THE NATURE AND CONTENTS OF HEALTH AND SAFETY (H&S) SPECIFICATIONS

PROFESSOR JOHN SMALLWOOD
CONSTRUCTION RESEARCH EDUCATION AND TRAINING ENTERPRISES (CREATE)
createjs@yahoo.co.uk
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Sheer-face construction, Aerial Cableway Station, Table Mountain (Deacon, 1997)
Introduction (2)

Bush-hammered concrete, UPE (Smallwood, 1994)
Introduction (3)

- The Construction Regulations require clients to provide principal contractors (PCs) with H&S specifications.
- The definition of H&S specification refers to H&S requirements.
- The contents are implicitly as opposed to explicitly stated.
- Based upon the client and designer requirements the contents are implied.
- Construction Regulations are not unique – can be argued that they were spawned by European Directive 92/57.
Introduction (4)

- A range of international literature informs regarding the role and influence of design on construction H&S
- ‘H&S through design’ is at the top of the hierarchy of controls (Hecker and Gambatese, 2003)
- Given:
  - The third anniversary of the promulgation of the Construction Regulations
  - Anecdotal evidence that the contents of H&S specifications are a regurgitation of the Construction Regulations
Introduction (5)

- An initial study was conducted in 2007 to determine the (Smallwood, 2007):
  - Prevalence of H&S specifications
  - Degree of project specificity of H&S specifications
  - Length of project specifications
  - Extent to which various aspects / issues are addressed in H&S specifications
  - Degree of concurrence relative to a range of H&S specification related statements

- The initial study was followed by a further study in 2010
International Labour Office (ILO) (1992) specifically states that designers should:

- Receive training in H&S
- Integrate the H&S of construction workers into the design and planning process
- Not include anything in a design which would necessitate the use of dangerous structural or other procedures or hazardous materials which could be avoided by design modifications or by substitute materials
- Take into account the H&S of workers during subsequent maintenance
151 / 450 (33.6%) reports of construction workers’ deaths and disabling injuries in the USA indicate the hazard that contributed to the incident could have been eliminated or reduced if design-for-H&S measures had been implemented (Behm, 2006)
Review of the literature – Legislation (Clients)

- Construction Regulations – clients must:
  - Prepare H&S specifications
  - Ensure that principal contractors (PCs) have made provision for H&S costs in their tenders
  - Provide PCs with any information that might affect H&S
Review of the literature – Legislation (Designers)

- Section 10 of the OH&S Act of 1993 - designers are allocated the responsibility to ensure that any ‘article’ is safe and without risks to health

- Construction Regulations – designers must:
  - Make available all relevant information about the design such as the soil investigation report; design loadings of the structure, and methods and sequence of construction
  - Inform PCs of any known or anticipated dangers or hazards or special measures required for the safe execution of the works
  - 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
  - Ensure that during commissioning, cognisance is taken of ergonomic design principles in order to minimize ergonomic related hazards in all phases of the life cycle of a structure
Methods and sequence of construction

Precast concrete planks and hollow blocks to composite slab, Plettenberg Bay (Hamp-Adams, 1994)
H&S specification

- Intention is to ‘design out’ the hazards
Research – Methodology 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
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
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)
### Table 1A: Length of H&S specifications provided to respondents (GCs: 2007)

<table>
<thead>
<tr>
<th>Category</th>
<th>Response per range of number of pages (%)</th>
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</thead>
<tbody>
<tr>
<td></td>
<td>Unsure</td>
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<tr>
<td>Shortest</td>
<td>9.1</td>
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<tr>
<td>Average</td>
<td>0.0</td>
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<tr>
<td>Longest</td>
<td>9.1</td>
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</table>

### Table 1B: Length of H&S specifications provided to respondents (ACHASM: 2010)

<table>
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<tr>
<th>Category</th>
<th>Response per range of number of pages (%)</th>
</tr>
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<td>Shortest</td>
<td>27.3</td>
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<tr>
<td>Average</td>
<td>9.1</td>
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<tr>
<td>Longest</td>
<td>9.1</td>
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</tbody>
</table>

### Table 1C: Length of H&S specifications provided to respondents (Workshops: 2010)

<table>
<thead>
<tr>
<th>Category</th>
<th>Response per range of number of pages (%)</th>
</tr>
</thead>
<tbody>
<tr>
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<td>Unsure</td>
</tr>
<tr>
<td>Shortest</td>
<td>27.0</td>
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<tr>
<td>Average</td>
<td>27.0</td>
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<td>Longest</td>
<td>26.7</td>
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</table>
### Research – Findings (4)

<table>
<thead>
<tr>
<th>Aspects / Issues</th>
<th>ACHASM</th>
<th>Workshops</th>
<th>Mean</th>
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</thead>
<tbody>
<tr>
<td></td>
<td>MS</td>
<td>Rank</td>
<td>MS</td>
</tr>
<tr>
<td>Existing services e.g. high voltage cables</td>
<td>2.92</td>
<td>5</td>
<td>3.82</td>
</tr>
<tr>
<td>H&amp;S file e.g. format &amp; frequency of amendment</td>
<td>3.00</td>
<td>3</td>
<td>3.62</td>
</tr>
<tr>
<td>Client restrictions e.g. traffic</td>
<td>3.00</td>
<td>2</td>
<td>3.52</td>
</tr>
<tr>
<td>Client’s activities e.g. sewerage works</td>
<td>3.15</td>
<td>1</td>
<td>3.30</td>
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<tr>
<td>Client specific requirements e.g. daily removal of rubbish &amp; waste &amp; security cards</td>
<td>2.92</td>
<td>4</td>
<td>3.47</td>
</tr>
<tr>
<td>Health hazards e.g. sewerage works</td>
<td>2.92</td>
<td>6</td>
<td>3.46</td>
</tr>
<tr>
<td>Client specific H&amp;S requirements e.g. permit to work procedure</td>
<td>2.69</td>
<td>9</td>
<td>3.65</td>
</tr>
<tr>
<td>Materials containing hazardous chemical substances (HCSs)</td>
<td>2.92</td>
<td>7</td>
<td>3.38</td>
</tr>
</tbody>
</table>

Table 2: Extent to which various aspects / issues are addressed in H&S specifications (Part A) (2010).
### Table 2: Extent to which various aspects / issues are addressed in H&S specifications (Part B) (2010).

<table>
<thead>
<tr>
<th>Aspects / Issues</th>
<th>ACHASM</th>
<th>Workshops</th>
<th>Mean</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>MS</td>
<td>Rank</td>
<td>MS</td>
</tr>
<tr>
<td>Project location details e.g. adjoining structures or geographical features</td>
<td>2.75</td>
<td>8</td>
<td>3.39</td>
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<tr>
<td>Hazardous processes e.g. bush-hammering concrete</td>
<td>2.62</td>
<td>10</td>
<td>3.13</td>
</tr>
<tr>
<td>Environmental hazards e.g. contaminated ground</td>
<td>2.31</td>
<td>14</td>
<td>3.39</td>
</tr>
<tr>
<td>Heavy materials e.g. blocks &amp; precast concrete kerb sections</td>
<td>2.54</td>
<td>11</td>
<td>3.11</td>
</tr>
<tr>
<td>Details of existing structures e.g. fragile materials</td>
<td>2.23</td>
<td>15</td>
<td>3.41</td>
</tr>
<tr>
<td>‘Designer’ design &amp; construction method statement e.g. reference to temporary works required</td>
<td>2.42</td>
<td>13</td>
<td>3.11</td>
</tr>
<tr>
<td>Design principles &amp; assumptions e.g. stages of instability</td>
<td>2.45</td>
<td>12</td>
<td>2.84</td>
</tr>
<tr>
<td>Permissible design loadings for stages of structures</td>
<td>2.00</td>
<td>17</td>
<td>3.16</td>
</tr>
<tr>
<td>Geotechnical reports</td>
<td>2.11</td>
<td>16</td>
<td>2.83</td>
</tr>
</tbody>
</table>
### Research – Findings (5)

<table>
<thead>
<tr>
<th>Aspects / Issues</th>
<th>ACHASM</th>
<th>Workshops</th>
<th>Mean</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>MS</td>
<td>Rank</td>
<td>MS</td>
</tr>
<tr>
<td>H&amp;S specifications should be a useful reference</td>
<td>4.77</td>
<td>1</td>
<td>4.48</td>
</tr>
<tr>
<td>H&amp;S specifications are a useful form of reference</td>
<td>4.23</td>
<td>4</td>
<td>3.95</td>
</tr>
<tr>
<td>Designers are incapable of compiling H&amp;S specifications</td>
<td>4.31</td>
<td>3</td>
<td>3.05</td>
</tr>
<tr>
<td>Project managers are incapable of compiling H&amp;S specifications</td>
<td>4.38</td>
<td>2</td>
<td>2.95</td>
</tr>
<tr>
<td>H&amp;S specifications are a ‘regurgitation’ of the Construction Regulations</td>
<td>3.58</td>
<td>6</td>
<td>3.49</td>
</tr>
<tr>
<td>Clients are incapable of compiling H&amp;S specifications</td>
<td>3.85</td>
<td>5</td>
<td>3.13</td>
</tr>
<tr>
<td>Contractors are expected to provide H&amp;S plans when inappropriate H&amp;S specifications are provided</td>
<td>3.50</td>
<td>8</td>
<td>3.40</td>
</tr>
<tr>
<td>Contractors are expected to provide H&amp;S plans when H&amp;S specifications are not provided</td>
<td>3.50</td>
<td>7</td>
<td>3.32</td>
</tr>
<tr>
<td>H&amp;S consultants are incapable of compiling H&amp;S specifications</td>
<td>2.62</td>
<td>9</td>
<td>2.63</td>
</tr>
</tbody>
</table>

Table 3: Extent to which respondents concur with various H&S specification related statements (2010).
Sections

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

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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, 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

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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
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
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 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

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Conclusions (1)

- The Construction Regulations are not explicit with respect to the nature and contents of the H&S specification – are implicit in that requirements of various regulations inform what ideally should be included.

- H&S specifications are marginally project specific and relatively lengthy, which implies that they could be more non-specific and more a regurgitation of the Construction Regulations. This conclusion is reinforced by the degree of concurrence relative to the statements:
  - H&S specifications are a ‘regurgitation’ of the Construction Regulations: 3.54 / 5.00 (2010) (4.00 / 5.00: 2007)
  - Contractors are expected to provide H&S plans when inappropriate H&S specifications are provided: 3.41 / 5.00 (4.18 / 5.00)
Conclusions (2)

- The origin of information included in H&S specifications is more client than designer based.
- Based upon the degree of concurrence relative to various statements, there is a lack of competence among clients, project managers, designers, and H&S consultants to compile H&S specifications.
Recommendations

- The Construction Regulations should be amended such that the nature and contents of H&S specifications is scheduled i.e. explicit

- The tertiary education of project managers, designers, and quantity surveyors should address construction H&S, and include a ‘designing for H&S’ module which includes design risk management

- The OH&S Inspectorate should conduct focused inspections relative to H&S specifications and visit design practices to determine the extent of design hazard identification and risk assessment
References (1)


References (2)


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