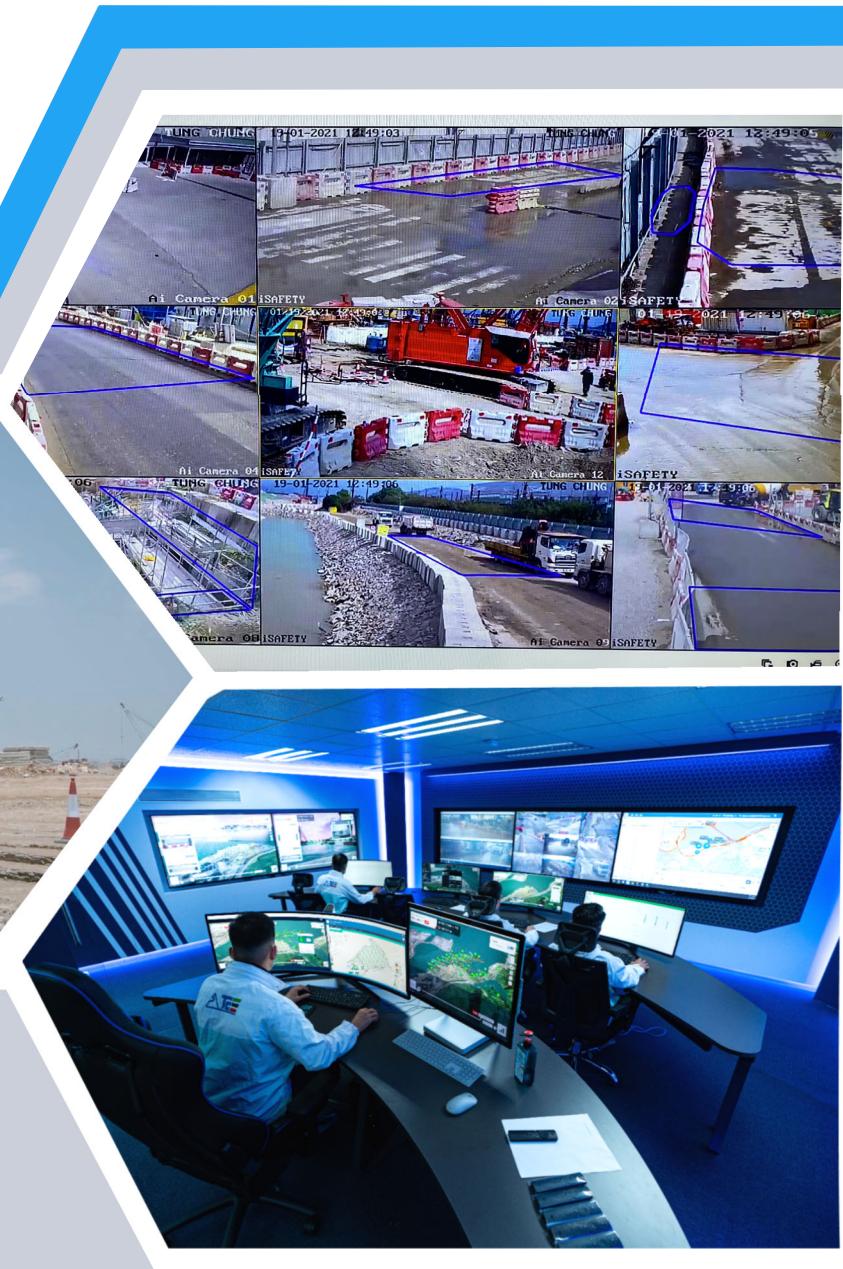




CONSTRUCTION
INDUSTRY COUNCIL
建造業議會



Reference Materials - Sample Specification for Provision of Services for Tracking Disposal of Construction and Demolition Materials by a Global Navigation Satellite System

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CONTENTS

Disclaimer	1
Acknowledgements	1
Preface.....	3
Abbreviations	4
1. Introduction	5
2. Sample Specification Clauses for Provision of Services for Tracking Disposal of Construction and Demolition Materials by a Global Navigation Satellite System.....	6
2.010 General Requirements	6
2.020 Operation	7
2.030 Deliverables	8

PREFACE

The Construction Industry Council (CIC) is committed to seeking continuous improvement in all aspects of the construction industry in Hong Kong. To achieve this aim, the CIC forms Committees, Task Forces and other forums to review specific areas of work with the intention of producing Alerts, Reference Materials, Guidelines and Codes of Conduct to assist participants in the industry to strive for excellence.

The CIC appreciates that some improvements and practices can be implemented immediately whilst others may take more time for implementation. It is for this reason that four separate categories of publication have been adopted, the purposes of which are as follows:

Alerts	The Alerts are reminders in form of brief leaflets produced quickly to draw the immediate attention of relevant stakeholders to the need to follow some good practices or to implement some preventive measures in relation to the construction industry.
Reference Materials	The Reference Materials are standards or methodologies generally adopted and regarded by the industry as good practices. The CIC recommends the adoption of the Reference Materials by industry stakeholders where appropriate.
Guidelines	The Guidelines provide information and guidance on particular topics relevant to the construction industry. The CIC expects all industry stakeholders to adopt the recommendations set out in the Guidelines where applicable.
Codes of Conduct	The Codes of Conduct set out the principles that all relevant industry participants should follow. Under the Construction Industry Council Ordinance (Cap. 587), the CIC is tasked to formulate codes of conduct and enforce such codes. The CIC may take necessary actions to ensure compliance with the codes.

If you have read this publication, we encourage you to share your feedback with us. Please take a moment to fill out the Feedback Form attached to this publication in order that we can further enhance it for the benefit of all concerned. With our joint efforts, we believe our construction industry will develop further and will continue to prosper for years to come.

ABBREVIATIONS

C&D	Construction and Demolition
DGNSS	Differential Global Navigation Satellite System
GNSS	Global Navigation Satellite System [#]
GPS	Global Positioning System
RFID	Radio Frequency Identification

[#]Global Navigation Satellite System (GNSS) is a general term for various satellite constellation systems for positioning, navigation, and timing services (e.g. Global Positioning System, GPS (United States), GLONASS (Russia), Galileo (European Union), and BeiDou (Mainland China)).

1. INTRODUCTION

Tracking the disposal of construction and demolition materials (C&D materials) by positioning technology of a Global Navigation Satellite System (GNSS) (e.g. Global Positioning System (GPS)) can provide prompt and actionable data for monitoring such disposal operations in construction projects. Through the provision of real-time information on the locations and routes of dump trucks, and comprehensive activity updates of all disposal trips from the construction sites to the disposal grounds, a GNSS tracking service can help construction projects to achieve waste management objectives by ensuring that C&D materials disposal operations run smoothly, efficiently and cost effectively.

This publication presents sample specification clauses that can be adopted/adapted for the procurement of services to track the disposal of C&D materials by a GNSS. It is written to provide reference materials for competent professionals in the preparation of contracts. (*Note: a GNSS tracking service is also useful for monitoring the delivery of MiC modules and other offsite components from the production factory to the construction site.*)

The sample specification clauses should be modified or added, where necessary, for the preparation of a particular specification, to suit the requirements of each individual project. Notes are given in italics against some of the clauses on the issues to be considered or factors to be taken into account in finalising the contract requirements.

Practitioners are encouraged to apply to the CIC to seek funding support under the Construction Innovation and Technology Fund (CITF²). Reference should be made to the CIC's CITF website on the pre-approved lists of technologies under the different categories (<http://www.citf.cic.hk/?route=search>). The website provides details of technological solutions that may be applicable in construction projects as well as information on relevant service providers.

As technologies advance rapidly, it is crucial to consult service providers on their latest technological solutions when preparing specifications. In particular, the italicised text in the specification clauses of this publication should be reviewed and updated, where appropriate. Appropriate functional requirements should be included in the specifications to meet the needs of the project and to derive value for productivity improvement and cost effectiveness.

² The CITF was established by the HKSAR Government to encourage wider adoption of innovative constructive methods and new technologies in the construction industry. The CITF provides funding support to consultants, levy paying contractors, registered specialist trade contractors and registered subcontractors to adopt new technologies in their Hong Kong construction projects. For details, please refer to the CITF website at www.citf.cic.hk. Please note that applications for CITF should be made before committing expenses. Technology will only be approved where it is found to meet the objectives of the CITF after assessment by the relevant Vetting Sub-Committee.

2. SAMPLE SPECIFICATION CLAUSES FOR PROVISION OF SERVICES FOR TRACKING DISPOSAL OF CONSTRUCTION AND DEMOLITION MATERIALS BY A GLOBAL NAVIGATION SATELLITE SYSTEM

2.010 General Requirements

- (1) The Contractor shall provide the services required himself or employ a competent service provider to provide the service.
- (2) The Contractor shall ensure that all dump trucks shall be equipped with a Global Navigation satellite system (GNSS) tracking device that can achieve a location tracking accuracy to within $\pm 5\text{m}$.

(Notes:

- (i) *Dump trucks are vehicles serving the Contract for the disposal of C&D materials from the Site to the disposal grounds as specified in the Contract (or any alternative disposal ground(s) subsequently approved by the Architect/Engineer).*
- (ii) *The term “Architect/Engineer” may be changed to other terms to suit different project situations. For example, “Supervising Officer”, “Contract Manager”, and “Appointing Party”, etc., may be used as appropriate.)*

- (3) The Contractor shall ensure that the GNSS tracking device complies with the technical requirements listed in the following table:

Item	Description	Requirements	Remarks
1	GSM band support or LoRa AS923	<i>Capable of supporting frequencies of the latest mobile networks (e.g. 850/900/1800/1900MHz)</i>	To enable communication between the tracking device and a backend server ³
2	GNSS sensitivity	<i>Acquisition: -160dBm Reacquisition: -160dBm Tracking: -160dBm</i>	To ensure accuracy and reliability of the GNSS tracking
3	Power supply	<i>Capable of supporting DC power supplies of construction waste collection vehicles (e.g. 12V - 24V)</i>	To enable continuous operation of the tracking device
4	GNSS data acquisition frequency	<i>Capable of acquiring GNSS data at a frequency upto 1 Hz</i>	To enable continuous operation of the tracking device
5	Data storage capacity when the GSM is offline	<i>2 hours of GNSS data</i>	To enable continuous GNSS tracking during temporary offline periods
6	Provision of a RFID card reader	<i>Capable of reading RFID card issued by a recognised organisation (e.g. CIC)</i>	To read RFID card (e.g. Construction Workers Registration Card)

³ The provider of the server should be indicated in the Contract.

- (4) The Contractor or his service provider shall have at least *two years of experience* in monitoring the movement of dump trucks or other types of vehicles.
- (5) The Contractor shall ensure that the approved GNSS tracking devices installed in dump trucks specifically for serving this Contract are not used to serve any other contract. The Contractor shall submit a declaration on this aspect upon request of the Architect/Engineer.
- (6) The Contractor shall ensure that all requirements under the Personal Data (Privacy) Ordinance (Cap. 486) have been duly complied with in relation to the data/information collected.

**2.020
Operation**

- (1) The Contractor shall inform all dump truck owners and drivers that the vehicle location data (i.e. data obtained from the installed GNSS tracking device (“GNSS vehicle location data”) for every trip involving disposal of C&D materials from the Site to the disposal grounds) will be regularly checked by the Contractor and the Architect/Engineer.
- (2) The Contractor shall obtain written consent from all dump truck drivers for the release of GNSS vehicle location data of the dump trucks serving the Contract to the Contractor and the Architect/Engineer for monitoring purposes.
- (3) The Contractor shall ensure that a bilingual (i.e. both Chinese and English) label is fixed at a prominent place inside the driver’s cabin of each dump truck serving the Contract. The label shall state that the GNSS vehicle location data will be logged throughout the whole disposal trip. The Contractor shall regularly remind all dump truck drivers to keep the GNSS tracking device in an active mode throughout the whole disposal trip.
- (4) The GNSS vehicle location data shall include the following items in a digital format as agreed by the Architect/Engineer:
 - (a) Contract number and title
 - (b) Fleet name (if appropriate)
 - (c) Date
 - (d) Vehicle registration mark
 - (e) Time
 - (f) Latitude & longitude (NEMA) or Northing & Easting in Hong Kong 1980 Grid System
 - (g) Region (Hong Kong, Kowloon, New Territories)
 - (h) District
 - (i) Street name
 - (j) Travelling direction
 - (k) Travelling speed
 - (l) Engine status (on or off)
 - (m) Weight of disposed material from a digital vehicle scale where available, $\pm 5\text{ kg}$
 - (n) Driver identification (ID)

- (5) The tracking routes of all dump trucks (i.e. routes engaged in the disposal of C&D materials under the Contract) shall be presented on a digital map of Hong Kong. The updating frequency of the GNSS location data presented on the digital map shall not exceed every 10 seconds when the engine is ON and every 60 minutes when the engine is OFF.
- (6) The GNSS data of each dump truck in the fleet and all historical paths of each dump truck under the Contract shall be shown on the digital map.
- (7) The GNSS tracking system shall allow the Contractor or the Architect/Engineer to define the construction site and the dumping ground for dump truck in/out recording. The on-board tracking unit in each dump truck shall be provided with a RFID reader for reading the driver's identification and activating the tracking system.
- (8) An orange light on each dump truck shall be turned on when the GNSS tracking device is enabled by the Contractor.
- (9) The GNSS vehicle location data shall belong to the dump truck owners. The Contractor shall ensure that the dump truck owners provide GNSS vehicle location data for any dump truck in any period related to disposal of C&D materials under the Contract as requested by the Contractor, for investigation by or submission to the Architect/Engineer for monitoring purposes. The Contractor shall allow the Architect/Engineer to provide GNSS vehicle location data to relevant government authorities for investigation, if necessary.
- (10) The Contractor shall ensure that all requirements under the Personal Data (Privacy) Ordinance (Cap. 486) have been duly complied with in relation to recording the GNSS vehicle location data and extracting the relevant data for the purpose of conducting spot checks or investigation of suspected incidents.
- (11) When any irregularity in dump truck disposal operations is observed (e.g. abnormal change of weight of disposed material, dumping outside the authorised disposal grounds, or the vehicle has deviated from the designated route to the disposal ground), the Contractor shall take appropriate remedial actions in a timely manner and inform the Architect/Engineer of the actions taken.

2.030 Deliverables

- (1) The Contractor shall maintain a digital register of dump trucks deployed for use in the Contract. The registered information shall include the vehicle owners' details, vehicle license plate numbers, installation date and details of the service provider (if any) of the GNSS tracking device. The register shall be updated at least monthly, and more regularly if required by the Architect/Engineer. The register shall be made available for inspection by the Architect/Engineer upon request. The register shall also be updated whenever a dump truck is no longer engaged by the Contract.
- (2) For newly-engaged dump trucks under the Contract, the Contractor shall provide the Architect/Engineer with details of vehicle licence registration, proof of GNSS tracking device installation, and a copy of the written consent of the owners, drivers and other relevant personnel that the GNSS vehicle location data will be released to the Contractor and the Architect/Engineer for monitoring purposes.

- (3) The Contractor shall appoint the Site Agent to be fully responsible for implementing and monitoring the operation of the GNSS tracking devices installed in all dump trucks serving the Contract. The responsible personnel shall ensure that all disposal trips are checked and a daily monitoring summary is maintained and kept on site. The monitoring summary shall include all raw data signed by the responsible personnel and checked by the Site Agent. The monitoring summary shall be submitted by the Contractor to the Architect/Engineer upon request.
- (4) The Contractor shall submit GNSS vehicle location data of any dump truck in any period during any C&D material disposal trip as specified by the Architect/Engineer. Spot checks will be conducted by the Architect/Engineer for *every 50 disposal trips* or on an as-needed basis (e.g. in cases of complaints or missing location data). The Contractor shall also appoint designated person(s) to spot check the GNSS vehicle location data for all dump trucks on the next working day following the disposal of C&D materials based on the daily monitoring summary.
- (5) The Contractor shall maintain the corresponding historical GNSS vehicle location data for *at least 6 months* after each C&D material disposal trip for retrieval if necessary.
- (6) When an irregularity is observed, the Contractor shall submit to the Architect/Engineer an explanation of the irregularity within four working days after the recorded date of the disposal trip in question. Otherwise, the Contractor shall submit the relevant GNSS vehicle location data to the Architect/Engineer within two working days upon the request of the Architect/Engineer.

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