

# Onshore Pipelines

# The Road to Success



17 March 2010





# Onshore Pipelines The **Road** to **Success**



- 1. IPLOCA's Novel Construction Initiative**
- 2. In search of Successful Pipeline Projects**
- 3. Resulting Document**
- 4. Future Developments**
- 5. Q & A**



# Onshore Pipelines The **Road** to **Success**



## 1. IPLOCA's Novel Construction Initiative



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## 1. IPLOCA's Novel Construction Initiative

### Initial Objectives of the Novel Initiative (2004):

- **Improve laying efficiency and standards of large diameter pipelines.**
- **Get better, safer and environmentally sound installation.**



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## 1. IPLOCA's Novel Construction Initiative

### The Novel Initiative Group focused in:

- **Technology innovation**
  - » Land Train
  - » Mechanized Tie Ins
  - » Other Innovative Ideas
- **Target → 35% Cost Reduction**



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## 1. IPLOCA's Novel Construction Initiative

### BASIC QUESTIONS:

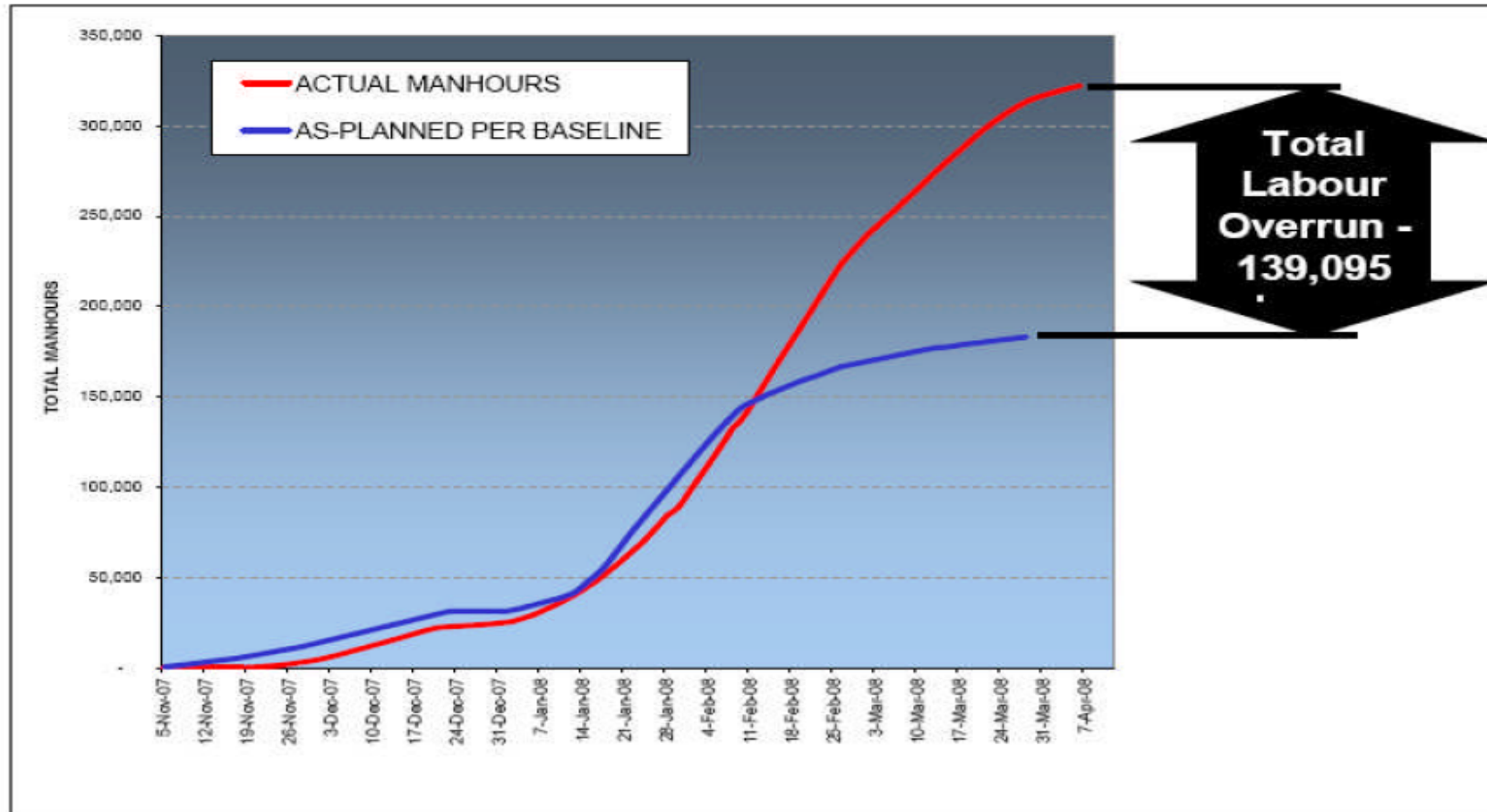
➤ Is Technology the key driver for cost reduction?

or,

➤ Is cost reduction primarily governed by a sound Process?



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## 1. IPLOCA's Novel Construction Initiative

### Objectives were revised (2007):

- Considering the number of pipeline projects which incurred schedule and cost overruns → a broader perspective was given to the Initiative.
- All phases of the Pipeline Projects were reviewed from Early Developments through Design, Construction and Commissioning...





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## 1. IPLOCA's Novel Construction Initiative

Six Working Groups integrated by **Oil & Gas Companies** and **IPLOCA members** were organized:

- » Planning, Design and Control (PDC)
- » Contract and Risk Sharing (CRS)
- » Earthworks (EW)
- » External Pipeline Protection Systems (ECPS)
- » Facing, Line-up and Welding (FLUW)
- » Laying and Lowering-in (L&L)



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## 2. The search of Successful Pipeline Projects



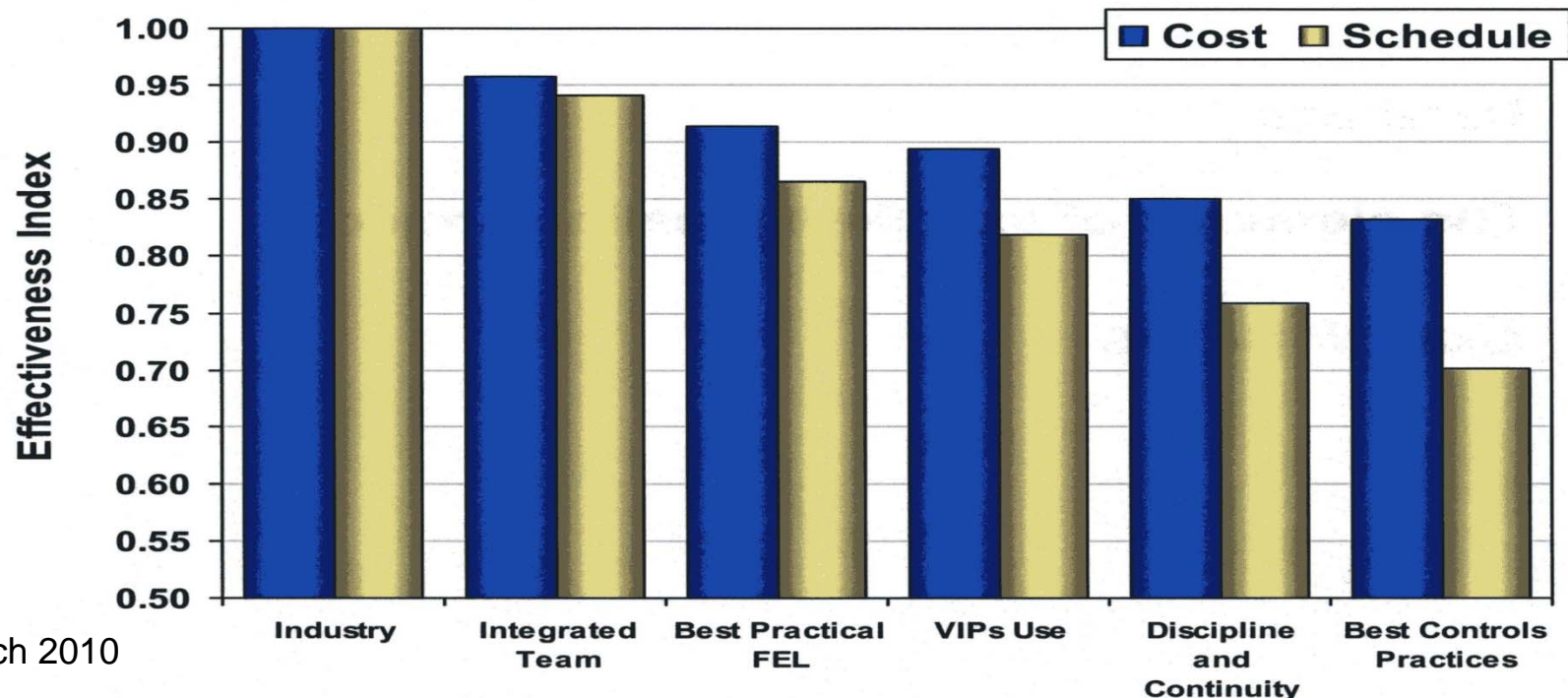
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## 2. The Elements of Successful Pipeline Projects

(source: Independent Project Analysis Inc.)

### Drivers of Performance for Pipeline Projects





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## 2. The Elements of Successful Pipeline Projects

- » **Solid Basic Data**
- » **Front End Loading**
- » **Team Integration and Alignment**
- » **Clear Scope of Works**
- » **Management of Risks and Changes**
- » **Value Improving Practices & Technologies**
- » **Discipline and Controls**



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## 3. Resulting Document

- Volume One:
  - » **The Road to Success. First Edition.**
  
- Volume Two:
  - » **Appendices**



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## The **Road** to **Success**



### 3. Volume One. **The Road to Success**

- Preface and Introduction
- 1 Executive Summary
- 2 Development Phases of Pipeline Project
- 3 The Baseline of a Contract
- 4 Analysis and Mitigation of Risks
- 5 Management of Construction Risks
- 6 Best Practices
- 7 New Trends and Innovation
- Bibliography / Acknowledgements



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## The **Road** to **Success**



### 3. Volume One. **The Road to Success**

- **Preface and** *The Joint Approach*
- 1 Executive Summary *- To whom the document is addressed*
- 2 Development Plan *- The objectives of the Road*
- 3 The Baseline of *- Challenges and Rewards of pipeline projects*
- 4 Analysis and Mitigation *- Key Principles to avoid disasters*
- 5 Management of Construction Risks *- Presentation of the Road*
- 6 Best Practices
- 7 New Trends and Innovation
- Bibliography / Acknowledgements



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## The **Road** to **Success**



### 3. Volume One. **The Road to Success**

- Preface and Introduction

**1 Executive Summary** *Summarized presentation of sections 2 to 7*

2 Development Phases of Pipeline Project

3 The Baseline of a Contract

4 Analysis and Mitigation of Risks

5 Management of Construction Risks

6 Best Practices

7 New Trends and Innovation

- Bibliography / Acknowledgements





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### 3. Volume One. **The Road to Success**

- Preface and Introduction
- 1 Executive Summary
- 2 Development Framework**
  - *FEL 1: Business Planning*
  - *FEL 2: Facility Planning*
  - *FEL 3: Project Planning*
- 3 The Baseline of a Contract
- 4 Analysis and Mitigation
- 5 Management of Construction
- 6 Best Practices
- 7 New Trends and Innovation
- Bibliography / Acknowledgements

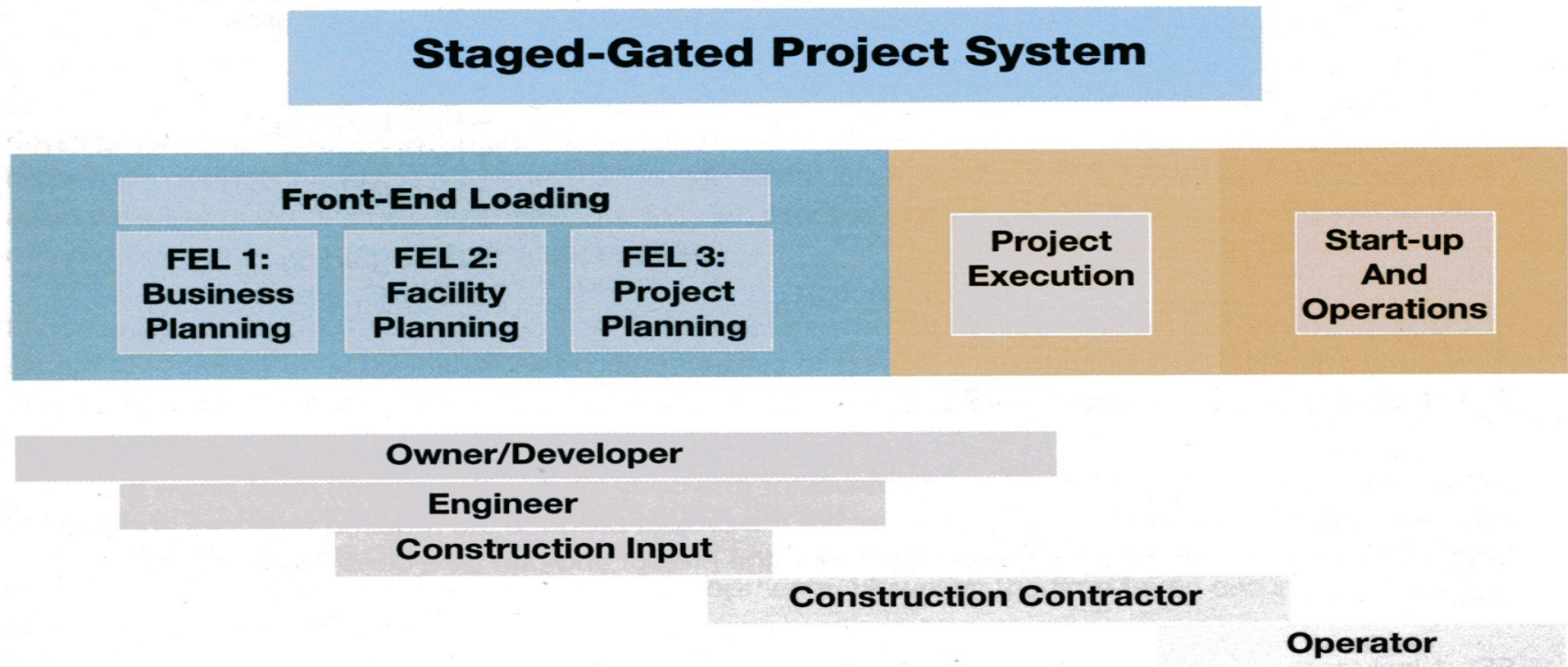


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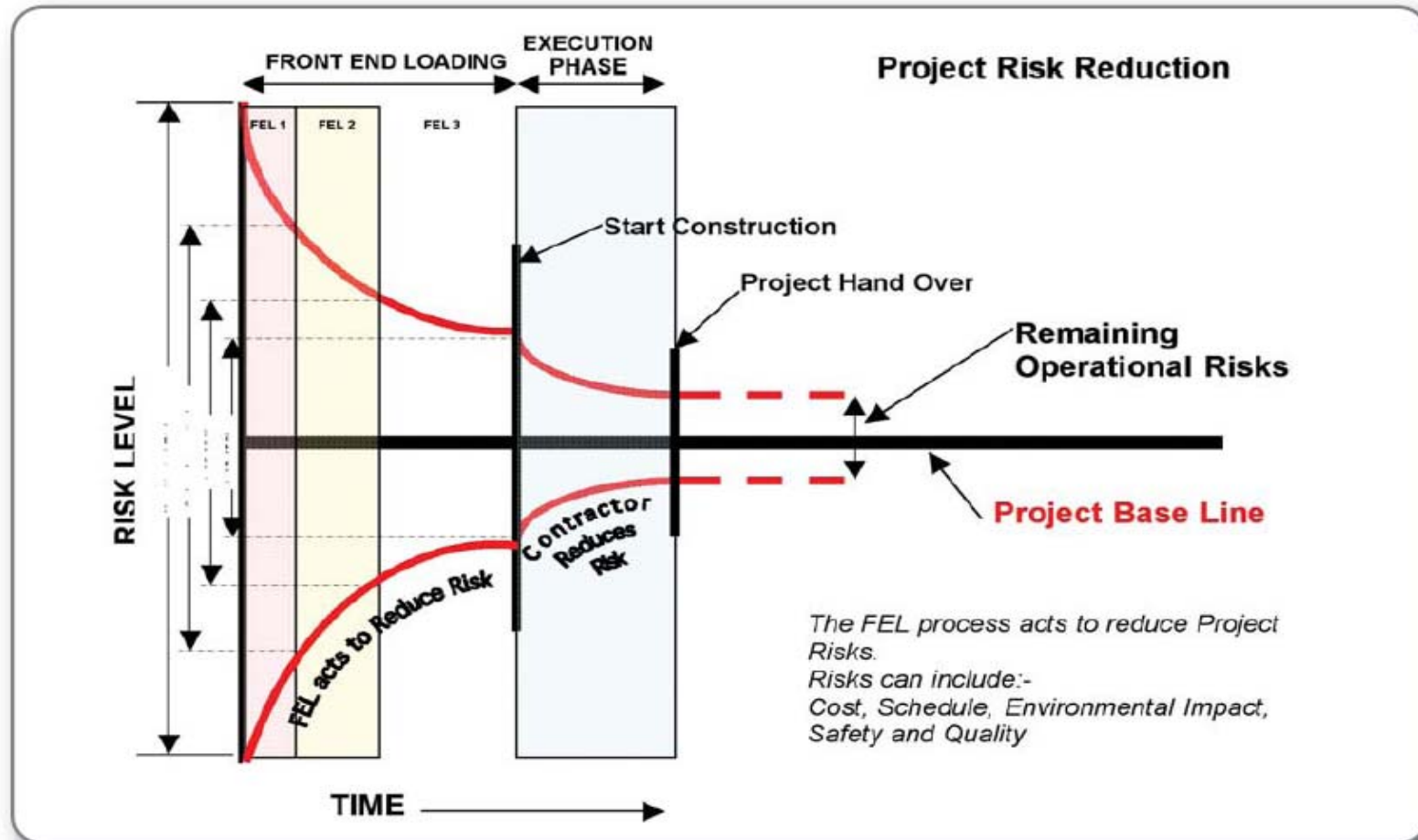


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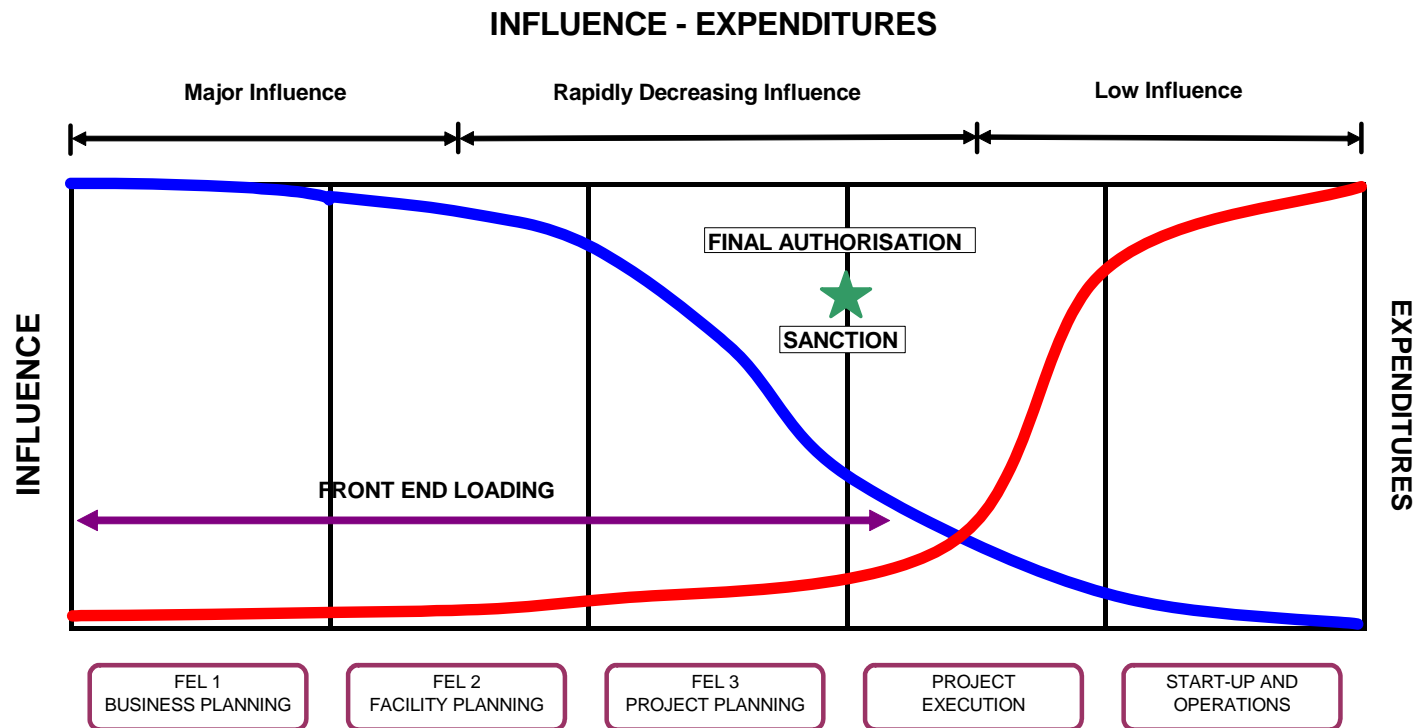


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- *Scope of Works*
- *Resourced Programme*
- *Cost Structure*
- *Conditions of Contract*

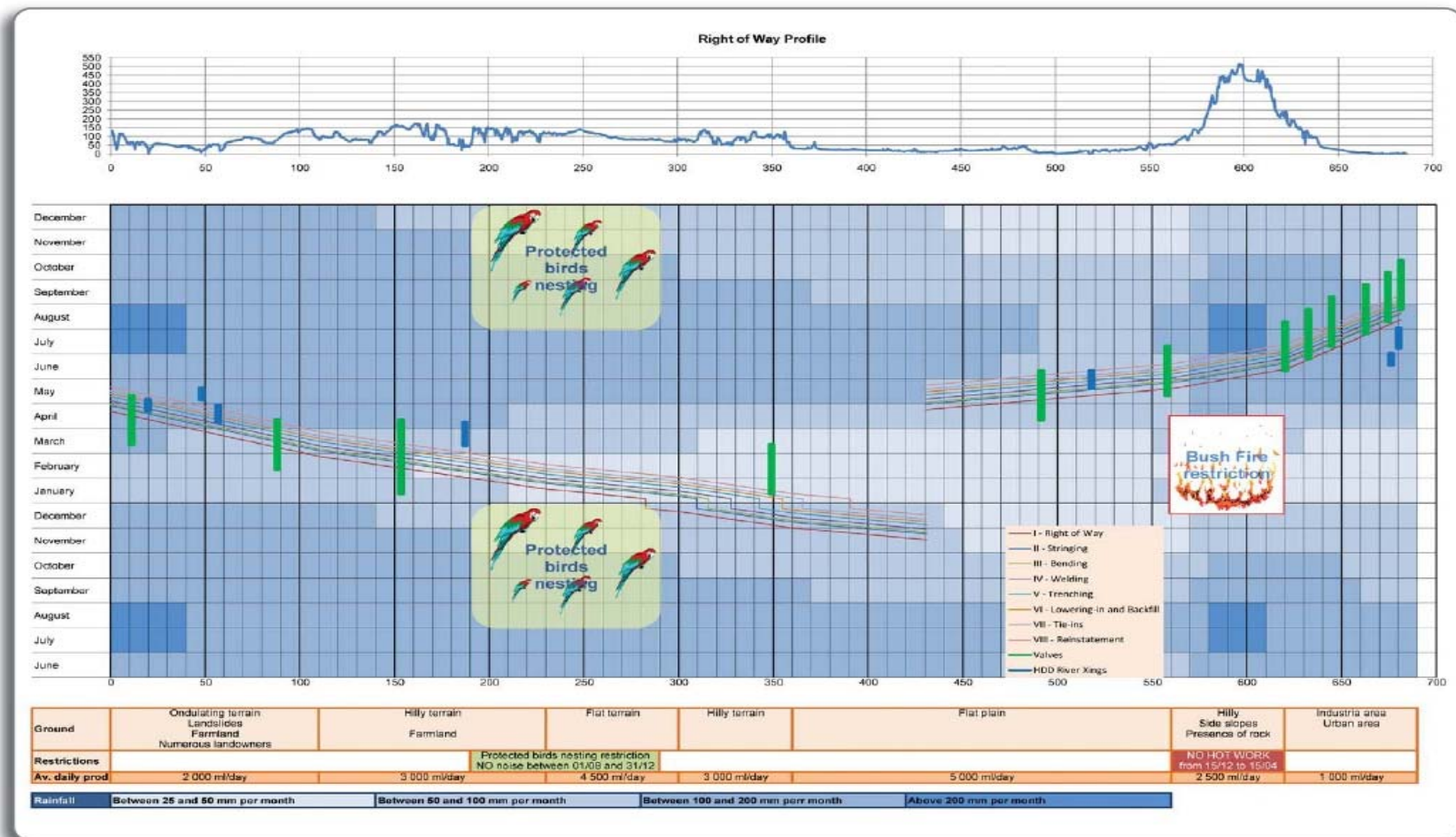


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- Preface and Introduction
- 1 Executive Summary
- 2 Development Phases of Pipeline Project
- 3 The Baseline of a Contract
- 4 Analysis and Mitigation of Risk**
  - *Categories of Risk Events*
  - *Detailed Description of Events*
  - *Timing of Risks Consideration*
  - *Risk Owner*
  - *Risk Mitigation by Contractor*
  - *Excess Mitigation by Client*
- 5 Management of Construction Risk
- 6 Best Practices
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### Risks Events were classified in 9 categories:

- A (Weather),
- B (Archaeological and Man Made Artefacts),
- C (Geological),
- D (Flora and Fauna),
- E (Social and Security),
- F (Materials),
- G (Engineering),
- H (Permit Conditions) and
- I (ROW Remediation).





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Risk Events Table				Mitigation measures		Contractual impact		
Category	Item	Description of events	Consideration of risk at FEL phase N°	Contractor	Client	Mitigation defined at FEL 3	Normal baseline mitigation - by Contractor	Excess mitigation - by Client
<b>A Weather</b>	a	Inclement weather conditions creating weather windows to be included in the programme of the works: those conditions may concern the rainy seasons/the monsoon, the periods when the land is flooded, when the snow constantly covers the land, the periods of permafrost, the periods when rock falls or snow slides are likely to occur, known periods of limitations (partial or total) to construction resulting from extreme temperatures or from temperature and humidity combined conditions or from uninterrupted humidity or light rain...	FEL 2	X		Make explicit and mutually agree the weather allowance in the baseline. Agree the criteria for defining a weather window including the consequences of the said weather on accessibility, trafficability and environmental impact (i.e. land too wet which could be damaged badly in case of traffic although the cause, the rain or the snow, has ended for some time...). Plan the works around the predefined weather windows.	All weather impacts and their consequences falling within the baseline weather allowance, said allowance being explicitly defined by the contract.	Bear the cost of any weather impacts above and beyond the baseline weather allowance as explicitly defined by the contract.
	b	Isolated cases of inclement weather conditions such as storms/hurricane/typhoons, ROW flooding, snow event, temperature extremes, temperature and humidity extreme combined conditions, air quality (e.g. ozone, sandstorm, smog, blizzard whiteout, fog), rockfalls and snow slides.	FEL 3	X		Climatic data should be readily available. Define in contract the expected time loss for those events during certain months of the year and the conservative preventing measures to implement as baseline.	Bear cost of preventing measures and include time loss in baseline programme.	Bear cost of additional preventing measures and/or time loss in excess of baseline.
	c	Special weather constraints/weather windows at crossings such as periods of flooding of a river, significant commercial fisheries imposing periods without construction activities...	FEL 2	X		Weather constraints and weather windows at crossings to be part of the baseline.	Baseline constraints to be included in the programme of construction of crossings.	Bear the cost of additional constraints in excess of baseline.



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Risk Events Table				Mitigation measures		Contractual impact		
Category	Item	Description of events	Consideration of risk at FEL phase N°	Contractor	Client	Mitigation defined at FEL 3	Normal baseline mitigation - by Contractor	Excess mitigation - by Client
<b>C</b> Geological	a	Ground conditions differing from the ground conditions (hard rock, hard ground, soft ground, sandy area, etc) derived from field surveys conducted prior to field mobilization (including geophysical and subsoil work).	FEL 2	×	×	Conduct field surveys prior to field mobilization, including geophysical and subsoil work in areas accessible then to define the baseline assumption of the various ground conditions to be encountered. At the start of work as soon as all sections of the ROW are available trial holes to be carried out to check initial assumptions.	In addition to the baseline include an allowance for deviations from the expected geology and define that allowance explicitly in the contract. As a guideline the limit of those deviations would be a) a change of the execution process, b) a change of equipment required, c) a variation of soil nature beyond an initially defined band.	Bear the cost for work slowdown/relocation or change of execution process or additional equipment required should unexpected geology beyond the deviations defined in the contract causing construction difficulty be identified at commencement or during construction phase.
	b	Geology at crossings.	FEL 2		×	Carry out detailed ground investigation at crossing including trial holes and boreholes and if possible carry out investigations below river beds. Ensure depth of investigation is below required construction depth. Consider seasonal variations of water table. Provide the design and set the baseline.	Contractor to allow for competent performance based on conditions indicated in baseline ground information.	Conduct surveys prior to work. Bear the cost for work slowdown/relocation if required.
	c	Swallow holes, ground liquefaction, mud volcanoes, crusted unstable soil (subkha), karst.	FEL 3		×	Conduct field surveys prior to field mobilization, including geophysical and subsoil work.	Include a baseline allowance for minor deviation of geology from that expected and define that allowance explicitly in the contract.	Conduct surveys prior to work. Bear the cost for work slowdown/relocation if required.



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- 4 Analysis and Mitigation of Risks
- 5 Management of Construction Risks**
  - *Assessment of impact of Risk Events on progress and cost*
  - *Possible mitigation measures*
- 6 Best Practices
- 7 New Trends and Innovations
- Bibliography / Acknowledgements

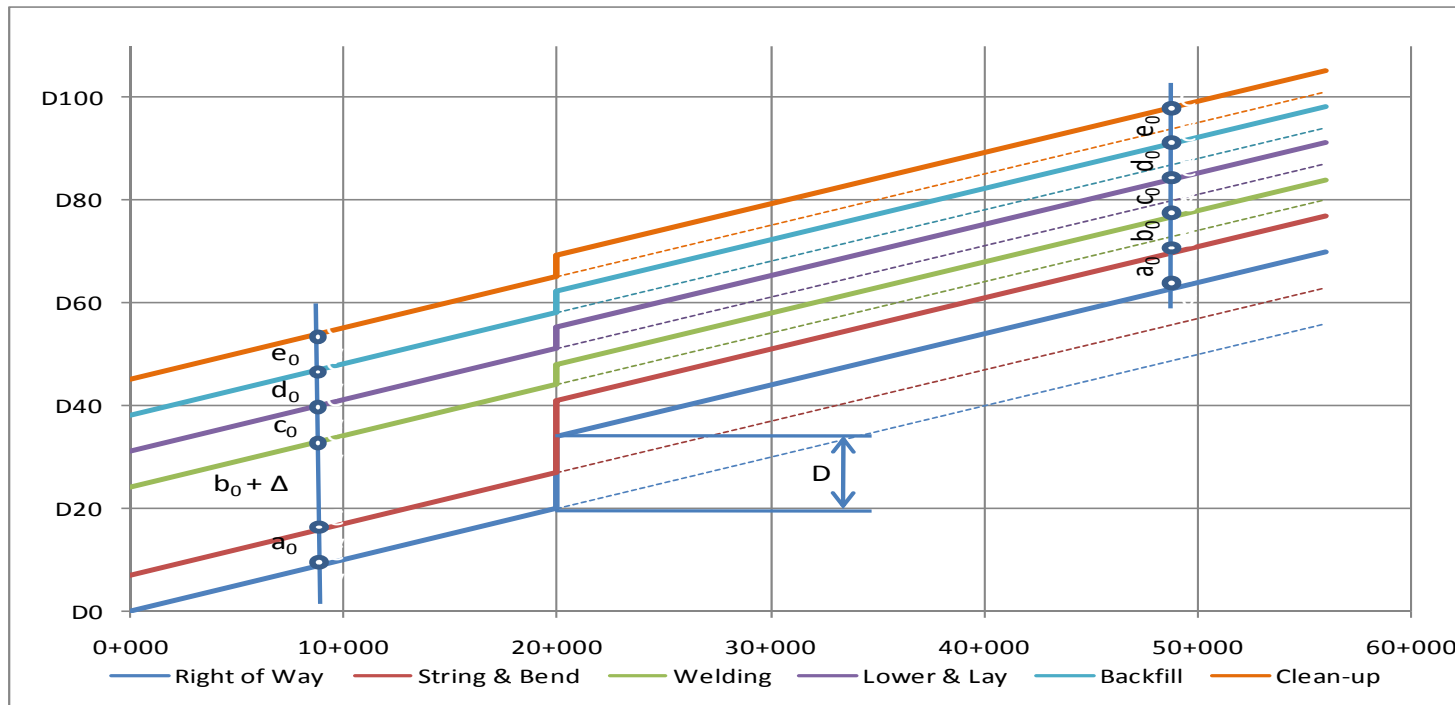


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Utilisation of March Charts to assess time impact of stoppages..





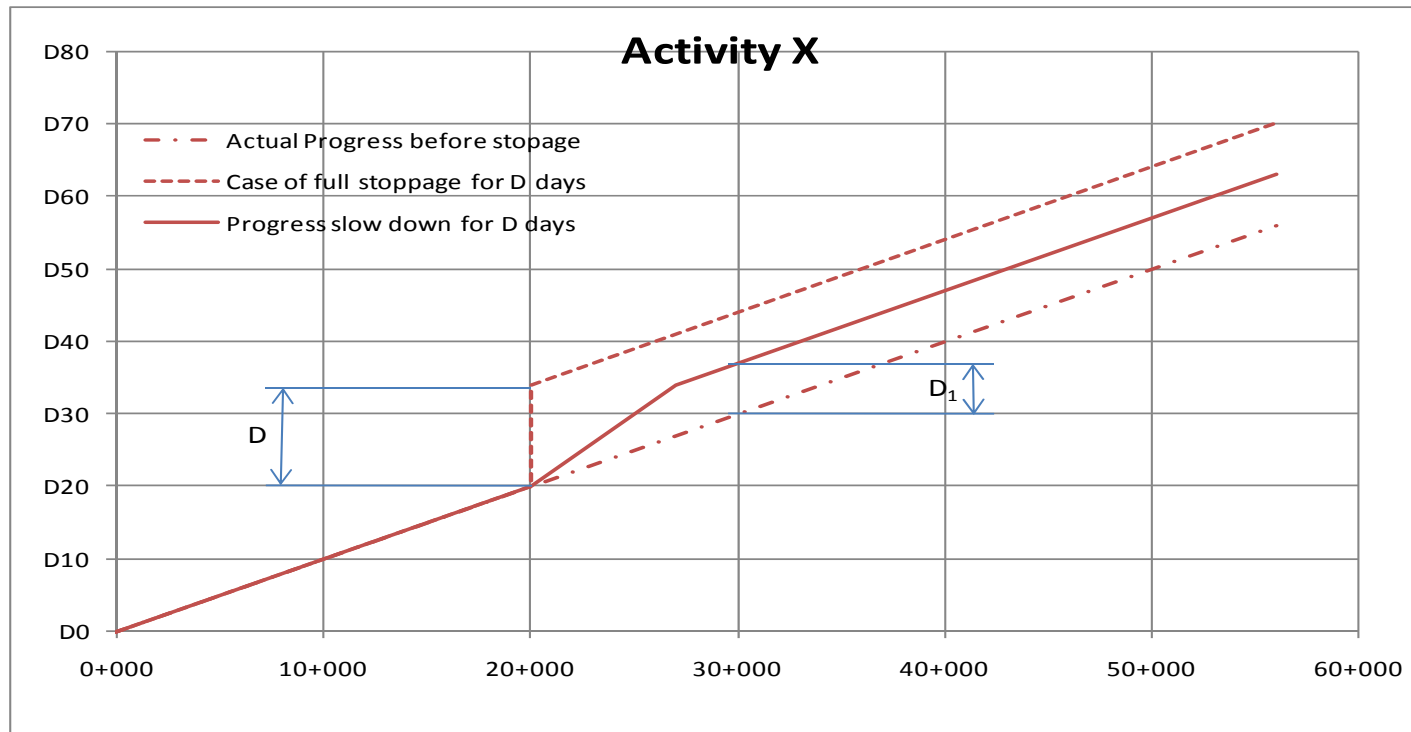
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... or of slowdowns. Comparison with stoppages





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- Preface and Introduction
  - 1 Executive Summary
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  - 3 The Baseline of a Cost-Effective Project
  - 4 Analysis and Mitigation of Risks
  - 5 Management of Construction
  - 6 Best Practices**
  - 7 New Trends and Innovations
  - Bibliography / Acknowledgements
- 6.1 Planning, Design & Control**
    - ROW & Constructability
    - Minimum Data for the Five Project Stages
  - 6.2 Earthworks**
    - Typical ROW Cross Sections
    - Earthworks Design
    - Environment
    - Health & Safety
  - 6.3 External Pipeline Protection System**
    - Mainline Anti Corrosion Coatings
    - Field Joint Anti Corrosion Coatings
    - Mechanical Protections



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**The Earthworks section, for instance,**

- **describes typical ROW Cross Sections for large diameter pipelines in 10 different terrain configurations**
- **deals with Earthworks Design (Trenches)**
- **Offers detailed guidelines to reduce impact on Environment and to deliver Safe working conditions**

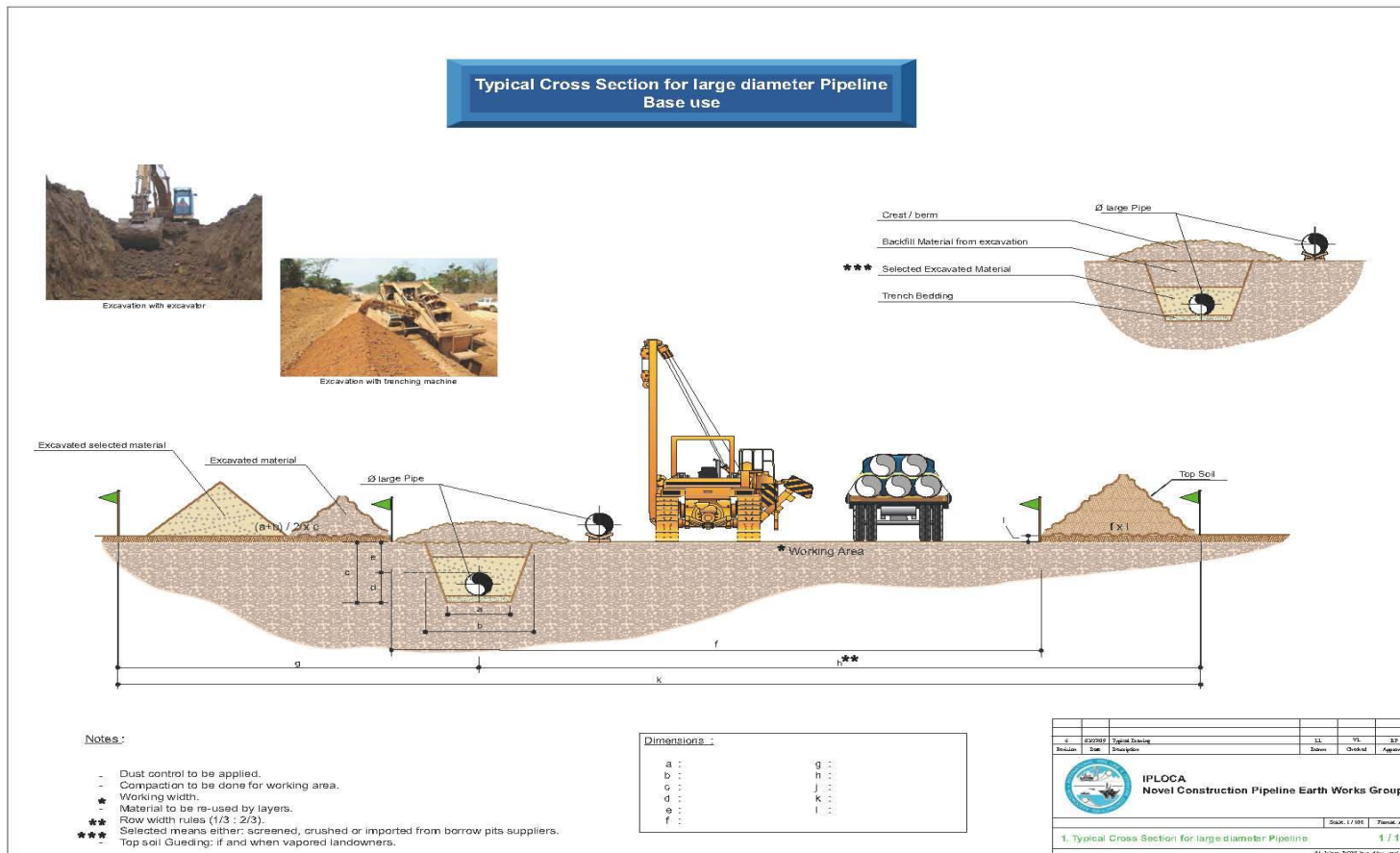


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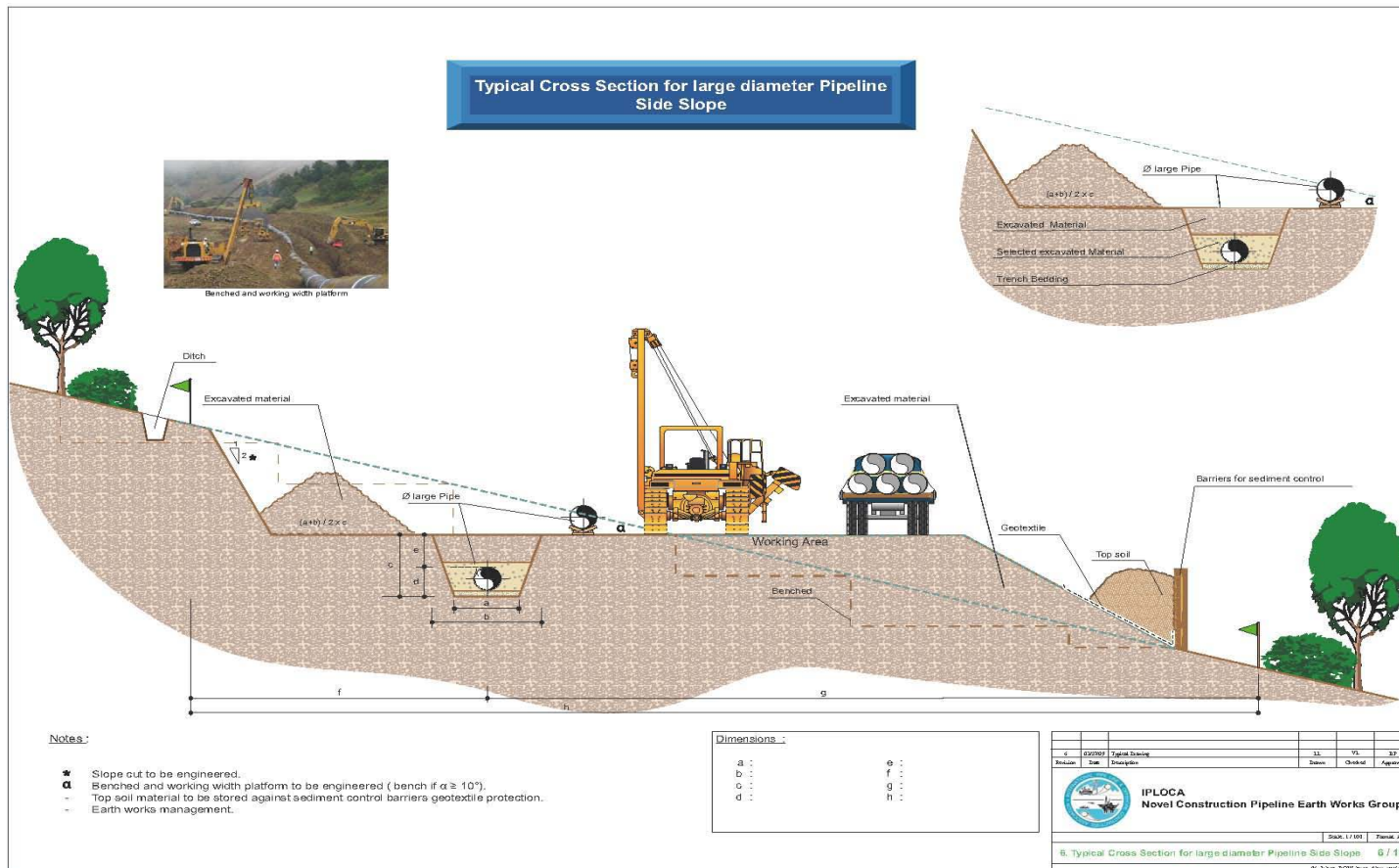


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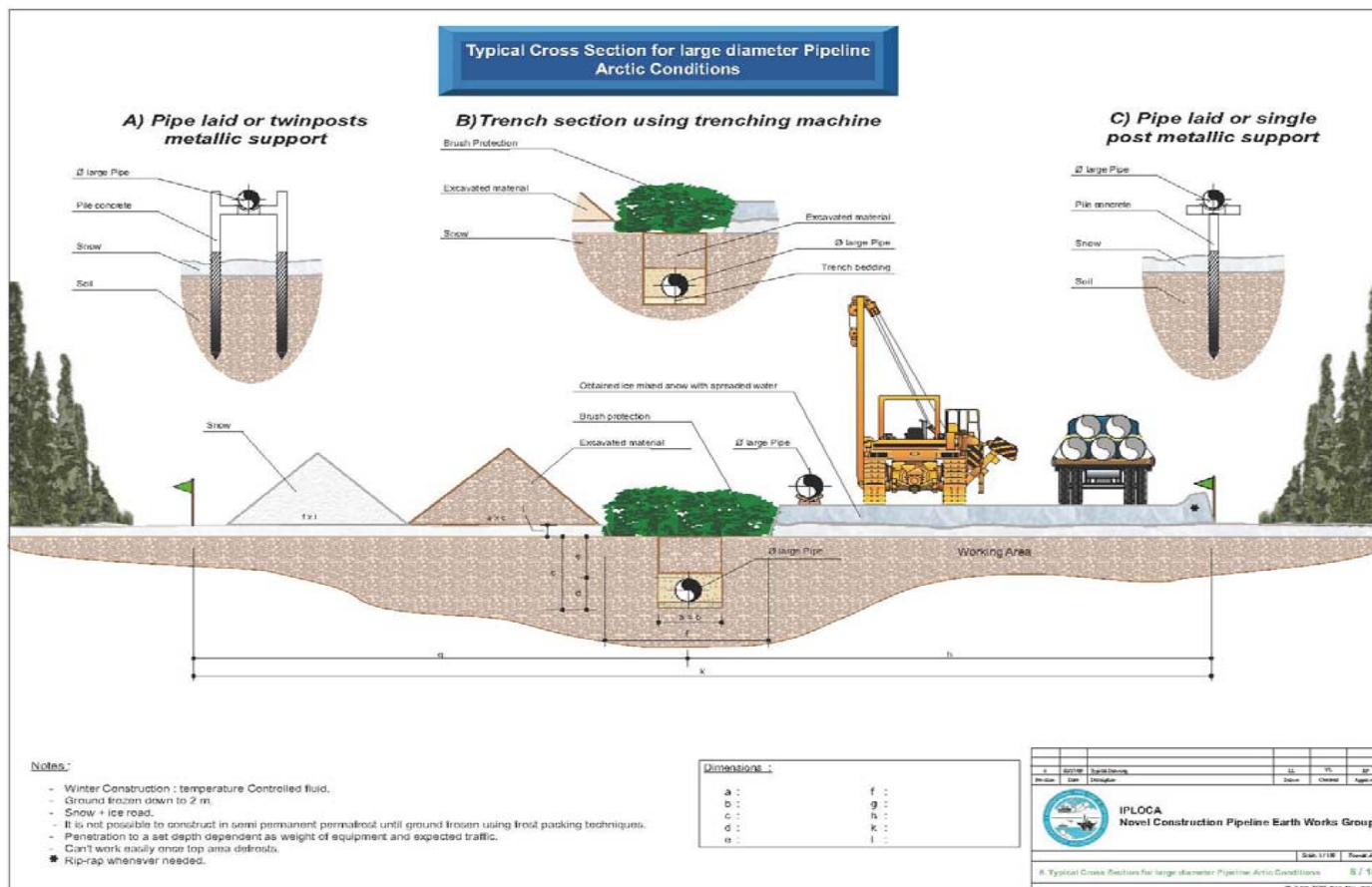


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  - 5 Management of
  - 6 Best Practices
  - 7 New Trends**
  - Bibliography / A
- 7.1 Near-Real-Time Construction Monitoring Tool*
  - 7.2 Pipeline Simulation Tool*
  - 7.3 Facing, Lining up & Welding Skid-less Methodology*
  - 7.4 Lower & Lay: "Ideal" Machine Specifications*

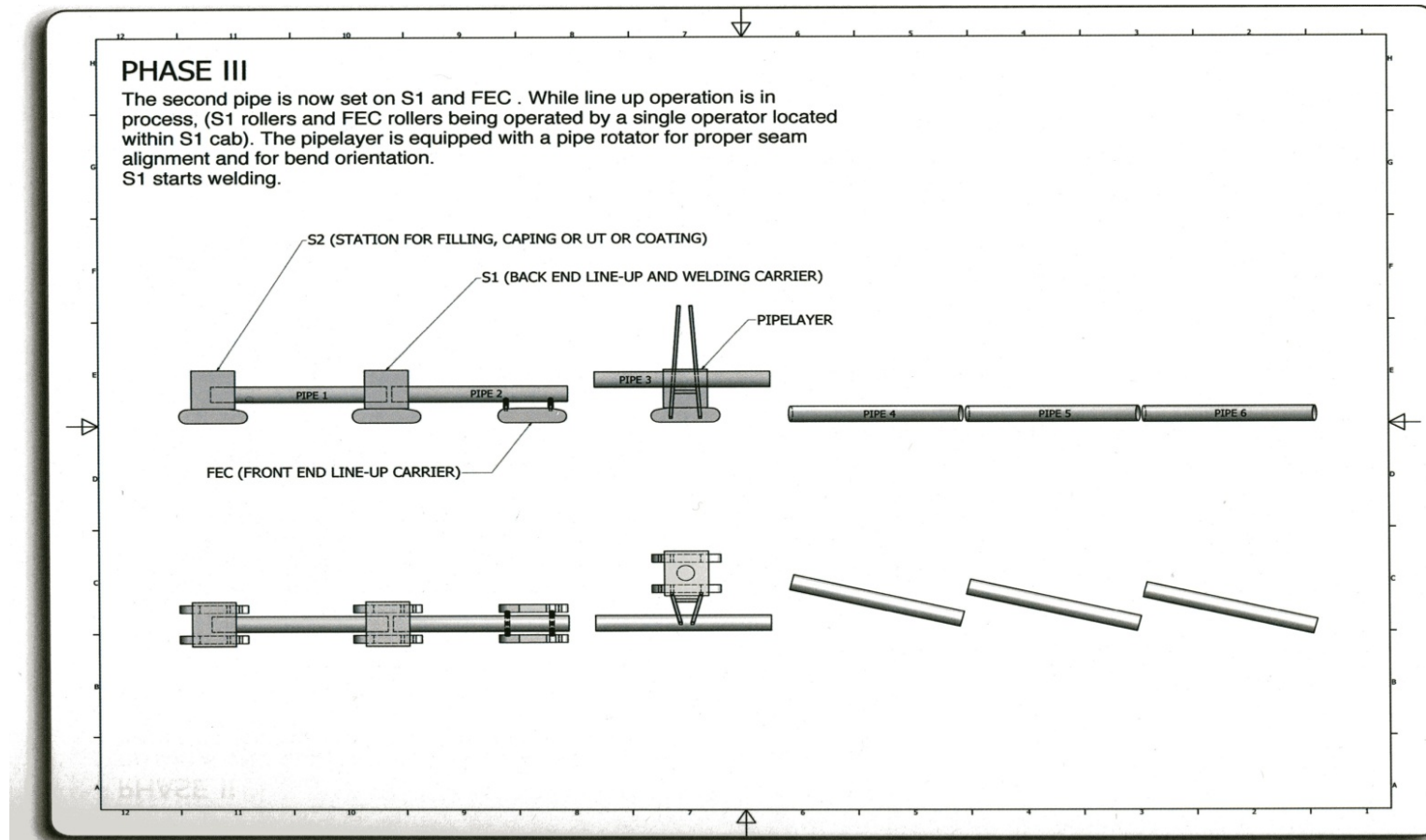


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- **Bibliography / Acknowledgements**

- *Reference Publications*  
- *Contributors to The Road*



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## 4. Future Developments:

- **Continuation of Novel Initiative Mar 23-24 Sessions:**
  - **Five new Working Groups** have been formed to,
  - **expand sections of The Road** as needed
  - **New Developments** have been proposed
  - **Objective:** to issue a second edition by **September 2011**
  
- **Cooperation with EPRG, PRCI & APIA**



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## 5. Q &A



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**The Road to Success is available in pdf  
format on [www.iploca.com](http://www.iploca.com)**

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**Comments and Suggestions**

**to be addressed to**

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