Infrastructure & Buildings at Port of Tripoli
Package 1

Volume 02 - A: General Requirements

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SPECIFICATIONS

GENERAL REQUIREMENTS

TABLE OF CONTENTS

TABLE OF CONTENTS

GENERAL REQUIREMENTS

GENERAL REQUIREMENTS

1:31 DESCRIPTION OF WORK AND SITE

1:31:1 THE WORKS

1001 THE WORKS:

The "Infrastructure & Buildings at Port of Tripoli- Package 1 (IBPT1)" Project is for the construction of a Containers Terminal at Tripoli Port, together with service buildings, service area and infrastructure, as part of the "Buildings and infrastructure for the Port of Tripoli" project, which has been previously partially executed in previous packages.

The scope of work of the "Infrastructure & Buildings at Port of Tripoli- Package 1 (IBPT1)" includes the following key elements among others:

1. Demolition and / or relocation of existing facilities interfering with the Works, as detailed in Tender Documents. Awarded Contractor shall coordinate with the Tripoli Port Authorities regarding the final relocation destination, which may be located inside or outside Tripoli Port premises. The associated cost to be retained from the Provisional Sum envisaged for the project, in compliance with Sub-Clause 13.5 of Conditions of Contract.
2. Relocation of existing weighing bridge along with the corresponding control room of 32 m2 BUA, as detailed in Tender Documents and in coordination with the Tripoli Port Authorities.
3. Coordination with Tripoli Port Authority regarding all facilities and services that are required to be maintained operational during construction period, and allow for proper implementation to TPA's satisfaction.
4. Geotechnical Site Investigation including boreholes and test pits for verification of soil conditions as indicated in Tender Documents.
5. Relocation of existing Fuel Tank, as indicated in Tender Documents.
6. Construction of a 500 m2 BUA Fire Station, including 282 m2 covered area, complete as specified and shown on drawings.
7. Construction of a 1,600 m3 ground Water Reservoir supplying domestic and firewater with construction of Pump Station building comprising three pumps, two operating and one standby, for the water network, and three pumps (an electrical pump, a diesel pump, and a jockey pump) to supply the fire network as shown on drawings.
8. Construction of a water distribution network consisting of 770 m of DI pipelines of 100 mm diameter, and 2,250 m of 200 mm transmission line, a connection to the public water network, gate valves, air valves, washout valves, service connections, and water meters.
9. Construction of a firefighting network consisting of 2,290 m of DI pipelines of 150 mm, including fire hydrants, gate valves, air valves, and washout valves.
10. Construction of a wastewater collection network consisting of 1110 m of 200 mm uPVC pipelines including about 20 manholes. The Network includes a sewage Pumping Station with 1m width x 1m length x 4 m depth.
11. A storm water drainage network consisting of 760 m of UPVC pipes up to 500 mm diameter, and 1,995 m of GRP pipes up to 2,000 mm diameter, manholes, gullies,

and an outlet crossing a marine protection wall and discharging into the sea through a sea outfall, as shown on drawings.

12. Outdoor lighting including high mast lighting poles together with all related cabling works and auxiliaries as shown on drawings.
13. Road works including the following:
    a. Construction of New Roads of a total length of 1.2 km, including intersections, tie in with the existing road and adjacent areas, sidewalks, medians, curbs, Signing and marking
    b. Reconstruction of existing road of a total length of 0.9 km, linking the external gate with the previously executed stacking area works, including utility lines as shown on drawings and Contract Documents.
14. Pavement of all roads and open spaces as follows:
    a. Earth works,
    b. Asphalt pavement for roads, and 10,300 sqm service area, and
    c. Rigid concrete pavement for a 92,000 sqm Container Stacking Yard.
15. Execution of boundary fence separating the Port operational area and the Special Economic Zone (SEZ), complete as specified and shown on drawings.
16. Telecommunication distribution network connection including but not limited to duct banks, handholes, Manholes and fiber optic connection ensuring an fully operational and functional system.
17. Fire alarm and detection network shall be distributed throughout the site based on an automatic analogue addressable fire alarm system, where each building or set of small buildings, is covered by an independent and autonomous Satellite Fire Alarm Cabinets (SFAC), all of which are interconnected via a fiber optic loop and report back to a Main Fire Alarm Control (MFAC) unit, located in the Fire Station.

1035 CONCURRENT WORK: other work not forming part of the Contract will be carried out by the Employer or other contractors or public bodies during the execution of the works.

Allow for the co-ordination of this work to enable the installation to progress without disruption to the completion of the works. Allow for the provision of all necessary temporary facilities as required and afford all reasonable access and assistance to enable the completion of these works in a timely manner.

1040 RESTRAINTS: the maintenance of the existing utilities (i.e. electrical supplies, water supply, sewage disposal and telecommunications) imposes serious restraints upon the programming of the works. The Contractor is to consider carefully and incorporate all the restraints into his programme of works and allow for same in his Contract Price.

The main restraints to consider are, but not limited to, the following:

- Ascertain location in the vicinity of the works and coordinate with public utilities and maintaining of public and private services not indicated in the Tender Documents and notifying the service authorities of proposed works before commencing any operation.

Allow for the co-ordination of this work to enable the installation to progress without disruption to the completion of the works. Allow for the provision of all necessary temporary facilities as required and afford all reasonable access and assistance to enable the completion of these works in a timely manner.

1045 PHASING OF WORK: The phasing of the work will be developed by the Employer and Contractor upon consideration of the contractors proposals for the programme of works and construction activities. The Contractor is to prepare his program in accordance with section 1.33.1 of these documents.

The Contractor shall prepare his programme to ensure that proper outlets will be provided to adjacent networks as soon as practicable and especially before wet seasons.

1051 SECTIONAL COMPLETION: The Works are to be completed and will be taken over by the Employer, in accordance with Clause 48 of the Conditions of Contract, after agreement of the construction programme.

1061 RESTRICTIONS ON METHODS OF WORKING: The contractor is to ascertain from the appropriate authorities any restrictions on the methods of working, incorporate into works and include in the Contract Price.

1065 SEQUENCE OF CONSTRUCTION: the limited workspace and numerous utilities in the Project Area calls for a thorough and well studied construction sequence. The Contractor shall prepare a construction sequence in conformity with his construction programme. Such a sequence/programme has to include procedures regarding maintenance of service during construction as well as utility diversion to ensure such service.

1071 RESTRICTIONS ON TIMES OF WORKING:

The Contractor is to ascertain from the various authorities the local retrictions during the completion of the works. The Contractor is to assume for the purposes of the Tender that normal working hours shall be from dawn to dusk.

1.31:2 THE SITE

2001 THE SITE is described on Drawings; the contractor shall make all necessary arrangements, including payment if need be, regarding any land outside the Site that may be needed as work areas. The Employer will not acknowledge any liability in respect of such land. The Contractor shall also be responsible for insuring that all roads and temporary facilities needed are sufficient to divert traffic adequately.

2015 CONTRACTORS SITE COMPOUND The Contractor shall locate and select sites outside the right-of-way for the use of his plant, equipment, site offices, residences, Temporary Works or any other uses which are essential during the execution of the Contract. The Contractor shall take the necessary measures for using these sites and shall be responsible for all expenses that may become due in return for such use. Prior to using any land owned by public or private owner outside the Site, the Contractor shall obtain the approval of the concerned Authorities and the Engineer.

2031 EXISTING UTILITIES: Utilities shall include, but not be limited to, existing water lines, sewer lines, wire lines, service connections, water meters and valve boxes, light poles and masts, pylons, cableways, signals, and all utility appurtenances within the limits of the proposed construction or extending beyond such limits to secure proper execution and connections as may be required or necessary. The Contractor's duty is to inspect the Site for himself pursuant to Sub-Clause 11.1 of the Conditions of Contract.

2032 EXISTING UTILITIES AND OBSTACLES: The Contractor shall:

take into account that the diversion works will be carried out by the Contractor to the requirements and approval of the Utility Owners and/or under their supervision, and that where required by the Utility Owners, diversion works be carried out by accredited specialist Contractors or by the Authorities themselves, and include for the same in the unit rates and Contract Price.

notwithstanding any information indicated on the Drawings with respect to such existing utilities, verify and identify by excavating trial pits and other measures including detection means all existing utilities. Map these utilities and prepare detailed and accurate existing utilities Drawings identifying after coordinating with the respective authorities the utilities that are in service and those that are dead or abandoned. Submit to the Engineer and to the Utility Owners existing utilities Drawings that are accurate and detailed giving location of utilities in plan and section with all pertinent data of the respective utility

work out and develop in coordination with the Utility Owners and the Engineer approved utilities diversion schemes as will be required, and also to enable execution of the Contract Works and maintain continued utilities services in the Area, and to the users

execute and provide superintendence for the execution of the utility diversions whether they are carried out by the Contractor directly or by other parties employed by him

provide accurate as Built Drawings of all permanent utility diversions that are executed under the Contract

be responsible for safeguarding and protecting from damage all utilities and appurtenances encountered during the Works and be responsible for the costs of making good any damage thereto, arising out of his own negligence.

2033 EXISTING OBSTACLES shall include, but not be limited to existing buildings, steel bridges and the like, walls, fences, gates, wells, septic tanks, manholes, pits, pipes, culverts, roadways, sidewalks, signs and rubbish dumps, whether or not shown on the Drawings. The contractor shall, at the commencement of the Contract, examine the Site and identify/verify all obstacles within the right-of-way above or below ground, and shall record all such information on suitable Site Drawings which shall be submitted to the Engineer within the agreed program but prior to commencement of that part of the Work.

2035 UTILITY DIVERSIONS The necessary utility diversions, either temporary or permanent, may be specified or directed to be carried out by the Contractor. Alternatively, the Employer may make arrangements for such works to be executed by other parties, normally the Utility Owners. In the event the utility diversions are specified or directed to be executed by the Contractor, the Contractor shall take into account that the diversion works will be carried out to the requirements and approval of the Utility Owners and/or under their supervision. The extent of the utility diversions have been, but are not limited to, described in the Documents.

2041 SITE INVESTIGATION: If any factual site investigation report has been made available for inspection at the Employer's office prior to submission of Tenders, this information is given without prejudice to the Contractor's obligation to inspect the Site and have satisfied himself prior to submitting his Tender, pursuant to sub-clause 11.1 of the Conditions of Contract.

Any information or data, whether expressed or implied, given in the Tender or Contract Documents in respect of climatological, hydrological, geophysical and sub-surface conditions on or in the vicinity of the Site, shall not be construed nor deemed to construe any passing of responsibility to the Employer or the Engineer for the correctness, accuracy, validity or use of any such information and data. The Contractor shall be solely responsible for his own assessment, interpretation and evaluation thereof and have made due allowance in his Tender as to risks, contingencies and all other circumstances which may influence or affect the undertaking of the Works.

1:32 DOCUMENTS AND DRAWINGS

1:32:1 DOCUMENTS GENERALLY

1001 ARRANGEMENT: The Documents are arranged in 4 volumes together with the Drawings, namely

Volume 1	Conditions of Contract
Volume 2	Specifications
Volume 3	Bill of Quantities
Volume 4	Drawings

1010 REFERENCING The Specifications for Items in the Bills of Quantities are prescribed in the respective Section/s corresponding to the type of Works involved.

All provisions of such Section/s shall be construed as Specifications for such Item of Work, except in respect of those provisions clearly inapplicable in the context in which they appear or unless they are waived or modified in the Contract Documents or by Variation Order.

Specifications and Drawings may contain cross references to other Sections, Clauses, Items, etc., which shall likewise be construed as Specifications for the Item of Work involved.

Any references in the Specifications to Work or materials not required by the Contract, will be deemed not to apply.

1011 SYMBOLS: Throughout the documentation units of measurement are referred to by symbols as follows:

No.	-	number
mm	-	millimeter(s)
cm	-	centimeter(s)
m	-	meter(s)
lin.m	-	linear meter
km	-	kilometer(s)
sq.mm	-	square millimeter(s)
sq.cm	-	square centimeter(s)
sq.m	-	square meter(s)
ha	-	hectare(s)
cu.m	-	cubic meter(s)
gm	-	gram(s)
kg	-	kilogram
tonne	-	metric ton (1,000 kg)
ml	-	milliliter(s)
ltr	-	liter(s)
Pa	-	Pascal(s)

N	-	Newton(s)
kN	-	kilo Newtons
MN	-	mega Newtons
A	-	amperes
mA	-	milli amperes
V	-	volt(s)
W	-	Watt
kW	-	kilowatt
C	-	Celsius (Centigrade)
Hz	-	Hertz (Frequency)
rpm	-	revolutions per minute
km/h	-	kilometers per hour
sec	-	seconds
min	-	minute(s) (or minimum)
h	-	hour(s)
mS	-	milli Siemens
dB	-	decibel(s)
dBA	-	decibels absolute
ppm	-	parts per million
in.	-	inch/inches (1 in. = 25.4 mm)
ft	-	foot/feet (1ft = 0.3048 m)
sq.in	-	square inch/inches
sq.ft	-	square foot/feet
cu.ft	-	cubic foot/feet
lb.	-	pound(s) (weight)
psi	-	pounds per square inch
gal	-	gallon(s) (U.S.)
gal(Imp)	-	gallon(s) (Imperial)
mph	-	miles per hour
HP	-	horsepower
USG	-	American gage

1021 DEFINITIONS given in the documents apply to terms, derived terms and synonyms in all documents. Near synonymous terms are to be interpreted in the light of the definitions.

Wherever in the Specification or in other Contract Documents any of the following terms is used, the intent and meaning shall be interpreted as follows:

ACCEPTED - Accepted in writing by the Engineer (or by the Employer where appropriate) as meeting the requirements of the Contract Documents and of any authorized variations thereto. "Acceptance" means accepted in writing as aforesaid. "Acceptable" means acceptable to the Engineer as aforesaid.

ADDENDUM - Amendment of or revision to any of the Contract Documents issued to Tenderers, and which is deemed to form part of the Contract Documents.

APPROVED - Approved in writing by the Engineer, including subsequent written approval or confirmation of previous verbal approval by the Engineer. "Approval" means approval in writing as aforesaid.

CERTIFICATE OF GUARANTEE - A signed statement by a person having legal authority to bind a company or supplier to its product, and which confirms that the materials and test results conform to the standards of these Specifications.

DIRECTED - Directed in writing by the Engineer, including subsequent written direction or confirmation of previous verbal direction by the Engineer.

DIVIDED HIGHWAY - A highway with separate roadways for traffic traveling in opposite directions.

HIGHWAY - A public way for purposes of vehicular travel and which includes the entire area within the right-of-way.

PRESPLITTING - Establishment of a free surface, or shear plane, in rock cuts, by controlled use of explosives in specially aligned and closely spaced drill holes along the slope line.

SHEATHING - Backfilling to the inside faces of structures such as retaining walls and abutments, using proprietary filter cloth and porous blocks, or using selected, free-draining material such as gravel or non-cementitious sand, etc, prior to placing and compacting normal backfill.

SOIL STABILIZATION - Procedure whereby cement, bitumen or lime is added to soils (subgrade layer) or to granular materials (sub-base course) in order to improve their load bearing capacity and their resistance to weathering and displacement.

SUBGRADE - The top surface of embankment or excavated area on which the pavement structure and shoulders are constructed. Also referred to as Subgrade Surface or Subgrade Level.

SUBGRADE LAYER - The top layer of material, of at least 200 mm compacted thickness, immediately below the subgrade surface.

SUBSIDIARY WORKS - Works which are subsidiary to or necessary or essential to, or in support of, or usual to, the execution and completion of other Works.

SUBSTRUCTURE - All of that part of the structure below the bearings of simple and continuous spans, skewbacks of arches and tops of footings of rigid frames, together with the backwalls, wingwalls, and wing protection railings.

VOLUNTEER CRACKS - Cracks or portions of cracks in Portland cement concrete pavements that are not coincident with constructed joints.

WORKING DRAWINGS - Shop Drawings, steel bending schedules, stress sheets, fabrication and erection Drawings, falsework Drawings, and any other supplementary

Drawings or data which the Contractor is required to submit to the Engineer for approval, generally before such Works commence.

1:32:2 DRAWINGS

2001 CONTRACT DRAWINGS are detailed on drawings identified as in Volume 4.

2011 DIMENSIONS AND DETAILS: Drawings are not to be scaled. Take all sizes from the dimensions shown on the Drawings or, where appropriate, as measured on site. Use detailed Drawings in preference to layout Drawings.

1:32:3 DRAWINGS ETC. PROVIDED BY THE CONTRACTOR

3001 GENERAL: The Engineer will supplement the Contract Drawings with further Drawings issued in accordance with the Conditions of Contract as he deems necessary. The Contractor shall prepare all other Drawings required for Temporary Works and for fabrication and co-ordination of trades and prepare all shop Drawings and other Drawings and documents required under the Contract, in addition to Drawings for work to be designed by the Contractor (if any).

3011 SHOP DRAWINGS: The Contractor shall prepare and submit for approval, shop drawings, material submittals and specifications, calculations, manufacturers' data etc. as required by the Specification or instructed by the Engineer in good time to meet the programme (including an allowance of 30 days for Engineer's approval for each submission or resubmission) and, in any case, a minimum of 45 days before the work is to be commenced or order placed, as appropriate. Drawings shall be carefully checked before submission to ensure that no conflict exists with other parts of the work, and shall be presented in accordance with submittal Procedure Note 2: Submittals for Shop Drawings (included at the end of this section). No extension of the Contract Time will be authorized because of failure to transmit submittals enough in advance of the Work to permit processing, including resubmittals.

3021 SUPPORTING DATA, such as manufacturers' standard details, performance standards etc. are to be in English, or accompanied by a translation, and are to be properly referenced to the Drawings and Specification and to be presented in accordance with Procedure Note 3: Submittals for Product Data (included at the end of this Section).

3031 PROCEDURE FOR SUBMISSION AND APPROVAL:

(1) Submit two hard copies and one electronic copy (pdf and autocad format) of each submittals, drawings and other documents for approval to the Engineer.

(2) Within 30 days of receipt at the Engineer's office, the Engineer will return one copy of the Drawings stamped as:

(a) approved, or

(b) approved as noted subject to amendments shown on the returned copy or in an accompanying letter, or

(c) revise and resubmit, with recommendations for resubmission, or

(d) rejected.

(3) In the case of approval, work may be commenced or orders placed.

(4) In the case of approval with qualifications, work may be commenced or orders placed, at the Contractor's risk, providing the qualifications are implemented.

(5) In case of returned for resubmission, do not proceed with the work covered by the submittal, including purchase, fabrication, delivery, or other activity for the product submitted, and resubmit until approval is obtained.

(6) In the case of rejection, works may not proceed. Prepare new submittal that complies with the Contract Document.

3041 "AS-BUILT" DRAWINGS: The Contractor shall neatly and professionally prepare as-built Drawings for all work completed, on reproducible copies of the Drawings and in electronic form on CD-ROM in a program stipulated by the Engineer (AutoCAD latest version or as agreed with the Engineer) for all the trades, Structural, Mechanical, Electrical, Environmental, Landscape, infrastructure and utilities and such other "As-Built" Drawings and submit to the Engineer for approval. The Contractor shall transmit the As-Built Drawings to the Engineer on a continuous basis before completion of construction but in all cases prior to issuance of the Taking Over Certificate of the Works.

The Contractor shall maintain on Site one complete set of the Contract which shall be available to the Engineer at all times and upon which the Contractor shall record on a continuous basis all changes and field adjustments. On a continuous basis shall mean as the work is progressively accomplished in relation to each Drawing.

As-Built Drawings shall be considered as part of Contractor's work effort. Submission of as-built Drawings will be a precondition for the Engineer's issuance of the Taking-Over Certificate.

3051 INSTRUCTION AND MAINTENANCE MANUALS: Where required under the Conditions of Contract and where required by the Specification, the Contractor shall provide four copies of instruction and maintenance manuals for equipment and installations. Manuals are to be in English and are to be properly bound in good quality hard covers and shall be submitted in accordance with Procedure Note 4: Instruction and Maintenance Manuals (included at the end of this section).

3061 COMPLETION: The works shall not be considered as complete for the purposes of the Taking Over under the Contract until the "as-built" Drawings and instruction and maintenance manuals have been provided.

1:32:4 SPECIFICATION

4001 CROSS-REFERENCES: Where Specification section numbers or type of work numbers are given on the Drawings or in the Bill of Quantities they are intended to help define the part or parts of the Specification which apply to particular kinds of work or parts of the Works.

If the references are to specific items or kinds or types of work within a section of the Specification, they must be taken as applying to the section as a whole, including all other relevant information. The references are not exclusive of other relevant information and requirements stated in other parts or sections of the Specification. The Specification as a whole must be taken as applying to the Works as a whole.

4011 STANDARDS DOCUMENTS: Where references are made to standards, codes of practice and Specifications issued by international bodies and organisations they are referred to by the following abbreviations:

AASHTO	(American Association of State Highway and Transportation Officials)
ACI	(American Concrete Institute)
AGA	(American Gas Association)
AISC	(American Institute of Steel Construction)
AMCA	(Air Moving and Conditioning Association)
ANSI	(American National Standards Institute)
ASA	(American Standards Association)
ASHRAE	(American Society of Heating, Refrigerating and Air-conditioning Engineers)
ASME	(American Society of Mechanical Engineers)
ASTM	(American Society for Testing and Materials)
AWWA	(American Water Works Association)
BS	(British Standards)
BS CP	(British Standards Codes of Practice)
CMA	(Cable Manufacturers Association)
DIN	(Deutsches Institut fur Normalisierung)
DTU	(Documents Techniques Unifies)
FM	(Factory Mutual)
IBR	(Institute of Boiler and Radiator Manufacturers)
ISO	(International Standardisation Organisation)
NBS	(National Bureau of Standards)
NEMA	(National Electrical Manufacturers Association)

NF	(Normes Francaises)
NFPA	(National Fire Protection Association)
NFS	(National Sanitation Foundation)
SAE	(Society of Automotive Engineers)
UL	(Underwriters' Laboratories Inc.)
VDE	(Verband Deutscher Electrotechniker)

4021 STANDARDS DOCUMENTS: Where references are made and year of issue and amendments are not stated, they are in every case to be deemed to include the latest edition or issue of such standard, current at the time of Tender.

4031 STANDARDS DOCUMENTS: Materials and workmanship conforming to national and international standards identical to, or technically equivalent to, standards specified may be used in the works subject to approval. Submit data, set out in the form of a comparative study and statement as evidence of the above.

4041 STANDARDS DOCUMENTS: The Contractor shall supply the Engineer's Representative with single copies of all standards referred to on the Drawings or in the Specification, for Site use.

4051 MANUFACTURER AND REFERENCE: Where used in this combination:

"manufacturer (Man:)" means the firm under whose name the particular product is marketed

"reference (Ref.:)" means the proprietary brand name and/or reference by which the particular product is identified.

4061 "MANUFACTURER'S RECOMMENDATIONS" means the manufacturer's current recommendations or instructions, printed or in writing.

4071 "OR OTHER EQUAL AND APPROVED" means that products of other manufacture may be substituted if prior approval has been obtained. The Engineer reserves the right to insist on the products specified. The rates or prices will be held to be based on the products specified, unless agreed otherwise.

4081 ABBREVIATIONS: Wherever the following abbreviations of titles, terms and units of measurement are used in the Specifications or on the Drawings, the intent and meaning shall be interpreted as described hereunder.

AASHTO	-	American Association of State Highway and Transportation Officials
ABS	-	Acrylonitrile-Butadiene-Styrene

ACI	-	American Concrete Institute
AISC	-	American Institute of Steel Construction
AISI	-	American Iron and Steel Institute
ANSI	-	American National Standards Institute
API	-	American Petroleum Institute
ASTM	-	American Society for Testing and Materials
AV.	-	average
AWG	-	American wire gauge
AWS	-	American Welding Society
bit.	-	bitumen/bituminous
BS	-	British Standard
BSSC	-	bituminous slurry seal coat
BST	-	bituminous surface treatment
CB	-	circuit breaker
CBR	-	California Bearing Ratio
conc	-	concrete
CIE	-	Commission Internationale de l'Eclairage
DBSC	-	double bituminous seal coat
DIN	-	Deutsches Institute Fur Normalizieung
Equiv	-	equivalent
FSS	-	Federal Standard Specification (USA)
hwy	-	highway
ht	-	height
H:V	-	horizontal:vertical
IEC	-	International Electrical Commission
IEE	-	Institution of Electrical Engineers (UK)
ISO	-	International Organization for Standardization
L.L.	-	liquid limit
L.S.	-	lump sum
max	-	maximum
MCCB	-	molded case circuit breaker
min	-	minimum (or minute)
MUTCD	-	Manual on Uniform Traffic Control Devices
NEC	-	National Electrical Code (UK)
NEMA	-	National Electrical Manufacturers' Association (USA)
NJB	-	New Jersey barrier
pav't	-	pavement
P.C.	-	prime cost
PCC	-	Portland cement concrete
PE	-	polyethylene
P.I.	-	plasticity index
P.L.	-	plastic limit
PTFE	-	Polytetrafluoroethylene
PVC	-	polyvinyl chloride
qty	-	quantity
RC	-	reinforced concrete
RCP	-	reinforced concrete pipe
rdwy	-	roadway
ROW	-	right-of-way

SBSC - single bituminous seal coat
S.G. - specific gravity
SI - Systeme International D'Unites
Sta - Station (location along a survey line)
SWG - standard wire gauge (UK)
TBSC - triple bituminous seal coat
uPVC - unplasticized polyvinyl chloride
VDE - Verband Deutscher Electrotechniker
wgt - weight

1:32:5 BILLS OF QUANTITIES

5001 MEASUREMENT PROCEDURES GENERALLY: All Works shall be measured net and in accordance with of the General Conditions of Contract. All units of measurement shall be in the Metric System, unless specified otherwise.

5002 METHOD OF MEASUREMENT: The Bills Of Quantities have been measured in accordance with the method of measurement incorporated therein, except where the description of any item in the Bills of Quantities indicates otherwise. Remeasurement of the Works and measurement of varied works will be carried out on the same basis of measurement.

5005 THE METHOD OF MEASUREMENT and computations to be used in determining quantities of materials furnished and of Works performed shall be as defined in respective sections in the Specification.

5010 FIELD MEASUREMENTS of quantities for monthly certificates and for Final Payment shall be made by the Contractor in the presence of the Engineer. Original copies of the field measurement notes, signed by the Contractor, will be retained by the Engineer.

5015 IF THE CONTRACTOR FAILS to measure any Pay Items, the Engineer may, at his discretion, estimate quantities of such items for the monthly Payment Certificate or recommend that no payment be made for the Items not measured and quantities not computed until it is measured.

5020 MANUFACTURED ITEMS Whenever standard manufactured items are specified, such as fence wire, plates, rolled shapes, pipe conduit, etc. and these items are identified by gauge, unit weight, section dimensions, etc., such identifications shall be deemed to be nominal weights or dimensions. Unless controlled by tolerances in cited Specifications, manufacturing tolerances established by the industries involved may be accepted by the Engineer at the recommendation of the Concerned Authorities.

5025 GAGE DESIGNATIONS The term "gage" when referring to the size steel plate shall mean U.S. Standard Gage, except when referring to galvanized sheets used in the manufacture of corrugated metal pipe, metal plate pipe culverts and arches and metal cribbing, when "gage" shall be as specified in AASHTO M 36 or AASHTO M 167, and when referring to wire when "gage" shall be as specified in AASHTO M32.

5030 FITTINGS AND ACCESSORIES When any Items are shown on the Drawings or specified as requiring miscellaneous fittings and accessories for which no separate measurement is provided, the Pay Item will be deemed to include for all such fittings and accessories.

5035 WEIGHT MEASUREMENTS All materials which are to be measured or proportioned by weight shall be weighed on accurate and approved scales by competent and qualified personnel, at locations designated or approved by the Engineer.

5036 WEIGHT MEASUREMENTS Trucks used to haul material being paid for by weight shall be weighed empty each day at such times as the Engineer directs and each truck shall bear a plainly visible and legible identification mark.

5040 LINEAR AND AREA MEASUREMENTS All items which are to be measured by linear meter, such as pipe culverts, guardrail, underdrains, etc., shall be measured parallel to the base or foundation upon which such structures are placed, unless otherwise shown on the Drawings.

5041 LINEAR AND AREA MEASUREMENTS Unless otherwise specified, longitudinal measurements for area computations shall be made horizontally and no deductions shall be made for fixtures with an area less than one sq.m. Transverse measurements for area computations shall be the neat dimensions shown on the Drawings or as ordered by the Engineer.

5042 LINEAR AND AREA MEASUREMENTS No measurements shall be made of rolled down or sloping edges of bituminous courses.

5051 EARTHWORK VOLUME MEASUREMENTS The quantities of excavation paid for under the Contract unit prices shall be limited to the lines shown on the Drawings and on approved cross sections. Excavation beyond lines shown on approved cross sections shall not be paid for unless approved by the Engineer. Excavation in excess of approved cross sections will be measured for payment only in the case of unstable or unsuitable materials ordered by the Engineer to be removed.

5060 ORDERING MATERIALS: The quantities stated in the Bills of Quantities are not to be used for ordering materials.

PROCEDURE NOTE 1

SUBMITTALS FOR SHOP DRAWINGS

SHOP DRAWINGS

A. Submit newly prepared information, drawn to accurate scale. Do not reproduce Contract Documents or copy standard printed information as the basis of Shop Drawings.

1. Include the following information on Shop Drawings:

   a. Dimensions
   b. Identification of products and materials included
   c. Compliance with specified standards
   d. Notation of co-ordination requirements
   e. Notation of dimensions established by field measurement.

2. Submit Co-ordination Drawings where required for integration of different construction elements. Show construction sequences and relationships of separate components where necessary to avoid conflicts in utilization of the space available.

3. Highlight, encircle or otherwise indicate deviations from the Contract Documents on the Shop Drawings.

4. Do not permit Shop Drawing copies without an appropriate final stamp or other marking indicating the action taken by the Engineer to be used in connection with construction.

5. Submittal: submit two hard copies and one reproducible copy (autocad version) and one signed soft copy in PDF format.

B. Shop drawings shall include but shall not be limited to the following, all timely submitted by the Contractor for the Engineer's approval:

1. General

   a. Key plans, legend and notes for the various work trades: road, environmental utilities, electrical and structural works, bridges and underpasses.
   b. Survey in accordance with the General Requirements of the Specifications.
   c. Survey of natural ground levels at project boundaries determining levels for existing roads, buildings, structures, car/garage entrances, etc.

d. Mapping of existing overhead utilities, trees and obstructions and underground utilities including locations of manholes, cables, pipe sizes and types etc. and survey and mapping of existing house connections and utility inlets and outlets.
e. Utility disposition in conjunction with existing utilities mapping including relocation and removal of utilities and obstructions in coordination with utility owners and concerned authorities.

2. Road Works

a. Cross sections, at 25m intervals or less, showing existing and proposed design levels, limit of expropriations, embankment slopes catch points, cut slopes and boundaries, and proposed retaining walls.
b. Road plans and profiles and intersections, grading plans based on performed surveys as above, ensuring setting out data, connection/matching with existing roads, road branches and entrances.
c. Road shop details including sidewalk and median tiling layout, ensuring adequate matching with existing buildings and shop entrances. Details of pavements, curbs, NJ barriers, etc.
d. Shop plans and details for traffic safety features including road marking, guard rails, handrails, balustrades, parapets, signs and gantry signs including their foundations and structural details.
e. Layouts and details for proposed traffic detours during construction approved by the relevant authorities and fitted with all needed safety devices.

3. Environmental Utilities

a. Utility plans and profiles including definitive location and coordinates of proposed manholes, access shafts, gullies, inspection chambers, etc., and utility cross sections. Shop details as well as details for manholes, chambers, gullies etc., and shop structural details for box culverts and channels including bar bending schedules.

4. Electrical

a. Cable plans and details and proposed specific locations of feeder pillars after coordination with concerned authorities, together with feed pillar schedules.
b. Road lighting layouts including definitive location and coordinates of lighting poles, draw pits etc., and road lighting shop details.
c. Layouts and shop details for bridge lighting, under bridge lighting, gantry signs and traffic signs lighting.
d. Telephone duct bank layouts, including definitive location and coordinates of manholes, handholes, etc.
e. Structural details for column foundations, manholes, handholes, boxes, etc.

The Contractor shall also, observe Contractor’s Electrical Drawings requirements stipulated in the Specification.

5. Structural Works

    a. Piles, and pile caps arrangement, dimensions and R.C. details.
    b. Formwork and shoring arrangement and details.
    c. Bar Bending Schedules.
    d. Arrangements for piers and abutments and retaining walls including layouts, elevations, cross sections and R.C. shop details.
    e. Layout and R.C. shop details for access, drainage, lighting openings, etc.

C. Submit Coordination Drawings: Prepare coordination drawings in accordance with requirements in individual Sections, where installation is not completely shown on Shop Drawings, where limited space availability necessitates coordination, or if coordination is required to facilitate integration of products and materials fabricated or installed by more than one entity. Include the following information, as applicable:

    a. Use applicable Drawings as a basis for preparation of coordination drawings. Prepare sections, elevations, and details as needed to describe relationship of various systems and components.
    b. Coordinate the addition of trade-specific information to the coordination drawings in a sequence that best provides for coordination of the information and resolution of conflicts between installed components before submitting for review.
    c. Indicate functional and spatial relationships of components of architectural, structural, civil, mechanical, and electrical systems.
    d. Indicate space requirements for routine maintenance and for anticipated replacement of components during the life of the installation.
    e. Show location and size of access doors required for access to concealed dampers, valves, and other controls.
    f. Indicate required installation sequences.
    g. Indicate dimensions shown on the Drawings. Specifically note dimensions that appear to be in conflict with submitted equipment and minimum clearance requirements. Provide alternate sketches to Engineer indicating proposed resolution of such conflicts. Minor dimension changes and difficult installations will not be considered changes to the Contract.

D. Organize coordination drawings as follows:

1. Floor Plans and Reflected Ceiling Plans: Show architectural and structural elements, and mechanical, plumbing, fire protection, fire alarm, and electrical Work. Show locations of visible ceiling-mounted devices relative to acoustical ceiling grid. Supplement plan drawings with section drawings where required to adequately represent the Work.
2. Plenum Space: Indicate sub-framing for support of ceiling and wall systems, mechanical and electrical equipment, and related Work. Locate components within ceiling plenum to accommodate layout of light fixtures indicated on Drawings. Indicate areas of conflict between light fixtures and other components.
3. Mechanical Rooms: Provide coordination drawings for mechanical rooms showing plans and elevations of mechanical, plumbing, fire protection, fire alarm, and electrical equipment.
4. Structural Penetrations: Indicate penetrations and openings required for all disciplines.

5. Slab Edge and Embedded Items: Indicate slab edge locations and sizes and locations of embedded items for metal fabrications, sleeves, anchor bolts, bearing plates, angles, door floor closers, slab depressions for floor finishes, curbs and housekeeping pads, and similar items.
6. Mechanical and Plumbing Work: Show the following:

    a. Sizes and bottom elevations of ductwork, piping, and conduit runs, including insulation, bracing, flanges, and support systems.
    b. Dimensions of major components, such as dampers, valves, diffusers, access doors, cleanouts and electrical distribution equipment.
    c. Fire-rated enclosures around ductwork.

7. Electrical Work: Show the following:

    a. Runs of vertical and horizontal conduit 1-1/4 inch diameter and larger.
    b. Light fixture, exit light, emergency battery pack, smoke detector, and other fire alarm locations.
    c. Panel board, switch board, switchgear, transformer, busway, generator, and motor control center locations.
    d. Location of pull boxes and junction boxes, dimensioned from column center lines.

8. Fire Protection System: Show the following:

    a. Locations of standpipes, mains piping, branch lines, pipe drops, and sprinkler heads.

9. Review: Engineer will review coordination drawings to confirm that the Work is being coordinated, but not for the details of the coordination, which are the Contractor's responsibility. If the Engineer determines that the coordination drawings are not being prepared in sufficient scope or detail, or are otherwise deficient, the Engineer will so inform the Contractor, who shall make changes as directed and resubmit.

PROCEDURE NOTE 2

PROJECT RECORD (AS-BUILT) DOCUMENTS

2.1 SUMMARY

A. THIS PROCEDURE NOTE specifies administrative and procedural requirements for the preparation and submittal of Project Record Documents.

B. PROJECT RECORD DOCUMENTS required include the following:

1. Marked-up copies of Contract Drawings.
2. Marked-up copies of Shop Drawings.
3. Newly prepared drawings.
4. Marked-up copies of Specifications.
5. Field records for variable and concealed conditions and other miscellaneous records.

C. MAINTENANCE OF DRAWINGS AND DOCUMENTS: Store record drawings and documents in the field office apart from the drawings and documents used for construction. Do not use Project Record Documents for construction purposes. Maintain record documents in good order and in a clean, dry, legible condition. Make Project Record Documents available at all times for the Engineer's inspection.

2.2 RECORD (AS-BUILT) DRAWINGS

A. MARKUP PROCEDURE: During construction, maintain a complete set of all Contract Drawings, approved Shop Drawings, for Project Record Document purposes.

1. Mark these drawings on a continuous basis to record and indicate all changes and field adjustments to show the actual installation where it varies from the installation shown on the original Drawings. Give particular attention to information on concealed elements that would be difficult to identify or measure and record later.
On a continuous basis means as the works are progressively accomplished and completed in relation to each and every drawing.

2. Items required to be marked include, but are not limited to, the following:

   a. dimensional changes to drawings.
   b. revisions to details shown on drawings.
   c. depths of foundations.
   d. locations and depths of underground utilities.
   e. revisions to routing of piping and conduits.
   f. revisions to electrical circuitry.
   g. actual equipment locations.
   h. duct size and routing.
   i. locations of concealed internal utilities.
   j. changes made by Engineer's Variation orders, instructions, directives, etc.
   k. changes made following Engineer's approval of substitutions, alternatives, etc.
   l. details not on original Contract Drawings.

3. Mark record prints of Contract Drawings or Shop Drawings, whichever is most capable of showing actual physical conditions, completely and accurately. Where Shop Drawings are marked, show cross-reference on Contract Drawings location.

4. Mark record sets. Use different colours to distinguish between changes for different categories of work at the same location.

5. Mark important additional information that was either shown schematically or omitted from original Drawings.

6. Note Variation order numbers and similar identifications.

7. Accurately record information in an understandable drawing technique.

8. Record data as soon as possible after obtaining it. Record and check the markup prior to enclosing concealed installations.

B. NEWLY PREPARED RECORD DRAWINGS: Prepare new drawings instead of following procedures specified for preparing record drawings where new drawings are required, and the Engineer determines that neither original Contract Drawings nor Shop Drawings are suitable to show the actual installation. New drawings may be required when a Variation order is issued as a result of the Engineer's approval of a substitution, alternative or other modification.

1. Consult with the Engineer for proper scale and scope of detailing and notations required to record the actual physical installation and its relation to other construction. When completed and approved, integrate newly prepared drawings with procedures specified for organising, copying, binding and submitting record drawings.

C. PROGRESS REVIEW: Unless otherwise indicated or directed, submit a copy of all mark-up and newly prepared drawings for progress review and approval by the Engineer at monthly intervals.

1. Limit submittals to only those drawings marked-up, prepared or further amended since the previous submittal. List drawings in each submittal on a transmittal form.

C. PREPARATION OF RECORD CAD DRAWINGS: Before requesting inspection for determining date of Substantial Completion, review marked-up final Record Prints with the Engineer. When authorized, prepare a full set of CAD Drawings of all Contract Drawings, Shop Drawings and newly prepared Drawings, whether or not changes or additional information are recorded:

1. Incorporate changes and additional information previously marked on Record Prints. Delete, redraw, and add details and notations where applicable.
2. Refer instances of uncertainty to the Engineer for resolution.
3. Identify and date each Record Drawing; include the designation "RECORD (AS-BUILT) DRAWING" in a prominent location.
4. Produce a full set of Record Drawing Plots from completed Record CAD Drawing files, as per the following Final Submittal Format:

   a. Organize Record Prints and newly prepared Record Drawings into manageable sets. Bind each set with thick cover sheets. Include identification and list contents on cover sheets.

   b. Organize CAD information into separate electronic files that correspond to each sheet of the Record Prints. Produce "List of Drawings" sheet. Name each file with the sheet identification number. Include identification in each CAD file.

   c. the Engineer will return the original marked-up record prints and drawings to the Contractor with final comments, for completing and organising into sets, printing, binding, and final submittal.

D. COPIES AND DISTRIBUTION:

1. After incorporating Engineer’s final comments, print one Reproducible Copy (A0 or A1 size) and two sets of A2 Copy Prints unless otherwise specified or directed, of each drawing, whether or not they contain recorded changes and additional information. Organise the copies into manageable sets. Bind each set with durable-paper cover sheets. Include appropriate identification, including titles, dates, and other information on the cover sheets.

2. Organise and bind original marked-up set of prints that were maintained during the construction period in the same manner.

3. Organize CAD information into separate electronic files that correspond to each sheet of the Record Prints. Produce "List of Drawings" sheet. Name each file with the sheet identification number. Include identification in each CAD file. Provide the Record CAD Drawings, along with an electronic pdf version of the said drawings, on two CD-Roms.
4. Submit the marked-up record set, two CDs of the "AutoCAD" latest version record drawing files, Reproducible Copy and the copy sets to the Engineer for the Employer’s records as a requirement precedent to the issue of a Taking-Over Certificate by the Engineer. The Engineer will retain the CD-ROM and one copy set.

2.4 MISCELLANEOUS RECORD SUBMITTALS

A. REFER to other Specification Sections for miscellaneous record-keeping requirements and submittals in connection with various construction activities.

1. Categories of requirements resulting in miscellaneous records may include, but are not necessarily limited to, the following as applicable:

a. field records on excavations and foundations.

b. field records on underground construction and similar work.

c. survey showing locations and elevations of underground lines.

d. invert elevations of drainage piping.

e. surveys establishing building lines and levels.

f. approved measurements for pricing purposes.

g. records of plant treatment.

h. ambient and substrate condition tests.

i. certifications received in lieu of labels on bulk products.

j. batch mixing and bulk delivery records.

k. testing and qualification of tradesmen.

l. documented qualification of installation firms.

m. load and performance testing.

n. inspections and certifications by governing authorities.

o. leakage and water-penetration tests.

p. fire-resistance and flame-spread test results.

q. inspection and correction procedures.

B. COMPLETE and compile miscellaneous records progressively, as they occur and become available. Do not wait until the end of the project.

1. Before submitting a request for inspection prior to issue of a Taking-Over Certificate by the Engineer, complete and compile miscellaneous records and place in good order, properly identified and catalogued, and bound or filed, ready for use and reference.

2. Submit completed miscellaneous records to the Engineer for review and approval.

a. the Engineer will return miscellaneous records to the Contractor with final comments, for completing and organising into sets, printing, binding, and final submittal.

C. COPIES AND DISTRIBUTION: After incorporating Engineer's final comments, print 3 copies unless otherwise specified or directed, of miscellaneous record documents. Organise the copies into sets and bind each set with durable-paper cover sheets. Include appropriate identification, including "MISCELLANEOUS PROJECT RECORDS", titles, dates, and other information on each cover sheet.

1. Submit the marked-up record copy sets to the Engineer for the Employer's records (PDF and soft copies (Autocad)) as a requirement precedent to the issue of a Taking-Over Certificate by the Engineer in accordance with Conditions of Contract. The Engineer will retain one copy set.

PROCEDURE NOTE NO. 3

INSTRUCTION AND MAINTENANCE MANUALS

1.1 SUMMARY

A. This Procedure Note specifies administrative and procedural requirements for instruction and maintenance manuals including the following:

1. Preparation and submittal of operating and maintenance manuals for building operating systems or equipment (As Applicable).

2. Preparation and submittal of instruction manuals covering the care, preservation and maintenance of architectural products and finishes (As Applicable).

3. Instruction of the Employer's operating personnel in operation and maintenance of building systems and equipment (As Applicable).

B. Special operating and maintenance data requirements for specific pieces of equipment or building operating systems are included in the appropriate Specifications Sections.

1.2 QUALITY ASSURANCE

A. Maintenance Manual Preparation: In preparation of Maintenance Manuals, use personnel thoroughly trained and experienced in operation and maintenance of the equipment or system involved.

1. Where written instructions are required, use personnel skilled in technical writing to the extent necessary for communication of essential data.

2. Where Drawings or diagrams are required, use draftsmen capable of preparing Drawings clearly in an understandable format.

B. Instructions for the Owner's Personnel: For instruction of the Employer's operating and maintenance personnel, use experienced instructors thoroughly trained and experienced in the operation and maintenance of the building equipment or system involved.

1.3 SUBMITTALS

A. Submittals Schedule: Comply with the following schedule for submittal of operating and maintenance manuals.

1. Before Substantial Completion, when each installation that requires submittal of operating and maintenance manuals is nominally complete, submit two draft copies of each manual to the Engineer for review. Include a complete index or table of contents of each manual. The Engineer will return one copy of the draft with comments within thirty days of receipt.

2. Submit one copy of data in final form at least thirty days before final inspection. This copy will be returned within thirty days after final inspection, with comments.

3. After final inspection make corrections or modifications to comply with the Engineer's comments. Submit the specified number of copies of each approved manual to the Engineer within fifteen days of receipt of the Engineer's comments.

B. Form of Submittal: Prepare operating and maintenance manuals in the form of an instructional manual for use by the Employer's operating personnel. Organize into suitable sets of manageable size. Where possible, assemble instructions for similar equipment into a single binder.

1. Binders: For each manual, provide heavy-duty, commercial quality, durable 3-ring vinyl covered loose-leaf binders, in thickness necessary to accommodate contents, sized to receive 8-1/2" by 11" paper. Provide a clear plastic sleeve on the spine, to hold labels describing the contents. Provide pockets in the covers to receive folded sheets.

   a. Where two or more binders are necessary to accommodate data, correlate data in each binder into related groupings in accordance with the Project Manual table of contents. Cross-reference other binders where necessary to provide essential information for proper operation or maintenance of the piece of equipment or system.

   b. Identify each binder on the front and spine, with the typed or printed title "OPERATION AND MAINTENANCE MANUAL", Project title or name, and subject matter covered. Indicate the volume number for multiple volume sets of manuals.

2. Dividers: Provide heavy paper dividers with celluloid covered tabs for each separate Section. Mark each tab to indicate contents. Provide a typed description of the product and major parts of equipment included in the Section on each divider.

3. Protective Plastic Jackets: Provide protective transparent plastic jackets designed to enclose diagnostic software for computerized electronic equipment.

4. Text Material: Where written material is required as part of the manual use the manufacturer's standard printed material, or if it is not available, specially prepared data, neatly typewritten, on 8-1/2" by 11", 20 pound white bond paper.

5. Drawings: Where Drawings or diagrams are required as part of the manual, provide reinforced punched binder tabs on the Drawings and bind in with the text.

   a. Where oversize Drawings are necessary, fold the Drawings to the same size as the text pages and as a foldout.

b. If Drawings are too large to be used practically as a fold out, place the Drawing, neatly folded, in the front or rear pocket of the binder. Insert a typewritten page indicating the Drawing title, description of contents and Drawing location at the appropriate location in the manual.

1.4 MANUAL CONTENT

A. In each manual include information specified in the individual Specification Section, and the following information for each major component of building equipment and its controls.

1. General system or equipment description
2. Design factors and assumptions
3. Copies of applicable Shop Drawings and Product Data
4. System or equipment identification, including:
   a. Name of manufacturer
   b. Model number
   c. Serial number of each component.
5. Operating instructions
6. Emergency instructions
7. Wiring diagrams
8. Inspection and test procedures
9. Maintenance procedures and schedules
10. Precautions against improper use and maintenance
11. Copies of warranties
12. Repair instructions including spare parts listing
13. Sources of required maintenance materials and related services
14. Manual Index.

B. Organize each manual into separate Sections for each piece of related equipment. As a minimum each manual shall contain a title page, a table of contents, copies of Product Data, supplemented by Drawings and written text, and copies of each warranty, bond and service Contract issued.

1. Title Page: Provide a title page in a transparent plastic envelope as the first sheet of each manual. Provide the following information.

   a. Subject matter covered by the manual
   b. Name and address of the Project
   c. Date of submittal
   d. Name, address, and telephone number of the Employer
   e. Name and address of the Employer
   f. Cross reference to related systems in other operating and maintenance manuals.

2. Table of Contents: After the Title Page, include a typewritten table of contents for each volume, arranged systematically according to the Project Manual format. Include a list of each product included, identified by product name or other appropriate identifying symbol and indexed to the content of the volume.

a. Where more than one volume is required to accommodate data for a particular system, provide a comprehensive table of contents for all volumes in each volume of the set.

3. General Information: Provide a general information Section immediately following the Table of Contents, listing each product included in the manual, identified by product name. Under each product, list the name, address, and telephone number of the Subcontractor or installer, and the maintenance contractor. Clearly delineate the extent of responsibility of each of these entities. In addition, list a local source for replacement parts and equipment.

4. Product Data: Where manufacturer's standard printed data is included in the manuals, include only sheets that are pertinent to the part or product installed. Mark each sheet to identify each part or product included in the installation. Where more than one item in a tabular format is included, identify each item, using appropriate references from the Contract Documents. Identify data that is applicable to the installation and delete references to information that is not applicable.

5. Written Text: Where manufacturer's standard printed data is not available, and information is necessary for proper operation and maintenance of equipment or systems, or it is necessary to provide additional information to supplement data included in the manual, prepare written text to provide necessary information. Organize the text in a consistent format under separate headings for different procedures. Where necessary, provide a logical sequence of instruction for each operating or maintenance procedure.

6. Drawings: Provide specially prepared Drawings where necessary to supplement manufacturer's printed data to illustrate the relationship of component parts of equipment or systems, or to

7. Provide control or flow diagrams. Co-ordinate these Drawings with information contained in Project record Drawings to assure correct illustration of the completed installation.

a. Do not use original Project Record Documents as part of the Operating and Maintenance Manuals.

8. Warranties, Bonds and Service Contracts: Provide a copy of each warranty, bond or service Contract in the appropriate manual for the information of the Owner's operating personnel. Provide written data outlining procedures to be followed in the event product failure. List circumstances and conditions that would affect validity of the warranty or bond.

1.5 MATERIAL AND FINISHES MAINTENANCE MANUAL

A. Submit four copies of each manual, in final form, on material and finishes to the Engineer for distribution, along with four sets in electronic PDF format (on CD-ROM). Provide one section for architectural products, including applied materials and finishes, and a second for products designed for moisture protection and products exposed to the weather.

1. Refer to individual Specification Sections for additional requirements on care and maintenance of materials and finishes.

B. Architectural Products: (As Applicable).

C. Moisture-Protection and Weather-Exposed Products: Provide complete manufacturer's data with instructions on inspection, maintenance and repair of products exposed to the weather or designed for moisture-protection purposes.

1. Manufacturer's Data: Provide manufacturer's data giving detailed information, including the following, as applicable:

a. Applicable standards
b. Chemical composition
c. Installation details
d. Inspection procedures
e. Maintenance information
f. Repair procedures

D. Schedule: Provide complete information in the materials and finished manual on products as directed by the Engineer.

1.6 EQUIPMENT AND SYSTEMS MAINTENANCE MANUAL (As Applicable)

A. Submit four copies of each completed manual on equipment and systems, in final form, to the Engineer for distribution, along with four sets in electronic PDF format (on CD-ROM). Provide separate manuals for each unit of equipment, each operating system, and each electric and electronic systems.

1. Refer to Specification Sections for additional requirements on operating and maintenance of the various pieces of equipment and operating systems

B. Equipment and Systems: Provide the following information for each piece of equipment, each building operating system, and each electric or electronic system.

1. Description: Provide a complete description of each unit and related component parts, including the following:

a. Equipment or system function
b. Operating characteristics
c. Limiting conditions.
d. Performance curves
e. Engineering data and tests
f. Complete nomenclature and number of replacement parts.

2. Manufacturer's Information: For each manufacturer of a component part or piece of equipment provide the following:

a. Printed operating and maintenance instructions
b. Assembly Drawings and diagrams required for maintenance
c. List of items recommended to be stocked as spare parts.

3. Maintenance Procedure: Provide information detailing essential maintenance procedures, including the following:

   a. Routine operations
   b. Trouble-shooting guide
   c. Disassembly, repair and reassembly
   d. Alignment, adjusting and checking

4. Operating Procedures: Provide information on equipment and system operating procedures, including the following:

   a. Start-up procedures
   b. Equipment or system break-in
   c. Routine and normal operating instructions
   d. Regulation and control procedures
   e. Instructions on stopping
   f. Shut-down and emergency instructions
   g. Summer and winter operating instructions.
   h. Required sequences for electric or electronic systems
   i. Special operating instructions.

5. Servicing Schedule: Provide a schedule of routine servicing and lubrication requirements, including a list of required lubricants for equipment with moving parts.

6. Controls: Provide a description of the sequence of operation and as-installed control diagrams by the control manufacturer for systems requiring controls.

7. Co-ordination Drawings: Provide each Contractor's co-ordination Drawings.

   a. Provide as-installed colour-coded piping diagrams, where required for identification.

8. Valve Tags: Provide charts of valve tag numbers, with the location and function of each valve.

9. Circuit Directories: For electric and electronic systems, provide complete circuit directories of panelboards, including the following:

   a. Electric service
   b. Controls
   c. Communication.

C. Schedule: Provide complete information in the equipment and systems manual on products specified as requested by the Engineer.

1.7 INSTRUCTIONS OF THE EMPLOYER'S PERSONNEL

A. Prior to final inspection, instruct the Employer's personnel in operation, adjustment, and maintenance of products, equipment and systems. Provide instruction at mutually agreed upon times.

1. For equipment that requires seasonal operation, provide similar instructions during other seasons.

2. Use operation and maintenance manuals for each piece of equipment or system as the basis of instruction. Review contents in detail to explain all aspects of operation and maintenance.

1:33 MANAGEMENT PROCEDURES

1:33:1 COMMENCEMENT, PROGRAMME AND PROGRESS

1001 COMMENCEMENT: The Employer shall issue the Order to Commence to the Contractor and shall notify accordingly the Engineer on the Date of issuance of the Order to Commence. After receipt of the Order to Commence, the Contractor shall inform the Engineer's Representative, at least 7 days in advance, of the proposed date for commencing work on Site.

1011 CO-ORDINATION: The Contractor shall co-ordinate the construction activities included therein to assure efficient and orderly installation of each Part of the works. Co-ordinate construction operations included under differing sections of the Specifications that are dependant upon each other for proper installation, connection and operation.

1. Where installation of one part of the work is dependant on the installation of other components, either before or after its own installation, schedule construction activities in the sequence required to obtain the best results.

2. Where availability of space is limited restricted by access or security, co-ordinate installation of the different components to assure maximum accessibility at desired times for required maintenance service and repair.

3. Make adequate provisions to accommodate items scheduled for later installation.

1021 PROGRAMME: The Contractor shall submit for the Engineer's review in accordance with Conditions of Contract, a computer-based programme in critical path network (CPN) form, showing at least the following information:

(a) Contract milestones (Commencement Date, date for completion of Sections of the Works, date for completion of the whole of the Works, etc.)

(b) duration of each construction activity in working days

(c) earliest/latest start and completion dates for each construction activity

(d) free float time for each activity

(e) total float time for each activity

(f) cost of each activity as per Contract rates

(g) duration and earliest/latest dates for procurement of materials and Plant

(h) duration and earliest/latest dates for mobilization

(i) duration and earliest/latest dates for activities to be performed by Subcontractors

(j) number of working days per week

(k) number of working shifts per day for each construction activity

(l) activities for Temporary Works to be supplied and constructed and the dates for supply, construction and removal

(m) dates for supply by the Engineer of Drawings and other information in accordance with Conditions of Contract

(n) dates for submission by the Contractor of Shop Drawings, samples and the like and dates for review and approval by the Engineer, in accordance with Conditions of Contract.

(o) dates and times for work to be performed by other Contractors or for materials and Plant to be supplied by the Employer

(p) duration and earliest/latest dates for testing and commissioning plant and engineering installations.

(q) bar chart showing earliest dates and total float of activities

(r) Constraints and work restrictions indicated in the Contract Documents

(s) Coordination with other contractors

(t) Coordination with relevant authorities.

(u) Resources for each activity

The Contractor shall consider and allow in its programme for uninterrupted port operations.

The Programme shall be accompanied by a detailed method statement/ narrative to show the Contractor's proposed methods, sequence and operation on site, productivity rates, et cetera.

1022 GUIDANCE: The Contractor shall abide by the following:

(a) The Engineer will guide the contractor in the determination of the level of detail to included in the CPN

(b) Construction activities will not be scheduled to exceed twenty-five (25) working days without the approval of the Engineer

(c) One day will be the smallest time unit used

1023 COMPUTER SOFTWARE: Project management software shall be of the professional high-end type (latest version of "Primavera" Project Management).

1031 RESOURCE SCHEDULES: The computer program used for preparing the programme shall also be used for preparation of resource schedules to be submitted to the Engineer with the programme. The resource schedules shall show at least the following information:

(a) quantity of materials to be used for each activity
(b) numbers and classes of workmen to be employed on the Site for each activity
(c) numbers and classes of equipment to be used for each activity
(d) histogram for workmen by class and overall classes
(e) histogram for equipment by class and overall classes.

1041 CASH FLOW ESTIMATE: The computer program used for preparing the programme shall also be used to prepare the cash flow estimate to be submitted by the Contractor in accordance with Conditions of Contract.

1051 MONITORING: The Contractor shall monitor progress of the works and the supply of resources and cash flow compared with the programme, schedules and estimate, update the programme with actual progress data monthly and shall revise the programme, schedules and estimate. At monthly intervals, update program to reflect actual progress of construction and activities. Issue and submit update program and corresponding Contractor's Construction Schedule reports coincidental with each Monthly Statement payment application, unless otherwise directed by the Engineer.

When periodic update indicates the Work is 21 or more calendar days behind the current approved schedule, submit a separate recovery schedule indicating means by which Contractor intends to regain compliance with the schedule. Indicate changes to working hours, working days, crew sizes, and equipment required to achieve compliance, and date by which recovery will be accomplished. Copies of revised programmes etc. and notices of actual and forecast delays and shortfalls shall be regularly given to the Engineer.

If requested by the Engineer, the Contractor shall prepare a summary of upcoming works indicating activities scheduled to occur or commence prior to submittal of next schedule update.

1061 COMPUTER PROGRAM: The Contractor shall provide the Engineer with a copy of the CD-ROM of the Target, updated and new Target programmes, schedules and estimates in both PDF and Primavera formats, along with 2 colored hard copies

1:33:2 RECORDS AND MEASUREMENTS

2011 LABOUR RECORD: The Contractor shall provide each week a record showing the number and description of workmen employed each day on the Works including those employed by Subcontractors.

2021 MATERIALS AND PLANT RECORD: The Contractor shall provide each week a record showing the quantity and description of all materials and plant delivered to the Site complete with copies of delivery notes.

2031 EQUIPMENT RECORD: The Contractor shall provide each week a record showing the number, type and capacity of all Contractor's Equipment, excluding hand tools, daily employed on the Works.

2041 DAILY CONSTRUCTION REPORT: The Contractor shall provide each day a record showing activities performed and locations in which work has been carried out, subcontractors at Project site, approximate count of personnel and equipment at Project site, accidents, unusual events, stoppages, temperature and weather conditions, and any other matter requested by the Engineer's Representative.

2051 MONTHLY REPORT: The Contractor shall provide monthly reports which summarise the daily and weekly reports and deliver to the Engineer's Representative not later than one week following the end of each month.

2061 WAGES BOOKS AND TIME SHEETS: The Contractor shall keep accurate and proper wage books and time sheets showing wages paid to and time worked by workmen and, when required, produce such wage books and time sheets for inspection by the Engineer's Representative.

2071 CLIMATIC CONDITIONS: The Contractor shall measure and keep an accurate daily record of and submit to the Engineer's Representative at the end of each week:

air temperatures: maximum and minimum

humidity

rainfall: total in mm and hours.

2081 SPECIAL RECORDS: In the event of delays for which an extension of time for completion is sought, or in the event of any claim for costs, the Contractor shall keep such special records of the circumstances as the Engineer's Representative may require, and submit copies regularly for his inspection.

2091 PHOTOGRAPHS: The Contractor shall provide progress photographs taken from approved stations but not less than 36 (Thirty Six) at monthly intervals and submit 3 prints not less than 16 cm x 20 cm with digital photos on CD.

2101 ACCIDENT REPORTS: On the occurrence of any accident which causes personal injury or damage to the Works or any other property, prepare a detailed accident report and submit two copies directly to the Engineer within one day of occurrence. Include details of date and time, location, prevailing conditions, chain of events and causes leading up to accident, persons involved, response by the Contractor's personnel and result or effect of accident. Obtain and attach witness statements, photographs and sketches as applicable.

1. On the occurrence of an accident or event that causes serious injury to any person, summon emergency services, notify appropriate authorities and inform the Engineer immediately.

1:33:3 SITE ADMINISTRATION

3001 ENGINEER'S SITE MEETINGS: The Engineer's Representative will hold site meetings once a month or more frequently if he deems necessary for the efficient management of the Works and he will distribute minutes. Any comments thereon shall be communicated within 5 working days, otherwise minutes are deemed to be considered true record by all attendees. The Contractor shall attend all such meetings and secure the attendance of Subcontractors and others if requested by the Engineer's Representative.

3011 CONTRACTOR'S SITE MEETINGS: The Contractor shall hold such meetings as are necessary for co-ordination of Subcontractors and review of progress.

3021 CO-ORDINATION OF SUBCONTRACTORS ETC.: The Contractor shall co-ordinate the work of all trades and Subcontractors so as to avoid delay and disruption or abortive work. The Contractor shall provide all Drawings, dimensions and other information required for the proper execution of subContract works and of associated builder's work and accept responsibility for the accuracy and fitness of subContract works.

3030 QUALITY CONTROL: The contractor shall prepare and submit for approval by the Engineer the Quality Plan of the project. This plan shall include, but not be restricted to:

- the provision and maintenance of a quality control programme throughout the project,
- the procedures that are to be undertaken by the Contractor throughout the project,
- inspection and testing of products, both on and off site, by independent professional inspection and testing companies, as applicable,
- provision of inspection and testing equipment,

- verification of affidavits and certificates that selected materials meet the specified standards,
- the maintenance of quality control documentation in accordance with the various procedures identified in these documents.

1:33:4 COMPLETION

4051 NOTICE OF COMPLETION: The Contractor shall give the Engineer at least four weeks notice of the anticipated date of substantial completion of the whole or any part of the Works.

4101 MAKING GOOD DEFECTS: The Contractor shall make arrangements with the Employer and give reasonable notice of the dates for access to the various parts of the Works for the purpose of making good defects and shall inform the Engineer of the dates and when remedial works to the various parts of the Works are completed.

1:34 QUALITY STANDARDS AND CONTROL

1:34:1 GENERALLY

1001 GOOD PRACTICE: Where and to the extent that materials, products and workmanship are not fully specified they are to be of a standard appropriate to the Works and suitable for the purposes stated in or reasonably to be inferred from the Contract Documents, and in accordance with good building practice, including the relevant provisions of current standards, regulations etc.

1:34:2 SETTING OUT AND ACCURACY

2001 SITE SURVEY: Before commencing Work on Site, the Contractor shall carry out a topographical survey of the Site, or such parts of the Site as the Engineer may direct, in conjunction with, or as instructed by, the Engineer, to record the Site limits, dimensions, ground levels, obstructions and other features and to establish base lines and points for future setting out and to record the basis for remeasurement of excavation and earthwork, where applicable.

2011 SETTING OUT: Set out the Works using calibrated equipment and accepted surveying techniques and practices.

1. Establish benchmarks and control points to set lines and levels at each story of construction and elsewhere as needed to locate each element of Project. A minimum of two permanent benchmarks shall be established and maintained on Site, referenced to data established by survey control points. Comply with authorities having jurisdiction for type and size of benchmark.
2. Establish dimensions within tolerances indicated. Do not scale Drawings to obtain required dimensions.
3. Inform installers of lines and levels to which they must comply.
4. Check the location, level and plumb, of every major element as the Work progresses.
5. Notify Engineer when deviations from required lines and levels exceed allowable tolerances.
6. Close site surveys with an error of closure equal to or less than the standard established by authorities having jurisdiction.

2021 SETTING OUT UTILITY WORKS shall be as shown on the Drawings or as instructed on Site. Stake-out be revised if, in the opinion of the Engineer, modification of line or grade is advisable.

2025 SETTING OUT CIVIL WORKS shall be as shown on the Drawings or as instructed on Site.

2031 SETTING OUT: Details of methods and equipment to be used in setting out the Works shall be submitted to the Engineer.

2041 SETTING OUT: The Contractor shall inform the Engineer when setting out is complete and before commencing construction and shall provide instruments and assistance for checking the setting out if required by the Engineer.

2051 RECORD DRAWINGS: The Contractor shall record details of all grid lines, existing ground levels, setting-out stations, bench marks and profiles on the site setting-out Drawing; retain on the Site throughout the duration of the Contract and hand to the Engineer on completion.

2061 ALL DIMENSIONS AND LEVELS both on the Drawings and the Site shall be checked, particularly the correlation between components and the work in place. Materials and components shall not be ordered or work carried out until any discrepancies have been resolved with the Engineer.

2081 APPEARANCE AND FIT: The Works shall be constructed to higher levels of accuracy than those specified where necessary to achieve a satisfactory appearance and to ensure that materials, elements and components of the building fit together as designed. Wherever the accuracy, fit or appearance of the work is likely to be critical or difficult to achieve the Contractor shall obtain the Engineer's approval of proposals or of the partially finished work as early as possible.

2101 NON-COMPLIANCE: Work which fails to meet the specified levels of accuracy must not be rectified without approval. Submit proposals for such rectification or removal and replacement and meet all costs arising, including effects on other work.

1:34:3 PRODUCTS AND MATERIALS

3001 PRODUCTS and materials are to be new unless otherwise specified and are to be handled, stored and fixed with care to ensure they are not damaged when incorporated in the Works.

3002 SELECTION OF PRODUCTS: Select products and materials in accordance with Procedure Note 4: Product Selection (included at the end of this Section).

3005 PRODUCT LIST SCHEDULE: The Contractor shall, before placing any purchase order for any products and materials intended for incorporation in the Works, submit for approval a product list schedule giving a complete description of all such products and

materials, names of manufacturers and suppliers and copies of all test reports verifying conformity with the provisions of the Specifications. Products and materials shall not be ordered without the approval of the Engineer. When directed by the Engineer or otherwise specified, the Contractor shall submit product and material samples for approval in accordance with sub-section 1:34:6.

3011 STANDARDS: For products and materials specified to particular standard, such as BS or ASTM, certificates of compliance are to be obtained from manufacturers when requested by the Engineer.

3021 SINGLE SOURCES: Where a choice of manufacturer or source of supply is allowed for any particular product or material, the whole quantity required to complete the work must be of the same type, manufacture and source. Written evidence of sources of supply are to be provided when requested by the Engineer and sources are not to be changed without approval.

3031 CHECKING COMPLIANCE OF PRODUCTS AND MATERIALS: The Contractor shall check all delivery tickets, labels, identification marks and where appropriate, the goods themselves to ensure that all products comply with the Specification. Where different types of any product are specified, he shall ensure that the correct type is being used in each location. In particular, the following shall be checked:

sources, types, qualities, finishes and colours are correct, and match any approved samples

accessories and fixings which should be supplied with the goods have been supplied

sizes and dimensions are correct

goods are clean, undamaged and in good condition, with intact protective coverings and unbroken seals

materials which have a limited shelf life are not out of date.

3041 STORAGE AND PROTECTION OF PRODUCTS AND MATERIALS: Products and materials shall be stored and protected so as to preserve their quality and suitability for incorporation into the Works. Products and materials approved before storage, may again be inspected prior to their use in the Works. The Contractor shall:

locate and arrange storage so as to facilitate inspection by the Engineer

prevent over-stressing and any other type of physical damage

keep clean and free from contamination and staining

keep dry and in a suitably low humidity atmosphere to prevent premature setting, moisture movement and similar defects. Where appropriate allow free air movement around and between stored components

prevent excessively high or low temperatures and rapid changes of temperature in the material

protect adequately from rain, frost, sun and other elements as appropriate

keep different types and grades of materials separately and adequately identified

so far as possible, keep materials in their original wrappings, packings or containers, with unbroken seals, until immediately before they are used

3045 PRODUCTS AND MATERIALS SUPPLIED BY EMPLOYER: The Contractor shall be responsible for the proper storage and protection of products and materials, if any, furnished by the Employer for the Contractor's use and shall make good any shortages, deficiencies or damage from any cause whatsoever, which may occur after delivery of such products and materials to the Site.

1:34:4 CONTRACTOR'S PLANT AND EQUIPMENT

4001 PLANT AND EQUIPMENT used in the Works shall be of appropriate size, sufficient capacity and in such good mechanical condition as to properly and adequately perform in accordance with the requirements of the Specifications and shall be available for use when required by the Engineer. The Engineer may order removal and replacement of unsatisfactory plant or equipment.

4005 WHEREVER PLANT AND EQUIPMENT of a particular size or type is specified, the Contractor may request permission to use an alternative type in place of that specified. In such cases, the Contractor shall furnish evidence to the Engineer, before approval is given, that the performance and output of the plant or equipment proposed is at least equal to that of the specified type.

4010 CONTRACTOR'S SCHEDULE OF PLANT AND EQUIPMENT: The Contractor shall submit together with his Tender, a complete Schedule of the numbers and types of plant and equipment which he proposes to utilise on Site to carry out the Works. The schedule shall contain full details for each item, including type, manufacturer, model, identification number, year of manufacture, number of years in use, and, for all new and previously used items, the manufacturer's brochures, catalogues and Specifications.

4015 PROVISION AND USE OF PLANT AND EQUIPMENT: The Contractor shall furnish all plant and equipment listed in his Schedule and necessary for construction of each phase of the Works. Such plant and equipment shall be delivered to the Site, inspected, and approved by the Engineer prior to commencement of the particular work for which it is intended. Any plant or equipment, or part thereof, which becomes excessively worn or defective shall be promptly repaired or replaced, as required by the Engineer.

4020 REMOVAL FROM SITE: The Contractor shall not remove from the Site any approved plant or equipment without the permission of the Engineer.

1:34:5 WORKMANSHIP

5001 WORK is to be carried out by or under the close supervision of experienced tradesmen skilled in the particular type of work.

5011 MANUFACTURER'S RECOMMENDATIONS: Products shall be handled, stored, prepared and used in accordance with manufacturer's recommendations. The Contractor shall inform the Engineer if these conflict with any other specified requirement and submit copies of manufacturer's recommendations to the Engineer when requested.

5021 SUITABILITY OF PREVIOUS WORK AND CONDITIONS: Before starting each new type or section of work the Contractor shall ensure that:

previous related work is appropriately complete, in accordance with the project documents, to a suitable standard and in a suitable condition to receive the new work

all necessary preparatory work has been carried out including provision for services, damp proofing, priming and sealing

environmental conditions are suitable, particularly that the building is suitably weathertight when internal components, services and finishes are installed.

5031 DEFECTS IN EXISTING WORK: The Contractor shall report to the Engineer if any existing work is defective and obtain his instructions before proceeding with new work which may cover up the defective work or which may be adversely affected by the defective work.

5041 RECTIFICATION OF DEFECTIVE WORK: If any part of the work is known or is suspected to be not in accordance with the Contract, the Contractor shall submit proposals to the Engineer for opening up, inspecting, testing and rectification and carry out the

Engineer's instructions in relation thereto, including, where so instructed, removal and reconstruction.

1:34:6 PRODUCT DATA, SAMPLES AND APPROVALS

6001 PRODUCT DATA AND SAMPLES: Where approval of products or materials is specified, the Contractor shall submit products data and samples or other evidence of suitability. Orders shall not be confirmed or materials used until approval has been obtained. Approved product and material samples are to be retained on the Site for comparison with products and materials used in the Works and, unless otherwise specified or directed, be removed when no longer required. All products and materials being used will be subject to inspection, testing, or rejection at any time prior to such incorporation.

6011 PRODUCT DATA shall be submitted in accordance with Procedure Note 4: Product Selection.

6015 SAMPLES shall be submitted in accordance with Procedure Note 5: Submittal of Samples (included at the end of this Section).

6021 WORK SAMPLES: Where samples of finished work are specified the Contractor shall obtain approval of stated characteristics before proceeding with the Works and shall retain approved samples on the Site for comparison with the Works. Work samples which are not part of the finished Works shall, unless otherwise specified or directed, be removed when no longer required.

6031 SOURCE TESTS: All source samples shall be taken by the Contractor in the presence of the Engineer, using approved sampling procedures. All source approval tests shall be performed under the supervision of the Engineer or when so specified, by an independent laboratory approved by the Engineer and engaged by and at the Contractor's own cost and expense.

6035 SOURCE TESTS: After approval of any source of materials, the Contractor shall produce from such source only to the extent that materials produced are of substantially the same quality as the approved samples.

6040 SOURCE TESTS: The Engineer may periodically order re-testing of previously approved sources to verify that they continue to conform to the Specifications and may order re-testing at the same or at a different laboratory from the one performing the original source approval tests. If re-testing indicates that a previously approved source no longer conforms with the Specifications, the Contractor shall forthwith cease production from such source.

6061 APPROVALS: Where and to the extent that products, materials or work are specified to be approved, or the Engineer instructs or requires that they are to be approved, the same must be supplied and executed to comply with all other requirements and, in respect of the stated or implied characteristics, either to the express approval of the Engineer, or to match a sample expressly approved by the Engineer as a standard for the purpose.

6065 APPROVALS: Inspection or any other action by the Engineer must not be taken as approval of products, materials or work unless the Engineer expressly confirms in writing, in terms referring to:

date of inspection

part of the work inspected

respects or characteristics which are approved

extent and purpose of the approval

any associated conditions.

Approval, inspection or any other action by the Engineer shall not in any way relieve the Contractor from his responsibility for ensuring the suitability and fitness for purpose of all products, materials and work incorporated into the Works.

1:34:7 GUARANTEES

7001 GUARANTEES: The Contractor shall comply with specific requirements for the provision of guarantees for products, work and installations that are required to be guaranteed in the Specifications. In addition he shall, unless otherwise specified:

ensure that all guarantees commence from the date of substantial completion of the Works as certified by the Engineer, are transferable and are assigned the Employer upon expiration of the Defects Liability Period, where specific periods of guarantee extend beyond that date

ensure that the following additional requirements are accommodated in the guarantees:

a. Related Damage and Losses: when correcting failed or defective guaranteed work, remove and replace other work that has been damaged as a result of such failure or that must be removed and replaced to provide access for correction of guaranteed.

b. Reinstatement of Guarantee: when failed or defective work covered by a guarantee has been corrected by replacement or rebuilding, reinstate the guarantee by written endorsement. The reinstalled guarantee period shall be equal to that of the original guarantee with an equitable adjustment for depreciation.

c. Replacement Cost: upon determination that work covered by a guarantee has failed or is defective, replace or rebuild the work to an acceptable condition complying with the requirements of the Contract. The Contractor shall be responsible for the full cost of removing, replacing and rebuilding failed or defective work, regardless of whether the Employer has benefited from use of the work through a portion of its anticipated useful service life.

submit proposed drafts of written guarantees and obtain approval from the Engineer prior to placing orders for any product, work or installation which is the subject of a specific guarantee requirement:

a. Rejection of Guarantees: the Engineer reserves the right on behalf of the Employer, to reject standard product or other guarantees which in his opinion, conflict with the requirements of the Contract.

compile and submit written guarantees to the Engineer at or prior to substantial completion in the following form:

a. four sets of original copies of all required guarantees, each properly executed by the Contractor, or by the Contractor, Subcontractor, supplier or manufacturer, as applicable

b. organise and arrange the guarantees in an orderly sequence according to the Specification format and bind into heavy duty, commercial quality, vinyl covered, loose leaf binders of appropriate thickness and size to accommodate contents. Identify each binder on the front and spine with the typed or printed title 'GUARANTEES' together with project title and name of Contractor. Provide table of contents, dividers and tab markers for each individual guarantee.

7011 GUARANTEES: The Works shall not be considered to be complete for the purposes of Taking Over under Conditions of Contract until all required written guarantees have been submitted and approved by the Engineer.

7031 GUARANTEES: EMPLOYER RECOURSE: Written guarantees made to the Employer are in addition to implied warranties, and shall not limit the duties, obligations, rights and remedies otherwise available under law, nor shall guarantee periods be interpreted as imposing limitations on the time in which the Employer can enforce such other duties, obligations, rights, or remedies.

1:34:8 WORK AT COMPLETION

8001 FINAL CLEANING: The Contractor shall clear and clean the Site and Works prior to substantial completion using methods acceptable to the Engineer in accordance with Procedure Note 6: Final Cleaning (included at the end of this Section).

8011 TEMPORARY MARKINGS, coverings and protective wrappings shall be removed unless otherwise instructed by the Engineer.

8021 PAINTED SURFACES: The Contractor shall touch up minor faults in newly painted or repainted work, carefully matching colour and brushing out edges, and shall repaint badly marked areas back to suitable breaks or junctions.

8031 MOVING PARTS: The Contractor shall adjust, ease and lubricate moving parts of new work as necessary to ensure easy and efficient operation, including doors, windows, drawers, ironmongery, appliances and controls.

8041 SECURITY AT COMPLETION: The Site and Works shall be left in a secure condition, with all accesses locked. Keys shall be labelled, scheduled and handed to the Employer.

8061 PARTIAL POSSESSION BY EMPLOYER: Where the Works are to be completed in Phases or Sections and such Phase or Section depends for its adequate functioning on work located elsewhere on the Site, such other work shall be completed as required in time to permit completion and occupation by the Employer of the Phase or Section.

8065 PARTIAL POSSESSION BY EMPLOYER: During execution of the remainder of the Works the Contractor shall ensure that:

completed Phases, Sections or parts of the Works have continuous and adequate provision of services, fire precautions, means of escape and safe access

occupants and users are exposed to minimum inconvenience, nuisance and danger.

8081 PROJECT COMPLETION PROCEDURES: Additional administrative requirements and procedural requirements for project completion are prescribed in Procedure Note 7: Project Completion (included at the end of this Section).

PROCEDURE NOTE 4

PRODUCT SELECTION

4.1 DEFINITIONS

A. DEFINITIONS: the following definitions are not intended to change the meaning of other terms used in the Contract, such as "specialties," "systems," "structure," "finishes," "accessories," and such similar terms which are self-explanatory and have well-recognised meanings in the construction industry.

1. "Products" are items purchased for incorporation in the Work, whether purchased for the project or taken from previously purchased stock. The term "product" includes the terms "material," "equipment," "system," and terms of similar intent.

    a. "Named Products" are items identified by the manufacturer's product name, including make or model number or other designation, shown or listed in the manufacturer's published product literature, that is current as of the date of the Contract.

2. “Materials" are products substantially shaped, cut, worked, mixed, finished, refined or otherwise fabricated, processed, or installed to form a part of the Work.

3. "Equipment" is a product with operational parts, whether motorized or manually operated, that requires service connections, such as wiring or piping.

4.2 PRODUCT SELECTION

A. GENERAL PRODUCT REQUIREMENTS: Provide products that comply with the Contract, that are undamaged and, unless otherwise indicated, unused at the time of installation:

1. Provide products complete with all necessary and associated fixings, accessories, trim, finish, safety guards and other devices and details needed for a complete installation and for the intended use and effect.

2. Standard Products: where available, provide standard products of types that have been regularly produced and used successfully in similar situations on other projects.

B. PRODUCT SELECTION PROCEDURES: Product selection is governed by the Contract and governing regulations, not by previous project experience. Procedures governing product selection include the following:

1. Proprietary Specification Requirements: where only a single product or manufacturer is named, provide the product indicated. No substitutions will be permitted, unless otherwise indicated.

2. Semi-Proprietary Specification Requirements: where two or more products or manufacturers are named, provide one of the products indicated. No substitutions will be permitted, unless otherwise indicated.

    a. where products or manufacturers are specified by name, accompanied by the term "or equal" or "or other equal and approved" comply with the procedures concerning "substitutions" to obtain approval for use of an unnamed product.

3. Non-Proprietary Specifications: when the Specifications list products or manufacturers that are available and may be incorporated in the Work, but do not restrict the Contractor to use of these products only, the Contractor may propose any available product that complies with Contract requirements. Comply with procedures concerning "substitutions" to obtain approval for use of an unnamed product.

4. Descriptive Specification Requirements: where Specifications describe a product or assembly, listing exact characteristics required, with or without use of a brand or trade name, provide a product or assembly that provides the characteristics and otherwise complies with Contract requirements.

5. Performance Specification Requirements: where Specifications require compliance with performance requirements, provide products that comply with these requirements, and are recommended by the manufacturer for the application indicated. General overall performance of a product is implied where the product is specified for a specific application.

    a. manufacturer's recommendations may be contained in published product literature, or by the manufacturer's certification of performance.

6. Compliance with Standards, Codes and Regulations: where Specifications only require compliance with an imposed code, standard or regulation, select a product that complies with the standards, codes or regulations specified.

7. Visual Matching: where Specifications require matching an established Sample, the Engineers decision will be final on whether a proposed product matches satisfactorily.

a. where no product available within the specified category matches satisfactorily and also complies with other specified requirements, comply with procedures concerning "substitutions" for selection of a matching product in another product category, or for non-compliance with specified requirements.

8. Visual Selection: where specified product requirements include a phrase similar to "..... as selected from manufacturer's standard colours, patterns, textures....", select a product and manufacturer that complies with other specified requirements. The Engineer will select the colour pattern and texture from the product line selected.

PROCEDURE NOTE 5

SUBMITTAL OF PRODUCT DATA

5.1 PRODUCT DATA

A. COLLECT product data into a single submittal for each element of construction or system. Mark each copy to show which choices and options are applicable to the project.

1. Where product data have been printed to include information on several similar products, some of which are not required for use on the project, or are not included in this submittal, mark copies to clearly indicate which information is applicable.

2. Where product data must be specially prepared for required products, materials or systems, because standard printed data are not suitable for use, submit as Shop Drawings not Product Data.

3. Include the following information in product data:

   a. manufacturer's printed recommendations
   b. compliance with recognised trade association standards
   c. compliance with recognised testing agency standards
   d. application of testing agency labels and seals
   e. notation of dimensions verified by field measurement
   f. notation of co-ordination requirements.
   g. Company profile showing previous similar experience/ similar projects.
   h. Quality certificates from reputable bodies documenting abidance by standards.
   i. Compliance statement of product data with the requirements of the Contract.

5. Submittals: submit 3 copies of each required product data submittal; submit 2 additional copies where copies are required for maintenance manuals. The Engineer will retain one copy, and will return the other marked with the action taken and corrections or modifications required. Unless the Engineer observes non-compliance with provisions of the Contract, the submittal may serve as the final submittal

6. Distribution: provide copies of final product data submittal to manufacturers, subcontractors, suppliers, fabricators, installers, governing authorities and others as required for performance of the construction activities. Show distribution on transmittal forms.

   a. do not proceed with installation of materials, products and systems until a copy of product data applicable to the installation is in the installer's possession.
   b. do not permit use of unmarked copies of product data in connection with construction activities.

PROCEDURE NOTE 6

SUBMITTAL OF SAMPLES

6.1 SAMPLES

A. SUBMIT SAMPLES physically identical with the material or product proposed for use; submit full-size, fully fabricated samples, cured and finished in the manner specified.

1. Mount, display, or package samples in the manner specified to facilitate review of qualities indicated. Prepare samples to match the Engineer's sample where so indicated. Include the following information:

    a. generic description of the sample
    b. size limitations
    c. sample source
    d. product name or name of manufacturer
    e. compliance with recognised standards
    f. compliance with governing regulations
    g. availability
    h. delivery time.

2. Submit samples for review of kind, colour, pattern, and texture, for a final check of these characteristics with other elements, and for a comparison of these characteristics between the final submittal and the actual component as delivered and installed.

    a. where variations in colour, pattern, texture or other characteristics are inherent in the material or product represented by a sample, submit sets of multiple units of the sample (not less than 3 units), which show approximate limits of the variations.

    b. refer to Specification Sections for requirements for samples that illustrate workmanship, fabrication techniques, details of assembly, connections, operation and similar construction characteristics.

    c. refer to Specification Sections for samples to be returned to the Contractor for incorporation in the work. Such samples must be in an undamaged condition at time of use. On the transmittal form, indicate such special requests regarding disposition of sample submittals.

3. Preliminary Submittals: where samples are specified for selection of colour, pattern, texture or similar characteristics from a manufacturer's range of standard choices, submit a single, full set of available choices for the material or product.

a. preliminary submittals will be reviewed and returned with the Engineer's marking indicating selection and other action taken.

4. Submittals: except for samples intended to illustrate assembly details, workmanship, fabrication techniques, connections, operation and other characteristics, submit two sets of samples unless otherwise indicated; one set will be returned by the Engineer, marked with the action taken.

   a. maintain sets of samples, as returned by the Engineer, at the project site, available for quality control comparisons throughout the course of construction activity.

   b. unless the Engineer observes non-compliance with provisions of the Contract, the submittal may serve as the final submittal.

   c. sample sets may be used to for the purpose of final inspection of the construction associated with each set.

5. Distribution of Samples: prepare and distribute additional set of samples to subcontractors, suppliers, fabricators, manufacturers, installers, governing authorities, and other as required for performance of the work. Show distribution on transmittal forms.

6. Field Samples specified in individual Specification Sections are special types of samples. Comply with sample submittal requirements to the fullest possible. Process transmittal forms to provide a record of activity.

PROCEDURE NOTE 7

FINAL CLEANING

7.1 SUMMARY

A. THIS PROCEDURE NOTE specifies administrative and procedural requirements for final cleaning at completion.

1. Special cleaning requirements for specific elements of the work are included in appropriate Sections of the Specifications.

B. GENERAL PROJECT COMPLETION requirements are included in Procedure Note 7: Project Completion.

C. ENVIRONMENTAL REQUIREMENTS: Conduct cleaning and waste disposal operations in compliance with local laws and ordinances. Comply fully with government and local environmental and anti-pollution regulations.

1. Do not dispose of volatile wastes, such as mineral spirits, oil, or paint thinner, in storm drains or sanitary sewer drains.

7.2 MATERIALS

A. CLEANING AGENTS: Use cleaning materials and agents recommended by the manufacturer or fabricator of the surface to be cleaned. Do not use cleaning agents that are potentially hazardous to health or property or that might damage finish surfaces.

7.3 FINAL CLEANING

A. GENERAL: Provide final cleaning operations when indicated. Employ experienced workers or professional cleaners for final cleaning. Clean each surface or unit of work to a standard acceptable to the Engineer, and a condition fit for purpose and immediate building occupancy. Comply with manufacturer's instructions.

B. COMPLETE the following cleaning operations at or prior to substantial completion and before requesting a Taking-Over Certificate in respect of any Section, part or whole of the Works, as applicable.

1. Clean the project Site and grounds in areas disturbed by construction activities, including landscape development areas, of rubbish, waste materials, litter and foreign substances. Sweep paved areas broom clean. Remove petro-chemical spills, stains and other foreign deposits. Rake grounds that are neither planted nor paved, to a smooth even-textured surface.

2. Remove tools, construction equipment, machinery and surplus material from the Site.

3. Clean exposed exterior and interior hard surfaced finishes to a dirt free condition, free of stains, films and similar foreign substances. Avoid disturbing natural weathering of exterior surfaces. Restore reflective surfaces to their original condition.

4. Remove debris and surface dust from limited access spaces, including roofs, plenums, shafts, trenches, equipment vaults, manholes and similar spaces.

5. Broom clean concrete floors in unoccupied spaces (As Applicable).

6. Vacuum clean carpet and similar soft surfaces, removing debris and excess nap. Shampoo, if required.

7. Clean transparent materials, including mirrors and glass in doors and windows. Remove glazing compounds and other substances that are noticeable vision-obscuring materials. Replace chipped or broken glass and other damaged transparent materials. Polish mirrors and glass, taking care not to scratch surfaces.

8. Remove labels that are not permanent labels.

The following shall be carried out as applicable:

9. Touch-up and otherwise repair and restore marred exposed finishes and surfaces. Replace finishes and surfaces that cannot be satisfactorily repaired or restored, or that show evidence of repair or restoration. Do not paint over laboratory certified and similar labels or mechanical and electrical name plates.

10. Wipe surfaces of mechanical and electrical equipment, elevator equipment and similar equipment. Remove excess lubrication, paint and mortar droppings and other foreign substances.

11. Clean plumbing fixtures to a sanitary condition, free of stains, including stains resulting from water exposure.

12. Replace air disposable filters and clean permanent air filters. Clean exposed surfaces of diffusers, registers, and grills. Clean ducts, blowers, and coils if units were operated without filters during construction.

13. Clean light fixtures, lamps, globes and reflectors to function with full efficiency. Replace burned out bulbs, and defective and noisy starters in fluorescent and mercury vapour fixtures.

14. Leave the entire project clean and ready for immediate occupation and use.

C. REMOVAL OF PROTECTION: Remove temporary markings, coverings and protective wrapping and other protection facilities installed during construction to protect previously completed installations during the remainder of the construction period.

D. COMPLIANCE: Comply with governing regulations and safety standards for cleaning operations. Remove waste materials from the site and dispose of in a lawful manner.

1. Where extra materials of value remain after completion of associated construction, they become the Employer's property. Unless otherwise indicated, dispose of these materials as directed by the Engineer.

PROCEDURE NOTE 8

PROJECT COMPLETION

8.1 SUMMARY

A. THIS PROCEDURE NOTE specifies administrative and procedural requirements applying to completion of the Works as a whole and to any Phased, Sectional or partial completion where applicable, including but not limited to:

1. Inspection procedures at substantial and final completion.
2. Instruction of Employer's personnel.

B. COMPLETION requirements for specific construction activities are included in the appropriate Sections of the Specification.

C. COMPLETION requirements for the following are specified elsewhere:

1. Final Cleaning: refer to Procedure Note 6.

2. Submittal of Guarantees: refer to sub-section 1:34:7.

3. Operation and maintenance manuals submittal: refer to Procedure Note 3, included in Section 1:32 Documents and Drawings.

4. Project record documents submittal: refer to Procedure Note 2, included in Section 1:32 Documents and Drawings.

8.2.1 SUBSTANTIAL COMPLETION

A. PRELIMINARY PROCEDURES: Prior to substantial completion, submit a request for inspection prior to issue of a Taking-Over Certificate by the Engineer. Before requesting inspection complete the following. Confirm and list any exceptions in the request.

1. Advise the Employer of impending insurance changeover requirements.

2. Obtain and submit any necessary releases required to enable the Employer unrestricted use of the Works and access to services and utilities. Include occupancy permits, operating certificates and similar releases, as appropriate.

3. Submit specified guarantees, workmanship bonds, maintenance agreements, final certifications, and similar documents.

4. Submit project record Drawings and documents, operation and maintenance manuals, final project photographs and similar final record information.

5. Deliver tools, spare parts, extra stock, and similar items.

6. Make final changeover of permanent locks and transmit keys to the Employer. Advise the Employer's personnel of changeover in security provisions.

7. Complete startup testing of systems and instruction of the Employer's operation and maintenance personnel. Discontinue and remove temporary facilities from the site together with construction tools and equipment and similar elements.

8. Submit final meter readings for utility services and similar data as of the date of substantial completion or dates when the Employer took possession of and assumed responsibility for corresponding parts or Sections of the Work.

9. Complete final cleaning requirements and touch-up painting.

10. Touch up and otherwise repair and restore marred, exposed finishes.

B. INSPECTION PROCEDURES: Upon receipt of the Contractor's request for inspection, the Engineer will either proceed with inspection or advise the Contractor of unfilled requirements. Taking-Over Certificate will be issued following satisfactory inspection or otherwise advise the Contractor of any work that must be completed or corrected before the Taking-Over Certificate will be issued.

1. The Engineer will re-inspect when requested and assured by the Contractor that the Works are substantially complete.

2. If necessary, re-inspection will be repeated.

3. Results of the completed inspection will, to the extent indicated by the Engineer, form the basis of requirements for final inspection at the expiration of the Defects Liability Period.

8.2.2 FINAL COMPLETION

A. PRELIMINARY PROCEDURES: Immediately prior to expiration of the Defects Liability Period, submit a request for final inspection prior to issue of a Defects Liability Certificate by the Engineer. Before requesting inspection complete the following. Confirm and list any exceptions in the request.

1. Submit any specified guarantees, certifications, releases, record documents, manuals, or similar documentation or other items not previously submitted and accepted at substantial completion.

2. Submit a certified copy of the Engineer's list of items to be completed or corrected during the Defects Liability Period, including any inspection list items outstanding from earlier inspections. The certified copy of the list shall be accompanied by a statement from the Contractor, confirming that each item has been completed or otherwise resolved for acceptance under circumstances acceptable to the Engineer.

3. Submit evidence, if applicable, of final continuing insurance coverage complying with insurance requirements.

B. FINAL INSPECTION PROCEDURES: Upon receipt of a request for final inspection, the Engineer will either proceed with inspection or advise the Contractor of unfilled requirements. The Engineer will issue a Defects Liability Certificate following satisfactory inspection or advise the Contractor of work that is incomplete or of obligations that must be fulfilled before the Defects Liability Certificate will be issued.

1. The Engineer will re-inspect when requested and assured by the Contractor that the Works are complete and all obligations fulfilled.

2. If necessary, re-inspection will be repeated.

8.3 INSTRUCTION OF EMPLOYER'S PERSONNEL

A. PRIOR TO SUBSTANTIAL COMPLETION, instruct Employer's personnel in the operation, adjustment, and maintenance of products, equipment, and systems. Provide instruction at mutually agreed upon times. Use qualified instructors thoroughly trained and experienced in the operation and maintenance of the equipment or systems involved

1. For equipment that requires seasonal operation or adjustment, provide similar instruction at appropriate seasons during the Defects Liability Period.

2. Use operation and maintenance manuals for each piece of equipment or system as the basis of instruction. Review contents in detail to explain all aspects of operation and maintenance.

B. OPERATION AND MAINTENANCE INSTRUCTION (As Applicable): Arrange for each installer of facility/building systems and equipment that requires operation and regular maintenance to meet with the Employer's personnel to provide instruction in proper operation, adjustment and maintenance. Provide instruction by manufacturer's representatives if installers are not experienced in operation and maintenance procedures. Include a detailed review of the following items:

1. Maintenance manuals.
2. Record documents.
3. Spare parts and materials.
4. Tools.
5. Lubricants.
6. Fuels.
7. Identification systems.
8. Control sequences.
9. Hazards.
10. Cleaning.
11. Guarantees and bonds.
12. Maintenance agreements and similar continuing commitments.

C. DEMONSTRATE as part of instruction for operating equipment, the following procedures:

1. Startup.
2. Shutdown.
3. Emergency operations.
4. Noise and vibration adjustments.
5. Safety procedures.
6. Economy and efficiency adjustments.
7. Seasonal operation and adjustments.
8. Effective energy utilization.

1:35 SECURITY AND SAFETY OBLIGATIONS

1:35:1 PROTECTION OF THE WORKS

1001 SECURITY: The Contractor shall take all measures necessary, including watching and lighting at night, to prevent unauthorised entry to the Site and to safeguard the Site, the Works, materials, Plant, Contractor's Equipment and Temporary Works against damage from trespass and theft.

1011 PROTECTION: The Contractor shall cover up and protect each section of completed work from damage by water, extreme heat and inclement weather or from damage caused by later operations and shall make good any damage to the satisfaction of the Engineer.

1021 STABILITY: The Contractor shall ensure that stability and structural integrity of the Works are maintained during construction and shall provide temporary supports where necessary and shall not overload any part of the Works with materials, Plant or Contractor's Equipment.

1031 MOISTURE: The Contractor shall prevent any part of the Works from becoming wet or damp where this may cause damage and shall provide fuel, equipment and attendance as necessary to dry out the Works in such a manner as to prevent blistering and failure of adhesion, damage due to entrapped moisture or excessive movement.

1041 HEATING, VENTILATING AND AIR CONDITIONING INSTALLATION cannot be used for drying out the Works.

1051 HEATING, VENTILATING AND AIR CONDITIONING INSTALLATION may be used for drying out the Works, subject to the following conditions:

the Employer does not guarantee that it will be available

the Contractor must take responsibility for the operation, maintenance and supervision of the system, indemnify the Employer against damage and pay all costs

the Contractor must indemnify the Employer against reduction in manufacturer's guarantee periods for equipment due to its use before substantial completion of the Works.

1061 RUBBISH: The Contractor shall remove rubbish and debris from the Site as it accumulates and keep the Works clean and tidy. Rubbish, dirt and debris shall be removed from voids and cavities before they are sealed.

1071 INFESTATION: The Contractor shall take all necessary measures, to the approval of the Engineer, to keep the Works free from infestation by rodents, insects and the like.

1081 EXISTING BUILDINGS AND FACILITIES: The obligations imposed on the Contractor by this sub-section in respect of the Works are to apply equally to any existing building or facility undergoing alteration as part of the Works, and to the contents of such buildings and facilities.

1:35:2 PROTECTION OF OTHER PROPERTY AND SERVICES

2001 ROADS AND FOOTPATHS: The Contractor shall protect public and private roads, footpaths and the like from damage by site traffic or other causes arising from the execution of the Works and shall repair any damage to the satisfaction of the relevant public authority or private owner.

2011 TREES, HEDGES, SHRUBS, LAWNS: The Contractor shall protect, maintain and preserve existing trees, hedges, shrubs, lawns etc. and shall replace to approval, or treat as instructed, any plants or planted areas damaged or removed without approval.

2021 EXISTING FEATURES: The Contractor shall prevent damage to existing buildings, fences, gates, walls, roads, paved areas and other features on the Site or adjacent thereto which are to remain in position during the execution of the Works.

2031 EXISTING SERVICES: The Contractor shall:

notify all service authorities and private owners before commencing any work which may affect or damage existing drains and services and observe all service authorities' regulations and/or recommendations for work adjacent to existing services

ascertain the positions of all services not indicated in the Contract Documents and check the positions of those which are so indicated

adequately protect, maintain and prevent damage to all services and shall not interfere with their operation without the consent of the service authority or owner.

If any damage is caused to existing services as a result of execution of the Works, the Contractor shall notify the Engineer and the service authority or private owner and make arrangements to repair the damage to the satisfaction of the service authority or private owner as appropriate.

2041 ADJOINING PROPERTY: The Contractor shall:

take all reasonable precautions to prevent damage to adjoining property and, if any damage is caused as a result of the execution of the Works, make good to the satisfaction of the owner

obtain permission of the owners if it is necessary to erect Temporary Works or otherwise use adjoining property and pay all charges

advise owners or occupiers of adjoining property of the dates on which work which may affect them is to be executed.

2051 EXISTING CONDITION of roads, paths, features, services and adjoining property which is at risk from damage shall be recorded by photographs or surveys, as appropriate and as directed by the Engineer.

2071 STRUCTURAL FABRIC: The Contractor shall:

provide and maintain during the execution of the Works all shoring, strutting, needling and other supports as may be necessary to preserve the stability of buildings or other structures, whether new or existing, on the Site or on adjoining property, that may be damaged, endangered or otherwise affected by the Works.

submit to the Engineer an outline statement of the methods proposed to be used for the support necessary to preserve the stability of buildings or other structures, together with all relevant Drawings, details, calculations, Specifications and subsoil investigation, as necessary for approval. Such approval by the Engineer shall in no way relieve the Contractor from his obligation and sole responsibility to ensure the prevention of damage to buildings and other structures on or adjacent to the Site.

2076 OCCUPIED PREMISES: The Contractor shall:

where works are to be carried out in or adjacent to occupied premises, ascertain the times and nature of the occupation and use. Carry out works with minimum inconvenience, nuisance and danger to the occupants and users.

advise the Engineer immediately, if any potential hazard or danger arises which may jeopardise the health or safety of persons in occupied premises.

1:35:3 STATUTORY AND OTHER OBLIGATIONS

3001 TRAFFIC REGULATIONS: The Contractor shall ascertain and comply with any regulations concerning traffic and parking in addition to the obligations imposed by the Conditions of Contract and by law.

3002 HEALTH AND SAFETY REGULATIONS: The Contractor shall ascertain and comply with standard Health and Safety regulations and applicable law and regulations.

3011 TRAFFIC CONTROL: The Contractor shall provide and maintain all necessary diversions, diversion signs, barricades, fencing, lighting, flagmen or stop/go signs where the Works affect the safety of traffic and the public on existing roads or temporary diversion roads.

3021 NOISE, POLLUTION AND NUISANCE: The Contractor shall ascertain and comply with any regulations concerning noise, pollution and other nuisance in addition to the obligations imposed by the Conditions of Contract and by law.

3031 NOISE: Compressors, percussion tools and vehicles are to have effective silencers of a type recommended by the manufacturers of the equipment. Pneumatic drills and other noisy appliances shall not be used during days of rest or after normal working hours without consent of the Engineer.

3041 FIRE PRECAUTIONS: The Contractor shall take all necessary measures to prevent personal injury or death, or damage to the Works or other property, including but not limited to

provision of fire fighting facilities in all vulnerable areas and as instructed by the Engineer

marking escape routes and illuminating them if necessary

instructing workmen in fire precautions and use of fire fighting equipment

displaying notices on fire safety and procedures in the event of a fire on Site.

3051 NUISANCE: The Contractor shall take necessary precautions to prevent nuisance from smoke, dust, rubbish, water, polluted effluent and other causes.

3061 EXPLOSIVES: The Contractor shall:

not use explosives without the express permission from the Engineer and controlling authorities

observe all regulations regarding proper purchasing, transportation, storage handling and use of explosives

ensure that explosives and detonators are stored separately in special secure buildings, located and clearly marked with permanent warning signs in English and Arabic "DANGER - EXPLOSIVES", in accordance with requirements of the controlling authorities and to the approval of the Engineer

ensure that all possible precautions are taken against accidental fire or explosion, and ensure that the explosives and detonators are kept in proper and safe condition

ensure that explosives and detonators are always transported in separate vehicles and kept apart until required for final stage of blasting procedure. Ensure that metallic tools are not used to open boxes of explosives.

3062 BLASTING PROCEDURES The Contractor shall:

ensure that the handling of explosives and blasting operations are carried out only by experienced shot-firers. Priming, charging, stemming and shot firing shall be carried out with greatest regard for safety and in strict accordance with the rules and regulations of the concerned authorities to the approval of the Engineer. Adequate warning of blasting shall always be given and all persons cleared from the area, before blasting takes place

ensure that police and other local authorities are kept fully informed of the blasting program so that they may be present when blasting takes place if they so require

ensure that explosive charges are not excessive, charged boreholes are properly protected and proper precautions are taken for the safety of persons and property

maintain an up-to-date inventory of all explosives and explosive devices and submit a monthly report to the Engineer, detailing the use of all explosives by date and location.

1:36 TEMPORARY WORKS AND SERVICES

1:36:1 GENERALLY

1001 LOCATIONS: The Engineer's Representative's approval is to be obtained for the intended siting of all spoil heaps, Temporary Works and services.

1011 STANDARDS AND DETAILS: Temporary Works are to be constructed to recognised standards and codes of practice so that they are fit for their purpose. Drawings and details of proposed Temporary Works are to be provided by the Contractor if requested by the Engineer.

1021 TEMPORARY WORKS and services are to be maintained, altered and adapted and as necessary and cleared away on completion or when no longer required. Work disturbed is to be made good.

1031 GENERAL: The Contractor shall provide all Temporary Works and services and Contractor's Equipment and tools required for the efficient and safe execution of the Works, including but not limited to:

temporary roads, hard standings, sleeper tracks and the like

temporary fences, gates and barriers

temporary offices, stores, messrooms, latrines and compounds

scaffold, ladders, hoists, cranes and the like

implementation of proper safety measures

temporary screens, chutes, coverings, roofs and rainwater pipes for protection of the Works and personnel

transport and vehicles on and off Site

fixed and movable mechanical plant and equipment

small tools

temporary water and power supplies and site lighting

temporary drainage.

1:36:2 TEMPORARY SITE FACILITIES

2011 ROADS: Permanent roads, hard standings and footpaths on the Site may be used provided they are adequately maintained and thoroughly cleaned and made good after use and left in unimpaired condition.

2021 TRAFFIC DIVERSIONS: The Contractor shall provide temporary diversions, detour roads, temporary bridges, culverts and similar facilities, whenever it is necessary to safely divert traffic through or around any part of the Works. Locations, widths, construction and maintenance of diversion and detour routes, including the provision of signs, pavement markings, lighting, traffic control and the like are to approved by the Engineer.

2031 FRENCH CROSSINGS are to be provided for free and safe passage of vehicles and pedestrians over pipe and other trenches.

2041 TEMPORARY SITE FENCE: The Contractor shall provide suitable and secure temporary site fencing and gates where necessary or as directed by the Engineer. Design of the fencing and gates, including location, construction details, etc. is to be submitted to the Engineer for approval prior to fabrication and erection.

2051 NAMEBOARD: The Contractor shall provide two suitably sized project nameboards, bearing the names of the Employer and Engineer together with any corresponding logos, the name of the project, the name of the Contractor and such other names and information as the Engineer may direct. Design and style of the nameboard is to be submitted to the Engineer for approval prior to fabrication. Nameboards are to be written in English and Arabic and erected at suitable locations as directed by the Engineer.

1:36:3 CONTRACTOR'S TEMPORARY FACILITIES

3001 CONTRACTOR'S TEMPORARY FACILITIES: The Contractor shall provide, furnish and equip as necessary, all temporary facilities as required for his own and Subcontractors' use; including but not limited to site offices and mess rooms with appropriate sanitary facilities; workshops, sheds and stores; temporary site toilets, latrines and the like.

1:36:4 TEMPORARY SERVICES

4001 WATER: The Contractor shall provide clean, fresh water for the Works and make temporary arrangements for storing and distributing about the Site.

4011 ELECTRICITY: The Contractor shall provide electric supply and all equipment for lighting and power for the Works and make temporary arrangements for distributing about the Site.

4021 POWER: The Contractor shall provide electric power for the Works, including supplies for commissioning engineering services and Plant, at the required voltages.

4031 LIGHTING: The Contractor shall provide lighting for the Site and the Works for safety and security of the Works and to facilitate proper execution of work and to illuminate internal surfaces during finishing work and inspection. Spaces designed to be artificially lit during daylight hours are to have temporary illumination similar to that provided by the permanent installation.

4061 TELEPHONES: The Contractor shall provide joint temporary telephone and cell phones facilities for his own and Subcontractors' use and for the use of those acting on behalf of the Engineer and shall pay the cost of all calls except international calls not connected with the works made by those acting on behalf of the Engineer.

4071 INTERNET: The Contractor shall provide uninterrupted internet connection for for his own and Subcontractors' use and for the use of those acting on behalf of the Engineer and shall pay Internet service use charges for Multi-user subscription and connection to Internet service provider.

1:36:5 TEMPORARY FACILITIES FOR THE ENGINEER

5101 SITE OFFICES FOR THE ENGINEER: The Contractor shall provide, service and maintain for the exclusive use of the Engineer's staff, prefabricated, portable or demountable offices, suitably sized, arranged, furnished and equipped, to the approval of the Engineer.

1. Offices are to be of proprietary manufacture and insulated and weathertight construction, with lockable entrances and operable windows, hard-wearing easy-clean surfaces and robust and secure fittings:

    a. incorporate sanitary facilities to the extent required for the number and gender of personnel to be accommodated.
    b. support on foundations adequate for normal loading.

2. Provide, maintain and pay all fees for all necessary and required services to offices and facilities, including but not necessarily limited to the following:

    a. heating and air-conditioning.
    b. electric lighting and power.

c. water supply.
d. potable water supply.
e. drainage system.
f. fire fighting appliances.
g. Telephone and internet service.
h. cleaning facilities and services and general attendance.

3. Provide new furniture and equipment suitable for intended use.

Submit fully detailed proposals to the Engineer and obtain approval prior to hire or purchase and delivery to the Site.

5121 SITE OFFICES FOR THE ENGINEER: Provide, furnish, equip, service and maintain site offices and facilities comprising the following:

1. Resident Engineer Office with:

a. 1 double pedestal desk with lockable drawers and 1 swivel armchair.
c. 1 layout reference table.
d. 2 lockable steel filing cabinets.
e. 1 lockable drawing hanger for 10 sets.
f. 1 shelf unit.
g. 2 pin boards.
h. 1 waste paper basket.

2. 3 Staff Offices, each approximately 4 m x 5 m; each with:

a. 2 desk with lockable drawers and 2 swivel chair.
b. 1 lockable steel filing cabinets.
c. 2 office chairs.
d. 1 lockable Drawing hanger for 10 sets.
e. 1 shelf units.
f. 1 pin boards.
g. 2 waste paper baskets.
h. 1 layout reference table.

1. 1 Secretary's Office, approximately 4 m x 5 m; with:

a. 1 secretary's desk and 1 swivel chair.
b. 2 large lockable steel filing cabinets.
c. 3 office chairs.
d. 2 shelf units.
e. 1 pin boards.
f. 1 waste paper baskets.
g. 7 desktop calculators: similar to CASIO fx-3600P.
h. Printer: "All-in-one" unit equipped with printer server, combining color printing, photocopying, scanning, and faxing, or separate units for each of these 4 functions, with A3/A4 paper cassettes.

Service and maintain office machines and equipment regularly and provide all associated consumables, stationery and paper supplies as and when requested.

2. 1 Conference Room, sized to accommodate meetings for 12 people; with:

   a. 1 conference table to seat 12 people.
   b. 12 chairs.
   c. 1 pin boards.
   d. 2 waste paper baskets.

3. 1 Store Room; each with:

   a. heavy duty shelf racking units.
   b. Drawing hangers and racks.

4. 2 Toilets; each with:

   a. WC suite.
   b. toilet roll holder
   c. lavatory basin.
   d. mirror and shelf.
   e. paper towel dispenser.
   f. soap dispenser.
   g. waste bin with cover.

   Service and maintain and clean toilets on a daily basis; provide all associated consumables and supplies as and when requested.

5. 1 Kitchenette; each with:

   a. 1 refrigerator 14 cu.ft. capacity.
   b. 1 water filter and 20 litre water cooler - hot/cold.
   c. 1 electric boiling ring.
   d. 1 Microwave oven.
   e. 1 large waste bin with cover.
   f. kitchen wall cabinets
   g. kitchen base cabinets incorporating heat resistant worktop and stainless steel sink/drainer.
   h. sets of crockery and cutlery sufficient for number of the Engineer's staff.

   Service and maintain and clean kitchen on a daily basis; provide all associated consumables and supplies as and when requested, including drinking water and stocks for making tea and coffee beverages.

5046 ENGINEER'S SITE OFFICES - COMPUTER EQUIPMENT: The Contractor shall provide for the exclusive use of the Engineer's staff, new Laptop computer equipment and peripheral hardware together with all associated accessories, necessary cabling and workstation desking. Submit detailed proposals to the Engineer and obtain approval prior to purchase and delivery to the Site.

Computers provided for the Engineer are to remain the property of the Contractor.

Locate and install in Engineer's site offices, connect and configure computers and peripheral equipment to provide complete and fully operational system installations to the approval of the Engineer, comprising the following:

1. 8 Approved Brand Name Laptop's: Acceptable Brand Name; Intel® Core™ Ultra 7 165U vPro® Processor, Integrated Graphics, 32 GB Memory, 1TB SSD, 14" display screen, with English/Arabic backlit keyboard, and Windows 11 Pro 64 Power, including multiple USB ports and built-in CD/DVD drive.

2. 8 Approved Brand Name Monitor Screens: 24" size, 23.8" viewable area, 60 Hz or higher refresh rate, LED backlight, 16:09 aspect ratio, 1920x1080 pixel resolution, each with dock station, HDMI cable, Keyboard 101 key English – Arabic, and mouse.
3. Software: Original, latest Arabic/English version, multi-user licensed copies of the following software programs for specified operating system, together with user manuals, and maintenance agreements for the duration of the Works:

    a. "Microsoft Professional Office, latest version", including 'Word', 'Excel', 'Power Point', 'Access' and 'Outlook'.

    b. "Microsoft Internet Explorer" or similar

    c. Licenses for Primavera Project Manager (Latest version) for the Engineer and additional licenses for the Contractor's use.

    d. "AutoDesk AutoCAD.

    e. "AntiVirus".
4. Internet: Multi-user subscription and connection to approved, local, Internet service provider.
5. Computer Workstation, comprising:
    a. Desking with wire management; to accommodate Laptop, monitor, keyboard and mouse.
    b. Operator's swivel chair.

Provide anti-static dust covers for all computer equipment. Service and maintain computer equipment regularly and provide all associated consumables, stationary and paper supplies as and when requested.

5091 ENGINEER'S SITE OFFICES - CAR PORTS: provide car ports complete with hardstandings and all necessary adjoining walkways for a minimum of 6 vehicles.

5191 ENGINEER'S VEHICLES: Vehicle for the Engineer: New, air-conditioned, motor vehicles. Vehicle provided for the Engineer is the property of the Contractor and shall be returned to the Contractor at the times as indicated.

2. Vehicle: 2 No. four wheel drive, latest model of the year in brand new condition.

3. Arrange for and pay all charges and costs arising in connection with the delivery, maintenance and running of vehicles, including but not limited to:

a. Delivery charges, license fees, road taxes and certificates.
b. Fully comprehensive insurance cover for any driver at all times.
c. Regular service maintenance and repairs as necessary to keep the vehicles at all times in good roadworthy condition.
d. Supply of fuel, lubricants, replacement parts and other consumables.

4. Provide an acceptable replacement vehicle during any period that a vehicle is unavailable for any reason, including maintenance and/or repair.

5201 VEHICLE DRIVERS: The Vehicles shall have two competent drivers during normal working hours.

5141 TELEPHONE FACILITIES FOR THE ENGINEER: The Contractor shall provide and maintain for the exclusive use of the Engineer's staff, appropriate and adequate telephone facilities and services to the approval of the Engineer, for the duration of the project, including the Defects Liability Period, as follows:

1. Provide and install PABX in the Engineer's site offices, with sufficient line connections and capacity to provide at least one extension in every office, meeting room or occupied space.

2. Provide line connections and services as follows

   a. 1 land line dedicated to PABX in the Engineer's offices.
   b. 2 cellular phones and 2 telephone lines with a monthly prepaid card of 70 US dollars for each line.

3. Pay for all connection, service and user charges and costs arising in connection with the provision of telephone facilities for the Engineer limited to local calls.

5401 SURVEYING EQUIPMENT AND ASSISTANCE: The Contractor shall make available on Site suitable surveying equipment, in good condition, to enable the Engineer to check setting out, etc. and shall provide chainmen and such other assistance as the Engineer may require.

5411 THERMOMETERS: The following shall be provided on Site:

maximum and minimum thermometer for measurement of atmospheric temperature

thermometer for measurement of concrete and ground temperature.

5421 TEST EQUIPMENT: The Contractor shall make available to the Engineer all test equipment required for carrying out tests on materials, Plant or finished work required by the Specification.

5451 INSPECTION FACILITIES: The Contractor shall provide all ladders, access lighting, facilities, etc. and such other assistance as the Engineer may require to inspect any part of the Works.

5402 LABORATORY: provide, furnish and equip, maintain and staff and clear away on completion two materials testing laboratory in an approved location manned by suitably qualified personnel or in an independent Laboratory approved by the Engineer and carry out all site testing required by the Specification.

5411 THERMOMETERS: The following shall be provided on Site:

maximum and minimum thermometer for measurement of atmospheric temperature.

5451 INSPECTION FACILITIES: The Contractor shall provide all ladders, access lighting facilities and assistance etc. required by the Engineer's Representative to inspect any part of the Works.

1:36:6 DIVERSION OF PUBLIC UTILITY SERVICES

6461 TEMPORARY DIVERSION OF EXISTING PUBLIC UTILITY SERVICES: where execution of the Works involves the temporary diversion of existing public utility services, the Contractor shall perform such temporary diversion and shall maintain the flow or service as directed by the Engineer. Unless otherwise stated the cost will be deemed to be included in the Contract Price.

6471 PERMANENT DIVERSION OF EXISTING PUBLIC UTILITY SERVICES: where the Works require the permanent diversion of existing public utility services, either where shown on the Drawings or where directed by the Engineer, the diversion shall be carried out by the Contractor and shall be paid for at the prices stated for such work in the Bill of Quantities.

1:37 HEALTH, SAFETY AND ENVIRONMENTAL REQUIREMENTS

1:37:1 SCOPE OF WORKS

1001 THE SCOPE OF WORKS: as defined in the Contract Documents shall, in addition to whatever is described therein, include the Contractor's responsibility for the management and control of all health, safety and environmental protection including all other related aspects of the project and the site. Such responsibility shall extend to the works and activities of its subcontractors, suppliers and other persons working on or visiting the Site. This shall include, but not be limited to the following:

Provision of suitable welfare facilities including drinking water, drainage, and sanitary disposal with sufficient ventilation and lighting where practical;

Safety consultation and the conduct of regular toolbox meetings;

Emergency procedures including fire-fighting facilities, appliances and training;
Suitable first-aid provisions including training of staff in first-aid skills and the process for emergency rescue;

Site access control and site security in coordination with the emergency procedures;

Site traffic management which shall include site access routes/ circulation and speed restriction/ directional signage;

Environmental management and protection measures against pollution and habitat preservation;

Site communication systems including suitable audible alarm system;

Housekeeping duties and waste management;

Provision and distribution of temporary electrical services including RCD protection for mains powered tools;

Allocation of space and control of contractors' Site facilities and storage areas;

Organisation of Site craneage, hoisting facilities and all lifting operations;

Provision and distribution of temporary utilities required for all works on the Project;

Organisation of final cleanup of the works prior to completion and handover; and

Suitable storage and segregation of flammable materials.

1021 OBLIGATIONS AND RESPONSIBILITIES: in fulfillment of the above obligations and responsibilities, the Contractor shall review the provisions and proposals of all subcontractors and suppliers. The Contractor shall integrate such provisions and proposals into his own HSE plan and ensure the overall management and control of the HSE aspects, facilities and activities of the Project on the Site are as defined above. The Contractor shall consult and coordinate with its subcontractors, suppliers, etc. and shall bring any deficiencies in their provisions and proposals relative to those functions of control and management of the HSE procedures on the Project and Site, for which he is responsible, to their attention.

1:37:2 HEALTH AND SAFETY INFORMATION

2001 GENERALLY: the Contractor shall submit a health, safety and environmental plan which should describe the Contractor's organization and resources, which he proposes to deploy and undertakes to safeguard the health and safety of operatives including those of subcontractors, nominated subcontractors and general visitors to site, including the employees of the Employer and the Engineer. The HSE plan shall include, but not limited to:

A copy of the Contractor's health, safety and environmental policy, statement, proposals and commitment;

Records of the Contractor's training and training policy;

The numbers and type of staff to be responsible for health and safety on this Project with details of their qualifications and duties, and how the responsibility for health and safety management is devolved to the workforce;

Programme of Implementation;

Roles and Responsibilities of all involved within the project including a structured organogram;

Project specific risk assessments and method statements including assessments for controlling and storing hazardous substances (COSHH);

Emergency arrangements for fire, explosions, and terrorist bomb threats that present life threatening situations;

Emergency preparedness and response including emergency rescue procedures;

Measures to reduce occupational health including noise, vibration, dust;

Details on the procedure for monitoring and measurement, workplace inspections, health surveillance, incident investigation, corrective and preventative action, and records;

High risk working procedures covering excavations, work at height, confined space, hot works, ensuring that a suitable permit to work system is enforced;

Information regarding the selection and use of appointed subcontractors;

Information regarding the selection and use of plant and work equipment; and

A strategic HSE induction programme that entails all of the above.

1:37:3 HEALTH AND SAFEY RESPONSIBILITIES OF THE CONTRACTOR

3001 THE CONTRACTOR SHALL: accept responsibility for overall control, co-ordination, supervision and administration of the whole of the Project in respect of health, safety and environmental management, including all subcontractors, nominated subcontractors, suppliers and visitors.

3006 THE CONTRACTOR SHALL: arrange and monitor a programme for health, safety and environmental management with each associated contractor, and subcontractor, and supply all information as necessary for the safe coordination of all work activities relative to the health and safety on the Site.

3011 THE CONTRACTOR SHALL: prepare a Health and Safety Programme for the Project, covering times of working, partial handovers etc. and ensure this programme takes into account the work of all associated contractors and subcontractors, whether nominated or otherwise; including:

In addition to the constant management and supervision of the Project and Site in respect of health and safety provided by the Contractor's person in charge, the Contractor shall ensure all significant or hazardous/risky types of work are under the close control of competent safety supervisors to ensure maintenance of satisfactory safety standards; and

The Employer and the Engineer have set the following health and safety goals for the project in pursuit of **Target Zero**:

a. Zero Accident
b. Zero Incidents.

3016 THE CONTRACTOR SHALL: engage suitably competent and adequately resourced staff, and ensure that associated contractors do likewise to their subcontractors by ensuring that HSE targets are met and that sufficient training is reviewed, and that reports on a daily, weekly, monthly, six monthly and annual basis in respect of health and safety management are made available to the Employer's and the Engineer's safety personnel. The Contractor shall always ensure that all the workers have been provided with suitable health and safety information, instruction and training in respect to their work activities.

3021 THE CONTRACTOR SHALL: ensure the involvement of the entire workforce, as subcontractors and suppliers may need to make special arrangements for workers with different languages. This could include providing translation, using interpreters or replacing written notices with clearly understood symbols or diagrams.

3026 THE CONTRACTOR SHALL: comply with all current legislation, regulations and local standards, both national and international, and define how the requirements of these documents are being met; and ensure copies of these documents are readily available either in hard copies or for access via computer links.

3031 THE CONTRACTOR SHALL: adequately safeguard the Site, its works, products, materials, plant and any existing buildings or structures from damage and theft; and take all reasonable precautions to prevent unauthorised access to the Site, the works and any adjoining properties. The Contractor shall prepare and enforce all necessary site rules, provide relevant parts of the HSE plan and other information to subcontractors and suppliers in sufficient time for them to plan their work.

3036 THE CONTRACTOR SHALL: take reasonable steps to prevent access by unauthorized persons to the Site by displaying suitable signage around the site perimeter and main gate entrance. Only persons who are explicitly authorized, individually or collectively, should be allowed access. The authorization may cover the whole site, or to be restricted to certain areas. Authorized people should have relevant site rules explained to them and undertake any necessary site induction, and should comply with site rules and co-operate with the stated requirements. Some authorized visitors may need to be supervised or accompanied while on site or when visiting specific areas.

3041 THE CONTRACTOR SHALL: provide specific information about the particular risks associated with the Site and the arrangements made for their control. A site induction is not intended to provide general health, safety and environmental training, but it should include a site-specific explanation of senior management commitment to health and safety outlining the project, individual's immediate line manager and any other key personnel, any site-specific health and safety risks. In general this site induction shall address access, transportation and storage of hazardous substances (COSHH), site contamination, manual handling, control measures on the site, arrangements for first aid, arrangements for reporting accidents and other incidents, details of any planned training, such as 'toolbox' talks, arrangements for consulting and involving workers in health and safety and information about the individual's responsibilities for health and safety.

3046 THE CONTRACTOR SHALL: ensure that adequate measures are implemented on Site to assure the stability and structural integrity of the Works during construction and support as necessary. The Contractor stall prevent overloading of structures and check the adequacy and structural integrity and stability of all erected scaffolding and other temporary "work access" systems and sign-off prior to use. The Contractor shall perform the following checks:

Existing buildings or structures adjacent to the Site will be occupied and/or used during the Contract;

Ensure the works are carried out safely and without due inconvenience and nuisance and without danger to occupants and users or equipment/ vehicles and provide for safe operation of the existing facilities;

Passes may be required for access to all parts of the Site. If required by the Employer, the Contractor shall submit a list of the names of all personnel requiring passes together with any other related information the Employer or Engineer may reasonably require; and ensure passes are carried at all times and returned to the Employer when requested and in any case on cessation of the work of the pass holder; and

Ensure the interaction of local residents and pedestrians is minimized at all times and that contractors vehicles do not obstruct access to property and residential areas.

3051 THE CONTRACTOR SHALL: comply with all rules and regulations listed within the Tender and Contract Documents and the 'Site Safety Plan' issued with those Documents. The Contractor shall ensure these rules and regulations are made known to all employees and visitors at safety inductions, and that these rules and regulations are displayed where all may see them.

3056 THE CONTRACTOR SHALL: comply with ISO 45001:2018 and ISO 14001:2015 standards.

3061 THE CONTRACTOR SHALL: inform the Employer and the Engineer in advance of all safety provisions and procedures which will require the compliance of the Employer's and the Engineer's representatives when visiting the site.

3066 WORK NOTIFICATION/PERMIT TO WORK PROCEDURES: will operate for all work carried out: Permits must be obtained by the Contractor in advance where deemed necessary from the Employer and/or the relevant authorities having jurisdiction. The Contractor must ensure that a permit to work system is also in place for hazardous activities that may occur within the Site boundary as opposed to operational areas, this may include activities such as, but not restricted to:

Hot Work;

Confined Spaces;

Electrical (Live Working);

Excavations;

Lone Working;

Demolitions / Explosions; and

Lifting Operations; Etc.

3071 THE CONTRACTOR SHALL: take all reasonable precautions to prevent pollution of the Site, its works, the adjacent facilities, the surrounding drainage and water supplies and the general environment; and provide within the HSE a detailed method statement as to how this requirement will be undertaken and monitored including frequency of checks etc.

3076 THE CONTRACTOR SHALL: remove waste, rubbish, debris, surplus materials and spoil regularly and keep the Site and works clean and tidy; ensure that all waste, rubbish, dirt and other residue are removed from voids and cavities in the construction before closure; and ensure that all roadways and pedestrian areas are kept clean and clear and free from debris at all times.

3081. THE CONTRACTOR SHALL: take all necessary measures to prevent personal injury, death and damage to the Works or other adjacent property or equipment from fire or explosion and the Contractor shall:

Not allow the burning of materials arising from the works on Site;

Designate safe “smoking” areas on the Site and ensure that no smoking is done in areas other than those so designated;

Ensure suitable fire-fighting equipment is available on Site; and

Undertake frequent emergency drills and regular inspections.

3084 THE CONTRACTOR SHALL: take all necessary precautions to avoid excessive electromagnetic disturbance of apparatus outside the Site.

3087 DURING WORK AND INSPECTIONS OF ALL TYPES: the Contractor shall provide temporary lighting, the intensity and direction of which closely resembles that provided by the permanent installation.

3090 THE CONTRACTOR SHALL: install, use and store construction laser equipment in accordance with the manufacturers’ instructions. Use either Class 1 or Class 2 laser equipment ensuring that the laser beam is not set at eye level, and that the beam is terminated at the end of its useful path.

3093 THE CONTRACTOR SHALL: adequately maintain roads and footpaths both around the Site and adjacent to the Site and keep clear of dust, mud and debris.

3095 THE CONTRACTOR SHALL: propose methods of work for effects on adjacent structures inside and outside the Site boundary and ensure the provision and maintenance during the execution of the works of all incidental shoring, strutting, needling and other supports and dewatering installations as may be necessary to preserve the stability of existing structures on the Site or adjoining, that may be endangered or affected by the Works. The Contractor shall support existing structure as necessary during cutting of new openings or replacement of structural parts and monitor adjacent structures and immediately report excessive movement to the Engineer. The Contractor shall allow for the removal of supports only after new work is strong enough to support the existing structure and prevent overstressing of completed work when removing supports.

3097 THE CONTRACTOR SHALL: define, produce and submit an overall Site-specific HSE plan for the Project. This plan should not be generic in nature and must build on the information provided within the Tender and Contract Documents.:

The plan must be prepared, submitted for review prior to the start of construction activities on the Works of the Contract and also be available for review at any time during the construction period. It should be implemented and managed as an operational document throughout the Project and available for all who may be affected by its contents; and

It must be clear in its purpose, well structured, relevant and easy to understand. It should not contain irrelevant material; and
the plan should clearly identify the correct methods of operation and any associated risks therein.

3099 THE CONTRACTOR SHALL: provide to all his staff, the Employer's and Engineer's staff and visitors for the duration of Project (including Mobilization & Defects Liability Period) with all Personal Protective Equipment (PPE) and other safety related items sufficient for the construction of the Project as per the HSE Plan and the Engineer's instructions in this respect.

1:37:4 HEALTH,SAFETY AND ENVIRONMENTAL PLAN

4001 HEALTH, SAFETY AND ENVIRONMENTAL PLAN must be developed and submitted by the Contractor to the Engineer for review & approval within 28 days of receipt of the Letter of Acceptance and is to include as a minimum the following:

4011 DESCRIPTION OF THE PROJECT:

Project Description and Programme details, including health and safety management details;

Details of all subcontractors, etc. including names and contact numbers of those responsible for health and safety affairs, type of work to be undertaken, etc;

Content and extent of all documents are to include but not restricted to the following:

- locations and contact numbers of all emergency services
- operational systems
- plans (traffic management, emergency arrangements, transport logistics)
- location of existing records and plans that are relevant to health and safety on site, including information about existing structures and buried services
- method statements
- risk assessments
- inspection reports
- training
- emergency response and rescue information
- partial and comprehensive evacuation plans

4021 ARRANGEMENTS FOR COMMUNICATION AND MANAGEMENT OF THE WORKS: The Contractor shall conduct and ensure the following:

Regular liaison between parties on Site.
Monitoring and review of health and safety performance and operational management systems.

Management structure and responsibilities related to health and safety goals for the project and arrangements for monitoring and review of health and safety performance.

Consultation with the workforce in respect of health and safety issues.

The exchange of information between all parties particularly the control of and transfer of health and safety information between all types of contractors and all levels of employees on Site, and ensuring it is understood.

The selection and control of contractors, and sub-contractors, and the liaison methods in place in respect of health and safety.

The security of the defined Site, including access and egress controls, and site rules.

Site safety inductions and orientation for all employees and visitors, and further training of all employees in respect of activities requiring specialist health and safety training. These arrangements should indicate how the Contractor ensures all employees have understood their health and safety duties (tests and reviews).

The provision of welfare facilities and first aid at all times of activity.

Arrangements for recording, reporting and investigation of accidents and incidents, including application of systems for future prevention of accidents and incidents and near misses.

The production, reviewing, approval and monitoring of application of risk assessments and method statements and the process whereby these documents are provide for review by the necessary authorities.

The setting of, monitoring, inspection and application of both contractual and additional Site rules, including a disciplinary system for non-compliances.

Fire and emergency procedures, including call out procedures for out-of-hours incidents/accidents/dangerous occurrences.

The establishment of the need for personal protective equipment, and or clothing throughout the Site, including procedures for monitoring non-compliances with these procedures and a disciplinary system.

Inspection, monitoring and review of activities throughout the Project.

The provision of necessary location and direction signage during construction, required to identify clearly all parts of the Site and the Project. Such signage shall be modified and updated on a regular basis to reflect the progress and development of works on Site.

4031 ARRANGEMENTS FOR CONTROLLING SIGNIFICANT SITE RISKS: The Contractor shall conduct and ensure the following:

The risks detailed may not be all of the significant risks associated with the work processes, and are indicative of those that may become apparent on the Site. The Contractor is to identify significant hazards and undertake a risk assessment of those hazards based on the systems detailed within the Contract Documents, and ensures all associated contractors, subcontractors utilize the same system. These risks should, where necessary, be subject to the production of method statements for reviewing by the Engineer and any authority, having jurisdiction.