Management of Cranes & Lifting

1.0 Introduction

This procedure prescribes the specific requirements to be observed with regard to tower cranes, mobile cranes, crawler cranes and forklifts/tele-handlers.

2.0 Key Matters to be Addressed:

- The requirements for competent personnel are described in clause 3.1
- External experts must be consulted prior to arranging for tower cranes to be used on site – see clause 3.3.9
- Tower crane bases and mobile/crawler crane working platforms must be subject to H&S Procedure SJ-P-36 Management of Temporary Works
- Lift plans are required for all crane activities

3.0 Procedure

3.1 Competent Personnel – the following requirements (clauses 3.1.1 to 3.2) apply to all crane activities

3.1.1 Appointed Person
Crane activities shall be planned by a competent person that holds a Construction Plant Competence Scheme (CPCS) Appointed Person (Lifting Operations) A61 qualification.

Note: the appointed person does not need to be present on site during lifting activities.

The Appointed Person appointment must be made in writing by the St James Project Director/Manager – see St James H&S Form SJ-F-32i Sample Letters of Appointment, for an example letter.

3.1.2 Crane Co-ordinator
A Crane Co-ordinator shall be appointed on projects where:

i) multiple crane operations are undertaken, and
ii) the potential exists for collision between cranes.

The scope and duties associated with this role are set out within the Code of Practice for Safe Use of Cranes, BS7121 Parts 1, 3 and 5. The Crane Co-ordinator is permitted to simultaneously perform one of the other roles in the lifting team except for crane operator.

The Crane Co-ordinator appointment must be made in writing by the St James Project Director/Manager – see St James H&S Form SJ-F-32i Sample Letters of Appointment, for an example letter.

3.1.3 Crane Supervisor
Crane operations shall only commence when a crane supervisor is present on site that holds a CPCS Crane Supervisor A62 qualification, or National Plant Operators Registration Scheme (NPORS) Crane Supervisor N405 qualification.

Note: a crane supervisor is required for each crane on site.
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The Crane Supervisor appointment(s) must be made in writing by the St James Project Director/Manager – see St James H&S Form SJ-F-32i Sample Letters of Appointment, for an example letter.

3.1.4 Crane Operators
Crane operators (drivers) shall hold a qualification from CPCS or NPORS, appropriate to the type of crane to be operated. Crane operators shall undergo fit-to-work medical examinations at no more than five-yearly intervals.

Crane operators shall be issued with written instructions regarding:

i) Placing the crane in out-of-service condition;
ii) reporting of faults;
iii) completing the Daily Tower Crane Checklist (SJ-F-32B);
iv) Rules for over-riding/disabling the Anti-Collision/Exclusion Zoning System;
v) Rules for “exceptional circumstances”?

– see St James H&S Form SJ-F-32i Sample Letters of Appointment, for a written instruction example.

3.1.5 Slinger/Signallers
Slinger/Signallers shall hold an appropriate qualification from CPCS or NPORS.

Note: Slinger/signallers may undertake more than one role in the lifting activity, e.g. crane supervisor & slinger/signaller; the crane operator may not undertake any other role.

3.1.6 Induction
A formal briefing shall be provided to communicate the lift plan to all on site involved with lifting operations, including any specific characteristics of the crane (e.g. operating parameters, anti collision, etc.). The briefing will be completed prior to the crane being taken into use, and repeated for new members of the lift team.

3.2 Crane Operations near Airfields (inc. heliports)
At all projects located within 6 km of an airfield, the St James Project Director/Manager shall contact the airfield operator prior to undertaking any crane activities that require a crane jib or boom to be raised 10m above the surrounding buildings, structures or trees.

If the airfield operator imposes any requirements or restrictions to safeguard airfield operations during crane activities, the Project Director/Manager shall record the requirements or restrictions and communicate the same to the appointed person(s) and crane users at the project.

3.3 Tower Cranes (all types: saddle, luffing, self-erecting, etc.)
Note: the requirements of clauses 3.1 to 3.2 apply to tower crane activities.

3.3.1 Age of Cranes
Tower cranes shall normally be less than ten years old at the time of erection on site (this applies to the ‘crane top’, i.e. main cat head, cab and winding gear sections. Should this requirement not be achievable due to exceptional circumstances, refer to the Head of H&S before proceeding.
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3.3.2 Structural Components & NDT Testing
All jib sections of each crane must have undergone Non Destructive Testing (NDT), e.g. magnetic particle inspection, to a minimum of 10% of the main structural joint welds, no more than three months prior to first erection on a St James site.

A 100% visual inspection of all crane structural welds by a competent person (certified testing organisation) shall be carried out prior to bringing the crane to site. Written evidence must be provided to show this has taken place. In addition main structural and mechanical components should be CE marked and certificates produced to confirm this.

A pre-delivery inspection report must be produced by the crane supplier and signed-off before erection on site confirming the requirements set out above have been complied with.

After twelve months of the crane being in service a further 100% visual inspection of structural welds must be carried out, on accessible parts of the tower crane, along with a load test (equivalent to test prior to taking into use).

3.3.3 Foundations
Imposed loads for out-of-service wind speeds shall be calculated by the crane provider in-line with the Construction Plant Association Tower Crane Technical Information Note TIN 027: Tower Crane Out-of-Service Wind Speeds.

Tower Crane foundations/bases shall be subject to St James H&S Procedure SJ-P-36 Management of Temporary Works. However, designs for tower crane foundations shall undergo a Category 3 check, i.e. the design shall be checked by a third-party engineer, independent of the original design engineer.

Note: Should it be necessary for luffing jib cranes to be placed at an out-of-service radius that is less than the manufacturers recommendation due to site restrictions, out-of-service wind loads experienced by the crane may increase, which will increase imposed loads and affect foundation designs – the crane supplier must be consulted when considering a reduced out-of-service radius. See also clause 3.3.23.

3.3.4 Anti-collision/Exclusion Zoning Systems
Automatic anti-collision systems shall be used where two or more cranes have the potential to come into contact, i.e. the crane working areas overlap.

Automatic exclusion zoning systems shall be used where a requirement to avoid over sailing a suspended load over an adjacent property or area has been identified.

Strobe lights shall be mounted on each crane fitted with an anti-collision or exclusion zoning system, configured to illuminate when the system has been disabled or overridden. The lights shall be positioned so as to be visible from ground level.

The St James Project Director/Manager shall issue written instructions to the crane operators, crane supervisors and crane co-ordinator stating that the anti-collision/exclusion zoning system must not be disabled or overridden without the express permission of the Project Director/Manager or designate, which shall only be given in extenuating circumstances. The system may only be disabled or overridden for one day, with new authorisation required for any extensions. Over-rides of more than one consecutive day must be notified to the Construction Director.
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Ensure that when a tower crane is being dismantled, which is being controlled or affected by an anti-collision system and where a risk of collision between the remaining cranes exists, the anti-collision system is reconfigured so as to remain active and effective during the dismantling works.

3.3.5 Electrical Bonding to Earth
Adequate electrical earthing must be achieved. (The resistance path between the bottom of the tower and earth should be measured and should not exceed a value of 10 $\Omega$).

Adequate lightning protection/earthing must be provided in accordance with BS7121 Part 5, in addition to the level of protection referred to above.

3.3.6 Slew Ring Bolt Checks
Ensure all slew ring bolts are checked for the correct torque prior to first erection on site and are visually checked, where possible, thereafter.

3.3.7 Security & Signage
Unauthorised access to tower cranes shall be prevented by installation of a 2.4m high hoarding (or similar secure fencing) at the base of the mast and at other accessible locations, e.g. tie positions. Access doors shall be protected by means of a keyless lock, e.g. digital combination lock.

Signs shall be affixed to the hoarding to warn that unauthorised personnel are not permitted to access the crane. Signs should also be placed at the top of the tower below the slew ring to warn of the hazards associated with passing through the slewing section when the crane is in use or in free slew.

If hoarding/fencing cannot be erected immediately following the crane erection, a lockable hatch shall be installed within the crane mast or at slew ring level that prevents access to the crane top.

Should it become evident that a tower crane mast has been accessed outside site working hours by unauthorised persons, the project management team shall review the project security arrangements, with the aim of increasing the security of the crane mast.

3.3.8 Lift Plan
Prior to commencing tower crane erection and lifting operations, the Appointed Person shall prepare a lift plan by completing St James H&S Form SJ-F-32A Project Lifting Plan, or similar document that includes the same details as a minimum, subject to the following requirement: Should a trade contractor or crane provider propose an alternative lift plan template, prior to its use the template shall be reviewed and approved by a St James H&S Manager.
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3.3.9 Independent Documentation Review
The following items must be reviewed on behalf of St James by an independent tower crane specialist to ensure that the correct solution has been determined and project specific issues appropriately addressed:

i. the proposed type(s) and model(s) of crane to be erected;
ii. the proposed crane position(s) in relation to the construction works and surrounding area;
iii. erection and dismantling risk assessment and method statement from the crane supplier(s);
iv. draft lifting plan to be used, including Appointed Person and lifting team details;
v. confirmation that type-specific training has been provided to the operator and lifting team.

3.3.10 Erection Checklist
Prior to initial erection the St James Project Director/Manager shall ensure that a St James Manager completes H&S Form: SJ-C-32H Erection Use & Dismantling of Tower Cranes.

3.3.11 Rated Capacity Indicator
All cranes shall be fitted with a functioning, calibrated Rated Capacity Indicator (RCI) that provides the crane operator with a real-time visual display of the percentage of the pre-set safe working load being applied during a lift, plus audible warning when the load exceeds a pre-set percentage of the rated capacity, (as determined by the supplier, St James and other relevant stakeholders, e.g. rail operators).

3.3.12 Design of Ancillary Equipment
The design of the fixing arrangements for ancillary equipment light boxes (illuminated signs), signs, aircraft warning beacons, floodlights etc., shall be provided to a structural designer by the crane supplier for verification prior to installation.

Photographic evidence shall be provided to the Project Team by the crane supplier to verify that the ancillary items have been fixed in accordance with the verified design, which must be provided prior to site closure on the day of installation of the items.

3.3.13 New Wire Ropes
All tower crane wire ropes shall be new when a tower crane is first erected on site. Certificates for the new wire ropes shall be obtained prior to erection by the project team.

3.3.14 Wind Measurement
An anemometer must be fitted to all tower cranes at the highest point; it must be verified that wind is accessible to the measuring point from 360° degrees of horizontal access. The wind monitoring system must include the following additional equipment which must be tested and verified as correctly functioning prior to the crane being put into use:

i. a visual and audible warning system, which can be disabled when the crane is taken ‘out of service’, using a two stage amber and red light system fitted to the crane in a prominent position, to warn when max wind speed is approaching and when it is reached;
ii. a repeater monitor located in the Principal Contractors office, displaying the wind speed in real time;
iii. a real time data logger located in the Principal Contractors office.
3.3.15 Obstacle Lights/Aviation Warning Lights
All tower cranes (regardless of type) shall be fitted with medium intensity (i.e. 2,000 candelas) steady red lights at the following positions:

Saddleback Cranes: highest fixed point (e.g. above cab/on A-frame), end of jib, counterbalance and mast at vertical intervals not greater than 52m.

Luffing Jib Cranes: highest fixed point (e.g. cab area/on A-frame), end of jib, mast at vertical intervals not greater than 52m

Lights shall be visible from all directions (i.e. through 360°) and, as a minimum, be illuminated from 30 minutes after sunset until 30 minutes before sunrise and at all times during inclement weather. Lighting function checks shall be made by crane operators on a daily basis.

Deviations from the above requirements require written authorisation from the Managing Director and Head of H&S.

3.3.16 Duty Board
A durable, legible and accurate duty board shall be affixed to the crane, which is visible at ground level.

3.3.17 Bolted Structural Connections
During erection, all bolted structural connections must only be tightened using calibrated and fully certified torque equipment, and documentary sign off acquired to verify that this has been carried out. Bolts must not be tightened by flogging.

Where possible all structural bolts must be marked by a suitable means to enable a weekly visual check to be carried out to ensure that movement (loosening) has not occurred.

Weekly visual checks of the structural bolted connections (where accessible) by the crane operator must be incorporated into the Risk Assessment and Method Statement.

The requirement for Weekly visual checks of the structural bolted connections by the crane operator shall be included within the lifting team briefings and lifting co-ordination meetings and records retained of the briefing.

3.3.18 Electronic Inverter Drives
Prior to first use of the tower crane, the crane provider shall confirm in writing whether any inverter drives have been replaced or repaired. Where an inverter drive has been replaced or repaired, written confirmation that the inverter drive control parameters have been correctly programmed must be provided.

3.3.19 On-site Machine History File
A machine history file shall be kept on site by the user to record all maintenance activities carried out on the crane whilst it is erected on that site.
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3.3.20 Initial Thorough Examinations (TE)
Following erection, the crane provider shall carry out a Thorough Examination (TE) of the crane; this TE must not be completed by a member of the erection team.

St James shall appoint an examiner, independent of the crane provider’s examiner, to complete a further TE immediately following erection and prior to the crane being taken into service.

3.3.21 Subsequent Thorough Examinations (TE)
St James’ independent inspector shall carry out a further TE three months after the initial TE, and then at six monthly intervals.

The crane provider shall carry out subsequent TE at no more than six monthly intervals.

3.3.22 Exceptional Circumstances
Any exceptional circumstances, (e.g. shock loads and extreme weather), must be reported to the St James Project Management Team, and the crane taken out of service until an independent ‘Thorough Examination’ has taken place and confirmed that the crane is fit to be put back into use. This requirement must be communicated to the members of the lift team during inductions, briefings and meetings.

3.3.23 Out of Service Requirements
For all luffing jib tower cranes, St James shall ascertain from the crane supplier the correct jib position/hook block radius for out of service conditions, i.e. outside working hours, during high winds, etc. St James shall notify crane operators of the correct position/radius in writing, and arrange to display a notice within each crane operating cab of the correct out-of-service position.

Should the out of service jib position/hook block radius need to differ from the crane manufacturers recommendation due to site restrictions, e.g. due to over sailing issues, the crane supplier shall be notified prior to a different position/radius being adopted by the crane operator(s).

Crane operators shall confirm on a daily basis that cranes have been left at the correct out of service radius, and that they have completed out-of-service checks by completing St James H&S Form: SJ-F-32B Tower Crane Daily Check List, or similar document that records the same detail.

3.3.24 Fault Identification
On a daily basis, the crane operator(s) shall report details of any faults to a St James site manager (nominated by the Project Director/Manager) or crane co-ordinator. The nominated site manager or crane co-ordinator shall confirm that identified faults have been notified to the crane provider/owner and the expected date of fault rectification.

3.3.25 Tower Crane Daily Check List
The tower crane daily check list SJ-F-32B shall be completed for each tower crane on site. It must be completed by the tower crane operator in the presence of the St. James Site Manager.
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3.3.26 Review of Operations
The St James Project Director/Manager shall ensure that formal reviews of the lift plan and lifting activities are undertaken at the following frequencies:

Weekly review attended by: St James Manager(s) involved in crane operations, and
Crane Co-ordinator, and
Crane Supervisor(s), and
Slinger/signaller(s)

Monthly review attended by: Appointed Person, and
St James Manager(s) involved in crane operations, and
Crane Co-ordinator, and
Crane Supervisor(s)

As a minimum, the meetings shall review the current storage arrangements on site, delivery schedules/arrangements, crane team resourcing, lifting equipment and lifting accessories; any planned or unplanned changes should be recorded.

The St James Project Director/Manager shall ensure that a written record of all review meetings is maintained (using St James H&S Form SJ-F-32F Crane Co-ordination Meeting Minutes), and that relevant lift plan(s) and associated RAMS are updated as necessary.

3.3.27 Dismantling Checklist
Prior to dismantling, the St James Project Director/Manager shall ensure that a St James Manager completes H&S Form: SJ-C-32H Erection Use & Dismantling of Tower Cranes.

3.4 Mobile Cranes
Note: the requirements of clauses 3.1 to 3.2 apply to mobile crane activities.

3.4.1 Contract Lifting
Mobile cranes required by St James or a trade contractor shall normally be procured under a ‘contract lift’ arrangement – see also clause 3.4.2.

3.4.2 Crane Hire Agreements
Trade contractors regularly using mobile cranes (e.g. steel erection, pre-cast concrete installation, tower crane suppliers, etc.), and wishing to procure mobile cranes under a ‘crane hire agreement’ shall complete H&S Form: SJ-F-32C Assessment of Arrangements to Operate under a Crane Hire Agreement, prior to commencing lifting activities.

Mobile crane activities [under a crane hire agreement] shall not commence on site until the Head of H&S and the Director Responsible for H&S provide written authorisation, i.e. by signing a completed H&S Form SJ-F-32C.

The trade contractor shall complete SJ-F-32C Assessment of Arrangements to Operate under a Crane Hire Agreement on a per-project basis, i.e. the form shall be completed for each new project for which they wish to use a mobile crane under a crane hire agreement.

3.4.3 Lift Plans
Mobile crane operations shall not commence on site until a signed and dated lift plan has been prepared by the appointed person that includes details of the crane make/model to be used, a dimensioned drawing or sketch highlighting the proposed crane location on site and extracts from the crane duty charts for the proposed crane configuration.
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Prior to commencing lifting activities, the lift plan shall be reviewed and evaluated following the requirements of H&S Procedure SJ-P-48 Risk Assessment & Method Statement Review, which necessitates the completion of H&S Forms: SJ-F-48B RAMS Review & Evaluation and SJ-F-32D Safe Use of Mobile Cranes.

For mobile crane operations that continue for a period of seven consecutive days or more, lifting operations shall be reviewed in-line with clause 3.3.13.

3.4.4 Mobile Crane Working Platform/Foundation
The maximum axle loads and outrigger loads of the proposed mobile crane and details of the ground or structure on which the crane will travel and be sited shall be provided to a civil or structural engineer to confirm that the ground conditions are capable of supporting the crane.

Ground strengthening works required in preparation for mobile crane activities shall be treated as temporary works and the requirements of H&S Procedure SJ-P-36 Management of Temporary shall be observed.

3.5 Crawler Cranes
Note: the requirements of clauses 3.1 to 3.2 apply to crawler crane activities.

3.5.1 Lift Plans
Crawler crane operations shall not commence on site until a signed and dated lift plan has been prepared by the appointed person that includes details of the crane make/model to be used, a dimensioned drawing or sketch highlighting the proposed crane locations/working area on site and extracts from the crane duty charts for the proposed crane configuration.

Prior to commencing lifting activities, the lift plan shall be reviewed and evaluated following the requirements of H&S Procedure SJ-P-48 Risk Assessment & Method Statement Review, which necessitates the completion of H&S Forms: SJ-F-48B RAMS Review & Evaluation and SJ-F-32D Safe Use of Mobile Cranes.

For crawler crane operations that continue for a period of seven consecutive days or more, lifting operations shall be reviewed in-line with clause 3.3.13.

3.5.2 Crawler Crane Working Platform
The maximum imposed load of the proposed crawler crane and details of the ground or structure on which the crane will travel/be sited shall be provided to a civil or structural engineer to confirm that the ground conditions are capable of supporting the crane.

Ground strengthening works required in preparation for crawler crane activities shall be treated as temporary works and the requirements of H&S Procedure SJ-P-36 Management of Temporary Works shall be observed.

The boundary of the working platform shall be clearly demarcated on site, so as to be visible to the crane operator.

3.5.3 Fault Identification
On a daily basis, the crane operator(s) shall present to St James records of daily inspections carried out, and confirm that identified faults have been notified to the crane provider and the expected date of fault rectification.
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3.5.4 Isolating Crawler Crane Controls
To prevent the inadvertent operation of a crawler crane’s controls, crane operators are to be instructed to engage an isolator switch whenever the crane is not actively engaged in lifting or manoeuvring.

This instruction does not apply in cases where the crane controls require two actions to command a motion, e.g. a requirement to depress a switch prior to the control stick becoming ‘active’.

3.5.5 Working Near Site Boundaries
Where crawler cranes are on-site for an extended period, i.e. several weeks, and are so positioned that a site boundary may be inadvertently over sailed, an assessment of the risk and impact of such over sailing should be made.

To mitigate the risk of inadvertent over sailing, control measures should be devised to alert the crane operator at appropriate times; such controls could include:

i. re-programming of the rated capacity indicator (RCI) to alarm at a reduced radius, or
ii. installing a boom angle sensor/limit switch and audible alarm, or
iii. installing an alarm that alerts the operator when the boom angle is being reduced/radius increased, or
iv. installing a slew restrictor and/or alarm.

The risk of inadvertent over sailing should be periodically re-assessed if site conditions change, e.g. during the demolition of a building adjacent to a site boundary.

3.6 Excavators used as Cranes
Refer to clause 3.7 of H&S Procedure SJ-P-24 Excavations, Groundworks & Underground Services for requirements regarding excavators used as cranes.

3.7 Forklifts & Tele-handlers
3.7.1 Operator Competence
Forklift/Tele-handler operators/drivers shall hold a CPCS, NPORS or RTITB qualification card appropriate to the type of forklift or tele-handler to be operated.

3.7.2 Medical Fitness
Forklift/Tele-handler operators/drivers shall hold evidence of attending ‘Fit for Work’ medicals at five-yearly intervals.

3.7.3 Weekly Inspection
Forklifts & Tele-handlers shall be inspected weekly by the operator/driver; records of inspection shall be maintained using H&S Form: SJ-F-32E Daily & Weekly Plant Inspection, or similar document, which records identical information.

3.7.4 Risk Assessment
The St James Project Director/Manager shall ensure that forklifts & tele-handlers under the direct control of the St James Project Management Team are included in a site-specific risk assessment, prepared using St James H&S Risk Assessment: SJ-RA-32F Use of Tele-handlers, which is communicated to all operators and vehicle banksmen.
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3.8 Thorough Examination & Inspection of Accessories for Lifting
All lifting accessories, i.e. any item of equipment that is attached to the hook/hook block of a crane for the purposes of suspending a load (e.g. chains, webbing slings, shackles, spreader beams, man-riding cages, etc.), shall be Thoroughly Examined by a competent person:

i. Within three months prior to the first use on site, and
ii. At three monthly intervals thereafter.

For new lifting accessories, an EC Declaration of Conformity may be accepted as evidence that the accessory may be used on site; subsequent Thorough Examinations shall be required after three months use on site, and at three monthly intervals thereafter.

Thorough Examination Certificates and EC Declarations of Conformity shall be held on site.

All lifting accessories (chains, webbing slings, shackles, spreader beams, man-riding cages, etc.) shall be inspected weekly by a competent person. Records of such inspections shall be maintained and available on site.

3.9 Use of ‘One Tonne’ Bags/Fabric Bags
‘One Tonne’/Fabric Bags are only to be moved from the delivery vehicle to the final resting point by crane if they can be kept at or below shoulder height.

Should the final destination of the load require the bag to be lifted above shoulder height, the bag must be placed in a secondary container before the lift, e.g. within a skip or stillage of appropriate capacity to contain the entire load.

Following a single lift, the lifting eyes of bags marked single lift must be cut, preventing the bag from being re-lifted. Bags that are marked as ‘multi-lift’/multi-use’, may be re-lifted, subject to the above conditions.

Supporting Documentation

- SJ-P-24 Excavations, Groundworks & Underground Services
- SJ-P-36 Management of Temporary Works
- SJ-P-48 Risk Assessment & Method Statement Review
- SJ-F-32A Project Lifting Plan
- SJ-F-32B Tower Crane Daily Check List
- SJ-F-32C Assessment of Arrangements to Operate under a Crane Hire Agreement
- SJ-F-32D Safe Use of Mobile Cranes
- SJ-F-32E Daily & Weekly Plant Inspection
- SJ-F-32F Crane Co-ordination Meeting Minutes
- SJ-R-32G Use of Telehandlers
- SJ-C-32H Erection Use & Dismantling of Tower Cranes
- SJ-F-32i Sample Letters of Appointment
- SJ-F-48B RAMS Review & Evaluation

Further Information
Is available via the Intranet and the H&S Department.