Presentation Outline

I. Introduction
   Project Management

II. Contract/Construction Management
   Stage 1: Construction Period
   Stage 2: Defects Liability Period

III. Project Controls
   Schedule Control
   Cost Control
   Quality Control
   Document Control

IV. Related and Arising Issues - IRAQ
I. Introduction

- Project Management services for all project phases should be provided through well established procedures/processes.

- Project Management activities span the life of projects beginning with the conceptual design phase and ending with the defects liability and occupancy phase.
Project Management Approach

1. Initiate
2. Plan
3. Implement
4. Monitor & Control
5. Close Out
Major Stakeholders

- Client
- Funding Agencies
- Project Manager
- Authorities
- End Users
- Supervision Consultants
- Construction Contractors
- Specialized Consultants
- Design Consultants
- Operators
- Facility Manager
Project Manager’s Organisation Chart
Contractor’s Organisation Chart

Contractor’s Representative

QA/QC Engineer

Procurement Manager

Subcontractors

Project Area 1 Manager

Project Area 2 Manager

Planning & Doc Manager

Admin. & Logistics Manager

Contracting Manager

Financial Manager

Surveyor Manager

Site Surveyor(s)

Technician(s)

Site Engineer(s)

Planning Engineer

Planning Engineer

Document Engineer

Warehouse Dept.

Services Dept.

Admin. Dept.

Accountant

Cashier
PM scope can cover:

- Project Initiation & Studies Period
- Design Period
- Tender & Contracting Period
- Construction Period
- Defects Liability Period
Manage the Construction

1. Kick off Meeting
   - Project Manager
   - Procedures issued to contractor and site staff

2. Update Project Plan
   - Project Manager

   - Project Manager
   - Contractor appointed by Client

4. Give Possession of Site & Issue Notice to Commence
   - Project Manager
   - Client

5. Review of Insurance Policies, Bank Guarantees, Bonds and Warranties
   - Project Manager
   - Contract Administrator

6. Works Ready for Testing, Commissioning and Inspection

7. Manage Construction Process
   - Project Manager
   - Min. of Meeting issued

8. Monitoring Testing, Commissioning and Inspection of the Works
   - Project Manager

9. Minutes of meeting, agreed actions
   - Payment issued to contractor

10. Testing and Commissioning Substantially Complete
II. Contract/Construction Management

Stage 1: CONSTRUCTION PERIOD
Stage 2: DEFECTS LIABILITY PERIOD (DLP)
II. Contract/Construction Management

stage 1: construction period

Activity 1
Organization and Mobilization

• Insurance Policies
• Performance Security
• Advance Payment Guarantee
• Notice to Commence
• Communication Procedures
II. Contract/Construction Management

stage 1: construction period

- Monitoring Progress
- Evaluating Performance
- Project Management Software
- Logic Network (CPM)
- Short Construction Activities
- Shop Drawings and Materials Submissions
- Procurement Schedules
- Quantity, Duration, Cost, Manpower and Equipment
- Resources Schedules and Histograms
- Work Breakdown Structures (WBS)
- Subcontractors’ Schedules
II. Contract/Construction Management

stage 1: construction period

- Activity 1 Organization and Mobilization
- Activity 2 Planning and Program
- Activity 3 Survey Check and Material Information

- Verify Staked-Out Centerline, Traverse Points, Control Points and Bench Marks
- Adequacy of Borrow Pits and Quarries
- Planned Sources, Supply and Testing of Construction Materials
II. Contract/Construction Management

stage 1: construction period

- Site Facilities Adequacy and Organization
- Layout Plan for all Temporary Site Facilities
- Check Site Accesses, Temporary Structures, Site Office, Accommodation, Laboratory, Stocking Yards, Plant Facilities, Safety Measures, Service Roads, Parking Areas
- Sufficiency, Adaptability, Interconnectivity, Suitability, Organization, Quality, Performance, Non-Interference with Permanent Works
II. Contract/Construction Management

stage 1: construction period

- Clearly Formulated, Well-Documented Method Statement: Method of Construction, Resources, Safety Precautions, Operation’s Duration
- Submission and Approval before Occurrence of Planned Early Start of Activities
II. Contract/Construction Management

stage 1: construction period

Activity 1
Organization and Mobilization

Activity 2
Planning and Program

Activity 3
Survey Check and Material Information

Activity 4
Plan for Site Organization

Activity 5
Construction Methods

Activity 6
Time Control

- Monitor Program, Construction Activities, Resources
- Update and Revise Program
- Periodic Co-Ordination Meetings
- Timely Shop Drawings and Samples Submission
- Schedules of Materials and Shop Drawings Submissions and Approvals tied to Program
- Monitor Labor and Plant Productivity, Materials Deliveries (Long-Lead Items), Identify Shortages
- Labor, Plant or Materials Deficiencies
- Identify Potential Variance: Scheduled v/s Actual Progress
II. Contract/Construction Management

stage 1: construction period

Activity 1 Organization and Mobilization
Activity 2 Planning and Program
Activity 3 Survey Check and Material Information
Activity 4 Plan for Site Organization
Activity 5 Construction Methods
Activity 6 Time Control
Activity 7 Cost Control

- Interim Payments
- Cash-Flow Estimate
- Implement Variation Orders
- Control & Monitor Quantities and Variation Orders w.r.t. Contract Price
II. Contract/Construction Management

stage 1: construction period

- Activity 1 Organization and Mobilization
- Activity 2 Planning and Program
- Activity 3 Survey Check and Material Information
- Activity 4 Plan for Site Organization
- Activity 5 Construction Methods
- Activity 6 Time Control
- Activity 7 Cost Control
- Activity 8 Quality Control

- Project Quality Assurance/Quality Control Plan
- Compliance with Safety and Environment Protection
- Review and Approval of Materials and Shop Drawings
- Inspection of Operations
- Inspection and Testing of Materials and Plant
II. Contract/Construction Management

stage 1: construction period

- Inspection of Work before Covering-Up
- “As-Built” Drawings and “Operation and Maintenance Manuals”
- List of Outstanding Works prior to Taking-Over
- Completion of Outstanding Works and Performance during Defects Liability Period
II. Contract/Construction Management

stage 1: construction period

- Activity 1: Organization and Mobilization
- Activity 2: Planning and Program
- Activity 3: Survey Check and Material Information
- Activity 4: Plan for Site Organization
- Activity 5: Construction Methods
- Activity 6: Time Control
- Activity 7: Cost Control
- Activity 8: Quality Control
- Activity 9: Site Meetings & Record Keeping

- Daily Record of Progress of Works
- Kick-off Site Meeting: Procedures, Means of Communication, Methods for giving Approvals, Instructions, Variation Orders, etc.
- Regular Site Meetings: Monitor Performance and Progress based on Program, Discuss Problems, Coordination Issues, etc.
II. Contract/Construction Management

stage 1: construction period

- Activity 1 Organization and Mobilization
- Activity 2 Planning and Program
- Activity 3 Survey Check and Material Information
- Activity 4 Plan for Site Organization
- Activity 5 Construction Methods
- Activity 6 Time Control
- Activity 7 Cost Control
- Activity 8 Quality Control
- Activity 9 Site Meetings and Record Keeping

- Daily Diary
- Maintain Up-To-Date Information Relevant to Progress, Performance, Quality, Quantities, Resources & Cost
- Maintain Project Records in Classified and Retrievable Form
II. Contract/Construction Management

stage 1: construction period

- Activity 1 Organization and Mobilization
- Activity 2 Planning and Program
- Activity 3 Survey Check and Material Information
- Activity 4 Plan for Site Organization
- Activity 5 Construction Methods
- Activity 6 Time Control
- Activity 7 Cost Control
- Activity 8 Quality Control
- Activity 9 Site Meetings & Record Keeping
- Activity 10 Monthly Progress Reports

- Executive Summary
- Section One: General Information
- Section Two: Progress Outline
- Section Three: Schedules
- Section Four: Resource Control
II. Contract/Construction Management

stage 1: construction period

- Activity 1 Organization and Mobilization
- Activity 2 Planning and Program
- Activity 3 Survey Check and Material Information
- Activity 4 Plan for Site Organization
- Activity 5 Construction Methods
- Activity 6 Time Control
- Activity 7 Cost Control
- Activity 8 Quality Control
- Activity 9 Site Meetings and Record Keeping
- Activity 10 Monthly Progress Reports

- Section Five: Cost Control
- Section Six: Quality Control
- Section Seven: Contract Records
- Section Eight: Progress Photographs
II. Contract/Construction Management

stage 1: construction period

- Activity 1 Organization and Mobilization
- Activity 2 Planning and Program
- Activity 3 Survey Check and Material Information
- Activity 4 Plan for Site Organization
- Activity 5 Construction Methods
- Activity 6 Time Control
- Activity 7 Cost Control
- Activity 8 Quality Control
- Activity 9 Site Meetings & Record Keeping
- Activity 10 Monthly Progress Reports
- Activity 11 Claims and Disputes

- Identify Potential Claims
- Settle Disputes or Differences
II. Contract/Construction Management

stage 1: construction period

- Activity 1 Organization and Mobilization
- Activity 2 Planning and Program
- Activity 3 Survey Check and Material Information
- Activity 4 Plan for Site Organization
- Activity 5 Construction Methods

- Activity 6 Time Control
- Activity 7 Cost Control
- Activity 8 Quality Control
- Activity 9 Site Meetings & Record Keeping

- Implementation of Methods and Procedures to Minimize the Potential Financial and Time Impact of Claims
- Settlement of time/cost claims
II. Contract/Construction Management

stage 1: construction period

- Activity 1: Organization and Mobilization
- Activity 2: Planning and Program
- Activity 3: Survey Check and Material Information
- Activity 4: Plan for Site Organization
- Activity 5: Construction Methods
- Activity 6: Time Control
- Activity 7: Cost Control
- Activity 8: Quality Control
- Activity 9: Site Meetings & Record Keeping
- Activity 10: Monthly Progress Reports
- Activity 11: Claims and Disputes
- Activity 12: Completion of Works / Taking-Over

- Establish schedule for Testing and Commissioning
- Witness Tests
- Prepare List of Outstanding Works
- Obtain Written Undertaking to Complete any Outstanding Work during DLP
II. Contract/Construction Management

stage 1: construction period

- Activity 1 Organization and Mobilization
- Activity 2 Planning and Program
- Activity 3 Survey Check and Material Information
- Activity 4 Plan for Site Organization
- Activity 5 Construction Methods
- Activity 6 Time Control
- Activity 7 Cost Control
- Activity 8 Quality Control
- Activity 9 Site Meetings & Record Keeping
- Activity 10 Monthly Progress Reports
- Activity 11 Claims and Disputes
- Activity 12 Completion of Works / Taking-Over

• Issue Taking-Over Certificate
• Check Progressively “As-built Drawings”
• Review “Operations and Maintenance Manuals”
II. Contract/Construction Management

stage 2: defects liability period

Activity 13
Inspection of Works

- Inspect and Verify that the Outstanding Works have been Satisfactorily Completed
- Remedy Detected Defects
- Final Taking-Over of Project at End of Defects Liability Period
II. Contract/Construction Management

stage 2: defects liability period

- Activity 13
  Inspection of Works

- Activity 14
  Defects Liability Certificate

- Issuance of Defects Liability Certificate
II. Contract/Construction Management

stage 2: defects liability period

- Activity 13 Inspection of Works
- Activity 14 Defects Liability Certificate
- Activity 15 Final Certificate and Final Report

- Final Statement submittal after Issuance of Defects Liability Certificate
- Issuance of Final Certificate
- Final Report
III. PROJECT CONTROLS

Scope

- Continuous monitoring of actual project performance (Time, Cost, Quality).

- Assessing performance and any needed corrective/preventive action.

- Maintaining accurate and updated information base through the project’s cycle.
Project Controls
Time & Cost

- Review time schedule/cash-flow estimate.
- Review material submittals/shop drawings schedules.
- Record delays and advise on recovery measures.
Project Controls
Time & Cost - BENEFITS

Project Controls of the project schedule will enable:

**Baseline**
- Identifying Project WBS and Baseline Schedule
- Identifying Critical Activities
- Resources Requirements
- Anticipated Cash Flow (S-Curve)

**Progress and Update**
- Measuring Progress/Performance
- Identifying delays and sources of delay (through further side analysis)
- Assessing the need for rescheduling and determining which activities need to be rescheduled

**Changes**
- Potential effect of Variation Orders
- Analyzing Contractors’ Claims for Extension of Time
PLANNING & SCHEDULING

- Critical Path Method (CPM)
- Critical Path Activities
- Logical Relationships
- Total Float (TF)
- Free Float (FF)
- Constraints
- Resources
Resources - Histograms
PLANNING & SCHEDULING

SCHEDULE COMPRESSION

- Shortening the Project Schedule duration without reducing the project scope which might increase the project cost.

SCHEDULE UPDATE

- Starts with monitoring of the project activities, collecting key progress information that would be translated into the following at the end of the reporting period (data date, time now or as of date):

  * Actual Start of progressing/completed activities
  * Actual Finish for completed activities
  * % complete/remaining duration/expected completion date for progressing activities

  The above information is entered into the Update Schedule and the schedule calculation performed.

  - The Updated Schedule is compared to the Baseline Schedule

    The Critical Path may change.
Progress Monitoring & Control

Baseline Vs. Updated Schedule

[Diagram showing schedule comparison]
ESSENTIAL FACTORS

Construction Contract Documents to specify clearly the requirements for the construction schedule:

- Category of Software (by name or of similar capabilities)
- Phasing
- Milestones
- WBS
- Interface with other construction projects
- Level of detail
- Short activities duration, quantities and cost (based on BOQ), resources (labor and equipment)
- Activities to include submittal, approval and procurement of materials
- Frequency of schedule update and reporting
- Type of reports to be submitted (Logic Network, Bar Charts, Tabular, Labor Histograms per trade and total, Equipment Histograms per equipment and total, Cost in tabular, histogram and S-Curve formats, Earned Value)
- Calendar
ESSENTIAL FACTORS

Project Calendars

A calendar of working days or shifts that establishes those dates on which activities are worked, and nonworking days. Nonworking days include holidays.

A project can have a unique calendar or multi-calendars.

Example: Activity with duration of 18 working days.
# MONTHLY PROGRESS REPORT

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Cost Control

- Review and process interim payments applications
- Monitor quantities and variation orders
- Monitor cash flow
- Evaluate change/variations impact
- Develop cost forecasts
- Calculate the earned value
- Develop, implement, update project cost
- Monitor/Identify variances between actual/budgeted costs
Cost (Value)
Histogram and S-Curve
Earned Value

Specific technique for measuring performance of work based on activities’ costs

**BCWS**: Budgeted cost of work scheduled (Planned Value)

**BCWP**: Budgeted cost of work performed (Earned Value)

**ACWP**: Actual cost of work performed (Actual Cost)

**Schedule Variance (SV)** = BCWP – BCWS

**Cost Variance (CV)** = BCWP – ACWP

- **Schedule Index (SI)** = BCWP/BCWS
- **Cost Index (CI)** = BCWP/ACWP
Earned Value
# Variation Order - Form

**VARIATION ORDER**

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<tr>
<td>Date :</td>
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**Project Name** :

**Employer** :

**Engineer** : DAR AL-HANDASAH (Shair & Partners)

**Contractor** :

---

**To** : The Contractor

**Subject** :

**Reference** :
- Our Letter
- Your Letter

**Description of varied work** :

---

**Estimated cost of this variation is** :

**Estimated time impact of this variation is** :

**For** : The Engineer

---

**c.c. The Employer**
- The Engineer's Representative
Quality Control

Quality is controlled through the following:

- Timely inspections and testing of works, materials and production plants
- Review and monitoring of Health, Safety and Environment (HSE) plan
- Inspection of material sources and list of suppliers
- Review and Approval of Materials and Shop Drawings
- Review of As-Built drawings and O&M manuals
- Submittal of certificates of guarantee
- Involvement of third party for laboratory testing
- Snag lists implementation
## Submittal for approval of materials - Form

### SUBMITTAL FOR APPROVAL OF MATERIALS

1. **MATERIAL DESCRIPTION** (one item only on this form):

2. **MANUFACTURER/SUPPLIER**:
   - Company Name:
   - Address:
   - Local Agent:

3. **DELIVERY**:
   - Country of Origin:
   - Delivery: Ex-works/ Total Duration:
   - Estimated Time of Arrival on Site:
   - Program: Date Material Required on Site:
   - Latest Date for Order:

We certify that the above submitted items have been reviewed in detail and are correct and in strict conformity with the contract drawings and specifications except as otherwise stated; also that the material sources indicated above have been reviewed in detail and that they will supply the submitted items in conformity with the above and deliver same timely.

Submitted by: ___________________________ Signature: ___________________________

### 4. ENGINEER'S REPRESENTATIVE'S COMMENTS:

- Approved
- Approved As Noted
- Revise and Resubmit
- Rejected
- Sample Required
- Tests Required
- Additional Information Required
- Manufacturer's Guarantee Required

Signature: ___________________________ DATE: / /
# Request for Inspection - Form

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<th>Contractor</th>
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Request for inspection

We request your attendance to inspect the following works:

1. **Type**: Viaducts, Tunnels & Structures
2. **Inspection time**: Date: / / 
3. **Location**: Zone, Road, Stations, Other
4. **Inspection**: First, Second, Third
5. **Purpose of the inspection**:
   - Setting out
   - Excavation & Shoring
   - Formwork
   - Reinforcement
   - Concreting
   - Waterproofing
   - Wearing Course
   - Others (specify)
   - Bearing
   - Predisposing
   - Grouting
   - Removal of Falsework
   - Cladding & Finishes
   - Permeates
   - Joints

Particular Details

Submitted by: __________________________ Signature: ____________________

6. **Inspection report**

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Date/Time of Inspection: / / :

7. **Engineer’s representative’s comments**

The works are:  □ Approved  □ Approved as Noted  □ Rejected

Signature: __________________________ DATE: / /
QA/QC Auditing

- Oversee QA/QC implementation
- Oversee inspection/ testing process
- Issue periodic audit reports
Document Control

Document Control in construction projects is the management of contract documents and the incoming and outgoing correspondence and their attachments and their flow to the members of the management team for action or information.

Parties involved are commonly:
- Client
- Funding Agency
- Consultant
- Contractor
- Authorities
- Stakeholders
- Other
Document Control

Develop/Implement/Maintain Document Control system to cover:

- Contract Documents
- Correspondence/Minutes of Meetings
- Site Correspondence/Reports
- Drawings Logs
- Submittals
Project Documentation

- A referencing system for all project documents is necessary to achieve proper document control and archiving.

- Referencing system applies to all documents and correspondences.
Referencing System

Example of Drawings Numbering System

XXXXX 001-W 001 1 of 1

- Project Number
- Zone No. or Building No.
- Discipline (Water Supply)
- Serial No. (001)
- X of Y
The project network should be prepared and maintained to serve as a Common Operating Platform that will facilitate and expedite management and flow of project documents/information among the project parties.
IV. Related and Arising Issues - IRAQ

Contract

- Definition of Employer/Engineer/Contractor relationships, especially that the independent role of the Engineer is not quite common in Iraq. Resolution needed through policy and exposure through seminars and workshops.

- Respect of design review phase in design-build contracts to avert problems that hinder the project’s progress during construction.

- Respect of the maximum share of works that can be subcontracted as in the Conditions of Contract.

- Adherence to Contract requirements for approval of sub-contracts.

- Familiarity with FIDIC/World Bank Contracts.
IV. Related and Arising Issues - IRAQ

Progress & Cost

- Project schedule to be properly established and regularly updated by experienced planners.
- Response to fast track of construction projects is needed.
- Adequate human resources and experienced staff to cover projects’ needs.
- Delays in procurement of long-lead items.
- Delays in possession of parts of Site that fall within sensitive areas.
- Expediency to obtain permits.
IV. Related and Arising Issues - IRAQ

Progress & Cost

- Centralization of decision-making on government construction projects.
- Delays in processing certified payments.
- Monthly submittal of progress reports.
- Long procedures for approval of variation orders.
- Financial back-up from Contractors’ head offices.
- Cash Flow regular updates.
IV. Related and Arising Issues - IRAQ

Quality

- Institution of comprehensive quality plan.

- Application of Quality Control procedures:
  - adherence to quality procedures
  - materials conformity to Specifications
  - difficulties associated with testing (central versus site laboratories)

- Technical back-up from Contractors’ head offices.
IV. Related and Arising Issues - IRAQ

**Document Control**

- Institution of integrated project document control.

- Systematic use of proper forms.
THANK YOU

50 years of engineering excellence

Der El-Heddad
Shair and Partners