

Concrete vs. Steel Structures: Comparison of Documentation Requirements

	Concrete	Steel	Comments
Engineering			
calculation notes	✓	✓	Concrete drawings are assumed to be of fabrication quality and can directly be used in Work Packages.
engineering drwgs	✓	✓	
technical specs	✓	✓	
Fabrication			
• <u>Assembly Method</u>	↓	↓	For GBS, assembly method part of design. Changes will typically require re-engineering.
fab hall dimensions		✓	
transport / lifting capacity		✓	
• <u>Shop drawings:</u>		↓	
nesting plans		✓	
welding plans		✓	
assembly plans	↓	✓	
• <u>Work Packages</u>	✓	✓	
• <u>Fabrication Execution</u>	✓	✓	

GBS - gravity base structure

Purpose of Work Packages (WP)

- provide all information required for construction of a specific part of the structure
- let workforce take ownership of construction preparation
- tool to ensure optimized, cost efficient execution
- this tool includes planning and follow-up (forecast/actual performance)

General Contents

- each WP covers one structural element, e.g. Bottom Slab, Lower Walls, etc.
- WPs to be developed for each discipline, i.e. civil, mechanical incl. E&I, etc.

Preparation of Work Packages

prior to execution:

- analyse all aspects of the work to be done: technical, schedule, H&S, QA/QC, manpower, etc.
- request engineering clarification if drawings lacking clarity
- if necessary, develop sketches to condense information from various drawings for a complex detail (applicable for e.g. nodes and highly congested areas)
- specify resources: materials, equipment, manpower
- specify aspects related to H&S, QA/QC,
- identify need for pretests (mock-ups) and training
- prepare slipform lists (embedments, penetrations, rebar changes)
- develop required work procedures/work instructions/check lists
- communicate WP to foremen/shift-leads/leading hands

during execution:

- register actual progress relative to forecast
- if required, take corrective actions
- follow up check lists

after execution:

- analyse positive and negative experience
- as required: improve WP for next work sequence

Development of WPs takes time and requires qualified individuals

GBS Work Packages

Input to Work Packages (examples)

Engineering Deliverables

Formwork
Rebar / Post-Tensioning
Material Specifications
Embedments / Penetrations
Electrical & Instrumentation
Other Systems
Ballast Slurry Lines

HSE

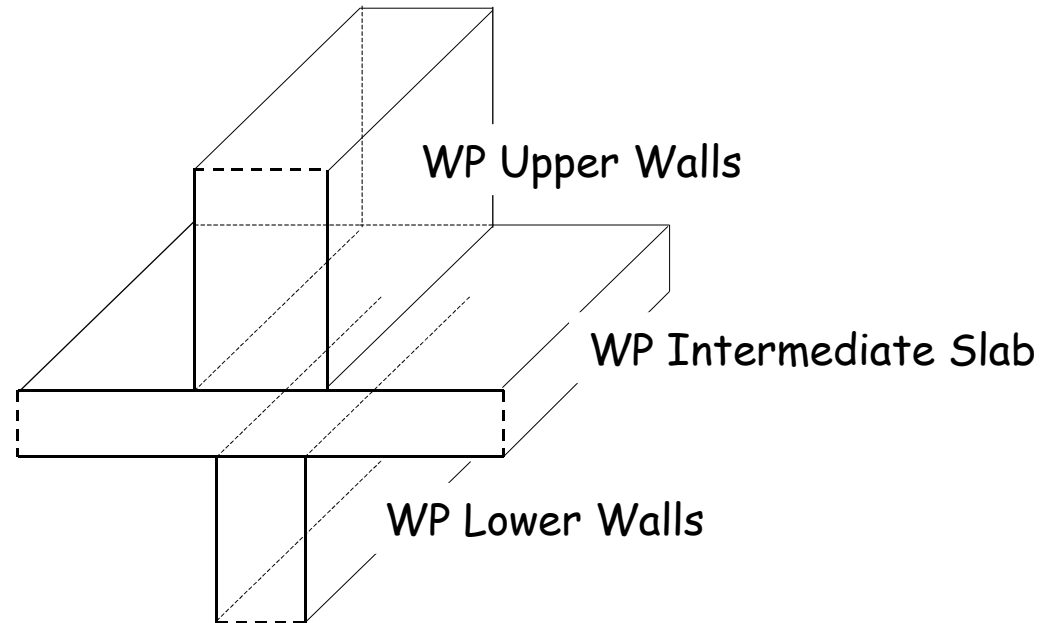
Health & Safety
Working Environment

Site Equipment

Scaffolding
Access
Utilities (Water,
Power)
Light
Craneage
Survey

Organization / Manpower

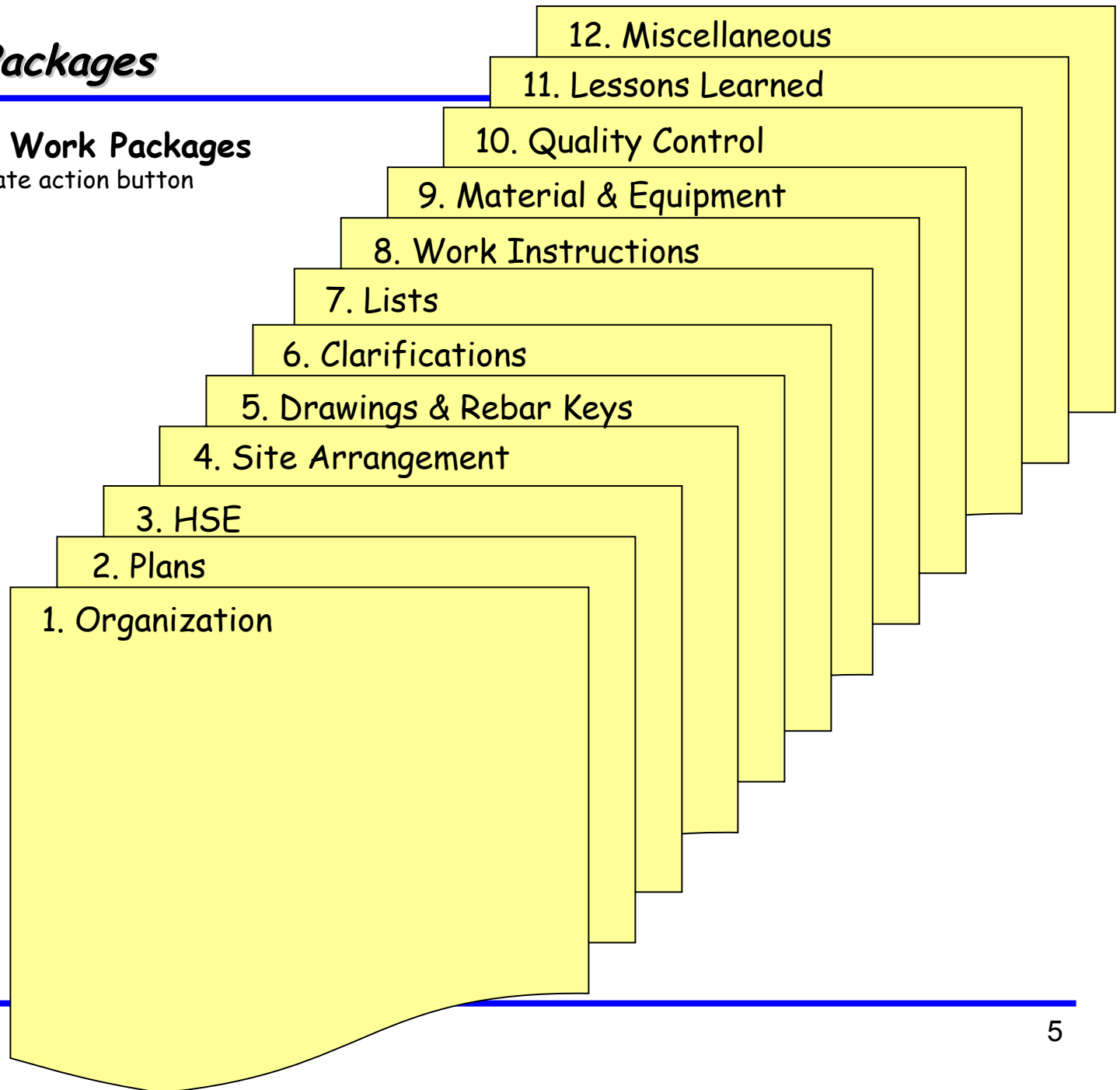
Schedule
QA / QC



GBS Work Packages

Elements of Work Packages


for details activate action button



Examples for the Degree of Detailing within WPs (from previous projects)

Figure 1  specifies

- the general set-up of the slipform system
- storage of vertical and horizontal rebars
- utility lines for water, air, power
- concrete supply: concrete pump lines, concrete chutes

Figure 2  specifies the start-up situation of a slipform operation

- timing of pouring
- thickness of concrete layers
- concrete composition: retarder, cement, workability (slump)
- start of first lift


Figure 3  : Guidance system for vertical rebars during slipforming


Figure 4  : Installation of large embedment plates in a wall structure

Figure 5  : Levelling device in a slab structure to obtain exact position of top-surface

GBS Work Packages

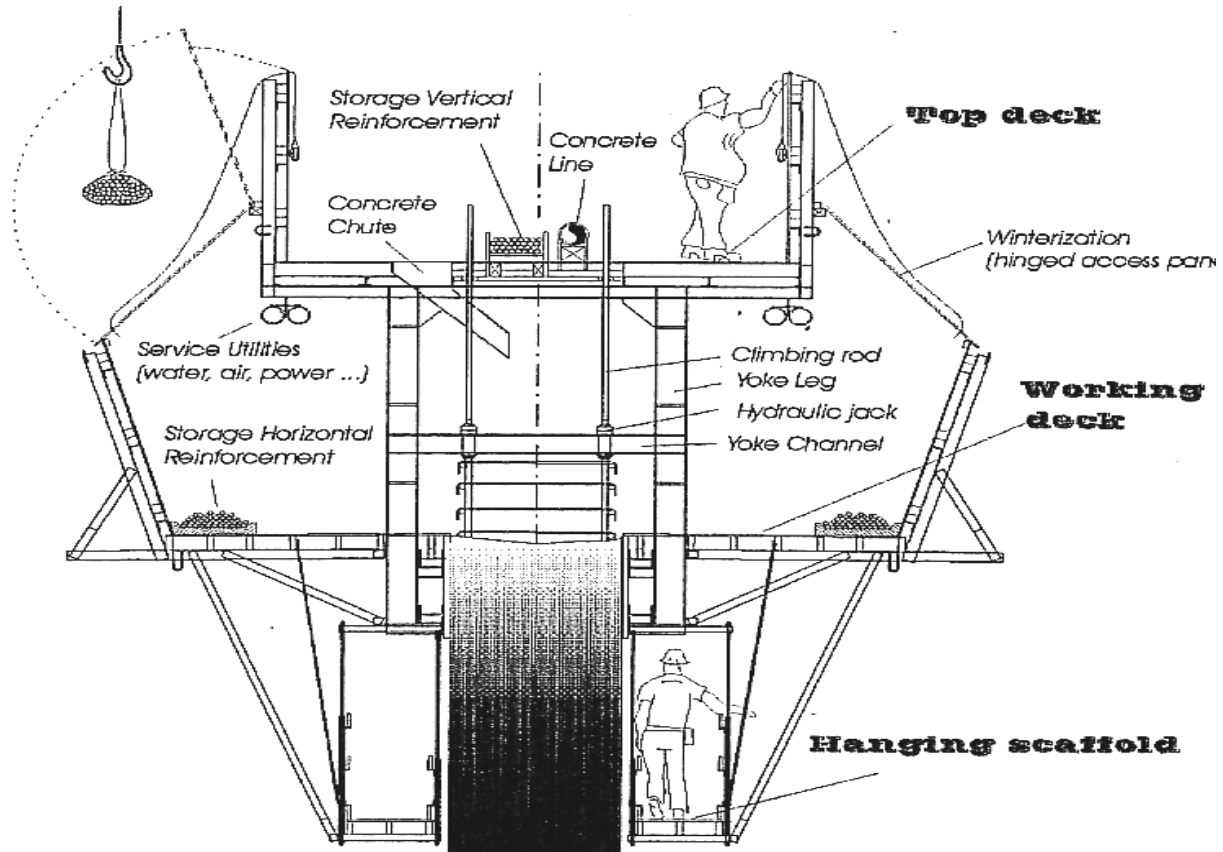


Fig. 1: Slipform System

GBS Work Packages

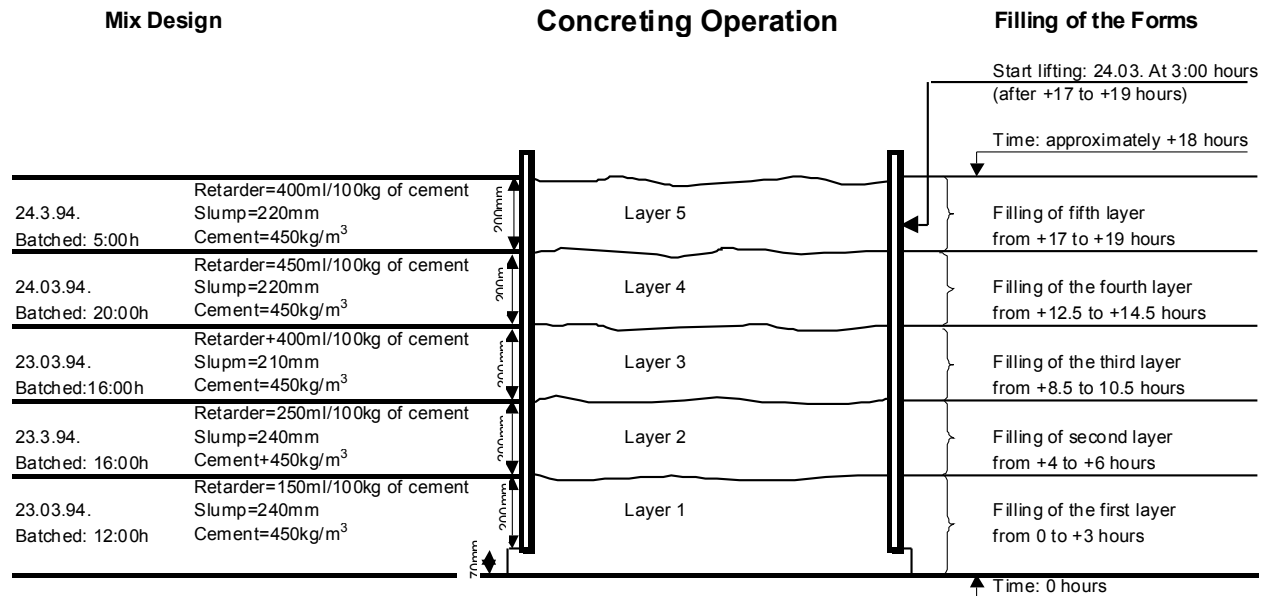


Fig. 2: Example of filling the forms during slipforming

GBS Work Packages

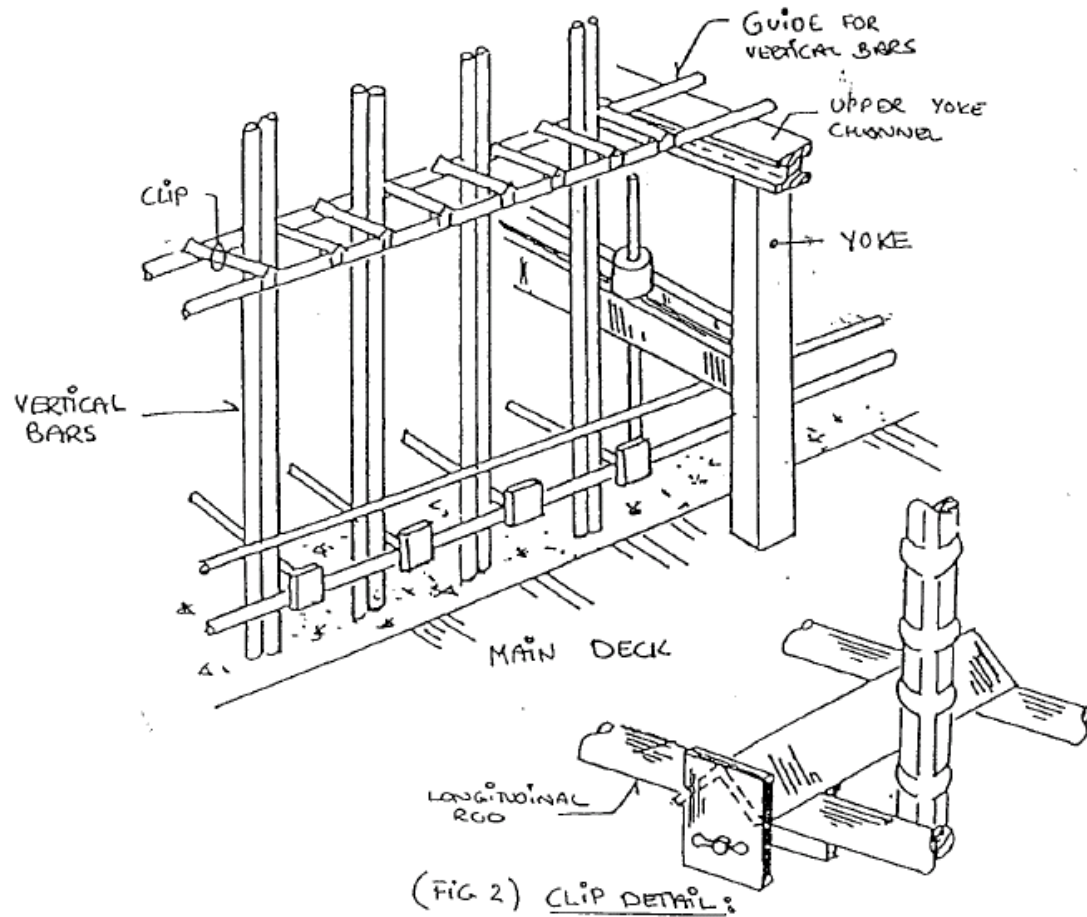


Fig. 3: Construction Example (Wall):
Guidance System for Vertical Rebars

GBS Work Packages

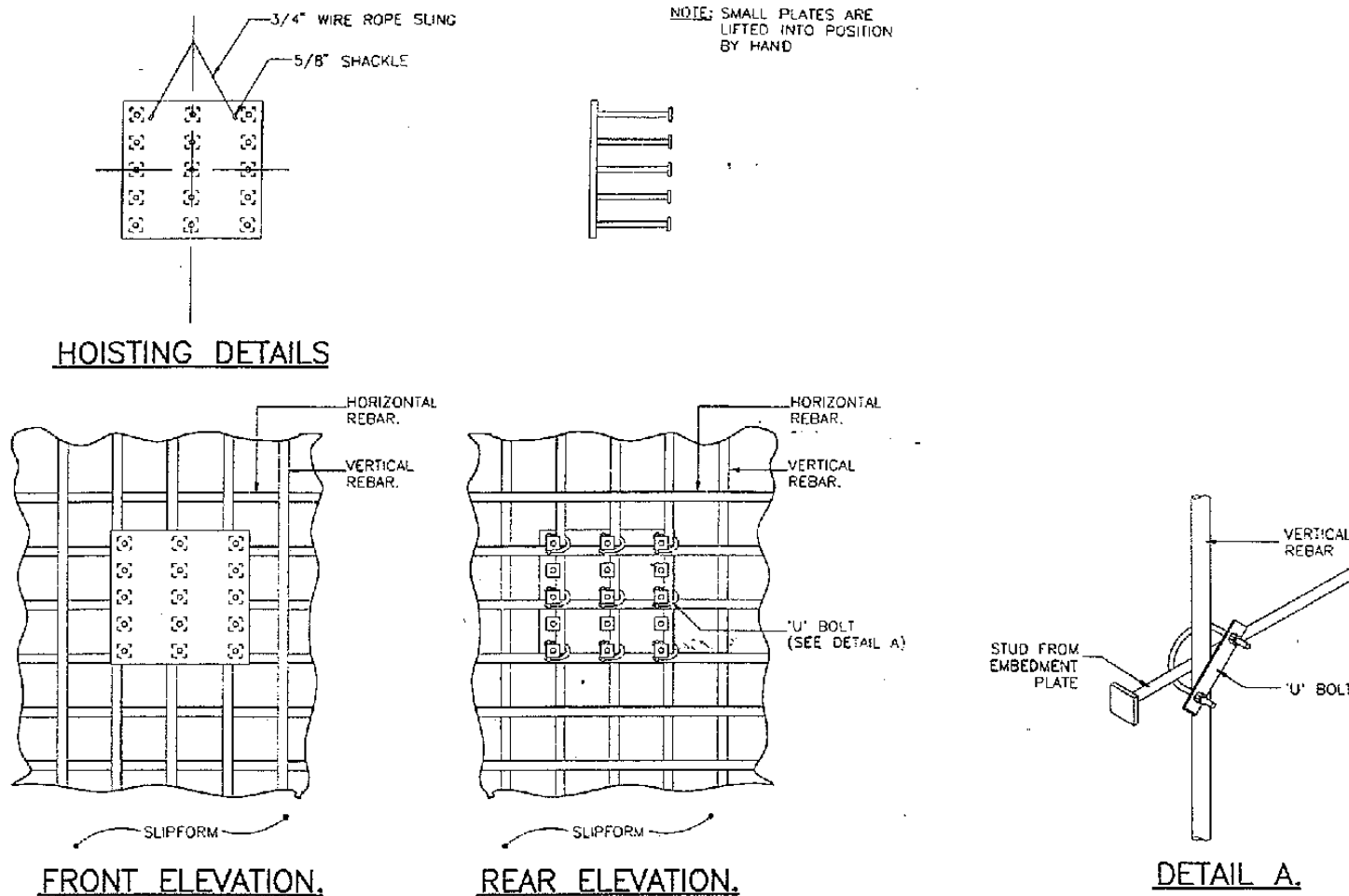


Fig. 4: Construction Example (Wall):
Installation of Large Embedment Plates

GBS Work Packages

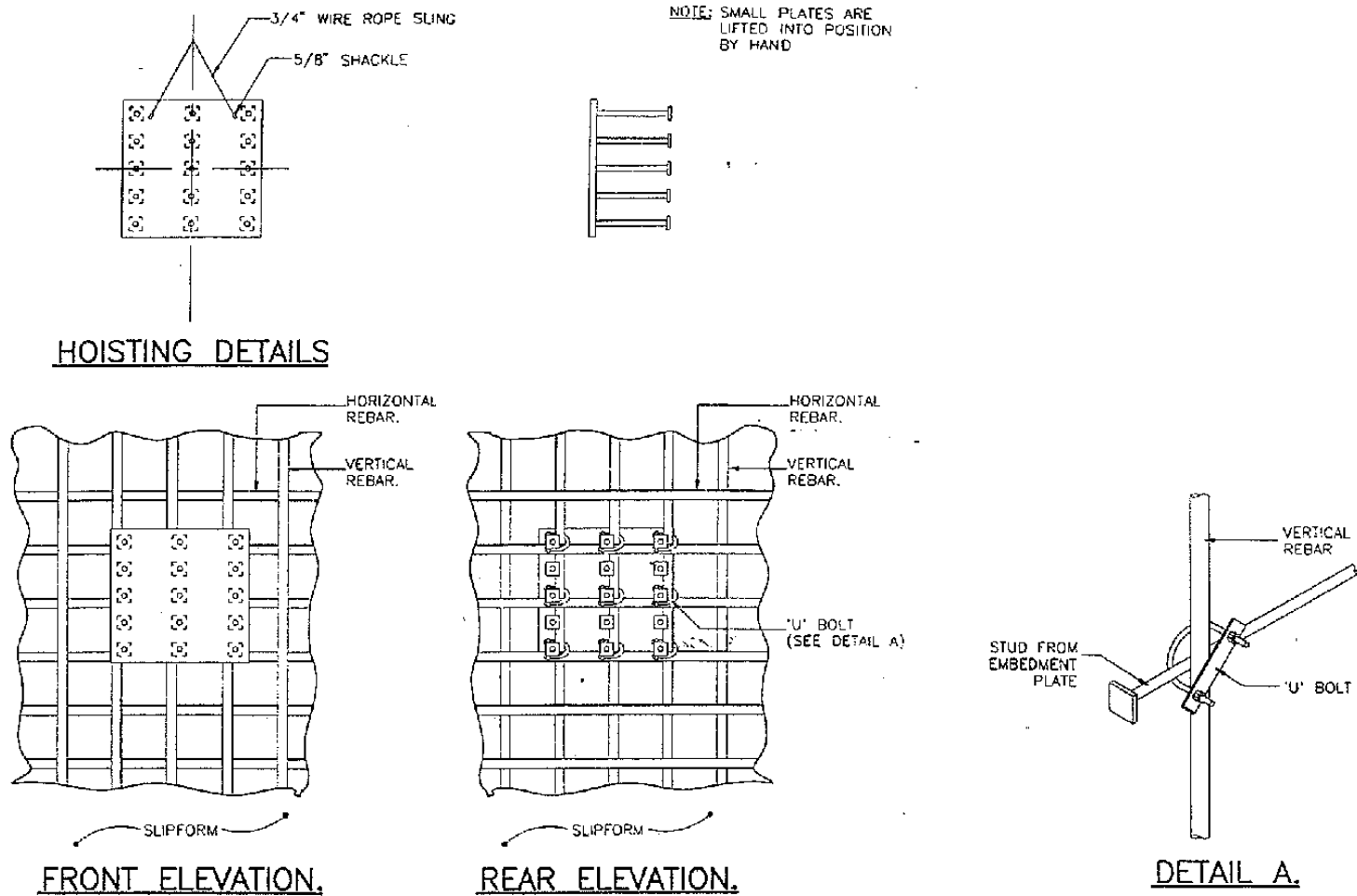


Fig. 4: Construction Example (Wall):
Installation of Large Embedment Plates