

Worker Welfare and Occupational Health Assurance in Extended-Hours and Night Work on A Saudi Cultural Quarter Development

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Abstract—Large cultural-quarter developments in Saudi Arabia may combine heritage-sensitive construction, multiple contractor interfaces, demanding schedules, and work performed during evening or night hours. These arrangements can reduce daytime heat exposure or public disruption, but may introduce fatigue, circadian disruption, reduced visibility, transport risks, and barriers to accessing health and welfare services. This paper develops an evidence-informed framework for assuring worker welfare and occupational health when extended-hours and night work are used on a Saudi cultural-quarter development. A targeted, non-systematic synthesis of Saudi regulatory material, international construction-safety guidance, fatigue literature, and Saudi construction heat-stress research informed six assurance pillars: legal and contractual governance; work-time and fatigue control; night-specific engineering; accessible occupational health and welfare; worker voice and fair treatment; and performance assurance through leading indicators and learning. The paper provides a risk register, implementation roadmap, and monitoring dashboard. It does not report project-level primary data or claim to assess the performance of a named development. The proposed framework should be validated against the current Saudi legal requirements and tested prospectively using project-specific data.

Index Terms—worker welfare, occupational health, night work, extended working hours, construction safety, fatigue risk management, Saudi Arabia, cultural-quarter development, contractor governance, heat stress.

I. INTRODUCTION

Cultural-quarter developments are complex socio-technical projects that may combine new construction, adaptive reuse, public realm, utilities, landscape, specialist finishes, and visitor-facing interfaces. Work packages often operate concurrently under tight

programme constraints. Night shifts may be used to limit public disruption, manage interfaces, or recover schedule; in Saudi Arabia, moving selected tasks away from peak daytime heat may also be beneficial. Yet changing the clock does not remove risk: the timing, duration, rotation, and predictability of work influence alertness, sleep, injury exposure, access to services, and family life.

Long working hours are associated with important health risks. WHO and ILO reported that working 55 or more hours per week is associated with higher risks of ischemic heart disease and stroke than working 35–40 hours per week (WHO & ILO, 2021). A systematic review of non-standard working-time arrangements found that most included studies reported increased safety-incident risk during or after night shifts, although certainty was limited by heterogeneity (Moen et al., 2025). Construction fatigue reviews similarly identify the need for prevention, evaluation, and intervention rather than relying only on individual awareness (Zong et al., 2024).

Worker welfare therefore cannot be reduced to personal protective equipment or induction records. Workers need genuine breaks, potable water, sanitation, safe transport, accessible medical support, understandable instructions, and a confidential route for reporting fatigue or unsafe schedules without retaliation. These protections depend on coordination among the project owner, principal contractor, subcontractors, labour suppliers, occupational-health providers, and transport teams.

II. APPROACH AND SCOPE

This is a targeted, non-systematic conceptual review, not a registered systematic review or empirical case study. Publicly available Saudi government material,

ILO/WHO/NIOSH guidance, and peer-reviewed research on work schedules, fatigue, construction safety, and heat exposure were synthesized thematically. Sources were grouped into regulatory requirements, exposure pathways, welfare-service access, and management-system controls. No exhaustive database search, formal risk-of-bias assessment, meta-analysis, or primary data collection was conducted.

The phrase “cultural-quarter development” is generic. No site name, workforce size, roster, incident record, contract structure, or worker survey was supplied. Recommendations are planning controls, not findings about a specific project. Legal applicability must be checked against the current official Arabic text and the worker categories concerned.

III. EVIDENCE BASE AND SAUDI CONTEXT

A. Fatigue, night work, and visibility

Fatigue can impair attention, reaction time, memory, and judgment. Risk accumulates when long shifts, consecutive nights, quick returns, heavy work, long commutes, or unplanned extensions reduce recovery. NIOSH identifies non-standard schedules, long hours, stress, demanding work, and hot environments as fatigue contributors (CDC/NIOSH, 2026). Night work additionally overlaps with the biological night, while daytime sleep may be shortened by daylight, noise, heat, or household demands. Poor temporary lighting, glare, deep shadows, and plant-pedestrian conflicts can compound the risk.

B. Heat exposure in Saudi construction

Saudi field research has assessed construction-worker heat stress, workload, hydration, and kidney-health risks in hot conditions (Al-Bouwarthan et al., 2019; 2020). These studies do not estimate risk at every project, but support integrating environmental monitoring, workload, hydration, acclimatization, recovery areas, and medical response. Night work may reduce direct solar exposure but does not guarantee safe conditions: heat may remain in concrete, paving, equipment, or enclosed spaces, and humidity can constrain evaporative cooling.

C. Selected legal and policy requirements

The summary below is an operational orientation, not legal advice. Saudi requirements may vary by worker

category, approval, sector, and amendment. A controlled legal register should state the official source, effective date, applicability, owner, and evidence of compliance.

MHRSD’s night-work page lists implementation from 5 October 2026; the project should verify the currently operative text and implementing guidance.

Table 1. Selected Saudi requirements and project implications

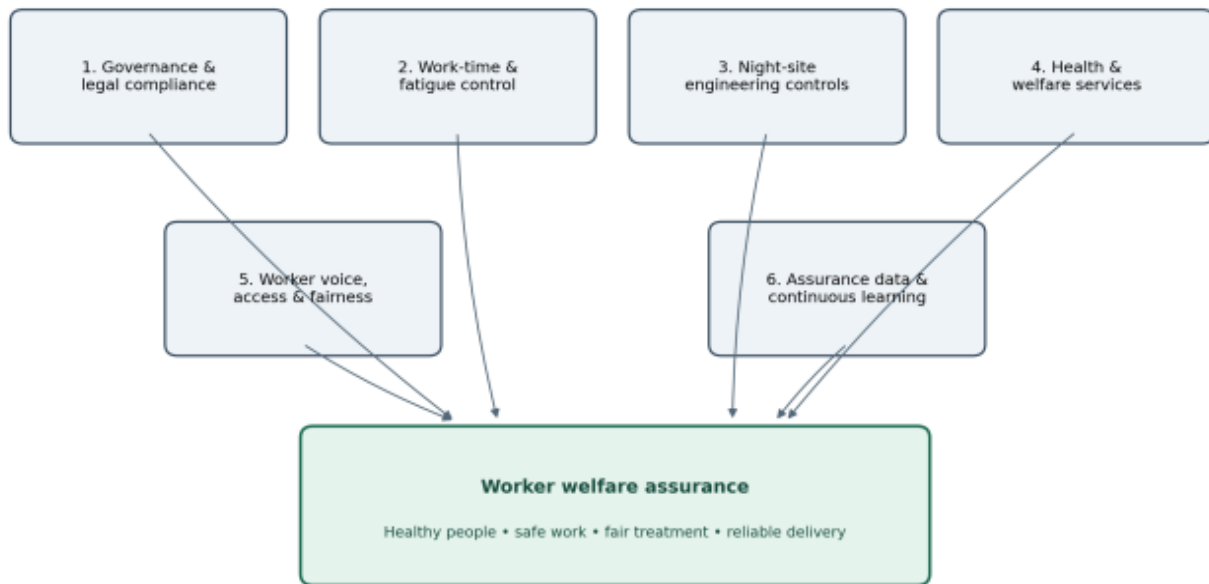
Topic source	Requirement indicated by official source	Assurance response
Working hours, Labour Law Art. 98	Generally, up to 8 actual hours/day or 48/week; Ramadan provisions apply to Muslim workers.	Reconcile actual hours, rosters, access records, and payroll.
Shift work, Art. 100	Approved shift arrangements may use averaging subject to specified limits and Ministry approval.	Verify approval and calculate averages using individual records.
Breaks, Arts. 101–102	Rest, prayer, and meal breaks are required; limits apply to consecutive work and daily workplace presence.	Ensure breaks are practical, uninterrupted, and supported by nearby facilities.
Overtime, Art. 107	Overtime compensation is hourly wage plus 50% of basic wage; applicable compensatory leave requires worker consent.	Record hours and approval; audit payroll and explain entitlements accessibly.
Night work, MHRSD Decision 18632	MHRSD defines night work as 23:00–06:00 and addresses health services and medical suitability.	Confirm current legal scope; provide confidential health assessment and reassignment process.
Midday outdoor work	Seasonal direct-sunlight prohibition is announced by MHRSD; dates vary by official notice.	Verify dates annually and maintain heat controls beyond the legal minimum.

IV. INTEGRATED WORKER WELFARE ASSURANCE FRAMEWORK

The framework contains six mutually reinforcing pillars. Its purpose is to make welfare commitments

auditable and to prevent gaps at contractor, shift, and workplace boundaries. A roster can be technically compliant yet unsafe if transport delays recovery, welfare facilities are inaccessible at night, or supervisors cannot replace a fatigued operator.

Integrated Worker Welfare and Night-Work Assurance Framework



4.1 Six assurance pillars

1. Governance and legal compliance.

Set a project-wide minimum standard, maintain a legal register, flow requirements into contracts, assign named owners, and authorize high-risk night tasks only after a documented risk assessment.

2. Work-time and fatigue control.

Review actual hours, consecutive nights, quick returns, overtime, commute duration, task intensity, and recovery. Control unplanned extensions and empower supervisors to pause or reassign work.

3. Night-specific engineering.

Use task-specific lighting; control glare and shadows; segregate pedestrians and plant; test emergency lighting; provide reliable communications; and define environmental stop-work triggers.

4. Occupational health and welfare.

Provide night-capable first aid, clinical referral, potable water, clean toilets, handwashing, rest areas,

safe food access where applicable, and transport aligned to actual shift end.

5. Worker voice and fair treatment.

Use multilingual briefings, confidential reporting, anti-retaliation safeguards, worker representation, and equal minimum protections for direct, subcontracted, and labour-supplied workers.

6. Assurance data and learning.

Track leading indicators, investigate high-potential near misses, review patterns by shift and task, protect medical privacy, and verify that corrective actions work in the field.

V. RISK REGISTER FOR EXTENDED-HOURS AND NIGHT WORK

The register below is a starting template, not a substitute for site-specific assessment. Ratings and stop-work triggers must be set using the project's approved matrix, task, location, environmental

conditions, workforce, and credible worst-case outcomes. Each risk should have an owner, verification method, and corrective-action deadline.

Table 2. Illustrative risk register and assurance response

Hazard exposure	Potential harm	Core controls
Long shifts, overtime, quick returns	Fatigue, errors, injury, poor recovery	Roster controls; actual-hours checks; approved extensions; breaks; safe transport.
Poor lighting, glare, shadows	Trips, falls, lifting or plant errors	Task lighting plan; pre-shift checks; emergency lighting; reflective barriers.
Plant-pedestrian interface	Collision or crush injury	Physical segregation; controlled crossings; speed control; reduce reversing; trained banksmen where required.
Residual heat / humidity / workload	Heat illness, dehydration, kidney stress	Environmental monitoring; water; acclimatization; workload and rest adjustment; cooling and emergency response.
Delayed medical access	Worsened injury or illness	Night-capable first aid; referral pathway; clear ambulance access; emergency drills.

Night work should not be treated as available programme capacity until staffing, competent supervision, lighting, medical cover, welfare facilities, transport, and recovery arrangements are confirmed. Schedule changes should trigger a fresh risk review, not merely a revised shift roster.

VI. IMPLEMENTATION AND MONITORING

Table 3. Phased implementation roadmap

Phase	Key actions	Readiness evidence
Legal and mobilization	Confirm current legal requirements; map contractor tiers; set minimum welfare standard and named owners.	Approved legal register; contract clauses; responsibility matrix.

Baseline and roster design	Compare day/night risks; review hours, commute, recovery, heat, lighting, and emergency access.	Task risk assessments; roster review; documented rationale for night work.
Welfare readiness	Verify medical coverage, referral, water, sanitation, rest, transport, reporting routes, and language access.	On-shift field verification; tested emergency and grievance pathways.
Controlled pilot	Pilot selected work packages; observe work; collect worker feedback; review hours and near misses.	Pilot review; corrective actions closed before scaling.

6.1 Performance dashboard

Table 4. Suggested leading and lagging indicators

Indicator	Management response
Actual-hours capture	Reconcile roster, access, and payroll records.
Roster exceptions	Address recurring schedule and staffing causes.
Break and welfare access	Relocate or increase facilities; review workload and supervision.
Night-work readiness	Pause tasks with missing critical controls.
Medical access	Adjust staffing, transport, and emergency arrangements.
Worker concerns	Escalate overdue high-risk cases and check for retaliation.

VII. DISCUSSION

7.1 Welfare as a production-control issue

The framework positions welfare as part of reliable production control. Water, rest, safe transport, clear instructions, medical access, and worker voice determine whether safety controls can be used in practice.

A rest area that is too distant, a clinic that is unavailable at night, or a reporting channel workers fear using represents a functional control failure.

Project owners should price these requirements into contracts and change control rather than expect contractors to absorb them without resources.

7.2 Avoiding the “night work solves heat” fallacy

Night work can reduce direct solar exposure, but it does not eliminate heat retained in surfaces or enclosed spaces and may add circadian, visibility, transport, and service-access risks. The correct decision compares task-specific total risk and considers alternatives such as redesign, prefabrication, sequencing, or controlled daytime work. Schedule recovery through additional shifts should include staffing, competence, supervision, emergency coverage, and cumulative recovery—not only expected output.

7.3 Data, fairness, and privacy

Assurance should not rely only on injury rates, which may be statistically unstable and influenced by reporting culture. Leading indicators should be triangulated with field observations, confidential worker feedback, payroll reconciliation, health-service access, and contractor audits. Medical data should remain clinically controlled; management dashboards should use aggregated, de-identified measures. Fatigue reports should trigger a system review, not automatic discipline or loss of earnings.

VIII. LIMITATIONS AND FUTURE RESEARCH

This is a targeted narrative synthesis rather than a systematic review; no exhaustive search, formal evidence grading, or meta-analysis was conducted. Much of the general working-time evidence comes from mixed occupations, while Saudi construction studies primarily address heat exposure. No project-specific workforce, incident, roster, payroll, or welfare data were available. The framework therefore does not estimate effectiveness or establish legal compliance at any named site.

Future studies should test the framework prospectively using shift-level hours, roster patterns, environmental measures, near misses, health-service access, worker interviews, and anonymous welfare surveys. Analyses should account for task, workload, contractor, experience, commute, season, and reporting culture. Ethical review and worker consultation are necessary when health or employment records are involved.

IX. CONCLUSION

Extended-hours and night work on a Saudi cultural-quarter development should be managed as a combined scheduling, engineering, occupational-health, welfare, and governance challenge. The six-pillar framework provides an auditable starting point: avoid unnecessary extended work; verify actual hours and recovery; authorize night tasks through specific risk assessment; provide accessible medical and welfare services; protect worker voice; and learn from leading indicators and incidents. The next step is to validate current Saudi requirements, baseline the actual work system, pilot the controls, and evaluate outcomes transparently. Project performance claims should be made only after appropriate data are collected and analyzed.

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