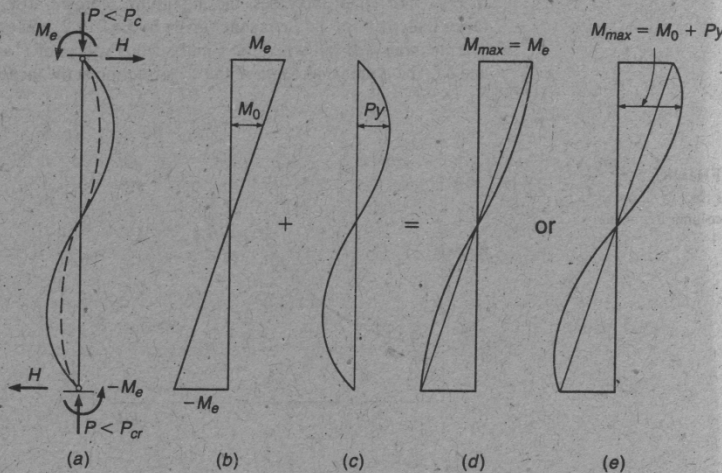


FIGURE 9.7
Moments in slender members
with compression plus
bending, bent in double
curvature.



On Design
Column Th.=Beam Th.


Can you control all Management Items?

- ◆ You can not control all Management Items **on all progress.**

How to manage?

Two Solutions

1st Solution

- ◆ To find your colleague to support you
 - NO!
 - You have to make collaboration with Contractor's Engineer of Site
 - How to?  Need New control system

2nd Solution

- ◆ To find Material of a Less Management Control Items

2nd solution

Material of a Less Management Control Items

◆ Which is a Less Management Control Item's Material



Material of a Less Management Control Items

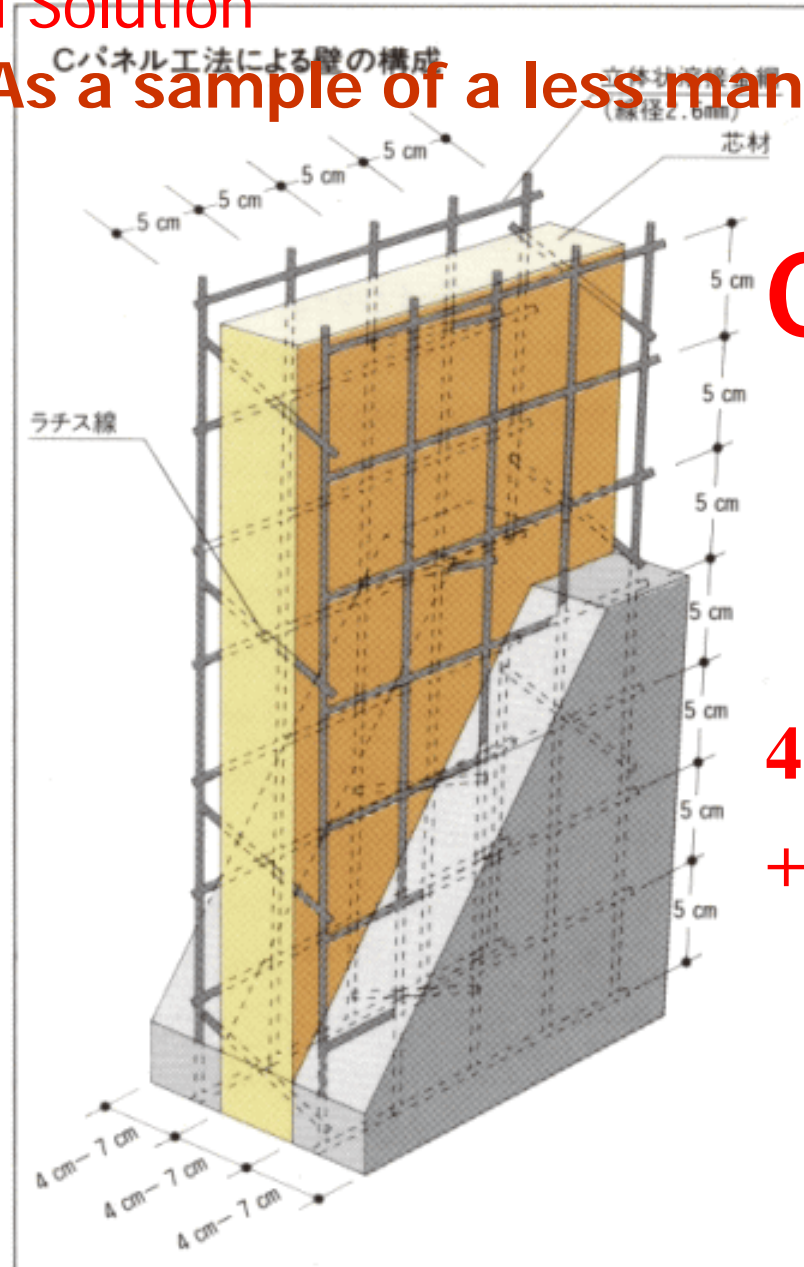
◆ Industrial Material

half-finished goods, partially fabricated item
semi manufactured goods

- **Hollow Block**
- Steel Structure
- Prefabrication's building
- Panel Wall
 - ◆ Pre-cast concrete Panel
 - ◆ **C-Panel Wall**

2nd Solution

As a sample of a less management control items



C-Panel Wall

Structural Wall

4cm~7cm styrene board
+ cement mortar

2nd solution

C-Panel Wall construction process 1



2nd Solution

C-Panel Wall construction process 2



Easy to make hole



Placing slab concrete



Mortar spray by Gun

2nd Solution

C-Panel Wall performance assessment

Weight of panel: 4.8kg/m²

Shear strength: 2.5t/m

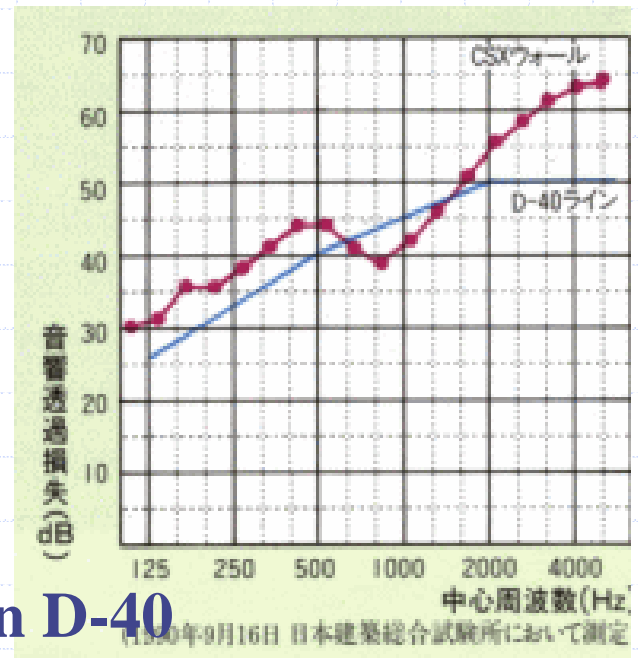
Thermal insulation performance:
0.62kcal/m²·h·°C

Fire resistance class:

Mortar Th. 2 x 37.5 2 hour
fireproof

Classification of sound
insulation

More than D-40



2nd Solution

C-Panel Wall Example of construction



1st Solution

Collaboration with Contractor's Engineer of Site

- ◆ How to get the supports
 - Starting from zero is difficult
 - Sample shall be shown
 - ◆ Checklist
 - ◆ Field Note
 - ◆ Description of quality control

1st Solution

Checklist

3.7 Check List at the commencement

The following checklist shows a minimum check item which the Surveillance Engineer inform to the contractor and confirm in the site by him necessary to change, and to add the item to this checklist according situation.

Check List at the commencement				
Site Name	Contractor	Date		
No.	Check item	Ok?	Comment	
1	Did you explain Design purport & other important information to Contractor?			
2	Did you transfer Request from Owner to Contractor?			
3	Did you check the Documents & find the item not decided yet?			
4	Did you inform scheduled design change item to Contractor?			
5	Did you confirm Contractor's obligation for the authority?			
6	Did you make Surveillance System of this site?			
7	Did you explain your Surveillance System to Contractor & discuss with Contractor?			
8	Did you explain Quality Control System to Contractor?			
9	Did you collaborate to Contractor to make Check List?			
10	Did you decide Construction photograph system(Duration, Interval, Location etc.)?			
11	Did you discuss about Construction photograph system with Contractor?			
12	Did you decide Report System & discuss with Contractor?			
13	Did you confirm Payment Schedule & procedure & discuss with Contractor?			
14	Did you confirm Overall work schedule & Approval schedule?			
15	Did you check Shop drawing list & schedule?			
16	Did you check Communication way with Contractor?			

(Signature of Surveillance Eng

4.3 Check List of Investigation surrounding the site

The following checklist shows a minimum check item to avoid incident from disaster on the site. It is necessary to change, and to add the item to this checklist according to the situation. And this checking should be done by the contractor at first.

Check List of Investigation surrounding the site				
Site Name	Contractor	Date		
No.	Check item	Ok?	Comment	
1	Confirmation of banking thickness			
2	Confirmation of height of Retaining wall			
3	Confirmation of stability of existing Retaining wall			
4	Confirmation of presence of design of retaining wall			
5	Confirmation of height of cutting and the method of surface treatment			
6	Confirmation of geographical features of inside and surrounding of site (pumice stone etc.)			
7	Confirmation of signs after peripheral water in site flows			
8	Confirmation of highest water level of river surrounding the site			
9	Survey of landslide mark (Tree, Crack etc.)			
10	Isn't there old well in the site?			
11	Are there neither an old septic tank nor an infiltration tank?			
12	Is the distance in the adjacent building and the construction building taken enough?			
13	Confirmation of existing drain route			
14	Confirmation of position of electric powers, and phone wires			
15	Content of catching investigation of the vicinity resident (The content is described in the comment column).			

(Signature of Contractor)

(Signature of Surveillance Engineer)

1st Solution

Field Note for Quality Control

Foundation reinforcement Checklist

[illegible]

Plinth beam reinforcement Checklist

The diagram illustrates a structural reinforcement layout for a 4x4 grid of squares. Each square in the grid is associated with a table detailing its reinforcement specifications. The tables are labeled 1G1, 1B1, 1B2, and 1G1, indicating different reinforcement types or zones. The central grid contains numbers and letters, some of which are circled or underlined, likely representing specific reinforcement details or dimensions. The tables provide a detailed breakdown of the reinforcement for each square, including the reinforcement type, quantity, and a checkmark indicating completion or verification.

1G1	Reinforcement	No.	check
Main	1/2	8	OK
Startup	3/8	6	OK
Hook			OK

1G1	Reinforcement	No.	check
Main	1/2	8	OK
Startup	3/8	6	OK
Hook			OK

1G1	Reinforcement	No.	check
Main	1/2	8	OK
Startup	3/8	6	OK
Hook			OK

1G1	Reinforcement	No.	check
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Hook			OK

1G1	Reinforcement	No.	check
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1G1	Reinforcement	No.	check
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Startup	3/8	6	OK
Hook			OK

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Main	1/2	8	OK
Startup	3/8	6	OK
Hook			OK

1G1	Reinforcement	No.	check
Main	1/2	8	OK
Startup	3/8	6	OK
Hook			OK

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History of Surveillance in Japan

◆ Japan walked on the same way like Pakistan

- Before Surveillance Engineer was surveillant like as jailer
 - ◆ The quality is bought by the inspection
 - ◆ All shop drawings were made by Main Contractor's Engineer
 - ◆ The client expected the role of the surveillant of the omission work to Surveillance Engineer
- While high growth period(1955-1970), Worker and engineer's deficiencies
- Then Quality had been going down

◆ Now almost sub-contractor can make construction plan of each work and Quality control

- All shop drawings are made by sub-contractor now
 - ◆ It causes the weakness of the general contractor

We hope that this manual has given something usefulness to the Surveillance Engineer and effect the improvement of construction management.

END

THANK YOU for your attention