

METRO MANILA SUBWAY PROJECT PHASE 1  
PACKAGE CP104 (Ortigas North and Ortigas South)  
Section VI Works Requirements- Employer's Drawings (DRW)

Civil Drawings GENERAL NOTES

- GN-CE-GN-0001

Civil Drawings COMMON DETAILS

- GN-CE-CD-0001
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Station Drawings Ortigas North Station

- STN- AR-ON-6022

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/Volume II, Part 2 Section VI,  
General Specification APPENDIX4

2.1 Tunneling :Civil					
		Design	Supply	Fix	Remarks
1	<b><u>Provision of access and work area for CP103</u></b> to make opening on the concrete wall, to launch or arrival of CP103's TBM, and, finally, to complete the tunnel connection to the north end of Ortigas North station	CP104	CP104	N/A	
2	Provision of concrete wall at the north end of Ortigas North Station on which CP103 can make opening reasonably easily in advance for launching or retrieving CP103's TBM	CP103	CP103	CP104	In case that CP103 proposes the use of different materials for the opening from material uses for the station box, CP103 shall supply those different materials and design the part of concrete wall using those, and CP104 shall fix the concrete wall.
3	Provision of concrete wall at the north end of Kalayaan Avenue Station on which CP104 can make opening reasonably easily in advance for launching or retrieving CP104's TBM	CP104	CP104	CP105	In case that CP104 proposes the use of different materials for the opening from material uses for the station box, CP104 shall supply those different materials and design the part of concrete wall using those, and CP105 shall fix the concrete wall.
4	Provision of access, work area, and temporary water supply for soil improvement works (if required) by CP103. Water consumption charge shall be paid by CP103)	CP104	CP104	N/A	TBM contractor (CP103) to provide requirement for the work area. CP102 and 104 to provide access and work area at the south end of East Avenue Station and the north end of Ortigas North Station box for TBM contractor (CP103)

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5	Provision of temporary footings to support crane to retrieve (or unload) TBM or check design of diaphragm wall.	CP103	CP103	CP103	TBM contractor (CP103) to provide requirements for work area. CP103 to provide design information of diaphragm wall at the north end of Ortigas North Station box for TBM contractor (CP103). 104 to supply work area and the access only.
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2.2 Tunnel E&M, Rolling Stock		Design	Supply	Fix	Remarks
1	Design, supply and fixing of Railway Systems; except where otherwise stated in this Contract	CP106	CP106	CP106	
2	Design, supply and fixing of Trackwork System; except where otherwise stated in this Contract	CP106	CP106	CP106	The Contractor to co-ordinate CP106 and agree size and locations, Anchor plugs and anchor bolts which shall be supplied and fixed by CP106
3	Cast-in Anchor plug and anchor bolt in tunnels for Rigid Suspension System (RSS).	CP106	CP106	CP104	CP106 to provide the requirements, including size and locations and anchoring materials to the Contractor. Contractor to co-ordinate CP106 and agree size and locations. Civil contractor will fix Anchor plug and bolt. Rigid Suspension System will be fixed by CP106.
4	Cast-in Anchor plug and anchor bolt in tunnels for CP106.	CP106	CP106	CP104	CP106 to provide the requirements, including size and locations and anchoring materials to the Contractor. Contractor to co-ordinate CP106 and agree size and locations. Civil contractor will fix Anchor plug and bolt.

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5	Drilling and Fixings for brackets and hangers for cable and supporting structure for fire main, socket outlets, drainage pipes	CP106	CP104	CP104	All trackside brackets, bolts, anchors, nuts, washers, packers, shims and the like shall be CP106's responsibility.
6	Drilling and Fixings for brackets and hangers for cable and supporting structure for CP106 cables and equipment	CP106	CP106	CP106	All trackside brackets, bolts, anchors, nuts, washers, packers, shims and the like shall be CP106's responsibility
7	Cable brackets and hangers, and pipe brackets attached to walkway structure (if any)	CP106	CP104	CP104	in case CP106 want to add additional device, CP106 need to design the method of attached to walkway by themselves. CP106 will be coordinated with CP102/103/104.
8	All cable recess, troughs, ducts, pipes and trenches, either across track or parallel to track, in track bed concrete.	CP106	CP106	CP106	
9	Removable covers for cable recess/troughs/trenches at track bed concrete.	CP106	CP106	CP106	On track bed concrete, cover to be installed only after cables are laid.
10	All cable recess, troughs, ducts, pipes and trenches, either across track or parallel to track, in base slab and first stage concrete of the cut and cover tunnels. Including cable ducts and pipes rising from base slab.	CP106	CP106	CP104	CP106 to provide requirements, including size and location. CP106 to provide relevant materials. The Contractor and CP106 to Co-ordinate on the design and agree on space.
11	Portion of sumps, drained manholes and drained pulling chambers beneath track-bed concrete.	-	CP104	CP104	Civil contractor supply, fix.
12	Track-bed concrete in bored tunnels and surface drain at both side of track-bed concrete	CP106	CP106	CP106	The Contractor and CP106 to agree the size of surface drain. The connection detail and material to the sump is arranged by the Contractor.

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13	1st stage concrete (underground Stations and bored tunnels)	-	CP104	CP104	Including all tunnel sumps and cast in pipes. Requirements for track bed depth to be agreed with CP106
14	Track bed - starter bar within 1st stage concrete if required (underground Stations and bored tunnels)	(CP106) Coordinate	CP104	CP104	CP106 to provide the requirement including size and location. Contractor to co-ordinate and agree the size and location/arrangement. Contractor to cut, bend and install.
15	Track bed- concrete (Underground stations and bored tunnels)	CP106	CP106	CP106	CP106 to place concrete. Contractor to co-ordinate access
16	Surface Drain at underground station	-	CP104	CP104	
18	Other Track-bed cast-in item within 1st stage concrete.	CP106	CP104 / CP106	CP104	The Contractor and CP106 to co-ordinate and agree on size, location and arrangement. Civil contractor will fix.
19	As-built Tunnel Alignment Modification	CP104/ CP106	CP104	CP104	The Contractor shall survey as-built alignment of bored tunnels and redesign as-built alignment coordinating with CP106 if necessary. Then, CP106 shall design track bed based on the as-built alignment designed by the Contractor. The final track alignment design shall be proved by Civil Contractors after Tunnel As-Build survey be done.
20	Space for side emergency walkway	CP104/ CP107	CP104	CP104	CP107 contractor or the Engineer will provide the structure gauge of the rolling stock for the Contractor to design the evacuation side walkway. And civil contractor will fix walk way.

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21	Provision of access and work areas on the ground level at the Cut and Cover Structure at North Avenue Station, Quezon Avenue Station and East Avenue Station for delivery of track work material and equipment.	CP104/ CP106	CP104 Provide works area only	CP104	The Contractor to co-ordinate works area with track works contractor CP106
22	Opening for carrying in or out of equipment for track works and CP106	CP106/ CP104	CP104	CP104	CP106 shall co-ordinate and agree on size and location. Civil works contractors and CP106 shall coordinate and agree on size and location for design of CSD & SEM drawings. CP106 to confirm the opening and access closure design (including its associated supporting structure) on whether it shall be permanently closed or demountable for future heavy maintenance.

2.3 STATION and SUBSTATION					Remarks
		design	Supply	fix	
1	E&M Railway System	CP106	CP106	CP106	
2	Penetrations with sleeves	CP106	CP104 /CP106	CP104 /CP106	
3	Box outs - full or part depth.	CP106	CP104	CP104	
4	Recesses and trenches formed in screed or finishes for CP106 services	CP106	CP106	CP104	
5	Excavation, backfill, compacting, turfing and finishes of trenches in earth, pavement, road and below drains for CP106 services	CP106	CP106	CP106	

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6	Cable pipes, ducts etc. (including draw wires) embedded into concrete or screed, buried in earth, pavement and road, also Pulling chambers (where required) with covers. Pulling chambers to be provided with drainage.	CP106	CP106	CP104	CP106 to provide requirements. CP106 to provide pipes, ducts and draw wires. Civil works contractors to co-ordinate and agree on size and location. Civil works contractors to provide pulling chambers where required. Civil works contractors to ensure cable pipes, ducts etc. are protected from ingress of water.
7	Telephone and Power intake entry pipes and ducts, draw wires, manholes, waterproofing sealing for manholes, entry points and concrete haunching for pipes and ducts	CP104/ CP106	CP104/ CP106	CP104	CP106 to provide requirements, including size and location. CP106 to provide pipes, ducts and draw wires Civil works contractors to coordinate and agree on size and location. Civil works contractors to provide manholes, waterproofing sealing for manholes, entry points and concrete haunching for pipes and ducts where required. Civil works contractors and CP106 to co-ordinate and agree on size and location. Covers and frames in finishes over (pull, junction and surface) boxes, chasing and subsequent sealing by mortar or equivalent by Civil works contractors.
8	Conduits, (pull, junction and/or surface) boxes, sheet metal trunking and ducting, which are cast into concrete and including draw wires. Cast-in conduits shall be adopted in all areas except the equipment and plant rooms in the stations	CP104/ CP106	CP106	CP104	CP106 to provide requirements, including size and location. CP106 to provide the required cast-in materials. Civil works contractors and CP106 to co-ordinate and agree on size and location. Protection of all ends and joints by Civil works contractors. Conduits assembled by Civil works contractors. Fixing of conduits to the re-bar by Civil works contractors shall be under CP106 supervision and jointly inspect before casting.
9	Cast-in sockets including bolts, nuts, washers, packing and shims	CP104/ CP106	CP106	CP104	CP106 to provide requirements, including size and location. CP106 to provide cast-in materials. CP101 to co-ordinate and agree on size and location.

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10	Drilling for anchors for CP106 equipment	CP104/ CP106	CP106	CP104	CP106 co-ordinate with Civil works contractors on location, size and drilling method. CP106 to provide materials.
11	CP106 cable and pipe support systems within the Stations and CP106 equipment rooms complete with anchors, nuts, bolts, washers, etc.	CP104/ CP106	CP106	CP106	CP106 to co-ordinate with Civil works contractors for design of CSD's / SEM's.
12	Grouting under CP106 machine beds	CP106	CP106	CP106	
13	Isolation and Insulation measures for the Platform Screen Doors (PSD) including insulating membrane beneath platform finish, insulation and surface seal between platform finish, PSD, and end returns, etc.	CP103	CP104	CP104	<b>29.5 MECHANICAL AND ELECTRICAL EQUIPMENT SPECIAL PROVISIONS</b> On Station platforms mechanical and electrical equipment shall be kept outside the isolation zone, continuously 2.5 m from edge of Platform Screen Doors. Where this is not possible, appropriate insulation material, subject to Engineer acceptance shall be provided to insulate/isolate metallic handrails, staircases and the like with an aim to minimize hazards due to touch voltage. To avoid touch potential problems at platforms, the surface of the Station platforms within 2.5m of the edge of platform horizontally and 3m vertically will be electrically isolated from Station Protective earth. This is achievable through application of <u>suitable insulation membrane</u> , subject to testing at Site and Engineer acceptance, continuously from edge of PSD Doors. Suitable insulation Teflon or similar washer, subject to testing and Engineer acceptance shall be used for installation above PSD doors.



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					<p>The Electrical Insulation Membrane shall be of high resistivity having minimum thickness of 2.5mm to 3mm and shall have Volume Resistivity Test to exceed <math>5 \times 10^{14}</math> ohm-cm electrical resistivity as per ASTM D257:2007 Standard. Testing of the Membrane shall be carried out with Digital Insulation Tester with a testing voltage of 250/500V DC and the passing criteria shall be as follows:</p> <p>a) On membrane surface – 500,000 ohms in dry/damp condition and</p> <p>b) On Platform Surface:</p> <ul style="list-style-type: none"> <li>• 35,000 ohms in dry condition and;</li> <li>• 10,000 ohms in a damp condition.</li> </ul> <p>The Insulation Membrane shall have the properties compliant with the following Internal Standards:</p> <ol style="list-style-type: none"> <li>1. DIN VDE 0115 Railway applications – General construction and safety requirements and</li> <li>2. EN 50122-1 Railway application – Fixed installations – Electrical safety, earthing and return circuit – Part 1: Protective provisions against electric shock.</li> </ol>
14	Top and bottom fixings and insulation at base of PSD.	CP106	CP106	CP106	The fixing and insulation work shall be executed along the entire length of PSD at a platform. CP106 Contractor shall execute Resistance Test between PSD and earth and between PSD and a platform.
15	All civil fixings/recesses necessary to secure PSD to the Station structures	CP104/ CP106	CP106	CP106	The fixing and insulation work shall be executed along the entire length of PSD at a platform. Civil Work Contractor shall ensure the structure can accommodate the fixing.

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16	Touch voltage insulation between PSD header and architectural panels such as cornice, false ceiling, etc	CP106	CP106	CP106	Civil Work Contractor CP101-CP105, CP108 & CP109 shall coordinate with CP106.
17	End returns (remote from PSD) and glass panels extended from the ends of PSD.	CP104	CP104	CP104	The end returns doors shall be insulated by Civil Work Contractor. Civil Work Contractor shall coordinate with CP106 Contractor about the interface requirements at the PSD.
18	Sealing of gap between CP106 equipment, and wall and floor finishes	CP106	CP106	CP106	Bedding or trims to be designed, supplied and fixed by CP106. Sealing material shall maintain the fire rating of the compartment where applicable.
19	Curbs around oil transformers, oil collecting pit, inspection cover and associated drainpipe	CP104/ CP106	CP104	CP104	CP106 to provide requirements, including size and location. Civil works contractors and CP106 to co- ordinate and agree on size and location. Covers and frames in finishes over (pull, junction and surface) boxes by Civil works contractors. Protection of all ends and joints by Civil works contractors.
20	Chequered plate cover for cable and pipe trenches in plant room	CP104/ CP106	CP106	CP106	Covers flush with finished floor level.
21	Power cabling from isolators to all CP106 equipment control panels. Control and monitoring cabling from all control panels up to interface terminal boxes (ITBs	CP104/ CP106	CP106	CP106	Isolators and associated cabling from power supply source to the isolators to be provided by Civil works contractors. Location of isolator and pump control panel to be coordinated by Civil works contractors with CP106. CP106 to provide cables from isolator to his equipment and make connections.

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22	Openings in ceiling panels & access panels for all CP106 equipment where required. (Examples: PA loudspeakers, CCTV cameras, clocks, LCX cables, antennas, platform indicators, signage, graphics & advertising panels.	CP106/ CP104	CP104	CP104	CP106 to provide requirement, including size and location of openings. Civil works contractors and CP106 to co-ordinate and agree on size and location. Equipment supporting system and fixings shall be done by CP106
23	Earth Mat System	CP104	CP104	CP104	CP106' s requirement to Civil packages. Earth Mat system design by Civil electrical team. The design of overall station Earth Mat should be less than 1 Ohms
24	Curbs around floor openings for services access.	CP106/ 104	CP104	CP104	CP106 to provide dimensions and locations. Civil works contractors and CP106 to co-ordinate and agree on dimensions and locations
25	Floor openings closure with fire resistive fillings after CP106 own cable work.	CP106	CP106	CP106	
26	Opening for carrying in or out of CP106's Equipment	CP106/ 104	CP104	CP104	Civil works contractors and CP106 shall coordinate and agree on size and location for design of CSD & SEM drawings. CP106 to confirm the opening and access closure design (including its associated supporting structure) on whether it shall be permanently closed or demountable for future heavy maintenance.
27	Entrance to carry in CP106's Equipment	CP104/ CP106	CP104	CP104	Civil works contractors and CP106 shall coordinate and agree on size and location
28	All equipment plinths (whether concrete or I- beams) as required by CP106.	CP104/ CP106	CP104	CP104	Where necessary for Interfacing Contractors, the Contractor shall provide plinths (whether concrete beams or steel I-beams) for Interface Contractors' plant and equipment.

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29	Cavity walls along civil wall or partitions in system equipment rooms or areas	CP104/ CP106	CP104	CP104	Civil works contractors to provide space and access and other requirements for cavity walls. Civil works contractors and CP106 to coordinate design and agree on space, access provision, and cavity walls.
30	All cable recess, troughs, ducts, pipes and trenches either across track or parallel to track, within and/or on track-bed concrete for all trackway. Removable or hinged covers for the abovementioned items.	CP106	CP106	CP106	CP106 to provide requirements. Civil works contractors to coordinate with CP106. Civil works contractors to provide pipes, covers etc. for CP106 requirements, CP106 to provide pipes covers etc. for Civil Works Contractors requirements.
31	Extended portion of sumps, drained manholes and drained pulling chambers within and/or on track-bed concrete. Removable or hinged covers for the items.	CP106	CP106	CP106	Interface specification and CP106 to review and comment if required
32	All cable recess, troughs, ducts, pipes, and trenches, either across track or parallel to track, beneath track-bed concrete for all trackway (with draw wires if necessary)	CP106	CP106	CP106	CP106 to provide requirements, including size and location draw wires. Civil works contractors and CP106 to co-ordinate design and agree on space, access provision, and cavity walls. Civil works contractors to protect the water ingress. Civil works contractors to co-ordinate with CP106.
33	Portion of sumps, drained manholes and drained pulling chambers beneath track-bed concrete.	-	CP104	CP104	Interface specification and CP106 to review and comment if required
34	Common services brackets	-	CP104	CP104	Civil works contractors to coordinate with CP106. And to be reflected in CSD drawings.

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35	Lifting points (eye bolts or similar) for CP106 Equipment installation and replacement	CP106/ 104	CP106	CP104	CP106 to provide requirements and supplying eye bolts or similar, Civil works contractors and CP106 to co- ordinate and agree on size and location.
36	Air conditioner of Sig-telecom room	-	CP104	CP104	Civil works contractors and CP106 to co-ordinate and agree on size/capacity and location.
37	Leakage water from ceiling of electrical plant room & electronic equipment rooms	-	CP104	CP104	CP106 shall provide the space and access route and other requirements for leakage water treatment. Civil works contractors to co- ordinate for the design and agree on the space and access provision, and cavity walls.
38	Removal of waste from bin during construction phase	-	CP104	CP104	Civil works contractors to make available refuse bins/skips in Stations and remove waste from site. CP106 to place their waste in bins. Waste from tunnel and viaduct to be placed in bins/skips located in Stations. The dealing of large size of waste such as packaging materials by CP106 that shall be removed by CP106.
39	Tunnel Ventilation System	-	CP104	CP104	
40	Tunnel Drainage System	-	CP104	CP104	Civil work Contractors and CP106 Contractor shall coordinate and agree on drainage plan (CP106 design concrete bed for track based on the drainage plan).
41	Cast-in concrete tremie pipe for casting track bed concrete by CP106	CP106/ 104	CP104	CP104	

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42	Cable Installation and Routing of Passenger Gates. (AFC)	CP106/ 104	CP106/ 104	CP104/ CP106	Civil works and CP106 Contractor shall coordinate and agree on the sizes and locations. CP106 Contractor shall supply Pipe/Sleeve/Condit to Civil works Contractor. Civil works Contractor shall fix Pipe/Sleeve. CP106 Contractor shall provide the passenger gates and carry out cabling. Civil works Contractor shall cover a floor opening and finish the floor between the passenger gates after cable installation work by CP106 Contractor.
43	Frame Works of TVMs, AVMs and ARVCTs	CP106/ 104	CP106	CP104	CP106 Contractor shall provide the frame materials for the finishing works of TVMs, AVMs and ARVCTs. Civil works Contractor shall install the frame materials for finishing works of TVMs, AVMs and ARVCTs.