

ASIA APPLICATION STANDARDS

GMR 4.1		Fall of Person			
Description: These critical controls and performance standards apply to situations where there is a risk of one or more people falling off an edge, object, structure or opening with the potential risk of fatal consequences. It is not intended to apply to slips or trips on the same surface level.					
<i>All applicable local, national and international environment, health and safety legislation and recognised codes, standards and other external requirements must always be complied with. Where there is a difference between Lendlease Standards and those required by legislation recognised codes, standards and other external requirements the higher standard must be applied.</i>					
GMR Subsection:		4.1.1 Fall Prevention Barriers			
Controls: Provide robust physical barriers to protect people falling from height. Performance Standards: i) All areas under construction or demolition (including deep excavations) from which a person could fall must be protected by physical barriers of sufficient height and strength to prevent people from falling or being blown off the edge of the structure or into an excavation or opening (e.g. screens, handrails, scaffolds, or guard rails for temporary structures). ii) All open edges from which a person could fall in asset operations and maintenance scenarios must also be effectively protected by physical barriers of sufficient height and strength to prevent people from falling (e.g. permanent climb resistant balustrades, guard rails or void screens) addressing the risks associated with the operation such as, likely usage, location, structural stability and weather conditions. iii) All mobile work platforms, temporary works platforms, equipment or machinery used for work at height must have edge protection in place to prevent the fall of a person from both the elevated work and from any potential for the platform to be destabilised from adjustment, movement or positioning manoeuvres. Restraining harnesses must be worn and secured to the manufacturer's designated anchor point by people working in MEWPs with booms unless working over water. iv) Edge protection must conform to the requirements of the regulations, standards and applicable local codes and have a method of attachment and a supporting structure capable of withstanding the required design loads that will be applied. v) Where containment mesh is secured to prevent fall of materials (refer to GMR 4.2.1) from an edge, it must also meet applicable edge protection requirements if required to prevent a fall of a person.					
General Requirements					
Methodology					
1. Perimeter protection shall be designed and endorsed by qualified, competent and experienced persons, i.e. qualified engineer. This must be considered during the design stage as the engineering and construction techniques for erection and removal may lead to additional risks. 2. Perimeter scaffold and screens must be capable of supporting their dead load, foreseeable live loads and additional forces, i.e. personnel, tools and equipment, wind loads, etc. 3. Overhead protection and catch nets must be engineered to be capable of protecting those below and must meet applicable edge protection requirements if needed to prevent fall of person. 4. Catch nets are to be engineered type that comply with EN 1263-1:2002 standard specifications: • Minimum Cord Size: 5mm • Mesh Configuration: Square Mesh • Minimum Breaking Energy: 2.3kJ (ISO 1806)					
Delivery					
1. Fall protection, so far as is reasonably practicable, shall be prefabricated or installed on the ground prior to lifting in place: • Life-line anchorage (unless possible and operation preference is to install from a MEWP) • Safety net anchorage (unless possible and operation preference is to install from a MEWP) • Guardrails to perimeter beams (unless another hard solution is OR WILL BE installed prior to personnel going onto steel i.e. screens, perimeter scaffold) Only when not practical					
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2. Where guardrails cannot be fitted to perimeter beams prior to lifting, they will then be fitted as a separate operation after erection, but prior to decking. In such cases, as much preparation work as is safe and practical will be carried out on the ground. Fitting of the guardrails shall take place from a safe work platform e.g. scaffold tower, MEWP, man box, etc.
3. Fitting of guardrails to beams already erected as a separate operation and prior to decking installation using the beam as access/place of work will be a last resort where no alternative safer method can be practically employed. This method will only be employed after detailed analysis of the risks and implementation of adequate control measures.



Stanchions with lifeline fitted to beam before lifting



Pre-installed handrail edge protection on pre-cast RC slab section prior to lifting in place



Pre-installed edge protection lifted in place



Pre-fabrication of roof structure on ground



Safety nets installed and dismantled from MEWP



Safety net for fall protection for personnel

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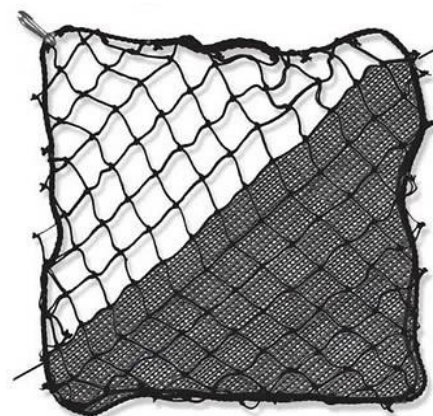
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Plant fitted with guardrails to provide fall protection for personnel accessing the plant during maintenance



Example of knotted personnel safety nets; these can be single strand or double strands



Knotless personnel safety nets can be used with the debris netting to provide mitigating control for both fall of persons and material

Perimeter Screens

Methodology

1. Perimeter screens shall be installed, jumped and dismantled by competent personnel as per the manufacturer's instructions.
2. Bottom of screen, integrated working deck, etc. is to be designed in order that fall of people and material is effectively prevented, i.e. platform/catch deck.

Delivery

1. Screens are not permitted to be jumped until the lowest "screen" protected floor has alternative suitable edge protection.
2. At all times, screens are to extend 1.8m (min.) above highest construction floor.
3. Protection is to be provided to a minimum of 3 full floors (more if required due to short cycles) below the construction floor.
4. Formwork is to extend as close as possible to the screen and a solution installed at the point where horizontal form work meets the vertical screen, e.g. metal or timber deck secured to prevent movement, fall of persons or materials, etc. A solution shall also be installed at 45° at this point in a manner that directs debris toward floor slab.

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Perimeter climbing screen



View from internal of perimeter screen



Examples of perimeter screens providing effective edge protection

Perimeter Scaffold

Methodology

1. Perimeter scaffold shall be installed, modified and dismantled in full compliance with local code, Lendlease Asia Scaffold Minimum Standard v4, and manufacturer's instructions.
2. These works shall be undertaken by qualified and experienced scaffolders meeting local legislative requirements.

Delivery

1. Areas below overhead scaffold work must be effectively protected by an appropriate robust exclusion zone of adequate size.
2. At all times, perimeter scaffold shall extend 1.8m (min.) above highest construction level.



Perimeter scaffold with netting



Proprietary perimeter scaffold with netting

Proprietary Edge Protection System

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Proprietary edge protection system provided during steel structure installation



Adjustable full height proprietary edge protection system to provide access for subsequent works, e.g. façade fixings.

NOTE: Netting to be provided to meet Lendlease's "No Gap" policy



Perimeter edge protection and safety net

Perimeter Rail and Toe Board

Methodology

1. Works shall be planned such that handrail edge protection must be installed prior to personnel being exposed to the leading edge.
2. Handrail systems shall be capable of withstanding a minimum force of 0.445kN applied to any part of the system.

Delivery

1. Minimum standard shall be
 - Posts at 2m centres (max.)
 - Top rails installed at 1200mm with mid-rails at half the height between top rail and toe board (max. 550mm vertical distance between elements)
 - Toe boards to be at a minimum height of 150mm

Note: Proprietary steel or tube & fitting systems are preferred. Timber rails are permitted ONLY as a manufactured element of a proprietary steel system.

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Fully enclosed edge protection consisting of robust guardrails and full height netting



2 perimeter rails (top @ 1200mm and mid-rail @ half the height between top rail and toe boards), floor to soffit netting



Perimeter edge protection on construction deck using proprietary scaffold system with multiple rails, toe boards, floor to top rail netting (>1.8m)

Inspection Regime

Types	Initial Inspection	Ongoing Inspection
Perimeter Screens	- Immediately after installation and preceding use - Competent person meeting local legislative requirements - Inspection to be recorded	- At intervals not exceeding 7 days by a competent person meeting local legislative requirements - After jumping - Inspection to be recorded
Perimeter Scaffolds	- Immediately after erection and preceding its use - Competent person meeting local legislative requirements - Inspection to be recorded - Green tag to be displayed at all access points after successful inspection - Red tag to be displayed at all access points where scaffold is undergoing erection, dismantling or modification	- At intervals not exceeding 7 days OR after any authorised modification OR if exposed to elements (heavy rain or strong winds), by a competent person meeting local legislative requirements - Green tag to be displayed at all access points after successful inspection - Red tag to be displayed at all access points upon unsuccessful inspection
Proprietary Edge Protection System and Perimeter Rails	- Immediately after erection and preceding its use - Competent person meeting local legislative requirements	- Visually inspected as part of weekly site review - Non-conformance and remedial actions to be recorded and closed out

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Metal Frame Erection

Methodology

1. All steel erection must occur within an enclosed, suitably robust and effective exclusion zone.
2. Lifting and slinging must be performed by competent operators, riggers and slingers who meet local legislative requirements.
Note: For countries that do not have a local qualification, competency shall be assessed by a Lendlease competent person.
3. Only cranes, plant and rigging equipment that have been maintained as per the manufacturer's instructions, inspected and certified as per all local and Lendlease requirements are to be used.
4. Safe procedures documented in the SWMS are to ensure lifting loads over personnel or working below suspended loads is avoided.
5. Life-line systems and anchorage shall be pre-fabricated and/or installed on the ground prior to lifting OR installed from a mechanical elevated work platform (MEWP).

Delivery

Steel Erection	• Rigging capable of remote release • MEWP • Mobile scaffolds • Fixed scaffold and towers • Rigged column man-box	• Crane man-box • Life lines • Beam gliders • Man locks
	Note: When accessing onto steel cannot be avoided, tie-off shall be to an anchor and system rated to withstand a minimum force of 15kN. If this is not possible, harness protection MUST be elevated to secondary fall protection at the FIRST POSSIBLE INSTANCE, i.e. first task for riggers would be to install and secure the safety net.	
Steel Deck and Form Deck	• MEWP or scaffolds for columns • False work with a full deck approx. 1.5m below soffit complete with safe access and edge protection whenever a fall risk exists • Safety net, air bags, etc. installed below the work area (harness as secondary fall protection only)	
1. All steel erection work, as much as reasonably practical, is to be done from MEWPs. 2. Surplus material e.g. bolts, must not be stored on beams. 3. Hand tools are to have lanyards fitted and secured to worker to eliminate the risk of falling.		
 Remote release shackle  Beam glider		

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Stair access to steel deck



Crane man box

Working on Roofs

Methodology

1. On buildings where there will be a need for the end user to access the roof, the design shall ensure that adequate safe access and edge protection is incorporated and that the type of protection is appropriately assessed against the need e.g. 1.2m (min.) parapet, handrails. Where The use of harnesses anchored onto an engineered life line system
2. Agreed safe work procedure is to ensure that minimal requirement for deck layers to be off laid sheets is achieved.
3. For work on pitched roofs a robust risk assessment and selection of appropriate means must be undertaken.
4. Subsequent trades must not be permitted to enter decked areas until the decking contractor has confirmed all works are complete and the deck is safe to access.
5. Prior to decking being fully installed, riggers, scaffolders, deck layers, safety personnel and supervisors who have undergone site specific training on working safely at height ONLY are permitted to go onto the steel. The following minimum standards must firstly be in place:
 - Compliant stair or ramp access (CAT ladders or MEWPs used for vertical access to steel is to be absolute last resort)
 - Certified engineered safety nets
 - Perimeter beam guardrails (unless another hard solution is installed e.g. screens, perimeter scaffold, etc.)
 - Life-lines to allow 100% tie off at all times

Exemption: A rigger may be permitted to access onto steel prior to installation of safety nets and perimeter guardrails ONLY to install the safety net when no other practical safer method exists (and only under an agreed safe system of work).

Exemption: A scaffolder with appropriate training may be permitted to access onto steel prior to installation of perimeter guardrails ONLY to install the guardrails when no other practical safer method exists (and only under an agreed safe system of work).

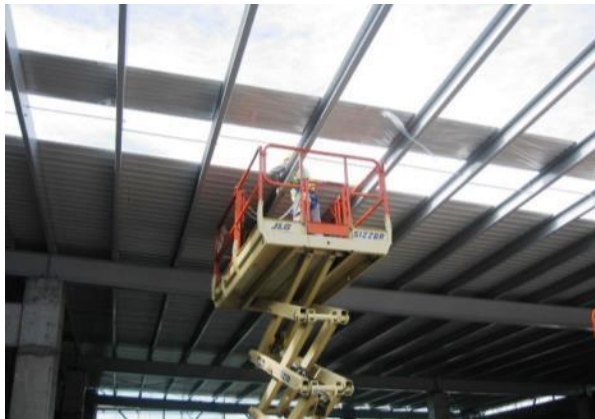
Delivery

1. Full perimeter protection must be provided for the duration of roof construction. This can be perimeter screen, scaffold, parapet or handrails.
2. If a safety harness (as primary fall protection or fall restraint) forms part of an agreed work procedure on any roof (permanent or temporary), a control system to access must be implemented i.e. locked Lendlease controlled access to the roof, asset/site specific height training, restriction of access to personnel inducted to roof procedure only.
NOTE The default standard is to provide safe access with robust guardrails installed at 1200mm (min.)
3. A safety net OR safety mesh must be installed as primary fall protection below roof work and extend at least 3m past any roof installed leading edge or to the perimeter protection.
4. Installation of decking shall not commence until perimeter protection and safety nets are installed.
5. A safety harness is to be used as secondary fall protection whenever a worker is within 2m of the leading edge. Workers are to remain 100% tied-off whenever 2m or closer to the leading edge (this is secondary as the safety net is primary).
6. Full fixing of sheets must take place as work progresses. Tacking of sheets with a later return to complete the fixing is not acceptable.
7. Working on a roof alone is strictly prohibited.

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8. Adequate lighting must be provided to all areas of work and access when working at night on a roof or where natural lighting condition is not sufficient.
9. For extreme roof pitches e.g. in traditional Thai buildings, a perimeter scaffold with a deck or platform (no lower than 200mm below and no higher than flush with the roof eave) is required to restrict potential falls.
 - Edge protection of the deck or platform must have a toe board and be fully netted so as to prevent falls of any person or material; and
 - Edge protection must be used in conjunction with a grid pattern network of life lines and/or tubes on the roof to provide fall restraint for workers.



Roof sheets installed from a MEWP

Concrete Form Deck Erection

Methodology

1. All formwork/false work systems shall be designed by a competent person meeting local legislative requirements.
2. Formwork is to be installed as much as possible from below. Where workers will be exposed to a fall risk, a full deck complete with access and edge protection is to be integrated into the false work.
3. Concrete buildings that employ handrails for perimeter protection must provide a safe work platform integrated into the false work structures (cantilever) that includes safe access for vertical edge carpentry and stressing work.

Delivery

1. Edge protection shall extend a minimum of 1.8m above the future floor slab being formed. This protection must remain until the edge protection is installed on the higher deck after casting AND the higher deck cantilever has been installed.
2. Permanent stairs are to be provided for safe vertical access between working floors. Where permanent stairs cannot keep up with construction, temporary stairs/ramps must be provided.
3. Ascending to the form deck is not permitted until as much formwork as possible has been installed from below and perimeter protection is installed.
4. Subsequent trades must not be permitted to ascend to the form deck until the formwork contractor has confirmed all works are complete and safe to access.



False work with a full deck to allow installation/dismantling of formwork from below

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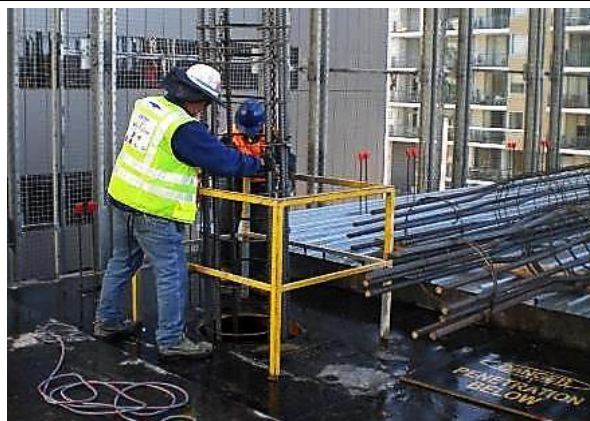
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Provision of perimeter edge protection and good work access at slab edge as part of falsework system



Caisson driven with its remaining portion (min. 1.2m high) left to provide edge protection to the bore hole



Column/Penetration protection

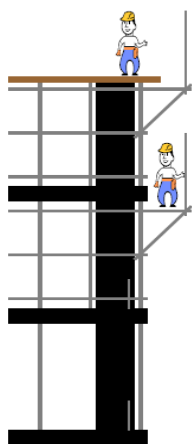


Illustration of the higher level cantilever installed prior to the lower one being dismantled.

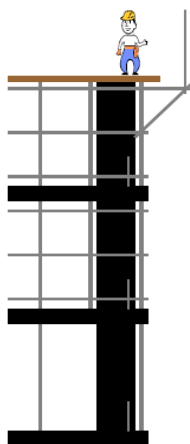


Illustration of acceptable perimeter protection on all floors with the cantilever offering protection for form workers at top of construction.

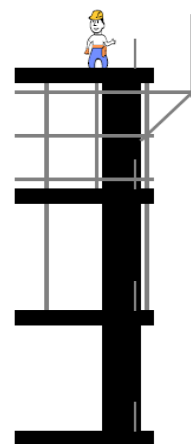


Illustration of slab being cast and edge handrails installed. As soon as the false work structure is installed, the lower cantilever may be dismantled. Ensure all slab edge work has occurred prior to dismantle i.e. form strip, stressing, etc.

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Proprietary modular formwork with propping system

COLUMNS

Methodology

1. Preference is to be given to pouring columns up. When this cannot be reasonably and practically achieved systems must be in place to prevent falls of people, i.e. mesh, secured cover, guardrails, etc.
2. Preference shall be given to the use of proprietary column shutters. However if traditional timber shuttering is used, these shall be pre-fabricated as much as possible. Lifting points must be checked and approved and props must be securely fixed.

Delivery

1. Where prefabrication is not practical and column cages must be built in-situ, steel fixers must be provided with a safe platform and access or MEWP to safely tie the steel.
2. Fixed scaffold used must be provided to a minimum of 3 sides (or 4 sides if the steel fixer will need to stretch past "partial breach").

NOTE: Scaffold towers are not permitted to be moved by crane unless engineered by design. In this instance, an independent SME review must be conducted as part of the Acute High-Risk activity management process.



Proprietary column formwork providing safe caged access and working deck



MEWP access for column work

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Circular/round column formwork with safe access platforms or access via articulated boom lift

RC WALLS

Methodology

1. Temporary safe environments must be provided for all aspects of RC wall construction.
2. Scaffolds, MEWPs, perimeter screens or jump forms are all acceptable options. Assessment covering all aspects of the job must take place and the final option selected must provide the best overall protection.

Delivery

1. Work decks must be fully planked with handrails, toe boards and netting that completely mitigate the fall of people and material.
2. Adequate safe access must be provided to all work decks. At all times the hazards associated with installing access must be considered.



Prefabricated wall formwork lifted into place and installed with telescopic boom lift



System formwork used for RC wall construction

CORES

Methodology

1. The individual risks associated with any particular method and sequence of core construction must be assessed and the safest method used.
2. Formwork systems are to be reviewed and agreed with Lendlease. These systems must be used in accordance with manufacturer's instruction and in compliance with applicable legal requirements.
3. Modification without prior manufacturer approval is strictly not permitted.
4. The Country Operations Manager shall ensure that adequate levels of experience and competence in using these systems reside within the Lendlease operation team.
5. As with all works at height, all personnel must be fully inducted into and understand the requirements of the relevant SWMS.
6. Core work must be undertaken by an appropriately qualified specialist contractor with a supervisor who specialises in the process present at the work face at all times.

Delivery

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- 1. Safe access must be provided to all levels of core formwork systems. System must be fully decked and enclosed to prevent fall of both people and materials.
- 2. Jumpform decks must have adequate end rails to prevent fall of persons. These must be in place during jumping operations.
- 3. Clear notices of SWL of all platforms must be displayed and rigorous housekeeping must be enforced.



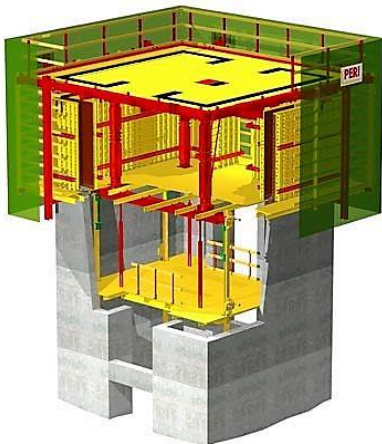
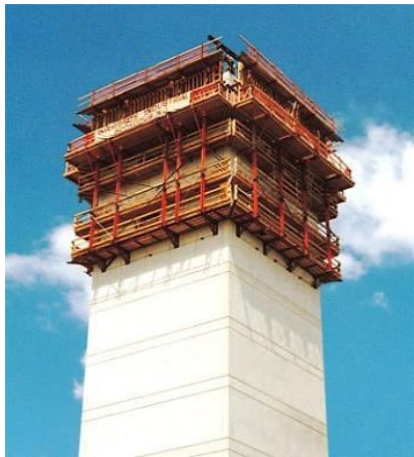
Rail-climbing core formwork system



Mast climbing formwork system



Self-climbing (ACS) core formwork system

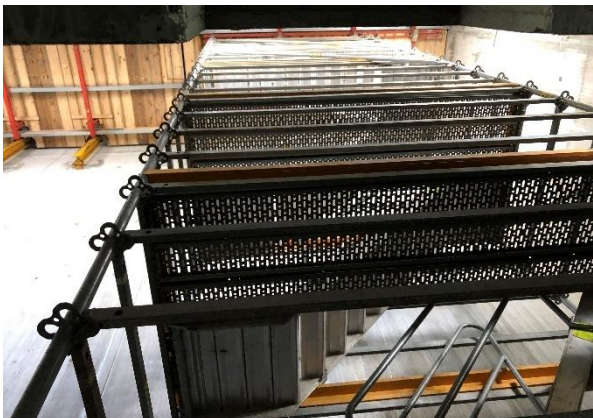


Sectional view of core formwork



Safe access (external) provided to working deck of core

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Examples of safe access (internal) provided to working deck of core

GMR Subsection: 4.1.2 Height Access Equipment

Controls: Height access equipment must be operated and maintained in accordance with the manufacturer's instructions.

Performance Standards:

- i) Control and prevent unauthorised access to climbable building equipment (e.g. cooling or heating plants and free-standing structures such as antennae, power station cooling towers, storage tanks and power transmission lines or towers).
- ii) Equipment or structures requiring worker access must eliminate or minimise the risk of a fall. Equipment requiring regular maintenance must be installed at, or moved to, ground level to eliminate the need to work at height.
- iii) Access to general construction work areas or floors must be provided by either a full permanent solution or via temporary staircases of adequate width with suitable handrails. Access via custom-built timber ladders is not permitted.
- iv) Suspended access equipment such as bosun chairs, cradles, gondolas and swing stages must only be used where safer means of height access cannot be achieved.
- v) Permanent BMUs such as mechanised cradle systems must provide safe access for cleaning and maintenance, be fixed to the operation's structure, have the safe working load clearly marked, and have sufficient designated safety harness anchor points designed to withstand the forces caused by a fall of any person(s) located anywhere on the platform.
- vi) All mast climbers, swing stage scaffolds and BMUs must be installed, maintained and inspected by an engineer or person(s) technically qualified to do so, following the manufacturer's specifications as a minimum. Details of the design, maintenance, inspections and manufacturer's specifications must be provided.
- vii) All people using mast climbers must attach using a fall restraint lanyard when the mast climber is moving. The lanyard must be attached to either a vertical line independent of the portable vertical access equipment, an engineered anchor point or horizontal static line fabricated and certified by the manufacturer or independent engineer for that purpose, or a transportable temporary independent anchor point engineered for that purpose. Emergency retrieval rescue procedures must be established for work involving a safety harness and lanyards.

General Requirements

Methodology

1. Access to general work areas or floors shall be provided by the full permanent solution wherever possible. If a permanent solution is not available at least one temporary access shall be capable of providing adequate access to conduct a stretcher rescue.
2. Temporary access shall be installed, modified and dismantled by competent and experienced personnel meeting local legislative requirements and be subjected to inspections and tagging as per scaffolding, i.e. at intervals not exceeding 7 days.

Delivery

1. Temporary access must provide a landing of acceptable size every 2m (max.) vertically.
2. Unless for personnel use only, access shall be stairs or ramps only. Tube and fitting ladder types installed as stairs are not permitted.
3. Ramps used for personnel and materials shall be no steeper than a gradient of 6:1 (3:1 permitted if ramp is for personnel only).

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Permanent stairs with temporary barriers to provide fall protection



Temporary stairs of tube and fitting construction



Single-cage passenger hoist



Twin-cage passenger hoist

Mobile Elevated Work Platform (MEWP)

Methodology

1. All MEWPs used on Lendlease operations must be safe by design and appropriate for the task and specific work environment.
2. MEWPs must be inspected prior to or upon arrival to site by a competent and experienced person meeting local legislative requirements, and verified to be of the type specified, in good condition and maintained in accordance with manufacturer's instructions (record of inspection to be maintained).
3. MEWPs must only be used within their safe working parameters set by the manufacturer.
4. Works involving MEWPs must be carefully planned to ensure all significant hazards associated with the task and environment, including safe delivery of the MEWP into the work location, electrical hazards, ground conditions, heights to be reached, materials to be handled, obstructions, services, traffic, weather conditions, etc. are identified and effective control measures are implemented.
5. The safe method of work and area of operation must be reassessed after any significant changes occur which could impact on safe operation e.g. weather conditions, work tasks, etc.
6. All operations using MEWPs must be covered by a Safe Work Method Statements produced before works commence on site. Rescue procedures must be developed to deal with all likely emergency situations.
7. All MEWP operators must be competent to safely use the specific equipment they are assigned to operate. Proof of competence includes relevant industry standard qualifications, training provided by the manufacturer and/or practical testing.

Delivery

1. All persons working in MEWPs must stay within the carrier at all times whilst working. Ascending rails/barricades or placing any item on any MAS/MEWP platform to gain additional height is not permitted.

Note: Any modification/s made to plant and equipment (e.g. for additional height access) must be approved by the manufacturer and certified as safe for use.

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2. Use of MEWPs must be controlled within an effective exclusion zone to prevent unauthorised entry and possible collisions with persons or vehicles. MEWP operations must be assisted by a banksman/spotter to direct plant/equipment operations and pedestrian movements.
3. MEWPs must be operated on firm and flat surfaces and not be moved across sloping ground with the carrier occupied and in the raised or extended position.
4. MEWPs must be operated in accordance with the manufacturer's instructions and must not be used:
 - In locations where the conditions are unsuitable for the MEWP (such as adjacent to unprotected edges and excavations, in confined locations, on excessive slopes, on rough terrain, over unprotected services, on unstable ground, etc.);
 - Beyond their Safe Working Load or for lifting materials liable to fall from the carrier;
 - As an unsafe means of access; or
 - In ways liable to make them unstable, e.g. travelling with the boom raised and with the counter-weight on the downhill side of a slope.
5. Daily pre-start briefings must be provided to MEWP operators on the safe method of work to be employed, paying particular attention to ensuring MEWP stability by:
 - Examining ground conditions, deploying outriggers (where fitted), and travelling with the boom lowered;
 - Preventing entrapment against fixed objects;
6. MEWPs must be subjected to ongoing inspections and maintenance to ensure they are kept in a safe condition:
 - Daily safety checks prior to use by the operator (record of inspection to be maintained).
 - Monthly inspections and maintenance service by a competent person, with associated fault reporting and remedy procedures recorded and maintained. All MEWPs shall display the current Lendlease monthly label of fitness for use.
7. Thorough 6-monthly examinations and servicing undertaken by a competent person and experienced personnel meeting local legislative requirements (updated inspection and maintenance log to be kept).



Steel erection using scissor lift within an exclusion zone



Bolt up from a Mechanical Access System



Single-man elevated work platform



Column formwork closure with scissor lift

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Articulating boom lift



Collective use of boom lift and scissor lift

Suspended Access Equipment

Methodology

1. All suspended access equipment e.g. Bosun chair, suspended cradles, gondolas and swing stages, etc. must only be used where safer means of access are not practical. These must be inspected and approved prior to and upon arrival to site by a competent and experienced person meeting local legislative requirements, and verified to be in good condition with regular servicing as per the manufacturer's instructions (record of inspection to be maintained).
2. Suspended access equipment must be installed by qualified and experienced personnel meeting local legislative requirements and in accordance with manufacturer's requirements, and inspected and approved for use by a competent person meeting local legislative requirements.
3. A rigorous and effective Permit-to-Work system must be in place for all suspended access equipment installation and dismantling.
4. All anchorage points that support suspended systems are to meet the manufacturer's instructions and be signed off by a competent engineer (certification is required).
5. Modification without prior written approval from the manufacturer is strictly not permitted.
6. Suspended access equipment must be operated only by trained and experienced personnel that meet local legislative requirements and in accordance with the manufacturer's instructions.
7. SWMS must include an emergency rescue plan that is understood by all those involved in the work. Rescue equipment must be made available and confirmed in place prior to task commencement.

Delivery

1. Suspended systems in their entirety MUST be inspected by experienced and competent personnel meeting local legislative requirements:
 - After installation and prior to use (Lendlease to keep a copy)
 - Daily before use (by the operator – operator/contractor to keep records for verification)
 - Ongoing at intervals not exceeding 7 days (Lendlease to keep a copy)
2. Personnel using this equipment must be 100% tied-off to their own exclusive vertical life line and fall restraint/arrester (rope grab) that forms no part of the suspended access system. Anchorage and fall arrest system shall be capable of withstanding a minimum force of 15kN.
3. Safe access and egress must be provided that ensure the safety of operatives.
4. Whenever suspended access equipment is in use a robust and effective exclusion zone of adequate dimension must be set up beneath the area of operation.
5. Suspended systems must not be operated during adverse weather conditions.

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Suspended cradle/platform



Operatives 100% tied-off to exclusive vertical life-line and fall restraint/arrester that forms no part of the suspended access system

Powered Vertical Access Equipment

Methodology

The following requirements must be implemented on all Lendlease operations where PVAE equipment is in use:

Equipment Supplier Controls and Duties

1. Confirmation that all Powered Vertical Access Equipment (PVAE) is installed, maintained and inspected by an engineer/competent person(s), as per the manufacturer's specifications. Details of the manufacturer's specifications, actual design as installed details (including temporary works), and maintenance and inspection regimes must be provided to the hirer and Lendlease.
2. Any engineer(s)/competent person(s) installing, maintaining and inspecting PVAE must provide proof of competence.
3. The engineer/competent person conducting inspections of PVAE equipment must keep a record of inspection and actions done to the device and/or attach tags detailing the last inspection and make these available on request.
4. The engineer/competent person must confirm that:
 - a. All structural anchorages have been installed and tested to manufacturers/design engineers' instructions; and
 - b. Where temporary anchorages include metal tubes as part of the tie arrangements, stop-ends must be provided so as to prevent ties from pulling off the end of the tubes.

NOTE: Where Lendlease acts as a supplier, Lendlease must apply the Controls and Duties of the equipment supplier.

Delivery

The following Requirements must be implemented on all Lendlease operations where PVAE equipment is in use:

Operational Controls and Duties

Lendlease, as part of its Weekly, Monthly and Quarterly compliance checks will verify compliance with the contents of this requirement:

1. Daily Checks – Before daily operations commence, a competent person or trained operator must conduct and record checks of the equipment following the manufacturer's recommendations to ensure the platform is in good working order and free from visual defects and any obstructions, e.g. open windows.
2. Weekly Inspections – In addition to those items reviewed as part of a daily check, the following items must be reviewed, checked and recorded by a trained operator or other competent person on a weekly basis:
 - a. Bolted connections are secure, e.g. platform connections, mast bolts and tie fixings to building structure;
 - b. Some form of visual indication must be logged as to which ties and bolts have been checked during inspection (e.g. coloured paint, or a mark-up on a drawing if access to bolts is restricted);
 - c. All limiters and brakes are fully operational; emergency controls are not to be overridden or mechanically bypassed;
 - d. Controls including emergency stop buttons function correctly; and
 - e. Power supply and all electrical cables and connections are in good order.
3. Independent Examinations – A thorough 3rd Party/Independent Examination following the manufacturer's specifications (provided by either the manufacturer/regulator/authorised assessor) must be carried out by an engineer/competent person(s) and a certificate of examination issued when any of the following circumstances apply:
 - a. Prior to first use;

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- b. At maximum 6 monthly intervals;
 - c. In the case of Mast Climbers, after substantial on-site repair or alteration, or when a section is extended or relocated; or
 - d. If the stability of the unit has been affected.
4. Additional Measures – All persons using a PVAE must be instructed to deploy a suitable fall arrest harness and lanyard at all times. Emergency retrieval rescue procedures must be allowed for and all harnesses, lanyards and static lines must be installed and attached to one of, or a combination of the following elements:
- a. A vertical line independent to the PVAE;
 - b. An engineered anchor point or horizontal static line fabricated and certified by the manufacturer for that purpose,; or
 - c. A transportable temporary independent anchor point engineered for that purpose.



Mast climbing work platforms installed with mesh or nets to provide protection for fall of persons and materials

GMR Subsection: 4.1.3 Temporary Access Platforms

Controls: Temporary access platforms must be structurally sound, free of defects and require three points of contact to be maintained when entering and leaving the access equipment.

Performance Standards:

- i) Effective measures are to be in place for the safe erection, dismantling and use of all scaffolds, temporary works and working platforms
- ii) All scaffolds must be fit for use, all structural members free from visible defects and the erected scaffold is stable and secure to prevent movement or collapse. Scaffolds must be plumb, have adequate cross-bracing, sound footings and be tied into the structure when the height/base ratio is greater than 2:1.
- iii) The use of A-frame scaffolds above two levels (i.e. two levels of A-frame but only a single above ground working platform) for the purposes of façade scaffolding, blockwork or other means is not permitted as it cannot be erected or dismantled in a safe manner to meet the GMRs.
- iv) Working platforms must be closely boarded or planked and free from defects. Remove any damaged boards or planks, debris, materials and waste from scaffolds as soon as it is practicable.
- v) Guard rails, mid-rails and toe boards must be installed on all open sides of platforms representing a fall risk.
- vi) The use of ladders for work at height must be minimised by effective work planning and using safer means of access consistent with the hierarchy of risk control (e.g. MEWPs, scissor lifts, scaffold towers, podium steps and working platforms). Custom-built timber ladders made on site without appropriate tread are not permitted to be used. All stair treads shall be assessed for anti-slip surfaces.
- vii) Maintain three points of contact at all times including when entering and leaving access equipment and when using a ladder to prevent exposure to a fall.
- viii) Climbing up the outside of a scaffold is prohibited.

Scaffolds – General Requirements

Definition:

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Competent	“Competent” shall be defined as an experienced person meeting local legislative requirements and demonstrating acceptable behaviours. - In countries where there is no local legislative requirement, “Competent” shall be defined as a person who has previous “hands on” scaffolding experience and demonstrates an acceptable level of understanding and behaviour. - Competent inspectors shall be defined as an experienced person within the field who has the authority to close a scaffold and/or understand and authorise alterations or improvements. - Traditional steel frame-type scaffold systems are prohibited to be used on all Lendlease operations as it cannot be erected or dismantled safely as per GMR requirements.
Fixed Scaffold	- Proprietary systems (Wedglock, Cuplock, Ringlock) - Tube and fitting
Mobile Scaffold	- Aluminium modular (maximum height of 8m to top deck) - Tube and fitting (maximum height of 8m to top deck)

Methodology

- All scaffold structure requirements on Lendlease operations including approved system/s, advanced elements, design, work method and certification criteria, worker qualification standards, etc. shall be clearly defined and recorded in the Height Mitigation Plan (HMP).
- Scaffold structures higher than 30m, drop scaffolds, spurs, struts, scaffolds built on needles (including needles) and any scaffold based support structure i.e. false work, shall be designed by a structural engineer meeting local legislative requirements.
- Scaffold structures that are PE designed are to have design plans attached to the SWMS when submitted to Lendlease for review and approval.
- Scaffold structure shall comply with the highest of local codes, manufacturer’s instructions, design requirements, Lendlease Asia Scaffold Minimum Standard v4 and this GMR.
- At no time is it permitted to mix and match scaffold proprietary system components.
- Erection, alteration and dismantling of scaffolds shall be subject to a permit to work system.
- A scaffold must be constructed on grounds, structures or foundations of adequate strength and stability.
- All structural members of a scaffold including any component thereof must be:
 - Of sound material, good construction and adequate strength;
 - Free from patent defects; and
 - Suitable and safe for the purpose for which it is intended.
- All boards, planks or decking used in the construction of a scaffold work platform must be:
 - Of uniform thickness;
 - Capable of supporting the load for which it is designed and intended;
 - Flushed along their lengths and firmly secured; and
 - Of non-skid surface.

Delivery

- Toe boards and guardrails shall be placed on the inside of the uprights and firmly secured to prevent accidental displacement.
- Free standing scaffolds must not exceed the maximum top deck height of 2 times the minimum base dimension.
- Buttress and rakers are permitted to achieve a higher free stand (max. height to top deck of 8m). Refer to Lendlease Asia Scaffold Minimum Standard v4.
- Working decks must be fully and closely planked with top and mid rails and toe boards installed to any edge exposed to the risk of fall of persons or materials (applicable as a minimum to all exposed edges more than 150mm from a full and substantial face).
- All external scaffolds higher than 4m or any scaffold where there is a risk of materials falling over the toe boards must have shade cloth/netting installed within the structure on all external faces and ends that achieves FULL coverage.
- All vertical components shall be plumb, and all horizontal components shall be level.
- When outriggers are used the maximum height to top deck is restricted to 5m.

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FACE & MOBILE SCAFFOLD

Delivery

1. Face and/or mobile scaffolds shall be erected, modified and dismantled by competent and experienced personnel (meeting local legislative requirements/Lendlease Asia Scaffold Minimum Standard v4) with the following key points:
 - a. Work within the structure OF ALL SYSTEMS at all times.
 - b. [For proprietary systems](#) – work off a fully planked and railed deck OR off 2 planks supported within the structure by hop-ups, and be no higher than 1m from that full deck, maintaining the higher ledger (in front) at waist height.
 - c. [For tube & fitting scaffold and all approved mobile systems](#) – work off a fully planked and railed deck OR with a safety harness used in restraint (stand on the top rail), and be less than 1m from the full deck, maintaining the higher ledger at waist height.
 - d. Fully plank the higher deck from below with handrails fixed in place.
 - e. Tie, brace and install access progressively.
 - f. Ascend and descend work decks via completed access bays only OR for mobiles, via the internal access ladder.



Face scaffold along perimeter of building fully planked, with handrails, bracings, toe boards and compliant stair access, and fully netted



Example of a proprietary mobile scaffold tower with guardrails, toe boards, internal ladder installed at an angle and locked castors.

BIRDCAGE & FALSEWORK

Delivery

1. Birdcage and false work structures shall be erected, modified and dismantled (as per local codes/Lendlease Asia Scaffold Minimum Standard v4/ manufacturer's instructions) by competent and experienced personnel meeting local legislative requirements.
2. The following are mandatory procedural minimum standards to be achieved or exceeded AND verified within the Country Operation Manager's review:
 - Work within the structure on a minimum of 3 secured boards (or 600mm minimum) - walking along tubes is strictly not permitted.
 - Install all higher deck components from below.
 - Ascend and descend between lifts via adequate, compliant and progressively built access bay/s i.e. stairs, ramp or ladder.
 - Wear a safety harness and maintain 100% tie-off where a fall hazard exists and whenever there is a risk of injury from falls.

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Birdcage scaffold using proprietary scaffold system



Birdcage scaffold with a working deck for installation/dismantling of formwork from below

ADVANCED SCAFFOLD ELEMENTS

Methodology

1. Drop scaffold – If reasonably possible this structure shall be built from a MEWP.
2. Scaffold built on needles – If reasonably possible the base to the first ties shall be built from a MEWP. After the first line of ties is installed and safe access is established, the work method shall be in FULL compliance with the Lendlease Asia Scaffold Minimum Standard v4.



Examples of cantilevered scaffold decks



Hanging/drop scaffold

SCAFFOLD ACCESS

Delivery

1. Safe access shall be provided to all working decks within an external access bay with relief landings at every 2m (max) intervals.
2. Access shall be of adequate width capable of allowing stretcher rescue.
3. Access shall be of stairs/ramp types. Where this is not possible due to room constraints or for mobile scaffolds, the access is permitted to be provided via internal ladders and the void in deck protected with a gate, hatch OR rails.
4. Internal ladders used shall be positioned at an angle of 75% (ratio of 1:4) and will have rungs not exceeding 300mm apart and stiles not exceeding 480mm apart.
5. Ladders shall be manufactured heavy duty type (with approved manufacturer mark or stamp) that forms part of the scaffold system. **The following access ladders are strictly NOT permitted to be used on Lendlease operations:**
 - Home-made or factory-made types that do not have approved manufacturer mark or stamp
 - Custom-built timber ladders made on site without appropriate treads
6. Ladders must extend sufficiently (at least 1 metre) above the stepping-off point.

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7. Ascending and descending scaffold decks must be from within the designated access only. Climbing the outside face of the scaffold, or any horizontal members that form part of the scaffold, i.e. ledger or transom, is strictly prohibited.
8. All stair treads shall be assessed for anti-slip surfaces.



Examples of proper scaffold access with handrails, toe boards and relief landing at every 2m; access with adequate width to allow stretcher rescue



Pre-fabricated stair access platform

INSPECTION & TAGGING

Delivery

1. All scaffold components must be inspected and damaged components immediately removed from site.
2. No scaffold must be used unless it has been inspected and certified fit for purpose/safe for use within 7 days immediately preceding the use of the scaffold.
3. Upon completion of installation and after any modification, all scaffolds must be inspected by a competent and experienced person meeting local legislative requirements.
4. Scaffolds shall be subjected to ongoing inspections at intervals not exceeding 7 days OR if exposed to the elements (e.g. after heavy rain, extreme wind, etc.) by a competent and experienced person meeting local legislative requirements.
5. All scaffolds on Lendlease operations shall be subjected to the tagging system.
6. Scaffolds under construction, modification and dismantling are to display red tags at ALL designated access points.
7. Scaffolds that are inspected and deemed fit for purpose, and open for general use, shall display a green tag at ALL designated access points.
8. A scaffold is not permitted to display both a green and red tag at the same time. Any person observing this shall immediately remove the green tag with the red tag remained.
9. Green tags shall display the following:
 - a. Name of the Lendlease operation
 - b. Location of scaffold
 - c. Date of initial and ongoing inspections
 - d. Name of inspectors against the respective date of inspection
 - e. Safe Working Load (SWL)

SAFE USE OF SCAFFOLD

Delivery

1. Only scaffolds that are fit for purpose and tagged safe for use (green tag) are to be used.
2. Prior to commencing work, personnel working from scaffolds shall conduct a basic inspection on a daily basis. Any concerns must be reported to the supervisor immediately.

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3. Mobile scaffolds are restricted to operating on level concrete or steel surfaces, and NOT closer than 3m (or more based on risk assessment dependent on scaffold height) to an additional unprotected or inadequately protected fall hazard.
4. Mobile scaffolds are to be fitted with lockable castors that must be locked at all times except during movement for positioning.
5. No person is permitted to remain on a mobile scaffold while it is moved.
6. Scaffold frames (ledgers, transoms, guardrails, ties, etc.) are strictly not to be used as material storage structures unless specifically designed as part of an engineered solution to the structure by a competent engineer.
7. Scaffold decks must be kept clean and free of debris or material build up.
8. Unauthorised modification or removal of any scaffold component is strictly prohibited.
9. Scaffolds must not be overloaded.
10. 100% fall restraint tie-off must be maintained when partially breaching handrails.
11. Ladders or makeshift devices used on top of working platforms to increase the height are prohibited.
12. Scaffold decks shall be ascended and descended from within the designated access only.
13. Scaffold frames that are horizontally affixed with pipes to form a ladder access are strictly not allowed.

Ladders

Methodology

1. The use of ladders, step ladders and extension ladders shall primarily be restricted to access only.
2. Ladders, step ladders and extension ladders can only be considered for a place of work if all of the following requirements are met:
 - a. All other safer alternatives i.e. MEWP, mobile scaffold, platform steps, podium steps, etc. have been considered and deemed "not reasonable and practicable";
 - b. The task is of a light nature, non-repetitive and short duration (i.e. less than 10 minutes) and three points of contact will be maintained;
 - c. The ladder will not be used closer than 3m to an additional unprotected fall hazard i.e. penetrations to have compliant penetration covers in place and edges are to have floor to ceiling protection; and
 - d. SMWS has been reviewed and agreed.
3. Ladders used on all Lendlease operations must meet the following conditions:
 - a. To be of manufactured heavy duty type (with approved manufacturer mark or stamp). Home-made or factory-made types without approved mark or stamp are strictly NOT permitted.
 - b. Fitted with rubber grips
 - c. Double rivets or screwed



Delivery

1. When used for access, ladders shall be inclined at an angle of 75° and extend a minimum of 1m past the deck or landing being ascended.
2. Ladders shall be secured both top and bottom or held (buddy system) to prevent instability.
3. Only non-conductive ladders (i.e. fibreglass) shall be used in a live switch room or in any location near to any electrical hazard.
4. Ladders must not be subjected to any side loading.
5. Ladders are to be used on level substantial surfaces only.
6. All ladders shall be inspected and tagged prior to first use on site and monthly thereafter by a competent person.

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Examples of podium steps as a safer alternative to ladders



Platform ladders



Fixed ladders only for access



7. Common types of ladders:

a. Fixed Ladder

- Fixed ladders shall not exceed 4m in height
- Only 1 person may use at any one time (separate provision must be made for carrying materials or equipment)

b. Platform Ladder

- Fitted with a locking bar that prevents the two legs spreading past safe operation point as per the manufacturer's recommendation
- When fully closed and vertical, the step ladder shall not exceed 4m in height
- Fully open with locking bar extended when in use
- Worker's feet shall not use the top 1m (top platform and 2 highest rungs) of the ladder

c. Podium Ladder

- Never remove components from the ladder/steps.
- Ensure stabilisers are used and in the correct position.
- Securely lock all the castors when stationary and before using the podium steps.
- Never lean anything against the podium step e.g. ladders, steps or materials.

GMR Subsection: 4.1.4 Management of Penetrations, Risers and Shafts

Controls: Effective measures must be in place to prevent the fall of people or materials down penetrations, risers and shafts.

Performance Standards:

- Construct all lift and elevator shafts to physically protect both those carrying out the construction and those below carrying out the lift installation. Provide safe working platforms for all those working in lift shafts.
- Fully protect openings to lift shafts with a secure full height system that prevents unauthorised entry and the risk of falls of people or materials. Shaft opening protection must remain in place until a safe working platform is provided or the lift doors are in place.

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- iii) Check penetrations and risers have either a structural mesh cast in during construction or are fitted with other protection such as metal guard rails or covers.
- iv) All floor openings and pit covers are to be mechanically fixed (i.e. screwed or bolted, not nailed) and have clearly labelled covers. Covers must be constructed to minimise the risk of a trip hazard.
- v) All covers to floor openings and pits are to have adequate load bearing where the cover is to be subjected to mobile plant or other significant loads other than people.
- vi) Remove protective measures only when work is taking place in the opening and prevent the potential fall of a person or fall of material whilst the work is taking place and replace the protective measures when work is completed.
- vii) Permanent balustrades or fencing around voids in public areas must be climb resistant (e.g. with top rails angled away from the void or similar).
- viii) Climable material or equipment must not be placed within 1m/3.3ft of the balustrade or fencing, unless the balustrade or fencing is extended in height to account for the material or equipment in close proximity.
- ix) Physical barriers must be in place to prevent persons falling into exposed holes or excavations as a result of piling operations.

General Requirements

Methodology

Penetrations in Vertical Elements	Penetration Size	Steel Mesh: Min. 50 x 50 x 5mm	Penetration Cover: 18mm (min) HD ply, or equivalent
	≤ 400mm		✓
	400mm to 2150mm	✓	✓
	Lift shaft openings	Full height lockable gate with full coverage of 50mm x 50mm (max) steel mesh.	
	> 2150mm	Edge protection capable of withstanding a force of 0.445kN at any part of system complete with toe boards that effectively prevent the fall of materials.	
Penetrations in Horizontal Elements	Penetration Size	Mesh: Min. 50 x 50 x 5mm steel mesh	Penetration Cover: 6mm steel plate, or 18mm (min) HD ply, or equivalent
	≤ 200mm x 200mm formed/cut/cored	Implement best protection based on risk assessment	
	200mm x 200mm to 600mm x 600mm formed or cut	✓	✓
	600mm x 600mm to 1000mm x 1000mm formed or cut	✓	✓ (Double sheet)
	> 1000mm x 1000mm formed or cut	Edge protection capable of withstanding a force of 0.445kN at any part of system complete with toe boards that effectively prevent the fall of materials. Note: Best practice to include the construction of upstands or kerbs around penetrations as an additional form of protection against vehicular traffic.	
	Note: Penetration protection intended as trafficable for vehicles/equipment must be engineered solutions with PE design and endorsement.		
1. Shaft openings must be protected by a full height lockable gate secured to allow the installation of lift doors prior to dismantling. A full coverage of 50mm x 50mm (max.) mesh shall be the minimum standard for the gate system to ensure fall of people and material into the shaft is prevented 2. The opening of the gate and access to shafts MUST be fully restricted and a method of sign in/out established so that at any time Lendlease are aware who is operating in the shaft.			

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Delivery

1. Install robust guardrails across the shaft opening as an additional protection to personnel for when gates are opened.
2. All gates must be locked and the release of keys controlled and aligned with the permit and sign-in/sign-out process.
3. Opening of the gates and/or working in any shaft requires a PtW to be approved by Lendlease after verifying that all conditions of the permit are complied with.
4. Personnel operating within lift shafts must be provided with safe access and egress and as far as practicable, a fully boarded work platform with robust edge protection to prevent the risk of falls of persons or materials e.g. scaffold, suspended deck or false car, etc.



Full-height lockable gate system for lift shaft management



Lift shaft provided with an exclusion zone, locked gates and guardrails across the shaft opening



Work platform or elevator false car with guardrails provides safe work environment for installers within elevator shaft

Penetrations

Methodology

1. Construction plans shall include the mesh details required for penetrations.
2. Penetration covers that are to be installed in areas with exposure to traffic, e.g. MEWPs, shall be engineered to withstand both the dead and live loads imposed.
3. Other means of protection provided can include hard barricades to prevent access by equipment.

Delivery

1. After concrete is cast, all floor penetrations must be protected with robust covers to prevent the fall of materials or persons through them. Covers shall be constructed so that they do not present a tripping hazard.
2. All penetration covers shall be mechanically fixed and firmly secured (screwed or bolted NOT nailed) so as to prevent dislodgment and/or easy removal.
3. Penetration covers are to have the words "HOLE BELOW - DO NOT REMOVE" painted on. Site shall assess and decide on relevant languages.
4. Hard edge protection shall be a top rail at 1200mm with a mid-rail at half the height of the top rail and a 150mm (min. height) toe board.

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Installation shall ensure capability of withstanding a minimum force of 0.445kN applied to any part of the system. This protection is to be located so that any permanent protection offered can be installed prior to dismantle

5. A PtW is required to be approved by Lendlease prior to any coring or cutting through concrete floors OR cutting out the mesh.
6. All penetration protection systems must be inspected in the weekly site review walk. Non-compliance and actions are to be recorded and closed out.



Services riser opening protected with 1.2m high 18mm protective board



Large penetration protected with full height robust fence



Mesh installed prior to slab casting



Medium penetration mesh cast in with secured cover on top

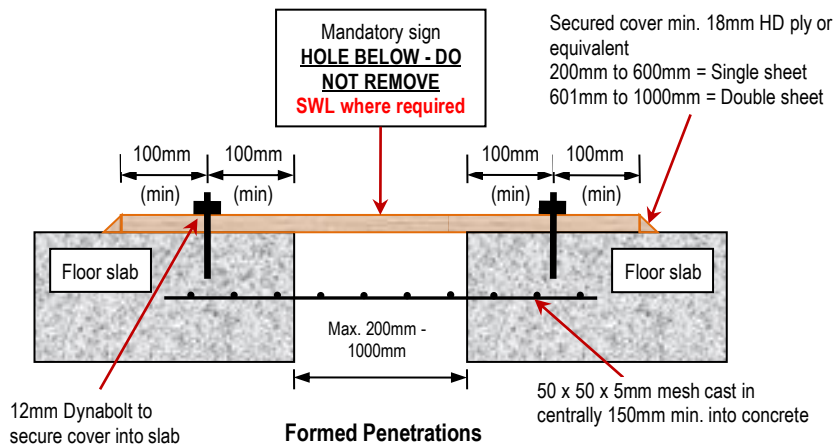


Examples of floor penetration covers firmly secured

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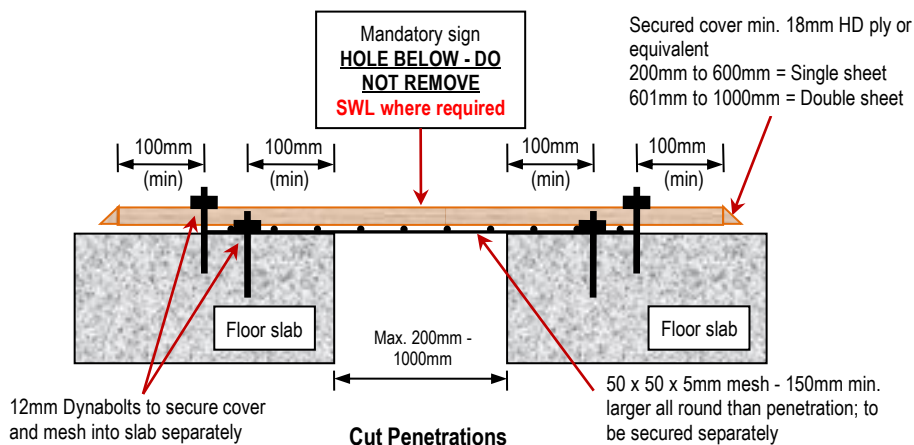
Lendlease Penetration Protection in Horizontal Elements

Do not store / move material or equipment over penetration protection without the endorsed design from an engineer



Lendlease Penetration Protection in Horizontal Elements

Do not store / move material or equipment over penetration protection without the endorsed design from an engineer



Lendlease “Cantilevered” Penetrations against Walls

A structural engineer must design the size and spacing of timbers, steel and bolts (vary with opening sizes)

The diagram illustrates a cross-section of a wall and floor slab. A horizontal timber beam is shown cantilevered against the wall. A mesh is cast into the floor slab, and a cover is secured over the mesh. A mandatory sign is placed above the timber beam. Dimensions for the mesh and cover are provided.

Mandatory sign
HOLE BELOW - DO NOT REMOVE
SWL where required

Secured cover min. 18mm HD ply or equivalent
200mm to 600mm = Single sheet
601mm to 1000mm = Double sheet

100mm (min) 100mm (min)

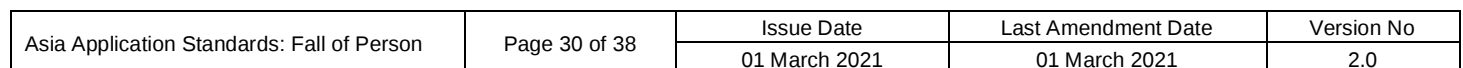
50 x 50mm timber secured all round onto cover

12mm Dynabolts to secure cover into slab
Note: secure on 3 sides

50 x 50 x 5mm mesh cast in centrally 150mm min. into concrete
Note: cast in 3 sides

Formed Penetrations

A structural engineer must design the size and spacing of timbers, steel and bolts (vary with opening sizes)

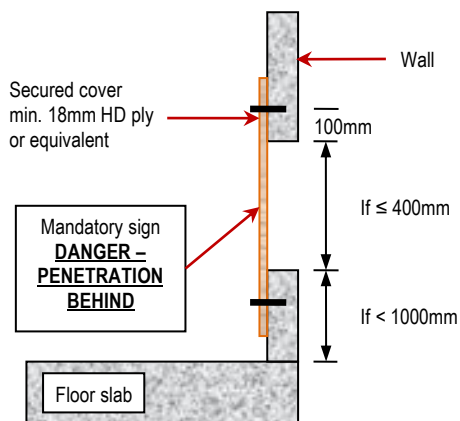


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Lendlease Penetration Protection in Vertical Elements

Bottom of penetration is < 1000mm from floor.
Height of penetration is ≤ 400mm.

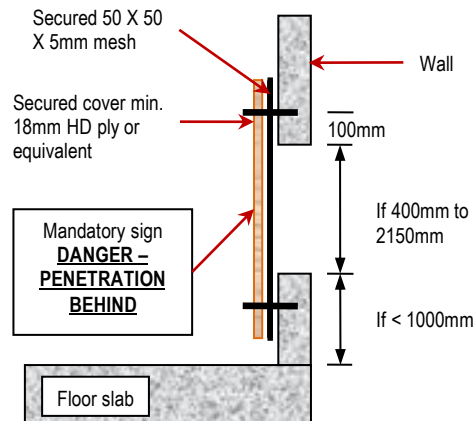
Cut Penetrations



Lendlease Penetration Protection in Vertical Elements

Bottom of penetration is < 1000mm from floor.
Height of penetration is > 1000mm.

Cut Penetrations

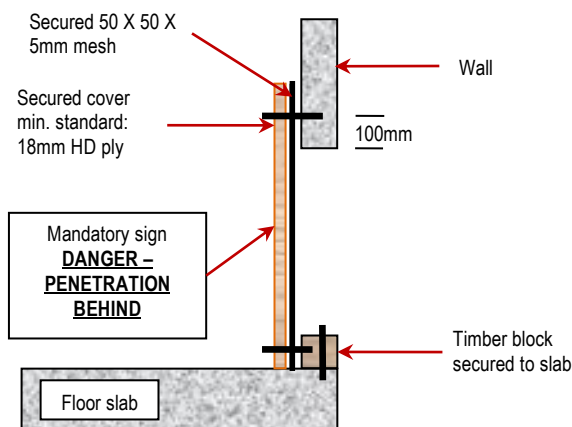


Note: Fall protection shall be provided prior to cutting and are to remain until the service has been installed or the penetration filled or covered.

Lendlease Penetration Protection in Vertical Elements

For Lift Shaft openings: Full height lockable gates may be used once formwork is totally stripped

Formed Penetrations



Note: Fall protection shall be provided prior to cutting and are to remain until the service has been installed or the penetration filled or covered.

REMOVAL OF PENETRATION COVER

Delivery

1. Penetration covers are to be removed just before the installation of the service.
2. As far as reasonably practicable penetrations are to have mesh cast in as per this GMR.
3. Cutting of mesh will require prior Lendlease approval via PTW for Concrete Coring and Cutting. Fall protection shall be installed prior to mesh cut-out.
 - Whenever possible leave mesh in position (in these situations initially install galvanised mesh)

ASIA APPLICATION STANDARDS

- Cut mesh immediately prior to installation of service
- If there is the need to cut mesh 250mm square or more, provide in this preference order:
 - a. Protection barrier (hard protection and toe boards) to prevent a person or materials from falling
 - b. A catch deck
 - c. A fall restraint system



Hard rails and toe boards installed before cutting out mesh



Mesh cut just enough to fit riser

Excavation/Exposed Holes

Methodology

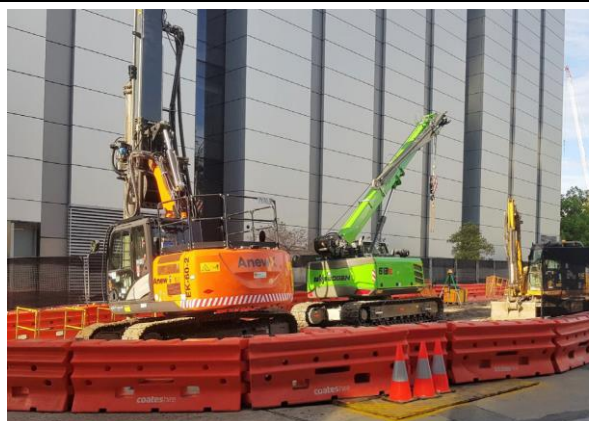
1. Construction method statements for excavations or piling operations shall include erection of physical barriers to prevent persons falling in.

Delivery

1. When excavation works or piling operations is in progress, an exclusion zone must be set up to restrict access to the works location.
2. Physical barriers shall be erected to ensure no persons can fall into the excavation or pile bore hole.
3. Hard edge protection shall be a top rail at 1200mm with a mid-rail at half the height of the top rail.
4. Installation shall ensure capability of withstanding a minimum force of 0.445kN applied to any part of the system. This protection is to be located so that any permanent protection offered can be installed prior to dismantle.
5. All edge protection systems must be inspected in the weekly site review walk. Non-compliance and actions are to be recorded and closed out.
6. Any barriers removed for the purpose of progressing the work shall be reinstated and made safe as soon as possible.
7. Other suitable fall prevention measures shall be in place when barriers are removed during work.



Excavation edge protection barriers



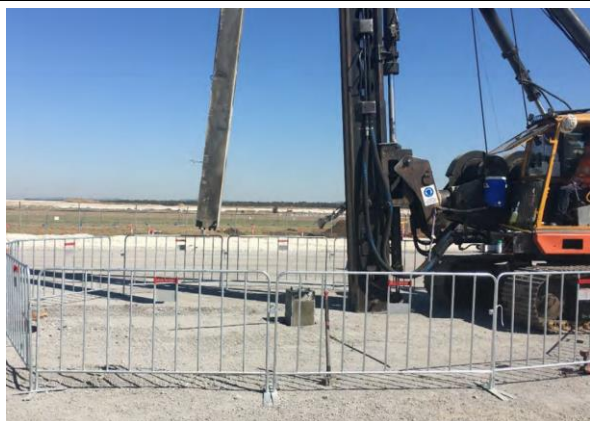
Barriers provide exclusion zone to piling work area

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Fences installed to act as exclusion zone barriers during boring works



Extended pile casing to offer fall protection



Prefabricated work platform with guardrails used for casting of bored piles

GMR Subsection: 4.1.5 Use of a Safety Harness

Controls: Any safety harness in use must be an approved type with fit for purpose anchor points.

Performance Standards:

- i) A safety harness must not be used as a primary means of fall prevention unless required for maintenance of assets, plant or equipment where physical barriers have not been installed. In these circumstances where a harness is being used as the primary means of falls prevention a full body safety harness must be used to provide either fall restraint (preferred) or fall arrest (least preferred) protection. If a full body safety harness is being used as the primary means of fall protection verification of competency in use is required.
- ii) Any safety harness in use must be attached to an appropriate anchor/tie-off point(s) by means of a compatible connector that provides either sufficient fall restraint protection or incorporates a decelerator to provide appropriate fall restraint/arrest. All of these components must be fit for purpose, properly inspected, tested, tagged and maintained in line with the manufacturer's guidelines or related standards and be used only by a person with the proof of competency to do so.
- iii) Any construction activity requiring the use of a safety harness as the primary means of fall prevention must have approval from the Region Head of Health & Safety.
- iv) Workers wearing a safety harness must be attached to a loadbearing element or structure through an approved anchor or tie-off point(s) installed by a person with qualifications or proof of competency per the manufacturer's specification and installation requirements.
- v) As part of the approval process, the design of the system and its load bearing adequacy (of the anchor/tie-off point) must be verified by a qualified independent engineer, consistent with GMR4.9 and an emergency fall arrest retrieval plan must be in place.
- vi) Approval must also verify the fall arrest system has a compatible twin or y-shaped lanyard and energy absorber to provide appropriate fall arrest protection. Workers using a safety harness as a primary means of fall protection must remain attached to the loadbearing element or structure at all times and must never remove both tails of the lanyard at any time.
- vii) Where a safety harness is configured to either fall arrest or fall restraint the related free fall distance and potential for the pendulum effect must be reviewed as part of the approval for use and the safety harness.

General Requirements

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Methodology		
1. A strict LoA is associated with any task requiring worker/s to wear a safety harness as primary fall protection. The LoA has been imposed to ensure maximum influence is exerted and that the highest operation level reasonably and practically possible is achieved. Compliance with the requirements of this LoA is mandatory – no exceptions!		
No person/s shall be permitted to work relying on a safety harness to provide primary fall protection without the prior written approval of the Lendlease Head of EH&S, Asia (alternate: Head of EHS Assurance, Asia) and Regional Operations Director, Asia, unless the activity is an authorised Lendlease exemption (see exemptions below).		
Exemptions from LoA	Country Operations Manager	Project Level SWMS approval process
Competent scaffolder (meeting local legislative requirements) performing scaffold works as per Lendlease Asia Scaffold Minimum Standard v4.		✓
Competent scaffolder (meeting local legislative requirements) performing scaffold advanced works (refer to GMR 4.1.3 for definition) – Drop / hanging scaffold, scaffold built on needles.	✓	
Competent erector (meeting local legislative requirements) erecting or dismantling a tower crane.	✓	
Competent erector (meeting local legislative requirements) erecting or dismantling a piling rig.		✓
Demolition activities where a leading edge is created from the actual demolition process.	✓	
Work on a completed roof where a parapet or other alternative edge protection, with a minimum height of 1.2m, was not installed or not part of the design.	✓	
Working above plant and services where scaffold, scissor lifts, etc. cannot be used due to tight room constraints.	✓	
Installation of handrails to a permanent staircase.		✓
Working on a loading platform where the length of load requires the end gates to be open.		✓
Working in partial breach of primary edge protection.	✓	
2. A safety harness cannot be considered for used as primary fall protection unless the following conditions have been fully met (use of harness as primary fall protection is by exception only):		
a. <u>All</u> other reasonable and practicable options to provide adequate fall prevention at a higher level have been reviewed and eliminated;		
b. The review and assessment have been confirmed by the relevant LoA and the SWMS procedure approved; and		
c. Conditions of Permit for works at height have been verified as fully complied with and the permit signed by the Lendlease Team Leader.		
3. The definition for the use of a harness to provide primary fall protection is as follows:		
a. SWMS must give clear definition of how a harness will be used and mention anchor ratings, approvals and permits required; and		
b. All tasks that employ a safety harness as primary protection must have a detailed rescue plan integrated within the SWMS.		
4. Definition of partial breach:		
a. Feet or buttocks are to remain on deck behind guardrails AT ALL TIMES; and		
b. Mandatory 100% tie-off to be maintained.		
5. Where safety harnesses are used, the following requirements must be complied with:		
a. The anchor point must be designed and checked in advance of any operative needing to use a harness as the primary means of fall prevention;		
b. All anchor points must be clearly identified and marked as a harness anchor point and be inspected before use in addition to a thorough examination by an independent professional engineer annually;		
c. The use of these systems is to be limited to specifically trained personnel, working in pairs;		
d. Before any works commence, emergency recovery plans must be in place, including the ability to communicate the need for rescue; and		
e. All harnesses must be inspected and tagged monthly and stored and hung in accordance with manufacturers requirements.		
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Delivery				
Definition	Shock Absorber	Minimum Anchor Rating	Mandatory Requirement	Example
FALL RESTRAINT Safe environment provided but with partial breach	YES or NO Either are ok	6kN	Harness to be set up and tied off to ensure that full breach is not possible.	
TRAVEL RESTRAINT Worker is exposed to an unprotected edge with a fall risk	NO	6kN	Harness to be set up and tied off to ensure that the worker's elbows cannot breach the edge.	
SECONDARY ARREST Worker is exposed to an unprotected edge with a fall risk	YES	15kN	Safety net or airbags, etc. to be installed below work area in a manner that would adequately arrest any fall prior to the safety harness being deployed.	
PRIMARY ARREST Worker is exposed to the risk of falling	YES	15kN	Environment shall allow for full deployment of shock absorber without worker striking any obstacle or ground.	
Safety Harness - Harnesses must be of "full body type" and provide support for the body across the lower chest (a chest strap), over the shoulders and around the thighs when a tensile load is applied to the fall arrest attachment element. - Harnesses, when properly fitted and used, must be able to prevent fallout. - The fall arrest attachment must be located at the back position except for special circumstances (e.g. confined space or vertical access to tower cranes where access does not prevent falls >2m) where a different harness is required that has the fall arrest attachment in the front. - Harnesses must display a regulatory agency certification (e.g. CE Label) and be capable of withstanding 15 kN (min.) tensile load. - Harnesses must be fitted with suspension trauma straps.				

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Lanyard and Shock Absorber

1. Lanyards must be double-type and constructed of a flexible line of rope or strap connected to or incorporating a shock absorbing component either as part of the lanyard or lanyard attachment system.
2. Lanyards must display a regulatory agency certification (e.g. CE Label) and be capable of withstanding 15 kN (min.) tensile load.



Connectors

1. All connectors (such as locking karabiners, self-locking snap hooks) must be equipped with self-closing, self-locking gates which remain closed and locked until intentionally unlocked and opened for connection or disconnection. They must be capable of being opened ONLY by at least two consecutive deliberate actions.
2. Tie-off must require the hook to be fully closed around the anchor.
3. Connectors must be stamped with a regulatory agency certification verifying capability to withstand 15 kN (min.) force without breaking or distorting.



Inspection and Maintenance of Safety Harness

Delivery

1. All Lendlease operations must establish and implement an effective maintenance programme to periodically inspect and maintain both operational and safety fall prevention/protection equipment in good working condition.
 - a. Every safety harness and all associated ancillary equipment (i.e. lanyards, shock absorber, hooks, etc.) must be inspected by a competent person prior to being first used on site.
 - b. All harnesses must be subjected to daily inspections by the user and ongoing periodic inspections by a competent person at intervals not exceeding one month.
 - c. Harnesses in use must be verified as fit for purpose by displaying the current Lendlease monthly inspection label.
2. An up to date inspection and maintenance inventory must be maintained and made available upon request.

Instruction and Training

Delivery

1. Persons working at height who are exposed to the risk of falling must be provided with sufficient and adequate information, instruction and training so that they have the skill and knowledge to perform the work safely. These must include as a minimum:
 - a. The nature of fall hazards to which the operatives are exposed;
 - b. The risk of injury associated with the task;
 - c. The control measures that are needed, including safe work procedures and the use of personal protective equipment;
 - d. The proper usage and maintenance of equipment; and
 - e. Procedures to follow in the event of an emergency such as rescue, accident, or injury.
2. Formal training and instruction must be provided for all personnel required to use individual fall prevention or arrest systems. This training must occur at the time of initial site induction. As a minimum the training will cover (Region to regulate):
 - a. Daily self-inspection of equipment;
 - b. Proper fitting and wearing;
 - c. Use and maintenance, care and storage of equipment;
 - d. Correct anchorage including maintaining 100% tie-off with two lanyards; and
 - e. Emergency rescue procedures including management of Suspension Trauma.

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GMR Subsection: 4.1.6 Secondary Fall Protection

Controls: Secondary fall arrest measures must be in place where the fall of person risk exists.

Performance Standards:

- i) Any work at height where all work faces cannot be enclosed must have in place a horizontal catch net (e.g. a diaper net, catch fan, horizontally projecting net or any other structurally designed element) as a secondary measure to prevent a fall of person risk. Where work is conducted outside of the building envelope (e.g. where a person is positioned in an articulated MEWP basket beyond the building envelope and the MEWP is positioned to within 3m/9.8ft of the edge and is perpendicular to the edge) measures must be implemented to prevent both the MEWP and the person from falling (e.g. tethering the MEWP back to the structure using an engineered tie or using engineered wheel stops). All people working in the basket are to be harnessed to the MEWP at all times.
- ii) Fall protection netting must always be a minimum of one bay ahead of the area of work with the exception of the last bay when edge protection has already been fitted.
- iii) A safety harness in use as a primary means of fall protection must be fitted with suspension trauma straps.

General Requirements

Delivery

1. All works at height where enclosure and containment cannot be effectively implemented must have a secondary fall prevention measure, i.e. horizontal catch net/deck (e.g. a diaper net, catch fan, horizontally projecting net, etc.) in place. These must be structurally designed by a qualified engineer.
2. Fall protection netting must be at least one bay (min.) ahead of the work area.
3. All works at height conducted from a MEWP must have measures in place to prevent the risk of fall to both the operative and the MEWP (e.g. tethering the MEWP back to the structure using an engineered tie, using engineered wheel stops, etc.).
4. All persons working in the basket of a MEWP are to be harnessed to the MEWP at all times.
5. Safety harnesses used as a primary means of fall protection must be fitted with suspension trauma straps.



Perimeter protection and safety nets provided prior to roofing works commencing

GMR Subsection: 4.1.7 Rescue Procedures

Controls: Rescue procedures must be in place before work commences for the recovery of any fall of person and arrest/suspension in a harness or in netting.

Performance Standards:

- i) Rescue and recovery protocols must be in place to recover any person who has fallen into a secondary fall protection element (e.g. horizontal netting or catch fan).
- ii) For all circumstances where a safety harness is in use and configured to either fall arrest or fall restraint a recovery plan must be established that addresses the requirement to reach any person suspended promptly (within 10 minutes) to minimise the risk of death from suspension trauma and that the rescue team are trained in dealing with suspension trauma.

General Requirements

Methodology

1. All works at height where the potential risk of fall of persons exist must have detailed rescue procedures in place as part of the SWMS.

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2. As a minimum, the procedures will include recovery of persons who have fallen into a secondary fall protection element (e.g. horizontal netting, catch deck/fan, etc.) or suspended from a fall arrest harness/equipment.
3. Rescue plans must detail the recovery of any person suspended from an arrest equipment promptly (within 10 minutes) to minimise the risk of death from suspension trauma.
4. Rescue teams must have undergone an approved training programme (meeting local legislative requirements) and certified competent in rescue procedures including dealing with suspension trauma.



Height rescue kit



Suspension trauma relief straps



Height rescue training



Height rescue operation

Note:

- This Application Standards provide guidance that meets the GMR requirements.
- The requirements should be implemented across projects to ensure that projects comply with GMR and reduce risks associated with the works.
- If site conditions require changes to proposed standards, please consult your project EHS leads and/or Country EHS managers and/or Regional EHS team to confirm the intent of the GMRs are still met.

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