

SAIOSH CENTRAL FREE STATE BRANCH HSE CONFERENCE

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**LINKING DESIGN HIRAS, THE H&S SPECIFICATION,
THE H&S PLAN, AND THE H&S FILE**

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**CONSTRUCTION RESEARCH EDUCATION AND TRAINING ENTERPRISES
(CREATE)**



Introduction (1)

- The Construction Regulations were not accompanied by guidelines
- The collective built environment understanding and appreciation of construction H&S issues is limited
- The construction contracting sector's understanding and appreciation of the role of all built environment stakeholders in construction H&S is limited
- Design hazard identification and risk assessments (HIRAs) are not pervasive
- In general, H&S specifications are a regurgitation of the OH&S Act and the Construction Regulations and not a product of client and design HIRAs and 'real' requirements
- As a result, in general, H&S plans are not H&S plans



Introduction (2)

- The H&S file is perceived to be ‘the contractors H&S file’
- Risk management is a project management knowledge area and ‘the’ key issue to construction management
- Raw risk and residual risk
- ‘Only a bigger fool transfers risk to another fool’



Introduction (3)

Construction H&S occurs in a macro environment:

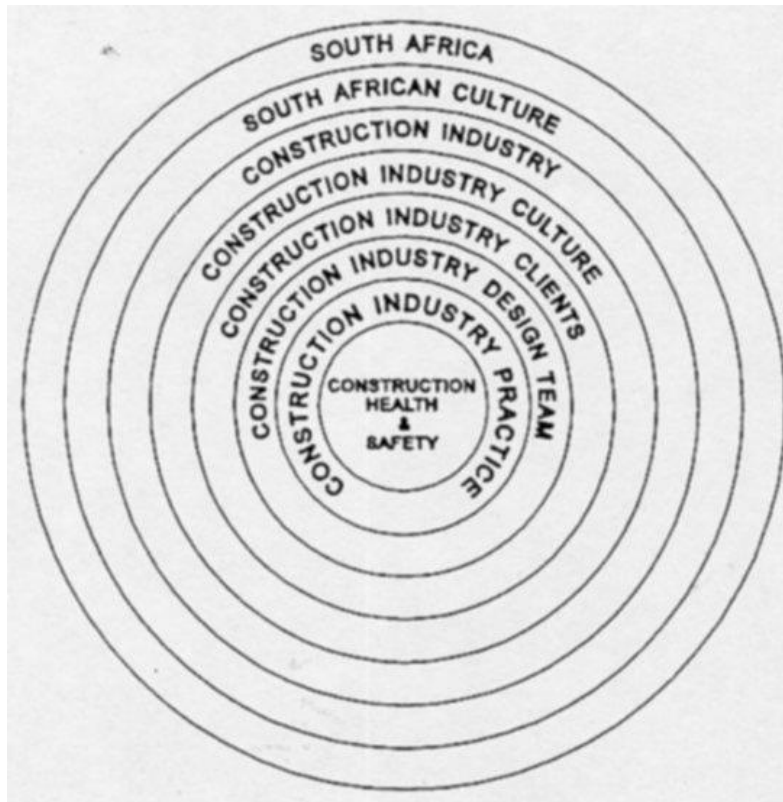


Figure 1: Construction H&S – the macro environment (Smallwood, 1995)



General design (1)



Bahia Temple, Delhi, India (Smallwood, 2005)



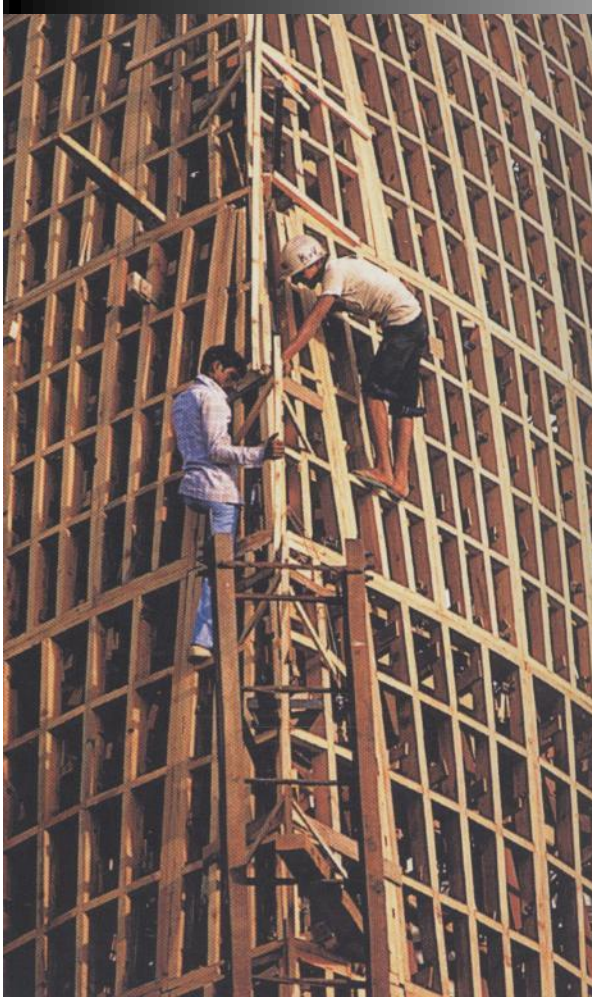
General design (2)



Bahia Temple, Delhi, India (The National Spiritual Assembly of the Bahia'is of India, 2002)



General design (3)



Bahia Temple, Delhi, India (The National Spiritual Assembly of the Bahia'is of India, 2002)

Designing for ergonomics and H&S (1)



Precast concrete stair flights, Port Elizabeth (Smallwood)

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Designing for ergonomics and H&S (2)



Precast concrete stair flights, Port Elizabeth (Smallwood)

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Construction Regulations (1)

- **Clients required to:**
 - 4 (1) (a) Prepare and provide Principal Contractor with H&S specifications (PM, designer, and QS input)
 - 4 (1) (b) Provide PC with any information that may affect H&S (PM, designer, and QS input)
 - 4 (1) (f) Provide sufficient H&S information when changes made to design and construction (PM and designer input)
 - 4 (1) (h) Ensure that PCs have made provision for the cost of H&S in their tenders (PM, designer, and QS input)
 - 4 (2) Discuss contents and approve H&S plan (PM, designer, and QS input)
- **Clients may:**
 - 4 (5) Appoint an agent in terms of the responsibilities, but in terms of 4 (6) must be competent and have the resources



Construction Regulations (2)

Relative to Structures 9 (2) designers are required to:

- **(a) Provide clients with all the relevant information that may affect the pricing of the work (H&S Specification)**
- **(b) Inform Principal Contractors (PCs) of any dangers or hazards and provide information for the safe construction of the design (H&S Specification)**
- **(c) Include a geo-science technical report, the design loading of the structure, and the methods and sequence of construction (actually 'design and construction' method statements) in a report made available to the PC (H&S Specification)**
- **(d) Modify the design or make use of substitute materials where the design necessitates the use of dangerous structural or other procedures, or materials hazardous to H&S (if not then include in the H&S Specification)**



Construction Regulations (3)

- (e) Consider H&S during maintenance subsequent to the completion of the project
- (f) Conduct inspections to ensure conformance of construction to design
- (g) Stop construction work not in accordance with design
- (h) Conduct a final inspection and issue a completion certificate
- (i) Minimise ergonomic hazards – commissioning and other phases



Construction Regulations (4)

- **To meet these requirements requires designers (and clients, PMs and Qs) to:**
 - Identify hazards and assess the risk
 - Mitigate or eliminate the hazards and risks
 - Record the residual risk, if any (H&S Specification)
 - Document the design HIRA process
- **All project phases: project initiation and briefing; concept and feasibility; design development; tender documentation and procurement; construction documentation and management, and project close out**
- **Required following any redesign during construction phase**
- **Ergonomic related hazards require analysis, evaluation and to be addressed in the risk assessment**



Reduction of risk through design and specification (1)

- Optimum approach – prevent hazard arising and avoid risk – are there alternatives?
- If not reasonably practicable - then combat at source
- If not reasonably practicable - then priority for measures to control risk that provide communal protection
- Specification of PPE to control risk is a last resort



Reduction of risk through design and specification (2)



(Steel Construction, 2004)



Reduction of risk through design and specification (3)



(Steel Construction, 2004)



Reduction of risk through design and specification (4)



(Steel Construction, 2004)



Reduction of risk through design and specification (5)



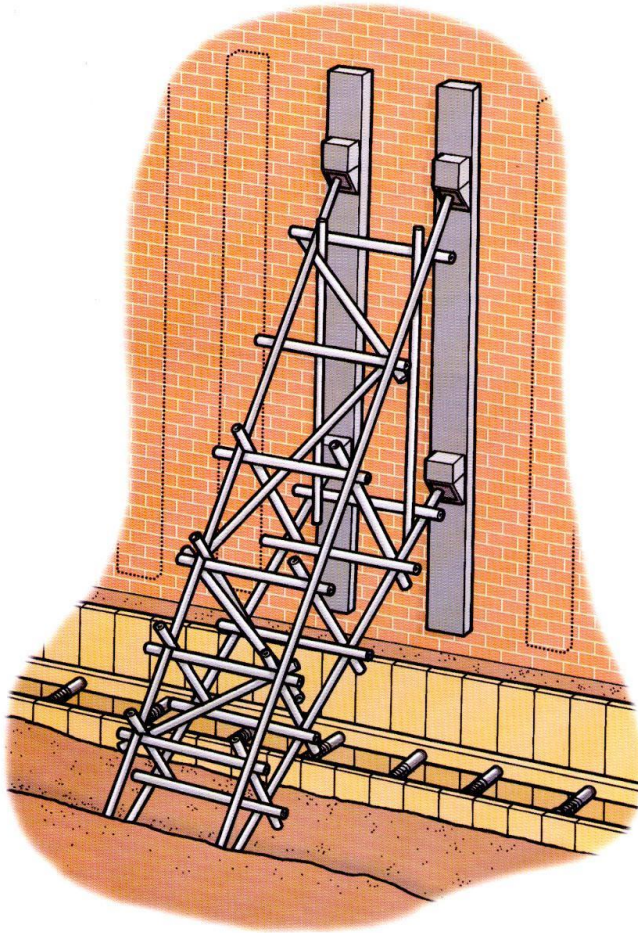
'Bush-hammered' concrete, Port Elizabeth (Smallwood)

Reduction of risk through design and specification (6)



'Melting' mastic asphalt, Canal Walk, Cape Town (Smallwood, 2000)

Reduction of risk through design and specification (7)



Shoring of building with excavation at base of building (HSE, 1999)

Reduction of risk through design and specification (8)



Thermal Lance, Mount Road Police Station, Port Elizabeth (Smallwood, 1987) 21

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Documentation of process

- Name(s) and function(s) of the assessor(s) / team
- Date of HIRA
- Work breakdown structure (WBS) / Elements / Finishes / Activities
- Hazards and risk / the above
- Response
- H&S specification reference
- Details of subsequent monitoring arrangements e.g. construction and requirements for further risk assessments



Do designers consider / refer to H&S? (1)

Occasion	Response (%)						Mean score	Rank
	Never	Rarely	Some-times	Often	Always	Don't Know		
Site inspections/ discussions	3.0	17.2	23.2	26.3	30.3	0.0	3.64	1
Site meetings	3.1	17.3	23.5	32.7	23.5	0.0	3.56	2
Site handover	9.1	18.2	19.2	19.2	33.3	1.0	3.50	3
Preparing project documentation	7.1	26.3	24.2	18.2	23.2	1.0	3.24	4
Pre-tender meeting	11.2	24.5	20.4	20.4	22.4	1.0	3.19	5
Working drawings	11.2	25.5	20.4	18.4	23.5	1.0	3.18	6
Evaluating tenders	15.0	23.0	19.0	16.0	25.0	2.0	3.13	7
Detailed design	11.2	26.5	20.4	20.4	20.4	1.0	3.12	8
Pre-qualifying contractors	10.1	25.3	28.3	17.2	18.2	1.0	3.08	9
Constructability reviews	12.2	24.5	22.4	19.4	17.3	4.1	3.05	10
Design coordination meetings	10.3	34.0	24.7	15.5	14.4	1.0	2.90	11
Client meetings	11.1	30.3	29.3	14.1	13.1	2.0	2.88	12
Concept (design)	19.2	27.3	21.2	15.2	16.2	1.0	2.82	13
Deliberating project duration	15.8	29.5	23.2	15.8	11.6	4.2	2.77	14

Table 1: Frequency at which Architectural practices consider / refer to H&S on various occasions (MS: 1 - 5) (Smallwood, 2000)



Do designers consider / refer to H&S? (2)

Aspect	Response (%)						Mean score	Rank
	Never	Rarely	Some-times	Often	Always	Don't Know		
Specification	6.1	17.3	20.4	25.5	28.6	2.0	3.54	1
Method of fixing	6.1	16.2	19.2	34.3	23.2	1.0	3.53	2
Position of components	8.1	15.2	21.2	33.3	18.2	4.0	3.40	3
Edge of materials	11.1	20.2	15.2	22.2	27.3	4.0	3.36	4
Content of materials	8.1	20.2	22.2	25.3	22.2	2.0	3.34	5
Details	12.2	15.3	22.4	24.5	22.4	3.1	3.31	6
Finishes	9.2	21.4	20.4	23.5	21.4	4.1	3.28	7
Type of structural frame	9.1	22.2	19.2	25.3	20.2	4.0	3.26	8
Plan layout	12.2	19.4	21.4	19.4	22.4	5.1	3.22	9
Texture of materials	13.1	18.2	26.3	20.2	19.2	3.0	3.15	10
Design (general)	11.2	23.5	28.6	18.4	17.3	1.0	3.07	11
Schedule	14.4	20.6	21.6	21.6	15.5	6.2	3.03	12=
Surface area of materials	17.3	18.4	19.4	21.4	17.3	6.1	3.03	12=
Elevations	15.3	23.5	22.4	15.3	18.4	5.1	2.98	14
Site location	18.0	26.0	20.0	14.0	19.0	3.0	2.90	15
Mass of materials	13.3	26.5	26.5	16.3	12.2	5.1	2.87	16

Table 2: Frequency of which Architectural practices consider / refer to H&S relative to various design related aspects²⁴
(MS: 1 - 5) (Smallwood, 2000)



Integrating design and construction into H&S (1)

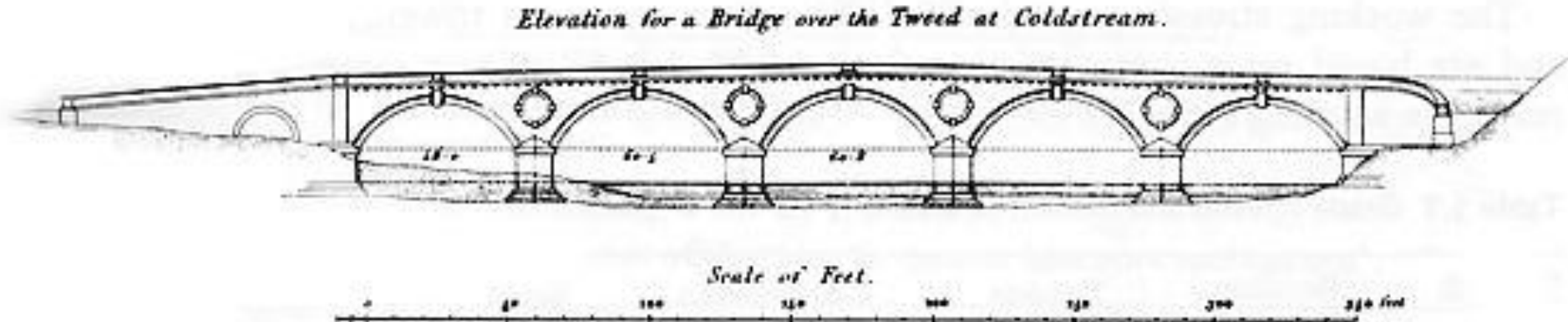


Figure 2: Elevation of masonry Bridge over the Tweed at Coldstream, 1866 (Irwin and Sibbald, 1983)

Integrating design and construction into H&S (2)

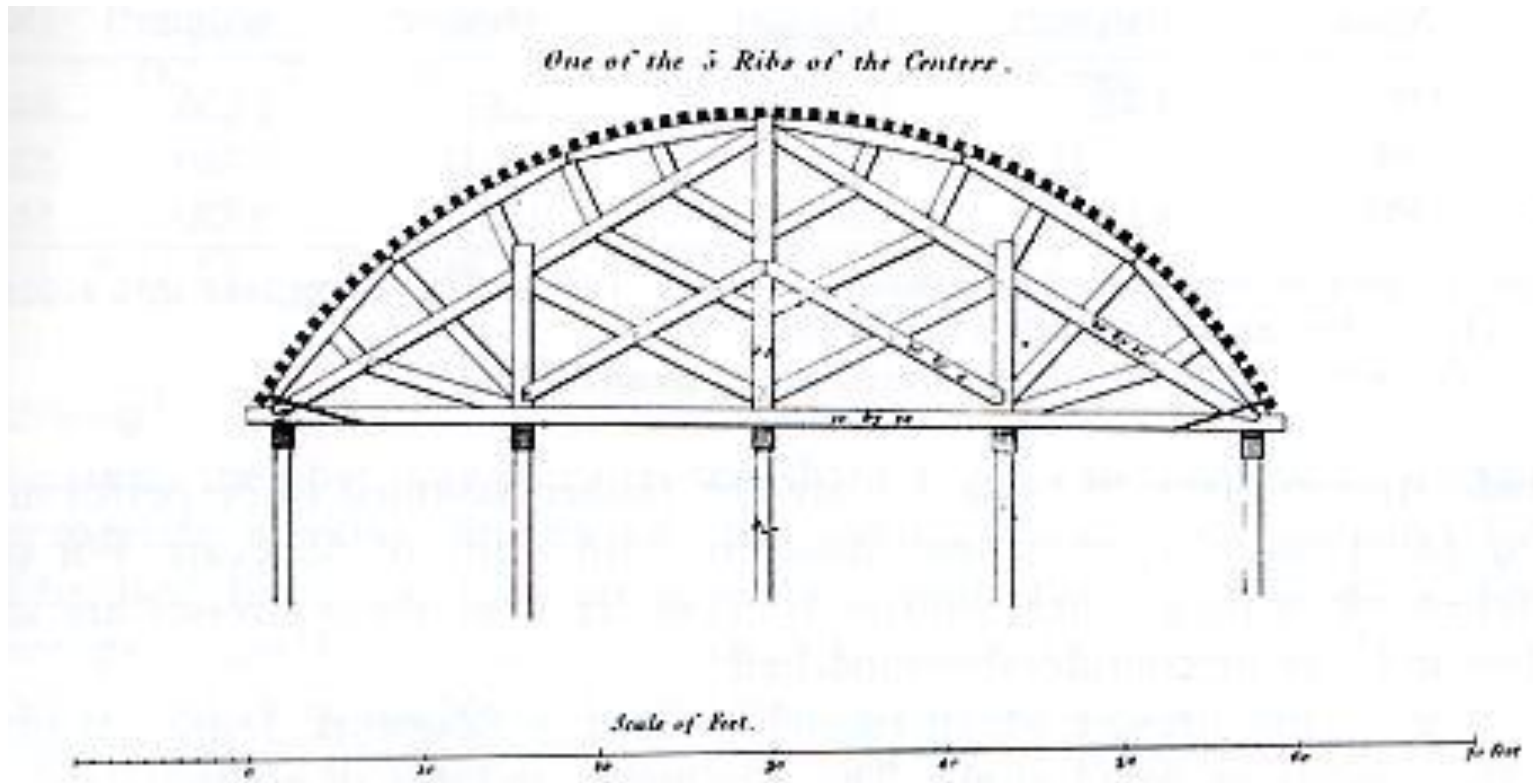


Figure 3: Centering for masonry Bridge over the Tweed at Coldstream, 1866 (Irwin and Sibbald, 1983)

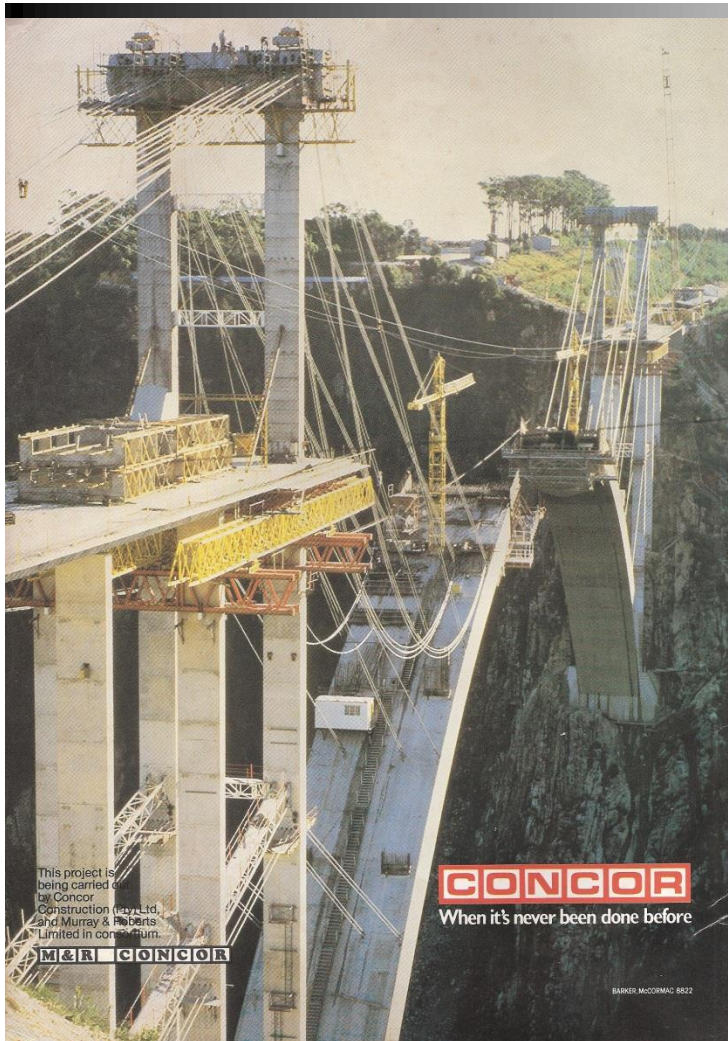
Integrating design and construction into H&S (3)



Bloukrans Bridge (p. 11, Concrete Beton, 1983)



Integrating design and construction into H&S (4)



Bloukrans Bridge (Inside Front, Concrete Beton, 1983)
© 2013 : Prof JJ Smallwood


Integrating design and construction into H&S (5)



Spanning new horizons requires inner strength

Built on the strength and reputation of Haggie Rand's pre-stressed, high-tensile wire — the Bloukrans Gorge bridge, 13 000 cubic metres of concrete, 216 metres above the river bed. A milestone in construction, combining the knowledge and expertise of contractors and suppliers.

Haggie Rand. Spanning new horizons in strength.

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Strachan Street, Germiston, P.O. Box 52, Germiston,
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Manufacturers of high carbon wire and strand,
including low relaxation PSC strand.

A Murray & Roberts and Colson Construction project.



Bloukrans Bridge (Outside Back, Concrete Beton, 1983)

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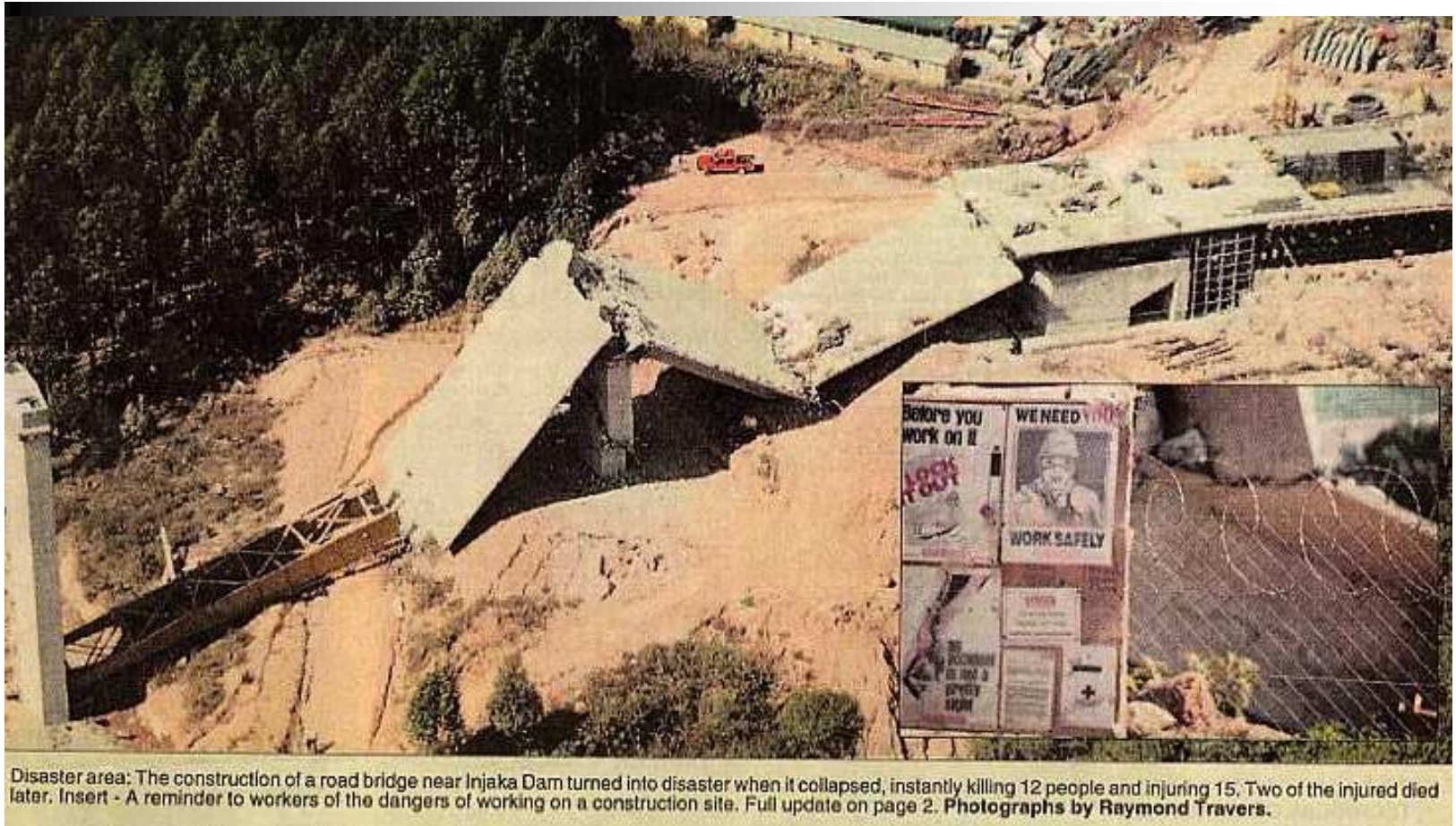
Integrating design and construction into H&S (6)

Bloukrans bridge project (Steele, 1983):

- “...notable for the close cooperation and team effort which were achieved by the consultant and contractor, and encouragement given by the client.”
- “... consulting engineers had clearly indicated in their design how the task should be tackled and worked closely with the contractors in converting the drawings they had supplied to reality...”



Injaka Bridge Collapse (1)



Disaster area: The construction of a road bridge near Injaka Dam turned into disaster when it collapsed, instantly killing 12 people and injuring 15. Two of the injured died later. Insert - A reminder to workers of the dangers of working on a construction site. Full update on page 2. Photographs by Raymond Travers.

Injaka Bridge collapse, Mpumalanga (Travers, 1998)



Injaka Bridge collapse (2)

- **Causes (Department of Labour, 2002):**
 - The slide path was not under the webs
 - The placing of the sliding pads between the deck and temporary bearings was not as specified
 - Insufficient reinforcement in the deck section, especially the bottom slab
 - The failure to fully appreciate the implications of the early cracks
 - The acceptance and approval of a launching nose which was substantially less stiff than that prescribed in the project specification
 - The deviation from the project specification regarding the automatic pier deflection monitoring at pier 2
 - The deviation from the project specification regarding the height tolerances of the temporary bearings on pier 3
 - The use of design and construction personnel, at decision-making level, without appropriate qualification and experience in incremental launched bridges



Injaka Bridge collapse (3)

- No independent design reviews were conducted of either the temporary or permanent works
- **Contributory causes (Department of Labour, 2002):**
 - The lack of experience on the part of design personnel in incremental launching techniques **resulted in poor communications between the parties to clarify understandings and interpretations regarding the slide path position**
 - **The lack of clear instructions in the project specification and clear indications on the consulting engineers' design drawings as to the position of the sliding path, resulted in incorrect interpretations being made**



Rationale for H&S specifications (1)



Helicopter crash, Strand Street, Cape Town (Vosloo, 1999)



Rationale for H&S specifications (2)



Helicopter crash, Strand Street, Cape Town (Vosloo, 1999)

Rationale for H&S specifications (3)



Helicopter crash, Strand Street, Cape Town (Vosloo, 1999)

Rationale for H&S specifications (4)



Helicopter crash, Strand Street, Cape Town (Amalgamated Press, 1999)

Rationale for H&S specifications (5)



Mist, Aerial Cableway Station, Table Mountain (Deacon, 1997)



Rationale for H&S specifications (6)



Site establishment, Aerial Cableway Station, Table Mountain (Deacon, 1997)



Rationale for H&S specifications (7)



Shear-face construction, Aerial Cableway Station, Table Mountain (Deacon, 1997)



Rationale for H&S specifications (8)



Shear-face construction, Aerial Cableway Station, Table Mountain (Deacon, 1997)



Rationale for H&S specifications (9)



Shear-face construction, Aerial Cableway Station, Table Mountain (Deacon, 1997)

Rationale for H&S specifications (10)



Transportation of materials and waste, Aerial Cableway Station, Table Mountain (Deacon, 1997)

Design HIRA (1)



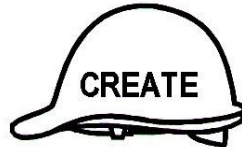
Precast planks / ribs and blocks to composite slab, Plettenberg Bay (Hamp-Adams, 1994)

Design HIRA (2)



Precast planks / ribs and blocks to composite slab, Plettenberg Bay (Hamp-Adams, 1994)

Design HIRA (3)



An example of a generic risk assessment form (GRA) -Page 1				
NAME OF ORGANIZATION				
NAME OF PROJECT				
ACTIVITY COVERED		Erecting precast plank and hollow block composite slab		
SIGNIFICANT HAZARDS		ASSESSMENT OF RISK		
		LOW	MEDIUM	HIGH
1	People falling			$3 \times 3 = 9$
2	Materials falling			$3 \times 2 = 6$
3	Collapse of structure	$1 \times 3 = 3$		
4	Pinching	$3 \times 1 = 3$		
5	Manual handling			$3 \times 2 = 6$
6	Tripping			$3 \times 2 = 6$
7	Failure of blocks (material)			$2 \times 3 = 6$

Figure 4: Design HIRA for erecting precast plank and hollow block composite slab



Design HIRA (4)



**Positioning pre-stressed precast hollow core slab using crane and a lifting beam
(SA Builder Bouer, 2004a)**



Design HIRA (5)



Positioning pre-stressed precast hollow core slab using crane and a lifting beam
(SA Builder Bouer, 2004b)



H&S Specification - Sections

- **Project details**
- **Client's considerations and management requirements**
- **Environmental restrictions and existing on-site risks**
- **Significant design and construction hazards**
- **H&S file**



H&S Specification - Project details

- **Project location including:**
 - Access e.g. Infrastructure such as railway routes and roads
 - Fauna and related e.g. crocodiles, malaria, and snakes
 - Services e.g. electricity, gas, sewage, and water
 - Socio-economic issues such as crime, and vandalism
 - Weather e.g. precipitation, temperature, and wind
 - Other e.g. landmines
- **Project description**
- **Phases and programme**
- **Details of client, designers, and other consultants**
- **Extent and location of existing records and plans**



H&S Specification - Client's considerations and management requirements

- Structure and organisation – general including H&S
- H&S goals for the project
- H&S monitoring and review
- Permit and authorisation requirements
- Emergency procedures
- Site rules and other restrictions on contractors, suppliers and others e.g. access arrangements to those parts of the site which continue to be used by the client, shift work, night work, restricted hours
- Mandatory client provided H&S training
- Activities on or adjacent to the site during the works
- Arrangements for liaison between parties



H&S Specification - Environmental restrictions and existing on-site risks

- **Safety hazards, including:**
 - Boundaries and access, including temporary access
 - Adjacent land uses
 - Existing storage of hazardous materials
 - Location of existing services – water, electricity, gas, etc.
 - Ground conditions e.g. geotechnical report
 - Existing structures – degree of stability, or fragile materials
- **Health hazards, including:**
 - Asbestos, including results of surveys
 - Existing storage of hazardous materials
 - Contaminated land, including results of surveys
 - Existing structures - hazardous materials e.g. asbestos containing
 - Health risks arising from client's activities



H&S Specification - Significant design and construction hazards

- Design assumptions and control measures e.g. design and construction method statements – composite slabs, and structural steel
- Arrangements for co-ordination of on-going design work and handling design changes e.g. Nominated subcontractors' shop drawings
- Information on significant hazards identified during design e.g. bush-hammered concrete
- Materials requiring particular precautions e.g. heavy blocks, and precast concrete kerbs



H&S Specification - H&S file

- **'As built' drawings and plans**
- **Design criteria e.g. design loadings**
- **Potential hazards included in the structure**
- **Construction methods and materials used**
- **Record of hazardous processes e.g. removal of asbestos containing materials (ACMs)**
- **Equipment and maintenance facilities**
- **Maintenance procedures and requirements**
- **Manuals (operating and maintenance) for plant and equipment**
- **Location and nature of utilities and services**



H&S Specification - Research method and sample stratum

- **2007 Study (Smallwood, 2007):**
 - 27 General contractors (GCs) which achieved a place in the Building Industries Federation South Africa (BIFSA) / Master Builders South Africa (MBSA) National H&S Competition on one or more of their projects during the period 1995 – 2005
 - 11 GCs responded, which represents a response rate of 39.3%
- **2010 Study:**
 - 13 Members of the Association of Construction Health and Safety Management (ACHASM) responded
 - 81 Delegates attending Construction Research Education and Training Enterprises (CREATE) H&S Specification Workshops responded



H&S Specification - Research findings (1)

- Mean percentage (approximate) of projects for which H&S specifications are provided is:
 - ACHASM: 56% (2010)
 - Workshops: 71% (2010)
 - GCs: 59% (2007)
- These are notable findings in that H&S specifications are required for all projects



H&S Specification - Research findings (2)

- Degree to which H&S specifications are project specific:
 - GCs: 3.57 / 5.00 (2007)
 - ACHASM and Workshops: 3.09 / 5.00 (2010)



H&S Specification - Research findings (3)

Category	Response per range of number of pages (%)							
	Unsure	1-5	6-10	11-20	21-30	31-40	41-50	> 51
Shortest	9.1	54.5	9.1	27.3	0.0	0.0	0.0	0.0
Average	0.0	0.0	9.1	63.6	18.2	0.0	9.1	0.0
Longest	9.1	0.0	0.0	9.1	9.1	18.2	18.2	36.4

Table 3A: Length of H&S specifications provided to respondents (GCs: 2007)

Category	Response per range of number of pages (%)							
	Unsure	1-5	6-10	11-20	21-30	31-40	41-50	> 51
Shortest	27.3	18.2	9.1	36.4	0.0	9.1	0.0	0.0
Average	9.1	0.0	9.1	18.2	36.4	9.1	18.2	0.0
Longest	9.1	0.0	0.0	0.0	27.3	9.1	18.2	36.4

Table 3B: Length of H&S specifications provided to respondents (ACHASM: 2010)

Category	Response per range of number of pages (%)							
	Unsure	1-5	6-10	11-20	21-30	31-40	41-50	> 51
Shortest	27.0	25.7	16.2	16.2	10.8	0.0	2.7	1.3
Average	27.0	5.4	12.2	10.8	21.6	14.9	5.4	2.7
Longest	26.7	1.3	4.0	6.7	10.7	5.3	20.0	25.3

Table 3C: Length of H&S specifications provided to respondents (Workshops: 2010)



H&S Specification - Research findings (4)

Aspects / Issues	ACHASM		Workshops		Mean	
	MS	Rank	MS	Rank	MS	Rank
Existing services e.g. high voltage cables	2.92	5	3.82	1	3.37	1
H&S file e.g. format & frequency of amendment	3.00	3	3.62	3	3.31	2
Client restrictions e.g. traffic	3.00	2	3.52	4	3.26	3
Client's activities e.g. sewerage works	3.15	1	3.30	11	3.23	4
Client specific requirements e.g. daily removal of rubbish / waste & security cards	2.92	4	3.47	5	3.20	5
Health hazards e.g. sewerage works	2.92	6	3.46	6	3.19	6
Client specific H&S requirements e.g. permit to work procedure	2.69	9	3.65	2	3.17	7
Materials containing hazardous chemical substances (HCSs)	2.92	7	3.38	10	3.15	8

Table 4: Extent to which various aspects / issues are addressed in H&S specifications (Part A) (2010).



H&S Specification - Research findings (5)

Aspects / Issues	ACHASM		Workshops		Mean	
	MS	Rank	MS	Rank	MS	Rank
Project location details e.g. adjoining structures or geographical features	2.75	8	3.39	8	3.07	9
Hazardous processes e.g. bush-hammering concrete	2.62	10	3.13	13	2.88	10
Environmental hazards e.g. contaminated ground	2.31	14	3.39	9	2.85	11
Heavy materials e.g. blocks & precast concrete kerb sections	2.54	11	3.11	14	2.83	12
Details of existing structures e.g. fragile materials	2.23	15	3.41	7	2.82	13
'Designer' design & construction method statement e.g. reference to temporary works required	2.42	13	3.11	15	2.77	14
Design principles & assumptions e.g. stages of instability	2.45	12	2.84	16	2.65	15
Permissible design loadings for stages of structures	2.00	17	3.16	12	2.58	16
Geotechnical reports	2.11	16	2.83	17	2.47	17

Table 4: Extent to which various aspects / issues are addressed in H&S specifications (Part B) (2010).



H&S Specification - Research findings (5)

Aspects / Issues	ACHASM		Workshops		Mean	
	MS	Rank	MS	Rank	MS	Rank
H&S specifications should be a useful reference	4.77	1	4.48	1	4.63	1
H&S specifications are a useful form of reference	4.23	4	3.95	2	4.09	2
Designers are incapable of compiling H&S specifications	4.31	3	3.05	7	3.68	3
Project managers are incapable of compiling H&S specifications	4.38	2	2.95	8	3.67	4
H&S specifications are a 'regurgitation' of the Construction Regulations	3.58	6	3.49	3	3.54	5
Clients are incapable of compiling H&S specifications	3.85	5	3.13	6	3.49	6
Contractors are expected to provide H&S plans when inappropriate H&S specifications are provided	3.50	8	3.40	4	3.45	7
Contractors are expected to provide H&S plans when H&S specifications are not provided	3.50	7	3.32	5	3.41	8
H&S consultants are incapable of compiling H&S specifications	2.62	9	2.63	9	2.63	9

Table 5: Extent to which respondents concur with various H&S specification related statements (2010).

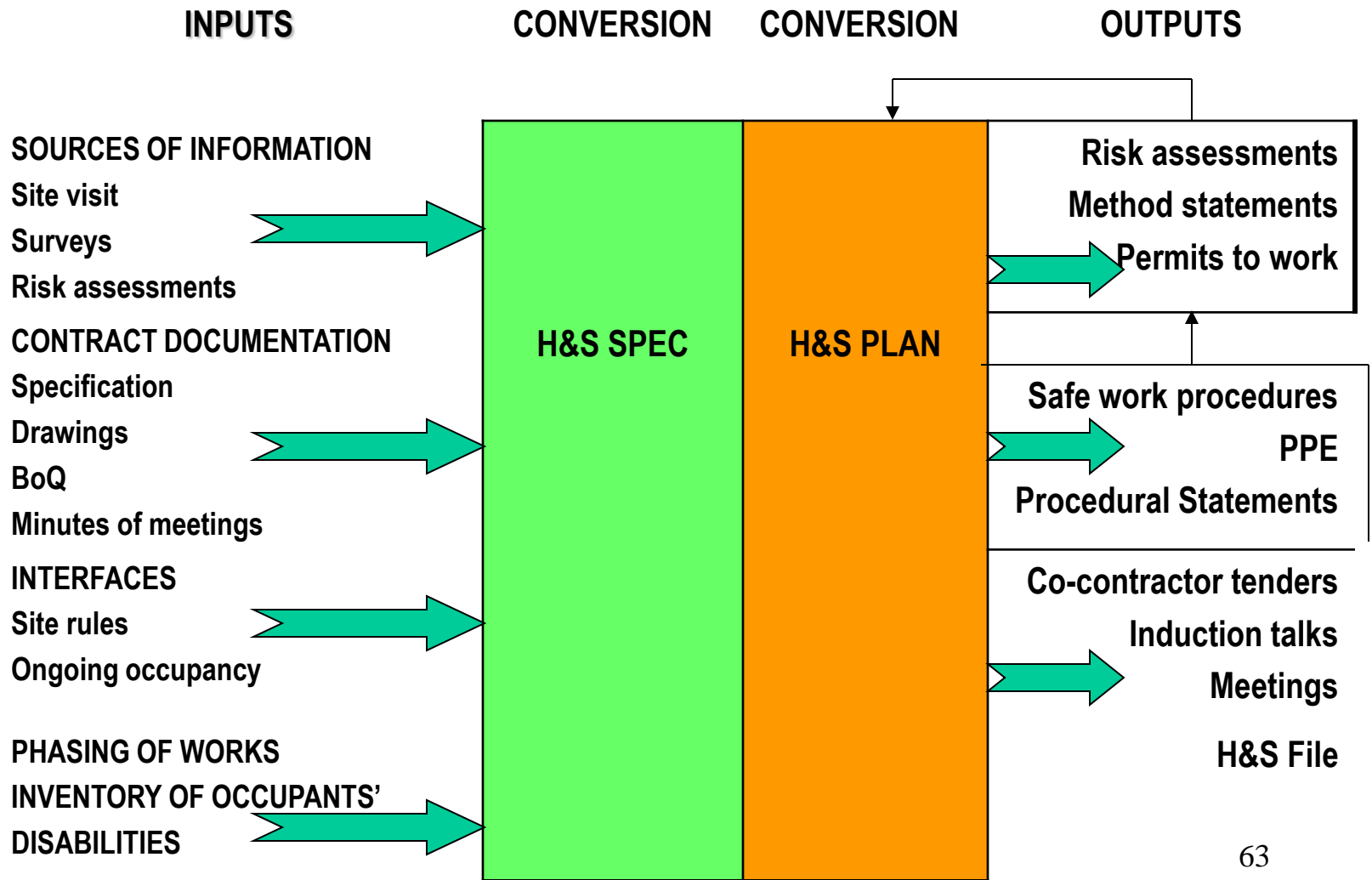


H&S Plans - Introduction

- **Constituted better practice prior to the Construction Regulations**
- **Major feature of the UK Construction (Design & Management) Regulations 1994**
- **Should be a function of an H&S specification**
- **Essential element of planning**
- **Forms basis for systematic management approach in which risk assessment is pivotal**
- **Goal is effective H&S management and work procedures that ensure maintenance of healthy and safe working conditions and practices**



H&S Plans - Systems Approach



H&S Plans - Construction Regulations (1)

- **‘Principal contractor (PC) and contractor’:**
 - **5 (1) PC is required to provide and demonstrate to the client a suitably documented H&S plan based on the client’s H&S specification**
 - **5 (4) CC is required to provide and demonstrate to the PC a suitably documented H&S plan based on the PC’s H&S specification**
 - **5 (5) PC is required to discuss and negotiate the contents with and approve the CC’s H&S plan**
 - **3 (1) PC is required to ensure that each CC’s H&S plan is implemented and maintained**
 - **3 (1) (d) PC is required to stop any CC from executing work not in accordance with the PC or CC’s H&S plan**



H&S Plans - Construction Regulations (2)

- 5 (6) PC is required to ensure that a copy of PC's H&S plan and CCs' H&S plans are available
- **Client:**
 - 4 (1) (d) is required to ensure that each PC's H&S plan is implemented and maintained
 - 4 (1) (e) is required to stop any contractor from executing work not in accordance with the PC's H&S plan



H&S Plans - Rationale and approach (1)

- Integrated approach to H&S
- Set out the H&S goals
- Explain how the key H&S issues will be managed
- Explain the action needed to control key risks and provide details of good working practice
- Needs to incorporate / refer to any required method statements, H&S rules and monitoring arrangements
- Amount of detail depends on the nature and extent of the project and contracting arrangements
- Level of detail should be proportionate to the risks



H&S Plans - Rationale and approach (2)

Types:

- Pre-tender phase and construction phase
- Pre-tender phase plan facilitates appropriate allowance for H&S in tender / bid
- Pre-tender phase plan facilitates construction phase
- Incorporate H&S specification pre-tender phase
- Pre-tender phase plan is not a requirement in the Construction Regulations, but recommended best practice



Pre-tender phase H&S Plan (1) (Description of project)

- Project description and programme details
- Details of client, designers, and other consultants
- Extent and location of existing records and plans



Pre-tender phase H&S Plan (2) (Client's considerations and management requirements)

- **Structure and organisation**
- **Safety goals for the project and arrangements for monitoring and review**
- **Permits and authorisation requirements**
- **Emergency procedures**
- **Site rules and other restrictions on contractors, suppliers and others e.g. access arrangements to those parts of the site which continue to be used by the client**
- **Activities on or adjacent to the site during the works**
- **Arrangements for liaison between parties**



Pre-tender phase H&S Plan (3) (Environmental restrictions and existing on-site risks) (1)

- **Safety hazards, including:**
 - Boundaries and access, including temporary access
 - Adjacent land uses
 - Existing storage of hazardous materials
 - Location of existing services – water, electricity, gas, etc.
 - Ground conditions
 - Existing structures – stability, or fragile materials
- **Health hazards, including:**
 - Asbestos, including results of surveys
 - Existing storage of hazardous materials
 - Contaminated land, including results of surveys



Pre-tender phase H&S Plan (4) (Environmental restrictions and existing on-site risks) (2)

- Existing structures - hazardous materials
- Health risks arising from client's activities



Pre-tender phase H&S Plan (5) Significant design and construction hazards)

- **Design assumptions and control measures**
- **Arrangements for co-ordination of on-going design work and handling design changes**
- **Information on significant risks identified during design (H&S risks)**
- **Materials requiring particular precautions**



Pre-tender phase H&S Plan (6) H&S file

- **Outline:**

- 'As built' drawings and plans
- Design criteria e.g. design loadings
- Potential hazards included in the structure
- Construction methods and materials used
- Equipment and maintenance facilities
- Maintenance procedures and requirements
- Manuals (operating and maintenance) for plant and equipment
- Location and nature of utilities and services

- **Budget**



Construction phase H&S Plan (1) (Description of project)

- Project description and programme details
- Details of client, designers, PC, CCs, major plant suppliers, and other consultants
- Extent and location of existing records and plans



Construction phase H&S Plan (2) (Communication and management of the work) (1)

- **Management structure and responsibilities**
- **H&S goals for the project and arrangements for monitoring and review of H&S performance**
- **Arrangements for:**
 - **Regular liaison between parties on site**
 - **Consultation with the workforce**
 - **The exchange of design information between the client, designers, and contractors on site**



Construction phase H&S Plan (3) (Communication and management of the work) (2)

- Handling design changes during the project
 - The selection and control of contractors
 - The exchange of H&S information between contractors
 - Security, site induction and on site training
 - Welfare facilities and first aid
 - The reporting and investigation of accidents and incidents including near misses
 - The production and approval of risk assessments and method statements
-
- Site rules
 - Fire and emergency procedures



Construction phase H&S Plan (4) (Arrangements for controlling significant site risks) (1)

- **Safety risks:**
 - Services, including temporary electrical installations
 - Preventing falls
 - Work with or near fragile materials
 - Control of lifting operations
 - Dealing with services (water, electricity and gas)
 - The maintenance of plant and equipment
 - Poor ground conditions
 - Traffic routes and segregation of vehicles and pedestrians
 - Storage of hazardous materials
 - Dealing with existing unstable structures
 - Accommodating adjacent land use
 - Other significant safety risks



Construction phase H&S Plan (5) (Arrangements for controlling significant site risks) (2)

- **Health risks:**
 - Removal of materials containing asbestos
 - Dealing with contaminated land
 - Manual handling
 - Use of hazardous chemical substances
 - Reducing noise and vibration
 - Other significant health risks



Construction phase H&S Plan (6) (H&S file)

- **Outline:**
 - 'As built' drawings and plans
 - Design criteria e.g. design loadings
 - Potential hazards included in the structure
 - Construction methods and materials used
 - Equipment and maintenance facilities
 - Maintenance procedures and requirements
 - Manuals (operating and maintenance) for plant and equipment
 - Location and nature of utilities and services
- **Budget**
- **Contributors**
- **Meetings**



H&S Files - Construction Regulations

- **‘Principal contractor (PC) and contractor’ 5 (7) requires the opening of a file which includes all documentation required in terms of the Act and Regulations**
- **‘PC and contractor’ 5 (8) requires the PC to hand over the file to the client upon completion – must include a record of all drawings, designs, and materials used and other similar information**
- **‘PC and contractor’ 5 (9) requires the PC to include a list of CCs, CC agreements and details of the type of work being done**



H&S Files - Rationale

- A record of information for the end user
- Alerts those responsible for the structure and equipment, of the significant H&S risks that need to be dealt with during subsequent use, construction such as alteration and refurbishment, maintenance and cleaning work, and demolition
- Can provide information for future H&S plans



H&S Files - Contents (1)

- **‘Record’ of ‘as built’ drawings and plans used and produced throughout the project**
- **Design criteria such as design loadings for structural elements**
- **Potential hazards included in the structure e.g. pre or post-tensioned beams or slabs – details should be provided**
- **General details of the construction methods and materials used**
- **Details of the equipment and maintenance facilities within the structure**
- **Maintenance procedures and requirements for the structure**



H&S Files - Contents (2)

- **Manuals produced by suppliers and specialist contractors, which outline operating and maintenance procedures and schedules for plant and equipment**
- **Details of the location and nature of utilities and services, including emergency and fire-fighting systems**



H&S files - Evolution

- Establish procedures for obtaining and collating the information – what information is to be collected, how it is to be collected, presented and stored
- Origins in the initiation phase
- Design phase information will be included
- Should be discussed at project progress meetings



H&S Files - Format

- The volume of information may require a document that summarises the key elements i.e. a quick guide
- Possibly in two parts:
 - Day to day use e.g. operational and maintenance manuals
 - Long-term use e.g. drawings required when major alteration work
- Ideally stored electronically
- Drawings are an ideal medium for recording H&S information



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