

SECTION 6

TECHNICAL SPECIFICATIONS

1. Specifications for Building Works (Vol.1), ICTAD Publication No. SCA/4/1 published in July 2004 -Third Edition.
2. Specifications for bored and cast in-situ reinforced concrete piles, CIDA Publication No. CIDA/SP/101 published in March 2016 –First Edition.
3. Standard Specifications for Construction and Maintenance of Roads and Bridges, ICTAD Publication No. SCA/5 published in June 2009 -Second Edition.
4. Schedules 1,2,3 and 4 of this section. This document included project details, appropriate other details as per the nature of the contract and addendum to the schedules with the section numbers retains as the same.

Copies of above Publication shall be purchased from the Construction Industry Development Authority (CIDA), “Sausiripaya”, No.123, Wijerama Mawatha, Colombo 7.

Information Copy - Not for Bidding

Schedule 1 : Information

S1.1 Name of Contract

Construction of New Bridge at 68m/ 72CH between Wellawa and Ganewatta

S1.2 General Information regarding the project

- (a) Site location : At 68 Mile 72 Chains between Wellawa and Ganewatta
- (b) Proposed structure : Construction of Two Abutments & a Pier for the Proposed New Bridge at 68m/72ch Between Wellawa and Ganewatta
- (c) Name of Employer : Sri Lanka Railways
- (d) Name of Engineer : To be nominated

S1.3 Site Investigation Document

Refer Geotechnical Investigation Report prepared by the Engineering Geology & Site Investigation unit-CECB, Digana Village, Rajawella on August 2021.

S1.4**Construction Drawings**

Refer the following drawings

DRAWING NO:	DRAWING TITLE
C1746/AGM-D1/BRI/ST/NO/01	GENERAL NOTES
C1746/AGM-D1/BRI/ST/GA/01	GENERAL ARRANGEMENT - BRIDGE LAYOUT PLAN
C1746/AGM-D1/BRI/ST/GA/02	GENERAL ARRANGEMENT - BRIDGE PLAN, SECTIONAL VIEW & PROFILE
C1746/AGM-D1/BRI/ST/GA/03	GENERAL ARRANGEMENT - BOREHOLE DATA
C1746/AGM-D1/BRI/ST/CO/01	CONCRETE OUTLINE - PIER
C1746/AGM-D1/BRI/ST/CO/02	CONCRETE OUTLINE - LEFT ABUTMENT
C1746/AGM-D1/BRI/ST/CO/03	CONCRETE OUTLINE - LEFT ABUTMENT
C1746/AGM-D1/BRI/ST/CO/04	CONCRETE OUTLINE - RIGHT ABUTMENT
C1746/AGM-D1/BRI/ST/CO/05	CONCRETE OUTLINE - RIGHT ABUTMENT
C1746/AGM-D1/BRI/ST/FD/01	FOUNDATION LAYOUT - LEFT ABUTMENT
C1746/AGM-D1/BRI/ST/FD/02	FOUNDATION LAYOUT - RIGHT ABUTMENT
C1746/AGM-D1/BRI/ST/RF/01	R/F DETAILS - PIER BASE
C1746/AGM-D1/BRI/ST/RF/02	R/F DETAILS - PIER
C1746/AGM-D1/BRI/ST/RF/03	R/F DETAILS - LEFT ABUTMENT- PILE CAP
C1746/AGM-D1/BRI/ST/RF/04	R/F DETAILS - RIGHT ABUTMENT- PILE CAP
C1746/AGM-D1/BRI/ST/RF/05	R/F DETAILS - LEFT ABUTMENT
C1746/AGM-D1/BRI/ST/RF/06	R/F DETAILS - LEFT ABUTMENT
C1746/AGM-D1/BRI/ST/RF/07	R/F DETAILS - RIGHT ABUTMENT
C1746/AGM-D1/BRI/ST/RF/08	R/F DETAILS - RIGHT ABUTMENT

S1.5

Concrete mix details

For Foundation & Sub Structures

- (a) Concrete grade : 40 N/mm²
- (b) Maximum size of aggregate : 20 mm
- (c) Minimum cement content : 300 kg/ m³
- (d) Maximum temperatures during placement : 32°C (Max)
- (e) When testing concrete works as per Clause 3.11, the average 28 day Strength of 3 cubes made from the same sample shall exceed the characteristic strength by an amount 7.5 N/mm².

For Approach Slab

- (a) Concrete grade : 30 N/mm²
- (b) Maximum size of aggregate : 20 mm
- (c) Minimum cement content : 260 kg/ m³
- (d) Maximum temperatures during placement : 32°C (Max)
- (e) When testing concrete works as per Clause 3.11, the average 28 day Strength of 3 cubes made from the same sample shall exceed the characteristic strength by an amount 7.5 N/mm².

S1.6

Reinforcement details

- (a) Grade of Reinforcement: 460 N/mm²
- (b) Length, diameter and other details of reinforcement:
 - Maximum length - 12m
 - Diameter – 10mm and 32mm
 - Other details – Refer Drg. No. C1746/AGM-D1/BRI/ST/RF/01-08

Steel Casing details

- (a) Yield strength of steel casing: 265 N/mm²
- (b) Outer diameter and thickness of steel casing:
 - Outer Diameter – 141mm
 - Thickness – 9.52mm
 - Other details – Refer Drg. No. C1746/AGM-D1/BRI/ST/FD/01&02

S1.7

Definition of Rock Level

Pier

The Design Bearing Capacity of Rock for the Raft Foundation is 1MPa.

Left Abutment

Pile Socketing in The Rock (CR=88%, RQD=44%) shall be not less than 1m.

Right Abutment

Pile Socketing in The Basement Rock (CR=97%, RQD=59%) shall be not less than 4m.

S.1.8 **File Load Test details**

Number of working piles to be tested

Static Load Test (SLT) – 01 of the total number of piles in each side
The maximum load which shall be applied on a Working Pile is 1.5 times the working load.

The Contractor shall arrange to perform Maintained Load Test on Working Piles as described below.

Pile Diameter (mm)	No. of Piles to be Tested	Working Load (kN)	Maximum Test Load (kN)
200	1	400	600

Schedule 2: Performance specification

Notwithstanding approval granted by the Engineer/Engineer's Representative to terminate the pile in accordance with Specification Clause S 1.7 (Rock Socket) the Contractor shall be responsible for ensuring that the expected working load capacity of each pile has been achieved.

Schedule 3: Specification Amendments

1.12 **Records and Reports**

Following details shall be included in to the pile record sheet.

- Details of the Piling Equipment
- Test Report

The report shall contain the following;

- Pile designation, date completed, weather condition, pile length, pile size, volume of grout intake, time of drilling at intervals not greater than 4m and time to grout the pile
 - Description of the apparatus used for testing, loading system and procedure for measuring settlement
 - Field data
 - Time/Settlement Curve
 - Load/Settlement Curve
 - Remarks explaining unusual events or data and movement of piles
 - Calibration certificates of dial gauges and pressure gauges
- The format of record shall be approved by the Engineer

S1.5 **Concrete Mix Details**

Clause S1.5 (CIDA/SP/101, March 2016) shall be deleted and the following shall be

substituted.

S1.5 Grouting Mix Details

Unless otherwise specified, the grout shall be non-shrink cement grout. The grout mix design such as the water-cement ratio, the minimum cement content and grout strength at 28 days shall be specified as follows;

- a). Water- cement ratio: 0.38-0.44
- b) Type of cement: Ordinary Portland Cement
- c).Minimum cement content: 380 kgm⁻³
- d).Grout strength at 28 days: 30 N/mm²

Grout shall be tested in accordance with BS 8081 and BS 4550. Maximum bleed shall be limited to 5%. Details of admixtures to be used shall be submitted to the Engineer for approval before commencement of works. The use of the admixture shall fully comply with manufacturer's instructions.

If the grout cube as tested failed to satisfy the criteria as prescribed in specification and drawings, the piles constructed using this batch of grout shall be rejected. The Contractor shall undertake all necessary additional and consequential remedial work to the approval of Engineer.

Table A2.1.1

Table A2.1.1(CIDA/SP/101, March 2016) shall be amended as follows;

Characteristics for Bentonite Suspensions					
Property	Unit	Stages			Test Equipment
		Fresh	Ready for Re-use	Before Grouting	
Density	g/ml	<1.10	<1.25	<1.15	Mud Balance
Marsh Viscosity (946 ml)	sec	32-50	32-60	32-50	Marsh Funnel
Sand Content	%	n.a.	n.a.	<4	Sand content
pH		7 to 11	7 to 12	n.a.	pH meter

n.a.: not applicable

Clauses 3.5-3.11

3.5 – 3.11 Clauses (CIDA/SP/101, March 2016) shall be deleted and the following shall be substituted.

3.5 Grouting Operations

a) Mixing and Placing Grout

The Contractor shall provide details of the method and equipment used in grout mixing. Further information such as grouting pressure, grouting procedure, grouting equipment and technique employed in grouting underwater shall also be furnished for approval.

Grout shall be mixed on Site and shall be free from segregation, clumping and bleeding. Grout shall be pumped into its final position in one continuous operation as soon as possible and in no case more than half an hour after mixing.

Micropile shall be grouted in one continuous process. If there significant loss of grout, the Contractor may choose to carry out pre-grouting in stages as necessary to prevent further loss of grout for the construction of micropile. Method statement of pre-grouting including details of equipment, materials and procedures have to be reviewed and approved by the Engineer. If after the process of pre-grouting and re-drilling of the hole is required. The Contractor has to bear the cost and time of the pre-grouting and re-drilling.

b) Grout Falls

The lost of flushing mediums of either water or drilling mud drilling will demonstrated potential excessive grout loss or falls. Depending on its seriousness, the Contractor can decide to carry out a water tightness test to decide whether pre-grouting is required. The cost and time of the test will be borne by the Contractor. Pre-grouting and re-drilling shall be carried out if results of the test shown that leakage exceeds 5L/min at an excess head of 0.1 Mpa, measured over a period of 10 minutes.

4.3.2 Rock Socket

Clause 4.3.2 (CIDA/SP/101) shall be deleted and the followings shall be substituted:

Referred in the Cl. S1.3 as per table below;

Abutment	Pile diameter (mm)	Minimum Socketing length (mm)
Left	200	1000
Right	200	4000

Schedule 4: Specification Additions

The following Subsections are added to the Specifications;

S4.1 – Information with Tender

S4.1.1 Information required to be supplied with the Bid and mentioned in this specification is listed below.

- a) A complete method statement including excavation, piling method, rock socketing, Contingency plan and mixing, transporting and placing of grouting. The Bidder shall propose minimum three Pile testing agents including methods with pertinent details.

S4.1.2 The Bidder should not rely solely on this List, which may be incomplete, but should ensure himself that all information required by the Contract Document is supplied in full with the Bid.

S4.1.3 Failure to supply the information required may result in rejection of the Bid.

No.	Clause	Description
(1)	1.7.1	Piling Method

		A complete method statement including excavation, piling method, construction sequence, rock socketing, cleaning of the pile toe, QA/QC plan, Contingency plan and mixing, transporting and placing of grouting.
(2)	1.8	Performance Specification
(3)	1.11	Piling Programme with resources to be deployed
(4)	4.2	Additional Investigation (If proposed by the Contractor)
(5)	5	Details of Pile Load Testing
(6)		Details of pile testing agent/agents including pertinent details.
(7)		Questionnaire to be filled by the Contractor in the given format as given in the Section V.

S.4.2 – Selection of Piles to Test

S.4.2.1 The piles to be tested shall be selected by the Engineer.

S.4.2.2 In case a test pile fails to show the anticipated pile capacity from the static load test the pile shall be considered as rejected and shall be replaced by the number of piles decided by the Engineer.

Further, if any test pile is failed, three more load tests shall be carried out for each failed pile, at the cost of the Contractor, on piles selected by the Engineer. This procedure shall be continued until all three test piles do not fail.