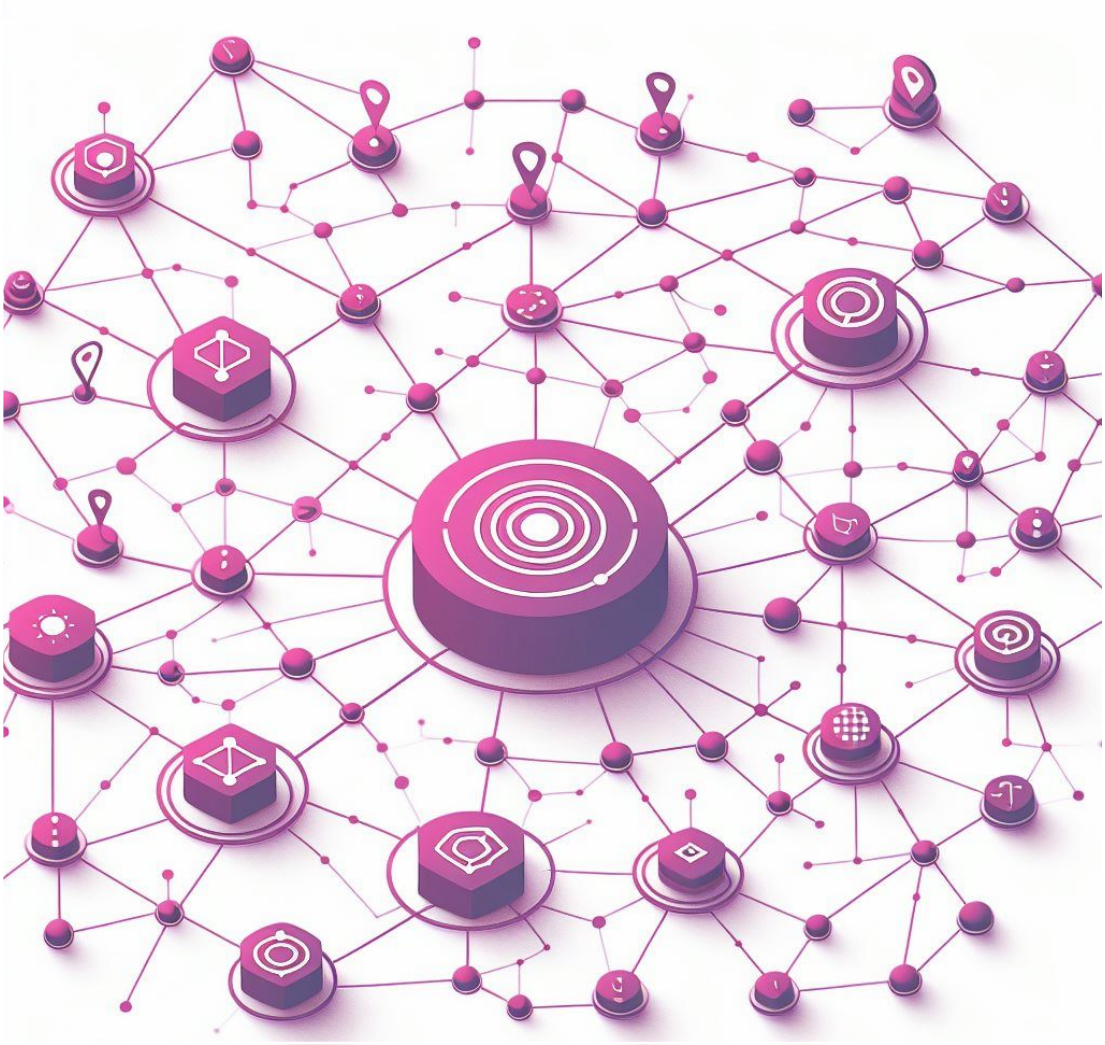
SITE MANAGEMENT DATA STANDARDS

For Data-Driven Project Performance Monitoring and Benchmarking



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Disclaimer

This Guide is a summary of site management data standards that may be adopted for the application of using digital platforms for project performance monitoring and benchmarking and does not purport to be exhaustive or applicable to all situations.

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This Guide may be amended from time to time. Please refer to the website of the Building and Construction Authority: www.bca.gov.sg for the latest version of this Guide.

Feedback

This Guide will be updated progressively from the Pre-release Edition published on 17 April 2024.

We welcome your comments about the Data Standards to help us continue to develop and improve it.

Please provide your inputs at https://go.gov.sg/datastd-feedback or scan the QR code on the right.

https://go.gov.sg/datastd-feedback

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Infocomm Media Development Authority (IMDA)

Intercorp Solutions Pte Ltd

Jurong Town Corporation (JTC)

Land Transport Authority (LTA)

Ministry of Manpower (MOM)

Novade Solutions Pte Ltd

Precise Development Pte Ltd

Real Estate Developers' Association of Singapore (REDAS)

SoilBuild Group Holdings Ltd

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TABLE OF CONTENTS

SECTION 1

INTRODUCTION

More regulators, clients and contractors are stepping up efforts to unlock the usefulness of data captured in different digital platforms or solutions used by construction projects. Establishing a set of industry-wide data standards is the key to consolidate these data to achieve data-driven decision-making (see figure 1).

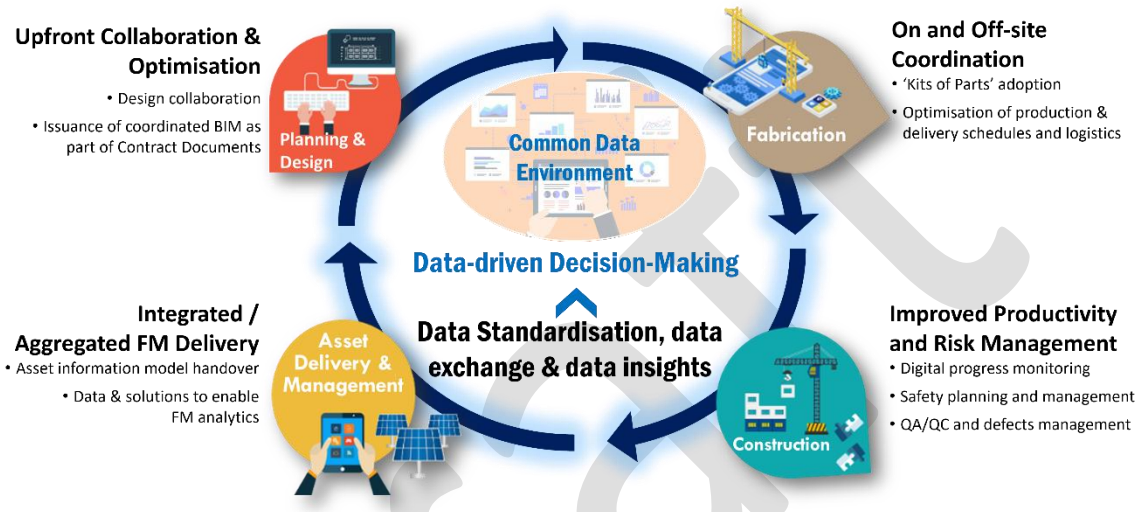

Figure 1: Harness Data for Better Decision-Making

Today, collection and management data from multiple sources is time consuming and error prone process due to a lack of data standardisation. As a result, project stakeholders are unable to utilise these data to monitor project health and performance. Firstly, contractors have to manually prepare different reports to meet regulatory and client's requirements. They also struggle to efficiently utilise project data scattered across multiple sources for effective project management. Secondly, reports received by regulators and clients from various contractors are predominantly descriptive and presented in diverse formats that are unsuitable for machine processing. This complicates the generation of insights and the performance of industry-level benchmarking.

SECTION 2

OBJECTIVES

The site management data standardisation effort is a crucial step forward in addressing the challenges faced by the industry in harnessing data locked in multiple digital platforms or solutions.

The standards aim to consolidate the data collected from respective digital platforms or solutions into a central location, known as Common Data Environment (CDE). This allows data flow across multiple digital platforms / solutions and stakeholders using common Application Programming Interfaces (APIs) that comply with site management data standards. This will enable various stakeholders to effectively utilise project data, and apply data analytics to make well-informed decisions, leading to more effective project performance monitoring and benchmarking (see figure 2).

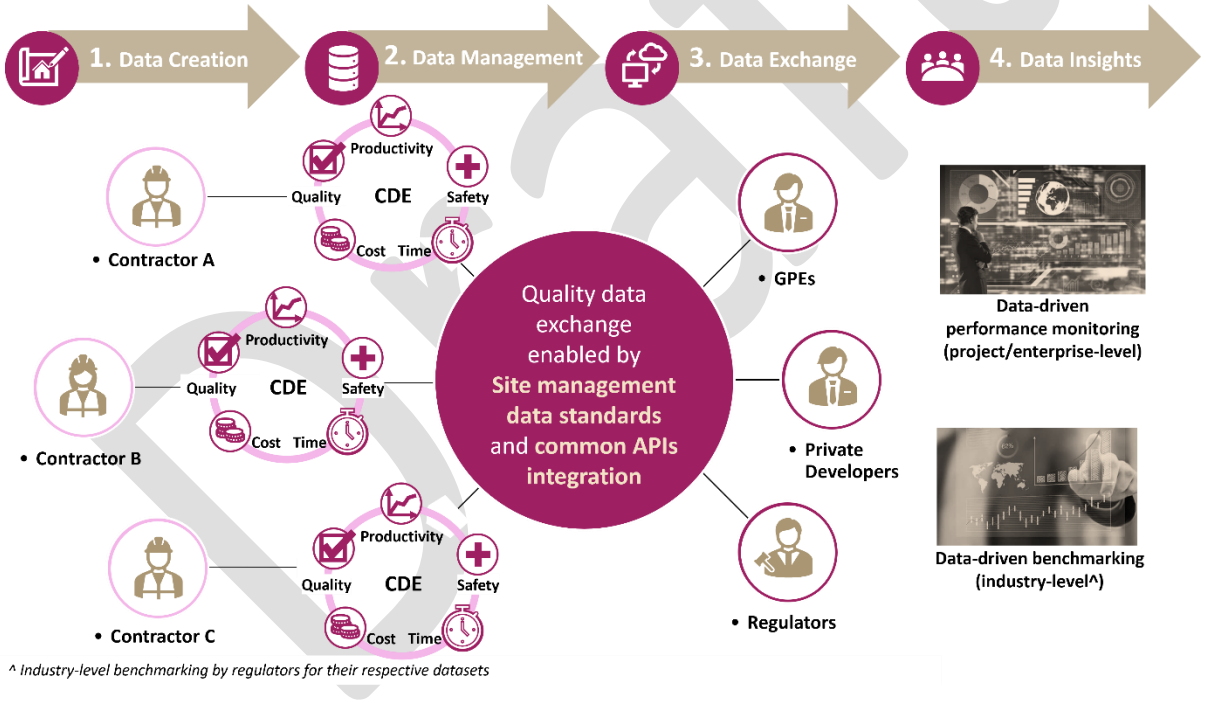

Figure 2: Data-driven Project Performance Monitoring and Benchmarking

SECTION 3

SITE MANAGEMENT DATA STANDARDS

Site management data standards cover safety, productivity, quality, time and cost data (see figure 3) from both regulatory and project delivery perspectives.

	Site Management Data Standards				
	Safety (Pre-release)	**Productivity** (Pre-release)	**Quality** (Next Release)	**Time** (Next Release)	**Cost** (Next Release)
Regulatory Data Requirements	Workplace Safety and Health	Construction Productivity	CONQUAS	*Not required by regulators*	
	Structural Safety				
Project Delivery Data Requirements	Public/Private-sector Clients & Contractors				

Figure 3: Site Management Data Standards

3.1 Safety Data Standardisation

The section describes the recommended data standardisation requirements for safety data in Appendix A. It aims to ensure consistency, accuracy, and interoperability in collecting, exchanging and analysing the root causes and trends of safety issues on construction sites from the following WSH and structural safety data with examples of performance metrics in table 1 and table 2 respectively.

Table 1 - Workplace Safety and Health (WSH)

Report/Dataset	Metric
Safety Accident/ Incident Report Incident Investigation	• Accident Frequency Rate (AFR) • Accident Severity Rate (ASR) • Workplace Injury Rate (WIR) • No. of safety accidents reported • No. of safety incidents by project • Root Causes
Safety Inspection Report (Non-Conformity Report (NCR)/Site Safety Inspection Negative Observation)	• No. of safety non-conformances by project • Top non- conformances highlighted by consultants /safety team • No. of non- conformances created by consultants and contractor management/safety team

	• No. of various types of safety non-conformances • No. of safety non- conformances based on trades • No. of safety non-conformances based on subcontractors • Outstanding/overdue non-compliance (>3 days) by project • Outstanding/overdue non-compliance (>7 days) by project
Site Safety Inspection Positive Observation	Nil
e-Permit to Work (PTW)	• No. of PTWs issued by project • No. of types of PTW

Table 2 - Structural Safety

Report/Dataset	Metric
Site Inspection & Approval Records (ERSS Annex C-1)	• No. of deviations from approved plan • Percentage completion of ERSS works (by stage) • No. outstanding ERSS works not yet inspected/approved
Certification & Monitoring Building Settlement (Annex D)	• Maximum building settlement • No. of building settlement that exceed design limits • No. of outstanding Annex D yet to be filled
Concrete Cube Test	• No. of satisfactory/unsatisfactory cube tests • Strength of concrete over time • No. of cube tests carried out • Strength of concrete by supplier • No. outstanding rectification works
Failure Notification Module	• No. of critical issues
Instrumentation & Monitoring Records	• No. of readings/instruments that exceed alert level (AL) • No. of readings/instruments that exceed Work Suspension Level (WSL) or Predetermined Level (PDL) • Change in instrument readings over time • No. of outstanding rectification works
Mass Engineered Timber (MET) Test Results	• No. of satisfactory/unsatisfactory MET tests • No. of MET tests carried out by type • Strength of MET element • Strength of MET element by supplier • No. of outstanding rectification works
Pile Load Test Record	• No. of satisfactory/unsatisfactory pile load test • No. of pile load tests carried out by type

	• No. of pile load tests that confirmed pile design
Piling Installation Record	• Percentage of type of pile use • Total number of piles • No. of piles installed • No. of short piles • Piling progress
Project Progress	• Demolition works progress • Piling works progress • Basement/substructure works progress • Superstructure works progress • Percentage progress of works by type • Percentage progress of works over time, by type
QP Attendance	• No. of times QP visits site • Percentage of purpose of QP's visit • Duration of QP's visit
Site Investigation Report	• No. of boreholes drilled • Location of boreholes drilled • Details of soil boring log • Test results of soil samples
Steel Strength Report	• No. of satisfactory/unsatisfactory steel tests • No. of steel tests carried out by type • Strength of steel element • Strength of steel element by supplier • No. of outstanding rectification works

SECTION 3

3.2 Productivity Data Standardisation

The section describes the recommended data standardisation requirement for manpower utilisation in Appendix B. It aims to establish and uniform methods for collecting and analysing productivity data derived from the following manpower utilisation data in table 3. The data described in this section has been incorporated into the existing Electronic Productivity Submission System (ePSS) templates for mandatory submissions[1].

Table 3 – Manpower Utilisation

Report/Dataset	Metric
Manpower utilisation aggregated data as per required under ePSS templates	• Total manpower (mandays) by project • Total manpower by trade • Total manpower by subcontractor • No. of unique count of workers by project[2] • No. of unique count of workers by trade by project[3]

3.3 Quality Data Standardisation (Next Release)

3.4 Time Data Standardisation (Next Release)

3.5 Cost Data Standardisation (Next Release)

1 Submission is mandatory for all Building works that involves a Gross Floor Area (or increase in Gross Floor Area for A&A works) of 5,000 m2, except the following:

- Any culvert, bridge, underpass, tunnel, earth retaining or stabilizing structure, slipway, dock, wharf or jetty;
- Any theme park;
- Any place of worship;
- Any power station; or
- Any waste processing or treatment places.

[2] This is applicable to Building works as described under Footnote (1).

[3] This is applicable to Building works as described under Footnote (1).

SECTION 4

CONCLUSION

Site management data standards would lay the critical foundation for the transformation of the industry into data-driven decision-making in the digital future, where stakeholders can rely on data analytics and insights to make near real-time and informed decisions to uplift performance at project and enterprise level.

Appendix A – Safety Datasets

Non-Conformity Report (NCR)/ Site Safety Inspection Negative Observation

Data Field	Definition	Mandatory/ Optional	Data Field Type	Data Validation Rule - Format
Report Identification Number	Report unique serial number generated by site management platform	Mandatory	string	
Report Date Time	Report submission date and time	Mandatory	date	YYYY-MM-DD
Report Revision	Report revision, starting value to be 1 and subsequent revision to be incremental by 1	Mandatory	int8	Minimum value = 1
Safety Inspection Observed Date/ Time	Date and time when safety inspection is observed	Mandatory	date-time	YYYYMMDD HH:MM:SS
Safety Inspection Trade	Trade relating to the safety inspection (for HDB), as per HDB reference guide (e.g. A1, B3, C5)	Optional	string	Min characters = 3, Max characters = 4, Range: A.1-A,6, B.1-B.17, C.1-C.15, D.1-D.7
Project Reference Number	Project Building Plan (BP) number issued by URA (e.g. A1234-12345-2022)	Mandatory	string	
Project Name	Project name or development name	Mandatory	string	
Location Gridline	Location (where safety inspection is observed) gridlines as per working drawings	Optional	string	
Location Zone	Location (where safety inspection is observed) zone as per working drawings	Optional	string	
Location Block	Location (where safety inspection is observed) block number	Optional	string	
Location Storey	Location (where safety inspection is observed) storey number	Optional	string	
Location Unit	Location (where safety inspection is observed) unit number	Optional	string	

Location Area	Location (where safety inspection is observed) area [Selection: 1 - Carpark; 2 - Bathroom; 3 - Balcony; 4 - Bedroom; 5 - Living Room; 6 - Kitchen; 7 - Others]	Optional	int8	Minimum value = 1, Max value = 7
Location Area Others	Description of other location area [Free Text description, mandatory when Others is selected]	Optional	string	loc_area_others = NOT NULL, IF loc_area = 7
Reporter Company Name	Reporter (of safety inspection) company name as in ACRA	Mandatory	string	
Reporter Company UEN	Reporter (of safety inspection) company Unique Entity Number	Mandatory	string	Min characters = 9 Alpha Numerics, Max characters = 10 Alpha Numerics
Reporter Personnel Name	Reporter (of safety inspection) personnel name as in NRIC or FIN	Mandatory	string	
Reporter Personnel Role	Reporter (of safety inspection) role or designation [Selection: 1 - Consultant Project Manager 2 - Contractor Project Manager 3 - Workplace Safety and Health Officer 4 - Workplace Safety and Health Coordinator 5 - Workplace Safety and Health Supervisor 6 - Site Engineer 7 - Site Supervisor 8 - Environmental Control Officer 9 - Resident Technical Officer 10 - Resident Engineer]	Optional	int8	Minimum value = 1, Max value = 10
Inspector Company Name	Inspector (of safety inspection) company name as in ACRA	Mandatory	string	
Inspector Company UEN	Inspector (of safety inspection) company Unique Entity Number	Mandatory	string	Min characters = 9 Alpha Numerics, Max characters = 10 Alpha Numerics

Inspector Personnel Name	Inspector (of safety inspection) personnel name as in NRIC or FIN	Mandatory	string	
Inspector Personnel Role	Inspector (of safety inspection) role or designation [Selection: 1 - Consultant Project Manager 2 - Contractor Project Manager 3 - Workplace Safety and Health Officer 4 - Workplace Safety and Health Coordinator 5 - Workplace Safety and Health Supervisor 6 - Site Engineer 7 - Site Supervisor 8 - Environmental Control Officer 9 - Resident Technical Officer 10 - Resident Engineer]	Optional	int8	Minimum value = 1, Max value = 10
Contractor Company Name	Contractor (of safety inspection) company name as in ACRA	Mandatory	string	
Contractor Company UEN	Contractor (of safety inspection) company Unique Entity Number	Mandatory	string	Min characters = 9 Alpha Numerics, Max characters = 10 Alpha Numerics
Contractor Personnel Name	Contractor (of safety inspection) personnel name as in NRIC or FIN	Optional	string	
Contractor Personnel Role	Contractor (of safety inspection) role or designation [Selection: 1 - Consultant Project Manager 2 - Contractor Project Manager 3 - Workplace Safety and Health Officer 4 - Workplace Safety and Health Coordinator 5 - Workplace Safety and Health Supervisor 6 - Site Engineer 7 - Site Supervisor 8 - Environmental Control Officer 9 - Resident Technical Officer 10 - Resident Engineer]	Optional	int8	Minimum value = 1, Max value = 10

Rectifier Company Name	Rectifier (of safety inspection) company name as in ACRA	Optional	string	rectifier_coy_nm = NOT NULL if no_rectification_performed = True
Rectifier Company UEN	Rectifier (of safety inspection) company Unique Entity Number	Optional	string	Min characters = 9 Alpha Numerics, Max characters = 10 Alpha Numerics
Rectifier Personnel Name	Rectifier (of safety inspection) personnel name as in NRIC or FIN	Optional	string	rectifier_personnel_nm = NOT NULL if no_rectification_performed = True
Rectifier Personnel Role	Rectifier (of safety inspection) role or designation [Selection: 1 - Consultant Project Manager 2 - Contractor Project Manager 3 - Workplace Safety and Health Officer 4 - Workplace Safety and Health Coordinator 5 - Workplace Safety and Health Supervisor 6 - Site Engineer 7 - Site Supervisor 8 - Environmental Control Officer 9 - Resident Technical Officer 10 - Resident Engineer]	Optional	int8	Minimum value = 1, Max value = 10 rectifier_personnel role = NOT NULL if no_rectification_performed = True
Verifier Company Name	Verifier (of safety inspection) company name as in ACRA	Optional	string	verifier_coy_nm = NOT NULL if nc_rectification_performed = True
Verifier Company UEN	Verifier (of safety inspection) company Unique Entity Number	Optional	string	Min characters = 9 Alpha Numerics, Max characters = 10 Alpha Numerics
Verifier Personnel Name	Verifier (of safety inspection) personnel name as in NRIC or FIN	Optional	string	verifier_personnel_nm = NOT NULL if no_rectification_performed = True
Verifier Personnel Role	Verifier (of safety inspection) role or designation [Selection: 1 - Consultant Project Manager	Optional	int8	Minimum value = 1, Max value = 10

	2 - Contractor Project Manager 3 - Workplace Safety and Health Officer 4 - Workplace Safety and Health Coordinator 5 - Workplace Safety and Health Supervisor 6 - Site Engineer 7 - Site Supervisor 8 - Environmental Control Officer 9 - Resident Technical Officer 10 - Resident Engineer]			verifier_personnel_role = NOT NULL if no_rectification_performed = True
Approver Company Name	Approver (of safety inspection) company name as in ACRA	Optional	string	Approver_coy_nm = NOT NULL if nc_rectification_performed = True
Approver Company UEN	Approver (of safety inspection) company Unique Entity Number	Optional	string	Min characters = 9 Alpha Numerics, Max characters = 10 Alpha Numerics
Approver Personnel Name	Approver (of safety inspection) personnel name as in NRIC or FIN	Optional	string	Approver_personnel_nm = NOT NULL if no_rectification_performed = True
Approver Personnel Role	Approver (of safety inspection) role or designation [Selection: 1 - Consultant Project Manager 2 - Contractor Project Manager 3 - Workplace Safety and Health Officer 4 - Workplace Safety and Health Coordinator 5 - Workplace Safety and Health Supervisor 6 - Site Engineer 7 - Site Supervisor 8 - Environmental Control Officer 9 - Resident Technical Officer 10 - Resident Engineer]	Optional	int8	Minimum value = 1, Max value = 10 Approver_personnel_role = NOT NULL if no_rectification_performed = True
Negative Observation Type	Negative Observation Type (required for submission to HDB) [Selection: 1 - Non-Compliance	Optional	int8	Minimum value = 1, Max value = 2

	2 - Near Miss (observation of an unplanned event that did not result in any injury, illness or damage, but had the potential to do so)			
Negative Observation Classification	Classification of negative observation [Selection: 1 - Work-At-Height Provison; 2 - Falling Objects Provison; 3 - Moving Objects Provision; 4 - Housekeeping; 5 - Professional Enginner (PE) Design Provision; 6 - Lifting Operations/Equipment Compliance; 7 - Electrical Appliances/System Compliance; 8 - Fire Extinguisher Provision; 9 - Fire/Explosion and Hotworks Provision; 10 - Traffic/Pedestrian Safety Management; 11 - Site Entry Requirements; 12 - RAs, SWPs or PTWs Compliance; 13 - Personal Protective Equipment (PPE) Provision; 14 - Temporary Structures Provision; 15 - Machinery/Equipment Maintenance and Operations; 16 - Excavation Precaution; 17 - Hazardous Materials Provision; 18 - Environmental and Noise Control Provision; 19 - Confined Space Provision; 20 - Dangerous Operations Provision; 21 - Statutory Licenses and Certificates; 22 - Others.]	Mandatory	int8	Minimum value = 1, Max value = 22
Negative Observation Others Description	Description of negative observation [Free Text description, mandatory when Others is selected]	Optional	string	no_class_desc = NOT NULL, IF nc_class = 22
Negative Observation Severity	Severity level of negative observation [Selection: 1 - Low Risk / Minor;	Mandatory	int8	Minimum value = 1, Max value = 3

	2 - Medium Risk / Major; 3 - High Risk / Critical / Severe]			
Negative Observation Rectification Performed	Was negative observation rectification performed [True = Yes, False = No]	Mandatory	Boolean	
Negative Observation Rectification Date Time	Date and Time when negative observation is rectified	Optional	date-time	2017-07-21T17:32:28Z no_rectification_dt = NOT NULL if no_rectification_performed = True
Negative Observation Photographs Attachment	Supporting photographs of negative observation	Optional	object	
Negative Observation Photographs Attachment for Pre-Rectification	Supporting photographs of negative observation for pre-rectification	Optional	object	
Negative Observation Pre-Rectifications Photographs Attachment	Negative observation pre-rectification photographs attachment [filename with extension, maximum 10 attachments]	Optional	array	Max 10 attachments
Negative Observation Pre-Rectifications Photographs Attachment Content	Negative observation pre-rectification photographs attachment [content stored in an encoded string format, maximum 10 attachments]	Mandatory	string	

Negative Observation Pre-Rectifications Photographs Attachment Filename	Negative observation pre-rectification photographs attachment [file name stored in an encoded string format, maximum 10 attachments]	Mandatory	string	
Negative Observation Photographs Attachment for Post-Rectification	Supporting photographs of negative observation for post-rectification	Optional	object	
Negative Observation Post-Rectifications Photographs Attachment	Negative observation post-rectification photographs attachment [filename with extension, maximum 10 attachments]	Optional	array	Max 10 attachments
Negative Observation Post-Rectifications Photographs Attachment Content	Negative observation post-rectification photographs attachment [content stored in an encoded string format. maximum 10 attachments]	Mandatory	string	
Negative Observation Post-Rectifications Photographs Attachment Filename	Negative observation post-rectification photographs attachment [file name stored in an encoded string format, maximum 10 attachments]	Mandatory	string	

Site Safety Inspection Positive Observation

Data Field	Definition	Mandatory/ Optional	Data Field Type	Data Validation Rule – Format
Report Identification Number	Report unique serial number generated by site management system	Mandatory	string	
Report Date Time	Report submission date and time	Mandatory	date-time	
Report Revision	Report revision, starting value to be 1 and subsequent revision to be incremental by 1	Mandatory	int8	Minimum value = 1
Safety Inspection Observed Date/Time	Date and time when safety is observed	Mandatory	date-time	YYYYMMDD HH:MM:SS
Safety Inspection Trade	Trade relating to the safety inspection (for HDB), as per HDB reference guide (e.g. A1, B3, C5)	Optional	string	Min characters = 3, Max characters = 4, Range: A.1-A,6, B.1-B.17, C.1-C.15, D.1-D.7
Project Reference Number	Project Building Plan (BP) number issued by URA (e.g. A1234-12345-2022)	Mandatory	string	
Project Name	Project name or development name	Mandatory	string	
Location Gridline	Location (where safety inspection is observed) gridlines as per working drawings	Optional	string	
Location Zone	Location (where safety inspection is observed) zone as per working drawings	Optional	string	
Location Block	Location (where safety inspection is observed) block number	Optional	string	
Location Storey	Location (where safety inspection is observed) storey number	Optional	string	
Location Unit	Location (where safety inspection is observed) unit number	Optional	string	
Location Area	Location (where safety inspection is observed) area [Selection: 1 - Carpark; 2 - Bathroom; 3 - Balcony; 4 - Bedroom;	Optional	int8	Minimum value = 1, Max value = 7

	5 - Living Room; 6 - Kitchen; 7 - Others]			
Location Area Others	Description of other location area [Free Text description, mandatory when Others is selected]	Optional	string	loc_area_others = NOT NULL, IF loc_area = 7
Reporter Company Name	Reporter (of safety inspection) company name as in ACRA	Mandatory	string	
Reporter Company UEN	Reporter (of safety inspection) company Unique Entity Number	Mandatory	string	Min characters = 9 Alpha Numerics, Max characters = 10 Alpha Numerics
Reporter Personnel Name	Reporter (of safety inspection) personnel name as in NRIC or FIN	Mandatory	string	
Reporter Role	Reporter (of safety inspection) role or designation [Selection: 1 - Consultant Project Manager 2 - Contractor Project Manager 3 - Workplace Safety and Health Officer 4 - Workplace Safety and Health Coordinator 5 - Workplace Safety and Health Supervisor 6 - Site Engineer 7 - Site Supervisor 8 - Environmental Control Officer 9 - Resident Technical Officer 10 - Resident Engineer]	Optional	int8	Minimum value = 1, Max value = 10
Inspector Company Name	Inspector (of safety inspection) company name as in ACRA	Mandatory	string	
Inspector Company UEN	Inspector (of safety inspection) company Unique Entity Number	Mandatory	string	Min characters = 9 Alpha Numerics, Max characters = 10 Alpha Numerics
Inspector Personnel Name	Inspector (of safety inspection) personnel name as in NRIC or FIN	Mandatory	string	
Inspector Role	Inspector (of safety inspection) role or designation [Selection: 1 - Consultant Project Manager 2 - Contractor Project Manager	Optional	int8	Minimum value = 1, Max value = 10

	3 - Workplace Safety and Health Officer 4 - Workplace Safety and Health Coordinator 5 - Workplace Safety and Health Supervisor 6 - Site Engineer 7 - Site Supervisor 8 - Environmental Control Officer 9 - Resident Technical Officer 10 - Resident Engineer]			
Contractor Company Name	Contractor (of safety inspection) company name as in ACRA	Mandatory	string	
Contractor Company UEN	Contractor (of safety inspection) company Unique Entity Number	Mandatory	string	Min characters = 9 Alpha Numerics, Max characters = 10 Alpha Numerics
Contractor Personnel Name	Contractor (of safety inspection) personnel name as in NRIC or FIN	Optional	string	
Contractor Personnel Role	Contractor (of safety inspection) personnel role or designation [Selection: 1 - Consultant Project Manager 2 - Contractor Project Manager 3 - Workplace Safety and Health Officer 4 - Workplace Safety and Health Coordinator 5 - Workplace Safety and Health Supervisor 6 - Site Engineer 7 - Site Supervisor 8 - Environmental Control Officer 9 - Resident Technical Officer 10 - Resident Engineer]	Optional	int8	Minimum value = 1, Max value = 10
Positive Observation Classification	Classification of negative observation [Selection: 1 - Work-At-Height Provison; 2 - Falling Objects Provison; 3 - Moving Objects Provision; 4 - Housekeeping; 5 - Professional Enginner (PE) Design Provision;	Mandatory	int8	Minimum value = 1, Max value = 22

	6 - Lifting Operations/Equipment Compliance; 7 - Electrical Appliances/System Compliance; 8 - Fire Extinguisher Provision; 9 - Fire/Explosion and Hotworks Provision; 10 - Traffic/Pedestrian Safety Management; 11 - Site Entry Requirements; 12 - RAs, SWPs or PTWs Compliance; 13 - Personal Protective Equipment (PPE) Provision; 14 - Temporary Structures Provision; 15 - Machinery/Equipment Maintenance and Operations; 16 - Excavation Precaution; 17 - Hazardous Materials Provision; 18 - Environmental and Noise Control Provision; 19 - Confined Space Provision; 20 - Dangerous Operations Provision; 21 - Statutory Licenses and Certificates; 22 - Others]			
Positive Observation Others Description	Description of positive observation [Free Text description, mandatory when Others is selected]	Optional	string	po_class_desc = NOT NULL, IF po_class = 22
Positive Observation Attachment	Supporting photographs of positive observation	Optional	object	
Positive Observation Photographs Attachment	Positive Observation photographs attachment	Optional	array	Max 10 attachments
Positive Observation Photographs Attachment Filename	Positive Observation photographs attachment [filename with extension, maximum 10 attachments]	Mandatory	string	

Positive Observation Photographs Attachment Content	Positive Observation photographs attachment [content stored in an encoded string format, maximum 10 attachments]	Mandatory	string	

Structural Safety

- **Site Inspection & Approval Records (ERSS Annex C-1)**

Data Field	Definition	Mandatory/Optional	Data Field Type	Data Validation Rule - Format
Project Reference Number	Project Building Plan (BP) number issued by URA (e.g. A1234-12345-2022)	Mandatory	String	
Project Description	Location project name as per Building Plan (BP) (e.g. New erection of 50 Sty Mixed Commercial & Residential Building on Lot 02549N MK01 at 7 Maxwell Rd)	Mandatory	String	
Are there Geotechnical Building Works (GBW) in the project?	To define if project has Geotechnical Building Works (GBW) or not [Selection: True - Yes False - No]	Mandatory	Boolean	
Is there an Accredited Checker (AC) for this project?	To define if project has Accredited Checker or not [Selection: True - Yes False - No]	Mandatory	Boolean	
Location/Section Name	Location of ERSS works within project site (e.g. Along Grid Line 4/5 - A/C)	Mandatory	String	
Critical Construction Stage	Stage of ERSS construction [Selection: 1 - Completion of installation of embedded walls, piling or kingpost, or ground improvement 2 - At strut/support level 3 - At final excavation level 4 - Removal of strut/support/removal of wall 5 - Others]	Mandatory	Integer	Min value = 1 Max value = 5

Critical Construction Stage (Others)	Description of Critical Construction Stage if others	Optional	String	Not NULL if Critical Construction Stage = 5
Section A: Declaration by builder	Declaration by Technical Controller of Builder that ERSS has been constructed according to the approved plans and hereby seek QP(S)'s approval before proceeding with the next construction stage [Selection: True - Yes False - No]	Mandatory	Boolean	Unable to proceed with form if Declaration = 2
Name of Technical Controller	Personnel name as in NRIC or FIN	Mandatory	String	
Builder Name	Company name as in ACRA	Mandatory	String	
Builder UEN	Company Unique Entity Number	Mandatory	String	Min characters = 9, Max characters = 10 Alphas
Date of declaration by Builder	Declaration date by Builder	Mandatory	Date-Time	dd/mm/yyyy HH:MM
Section B1: Date of inspection by QP(S)	Date of inspection by QP(Supervision) for ERSS	Mandatory	Date-Time	dd/mm/yyyy HH:MM
Date of inspection by QP(Geo)(S)	Date of inspection by QP(Geo)(Supervision) for ERSS	Optional	Date-Time	dd/mm/yyyy HH:MM Not NULL if project has GBW? = 1
Status and Comments by QP(S)	Comments from inspection. To report any deviations from approved plans	Optional	String	
Status and Comments by QP(Geo)(S)	Comments from inspection. To report any deviations from approved plans	Optional	String	

Section B2: QP(S)'s and QP(Geo)(S)'s (if applicable) Assessment	QP(S)'s and QP(Geo)(S)'s (if applicable) assessment after inspection of the site and its neighbouring areas, assessment of the performance of the constructed ERSS, results of the instrumentation and monitoring readings, and actual ground conditions. [Selection: True - I am satisfied that the constructed ERSS is fully in accordance with the approved plans. I hereby grant approval for the builder to proceed to the next construction stage. I have submitted a copy of this form to QP(D), QP(D)(Geo) (if applicable), AC and AC (Geo) (if applicable) together with a copy of instrumentation and monitoring results, relevant as-built information of ERSS and actual ground condition encountered at site. (Sections C & D are not applicable) False - There are changes to the approved plan, which in my opinion do not require a re-design of ERSS. I hereby grant approval to the builder to proceed to the next construction stage subject to confirmation by QP(D)s and AC(s). (Sections C and D to be completed by QP(D), QP(D)(Geo) AC and AC(Geo) (where applicable))]	Mandatory	Boolean	Section C & D is not NULL if QP(S) & QP(Geo)(S) Assessment = 2
QP(S) Name	Name of QP (Supervision) for ERSS	Mandatory	String	
Date of assessment by QP(S)	Date-time of declaration and assessment by QP(S) for ERSS	Mandatory	Date-Time	dd/mm/yyyy HH:MM
QP(Geo)(S) Name	Name of QP (Geo)(Supervision) for ERSS	Optional	String	
Date of assessment by QP(Geo)(S)	Date-time of declaration and assessment by QP (Geo)(Supervision) for ERSS	Optional	Date-Time	dd/mm/yyyy HH:MM
Section C: QP(D) and QP(D)(Geo) (if applicable)	QP(D) and QP(D)(Geo) (if applicable) decision for a re-design of the ERSS	Optional	Boolean	Not NULL if QP(S) & QP(Geo)(S) Assessment = 2

decision after assessment and review of the adequacy of the as-installed key structural elements of the ERSS, results of instrumentation and monitoring readings, actual ground conditions and the changes highlighted by the QP(S) and QP(S)(Geo) (if applicable) and conclude that	[Selection: True - The changes do not require a re-design of the ERSS. ERSS works to the next construction stage can proceed. False - Amendment submission to BCA is required before ERSS works to the next construction stage can proceed, and no excavation is permitted.]			
QP(D) Name	Name of QP (Design) for ERSS	Optional	String	
Date of decision by QP(D)	Date-time of decision by QP(Design) for ERSS	Optional	Date-Time	dd/mm/yyyy HH:MM
QP(D)(Geo) Name	Name of QP (Design)(Geo) for ERSS	Optional	String	Not NULL if project has GBW? = 1
Date of decision by QP(D)(Geo)	Date-time of decision by QP(Design)(Geo) for ERSS	Optional	Date-Time	dd/mm/yyyy HH:MM Not NULL if project has GBW? = 1

Section D: AC and AC(Geo) (if applicable) assessment after the review of the adequacy of the as-installed key structural elements of the ERSS, results of instrumentation and monitoring readings, actual ground conditions and the QP(D)'s assessment report and concluded that	Accredited Checker (AC)'s assessment for a re-design of ERSS [Selection: True - The changes do not require a re-design of the ERSS. I agree to permit the builder to proceed ERSS works to the next construction stage. False - Amendment submission to BCA is required before ERSS works to the next construction stage can proceed, and no excavation is permitted.]	Optional	Boolean	Not NULL if QP(S) & QP(Geo)(S) Assessment = 2 & project has AC
AC Name	Name of Accredited Checker for ERSS	Optional	String	Not NULL if QP(S) & QP(Geo)(S) Assessment = 2 & project has AC
Date of assessment by AC	Date-time of assessment by Accredited Checker for ERSS	Optional	Date-Time	dd/mm/yyyy HH:MM Not NULL if QP(S) & QP(Geo)(S) Assessment = 2 & project has AC
AC(Geo) Name	Name of Accredited Checker (Geo) for ERSS	Optional	String	Not NULL if QP(S) & QP(Geo)(S) Assessment = 2 & project has AC & project is GBW? = 2
Date of assessment by AC(Geo)	Date-time of assessment by Accredited Checker (Geo) for ERSS	Optional	Date-Time	dd/mm/yyyy HH:MM Not NULL if QP(S) & QP(Geo)(S) Assessment = 2 & project has AC & project is GBW? = 2

- **Certification & Monitoring Building Settlement (Annex D)**

Data Field	Definition	Mandatory /Optional	Data Field Type	Data Validation Rule - Format
Project Reference Number	Project Building Plan (BP) number issued by URA (e.g. A1234-12345-2022)	Mandatory	String	
ST Number	Structural Plan number (e.g ST01)	Mandatory	String	
Name/ Block Number of Building	Location (where building settlement observed) Name of Building/Block Number	Mandatory	String	
Number of storeys above ground	Number of storeys above ground of building where settlement is observed	Mandatory	Integer	Minimum value = 1
Number of storeys of basement	Number of basement storeys of building where settlement is observed	Mandatory	Integer	Minimum value = 0
Qualified Person (Supervision) Name	Personnel name as in NRIC or FIN	Mandatory	String	
Qualified Person (Supervision) Registration Number	Personnel Professional Engineer registration number	Mandatory	String	
Qualified Person (Geotechnical)(Supervision) Name	Personnel name as in NRIC or FIN	Optional	String	
Qualified Person (Geotechnical)(Supervision) Registration Number	Personnel Professional Engineer registration number	Optional	String	
Number of storeys building has reached	Number of storeys above ground constructed of building where settlement is observed	Mandatory	Integer	Minimum value = 1

Date when the building reached the stated storey number	Date when building reached the stated storey number under supervision of QP	Mandatory	Date-Time	dd/mm/yyyy HH:MM
Maximum measured building settlement	Maximum building settlement measured in millimeter	Mandatory	Integer	
Maximum allowable building settlement	Maximum allowable building settlement by design in millimeter	Mandatory	Integer	
Maximum measured differential building settlement	Difference between largest and smallest measured building settlement and in millimeter	Mandatory	Integer	
Maximum allowable differential building settlement	Maximum allowable difference between largest and smallest building settlement and in millimeter	Mandatory	Integer	
QP(S)'s Assessment	QP(S) assessment for building settlement observed [Selection: True- I confirm that I have personally determined and I am satisfied that building settlement monitoring results so far for the above building do not exceed the design limits in accordance with the approved set of structural plans/calculations False - The building settlement has exceeded the design limits in accordance with the approved set of structural plans/calculations]	Mandatory	Boolean	

Has the building reached roof level?	Declaration whether the building has reached roof level and that this is the final submission [Selection: True- The building has not reached roof level. False - The building has reached the roof level and the building settlement has stabilised. This is the last reading submitted for this project.]	Mandatory	Boolean	

- **Concrete Cube Test**

Data Field	Definition	Mandatory /Optional	Data Field Type	Data Validation Rule - Format
Project Reference Number	Project Building Plan (BP) number issued by URA (e.g. A1234-12345-2022)	Mandatory	String	
Location	Location of casting	Mandatory	String	
Cube Ref. No.	Cube reference no. by builder/supplier	Mandatory	String	
Concrete Grade	Concrete Grade (e.g. C40/50)	Mandatory	String	
Concrete batch number	Concrete batch reference number by supplier	Mandatory	String	
Supplier	Company that supplies concrete	Optional	String	
Design Mix code/ description	Design mix code or mix description of concrete used by supplier	Mandatory	String	
Concrete Type	Type of concrete [Selection - 1 - Normal 2 - Green Concrete 3 - Lightweight Concrete 4 - Others]	Mandatory	Integer	Min value = 1 Max value = 3
Description of Concrete Type	Additional information if Concrete type is selected to be anything other than normal e.g. for Green Concrete or Lightweight - elaborate on design mix, special aggregates/admixtures used etc. for others, elaborate on concrete specialty	Optional	String	Not NULL if Concrete Type = 2, 3 or 4
Date of Casting	Date of casting building element/structure	Mandatory	Date-Time	dd/mm/yyyy HH:MM
Concrete Slump	Concrete slump height in millimeter	Mandatory	Integer	
Compressive Strength Required	Concrete cube compressive strength required in newtons per square millimeter (N/mm2)	Mandatory	Float	up to 1 d.p

Date of Test 7-day	Date of 7-day cube test	Mandatory (if applicable)	Date-Time	dd/mm/yyyy HH:MM
7-day Cube Strength	Cube strength after 7-days in newtons per square millimeter (N/mm2)	Mandatory (if applicable)	Float	up to 1 d.p
Date of Test 28-day	Date of 28-day cube test	Mandatory (if applicable)	Date-Time	dd/mm/yyyy HH:MM
28-day Cube Strength	Cube strength after 28-days in newtons per square millimeter (N/mm2)	Mandatory (if applicable)	Float	up to 1 d.p
Result of Test	Results of cube test [Selection: True- Pass False - Fail]	Mandatory (if applicable)	Boolean	
Action Taken for Failure	To input rectification works taken if concrete cube test fails	Optional	String	Not NULL if Results = False

- **Failure Notification Module**

Data Field	Definition	Mandatory /Optional	Data Field Type	Data Validation Rule - Format
Type of Failure	Type of failure [Selection: 1 - Instrumentation Reading Exceed Alert Level 2 - Instrumentation Reading Exceed Suspension Level 3 - Concrete Cube Test Failed 4 - Steel Test Failed 5 - Ultimate Pile Load Test Failure 6 - Working Pile Load Test Failure 7 - Pile Dynamic Analyser (PDA) 8 - Short pile (actual penetration length short more than 20% of design penetration length) 9 - Others	Mandatory	Integer	Min value = 1 Max value = 9
Project Reference Number	Project Building Plan (BP) number issued by URA (e.g. A1234-12345-2022)	Mandatory	String	
Project Description	Location project name as per Building Plan (BP) (e.g. New erection of 50 Sty Mixed Commerical & Residential Building on Lot 02549N MK01 at 7 Maxwell Rd)	Mandatory	String	
Description of Failure	partial automated fill from the other datasets	Mandatory	String	
BCA Officer Email	(to be subsumed by Project Portal logic after integration)	Optional	String	
Additional Data	Link to the original data set (or attach as separate document that can download)	Optional	String	
QP Assessment	Outcome/ conclusion of assesment from QP based on investigation	Mandatory	String	

- **Instrumentation & Monitoring Records**

Data Field	Definition	Mandatory /Optional	Data Field Type	Data Validation Rule - Format
Project Reference Number	Project Building Plan (BP) number issued by URA (e.g. A1234-12345-2022)	Mandatory	String	
Report Identification Number	Report unique serial number	Mandatory	Integer	Min value = 0 Max value = 9
Report Date Time	Report submission date and time	Mandatory	Date-Time	dd/mm/yyyy HH:MM
Report Revision Number	Report revision, starting value to be 1 and subsequent revision to be incremental by 1	Mandatory	Integer	Min value = 1
Report Writer's Name	Personnel's name as in NRIC or FIN who prepared the report	Optional	Integer	Min value = 0 Max value = 9
Reading Taken Date	Duration and date of reading taken	Mandatory	Date-Time	dd/mm/yyyy HH:MM
Project Client Name	Client's name of the project registered in BCA	Mandatory	String	
IM Contractor Company name	IM Contractor company registered name	Mandatory	String	
IM Contractor Company location	IM Contractor company registered address	Mandatory	String	
IM Contractor Company UEN	IM Contractor company Unique Entity Number	Optional	Integer	Min value = 0 Max value = 9
Project Description	Location project name as per Building Plan (BP) (e.g. New erection of 50 Sty Mixed Commerical & Residential Building on Lot 02549N MK01 at 7 Maxwell Rd)	Mandatory	String	

Type of instrument	Type of instrument [Selection: 1 - water standpipe 2 - inclinometer 3 - tilt meter 4 - piezometer 5 - vibration meter 6 - prism 7 - others]	Mandatory	Integer	Min value = 1 Max value = 7
Instrument Reference Number	Instrument unique serial number	Mandatory	Integer	Min value = 0 Max value = 9
Current reading	Current reading in millimeter	Mandatory	Integer	
Alert level (AL)	Alert level in millimeter	Mandatory	Integer	
Work Suspension level (WSL) or Predetermined level (PDL)	Work Suspension level or Predetermined level in millimeter	Mandatory	Integer	
Breach alert level?	[Selection: 1 - Pass 2 - Fail 3 - Not observed]	Mandatory	Integer	Min value = 1 Max value = 3
Breach WSL/PDL?	[Selection: 1 - Pass 2 - Fail 3 - Not observed]	Mandatory	Integer	Min value = 1 Max value = 3

- **MET Test Results**

Data Field	Definition	Mandatory /Optional	Data Field Type	Data Validation Rule - Format
Project Reference Number	Project Building Plan (BP) number issued by URA (e.g. A1234-12345-2022)	Mandatory	String	
Location	Location of MET member	Mandatory	String	
Test reference number	Test reference number	Mandatory	String	
Origin of MET/ Manufacturer		Mandatory	String	
Supplier	Company that supplies MET	Optional	String	
Description of MET	Description of MET	Mandatory	String	
Type of Specimen (CLT/Glulam)				
Specimen size				
MET Test Type	Test carried out for MET [Selection: 1 - Finger joint test; 2 - Delamination test; 3 - Bending Test 4 - Shear Test 5 - Others]	Mandatory	Integer	Min value = 1 Max value = 5
Description of MET Test Type	Description of test carried out for MET (if others chosen)	Optional	String	Not NULL if MET Test type = 4
MET Strength Required	MET strength required in newtons per square millimetres (N/mm2)	Mandatory	Float	up to 1 d.p
Date of Test	Date of MET Test	Mandatory	Date-Time	dd/mm/yyyy HH:MM

Result of Test	Results of test and type [Selection: True- Pass False - Fail]	Mandatory (if applicable)	Boolean	
Action Taken for Failure	To input rectification works taken if MET test fails	Optional	String	Not NULL if Results = False

- **Pile Load Test Record**

Data Field	Definition	Mandatory /Optional	Data Field Type	Data Validation Rule - Format
Project Reference Number	Project Building Plan (BP) number issued by URA (e.g. A1234-12345-2022)	Mandatory	String	
ST Number	Structural Plan number (e.g ST01)	Mandatory	String	
Pile Load Test Reference Number	Test report unique serial number (e.g XX)	Optional	String	
Type of Pile Load Test	Type adopted for pile load test [Selection: 1 - Working Load Test 2 - Ultimate Load Test]	Mandatory	Integer	Min value = 1 Max value = 2
Method of Pile Load Test	Method adopted for pile load test [Selection: 1 - Reaction Test Pile (e.g Kentledge, Ground Anchor, Tension Pile etc) 2 - Bi-directional load Test 3 - Rapid Load Test 4 - Others]	Mandatory	Integer	Min value = 1 Max value = 4
Method of Pile Load Test (Others)	Description of Pile Load Test Method (if Reaction Test Pile Others)	Optional	String	Not NULL if Method of Pile Load Test = 1 or 4
Date Time of Test	Pile load testing date and time	Mandatory	Date	dd/mm/yyyy
Pile Diameter	Diameter of Tested Pile in millimeter	Mandatory	Integer	
Pile Length	Length of Tested Pile in meter	Mandatory	Float	up to 1 d.p
Qualified Person (Supervision) Name	Personnel name as in NRIC or FIN	Mandatory	String	
Qualified Person (Supervision) Registration Number	Personnel Professional Engineer registration number	Mandatory	String	
Qualified Person (Geotechnical)(Supervision) Name	Personnel name as in NRIC or FIN	Optional	String	

Qualified Person (Geotechnical)(Supervision) Registration Number	Personnel Professional Engineer registration number	Optional	String	
Pile Working Load	Designed working load of tested pile in kilonewtons	Mandatory (if applicable)	Integer	
Measured Pile head Settlement at 1 time working load	Pile settlement at 1 time working load in millimeter	Mandatory (if applicable)	Integer	
Max no. of times of working load test pile is loaded to	No. of times of working load test pile is loaded to (e.g x times of working load)	Mandatory (if applicable)	Float	up to 1.dp
Measured Pile Head Settlement	Pile settlement when test pile subjects to x times of working load in millimeter	Mandatory (if applicable)	Integer	
Working Load Test Results	Results of working load test [Selection: True- Pass False - Fail]	Mandatory (if applicable)	Boolean	
Builder Name	Company name as in ACRA	Mandatory	String	
Builder UEN	Company Unique Entity Number	Mandatory	String	Min characters = 9, Max characters = 10 Alphas
Name of Technical Controller	Personnel name as in NRIC or FIN	Mandatory	String	
Name of RE/RTO	Personnel name as in NRIC or FIN	Mandatory	String	
RE/RTO Registration Number	RE/RTO registration number	Mandatory	String	
QP Assessment	QP satisfaction with pile load test results [Selection: True - Satisfied False - Not Satisfied]	Mandatory	Boolean	
Pile Design Confirmation	Whether the load test results confirmed or did not confirm the design assumptions and parameters adopted in the pile design [Selection: True - Confirmed False - Not Confirmed]	Mandatory	Boolean	

- **Piling Installation Record**

Data Field	Definition	Mandatory/ Optional	Data Field Type	Data Validation Rule - Format
Record Identification Number	Record unique serial number generated by site management system	Mandatory	string	
Record Date/ Time	Record creation date and time	Mandatory	date-time	YYYYMMDD HH:MM:SS
Record Revision	Record revision, starting value to be 1 and subsequent revision to be incremental by 1	Mandatory	int8	Minimum value = 1
Project Reference Number	Project Building Plan (BP) number issued by URA (e.g. A1234-12345-2022)	Mandatory	string	
Project Name	Project name or development name	Mandatory	string	
Piling Installation Date	Date of piling installation	Mandatory	date	YYYYMMDD
Main Contractor Company Name	Main contractor company name as in ACRA	Mandatory	string	
Main Contractor Company UEN	Main contractor company Unique Entity Number	Mandatory	string	Min characters = 9 Alpha Numerics, Max characters = 10 Alpha Numerics
Piling Contractor Company Name	Piling contractor company name as in ACRA	Mandatory	string	
Piling Contractor Company UEN	Piling contractor company Unique Entity Number	Mandatory	string	Min characters = 9 Alpha Numerics, Max characters = 10 Alpha Numerics
Registered Surveyor Company Name	Surveyor (of piling installation) company name as in ACRA (i.e. with reference to BCA-BE-QPCTPW_ANNEX A_r1)	Optional	string	
Registered Surveyor Company UEN	Surveyor (of piling installation) company Unique Entity Number	Optional	string	

Registered Surveyor Name	Surveyor (of piling installation) name as in Land Surveyor Board registration (i.e. with reference to BCA-BE-QPCTPW_ANNEX A_r1)	Optional	string	
Registered Surveyor Number	Surveyor (of piling installation) registration number as in Land Surveyor Board (i.e. with reference to BCA-BE-QPCTPW_ANNEX A_r1)	Optional	int8	
Annex C Submission	Annex C submission for 50% completion of piling (True = submitted to BCA, False = not submitted to BCA)	Mandatory	boolean	
Total Number of Piles	Total number of piles for project	Mandatory	integer	
Pile Details	Details of Piling	Mandatory	array	
Pile Reference Number	Pile reference number as per approved piling plan (i.e. with reference to BCA-BE-QPCTPW_ANNEX A_r1)	Mandatory	string	
Pile Type	Pile types as per standard naming conventions (i.e. with reference to BCA-BE-QPCTPW_ANNEX A_r2) [Selection: 1 - Bored Pile; 2 - Bored Micro Pile; 3 - Driven Steel Micro Pile; 4 - Driven Reinforced Concrete Pile; 5 - Jack-in Reinforced Concrete Pile; 6 - Secant Bored Pile (SBP); 7 - Others]	Mandatory	int8	Min value = 1 Max value = 7
Pile Type Others	Description of other pile foundation types [Free Text]	Optional	string	NOT NULL if pile_dets.type = 9
Pile Foundation Type	Types of pile foundation: [Selection: 1 - Displacement Piles; 2 - Replacement Piles; 3 - Others]	Mandatory	int8	Min value = 1 Max value = 3
Pile Foundation Type Others	Description of other pile types [Free Text]	Optional	string	NOT NULL if pile_dets.foundation = 3
Pile X-Easting	As-built SVY21 easting coordinates of piles in metres (i.e. with reference to BCA-BE-QPCTPW_ANNEX A_r3)	Mandatory	double	up to 3 d.p
Pile Y-Northing	As-built SVY21 northing coordinates of piles in metres (i.e. with reference to BCA-BE-QPCTPW_ANNEX A_r4)	Mandatory	double	up to 3 d.p

Pile As-Built Length	Actual length of a pile as measured on site from the cut-off level in metres (i.e. with reference to BCA-BE-QPCTPW_ANNEX A_r5)	Mandatory	double	up to 1 d.p
Pile Cut Off Level	As-built elevation at which the pile is cut off or terminated according to Singapore Height Datum in metres (i.e. with reference to BCA-BE-QPCTPW_ANNEX A_r6)	Mandatory	double	up to 1 d.p
Pile Toe Level	As-built elevation of the bottom of a pile where it meets the ground or soil according to Singapore Height Datum in metres (i.e. with reference to BCA-BE-QPCTPW_ANNEX A_r7)	Mandatory	double	up to 1 d.p
Pile Diameter	Diameter or length of longest side of pile in millimetres	Mandatory	double	
Pile Width	Length of shorter side of pile in millimetres (no value if pile is circular) (i.e. with reference to BCA-BE-QPCTPW_ANNEX A_r8)	Optional	double	
Pile Design Penetration Length	Penetration length of pile from cut off level, as designed in approved piling plan in metres (i.e. with reference to BCA-BE-QPCTPW_ANNEX A_r9)	Mandatory	double	up to 1 d.p
Pile Design Socketing Length	Design embedment length into competent soil or bedrock in metres as in approved piling plan (value 0 if no requirement for socketing) (i.e. with reference to BCA-BE-QPCTPW_ANNEX A_r11)	Mandatory	double	up to 1 d.p
Pile Actual Socketing Length	Actual embedment length into competent soil or bedrock in metres (value 0 if no requirement for socketing) (i.e. with reference to BCA-BE-QPCTPW_ANNEX A_r12)	Mandatory	double	up to 1 d.p
Pile Local X Eccentricity	Horizontal distance between the centerline of the pile and the specified location on the pile, in the local X direction, in millimetres (i.e. with reference to BCA-BE-QPCTPW_ANNEX A_r13)	Mandatory	double	
Pile Local Y Eccentricity	Horizontal distance between the centerline of the pile and the specified location on the pile, in the local Y direction, in millimetres (i.e. with reference to BCA-BE-QPCTPW_ANNEX A_r14)	Mandatory	double	
Pile Zone Borehole Number	Zone pile is located in or borehole number which according to pile design	Optional	string	

Pile Working Load	The load which the pile is designed to carry without exceeding the allowable settlement requirement, in kilonewton (i.e. with reference to BCA Piling Inspection Form)	Optional	double	
Pile Boring Start Date Time	Date and Time when boring or jacking of piles started (i.e. with reference to BCA Piling Inspection Form)	Optional	date-time	YYYYMMDD HH:MM:SS
Pile Boring End Date Time	Date and Time when boring or jacking of piles ended (i.e. with reference to BCA Piling Inspection Form)	Optional	date-time	YYYYMMDD HH:MM:SS
Pile Verticality	Verticality ratio reading as measured by piling machine (ratio as in 1:value) (i.e. with reference to BCA Piling Inspection Form)	Optional	int8	
Pile Reinforcement Bars Number Size	Number of reinforcement bar, type of reinforcement bar and reinforcement bar size/diameter (e.g. 10H16) (i.e. with reference to BCA Piling Inspection Form)	Optional	string	
Pile Reinforcement Bars Length	Length of reinforcement bars in metres (i.e. with reference to BCA Piling Inspection Form)	Optional	double	up to 1 d.p
Pile Reinforcement Links Size Spacing	Type of reinforcement bar, reinforcement bar size/diameter, reinforcement link spacing in millimetres (e.g. H10-200) (i.e. with reference to BCA Piling Inspection Form)	Optional	string	
Pile Spacer Size	Size of pile spacer in milimetres (i.e. with reference to BCA Piling Inspection Form)	Optional	double	
Pile Spacer Spacing	Spacing of pile spacer in milimetres (i.e. with reference to BCA Piling Inspection Form)	Optional	double	
Pile Concreting Method	Method of pile concreting (i.e. with reference to BCA Piling Inspection Form) [Selection: 1 - Dry; 2 - Tremie; 3 - Others]	Optional	int8	Min value = 1, Max value = 3
Pile Concreting Method Others	Description of other concreting method [Free Text]	Optional	string	NOT NULL if pile_dets.concrete_method = 3
Pile Concrete Grade	Grade of pile concrete (e.g. C40/50, C32/40) (i.e. with reference to BCA Piling Inspection Form)	Optional	string	

Pile Toe Cleaned	Pile toe cleaned (i.e. with reference to BCA Piling Inspection Form) [Selection: True - Yes; False - No]	Optional	boolean	
Pile Concreting Start Date Time	Date and Time when concreting started (i.e. with reference to BCA Piling Inspection Form)	Optional	date-time	YYYYMMDD HH:MM:SS
Pile Concreting End Date Time	Date and Time when concreting ended (i.e. with reference to BCA Piling Inspection Form)	Optional	date-time	YYYYMMDD HH:MM:SS
Pile Calculated Concrete Volume	Calculated volume of pile concrete in cubic metres (i.e. with reference to BCA Piling Inspection Form)	Optional	double	
Pile Actual Concrete Volume	Actual volume of pile concrete in cubic metres (i.e. with reference to BCA Piling Inspection Form)	Optional	double	
Pile Concrete Supplier Name	Concrete supplier company name (i.e. with reference to BCA Piling Inspection Form)	Optional	string	
Competent Soil Standard Pentration Test Requirement	N value of soil standard penetration test (i.e. with reference to BCA Piling Inspection Form)	Optional	int8	
Competent Soil Depth	Depth from cut off level where competent soil encountered in metres (i.e. with reference to BCA Piling Inspection Form)	Optional	double	up to 1 d.p

- **Site Progress**

Data Field	Definition	Mandatory /Optional	Data Field Type	Data Validation Rule - Format
Project Reference Number	Project Building Plan (BP) number issued by URA (e.g. A1234-12345-2022)	Mandatory	String	
Project Description	Location project name as per Building Plan (BP) (e.g. New erection of 50 Sty Mixed Commerical & Residential Building on Lot 02549N MK01 at 7 Maxwell Rd)	Mandatory	String	
Block/Zone	Segregation of block/zone/storey to be based on project team. To indication whole area if no segregation	Mandatory	String	
Any Demolition works	Whether project has Demolition works [Selection: True- Yes False - No]	Mandatory	Boolean	
Any ERSS works	Whether project has ERSS works	Mandatory	Boolean	
Any Piling works	Whether project has Piling works	Mandatory	Boolean	
Any Basement works	Whether project has Basement works	Mandatory	Boolean	
Any Superstructure works	Whether project has Superstructure works	Mandatory	Boolean	
Demolition Progress	Work done for demolition based on overall project (unit in %)	Optional	Integer	Not NULL if Any Demolition works=True Min value = 0 Max value = 100
ERSS Progress	Work done for ERSS based on overall project (unit in %)	Optional	Integer	Not NULL if Any ERSS works=True Min value = 0 Max value = 100

Piling Progress	Work done for piling based on overall project (unit in %)	Optional	Integer	Not NULL if Any Piling works=True Min value = 0 Max value = 100
Basement Progress	Work done for substructures based on overall project (unit in %)	Optional	Integer	Not NULL if Any Basement works=True Min value = 0 Max value = 100
Superstructure Progress	Work done for superstructures based on overall project (unit in %)	Optional	Integer	Not NULL if Any Superstructure works=True Min value = 0 Max value = 100
Architectural Progress	Work done for architectural works based on overall project (unit in %)	Optional	Integer	Not NULL if Any Superstructure works=True Min value = 0 Max value = 100
MEP Progress	Work done for architectural works based on overall project (unit in %)	Optional	Integer	Not NULL if Any Superstructure works=True Min value = 0 Max value = 100
Date of update	Date of project progress update	Mandatory	Date-Time	dd/mm/yyyy HH:MM

- **QP Attendance**

Data Field	Definition	Mandatory /Optional	Data Field Type	Data Validation Rule - Format
Project Reference Number	Project Building Plan (BP) number issued by URA (e.g. A1234-12345-2022)	Mandatory	String	
Personnel Details	Personnel details visiting work site	Mandatory	String	
Personnel Details Name	Personnel name as in NRIC or FIN	Mandatory	String	
Personnel Details Identification	Personnel identification as NRIC or FIN	Mandatory	String	Min characters = 9, Max characters = 9 Alphas
Personnel Details Work Pass	Personel type of pass [Selection: 1 - Citizen or Permenant Resident; 2 - Skill Pass or Employment Pass; 3 - Work Permit]	Mandatory	String	Min value = 1 Max value = 3
Personnel Details Category	Personnel category of work at site [Selection: 1 - Structure; 2 - Architecture; 3 - Fabrication; 4 - M&E; 5 - Admin 6 - Others]	Optional	Integer	Min value = 1 Max value = 6
Personnel Details Trade	Personnel trade as specified in the EPSS guidebook Annex A	Mandatory	Integer	
Personnel Details Time In	Personnel time in to/enters site	Mandatory	Date-Time	dd/mm/yyyy HH:MM
Personnel Details Time Out	Personnel time out from/exits site	Mandatory	Date-Time	dd/mm/yyyy HH:MM
Personnel Details PE Registration Number	Personnel Professional Engineer registration number	Optional	String	Min characters = 3, Max characters = 4 Alphas

Personnel Details Purpose to Site	Personnel purpose of entering site [Selection: 1 - Technical Meeting; 2 - Inspection; 3 - Others]	Optional	Integer	Min value = 1 Max value = 3

- **Site Investigation Report**

Data Field	Definition	Mandatory /Optional	Data Field Type	Data Validation Rule - Format
Project Reference Number	Project Building Plan (BP) number issued by URA (e.g. A1234-12345-2022)	Mandatory	String	
Report Identification/Contract Number	Report unique serial number	Mandatory	String	
Report Date Time	Report submission date and time	Mandatory	Date-Time	dd/mm/yyyy HH:MM
Report Revision Number	Report revision, starting value to be 1 and subsequent revision to be incremental by 1	Mandatory	Integer	
SI Contractor Company name	SI Contractor company registered name	Mandatory	String	
SI Contractor Company location	SI Contractor company registered address	Mandatory	String	
SI Contractor Company UEN	SI Contractor company Unique Entity Number	Mandatory	String	
Project Description	Location project name as per Building Plan (BP) (e.g. New erection of 50 Storey Mixed Commercial & Residential Building on Lot 02549N MK01 at 7 Maxwell Rd)	Mandatory	String	
PE's Certification for SI Report	Declaration of Professional Engineer for Site Investigation Report	Mandatory	String	
PE's Signature and Stamp	Professional Engineer's formal signature and his/her name and registered number in Professional Engineer Board Singapore	Mandatory	String	
PE's Certification Date	Certification date for report	Mandatory	Date-time	dd/mm/yyyy HH:MM

Project Client Name	Client's name of the project registered in BCA	Optional	String	
Project Consultant Name	Consultant's name of the project registered in BCA	Optional	String	
Site Location Plan	Location where soil investigation work is conducted	Mandatory	String	
Scope of Work	Scope of work for site investigation [Possible Selection: 1) Description of field investigation works including - number of boreholes drilled - termination of boring - name of geologist or company to supervise field exploration and drilling works - groundwater observation - description and method of borehole exploration works - description of in-situ testing - start and end date for the field exploration program 2) Description of laboratory testing including - test sampling - code of practice - summary of total quantities of field investigation works and laboratory works]	Mandatory	String	
Site geology and soil profile	Description and details of soil and rock	Mandatory	String	
Boreholes Location Plan	Location where boreholes drilled for investigation work	Mandatory	String	
Soil Boring Logs	Details of soil boring logs in AGS format	Mandatory	String	
Laboratory Test Results	Test results for soil samples	Mandatory	String	

- **Steel Strength Report**

Data Field	Definition	Mandatory /Optional	Data Field Type	Data Validation Rule - Format
Project Reference Number	Project Building Plan (BP) number issued by URA (e.g. A1234-12345-2022)	Mandatory	String	
Project Description	Location project name as per Building Plan (BP) (e.g. New erection of 50 Sty Mixed Commercial & Residential Building on Lot 02549N MK01 at 7 Maxwell Rd)	Mandatory	String	
Report Identification Number	Report unique serial number / Job ref.	Mandatory	Integer	Min value = 0 Max value = 9
Report Date Time	Report submission date and time	Mandatory	Date-Time	dd/mm/yyyy HH:MM
Report Revision Number	Report revision, starting value to be 1 and subsequent revision to be incremental by 1	Mandatory	Integer	Min value = 1
Laboratory Test	Steel strength tests including - steel material class includes FPC (Factory Production Control) - certificate or MTC (Material Test Certificate) - steel material standards/ grades (unit in MPa) - contains of steel (chemical element & symbol shown in periodic table)	Mandatory	String	
Design steel strength	Design steel strength in megapascals (MPa)	Mandatory	Float	No. of decimal place = 2

Test steel strength	Test steel strength in megapascals (MPa)	Mandatory	Float	No. of decimal place = 2
Result of test	[Selection: 1 - Pass 2 - Fail 3 - Not observed]	Mandatory	Integer	Min value = 1 Max value = 3
Name of Steel Mill	Name of Steel Mill	Mandatory	String	
Country of Origin of steel mill	Country of Origin of steel mill	Mandatory	String	
Steel Fabricator	Name of steel fabricator	Mandatory	String	
Steel Fabricator based locally?	Whether steel fabricator is based locally or overseas [Selection: True - Local False - Overseas]	Mandatory	Boolean	
Country of steel fabricator	Country of steel fabricator if overseas	Optional	String	Not NULL if Steel Fabricator based locally? = False
Name of the appointed ITA to supervise the fabrication process	Name of the appointed ITA to supervise the fabrication process	Optional	String	Not NULL if Steel Fabricator based locally? = False
Name of the appointed RE/RTO to station at plant	Name of the appointed RE/RTO to station at plant	Optional	String	

Accreditation of fabricator with SSS	Whether Steel fabricator is accredited under Singapore Structural Steel Society (SSSS) [Selection: True - Yes False - No]	Optional	Boolean	
Accreditation of fabricator as licensed specialist builder	Whether steel fabricator is licensed as a specialist builder under BCA's Builders Licensing Scheme [Selection: True - Yes False - No]	Optional	Boolean	
Specification of bolts to be used	Specification of bolts to be used	Optional	String	
Number of samples (steel elements) to carry out testing	Number of samples (steel elements) to carry out testing	Optional	Integer	Min value = 0 Max value = 9
Number of samples (steel connections) to carry out testing	Number of samples (steel connections) to carry out testing	Optional	Integer	Min value = 0 Max value = 9
Accreditation of testing lab with SAC-Singlass (For steel elements)	Accreditation of testing lab with SAC-Singlass (For steel elements) [Selection: 1 - Yes 2 - No 3 - Not applicable]	Optional	Integer	Min value = 1 Max value = 3

Accreditation of testing lab with SAC-Singlass (For steel connectios)	Accreditation of testing lab with SAC-Singlass (For steel connectios) [Selection: 1 - Yes 2 - No 3 - Not applicable]	Optional	Integer	Min value = 1 Max value = 3
Performance of tests in accordance to design specifications (For steel elements)	Performance of tests in accordance to design specifications (For steel elements)	Optional	String	
Performance of tests in accordance to design specifications (For steel connections)	Performance of tests in accordance to design specifications (For steel connections)	Optional	String	

Appendix B – Productivity Datasets

Manpower Utilisation Aggregated Data

Data Field	Definition	Mandatory/ Optional	Data Field Type	Data Validation Rule - Format
Report Identification Number	Report unique serial number generated by Biometric Authentication Systems (BAS)	Mandatory	string	
Report Period	Report submission period (e.g. for Jan 2023)	Mandatory	Date-time	YYYY-MM-DD
Report Data Time	Report submission date and time	Mandatory	Date-time	YYYYMMDD HH:MM:SS
Report Revision	Report revision, starting value to be 1 and subsequent revision to be incremental by 1	Mandatory	int8	Minimum value = 1
Project Reference Number	Project Building Plan (BP) number (e.g. A1234-12345-2022)	Mandatory	string	
Project Name	Project name (e.g. Construction of 50 Sty Mixed Commerical & Residential Building at 7 Maxwell Rd)	Mandatory	string	
Report Company Name	Company (that submit report) name as in ACRA	Mandatory	string	
Report Company UEN	Company (that submit report) Unique Entity Number	Mandatory	string	Min characters = 9, Max characters = 10 Alphas
Manpower Total	Total man-days of all trade groups	Mandatory	double	
Manpower Breakdown Group A	Manpower breakdown man-day by trade and trade category	Mandatory	array	
Manpower Trade	Trade (e.g. 2.2, 3.1, 4.1) as specified in the EPSS guidebook Annex A	Mandatory	string	Min characters = 3, Max characters = 4, Range: 1.0, 2.1-2.13, 3.1-3.7, 4.1-4.20, 5.1-5.6, 6.1-6.4, 7.1-7.2

Manpower Total by Trade	Total man-days per trade (e.g. machine operator, carpentry, blockwall) as specified in the EPSS guidebook Annex A	Mandatory	double	
Manpower Total by Trade Category	Total man-days per trade category (e.g. basement, structural works, architectural works) as specified in the EPSS guidebook Annex A	Mandatory	double	
Manpower Breakdown Group B	Manpower breakdown man-day by trade, personnel category and company (for REDAS)	Optional	array	
Manpower Trade	Trade (e.g. 2.2, 3.1, 4.1) as specified in the EPSS guidebook Annex A (for REDAS)	Optional	string	Min characters = 3, Max characters = 4, Range: 1.0, 2.1-2.13, 3.1-3.7, 4.1-4.20, 5.1-5.6, 6.1-6.4, 7.1-7.2
Personnel Category	Personnel category of work at site [Selection: 1 - Structure; 2 - Architecture; 3 - Fabrication; 4 - M&E; 5 - Staff] (for REDAS)	Optional	int8	Minimum value = 1, Max value = 5
Personnel Employer Company Name	Company (that employ personnel) name as in ACRA (for REDAS)	Optional	string	
Manpower Total by Trade Personnel Category Company	Total man-days per trade, personnel category and employer company (for REDAS)	Optional	double	