General Bid Bulletin No. 5
03 June 2021

THE MALOLOS-CLARK RAILWAY PROJECT AND THE NORTH-SOUTH RAILWAY PROJECT SOUTH LINE COMMUTER PACKAGE CP NS-01: PROCUREMENT OF ELECTRICAL AND MECHANICAL SYSTEMS AND TRACK WORKS (IFB No: 21-040-3)

TO ALL PROSPECTIVE BIDDERS:

This General Bid Bulletin is issued to amend/clarify certain provisions in the Bidding Documents for the above-mentioned Project. Please refer to the attached Annexes of this General Bid Bulletin for details:

1. **Annex "A"** – Clarifications to the Bidding Documents.
2. **Annex "B"** – Addendum to the Bidding Documents with "**Attachment 1**"
3. **Annex "C"** – Not Applicable

All other portions of the Bidding Documents not affected by these revisions, amendments and/or clarifications shall remain unchanged.

Revisions/amendments/clarifications made herein shall be conserved as an integral part of the Bidding Documents of this Project.

For your guidance and information.

For the Bids and Awards Committee

SIGNATURE REDACTED

ENGR. JAIME M. NAVARRETE, JR
Chairperson

Annex A

PACKAGE CP NS-01: E&M SYSTEMS AND TRACK WORKS
General Bid Bulletin No. 5
Annex A

Item No.	Volume Section No. Page No. Clause No. / Title Reference Text	Clarification Request	Proposed Revised Text (if any)	Response
1	Part 2 – Employer's Requirements Section V1. Employer's Requirements Technical Requirements – Signaling, ERT-164, 2.26.10.1 2), Trains moving from the NSCR-EX line to the MMSP line will transition to CBTC after passing over the transition announcement balises and registering with a Zone Controller for the system. The trains shall be fitted with both ERTMS equipment and CBTC equipment.	Is this transition on the move and therefore it is required an interface OBU ETCS - OBU CBTC? We assume that the signaling contractor for this package will provide the interface for the OBU ETCS and this will be adapted by the Rolling Stock and Signaling contractors of MMSP line. Please additionally confirm that the responsibility of integration, putting into service and approval will be with the Rolling Stock Contractor and the Signaling Contractor of CP-NS 01 package is responsible for interface only.		Please refer to paragraph 3 of 2.26.10.2 2), the change over of system will be with train stopping at Bicutan. The three contractors CP106, CP107 and NS01 shall be required to interface for all aspects of the requirements.
2	Part 1 – Bidding Procedures Section III. Evaluation and Qualification Criteria, EQC-8, 4.2 (a) and (b), (can be a specialist subcontractor(vi))	For the experience submitted by the specialist sub-contractor for criteria 4.2 (a) and (b), please confirm if experience certificates issued to parent companies / affiliate companies / subsidiary companies of such specialist sub-contractor will be accepted.		Experience certificates issued to parent companies / subsidiary companies of such specialist sub-contractor is acceptable.
3	Part 2 – Employer's Requirements Section V1. Employer's Requirements Technical Requirements – Signaling,	Please clarify: If the signaling contractor of the package The Malolos – Clark Railway Project and the North South Railway Project-South Line (Commuter)		The Signaling system of NS01 shall interface with the trains and maintenance vehicles as mentioned in the clause 2.4.1 The CP03 trains shall run on NSCR line.

PACKAGE CP NS-01: E&M SYSTEMS AND TRACK WORKS
General Bid Bulletin No. 5
Annex A

Item No.	Volume Section No. Page No. Clause No. / Title Reference Text	Clarification Request	Proposed Revised Text (if any)	Response
	ERT-83, 2.4 Scope of Work 2.4.1 General, • The quantity of Rolling Stock EMU units to be equipped with ERTMS onboard and commissioned by the Contractor are as follows: o 7 x 8 Car Limited Express o 38 x 8 Car Commuter trains o 30 x 8 Car Trains from MMSP line (to be fitted with CBTC and ERTMS systems onboard. CBTC system supplied by others) • This will interface to an adjacent section; the Malolos to Solis project also called (NSCR-N1) being done by a separate team. The depot and OCC for NSCR-N1 is located at Malanday. NSCR-N1 is in the middle of MCRP and NSRP.	CP NS-01 needs to interface with any other Rolling Stock onboard equipment other than the ones mentioned in clause 2.4.1 which might be equipped by the signaling contractor who is providing the signaling systems for the section Malolos-Solis (NSCR-N1 package). If yes, please also confirm that the interface provided in such case will be adapted by the OBU supplier of the contract package NSCR-N1.		There shall be interoperability requirement of Trackside equipment of NS01 with On board equipment of CP04 and Onboard equipment of NS01 with track side equipment of CP04. Please refer clause 2.4.1. The two contractors shall have to interface for interoperability.
4	Part 2 – Employer's Requirements Section V1. Employer's Requirements Technical Requirements – Signaling,	Please specify what does triple-modular redundancy mean in this case? Our understanding is 2x2oo2 is accepted. Please confirm.		The Bidder's understanding is correct. Please refer ERT 121, clause 2.16.5. ERT 86, clause 2.6.1 1) c). Please refer to Annex B

PACKAGE CP NS-01: E&M SYSTEMS AND TRACK WORKS
General Bid Bulletin No. 5
Annex A

Item No.	Volume Section No. Page No. Clause No. / Title Reference Text	Clarification Request	Proposed Revised Text (if any)	Response
	ERT-86, 2.6 Scope of Supply 2.6.1 1) c), Computer Based Interlockings (CBI) shall be SIL 4 system and be configured as triple-modular redundant or equivalent. The CBI should be approved for an ETCS Level 2 system. It shall interface with trackside signaling, the RBC and the ATS at the OCC			
5	Part 2 – Employer's Requirements Section V1. Employer's Requirements Technical Requirements – Signaling, ERT-89, 2.8 Performance Requirements 2.8.1 1) , All the sub systems, equipment to be used for ERTMS / ETCS Level 2 System (including but not be limited to ATP, ATS, CBI, GSM-R, RBC and ATO) shall be of proven design, ratified by Independent Safety Assessor and shall have been successfully	AoE is still not formally baselined. Please confirm that proven design of a successfully implemented ATO is sufficient to fulfill this criteria.		The system shall be proven for Interoperability with other contractor.

PACKAGE CP NS-01: E&M SYSTEMS AND TRACK WORKS
General Bid Bulletin No. 5
Annex A

Item No.	Volume Section No. Page No. Clause No. / Title Reference Text	Clarification Request	Proposed Revised Text (if any)	Response
	implemented in transit systems currently in operation.			
6	Part 2 – Employer's Requirements Section V1. Employer's Requirements Technical Requirements – Signaling, ERT-100 ERT-117, 2.10.1 2.15.1 2), The Contractor shall provide on-board units (OBU) and all accessories at each end of the train. vs The ATP on-board equipment shall manage and control both two cabs (the front cab and the rear cab)	Please confirm if the requirement means 2 OBU per composition (1 OBU at each end of the train)?		The Bidder's understanding is correct. The Contractor shall provide on-board units (OBU) and all accessories at each end of the train.
7	Part 2 – Employer's Requirements Section V1. Employer's Requirements Technical Requirements – Signaling, ERT-100, 2.10.1, The EVC of the OBU shall be redundant	Please confirm if a 2oo2 system is acceptable. This is a globally accepted standard for OBUs implemented by us.		The requirement is redundant EVC of OBU.
8	Part 2 – Employer's Requirements Section V1. Employer's Requirements Technical Requirements – Signaling, ERT-116,	Can we assume that train integrity is not used for any ERTMS functionality and this is only for applying emergency brake?		For other functions, train integrity shall be used as provided in Baseline 2 Release 3.

PACKAGE CP NS-01: E&M SYSTEMS AND TRACK WORKS
General Bid Bulletin No. 5
Annex A

Item No.	Volume Section No. Page No. Clause No. / Title Reference Text	Clarification Request	Proposed Revised Text (if any)	Response
	2.14 24), The ATC shall detect train integrity and any parting of the train shall ensure the emergency brake shall be immediately applied			
9	Part 2 – Employer's Requirements Section V1. Employer's Requirements Technical Requirements – Signaling, ERT-116, 2.15.1 1), To achieve such functions, the EVC shall contain within its memory, the vital data of the track configuration (gradients, curves, Permanent Speed Restrictions, stopping points, relocation balise positioning, etc.)	Can we assume that as per ERTMS, it is the RBC the one providing the vital data of the track configuration?		ERT 116, clause 2.15.1 1) change from "To achieve such functions, the EVC shall contain within its memory, the vital data of the track configuration (gradients, curves, Permanent Speed Restrictions, stopping points, relocation balise positioning, etc.)." To "To achieve such functions, the system shall contain within its memory, the vital data of the track configuration (gradients, curves, Permanent Speed Restrictions, stopping points, relocation balise positioning, etc.) as provided in UNISIG standards." Please refer to Annex B.
10	Part 2 – Employer's Requirements Section V1. Employer's	Please confirm the requirement of switchable balises is purely based on the system design and		The Bidder's understanding is correct. The requirement of switching balises will be

PACKAGE CP NS-01: E&M SYSTEMS AND TRACK WORKS
General Bid Bulletin No. 5
Annex A

Item No.	Volume Section No. Page No. Clause No. / Title Reference Text	Clarification Request	Proposed Revised Text (if any)	Response
	Requirements Technical Requirements – Signaling, ERT-102, 2.10.3 2), In some instances, switchable balises may be required (where signals are retained).	architecture of the signaling contractor and not a mandatory scope of supply.		based on system design and architecture proposed by Signaling contractor.
11	Part 2 – Employer's Requirements Section V1. Employer's Requirements Technical Requirements – Training, ERT-1007, 9.2.1, The Contractor shall provide two (2) Train Operation Simulators at the Training Center in Mabalacat Depot. One (1) Train Operation Simulator shall be designed for the Commuter Train (CP NS-02) and the other one (1) for Limited Express Train (CP NS-03).	Please confirm if the ATS training simulator is independent of the Training Facility described under this chapter and is only for ATS operating staff?		The Bidder's understanding is correct. ATS Training Simulator is independent of the Train Operation Simulators described in ERT 1007. For ATS Training Simulator bidder shall refer to clause 2.17.38 in ERT 144, Part 2 – Employer's Requirements Section VI. Employer's Requirements Technical Requirements-Signaling.
12	Vol. I Part I Section II, BDS-9, ITB 21.1, The amount and currency of the Bid Security shall be Japanese Yen Two Thousand Seven Hundred Fifty Million (JPY 2,750,000,000).	Please confirm whether several separate bid securities from each and every JV member of the bidder (JV is yet to be formed) in total sum to be equal to 2.75 Bln JPY can be accepted (i.e. 3 bid securities from JV members, say, 1 Bln JPY + 1 Bln JPY + 0.75 Bln JPY totaling 2.75 bln JPY).		The Bidder's proposal is not accepted. Reference to Part 1 Bidding Procedure, ITB 21.7:" If the JV has not been legally constituted into a legally enforceable JV at the time of bidding, the Bid Security shall be in the names of all future members as

PACKAGE CP NS-01: E&M SYSTEMS AND TRACK WORKS
General Bid Bulletin No. 5
Annex A

Item No.	Volume Section No. Page No. Clause No. / Title Reference Text	Clarification Request	Proposed Revised Text (if any)	Response
				named in the letter of intent referred to in ITB 4.1 and ITB 11.2.
13	Vol. II Part 2, Section VI, , ERT-1031, 10.3.4 (1), In case of failure of the normal power supply to PSD system, PSD system shall continue to operate from the uninterruptible power supply provided by the Contractor at each station	1) As per station Architectural drawing (eg. MCRP-DWG-CAL-AR-3102), dedicated UPS room for PSD is not available while AFC UPS room is shown. Please clarify UPS supply to PSD system is from AFC UPS system and no dedicated UPS for PSD is required. 2) For Section-1 PSD system, please clarify if UPS for PSD system shall be supplied by CP-04 Contractor or NS-01 Contractor.		1)PSD shall have dedicated UPS supply. The Contractor shall interface with other contractors for the requirement of room. 2) UPS for PSD at all stations shall be provided by NS01 contractor.
14	Volume 2Section VI / c), ERT-619, 7.1.1.7; 7.2.1.3, The AFC system performance shall conform to the AFC National Standard.	Please provide the AFC National Standard or any equivalent standard for use by the Bidder.		A copy of the AFC National Standard shall be provided upon execution of Non-Disclosure Agreement with AFCS-PO/DOTr.
15	Volume 2Section VI / c), ERT-622, 7.3.3, Related Rules and Standards	Table 7-3, last row states "(confidential) - TranspoTM Automatic Fare Collection Scheme – Core Operating Rules"; please clarify how the Bidder would be able to conform/comply to this rule/standard.		The Contractor shall comply to the AFC National Standard. Please refer to Annex B
16	Volume 2 Section VI / c), ERT-623, 7.4; 7.4.1.1, Scope of Equipment Supply	There is no clause 7.4.1 and hence the subclauses numbering needs to be revised accordingly.		The Contractor may refer to Section 7.4.

PACKAGE CP NS-01: E&M SYSTEMS AND TRACK WORKS
General Bid Bulletin No. 5
Annex A

Item No.	Volume Section No. Page No. Clause No. / Title Reference Text	Clarification Request	Proposed Revised Text (if any)	Response
17	Volume 2Section VI / c), ERT-631; ERT-633, 7.7.3.8 and 7.7.5.1, Business Rules; finalized Business Rules	Please provide the business rules or clarify the terms used		The Business Rules is part of the AFC National Standard. A copy of the AFC National Standard shall be provided upon execution of Non-Disclosure Agreement with AFCS-PO/DOTr.
18	Volume 2 Section VI / c), ERT-673, 7.14.1.12, The AFC Training System shall include, but shall not be limited to, a SAC, a TVM, an Automatic Gate array with two reversible aisles (one standard, one wide), a POS, a HT with charger and an AFC-CC simulator. The AFC Maintenance System shall include, but shall not be limited to, a SAC, a TVM, an Automatic Gate array with two reversible aisles (one standard, one wide), a POS, a HT with charger and an AFC-CC simulator.	Please confirm Bidder understanding that supply scope are following equipment used for both AFC Training System and AFC Maintenance System: - a SAC, - a TVM, - an Automatic Gate array with two reversible aisles (one standard, one wide), - a POS, a HT with charger and - an AFC-CC simulator		The Contractor shall provide 1 set for AFC Training System and 1 set for AFC Maintenance System respectively

PACKAGE CP NS-01: E&M SYSTEMS AND TRACK WORKS
General Bid Bulletin No. 5
Annex A

Item No.	Volume Section No. Page No. Clause No. / Title Reference Text	Clarification Request	Proposed Revised Text (if any)	Response
19	Volume 2 Section VI / c), ERT-675, 7.16.1.1 / a) / iii, The contractor shall provide the following tools but not limited to: a) Ticket and Cash handling iii. Bank notes and coins for tests and maintenance	Please clarify specific requirement of bank notes and coins. Contractor understanding that genuine Philippine bank notes and coins are out of scope of supply of Contractor.		The Contractor shall provide genuine bank notes and coins for the purpose of tests and maintenance as stated in clause 7.16.1.1.
20	Volume 2, Section VI, , ERG-43, 6.10.8, The Contractor shall use the EDMS selected by the Engineer during the whole project life cycle.	Please clarify which software of EDMS shall be used for NS-01 package. For reference and proper cost estimation, please provide instruction or manual for EDMS set-up and procedure for on-going MCRP civil packages of interface contractors.		The EDMS system to be used is Aconex. Please contact the distributor of this system to obtain full details.
21	Volume 2, Section VI, , ERG-43, 6.10.8, The EDMS shall be used by all participants engaged on the Project, including the Contractor, Interface Contractors, Subcontractors, sub-Subcontractors, manufacturers, suppliers, and their subsequent legal successors in title. All costs associated with licenses and/or tokens required for the EDMS shall be borne by the Contractor.	Please clarify if NS01 Contractor shall have own EDMS platform/database for own scope and give access right to Employer/Engineer and other interface contractors as required or NS01 Contractor shall utilize EDMS platform/database provided by Employer for own scope documents management at Contractor's cost.		The Bidder's understanding is incorrect, the contract shall adopt the Aconex EDMS platform.

PACKAGE CP NS-01: E&M SYSTEMS AND TRACK WORKS
General Bid Bulletin No. 5
Annex A

Item No.	Volume Section No. Page No. Clause No. / Title Reference Text	Clarification Request	Proposed Revised Text (if any)	Response
22	Volume 2, Section VI, , ERG-43, 6.3.1, 6.3.1. The format and exchange of all deliverables shall be in accordance with the "BIM Information Management Flow" which shall be issued by the Engineer.	Please clarify if there is recommendable or acceptable software/platform for CAD/3D to comply with BIM requirements. Please also clarify which software/platform is used for on-going MCRP civil packages.		The BIM and CAD requirements are stated in the BIM Manual. Please refer to Annex B.
23	Volume 2, Section VI, , ERG-43, 6.3.4, 6.3.4. Building Information Model (BIM) Execution Plan for LOD 100 to 500	Considering nature of design and work flow in terms of BIM execution, Employer or Civil interface contractors will set up 3D platform/data base and provide 3D model of civil / architecture parts and NS01 Contractor will produce 3D model input of NS01 supply scope in 3D model provided of civil / architecture. Please confirm our understanding.		The Bidder's understanding is correct.
24	Volume 2 Section VI / b), c), ERG-71, 15. Training / 15.20 Administration, 15.20.1. The Contractor shall be: (1) Responsible for the reception of, and hotel and travel arrangements for each trainee in regions other than Manila;	Please confirm ITB understanding, Contractor shall arrange only the reservation and booking of hotel and travel of the trainees, however cost of payment of travel and hotel will be by the trainees.		The Bidder's understanding is incorrect. Please refer to ERG Clause 15.1.1. All costs for travel and hotel shall be paid by the Contractor.

PACKAGE CP NS-01: E&M SYSTEMS AND TRACK WORKS
General Bid Bulletin No. 5
Annex A

Item No.	Volume Section No. Page No. Clause No. / Title Reference Text	Clarification Request	Proposed Revised Text (if any)	Response
	(2) Responsible for the general welfare of trainees under its control.			
25	Volume 2 Section VI / c), ERG-53 ERT-451 ERT-487 ERT-612 ERT-669, 10.1.4 Inspection Hold Points /(3) PSS4.7.1 / (2) PDS 5.9.1 /(2) OCS 6.5.1 / e) AFC 7.12.2 , (3) No equipment shall be considered ready for delivery without the Engineer's endorsement in writing. The Contractor shall bear the cost of attendance of the inspections including travel, flight charge from Manila to the place where the inspection will be made, lodging, local transportation, safety equipment, etc., for the Employer's and Engineer's Personnel. (2) Cost of Tests	For Bidder estimating of Engineer or Employer inspector's witnessing the hold points, please confirm following estimate basis or advise specific estimate guidelines. - number of attending inspectors, considering inspection activities and duration according to Contractor's Inspection and Test Plan per ERG clause 10.1.1 (2). - Origin of inspectors are coming from Manila only, if any other Country is expected please inform.		The inspections will be attended by a maximum of four (4) staffs from the Employer and Engineer. Please refer to ERG Clause 4.5.11.

PACKAGE CP NS-01: E&M SYSTEMS AND TRACK WORKS
General Bid Bulletin No. 5
Annex A

Item No.	Volume Section No. Page No. Clause No. / Title Reference Text	Clarification Request	Proposed Revised Text (if any)	Response
	1) The Contractor must bear the cost of all necessary tests. 2) As for the cost of the test which is carried out outside Philippines, the Contractor must bear the expenses relating the witnessing and the verification by the Employer and the Engineer.			
26	4 CP NS-01 BD Draft Part 2 Vol.2 EM Version 11 FINAL REV A, ERT-537-618, n/a, n/a	The Employer Requirements are mainly referring to Japanese standards. For Non-Japanese suppliers, these standards are not known and unfortunately cannot be complied with. Please accept, as a matter of competition, offer based on applicable European (EN, TSI) and International standards (IEC) only.		The Contractor would need to comply to Japanese Standards however they may propose an equivalent/superior proven standard during the design phase.
27	4 CP NS-01 BD Draft Part 2 Vol.2 EM Version 11 FINAL REV A, ERT-537-618, n/a, n/a	The Employer Requirements contains many detailed product and component descriptions including dimensions, materials, and weight, etc. according to Japanese OCS design principles. To increase competition, please allow the contractor to deliver proven European Design and Components (also in operation all around the world, incl. Asia) based on contractor detailed analysis (as written 6.1.1		The contractor may propose a proven overhead line system that meets the performance requirments stated in the Specification. The contactor shall determine all conductor sizes from the power simulation and overhead line system configuration from the pantograph dynamic simulation. With regards to tensioning equipment the contractor shall generally

PACKAGE CP NS-01: E&M SYSTEMS AND TRACK WORKS
General Bid Bulletin No. 5
Annex A

Item No.	Volume Section No. Page No. Clause No. / Title Reference Text	Clarification Request	Proposed Revised Text (if any)	Response
		General), taking into consideration the local environmental and operational requirement listed in the specification (under Ch. 6 OVERHEAD CONTACT LINE SYSTEM). Example deviations compared to the specified system: pole structure (material specification according to European norms), conductor sizes (according to European norms in size and temperature), the tensioning system (contractor´s system uses tensioning device with counterweights instead of tensioning springs), the insulator type (contractor´s system uses composite insulator instead of porcelain type), overvoltage protection devices (according to European norms) etc. Please confirm that the components specified in the Employer Requirements as “Example” are for information only and do not have to be complied with.		use spring tensioning equipment as the counterweights will block the emergency walkways and require cages to stop weights failing in the event of a conductor failure.
28	4 CP NS-01 BD Draft Part 2 Vol.2 EM Version 11 FINAL REV A, ERG-40, 6.3,	It is our understanding that the responsibility for the application of Building Information Modelling (BIM) will be with the Employer as all parties (foremost Civil Works, but also Rolling Stock, track works, EPC systems etc.) will		The Bidder's understanding is correct. The contractor shall provide input into a federated model managed by the Engineer.

PACKAGE CP NS-01: E&M SYSTEMS AND TRACK WORKS
General Bid Bulletin No. 5
Annex A

Item No.	Volume Section No. Page No. Clause No. / Title Reference Text	Clarification Request	Proposed Revised Text (if any)	Response
		contribute to the federated model. Hence the BIM management may need to be with the overarching entity, i.e. the Employer. Please kindly confirm.		
29	4 CP NS-01 BD Draft Part 2 Vol.2 EM Version 11 FINAL REV A, ERG-79 ERT-72 ERT-164, 20.1 2.1 2.26.10.1,	As several interface partners are outside this project (e. g. Civil Works, Rolling Stock) it is our understanding that the Contractor's obligation is limited to contribute to the interface clarification process. The responsibility to coordinate and manage all interface partners beyond the scope of work of this project remains with the Employer. If the interface process may lead to an extension of time, additional costs to be incurred caused by an interface partner etc. this would be subject to a variation. Please kindly confirm.		The Bidder's understanding is not correct. Reference to the Employer's Requirement, General Requirements, item 20 Interface Management, the Contractor's responsibility for interface coordination. The Contractor shall develop and submit for approval by the Engineer an Interface Control Document for each sub-system and other Interface Contractors. The Interface Control Document shall be a "live" common document between each sub-system and other Interface Contractors and external parties, which will be revised and re-submitted by the Contractor to ensure that it remains current, and at other times as directed by the Engineer. It shall be signed off by the Contractor, his sub-contractors, and the Interface Contractors, prior to submission. The submission date of each Interface Control Document shall be

PACKAGE CP NS-01: E&M SYSTEMS AND TRACK WORKS
General Bid Bulletin No. 5
Annex A

Item No.	Volume Section No. Page No. Clause No. / Title Reference Text	Clarification Request	Proposed Revised Text (if any)	Response
				coordinated with the respective parties. Reference to the Employer's Requirement, General Requirements, item 7.4.4, the Contractor shall submit the Interface Register with the status of the Interface progress along with the Monthly Progress report showing those interface activities achieved and those projected ahead with details of any interfaces currently in progress and any that have been missed with mitigation proposals. If the Contractor suffers delay and/or incurs cost from rectifying this loss or damage, the Contractor shall give a further notice to the Engineer and subject to General Conditions ("GC") and Particular Conditions ("PC"), including sub-clauses 3.3. (Instructions of Engineer), 3.5 (Determinations), 8.4 (Extension of Time for Completion), 8.5 (Delays Caused by Authorities), 13 (Variations and Adjustments), 13.7 (Adjustment for Changes in Legislation), 17

PACKAGE CP NS-01: E&M SYSTEMS AND TRACK WORKS
General Bid Bulletin No. 5
Annex A

Item No.	Volume Section No. Page No. Clause No. / Title Reference Text	Clarification Request	Proposed Revised Text (if any)	Response
				(Risk and Responsibility), 19 (Force Majeure), and 20.1 (Contractor's Claims), and subject to observance of the applicable communication obligations under the GC and PC in the Bidding Documents, such as sending of notices and keeping of contemporary records, with the Engineer taking due regard of all relevant circumstances,
30	4 CP NS-01 BD Draft Part 2 Vol.2 EM Version 11 FINAL REV A, ERG-87, 21.2,	It is our understanding that RAMS, System Assurance and System Safety and Homologation, e.g. as according to EN 50126, is limited to the scope of work within this project, e. g. for systems mentioned in Table 21.2. The overarching RAMS topics, such as the System Safety Case including Rolling Stock remains with the Employer. Please kindly confirm.		The Bidder's understanding is correct, the Overarching (Integration) RAMS topics shall be with the Engineer and Employer. The requirements stated in Clause "21. System Assurance" (in accordance with EN50126, EN 50128 and EN 50129) which includes RAM and System Safety requirements is limited to E&M Systems and Trackwork scope of work for this NS-01 project. And, System Assurance requirements related to Rolling Stocks are covered under separate contract packages NS-02 and NS-03 respectively.
31	Part 2 – Employer's Requirements Section VI. Employer's Requirements	It is understood that shunting locomotive(s) shall be used to rescue a failed train. As a train		Please refer to Annex B.

PACKAGE CP NS-01: E&M SYSTEMS AND TRACK WORKS
General Bid Bulletin No. 5
Annex A

Item No.	Volume Section No. Page No. Clause No. / Title Reference Text	Clarification Request	Proposed Revised Text (if any)	Response
	Technical Requirements -Depot Facilities, ERT - 941, N41.02 Shunting Locomotive (Engine Type) , Contractor shall supply diesel locomotive (1 units) along with one flat car suitable for mainline operations having maximum 2.95m wide, to recover failed train, 270t, on 3.5% Downgrade.	has a weight of 270t and need to be rescued at a slope of 3,5% one locomotive (weight approx. 64t) will be not sufficient for safe rescue and return this consist safely back to the depot. It is proposed to consider two locomotives, which are coupled and operate in parallel for a safe rescue of a failed train from any location of the mainline.		
32	Part 2 – Employer's Requirements Section VI. Employer's Requirements Technical Requirements -Depot Facilities, ERT – 710 , Table 8.13 Special Equipment and Tools of the railway system and the rolling stock N1 - Light Repair Shop, Real time wheel geometry measurement system	Can you please clarify, if the "Real time wheel geometry measurement system" is referring to an automatic wheel geometry measurement system to be installed at the depot or it is referring to a manually operated handheld wheel geometry measuring tool.		"Real time wheel geometry measurement system" refers to an automatic wheel geometry measurement system to be installed at the depot.
33	Part 2 – Employer's Requirements Section VI. Employer's Requirements Technical Requirements -Depot Facilities, ERT – 713 , Table 8.13 Special Equipment and Tools of the	Can you please clarify, if the "Real time wheel geometry measurement system" is referring to an automatic wheel geometry measurement system to be installed at the depot or it is		"Real time wheel geometry measurement system" refers to an automatic wheel geometry measurement system to be installed at the depot.

PACKAGE CP NS-01: E&M SYSTEMS AND TRACK WORKS
General Bid Bulletin No. 5
Annex A

Item No.	Volume Section No. Page No. Clause No. / Title Reference Text	Clarification Request	Proposed Revised Text (if any)	Response
	railway system and the rolling stock S1 - Light Repair Shop, Real time wheel geometry measurement system	referring to a manually operated handheld wheel geometry measuring tool.		
34	4 CP NS-01 BD Draft Part 2 Vol.2 EM Version 11 FINAL REV A, ERG-43, 6.11.1, The Engineer will complete his review of the submission within 21 calendar days, after which the review comments will be furnished to the Contractor in writing. The Contractor shall then meet with the Engineer to discuss the review comments. Within two weeks of the receipt of the Engineer's comments, the Contractor shall submit his proposals for implementation in the next submission. Where the comments are minor, such proposals may be clarified by calculations, part prints, etc. acceptable to the Engineer and included in the Contractor's next submission.	It is our understanding that during the meeting mentioned in the respective clause 6.11.1 all comments will be discussed and agreed upon between the Employer and the Contractor. The resubmission of the design document, considering the Engineer's comments as discussed and agreed in aforementioned meeting, shall be approved by the Engineer. If this is not the case, another meeting, and only a second review cycle shall be required to obtain the Employers final approval. So Contractor assumes that no third review cycle will be required if both parties are following this process, and the design document is deemed approved after the second resubmission, causing a design freeze. Any modification, thereafter, requested by the Employer, shall be considered a Variation under the Contract. Please kindly confirm.		The Bidder's understanding is incorrect. Reference to the ERT 22.3.2, The Engineer's response to the submission shall be made within 21 days of receipt of the submission; however, the Engineer shall endeavor to respond within 21 days, provided that the submission is made no later than the date shown on the design submissions program. The Engineer may extend the review period depending on the amount and quality of documentation accompanying the submission.

PACKAGE CP NS-01: E&M SYSTEMS AND TRACK WORKS
General Bid Bulletin No. 5
Annex A

Item No.	Volume Section No. Page No. Clause No. / Title Reference Text	Clarification Request	Proposed Revised Text (if any)	Response
35	Volume 2, Section VI, GBB No. 2, ERT-37, 1.17.4 Item No. 48, In depot turnouts, JIS 50N rail shall be used with compatible components. Standard Rails can be used for turnouts in Depot.	According to Item No. 48 of GBB No.2, we understand the turnout ordinary rail in Depot will be Standard Rail of JIS E 1101, and Standard Rail specified in ERT-1.12.3 will not be applied due to code mixture as JIS 50N with EN Grade R260. Please clarify.		Standard rail shall be compliant to EN 13674-1 or JIS E 1101 or equivalent. JIS 50N rail shall be used in depot turnouts with compatible components following the requirements stated in ERT 1.17.2, ERT 1.17.4, ERT 1.17.5, and ERT 1.12.3.
36	Volume 2, Section V1, ERT-1024, 10.2.1/Design Life, Reliability and Maintainability (6), If glass panels cannot be replaced from the platform side, it shall be possible to install a temporary safety screen from the platform side and such temporary safety screens shall be supplied at every station in adequate quantity.	Please provide the specific requirements of “temporary safety screen”, if any.		The contractor shall propose appropriate design and standards to fulfil the requirements at design stage for the approval of the Engineer.
37	Volume 2, Section V1, ERT-1024, 10.2.2 Design Standard €, Standard on Fire Safety	Since there are no specific Standard here, Contractor suggests using EN 10101, NF 16-102, which were agreed for Metro Manila Phase 1 project.		The contractor shall propose relevant standards for proven products at design stage for the approval of the Engineer.

PACKAGE CP NS-01: E&M SYSTEMS AND TRACK WORKS
General Bid Bulletin No. 5
Annex A

Item No.	Volume Section No. Page No. Clause No. / Title Reference Text	Clarification Request	Proposed Revised Text (if any)	Response
38	Volume 2, Section V1, ERT-1024, 10.2.2 Design Standard (f), Standard on Loading performance	Since there are no specific Standard here, Contractor suggests using EN 1991-1-1, which were agreed for Metro Manila Phase 1 project.		The contractor shall propose relevant standards for proven products at design stage for the approval of the Engineer
39	Volume 2, Section V1, ERT-1024, 10.3.1General Requirements (3), It is proposed to operate a 10-car train in the future. Therefore, PSD system shall have the expandability to accommodate 10-car train with minimum modification. The Contractor shall design a provisional system to accommodate 10-car in the future. The entry / exit doors for driver's cabs, adjacent doors and panels, and the platform end doors shall be relocatable to suit the future 10 car operation.	Contractor suggests installing non-motorized sliding doors for the potential upgrade to 10-car train in the future. There will be no electronic parts inside these non-motorized sliding doors, which is the same approach used in Metro Manila Phase 1 project.		Non-motorized sliding doors of same design as other doors for the potential upgrade to 10-car train in the future, are acceptable with proper arrangement of locking and detection that doors are closed.
40	Volume 2, Section V1, ERT-1026, 10.6.1 General Requirements (7), All screens shall be constructed of toughened glass or laminated glass for safety. And the glass should be compliant with relevant international and local standards.	1. Contractor suggests using toughened glass, which was approved in Metro Manila Phase 1 project; 2. For elevated stations, if it is too high, then Contractor suggests using laminated glass for safety reasons."		The contractor shall propose relevant standards for proven products at design stage for the approval of the Engineer

Annex B

PACKAGE CP NS-01: E&M SYSTEMS AND TRACK WORKS
General Bid Bulletin No. 5
Annex B

ITEM NO.	REFERENCE/CLAUSE/ SECTION	REVISIONS / AMENDMENTS
		Volume II Part 2 – Employer's Requirements
1	OCS Section. Appendix A-9, A-10, A-11, A-59, A-60 & A-68	Mast positions revised.
2	Chapter 8, Part A of Appendix 8.1: North Depot, N41.02: Shunting Locomotive (Engine Type) Page ERT-941	Revised item N41.02 to be read as: 2. Functional Requirements Clause 2.2 Contractor shall supply diesel locomotives (2 units) along with one flat car suitable for mainline operations having maximum 2.95m wide, to recover failed train, 270t, on 3.5% downgrade. Locomotives should be able to work in both single and in multiple mode as a consist of two locomotives as per the operational requirement. Clause 2.9 (vii) vii. Maximum speed without load: 80km/h
3	Chapter 8, Clause 8.9.3.3 Page ERT-709	Revised Clause 8.9.3.3 to read as: 8.9.3.3 Contractor shall supply diesel locomotives (2 units) along with one flat car suitable for mainline operations having maximum 2.95m wide, to recover failed train, 270t, on 3.5% downgrade.
4	ERT 86, clause 2.6.1 1) c)	Delete part of sentence

PACKAGE CP NS-01: E&M SYSTEMS AND TRACK WORKS
General Bid Bulletin No. 5
Annex B

ITEM NO.	REFERENCE/CLAUSE/ SECTION	REVISIONS / AMENDMENTS
		"Computer Based Interlockings (CBI) shall be SIL 4 system ~~and be configured as triple-modular redundant or equivalent~~. The CBI should be approved for an ETCS Level 2 system. It shall interface with trackside signaling, the RBC and the ATS at the OCC"
5	ERT 117, clause 2.15.1 1)	Replace "To achieve such functions, the EVC shall contain within its memory, the vital data of the track configuration (gradients, curves, Permanent Speed Restrictions, stopping points, relocation balise positioning, etc.)." By "To achieve such functions, the System shall contain within its memory, the vital data of the track configuration (gradients, curves, Permanent Speed Restrictions, stopping points, relocation balise positioning, etc.) as provided in UNISIG standards."
6	Part 2 Section VI Technical Requirements – AFC Section 7.3.3	Table 7-3 Rules and Standards revised.
Volume III Part 2 – Employer's Requirements d) Employer's Drawings		
7	5a_CP NS-01 BD Part 2 Vol.3 E_M Version 11.0 FINAL Rev. A page 4	9) TRACK ALIGNMENT DRAWINGS b) NSRP – SOUTH Remove text "CP05 &"
8	5a_CP NS-01 BD Part 2 Vol.3 E_M Version 11.0 FINAL Rev. A page 88	Drawing removed and replaced by drawing NSCR-GCR-NSO1-DWG-TK-000001

PACKAGE CP NS-01: E&M SYSTEMS AND TRACK WORKS
General Bid Bulletin No. 5
Annex B

ITEM NO.	REFERENCE/CLAUSE/ SECTION	REVISIONS / AMENDMENTS
9	5b_CP NS-01 BD Part 2 Vol.3 E_M Version 11.0 FINAL Rev. A page 4	9) TRACK ALIGNMENT DRAWINGS b) NSRP – SOUTH Remove text “CP05 &”
10	5b_CP NS-01 BD Part 2 Vol.3 E_M Version 11.0 FINAL Rev. A page 157	9) TRACK ALIGNMENT DRAWINGS b) NSRP – SOUTH Remove text “CP05 &”
11	5b_CP NS-01 BD Part 2 Vol.3 E_M Version 11.0 FINAL Rev. A page 158-162	CP05 TRACK ALIGNMENT drawings removed
12	BIM	BIM Information Management Flow- Rev 1

Annex B – Attachment 1

Contract	Segment Reference	Segment Start Chainage	Segment End Chainage	Segment Width (mm)	Span Length (m)	Provision Right Track Facing CIA	Provision Left Track Facing CIA	Notes
N-01	P-141/16	40+287.475	40+289.950	2475	40.000	Mast	Mast	
N-01	P-142/16	40+327.475	40+329.950	2475	40.000	Mast	Mast	
N-01	P-144/1	40+370.000	40+372.475	2475	40.000	Mast	Mast	
N-01	P-145/1	40+410.000	40+412.475	2475	40.000	Mast	Mast	
N-01	P-145/7	40+424.975	40+427.475	2500	40.000	Backstay	Backstay	
N-01	P-146/1	40+450.000	40+452.475	2475	40.000	Mast	Mast	
N-01	P-147/1	40+490.000	40+492.475	2475	40.000	Mast	Mast	
N-01	P-148/1	40+530.000	40+532.475	2475	40.000	Mast	Mast	
N-01	P-149/1	40+570.000	40+572.475	2475	40.000	Mast	Mast	
N-01	P-149/10	40+592.475	40+594.975	2500	40.000	Backstay	Backstay	
N-01	P-149/16	40+607.475	40+609.950	2475	40.000	Mast	Mast	
N-01	P-150/8	40+627.475	40+629.975	2500	35.000	Backstay	Backstay	
N-01	P-150/14	40+642.475	40+644.950	2475	35.000	Mast	Mast	
N-01	P-152/4	40+687.475	40+689.975	2500	35.000	Mast	Mast	Switch- 40+688.000
N-01	P-153/1	40+715.000	40+717.475	2475	35.000	Mast	Mast	
N-01	P-153/12	40+742.475	40+744.975	2500	35.000	Mast	Mast	Switch- 40+742.000
N-01	P-154/12	40+777.475	40+779.950	2475	30.000	Mast	Mast	
N-01	P-155/7	40+794.975	40+797.475	2500	32.500	Mast	Mast	Switch- 40+794.000
N-01	P-156/1	40+812.500	40+860.000	47500	47.500	Mast	Mast	Mast-40+814.000
N-01	P-157/1	40+860.000	40+862.475	2475	40.000	Mast	Mast	

Contract	Segment Reference	Segment Start Chainage	Segment End Chainage	Segment Width (mm)	Span Length (m)	Provision Right Track Facing CIA	Provision Left Track Facing CIA	Notes
N-01	P-157/16	40+897.475	40+899.950	2475	40.000	Mast	Mast	
N-01	P-158/4	40+923.550	40+927.350	3800	40.000	Backstay	Backstay	
N-01	P-158/7	40+934.950	40+939.950	5000		Mast	Mast	
N-01	P-159/13	40+985.000	40+990.000	5000	50.000	Mast	Mast	
N-01	P-161/1	41+030.000	41+049.000	19000	19.000	Mast	Mast	Adjacent to Pier
N-01	P-161/1	41+030.000	41+049.000	19000	19.000	Backstay	Backstay	
N-01	P-166/16	41+246.475	41+248.950	2475	40.000	Mast	Mast	
N-01	P-167/16	41+286.475	41+288.950	2475	40.000	Mast	Mast	
N-01	P-168/1	41+289.000	41+291.475	2475	40.000	Block Out	Block Out	
N-01	P-168/16	41+326.475	41+328.950	2475	40.000	Mast	Mast	
N-01	P-168/16	41+326.475	41+328.950	2475	40.000	Block Out	Block Out	
N-01	P-157NB/16	40+897.475	40+899.950	2475	40.000	Mast		
N-01	P-158NB/7	40+934.950	40+939.950	5000	40.000	Mast		
N-01	P-160NB/1	40+989.996	41+005.946	15950	40.000	Mast		
N-01	P-160NB/7	41+024.946	41+029.046	5000	40.000	Mast		Adjacent to Pier
N-01	P-166NB/6	41+246.472	41+248.947	2475	40.000	Mast		Mast added
N-01	P-167NB/15	41+283.915	41+286.415	2500	40.000	Block Out		
N-01	P-167NB/16	41+286.415	41+288.890	2475	40.000	Mast		
N-01	P-168NB/1	41+288.761	41+291.236	2475	40.000	Block Out		
N-01	P-168NB/16	41+323.736	41+326.211	2475	40.000	Mast		
N-01	P-168NB/16	41+326.236	41+328.711	2475	40.000	Block Out		
N-01	P-157SB/16	40+897.475	40+899.950	2475	40.000		Mast	

Contract	Segment Reference	Segment Start Chainage	Segment End Chainage	Segment Width (mm)	Span Length (m)	Provision Right Track Facing CIA	Provision Left Track Facing CIA	Notes
N-01	P-160SB/1	40+990.051	41+006.001	15950	40.000		Mast	
N-01	P-160SB/7	41+025.001	41+030.001	5000	40.000		Mast	
N-01	P-166SB/16	41+246.473	41+248.948	2475	40.000		Mast	Mast added
N-01	P-167SB/15	41+283.915	41+286.415	2500	40.000		Block Out	
N-01	P-167SB/16	41+286.415	41+288.890	2475	40.000		Mast	
N-01	P-168SB/1	41+288.762	41+291.237	2475	40.000		Block Out	
N-01	P-168SB/16	41+323.737	41+326.212	2475	40.000		Mast	
N-01	P-168SB/16	41+323.237	41+328.712	2475	40.000		Block Out	
N-01	P-169/1	41+329.000	41+363.250	34250	34.250	Mast	Mast	
N-01	P-169/1	41+329.000	41+363.250	34250	34.250	Block Out	Block Out	
N-01	P-170/1	41+363.250	41+397.500	34250	34.250	Mast	Mast	
N-01	P-171/2	41+399.975	41+402.475	2500	35.000	Mast	Mast	
N-01	P-172/1	41+432.500	41+434.975	2475	35.000	Mast	Mast	
N-01	P-173/1	41+467.500	41+469.975	2475	35.000	Mast	Mast	
N-01	P-173/7	41+482.475	41+484.975	2500	35.000	Backstay	Backstay	
N-01	P-173/8	41+484.975	41+487.475	2500	35.000	Backstay	Backstay	
N-01	P-173/14	41+499.975	41+502.450	2475	35.000	Mast	Mast	
N-01	P-175/1	41+540.000	41+542.475	2475	40.000	Mast	Mast	
N-01	P-176/1	41+580.000	41+582.475	2475	40.000	Mast	Mast	
N-01	P-177/1	41+620.000	41+622.475	2475	35.000	Mast	Mast	
N-01	P-178/1	41+655.000	41+657.475	2475	35.000	Mast	Mast	
N-01	P-178/7	41+669.975	41+672.475	2500	35.000	Backstay	Backstay	

Contract	Segment Reference	Segment Start Chainage	Segment End Chainage	Segment Width (mm)	Span Length (m)	Provision Right Track Facing CIA	Provision Left Track Facing CIA	Notes
N-03	P-986/7	73+764.975	73+767.475	2500	40.000	Mast	Mast	
N-03	P-987/1	73+790.000	73+792.475	2475	40.000	Mast	Mast	
N-03	P-987/10	73+812.475	73+814.975	2500	40.000	Mast	Mast	
N-03	P-987/16	73+827.475	73+829.950	2475	40.000	Backstay	Backstay	
N-03	P-988/5	73+839.975	73+842.475	2500	40.000	Mast	Mast	
N-03	P-978NB/15	73+465.198	73+467.698	2500	40.000	Block out		
N-03	P-978NB/16	73+465.198	73+467.673	2475	40.000	Mast		
N-03	P-978NB/16	73+467.698	73+470.173	2475	40.000	Block out		
N-03	P-979NB/1	73+470.050	73+472.525	2475	40.000	Block out		
N-03	P-979NB/1	73+470.050	73+472.525	2475	40.000	Mast		
N-03	P-979NB/2	73+472.525	73+475.025	2500	40.000	Block out		
N-03	P-979NB/16	73+507.525	73+510.000	2475	40.000	Mast		
N-03	P-986NB/1	73+749.994	73+752.469	2475	40.000	Backstay		
N-03	P-986NB/7	73+764.969	73+767.469	2500	40.000	Mast		
N-03	P-987NB/1	73+789.919	73+792.394	2475	40.000	Mast		
N-03	P-987NB/10	73+812.394	73+814.894	2500	40.000	Mast		
N-03	P-987NB/16	73+827.394	73+829.869	2475	40.000	Backstay		
N-03	P-988NB/5	73+839.703	73+842.203	2500	40.000	Mast		
N-03	P-978SB/15	73+465.201	73+467.701	2500	40.000		Block out	
N-03	P-978SB/16	73+465.201	73+467.676	2475	40.000		Mast	
N-03	P-978SB/16	73+467.701	73+470.176	2475	40.000		Block out	
N-03	P-979SB/1	73+470.053	73+472.528	2475	40.000		Block out	
N-03	P-979SB/1	73+470.053	73+472.528	2475	40.000		Mast	
N-03	P-979SB/2	73+472.528	73+475.028	2500	40.000		Block out	

Contract	Segment Reference	Segment Start Chainage	Segment End Chainage	Segment Width (mm)	Span Length (m)	Provision Right Track Facing CIA	Provision Left Track Facing CIA	Notes
N-03	P-979SB/16	73+507.528	73+510.003	2475	40.000		Mast	
N-03	P-986SB/1	73+749.994	73+752.469	2475	40.000		Backstay	
N-03	P-986SB/7	73+764.969	73+767.469	2500	40.000		Mast	
N-03	P-987SB/1	73+789.919	73+792.394	2475	40.000		Mast	
N-03	P-987SB/10	73+812.394	73+814.894	2500	40.000		Mast	
N-03	P-987SB/16	73+827.394	73+829.869	2475	40.000		Backstay	
N-03	P-988SB/5	73+839.703	73+842.203	2500	40.000	Mast		
N-03	P-989/1	73+870.000	73+897.500	27500	27.500	Mast	Mast	Mast-73+870.000
N-03	P-990/1	73+897.500	73+926.500	29000	29.000	Mast	Mast	Mast-73+897.500
N-03	P-991/1	73+926.500	73+928.975	2475	27.500	Mast	Mast	
N-03	P-991/7	73+938.975	73+941.475	2500	27.500	Mast	Mast	Switch-73+941.931
N-03	P-991/7	73+941.475	73+943.975	2500	27.500	Mast	Mast	Switch-73+941.930
N-03	P-992/1	73+981.500	74+037.500	56000	56.000	Mast	Mast	Mast-73+981.000
N-03	P-992/1	73+981.500	74+037.500	56000	56.000	Backstay	Backstay	Backstay-73+996
N-03	P-993/10	74+059.975	74+062.475	2500	56.000	Mast	Mast	
N-03	P-994/11	74+099.975	74+102.475	2500	56.000	Mast	Mast	
N-03	P-995/13	74+139.975	74+142.475	2500	56.000	Mast	Mast	
N-03	P-996/15	74+179.975	74+182.475	2500	56.000	Mast	Mast	
N-03	P-997/15	74+219.975	74+222.475	2500	56.000	Mast	Mast	
N-03	P-998/14	74+257.475	74+259.950	2475	56.000	Mast	Mast	
N-03	P-1000/1	74+295.000	74+297.475	2475	35.000	Mast	Mast	
N-03	P-1001/3	74+334.975	74+337.475	2500	35.000	Mast	Mast	
N-03	P-1001/10	74+352.475	74+354.975	2500	35.000	Backstay	Backstay	
N-03	P-1001/16	74+367.475	74+369.950	2475	35.000	Mast	Mast	

Contract	Segment Reference	Segment Start Chainage	Segment End Chainage	Segment Width (mm)	Span Length (m)	Provision Right Track Facing CIA	Provision Left Track Facing CIA	Notes
N-03	P-1117/1	78+701.000	78+703.475	2475	30.000	Mast	Mast	
N-03	P-1118/1	78+731.000	78+733.475	2475	40.000	Mast	Mast	
N-03	P-1119/1	78+771.000	78+773.475	2475	37.500	Mast	Mast	
N-03	P-1119/14	78+803.475	78+805.975	2500	37.500	Block out	Block out	
N-03	P-1119/15	78+803.475	78+805.975	2500	37.500	Block out	Block out	
N-03	P-1109NB/1	78+414.818	78+417.293	2475	27.500	Mast		
N-03	P-1110NB/1	78+442.404	78+444.879	2475	27.500	Mast		
N-03	P-1111NB/1	78+470.069	78+472.544	2475	40.000	Mast		
N-03	P-1117NB/1	78+700.998	78+703.473	2475	27.500	Mast		
N-03	P-1118NB/1	78+728.472	78+730.947	2475	40.000	Mast		
N-03	P-1119NB/1	78+768.330	78+770.805	2475	40.000	Mast		
N-03	P1119NB/14	78+800.805	78+803.305	2500	40.000	Block out		
N-03	P1119NB/15	78+803.305	78+805.805	2500	40.000	Block out		
N-03	P-1109SB/1	78+417.636	78+420.111	2475	27.500		Mast	
N-03	P-1110SB/1	78+444.842	78+447.317	2475	27.500		Mast	
N-03	P-1117SB/1	78+700.998	78+703.473	2475	27.500		Mast	
N-03	P-1118SB/1	78+733.462	78+735.937	2475	40.000		Mast	
N-03	P-1119SB/1	78+773.305	78+775.780	2475	40.000		Mast	
N-03	P1119SB/14	78+805.780	78+808.280	2500	40.000		Block out	
N-03	P1119SB/15	78+808.280	78+810.780	2500	40.000		Block out	
N-03	P-1120/1	78+808.500	78+845.500	37000	37.000	Mast	Mast	
N-03	P-1120/1	78+808.500	78+845.500	37000	37.000	Block out	Block out	
N-03	P-1121/1	78+845.500	78+880.000	34500	34.500	Mast	Mast	

Contract	Segment Reference	Segment Start Chainage	Segment End Chainage	Segment Width (mm)	Span Length (m)	Provision Right Track Facing CIA	Provision Left Track Facing CIA	Notes
N-01	P-141/16	40+287.475	40+289.950	2475	40.000	Mast	Mast	
N-01	P-142/16	40+327.475	40+329.950	2475	40.000	Mast	Mast	
N-01	P-144/1	40+370.000	40+372.475	2475	40.000	Mast	Mast	
N-01	P-145/1	40+410.000	40+412.475	2475	40.000	Mast	Mast	
N-01	P-145/7	40+424.975	40+427.475	2500	40.000	Backstay	Backstay	
N-01	P-146/1	40+450.000	40+452.475	2475	40.000	Mast	Mast	
N-01	P-147/1	40+490.000	40+492.475	2475	40.000	Mast	Mast	
N-01	P-148/1	40+530.000	40+532.475	2475	40.000	Mast	Mast	
N-01	P-149/1	40+570.000	40+572.475	2475	40.000	Mast	Mast	
N-01	P-149/10	40+592.475	40+594.975	2500	40.000	Backstay	Backstay	
N-01	P-149/16	40+607.475	40+609.950	2475	40.000	Mast	Mast	
N-01	P-150/8	40+627.475	40+629.975	2500	35.000	Backstay	Backstay	
N-01	P-150/14	40+642.475	40+644.950	2475	35.000	Mast	Mast	
N-01	P-152/4	40+687.475	40+689.975	2500	35.000	Mast	Mast	Switch- 40+688.000
N-01	P-153/1	40+715.000	40+717.475	2475	35.000	Mast	Mast	
N-01	P-153/12	40+742.475	40+744.975	2500	35.000	Mast	Mast	Switch- 40+742.000
~~N-01~~	~~P-154/4~~	~~40+757.475~~	~~40+759.975~~	~~2500~~	~~30.000~~	~~Mast~~	~~Mast~~	
N-01	P-154/12	40+777.475	40+779.950	2475	30.000	Mast	Mast	
N-01	P-155/7	40+794.975	40+797.475	2500	32.500	Mast	Mast	Switch- 40+794.000
N-01	P-156/1	40+812.500	40+860.000	47500	47.500	Mast	Mast	Mast-40+814.000
N-01	P-157/1	40+860.000	40+862.475	2475	40.000	Mast	Mast	

Contract	Segment Reference	Segment Start Chainage	Segment End Chainage	Segment Width (mm)	Span Length (m)	Provision Right Track Facing CIA	Provision Left Track Facing CIA	Notes
N-01	P-157/16	40+897.475	40+899.950	2475	40.000	Mast	Mast	
N-01	P-158/4	40+923.550	40+927.350	3800	40.000	Backstay	Backstay	
N-01	P-158/7	40+934.950	40+939.950	5000		Mast	Mast	
N-01	P-159/13	40+985.000	40+990.000	5000	50.000	Mast	Mast	
N-01	P-161/1	41+030.000	41+049.000	19000	19.000	Mast	Mast	Adjacent to Pier
N-01	P-161/1	41+030.000	41+049.000	19000	19.000	Backstay	Backstay	
N-01	P-166/16	41+246.475	41+248.950	2475	40.000	Mast	Mast	
N-01	P-167/16	41+286.475	41+288.950	2475	40.000	Mast	Mast	
N-01	P-168/1	41+289.000	41+291.475	2475	40.000	Block Out	Block Out	
N-01	P-168/16	41+326.475	41+328.950	2475	40.000	Mast	Mast	
N-01	P-168/16	41+326.475	41+328.950	2475	40.000	Block Out	Block Out	
N-01	P-157NB/16	40+897.475	40+899.950	2475	40.000	Mast		
N-01	P-158NB/7	40+934.950	40+939.950	5000	40.000	Mast		
N-01	P-160NB/1	40+989.996	41+005.946	15950	40.000	Mast		
N-01	~~P-161NB/1~~ P-160NB/7	~~41+030.000~~ 41+024.946	~~41+049.000~~ 41+029.046	~~19000~~ 5000	~~19.000~~ 40.000	~~Mast~~ Mast		Adjacent to Pier
N-01	P-166NB/6	41+246.472	41+248.947	2475	40.000	Mast		Mast added
N-01	P-167NB/15	41+283.915	41+286.415	2500	40.000	Block Out		
N-01	P-167NB/16	41+286.415	41+288.890	2475	40.000	Mast		
N-01	P-168NB/1	41+288.761	41+291.236	2475	40.000	Block Out		
N-01	P-168NB/16	41+323.736	41+326.211	2475	40.000	Mast		
N-01	P-168NB/16	41+326.236	41+328.711	2475	40.000	Block Out		

Contract	Segment Reference	Segment Start Chainage	Segment End Chainage	Segment Width (mm)	Span Length (m)	Provision Right Track Facing CIA	Provision Left Track Facing CIA	Notes
N-01	P-160SB/1	40+990.051	41+006.001	15950	40.000		Mast	
N-01	~~P-161SB/1~~ P-160SB/7	~~41+030.000~~ 41+025.001	~~41+049.000~~ 41+030.001	~~19000~~ 5000	~~19.000~~ 40.000		Mast	
N-01	P-166SB/16	41+246.473	41+248.948	2475	40.000		Mast	Mast added
N-01	P-167SB/15	41+283.915	41+286.415	2500	40.000		Block Out	
N-01	P-167SB/16	41+286.415	41+288.890	2475	40.000		Mast	
N-01	P-168SB/1	41+288.762	41+291.237	2475	40.000		Block Out	
N-01	P-168SB/16	41+323.737	41+326.212	2475	40.000		Mast	
N-01	P-168SB/16	41+323.237	41+328.712	2475	40.000		Block Out	
N-01	P-169/1	41+329.000	41+363.250	34250	34.250	Mast	Mast	
N-01	P-169/1	41+329.000	41+363.250	34250	34.250	Block Out	Block Out	
N-01	P-170/1	41+363.250	41+397.500	34250	34.250	Mast	Mast	
N-01	P-171/2	41+399.975	41+402.475	2500	35.000	Mast	Mast	
N-01	P-172/1	41+432.500	41+434.975	2475	35.000	Mast	Mast	
N-01	P-173/1	41+467.500	41+469.975	2475	35.000	Mast	Mast	
N-01	P-173/7	41+482.475	41+484.975	2500	35.000	Backstay	Backstay	
N-01	P-173/8	41+484.975	41+487.475	2500	35.000	Backstay	Backstay	
N-01	P-173/14	41+499.975	41+502.450	2475	35.000	Mast	Mast	
N-01	P-175/1	41+540.000	41+542.475	2475	40.000	Mast	Mast	
N-01	P-176/1	41+580.000	41+582.475	2475	40.000	Mast	Mast	
N-01	P-177/1	41+620.000	41+622.475	2475	35.000	Mast	Mast	
N-01	P-178/1	41+655.000	41+657.475	2475	35.000	Mast	Mast	

Contract	Segment Reference	Segment Start Chainage	Segment End Chainage	Segment Width (mm)	Span Length (m)	Provision Right Track Facing CIA	Provision Left Track Facing CIA	Notes
N-03	P-986/7	73+764.975	73+767.475	2500	40.000	Mast	Mast	
N-03	P-987/1	73+790.000	73+792.475	2475	40.000	Mast	Mast	
N-03	P-987/10	73+812.475	73+814.975	2500	40.000	Mast	Mast	
N-03	P-987/16	73+827.475	73+829.950	2475	40.000	Backstay	Backstay	
N-03	P-988/5	73+839.975	73+842.475	2500	40.000	Mast	Mast	
N-03	P-978NB/15	73+465.198	73+467.698	2500	40.000	Block out		
N-03	P-978NB/16	73+465.198	73+467.673	2475	40.000	Mast		
N-03	P-978NB/16	73+467.698	73+470.173	2475	40.000	Block out		
N-03	P-979NB/1	73+470.050	73+472.525	2475	40.000	Block out		
N-03	P-979NB/1	73+470.050	73+472.525	2475	40.000	Mast		
N-03	P-979NB/2	73+472.525	73+475.025	2500	40.000	Block out		
N-03	~~P-980NB/1~~ P-979NB/16	~~73+509.999~~ 73+507.525	~~73+512.474~~ 73+510.000	2475	40.000	Mast		
N-03	P-986NB/1	73+749.994	73+752.469	2475	40.000	Backstay		
N-03	P-986NB/7	73+764.969	73+767.469	2500	40.000	Mast		
N-03	P-987NB/1	73+789.919	73+792.394	2475	40.000	Mast		
N-03	P-987NB/10	73+812.394	73+814.894	2500	40.000	Mast		
N-03	P-987NB/16	73+827.394	73+829.869	2475	40.000	Backstay		
N-03	P-988NB/5	73+839.703	73+842.203	2500	40.000	Mast		
N-03	P-978SB/15	73+465.201	73+467.701	2500	40.000		Block out	
N-03	P-978SB/16	73+465.201	73+467.676	2475	40.000		Mast	
N-03	P-978SB/16	73+467.701	73+470.176	2475	40.000		Block out	
N-03	P-979SB/1	73+470.053	73+472.528	2475	40.000		Block out	
N-03	P-979SB/1	73+470.053	73+472.528	2475	40.000		Mast	
N-03	P-979SB/2	73+472.528	73+475.028	2500	40.000		Block out	

Contract	Segment Reference	Segment Start Chainage	Segment End Chainage	Segment Width (mm)	Span Length (m)	Provision Right Track Facing CIA	Provision Left Track Facing CIA	Notes
N-03	~~P-980SB/1~~ P-979SB/16	~~73+510.002~~ 73+507.528	~~73+512.477~~ 73+510.003	2475	40.000		Mast	
N-03	P-986SB/1	73+749.994	73+752.469	2475	40.000		Backstay	
N-03	P-986SB/7	73+764.969	73+767.469	2500	40.000		Mast	
N-03	P-987SB/1	73+789.919	73+792.394	2475	40.000		Mast	
N-03	P-987SB/10	73+812.394	73+814.894	2500	40.000		Mast	
N-03	P-987SB/16	73+827.394	73+829.869	2475	40.000		Backstay	
N-03	P-988SB/5	73+839.703	73+842.203	2500	40.000	Mast		
N-03	P-989/1	73+870.000	73+897.500	27500	27.500	Mast	Mast	Mast-73+870.000
N-03	P-990/1	73+897.500	73+926.500	29000	29.000	Mast	Mast	Mast-73+897.500
N-03	P-991/1	73+926.500	73+928.975	2475	27.500	Mast	Mast	
N-03	P-991/7	73+938.975	73+941.475	2500	27.500	Mast	Mast	Switch-73+941.931
N-03	P-991/7	73+941.475	73+943.975	2500	27.500	Mast	Mast	Switch-73+941.930
N-03	P-992/1	73+981.500	74+037.500	56000	56.000	Mast	Mast	Mast-73+981.000
N-03	P-992/1	73+981.500	74+037.500	56000	56.000	Backstay	Backstay	Backstay-73+996
N-03	P-993/10	74+059.975	74+062.475	2500	56.000	Mast	Mast	
N-03	P-994/11	74+099.975	74+102.475	2500	56.000	Mast	Mast	
N-03	P-995/13	74+139.975	74+142.475	2500	56.000	Mast	Mast	
N-03	P-996/15	74+179.975	74+182.475	2500	56.000	Mast	Mast	
N-03	P-997/15	74+219.975	74+222.475	2500	56.000	Mast	Mast	
N-03	P-998/14	74+257.475	74+259.950	2475	56.000	Mast	Mast	
N-03	P-1000/1	74+295.000	74+297.475	2475	35.000	Mast	Mast	
N-03	P-1001/3	74+334.975	74+337.475	2500	35.000	Mast	Mast	
N-03	P-1001/10	74+352.475	74+354.975	2500	35.000	Backstay	Backstay	
N-03	P-1001/16	74+367.475	74+369.950	2475	35.000	Mast	Mast	

Contract	Segment Reference	Segment Start Chainage	Segment End Chainage	Segment Width (mm)	Span Length (m)	Provision Right Track Facing CIA	Provision Left Track Facing CIA	Notes
N-03	P-1117/1	78+701.000	78+703.475	2475	30.000	Mast	Mast	
N-03	P-1118/1	78+731.000	78+733.475	2475	40.000	Mast	Mast	
N-03	P-1119/1	78+771.000	78+773.475	2475	37.500	Mast	Mast	
N-03	P-1119/14	78+803.475	78+805.975	2500	37.500	Block out	Block out	
N-03	P-1119/15	78+803.475	78+805.975	2500	37.500	Block out	Block out	
N-03	P-1109NB/1	78+414.818	78+417.293	2475	27.500	Mast		
N-03	P-1110NB/1	78+442.404	78+444.879	2475	27.500	Mast		
N-03	P-1111NB/1	78+470.069	78+472.544	2475	40.000	Mast		
N-03	P-1117NB/1	78+700.998	78+703.473	2475	27.500	Mast		
N-03	P-1118NB/1	78+728.472	78+730.947	2475	40.000	Mast		
N-03	P-1119NB/1	78+768.330	78+770.805	2475	40.000	Mast		
N-03	P1119NB/14	78+800.805	78+803.305	2500	40.000	Block out		
N-03	P1119NB/15	78+803.305	78+805.805	2500	40.000	Block out		
N-03	P-1109SB/1	78+417.636	78+420.111	2475	27.500		Mast	
N-03	P-1110SB/1	78+444.842	78+447.317	2475	27.500		Mast	
~~N-03~~	~~P-1111SB/1~~	~~78+472.046~~	~~78+474.521~~	~~2475~~	~~40.000~~		~~Mast~~	
N-03	P-1117SB/1	78+700.998	78+703.473	2475	27.500		Mast	
N-03	P-1118SB/1	78+733.462	78+735.937	2475	40.000		Mast	
N-03	P-1119SB/1	78+773.305	78+775.780	2475	40.000		Mast	
N-03	P1119SB/14	78+805.780	78+808.280	2500	40.000		Block out	
N-03	P1119SB/15	78+808.280	78+810.780	2500	40.000		Block out	
N-03	P-1120/1	78+808.500	78+845.500	37000	37.000	Mast	Mast	
N-03	P-1120/1	78+808.500	78+845.500	37000	37.000	Block out	Block out	
N-03	P-1121/1	78+845.500	78+880.000	34500	34.500	Mast	Mast	

N41.02 Shunting Locomotive (Engine Type)

1. Quantity: One (1) set

2. Functional Requirements

2.1. The shunting locomotive (engine type) shall be provided for the shunting of the rolling stock in the Depot/Workshop and during rescue operation of a failed Trainset on mainline.

2.2. Contractor shall supply diesel locomotives (2 units) along with one flat car suitable for mainline operations having maximum 2.95m wide, to recover failed train, 270t, on 3.5% downgrade. Locomotives should be able to work in both single and in multiple mode as a consist of two locomotives as per the operational requirement.

2.3. Locomotives shall be fully equipped for emergency responses.

2.4. Contractor shall supply adaptors for tight lock couplers to couple to work trains.

2.5. Space for Onboard Signaling and Telecom equipment shall be provided by doing proper interfacing with Signaling and Telecom contractor for equipment installation details.

2.6. All onboard Signaling and Telecom Equipment along with cables and wire harness will be provided by Signaling and Telecom sub-contractors.

2.7. Installation will be done by Locomotive manufacture by doing necessary interface. Commissioning will be done jointly with Signaling and Telecom contractors.

2.8. The shunting locomotive shall be stored in the shunting locomotive shed supplied by the Building Contractor.

2.9. Major performance of the shunting locomotive shall be as follows; the Contractor shall confirm the type of coupler to the Rolling Stock Contractor:

i. Type: diesel locomotive,
ii. Track gauge: 1,435 mm,
iii. Coupler: the couplers of rolling stock at both ends,(to be supplied by Rolling stock contractor CP NS-02)
iv. The locomotive envelope to follow rolling stock and structure gauge drawing MCRP-DWG-GEN-TK- 0020 Rev 6 or latest.
v. Driver cab: air conditioned, with assistant driver's seat,
vi. Traction force: max. for rolling stock with Ten (10)-car set,
vii. Maximum speed without load: 80km/h
viii. Onboard signaling and telecom equipment

3. Design

3.1. The shunting locomotive can be operated by single driver. The shunting locomotive shall be equipped with the following features, but not limited to:

i. Wide windows for wide and clear view from the cab for safe operation,
ii. Bi-directional operation
iii. Visually checking of the coupling status in the cab,
iv. Decks and handrails at both end for marshalling staff,
v. Remote releasing of coupling.

3.2. The following accessories shall be included, but not limited to:

i. Standard accessories,
ii. Maintenance tool kit.

4. Interface Requirement

N41.02 Shunting Locomotive (Engine Type)

1. Quantity: One (1) set

2. Functional Requirements

2.1. The shunting locomotive (engine type) shall be provided for the shunting of the rolling stock in the Depot/Workshop and during rescue operation of a failed Trainset on mainline.

2.2. Contractor shall supply diesel locomotives (~~1~~ 2 units) along with one flat car suitable for mainline operations having maximum 2.95m wide, to recover failed train, 270t, on 3.5% downgrade. Locomotives should be able to work in both single and in multiple mode as a consist of two locomotives as per the operational requirement.

2.3. Locomotives shall be fully equipped for emergency responses.

2.4. Contractor shall supply adaptors for tight lock couplers to couple to work trains.

2.5. Space for Onboard Signaling and Telecom equipment shall be provided by doing proper interfacing with Signaling and Telecom contractor for equipment installation details.

2.6. All onboard Signaling and Telecom Equipment along with cables and wire harness will be provided by Signaling and Telecom sub-contractors.

2.7. Installation will be done by Locomotive manufacture by doing necessary interface. Commissioning will be done jointly with Signaling and Telecom contractors.

2.8. The shunting locomotive shall be stored in the shunting locomotive shed supplied by the Building Contractor.

2.9. Major performance of the shunting locomotive shall be as follows; the Contractor shall confirm the type of coupler to the Rolling Stock Contractor:

i. Type: diesel locomotive,
ii. Track gauge: 1,435 mm,
iii. Coupler: the couplers of rolling stock at both ends,(to be supplied by Rolling stock contractor CP NS-02)
iv. The locomotive envelope to follow rolling stock and structure gauge drawing MCRP-DWG-GEN-TK- 0020 Rev 6 or latest.
v. Driver cab: air conditioned, with assistant driver's seat,
vi. Traction force: max. for rolling stock with Ten (10)-car set,
vii. Maximum speed without load: 80km/h
viii. Onboard signaling and telecom equipment

3. Design

3.1. The shunting locomotive can be operated by single driver. The shunting locomotive shall be equipped with the following features, but not limited to:

i. Wide windows for wide and clear view from the cab for safe operation,
ii. Bi-directional operation
iii. Visually checking of the coupling status in the cab,
iv. Decks and handrails at both end for marshalling staff,
v. Remote releasing of coupling.

3.2. The following accessories shall be included, but not limited to:

i. Standard accessories,
ii. Maintenance tool kit.

4. Interface Requirement

8.9.3.3. Contractor shall supply diesel locomotives (2 units) along with one flat car suitable for mainline operations having maximum 2.95m wide, to recover failed train, 270t, on 3.5% downgrade.

8.9.3.4. Locomotives shall be fully equipped for emergency responses.

8.9.3.5. Contractor shall supply adaptors for tight lock couplers to couple to work trains.

8.9.3.6. Flat car: Contractor shall supply flat car with side boards to carry tools, re-railing equipment and emergency response equipment, 15m length, 2.95m wide, with platform 1.10m above T.O.R.

8.9.3.7. Contractor shall supply and install tight lock couplers on both ends flat car (free issue).

8.9.3.8. It is assumed that the fuel supply equipment (N41-03) is used for the shunting Diesel locomotive (N41-02).

8.9.3.9. Common use (N61 and S61):

These facilities are used commonly in/outside of the depot/workshop area for the works concerned with rolling stock maintenance and accidents.

8.9.3.10. Tools:

a. These equipment/facilities are used commonly for the works concerned with rolling stock maintenance and accidents.

b. These tools can be provided by general commercial tool suppliers.

c. The contractor shall confirm to the interface contractor to resolve the interface problems as specified in Technical Requirement and Section 19 of ERG.

8.9.3.11. Other tools/equipment/facilities for rolling stock maintenance that is assumed not to procure at general commercial markets are treated as special tools and test equipment of the railway system and rolling stock.

8.9.3.12. These Special tools and test equipment are to be planned and supplied in close consultation and interfacing with Rolling Stock supplier at appropriate time with approval of Engineer. Special tools and test equipment of the rolling stock shown in Table 8.13 are indicative only. Actual requirement and specifications shall be reviewed and finalized as per the maintenance requirement of the Rolling stock supplier.

8.9.3.3. Contractor shall supply diesel locomotives (~~1~~ 2 units) along with one flat car suitable for mainline operations having maximum 2.95m wide, to recover failed train, 270t, on 3.5% downgrade.

8.9.3.4. Locomotives shall be fully equipped for emergency responses.

8.9.3.5. Contractor shall supply adaptors for tight lock couplers to couple to work trains.

8.9.3.6. Flat car: Contractor shall supply flat car with side boards to carry tools, re-railing equipment and emergency response equipment, 15m length, 2.95m wide, with platform 1.10m above T.O.R.

8.9.3.7. Contractor shall supply and install tight lock couplers on both ends flat car (free issue).

8.9.3.8. It is assumed that the fuel supply equipment (N41-03) is used for the shunting Diesel locomotive (N41-02).

8.9.3.9. Common use (N61 and S61):

These facilities are used commonly in/outside of the depot/workshop area for the works concerned with rolling stock maintenance and accidents.

8.9.3.10. Tools:

a. These equipment/facilities are used commonly for the works concerned with rolling stock maintenance and accidents.

b. These tools can be provided by general commercial tool suppliers.

c. The contractor shall confirm to the interface contractor to resolve the interface problems as specified in Technical Requirement and Section 19 of ERG.

8.9.3.11. Other tools/equipment/facilities for rolling stock maintenance that is assumed not to procure at general commercial markets are treated as special tools and test equipment of the railway system and rolling stock.

8.9.3.12. These Special tools and test equipment are to be planned and supplied in close consultation and interfacing with Rolling Stock supplier at appropriate time with approval of Engineer. Special tools and test equipment of the rolling stock shown in Table 8.13 are indicative only. Actual requirement and specifications shall be reviewed and finalized as per the maintenance requirement of the Rolling stock supplier.

accordance with the specification. The Contractor shall also supply any additional equipment required to supplement the system not indicated below.

1) Control equipment; including:
   a) Complete GSM-R Train Control Radio system for secure transmission of voice and data including the Signaling Data Communication System (DCS) Radio Modems, cabling, accessories, fixtures and fittings for an ETCS Level 2 system;

      In addition, use for ETCS data transmission, GSM-R radio system shall also provide for train operational communications including Railway Emergency calls, broadcast calls, group calls and packet data. Users will include train drivers, dispatchers, operational controllers, shunting groups. Fixed terminal devices and mobiles phones will need to be provided. Further details will be specified by train operations.

   b) Radio Block Center (RBC) equipment that will be the central point for processing ETCS logic. This will interface with onboard ETCS system on trains, Computer based Interlocking and signaling control and indications systems at the OCC.
   c) Computer Based Interlockings (CBI) shall be SIL 4 system. The CBI should be approved for an ETCS Level 2 system. It shall interface with trackside signaling, the RBC and the ATS at the OCC
   d) Computers / workstations required for NMS systems;
   e) Train borne equipment (EVC, JRU, TIU, TWC, Doppler Radar, DMI, Antennae, Tacho-generators, accelerometers, redundant GSM-R voice and data Radio Equipment inclusive of all cabling, accessories, fixtures and fittings required for the ETCS system);
   f) Train Detection System; and
   g) Signals and Marker Boards (where applicable) inclusive of buffer stop signals.
2) In addition to use for ETCS data transmission, GSM-R radio system shall also provide for train operational communications including Railway Emergency calls, broadcast calls, group calls and packet data. Users will include train drivers, dispatchers, operational controllers, shunting groups. Fixed terminal devices and mobiles phones will need to be provided. Further details will be specified by train operations.
3) An ATO sub-system that shall consist of the onboard ATO-OB and trackside ATO-TS. The ATO will be an add-on to the ETCS system in accordance with the (ATO over ETCS) system requirements specification (subset 125) and the ATO-OB / ATO-TS interface (subset 126).
4) Servers and computers for ATS including LAN at OCC, stations, Depot and other locations and fiber optic links; Workstations; Overview Video Screen. Train real time Display aid in Drivers' offices.
5) Trackside equipment inclusive of Balises, Base Transceivers Stations (BTS), switch machines, signals (where applicable), and train detection system.
6) Concrete or metallic bases / fixtures / supports for Indoor and trackside equipment;
7) Enclosures and supporting brackets for housing and affixing equipment;
8) All cables (excluding fiber-optical backbone), cable terminations and cabling support / protection pipes / accessories necessary for the Works except those specifically excluded from scope of supply;

accordance with the specification. The Contractor shall also supply any additional equipment required to supplement the system not indicated below.

1) Control equipment; including:

   a) Complete GSM-R Train Control Radio system for secure transmission of voice and data including the Signaling Data Communication System (DCS) Radio Modems, cabling, accessories, fixtures and fittings for an ETCS Level 2 system;

      In addition, use for ETCS data transmission, GSM-R radio system shall also provide for train operational communications including Railway Emergency calls, broadcast calls, group calls and packet data. Users will include train drivers, dispatchers, operational controllers, shunting groups. Fixed terminal devices and mobiles phones will need to be provided. Further details will be specified by train operations.

   b) Radio Block Center (RBC) equipment that will be the central point for processing ETCS logic. This will interface with onboard ETCS system on trains, Computer based Interlocking and signaling control and indications systems at the OCC.

   c) Computer Based Interlockings (CBI) shall be SIL 4 system ~~and be configured as triple modular redundant or equivalent~~. The CBI should be approved for an ETCS Level 2 system. It shall interface with trackside signaling, the RBC and the ATS at the OCC

   d) Computers / workstations required for NMS systems;

   e) Train borne equipment (EVC, JRU, TIU, TWC, Doppler Radar, DMI, Antennae, Tacho-generators, accelerometers, redundant GSM-R voice and data Radio Equipment inclusive of all cabling, accessories, fixtures and fittings required for the ETCS system);

   f) Train Detection System; and

   g) Signals and Marker Boards (where applicable) inclusive of buffer stop signals.

2) In addition to use for ETCS data transmission, GSM-R radio system shall also provide for train operational communications including Railway Emergency calls, broadcast calls, group calls and packet data. Users will include train drivers, dispatchers, operational controllers, shunting groups. Fixed terminal devices and mobiles phones will need to be provided. Further details will be specified by train operations.

3) An ATO sub-system that shall consist of the onboard ATO-OB and trackside ATO-TS. The ATO will be an add-on to the ETCS system in accordance with the (ATO over ETCS) system requirements specification (subset 125) and the ATO-OB / ATO-TS interface (subset 126).

4) Servers and computers for ATS including LAN at OCC, stations, Depot and other locations and fiber optic links; Workstations; Overview Video Screen. Train real time Display aid in Drivers' offices.

5) Trackside equipment inclusive of Balises, Base Transceivers Stations (BTS), switch machines, signals (where applicable), and train detection system.

6) Concrete or metallic bases / fixtures / supports for Indoor and trackside equipment;

7) Enclosures and supporting brackets for housing and affixing equipment;

1) In ETCS Level 2, the ATP on-board equipment shall calculate a braking control pattern for the MA based upon data received from the RBC and the train's speed and direction determined by the tachometer/radar and with position correction by wayside Balises. To achieve such functions, the System shall contain within its memory, the vital data of the track configuration (gradients, curves, Permanent Speed Restrictions, stopping points, relocation balise positioning, etc.) and constantly receives real-time track status (Movement Authority status, point position, Temporary Speed Restriction, etc.) as provided in UNISIG standards.

2) The ATP on-board equipment shall consist of an EVC (European Vital Controller), BTM (Balise Transmitting Module), TIU (Train Interface Unit), Redundant TRM (Train Radio Modems), DMI (Driver Machine Interface), Pulse generator, Doppler Radar, JRU (Juridical Recording Unit), TMS (Train Management System). The ATP on-board equipment shall manage and control both two cabs (the front cab and the rear cab).

3) The ATP on-board equipment shall be based upon the standards as indicated in CCS TSI sub-sets. The ATP on-board equipment shall comply with SIL-4 requirements.

4) The train-borne ATP equipment shall be of a well-proven design, highly reliable and capable of operation in the electrically disturbed environment produced by traction motors and train control systems (e.g., inverters, choppers, etc.). It shall also be capable of withstanding vibration and oscillations produced by the interaction of the vehicle and track.

5) Fail-safe principles shall be adopted for the vehicle speed measuring system. The speed measurement indication on the speedometer shall denote true train speed within a tolerance of ± 2km/h. This is subject to calibration for wheel diameter; therefore, the system shall be adjustable to compensate for wheel diameter parameters. The Contractor shall determine, justify and submit for approval the design tolerances on the nominal speed profiles.

   The ATP system shall measure train speed in a fail-safe manner. This shall be derived from at least two independent sensors. Any fault in the speed measurement system shall either be detected as a fault or result in a higher than actual speed indication. The speed measurement system shall be able to measure the true speed of the trains and there should be no measurement errors due to wheel slip or slide. The distance measurement, which may be falsified by sliding and skidding, shall be synchronized regularly. The error in the speed measurement due to wear in wheel diameter shall be mitigated by automatic means or other safe methods.

6) The ATP system shall provide the driver with an audible warning should the maximum allowable speed be violated. Should the driver not respond to this warning by reducing the vehicle speed to the correct limit within a predetermined period, an irrevocable operation of the emergency brakes shall be invoked.

7) Errors in speed measurement due to excessive wear and usage of the speed measuring device shall result in an indication, which is higher than the actual speed. Wheel wear shall be taken into account for correction within the measuring device.

8) The on-board ATP system shall be provided with health monitoring, which will continuously examine the integrity of the system. In the event of a malfunction, which affects the integrity of the system, the train shall be required to be brought to a complete stop. An ATP bypass switch shall be operated to allow the train to continue during ATP on-board equipment failure. The use of the bypass switch shall be logged and time-stamped by the on-board Train Management System.

1) In ETCS Level 2, the ATP on-board equipment shall calculate a braking control pattern for the MA based upon data received from the RBC and the train's speed and direction determined by the tachometer/radar and with position correction by wayside Balises. To achieve such functions, the ~~EVC~~ System shall contain within its memory, the vital data of the track configuration (gradients, curves, Permanent Speed Restrictions, stopping points, relocation balise positioning, etc.) and constantly receives real-time track status (Movement Authority status, point position, Temporary Speed Restriction, etc.) as provided in UNISIG standards.

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AFC National Standard	National Standard for Interoperable Automatic Fare Collection System
Business Rules	A document designed for an interoperable transit network which accommodates multiple Automatic Fare Collection System (AFCS) operators and multiple Contactless Smart Medium (CSM) ISSUERs.
National QR Code Standard	Banko Sentral ng Philipinas (BSP) Standard on QR code
ISO/IEC 14443	Identification Cards – Contactless Integrated Circuit Cards – Proximity Cards
ISO/IEC 15408	Information Technology -- Security Techniques -- Evaluation Criteria for IT Security
ISO 24014-1	Public Transport – Interoperable Fare Management System – Part 1 Architecture
IEEE802	A standard for local area network
PEcC	Philippine Electronics Code
RFC 4301	Security Architecture for the Internet Protocol
TIA/EIA 5688	Commercial Building Telecommunications Cabling Standard
Republic Act No.7277	The Magna Carta for Disabled Persons of the Philippines

7.4 Scope of Equipment Supply

The contractor shall supply the following but not limited to:

7.4.1.1 System Components

a) Station accounting computer, including all of its constituent components
b) Normal Automatic Gate
c) Wide Automatic Gate
d) Ticket Vending Machine
e) Point of Sales, including all of its constituent components
f) Handheld Terminal
g) Uninterruptible Power Supply
h) Central Computer System, including all of its constituent components
i) Cash Handling System
j) Card Handling System
k) Contactless Card
l) Contactless Card Reader
m) QR Code Reader

7.4.1.2 Station AFC Facilities

a) Station accounting computers
b) Normal Automatic Gates
c) Wide Automatic Gates

TCP/IP	Transmission Control Protocol/Internet Protocol
TOC	Taking Over Certificate
TVM	Ticket Vending Machine
UPS	Uninterruptible Power Supply

7.3.3 Related Rules and Standards

The contractor should conform to the following standards, but not limited to:

Table 7-3 Rules and Standards

AFC National Standard	National Standard for Interoperable Automatic Fare Collection System
Business Rules	A document designed for an interoperable transit network which accommodates multiple Automatic Fare Collection System (AFCS) operators and multiple Contactless Smart Medium (CSM) ISSUERs.
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TIA/EIA 5688	Commercial Building Telecommunications Cabling Standard
Republic Act No.7277	The Magna Carta for Disabled Persons of the Philippines
~~(confidential)~~	~~TranspoTM Automatic Fare Collection Scheme – Core Operating Rules~~

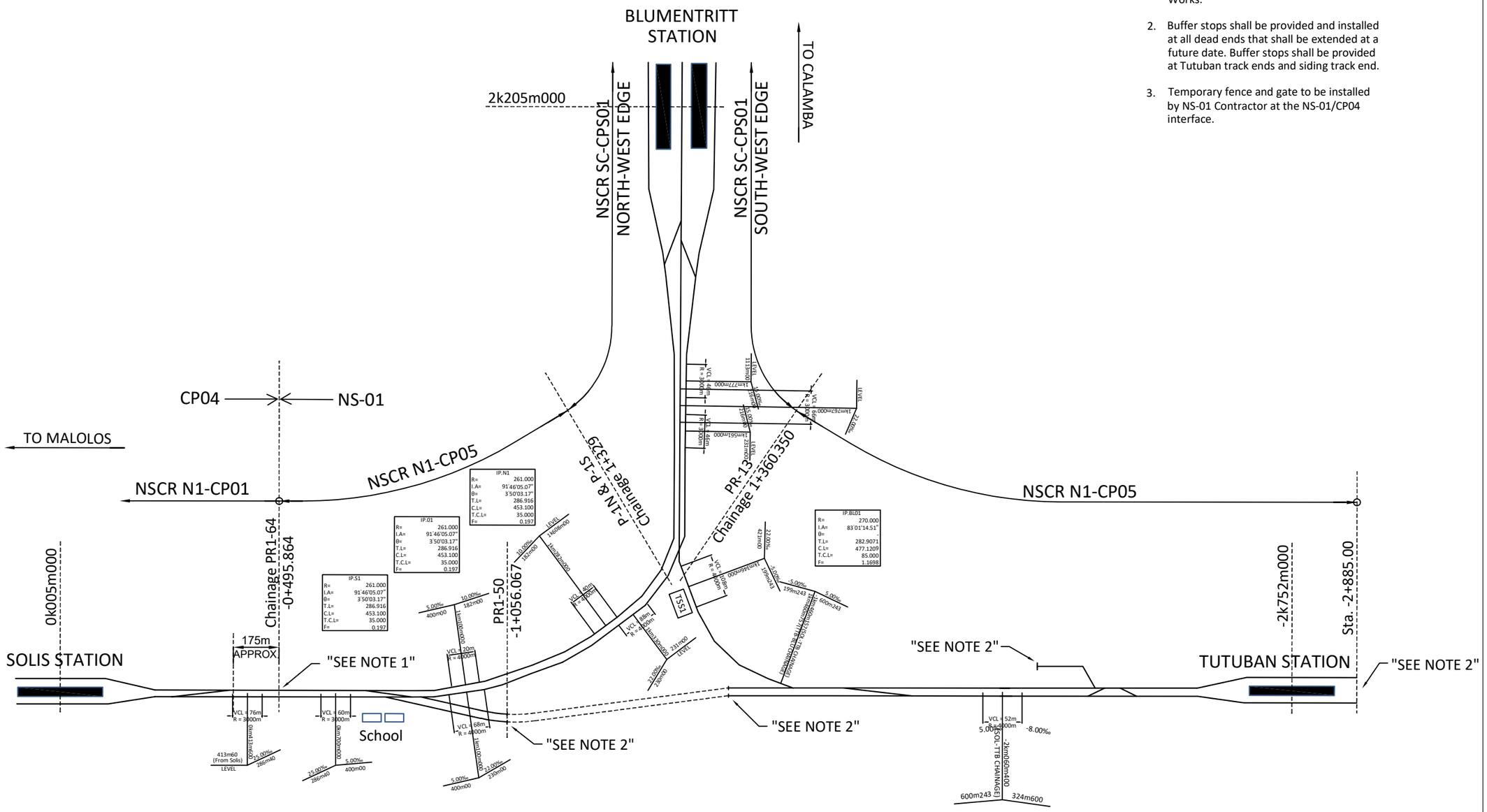
SECTION VI. EMPLOYER'S REQUIREMENT – d) EMPLOYER'S DRAWINGS (ERD)

TABLE OF CONTENTS

SECTION VI. EMPLOYER'S REQUIREMENT – d) EMPLOYER'S DRAWINGS (ERD)

TABLE OF CONTENTS

NOTE:
1. Temporary Buffer Stop shall be provided and installed by CP04 Contractor at Chainage -0+495.This Buffer Stop shall be removed by the NS-01 Contractor on connection of the Trackwork to the CP04 Works.
2. Buffer stops shall be provided and installed at all dead ends that shall be extended at a future date. Buffer stops shall be provided at Tutuban track ends and siding track end.
3. Temporary fence and gate to be installed by NS-01 Contractor at the NS-01/CP04 interface.



LEGEND:

---------- FUTURE CONNECTION

FOR REFERENCE ONLY

VERSIONS	DATE	DESCRIPTION
00	21 MAY 2021	ISSUED FOR REFERENCE

DEPARTMENT OF TRANSPORTATION (DOTr)

PHILIPPINE NATIONAL RAILWAYS

CONSULTANT

JICA DESIGN TEAM (JDT)

ORIENTAL CONSULTANTS GLOBAL CO.,LTD.

KATAHIRA & ENGINEERS INTERNATIONAL

PACIFIC CONSULTANTS CO.,LTD.

JAPAN INTERNATIONAL CONSULTANTS FOR TRANSPORTATION CO.,LTD.

TONICHI ENGINEERING CONSULTANTS, INC.

Tokyo Metro Co.,Ltd.

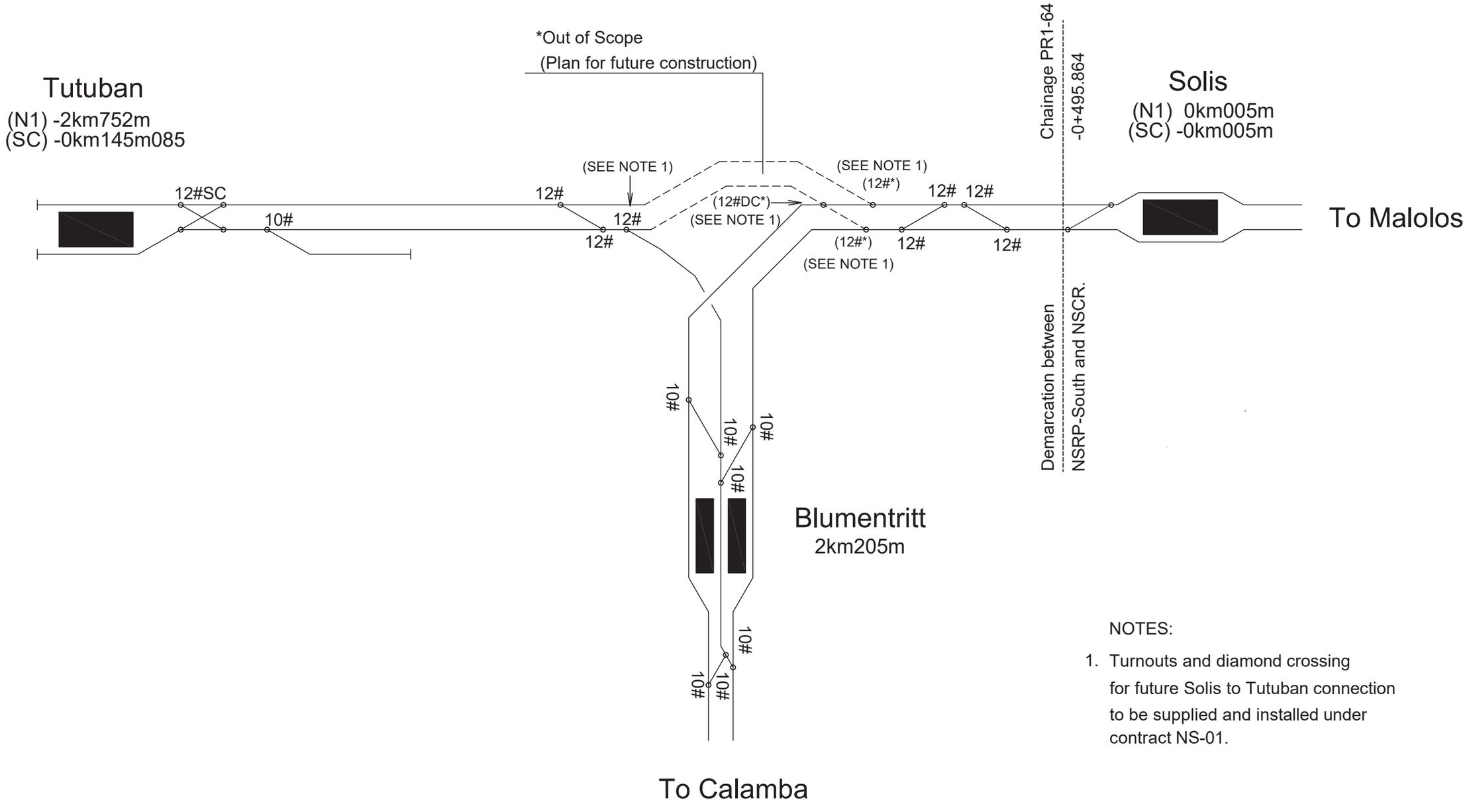
TITLE	–	–
DESIGNER	A.AGUILAR	–
CHECK	R.ZARASPE	–
TEAM LEADER	P.SWIFT	–
P. MANAGER	Y.MAEDA	–

MALOLOS – CLARK RAILWAY PROJECT (MCRP)
NORTH SOUTH RAILWAY PROJECT–SOUTH (NSRP–SOUTH)

Package CP NS–01 : Bidding Documents

SOLIS, BLUMENTRITT AND TUTUBAN (SBT) LAYOUT

DATE	MAY 2021
SCALE	AS SHOWN
SHEET No.	1 of 1
DRG No.	NSCR–GCR–NS01–SBT–DWG–TK–000001
DRG S.	–
REV	00



NOTES:

1. Turnouts and diamond crossing for future Solis to Tutuban connection to be supplied and installed under contract NS-01.

VERSIONS	DATE	DESCRIPTION
GC01	20 SEP 2019	NEW DRAWING SHEET
GC02	07 DEC 2020	JUNCTION REVISED
GC03	03 MAR 2021	ISSUED FOR REFERENCE

DEPARTMENT OF TRANSPORTATION (DOTr)

PHILIPPINE NATIONAL RAILWAYS

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KATAHIRA & ENGINEERS INTERNATIONAL

PACIFIC CONSULTANTS CO.,LTD.

JAPAN INTERNATIONAL CONSULTANTS FOR TRANSPORTATION CO.,LTD.

TONICHI ENGINEERING CONSULTANTS, INC.

Tokyo Metro Co.,Ltd.

TITLE	JDT	SMEC
DESIGNER	A.AGUILAR	–
CHECK	R.ZARASPE	–
TEAM LEADER	P.SWIFT	–
P. MANAGER	Y.MAEDA	–

MALOLOS – CLARK RAILWAY PROJECT (MCRP)
NORTH SOUTH RAILWAY PROJECT–SOUTH (NSRP–SOUTH)

Package CP NS–01 : Bidding Documents

SOLIS, BLUMENTRITT AND TUTUBAN (SBT) LAYOUT

DATE	SEPTEMBER 2019
SCALE	AS SHOWN
SHEET No.	
DRG No.	NSCR-SW-ALT-SBT-D-0001
DRG S.	REV GC03

SECTION VI. EMPLOYER'S REQUIREMENT – d) EMPLOYER'S DRAWINGS (ERD)

TABLE OF CONTENTS

SECTION VI. EMPLOYER'S REQUIREMENT – d) EMPLOYER'S DRAWINGS (ERD)

TABLE OF CONTENTS

9) TRACK ALIGNMENT DRAWINGS

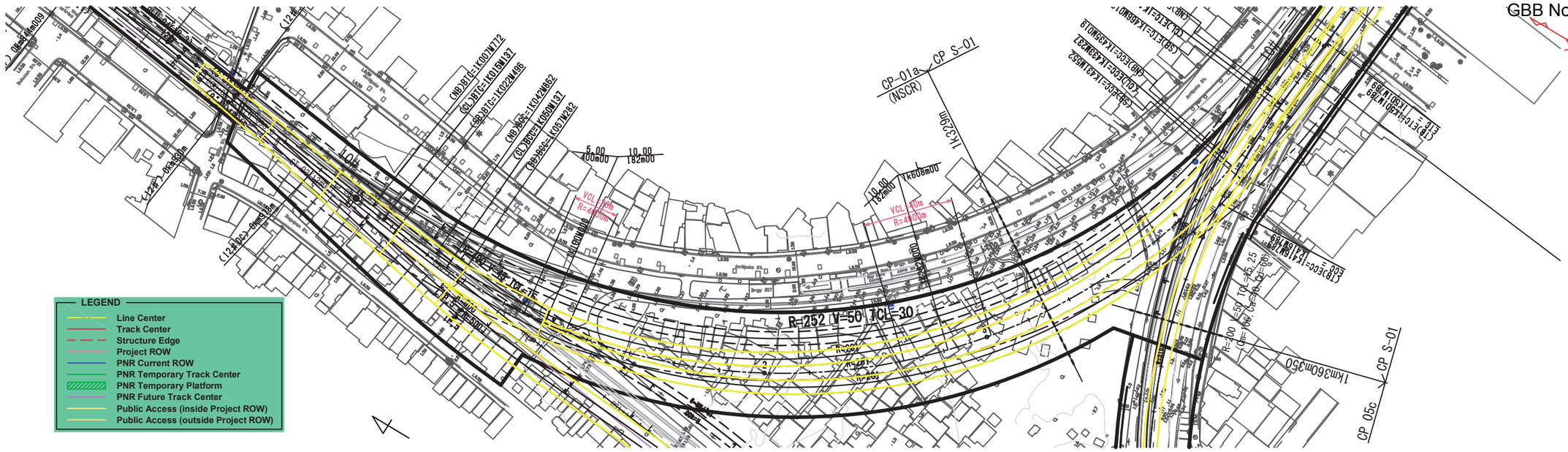
b) NSRP – South : CP S-01 to CP S-07

9) TRACK ALIGNMENT DRAWINGS

b) NSRP – South : ~~CP05 &~~ CP S-01 to CP S-07

CP05 TRACK ALIGNMENT

GBB No. 5



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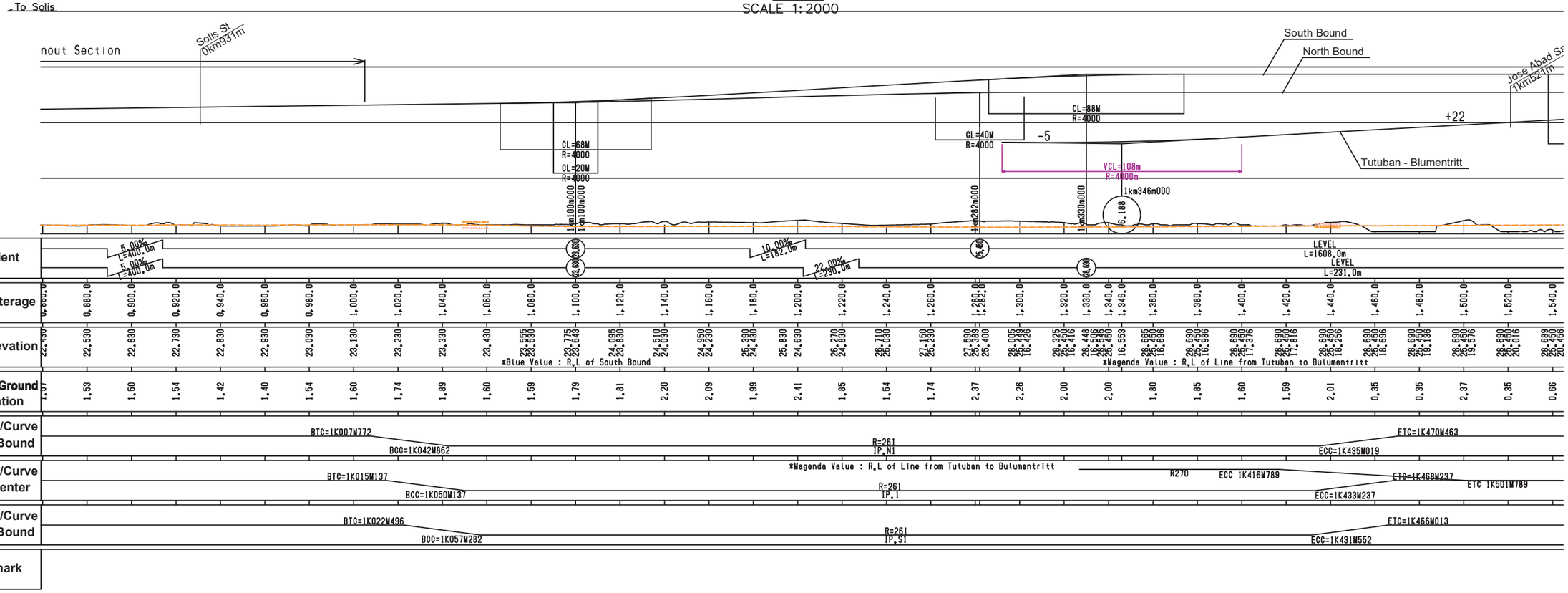

PROFILE
SCALE H=1:2000 V=1/800

VERSIONS	DATE	DESCRIPTION
21	6 OCT 2020	ISSUE FOR BIDDING

DEPARTMENT OF TRANSPORTATION (DOTr)

PHILIPPINE NATIONAL RAILWAYS

CONSULTANT

JICA DESIGN TEAM (JDT)

ORIENTAL CONSULTANTS GLOBAL CO., LTD.
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PACIFIC CONSULTANTS CO., LTD.
JAPAN INTERNATIONAL CONSULTANTS FOR TRANSPORTATION CO., LTD.
TONICHI ENGINEERING CONSULTANTS INC.
TOKYO METRO CO., LTD

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DESIGNER	J. UCHIDA	R. ACOSTA JR.
CHECK	I. NAMIKAWA	V. BALAKRISHNAN
TEAM LEADER	N. MATSUMOTO	M. TOVEY
P. MANAGER	N. KAWAI	R. YUZON JR.

THE NORTH - SOUTH COMMUTER RAILWAY PROJECT

PACKAGE CP S-01A : DETAILED DESIGN

TITLE

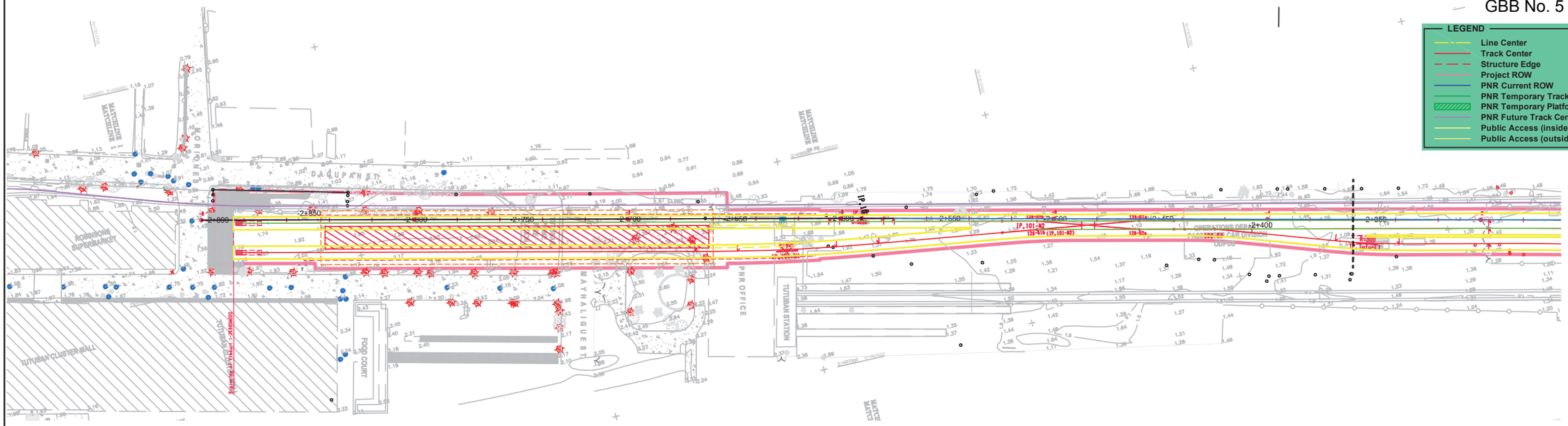
Track Alignment (0k900m~1k500m)

DATE	OCTOBER 2020
SCALE	AS SHOWN IN A3
SHEET No.	3 / 3
DRG No.	NSRP-SW-ALT-PL-D-0003
DRG S.	REV 21

Station Matrix (rev.190422)
*comment

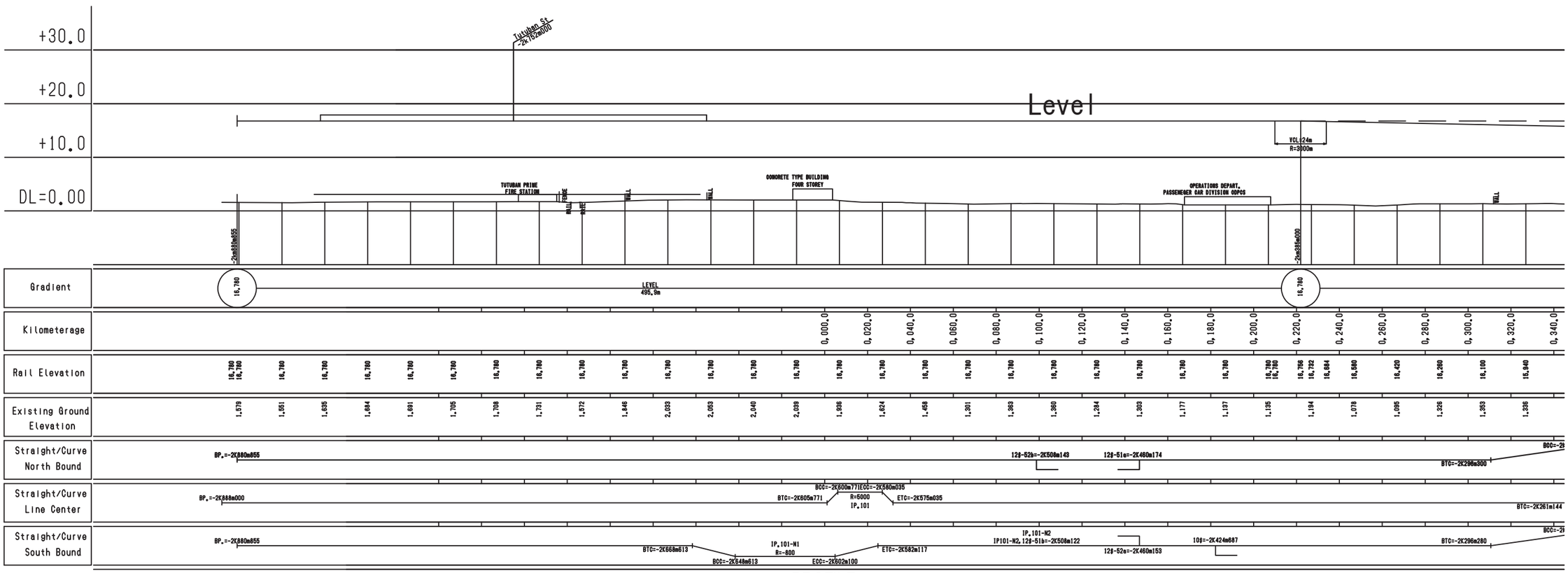
Last modified by Junichi UCHIDA: 2020 ver3.9.0

GBB No. 5



Plan
SCALE 1: 2000

To Tutuban — To Calamba



PROFILE
SCALE H=1: 2000 V=1/800

Station Matrix (rev.190422)
*comment

Last modified by Junichi UCHIDA 2020 ver3.9.0

VERSIONS	DATE	DESCRIPTION
21	6 OCT 2020	ISSUE FOR BIDDING

DEPARTMENT OF TRANSPORTATION (DOTr)

PHILIPPINE NATIONAL RAILWAYS

CONSULTANT

JICA DESIGN TEAM (JDT)

ORIENTAL CONSULTANTS GLOBAL CO., LTD.
KATAHIRA & ENGINEERS INTERNATIONAL
PACIFIC CONSULTANTS CO., LTD.
JAPAN INTERNATIONAL CONSULTANTS FOR TRANSPORTATION CO., LTD.
TONICHI ENGINEERING CONSULTANTS INC.
TOKYO METRO CO., LTD

TITLE	JDT	SMEC
DESIGNER	J. UCHIDA	R. ACOSTA JR.
CHECK	I. NAMIKAWA	V. BALAKRISHNAN
TEAM LEADER	N. MATSUMOTO	M. TOVEY
P. MANAGER	N. KAWAI	R. YUZON JR.

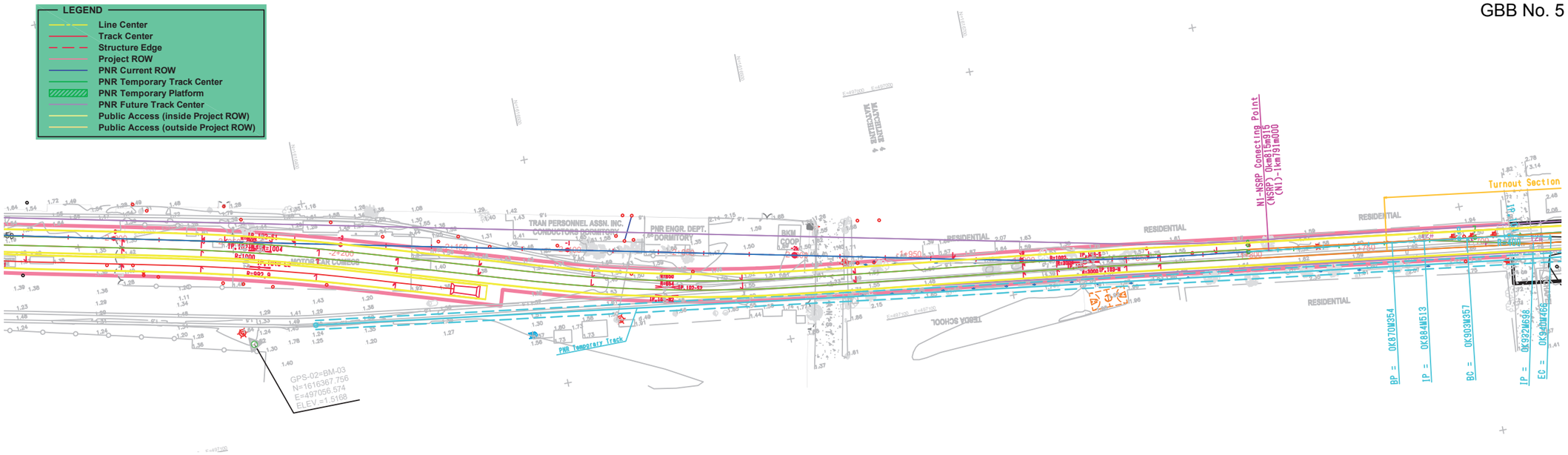
NORTH SOUTH RAILWAY PROJECT - SOUTH (NSRP - SOUTH)

PACKAGE CP S-01B : DETAILED DESIGN

TITLE
Track Alignment
(Tutuban – Blumentritt ~0k300m)

DATE: OCTOBER 2020
SCALE: AS SHOWN IN A3
SHEET No.: 1 / 3
DRG No.: NSRP-SW-ALT-PL-D-0001
DRG S.:
REV: 21

GBB No. 5



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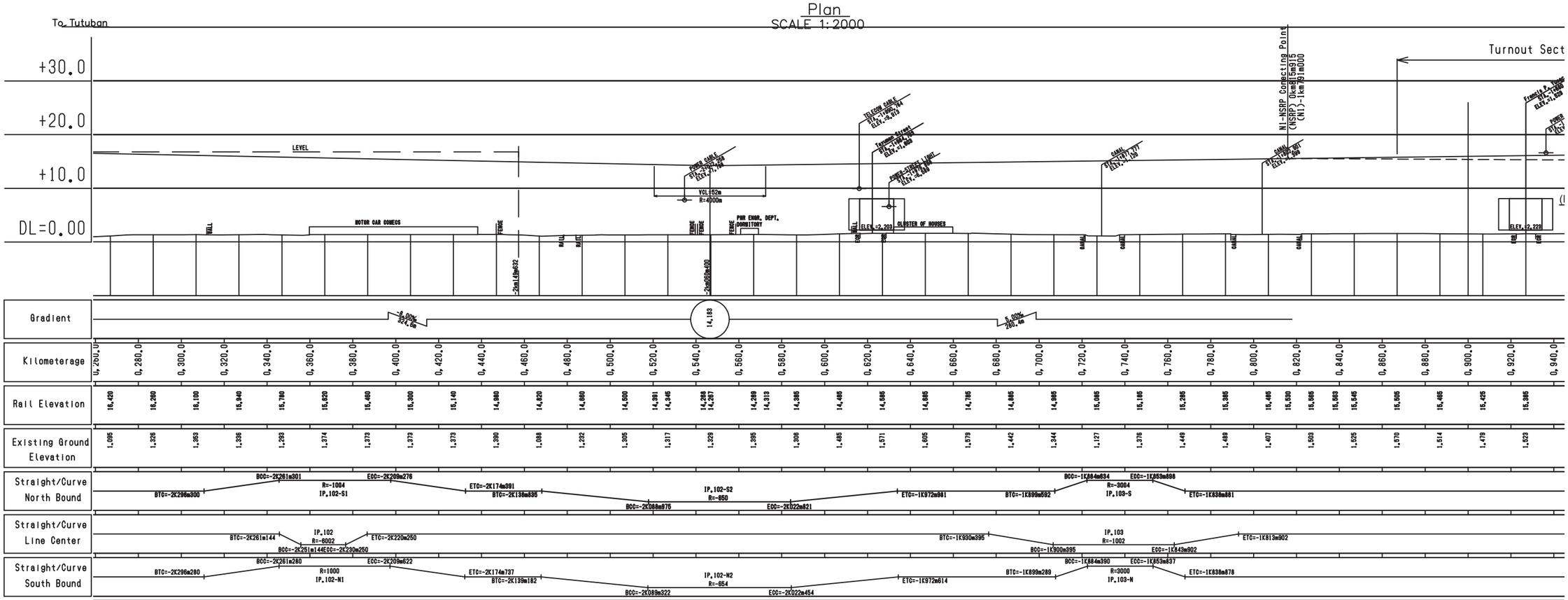


PROFILE
SCALE H=1:2000 V=1/800

VERSIONS	DATE	DESCRIPTION
21	6 OCT 2020	ISSUE FOR BIDDING

DEPARTMENT OF TRANSPORTATION (DOTr)

PHILIPPINE NATIONAL RAILWAYS

CONSULTANT

JICA DESIGN TEAM (JDT)

ORIENTAL CONSULTANTS GLOBAL CO., LTD.
KATAHIRA & ENGINEERS INTERNATIONAL
PACIFIC CONSULTANTS CO., LTD.
JAPAN INTERNATIONAL CONSULTANTS FOR TRANSPORTATION CO., LTD.
TONICHI ENGINEERING CONSULTANTS INC.
TOKYO METRO CO., LTD

TITLE	JDT	SMEC
DESIGNER	J. UCHIDA	R. ACOSTA JR.
CHECK	I. NAMIKAWA	V. BALAKRISHNAN
TEAM LEADER	N. MATSUMOTO	M. TOVEY
P. MANAGER	N. KAWAI	R. YUZON JR.

NORTH SOUTH RAILWAY PROJECT - SOUTH (NSRP - SOUTH)

PACKAGE CP S-01B : DETAILED DESIGN

TITLE
Track Alignment
(Tutuban – Blumentritt 0k300m~0k900m)

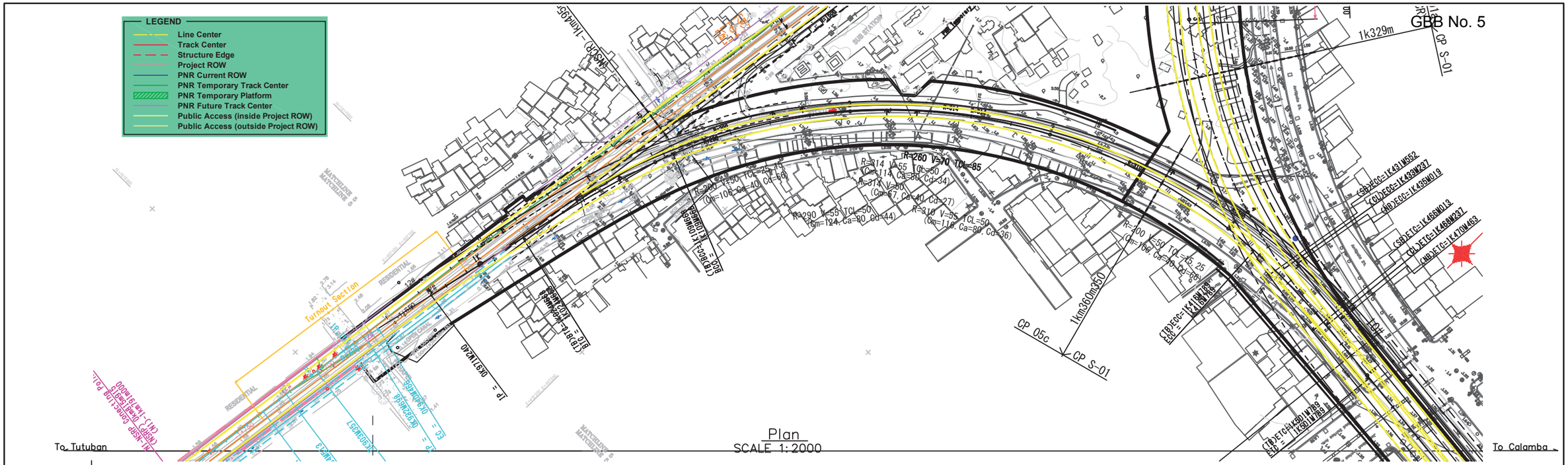
DATE: OCTOBER 2020
SCALE: AS SHOWN IN A3
SHEET No.: 2 / 3
DRG No.: NSRP-SW-ALT-PL-D-0001
DRG S.:
REV: 21

Station Matrix (rev.190422)
*comment

Last modified by Junichi UCHIDA 2020 ver3.9.0

GBB No. 5

LEGEND
- Line Center
- Track Center
- Structure Edge
- Project ROW
- PNR Current ROW
- PNR Temporary Track Center
- PNR Temporary Platform
- PNR Future Track Center
- Public Access (inside Project ROW)
- Public Access (outside Project ROW)



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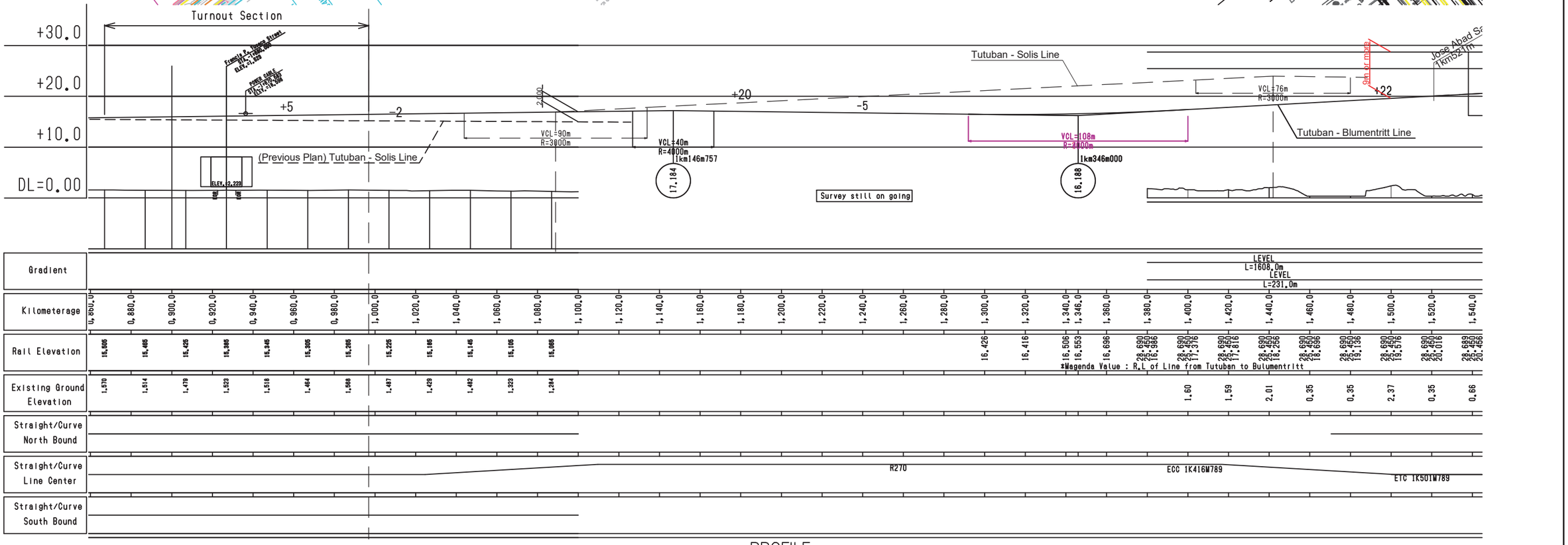

PROFILE
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VERSIONS	DATE	DESCRIPTION
21	6 OCT 2020	ISSUE FOR BIDDING

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ORIENTAL CONSULTANTS GLOBAL CO., LTD.
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JAPAN INTERNATIONAL CONSULTANTS FOR TRANSPORTATION CO., LTD.
TONICHI ENGINEERING CONSULTANTS INC.
TOKYO METRO CO., LTD

TITLE	JDT	SMEC
DESIGNER	J. UCHIDA	R. ACOSTA JR.
CHECK	I. NAMIKAWA	V. BALAKRISHNAN
TEAM LEADER	N. MATSUMOTO	M. TOVEY
P. MANAGER	N. KAWAI	R. YUZON JR.

NORTH SOUTH RAILWAY PROJECT - SOUTH (NSRP - SOUTH)

PACKAGE CP S-01B : DETAILED DESIGN

TITLE
Track Alignment
(Tutuban – Blumentritt 0k900m~1k500m)

DATE: OCTOBER 2020
SCALE: AS SHOWN IN A3
SHEET No.: 3 / 3
DRG No.: NSRP-SW-ALT-PL-D-0001
REV: 21

Station Matrix (rev.190422)
*comment

Last modified by Junichi UCHIDA 2020 ver3.9.0

NORTH-SOUTH COMMUTER RAILWAY EXTENSION (NSCR-EX) PROJECT
(Malolos – Clark) (Solis – Calamba)
GENERAL CONSULTANT

PROJECT SPECIFIC PROCEDURE

BIM Information Management Flow

Deliverable No. 9 - NSCR-GCR-LWD-ZWD-TDC-BM-000001

Document No.: NSCR-GC-LWD-ZWD-TDC-BM-000001, Rev 1, 22-Feb-2021
Printed copy is uncontrolled. Always refer to the electronic copy as the latest version.

A. Approval

	Name		Title	Date	Signature
Prepared by:	Albert Anthony Quesada	N2SC	BIM Director	26-02-2021	
Reviewed by:	Ian Watson	N2SC	Design Manager	26-02-2021	
Authorized by:	Katsuyuki Saito	N2SC	Project Director	02-03-2021	

B. Document Revision History

Rev.	Revision Date	Description of Change	Functional Endorsement	Location of Change
1	01-21-2021	Included the Document Revision History Tracker		Page 2
		Included the procedure for updating the document.		Page 11/Scope
		Updated the Project Details/Contract Form: Build – Civil Works Design and Build – E&M and Rail Systems		Page 13 and 72
		Updated BIM Model Structure Diagrams: 2.1 to 2.10 (Included the Auxiliary Electronic System should be included in the BIM Model Structure)		Page 15 to 24
		Updated BIM Model Structure Diagrams: 2.8 to 2.10 (Deleted duplicate Rail System instance)		Page 22 to 24
		Updated the Number of Contract Packages		Page 25 now Page 26
		Drawing Size (Trackwork)		Page 32 now Page 33
		Updated and added the date for the delivery of the LOD Matrix and Catalogue		Page 50 / COBie Standards
		Updated paragraph to include Clash Detection and Resolution in the Pre-Final and Final Design Stage		Page 67 now Page 68
		Updated the RASCI Table		Page 78 now Page 80 Section 11.9 Roles and Responsibilities

		Update to include 4D modeling for SC Contract Packages Only		Page 180 – Section 1.1 of Appendix H - Navisworks
		Added Note: Asset and Non-Asset Element (example)		Page 67 – of Section 9. Asset/MMS Information

Document No.: NSCR-GC-LWD-ZWD-TDC-BM-000001, Rev 1, 22-Feb-2021

TABLE OF CONTENTS

IMPORTANT NOTE:

This procedure ***SHALL NOT*** be submitted to the Client without review in any instance. After review, this procedure shall be approved by the Project Director/Manager.

1. INTRODUCTION

The Government of Philippines (hereinafter referred as “GOP “) has received a loan from the Japan International Cooperation Agency (hereinafter referred to as "JICA") to finance the North-South Commuter Railway Extension Project (NSCR-EX) (hereinafter referred as “the Project”) which aims to provide a commuter and intercity railway service connecting Metro Manila to its adjacent northern and southern suburban areas. The Clark to Calamba railway is deemed as an important mass transit backbone for the metropolis as well as for the growth corridor of the Greater Capital Region (hereafter referred to as “GCR”), which comprises of Region.

Department of Transport (DOTr) has started to implement the Digital Engineering Program for the all railway project starting with Metro Manila Subway Project and North-South Commuter Railway Extension Project (NSCR-EX). The main part of the program is establishing a CDE the will run within the whole project life cycle.

The CDE will be composed of the following:

- Electronic Data Management System (EDMS)
- Building Information Modeling (BIM)
- Risk and Requirements Management
- Cost Management
- Dashboard and Communication
- Asset Management

Based on this Directive and Information Requirements of the project, the General Consultant will formulate and provide a manual and guidelines. This is to ensure all information are proper gathered, in the correct format and run thru the appropriate workflow.

1.1 PURPOSE

This Project BIM Manual will provide guidelines that ensure project Teams will produce, release, and receive data in a consistent format, for NSCREX project. This will maintain an efficient exchange of data between disciplines and the compatibility of each discipline.

The primary goals of this structure are to improve coordination among all functional groups within the NSCR-EX Project team, as well as to develop BIM projects in a way that will facilitate the further use of this electronic information beyond the initial contract.

This document is also to outline a plan for the definition, preparation and delivery of asset information that could be used in O&M phase of the project by MMS team. The end product is technically the final as-built BIM model with the provision of required asset information (object attributes) at object level which is used in overall MMS solution.

The Project BIM Manual shall include:

- BIM Standards
- Information Exchange
- Asset/MMS Information

1.2 SCOPE

As a BIM framework for ensuring Project compliance with the EIR, the BEP facilitates BIM deliverables management in line with the Program and includes the management, planning and documentation exchange processes, standard methods and procedures and the related IT solutions.

This document is binding on all Project Team Members responsible for authoring, checking and verifying BIM Models and associated data. All Project Team Members shall comply with this BEP in its entirety. A thorough understanding of DOTr Information Requirements is a prerequisite for using this document.

This BIM Execution Plan is a live document and will be subject to change during the Project's duration. More information regarding the deliverables of this document and the contents to be updated can be found in 270235_REP_0010_D9_Info Mgt Plan.

This BIM Execution Plan shall be the only BIM Plan used by the Project Team Members. All relevant organizational standards, information and methods of working shall be incorporated into this BEP.

The process for updating the document is when certain sections or procedures are updated due to project needs this is in coordination with (GCR and the JV Contractors), the document then is to be resubmitted to the DOTr for approval and upgraded to another revision of the document.

1.3 RESPONSIBILITIES

It is the responsibility of all NSCR-EX Project Team Members (including Consultant's subcontractors) to comply with the processes set out in this document.

These processes are established and maintained by the Consortium Technical Office and the Consortium BIM Team, being the BIM Manager, and the BIM Coordinators the ones responsible for its implementation. Also, the BIM Managers of each Project stakeholder oversee the correct application of these processes within their respective organizations.

1.4 APPENDICES

	Name	Definition	Document Number
1		BIM EXECUTION PLAN	To be developed by CWJV
		BIM DELIVERY PROGRAMME	To be developed by CWJV
2		BIM USES	To be developed by CWJV
3		BIM CAPABILITY ASSESSMENT	To be developed by CWJV
4		MASTER INFORMATION DELIVERY PLAN (MIDP)	To be developed by CWJV
5		QA/QC MANAGEMENT PLAN	To be developed by CWJV
6	Appendix A	DRAWING ISSUE LIST (DIL) SAMPLE	
7	Appendix B	DRAWING ISSUE HISTORY (DIH) SAMPLE	
8	Appendix C	DRAWING NUMBERING CONVENTION	

9	Appendix D	AUTODESK CIVIL 3D	
10	Appendix E	AUTODESK REVIT	
11	Appendix F	ACONEX	
12	Appendix G	ACONEX – ANNEX A	
13	Appendix H	AUTODESK NAVISWORKS	
14	Appendix I	COMMON DATA ENVIRONMENT PROJECTWISE	
15	Appendix J	N1, N2 and SC CLUSTERS	

1.5 DEFINITIONS

Name	Definition
DOTr	Department of Transportation and Railway (Philippines)
The Employer	Department of Transportation and Railway (DOTr)
General Consultant	Greater Capital Railway Consortium (GCR)
The Engineer	Appointed by the Employer to act as the Engineer for the purposes of the Contract.
The Contractor	The person(s) named as contractor in the Letter of Acceptance and the Contract Agreement, and the legal successors in title to this person(s)
The Project	North-South Commuter Railway Extension

1.6 ABBREVIATIONS

Name	Definition
GCR	General Consultant (Greater Capital Railway Consortium)
NSCR-EX	North-South Commuter Railway Extension
AIM	Asset Information Model
BEP	BIM Execution Plan
BIM	Building Information Modelling
BOM	Bill of materials
BS	British Standard
CAD	Computer Aided Design
CDE	Common Data Environment
CDRL	Contract Deliverables Requirements List
CTO	Consortium Technical Office
COBie	Construction Operation Building and Information exchange
CW	Civil Works
CWJV	Civil Works Joint Venture
DCP	Design Control Point

DMP	Design Management Plan
DOORS	Dynamic Object-Oriented Requirements System
DRS	Document Review Sheet
EDMS	Electronic Document Management System
EIR	Employer's Information Requirements
HSE	Health, Safety and Environment
GIS	Geographic Information System
IFC	Industry Foundation Class
ISO	International Organization for Standardization
LOD	Level of Definition
Lod	Level of detail (geometry)
Loi	Level of information (Attributes)
MMS	Maintenance Management System
MIDP	Master Information Delivery Plan
MPDT	Model Production Delivery Table
NOC	No Objection Certificate
PIM	Project Information Model
RSY	Rail Systems - TBD
TBD	To Be Defined
TIDP	Task Information Delivery Plan
WBS	Work Breakdown Structure

1.7 PROJECT DETAILS

PROJECT NAME:

North – South Commuter Railway Extension (NSCR-EX)

CLIENT:

DOTr

PROJECT CONTRACT FORM:

Build – Civil Works

Design and Build – E&M and Rail Systems

PROJECT ADDRESS:

North and South of Luzon, Philippines

1.8 PROJECT SCHEDULE AND MAJOR MILESTONES

This section gives a summary of the information of Baseline Program which is submitted as a separate document as well as the major milestones required for the completion of the works,

Since the design and drawing extraction are being processed in BIM from DCP 2 onwards the as-built stage, the corresponding activity dates are the same as the BIM activity dates.

1.9 PROJECT GOALS, PROJECT CHALLENGES AND RISKS

The NSCR-EX Project aims to achieve Level 2 of BIM maturity as defined within ISO 19650 suite and supporting standards. Based on this, all Project stakeholders shall work following a continuous, integrated, multi-disciplinary collaboration process, virtual building process and simulations from which will intend to enhance design and construction methods with regards to quality, execution time and cost.

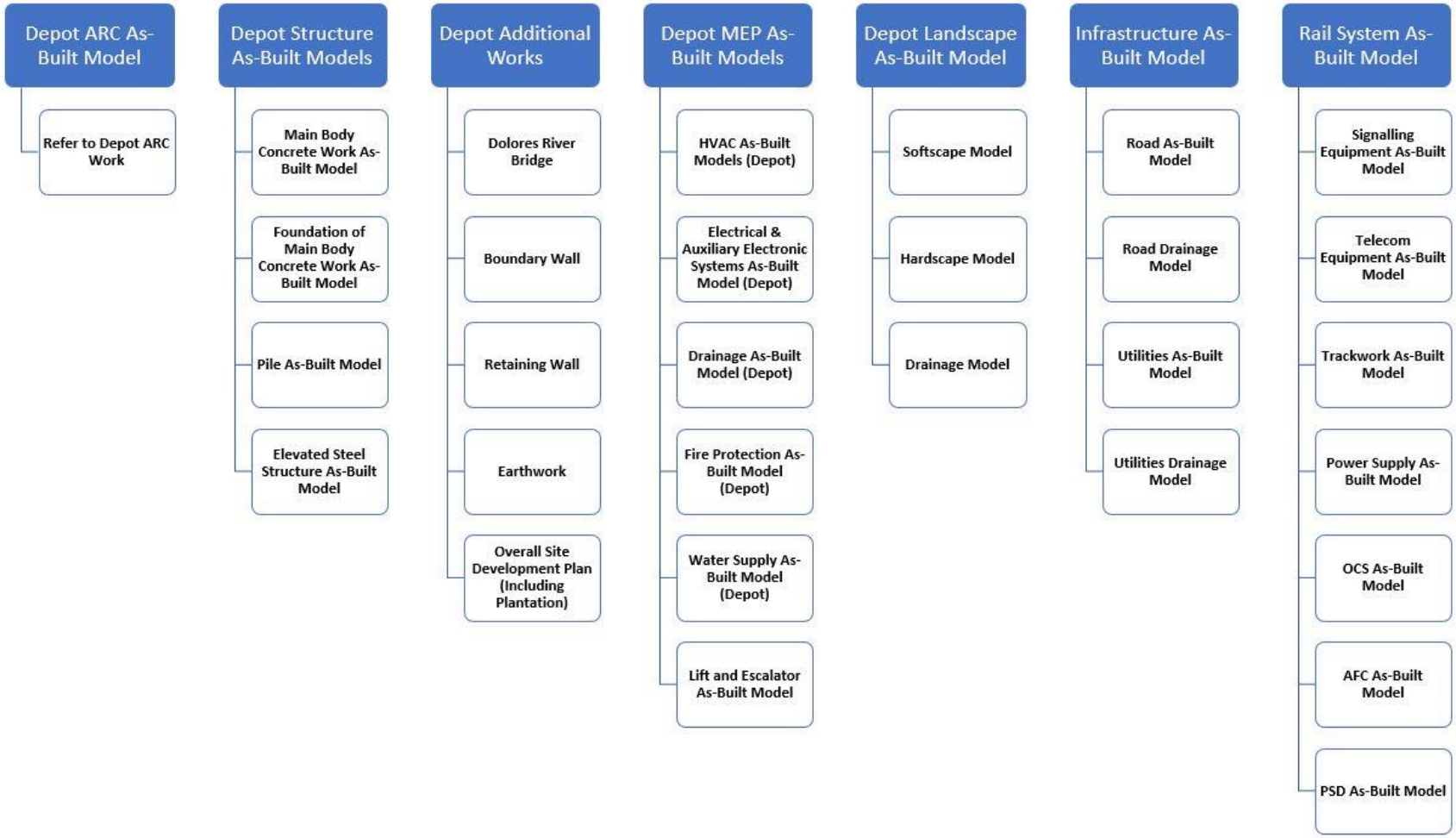
Apart from meetings, effective collaboration shall be assured through information exchange within the Common Data Environment (CDE). Design, construction, As-built and management information will be shared amongst Project stakeholders with appropriate access rights by using defined file formats (native, IFC) and discipline-specific software fit for each BIM use and deliverable (e.g. design, coordination, As-built, COBie, etc.). The end goal is to generate a federated model through which clashes between different systems and disciplines will be identified and resolved, thus assuring coordination and collaboration before construction activities commence, as well as to deliver As Built and AIM. To achieve this goal, the Project's supply chain shall be engaged through BIM.

2. BIM Model Structure

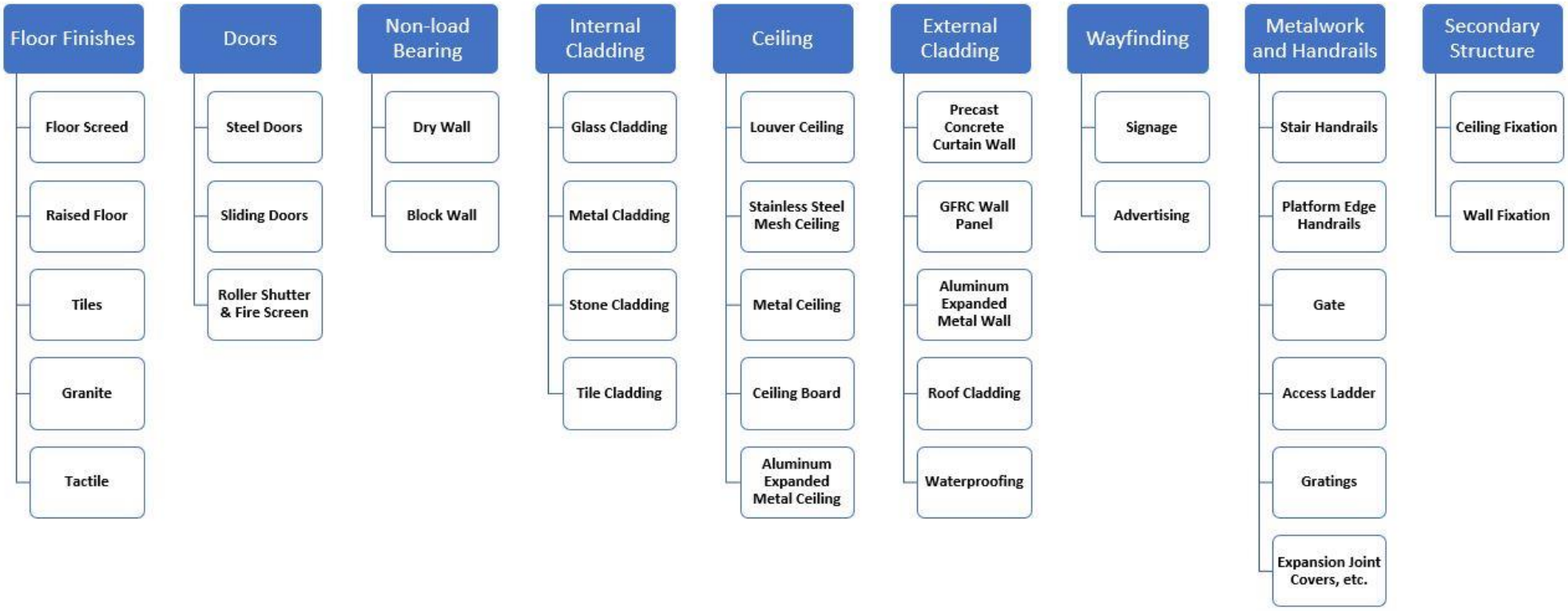
NSCR-EX BIM Model Structure will be based on the following sub geo structure:

a. Depot As-Built Model Structure
b. Outlying As-Built Model Structure
c. Elevated Station As-Built Model Structure
d. Underground Station As-Built Model Structure
e. Liner Structure-Viaduct As-Built Mode Structure
f. Linear Structure-Tunnel As-Built Model Structure
g. Linear Structure-Cut and Cover As-Built Model Structure

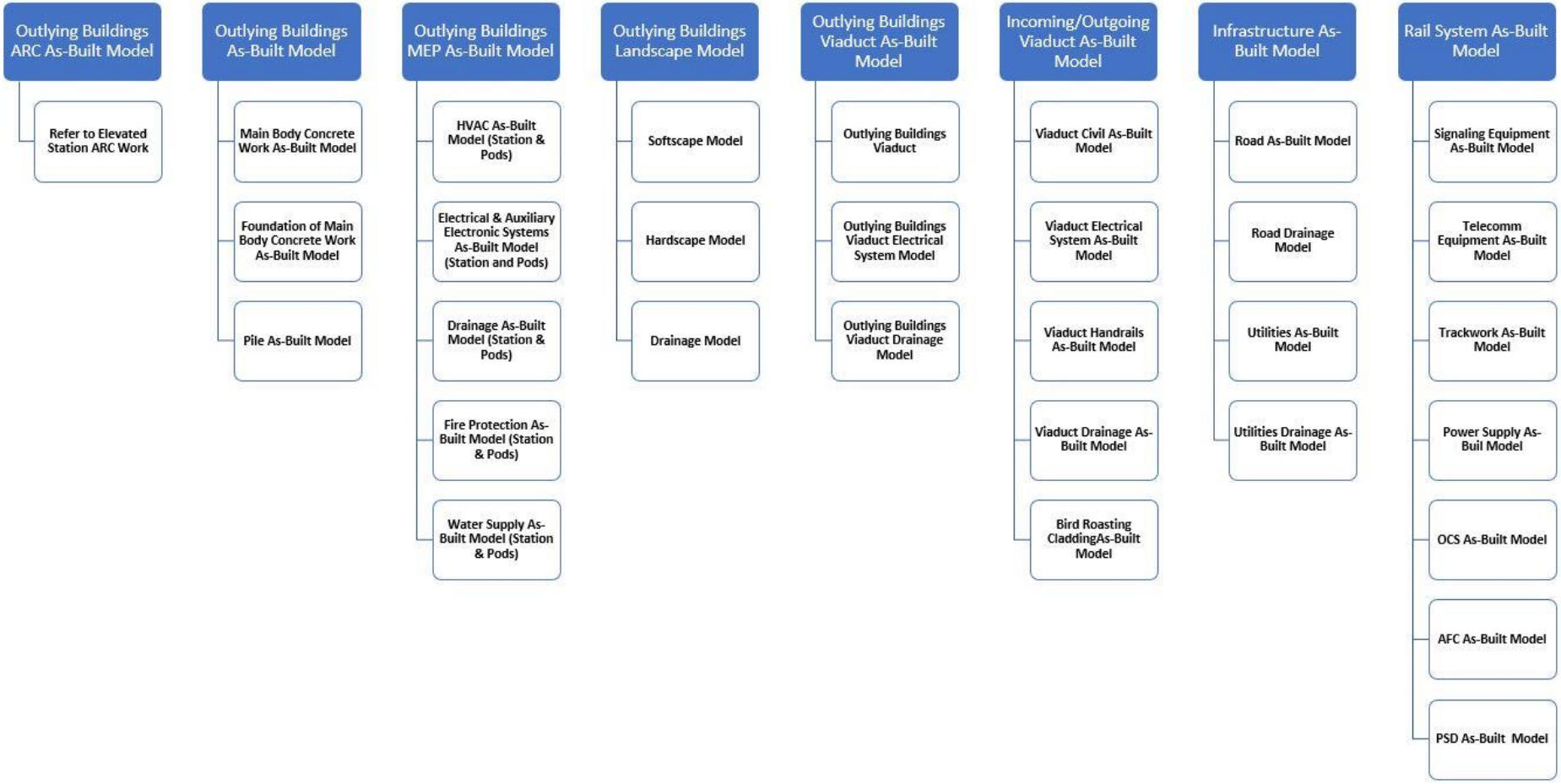
2.1 Depot As-Built Model Structure



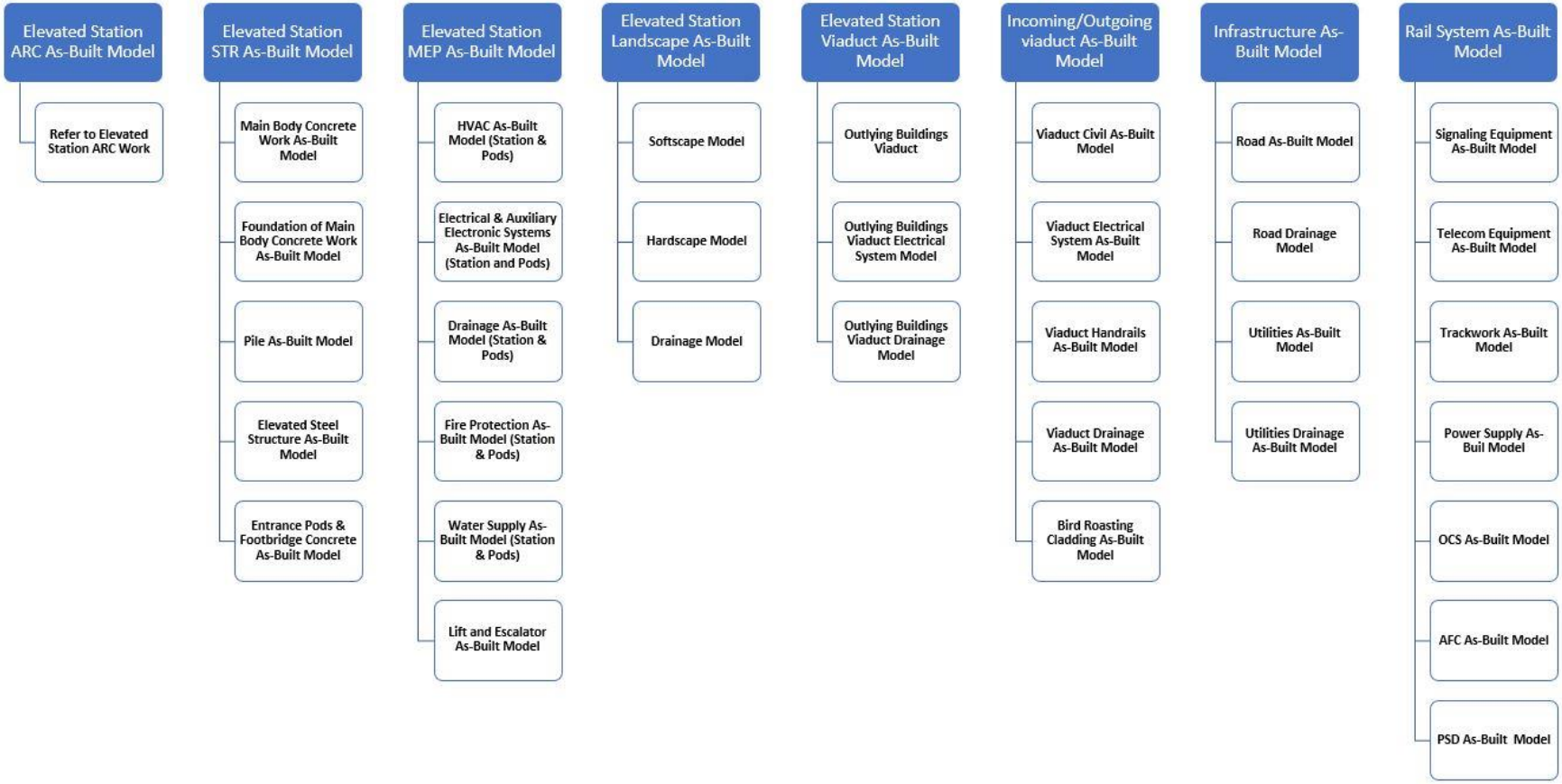
2.2 Depot ARC Work



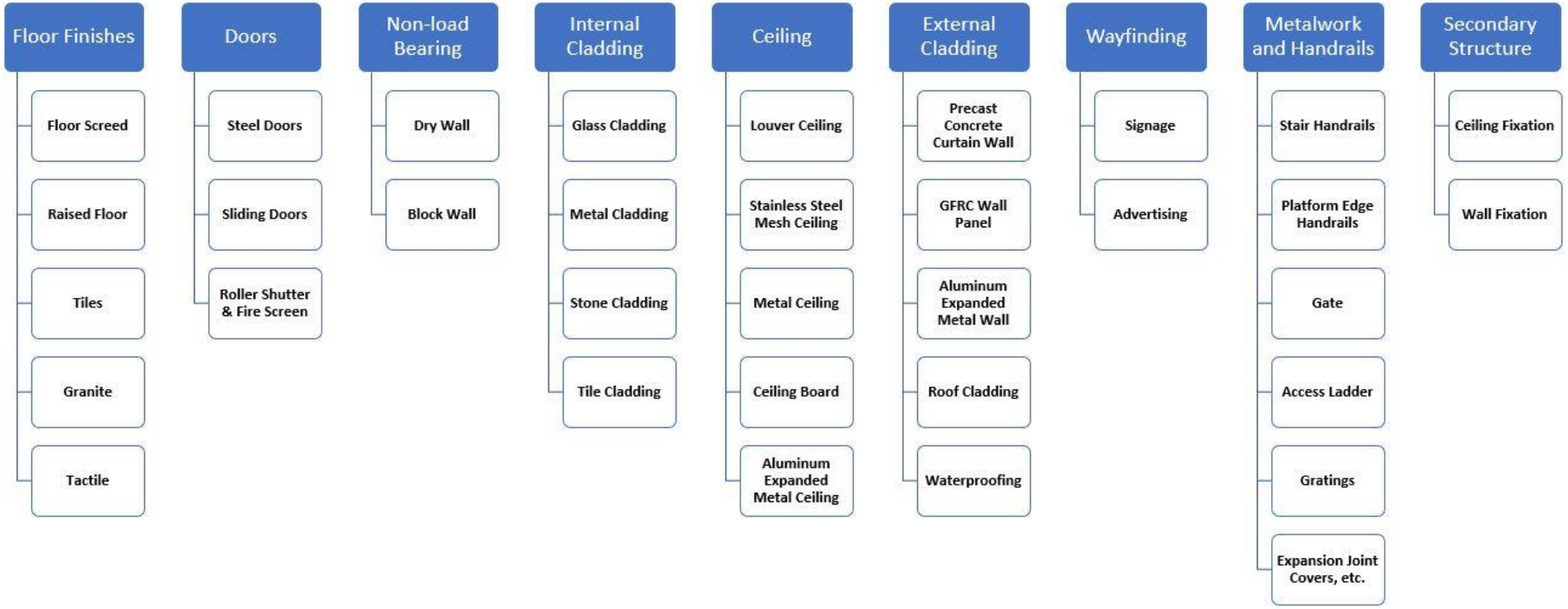
2.3 Outlying Buildings



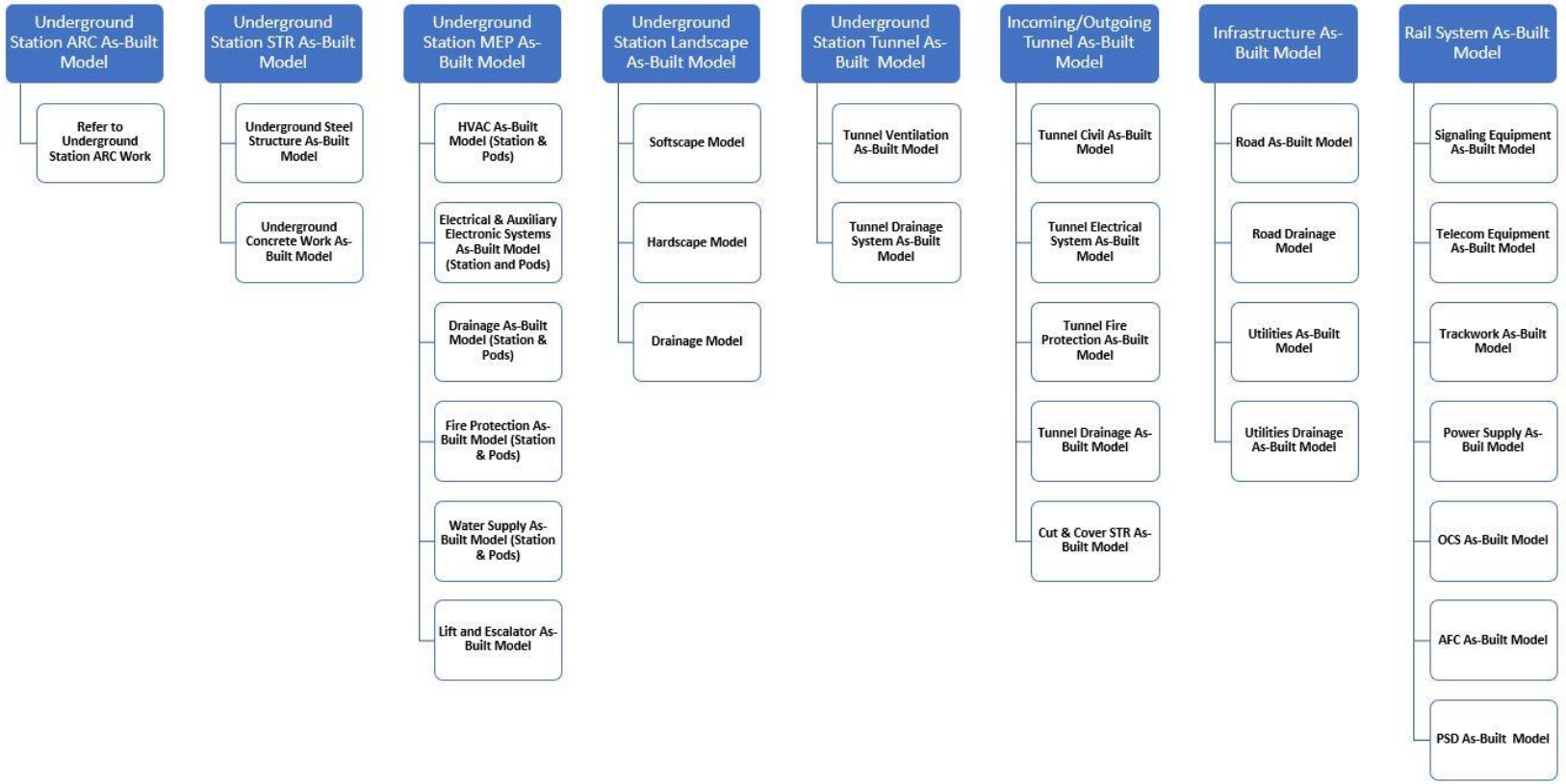
2.4 Elevated Station As-Built Models Structure



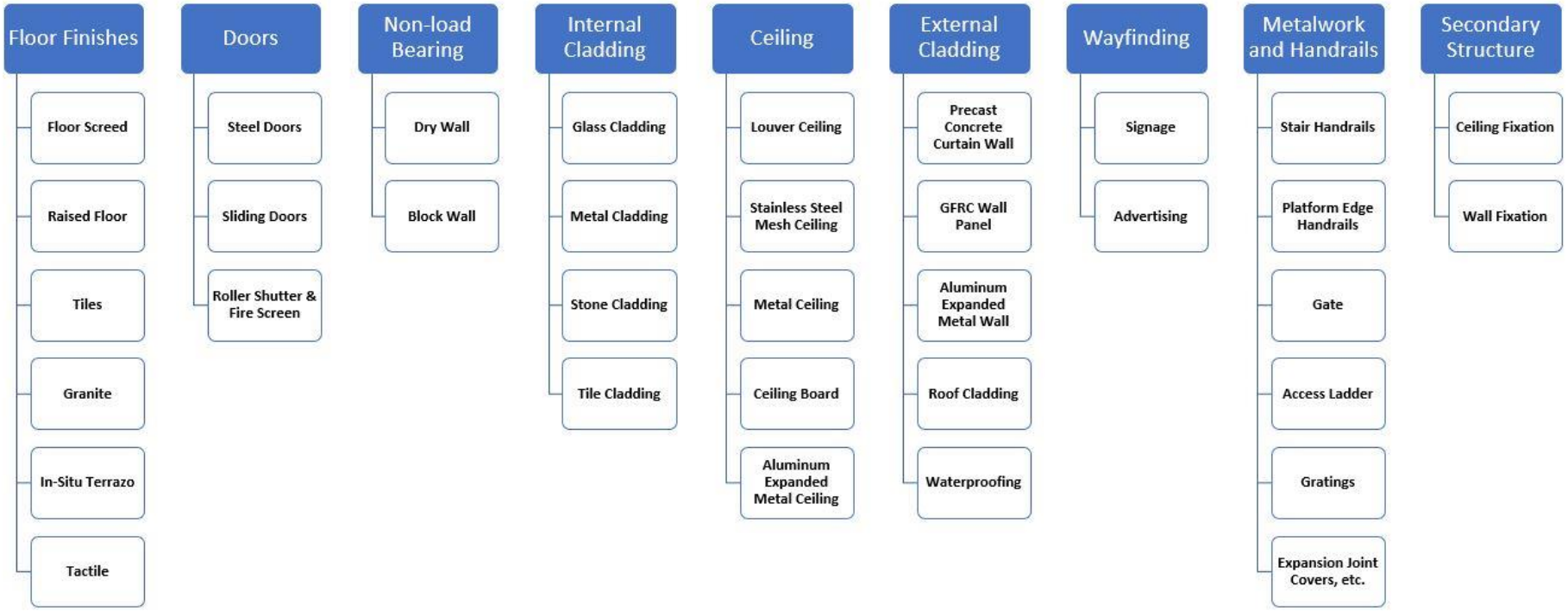
2.5 Elevated Station ARC Work



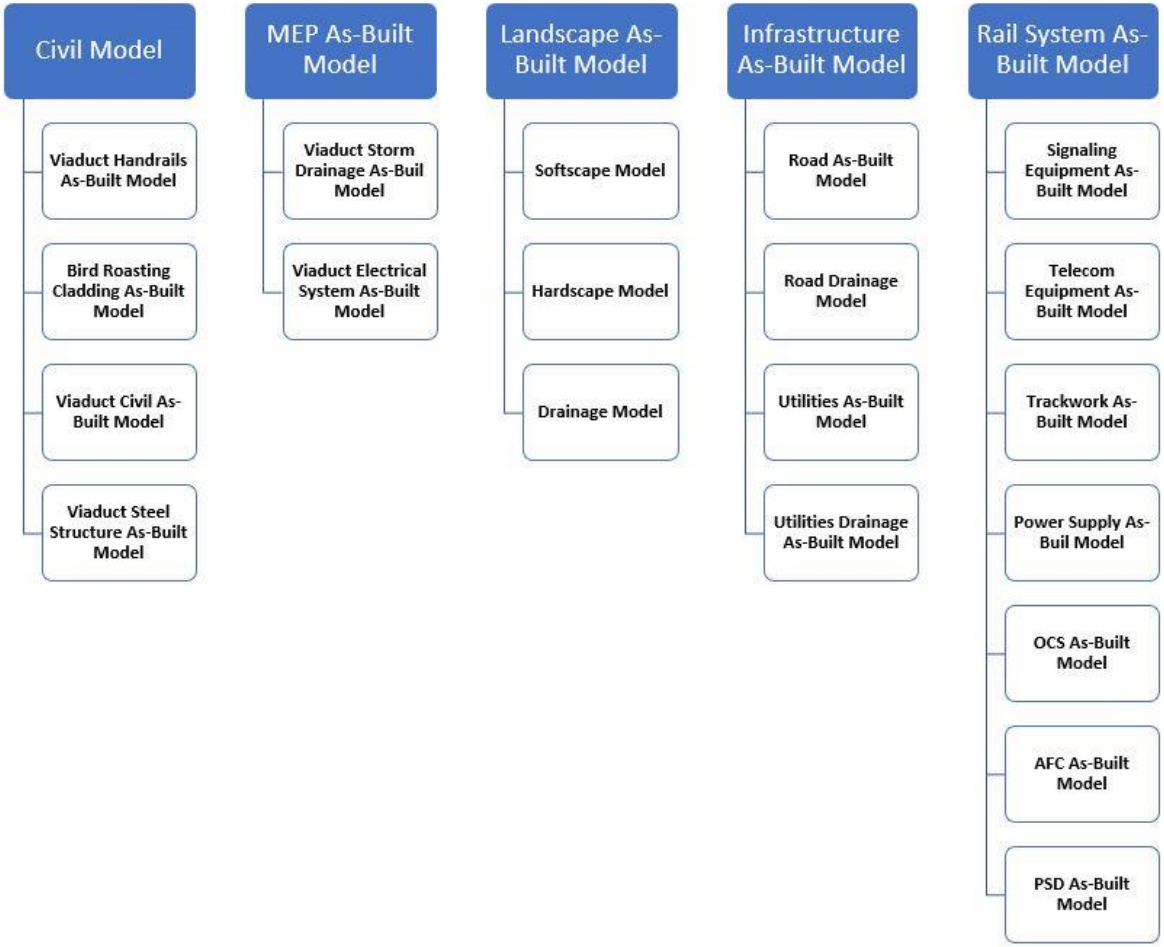
2.6 Underground Station As-Built Model Structure



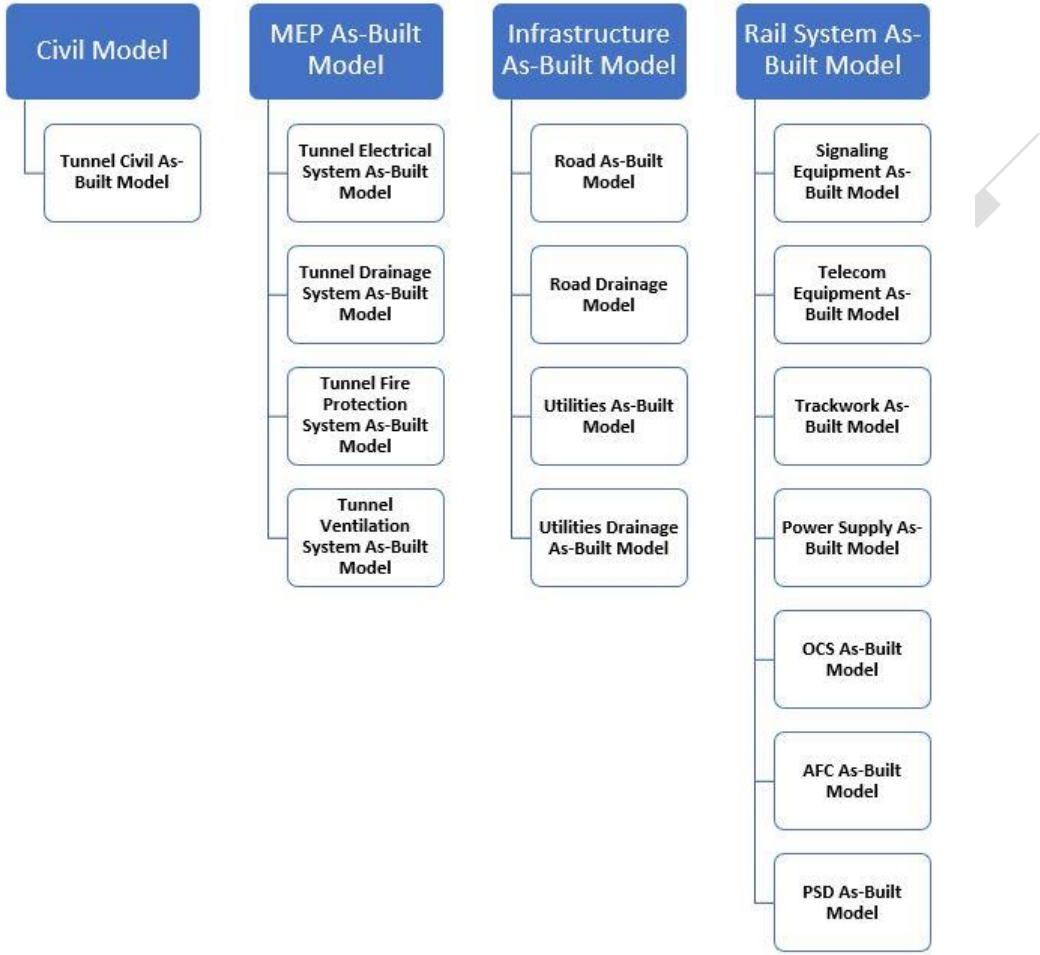
2.7 Underground Station ARC Work



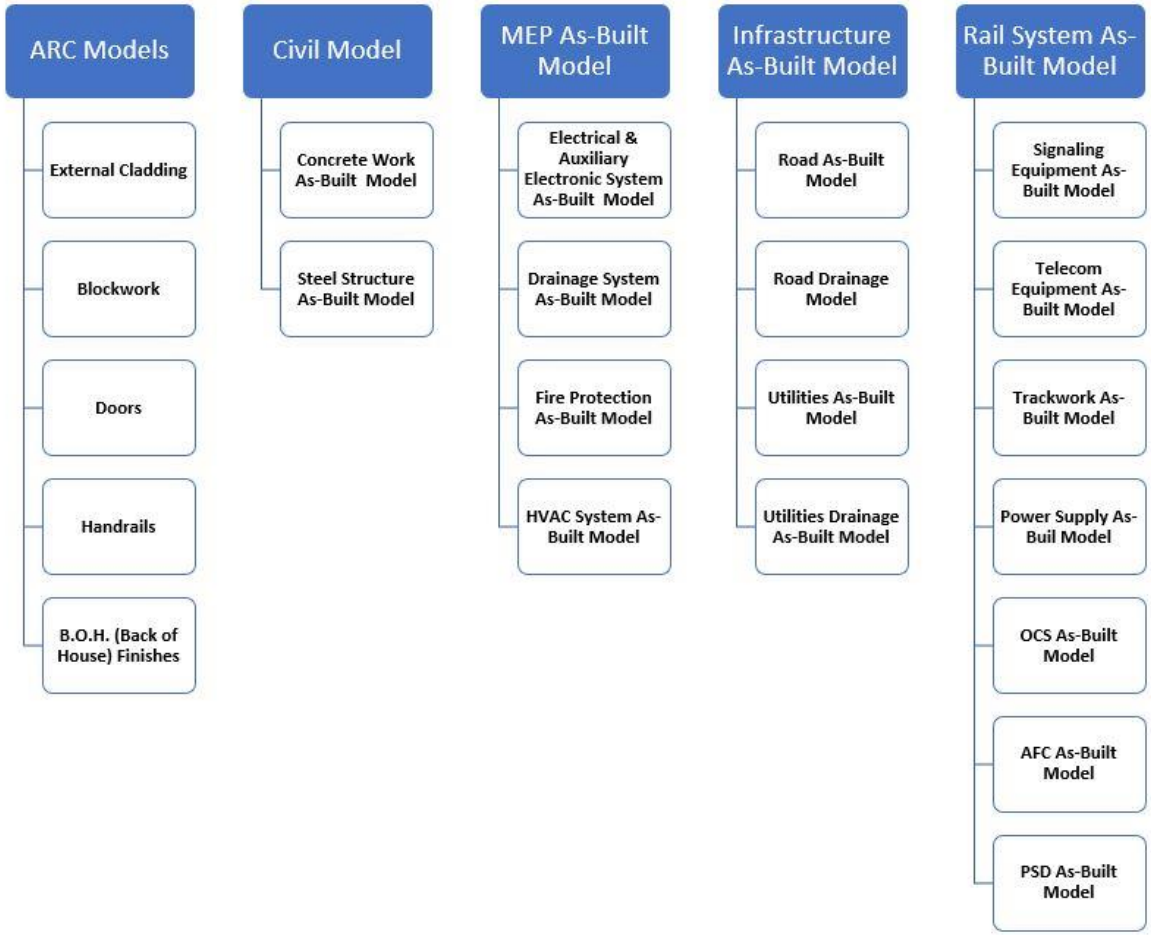
2.8 Linear Structure - Viaduct



2.9 Linear Structure – Tunnel



2.10 Linear Structure – Cut and Cover



3. Coordinates

All coordinates and levels stated on drawings shall be based on the Philippine Reference System of 1991 (PRS-92).

All "coordinate-related" drawing (both Model files and Master drawing files) shall be drawn with true coordinate location based on PRS-92 in a global coordinate system.

All section and elevations in model files shall be based on PRS-92, and the "Railway elevation, +0.000m" shall generally coincide with "0" of the y-axis for 2D sections, profiles, and elevations where applicable. For ease of reference, all sections and elevations shall be aligned with the same datum.

4. Cluster/Contract (Packages)

Contract packages (Package 1 to Package 21) shall be divided into Clusters that will allow for sensible packaging of data and information for the infrastructure and systems.

Clusters on railways shall have around the length of 1km to minimize the loading/processing time of the digital model.

One building structure shall be considered as one cluster.

Viaduct clusters may be shortened either side of the station accordingly.

For N1, N2 and SC Clusters:

Please refer to Appendix J.

5. Model Naming and Level of Development

Clusters shall be named as package specific e.g. CPN01-001 (Contract Package 1 – Cluster 001)

Cluster Numbering:

Field	**Project**	-	**Originator**	-	**Location /Zone/ Contract**	-	**Area**	-	**Model /LOD**	-	**Discipline**	-	**Number**	-	**Revision**
Example	NSCR	-	GCR	-	CPN01	-	001	-	300	-	STR	-	000001	-	R00
Description	*North South Commuter Railway*		*Originator*		*Contract Package No.1*		*Station/ Cluster Name/ No.*		*Level of Development*		*Structural Engineering*		*6-digit Sequential Number*		*Revision Number*

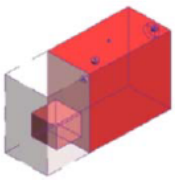
Example Numbering: NSCR-GCR-N01-001-300-STR-000001-R00

Projects		
No.	Name	Definition
1	N1	Manila - Malolos
2	N2SC	N2 and SC / Entire NSCR-EX
2	N2	Malolos – New Clark City
3	SC	Manila - Calamba
4	MMSP	Metro Manila Subway Project
5	NSCR	North-South Commuter Railway

Originator		
No.	Name	Definition
1	DOTR	Department of Transportation
2	GCR	Greater Capital Railway Consortium (NSCR-EX General Consultant)
3	NST	NS Tren (NSCR Phase 1 General Consultant)
4	OCGJV	Oriental Consultants Global Joint Venture (MMS Phase 1 General Consultant)
5	ARUP	Ove Arup
6	JDT	JICA Design Team

Contract Packages		
No.	Name	Definition
1	CP 01	N1 Contract Package 01
2	CP 02	N1 Contract Package 02
3	CP 03	N1 Contract Package 03
4	CP 04	N1 Contract Package 04
5	CP 05	N1 Contract Package 05
6	CP N01	N2 Contract Package N01
7	CP N02	N2 Contract Package N02
8	CP N03	N2 Contract Package N03
9	CP N04	N2 Contract Package N04
10	CP N05	N2 Contract Package N05
11	CP S01	SC Contract Package S01
12	CP S02	SC Contract Package S02
13	CP S03A	SC Contract Package S03A
14	CP S03B	SC Contract Package S03B
15	CP S04	SC Contract Package S04
16	CP S05	SC Contract Package S05
17	CP S06	SC Contract Package S06
18	CP S07	SC Contract Package S07
19	CP NS01	N2SC Contract Package NS01
20	CP NS02	NSCR Contract Package NS02
21	CP NS03	NSCR Contract Package NS03
*N1 – refers to entire N1 (Manila - Malolos) *N2 – refers to entire N2 (Malolos – New Clark City) *SC – refers to entire SC (Manila – Calamba) *N2SC – refers to both N2 and SC/Entire NSCR-EX *NSCR – North-South Commuter Railways		

Level of Development

LOD 100 Conceptual	LOD 200 Approximate geometry	LOD 300 Precise geometry	LOD 400 Fabrication	LOD 500 As-built
				
The Model Element **may be** graphically represented in the Model with a **symbol or other generic representation**, but does not satisfy the requirements for LOD 200. Information related to the Model Element (i.e. cost per square metre, etc.) can be derived from other Model Elements.	The Model Element **is** graphically represented in the Model as a **generic** system, object, or assembly with **approximate** quantities, size, shape, location, and orientation. Non-graphic information may also be attached to the Model Element.	The Model Element **is** graphically represented in the Model as a **specific** system, object, or assembly **accurate** in terms of quantity, size, shape, location, and orientation. Non-graphic information may also be attached to the Model Element.	The Model Element **is** graphically represented in the Model as a **specific** system, object, or assembly that is **accurate** in terms of quantity, size, shape, location, and orientation with **detailing, fabrication, assembly, and installation information**. Non-graphic information may also be attached to the Model Element.	The Model Element **is** a **field verified** representation **accurate** in terms of size, shape, location, quantity, and orientation. Non-graphic information may also be attached to the Model Element.

Discipline

No.	Name	Definition
1	AFC	Automatic Fare Collection
2	ARC	Architectural
3	CMS	Computerized Maintenance Management System
4	DEP	Depot Equipment
5	ELE	Electrical
6	FPR	Fire Protection
7	IND	Interior Design
8	LSA	Landscape Architectural
9	MEC	Mechanical
10	OCS	Overhead Catenary System
11	P&S	Plumbing and Sanitary
12	PSD	Platform Screen Door
13	PWR	Power Supply
14	RSC	Rolling Stock Commuter
15	RSL	Rolling Stock Limited Express
16	SIG	Signaling
17	STR	Structural
19	TEL	Telecommunications
20	TMW	Temporary Works
22	TWK	Trackwork

6. Design Standards

6.1 Purpose and Scope

6.1.1 Purpose

This Manual sets out the standards to be followed in the production of Computer-Aided Design & Drafting (CADD) drawings for the DOTr. The purpose of these standards is to ensure that all drawings are produced in a consistent and efficient manner, with a high level of clarity, readability, and professionalism.

6.1.2 Scope

This Drawing & CADD Manual applies to all internal organizations and external originators producing drawings for the NSCR Project. All drawings, including those prepared by external consultants and contractors, shall comply with the standards set out in this Drawing & CADD Manual.

6.1.3 Definitions

The definitions of the main terms used in the CADD Manual are stated below.

CADD System	The computer system used to create CADD drawing files and produce paper plots output. AutoCAD is adopted as the standard CADD system for the DOTr.
Control Base Alignment Drawings	The set of railway alignment drawings controlled by the DOTr.
Drawing File	Drawing file is the electronic file(s) of a drawing with a unique drawing number. The file may comprise either- • a complete drawing, containing all the details in one file including a standard Title Block file reference. • a composite drawing with its major details / contents referenced from other drawings / base maps, such as the Alignment and General Arrangement (GA) Plan. or. • a clipped portion of a larger master drawing with multiple references or model files, such as the Architectural layouts and Station-box drawings.
Drawing Issue	A formal issue of a drawing(s) by a Project Consultant/ Contractor in the execution of a Contract.
Drawing Issue History (DIH)	A report which shows the history of drawing revision issue.
Drawing Management System (DMS)	CADD drawing management system to control the CADD drawings' integrity, such as format,

	numbering, revision, security, as well as to provide archive and search functions.
Electronic Project Management System	A computer system with database and project management functions to be used by all the DOTr's staff, consultants, and contractors involved in projects managed by Projects Division for capturing, sharing, storing, controlling, managing and archiving incoming and outgoing project documents throughout and beyond the project period.
Model Files	The reference files used to store all common project data (2D or 3D) for effective design processing. Drawing co-ordination of all disciplines working on the same project is carried out by combining the model files through referencing.
Originator	A person or an organisation responsible for producing drawings.
Stage	A stage refers to a part of the drawing production phase, such as tender stage, construction stage, as-built stage, etc.
Symbol	A graphic element used in a drawing to indicate the occurrence/ location of an item or feature, or as an annotation to indicate one or more of the attributes of an item or feature, but not drawn to scale.

6.1.4 Abbreviations

The abbreviations stated below are applicable to the Manual.

CADD	Computer-Aided Design and Drafting
CBAD	Control Base Alignment Drawings
CFSS	CADD File Submission Summary
CM	Construction Manager
CSWP	Computer-Aided-Drafting Standard for Works Projects
DC	Drawing Coordinator
DIH	Drawing Issue History
DIL	Drawing Issue List
DM	Design Manager
IDT	In-house Design Team
MS/SU	Master Units / Sub Units

PDF	Portable Document Format (Adobe Systems Inc. file format for viewing various documents on computers) Position Units
PU	Position Units

6.2 Applicable Standards

6.2.1 Codes and Standards

In addition to the requirement of this document, drawings shall be prepared in accordance with the requirements of the following principal standards and systems:

- BS 308 — Engineering Drawing Practice (British Standard Institute)
- BS 1192 — Construction Drawing Practice (British Standards Institute)

6.2.2 Revision of Standards

DOTr may from time to time revise parts of this documents, as necessary. Such changes will be controlled by DOTr and issued in accordance with DOTr's quality system procedures. Such changes will be kept in manual updates and to be incorporated in the next revision.

The version of the aforesaid codes and standards shall be the latest version unless otherwise specified. If revised versions of such documents are issued by the relevant agency during the course of the Project or Contract, the Originator shall advise the DOTr of the potential impacts associated with adopting the newest versions. The version of the aforesaid codes and standards shall be the latest version unless otherwise specified. If revised versions of such documents are issued by the relevant agency during the course of the Project or Contract, the Originator shall advise the DOTr of the potential impacts associated with adopting the newest versions.

6.2.3 Conflict of Standards

In case of any inconsistency, ambiguity or discrepancy found between this document and the aforesaid codes and standards, the Originator shall in the first instance notify and seek appropriate direction from DOTr. The CAD Guideline Procedure Manual shall prevail over any other drafting standards in general.

6.3 Information and Data provided by DOTr

6.3.1 CADD Utilities Package

Upon the appointment of the Originator, DOTr shall in due course provide to the Originator the softcopies of a CADD utilities package, which shall comprise the following:

- Drawing and CADD Manual
- DOTr standard title block
- Drawing file samples for Project or In-house works
- Templates of DIH and DIL

6.3.2 Files provided by other for CADD use

The Originator, as pan of his drawing production, may use electronic files and data produced by others and supplied by various parties such as the Government, General Consultants, other Project Contractors, and DOTr. In such cases, the Originator shall be aware that such files or data may not necessarily conform to the requirements of this document. If the Originator incorporates any part of such electronic files or data into the drawings, the Originator shall undertake any necessary modification or conversion work to ensure that all deliverables under the Contract shall comply with the requirements of this document.

Notwithstanding the above, the drawing details shown on Government survey and map files which are reproduced as the base maps in the Originator's drawings shall not be modified.

6.4 CADD Standards

6.4.1 General Requirement

6.4.1.1 Drawing Format and CADD system

All drawings prepared for DOTr shall be prepared in AutoCAD 2015 or above format, and software version to be agreed by DOTr.

All Model Files and Drawings Files to be used between all parties for the readable exchange and development of drawings shall be compatible with AutoCAD 2015 or otherwise agreed by DOTr.

All files shall be capable of being implemented, revised and plotted through standard AutoCAD production techniques (i.e. not to attach reference files with "CADD drawing contents" in bitmap, jpg or raster format to an AutoCAD title frame).

6.4.1.2 Integrity of drawing systems

CADD operators shall ensure the integrity of their drawing contents production such as:

- placing elements precisely within the drawing file.
- all geometries shall be constructed to-scale.
- dimensions shall be labelled to-scale from elements or line segments.
- lines segments shall be joined / snapped exactly to the end point or intersection point etc.

6.4.1.3 Government Topographical maps

Topographical background maps shall always be displayed and plotted underneath the drawing and other reference files, in general in grey colour with halftone effect where appropriate. Notwithstanding, the drawings of Government survey and map files which to be reproduced as the base maps in the Originator's drawings shall not be modified.

6.4.1.4 CADD Reference Files (Model Files)

The use of CADD reference files is to ensure that unity and accuracy of the common CADD data across different disciplines is maintained, such as the use of common background reference. To facilitate this function across systems, the 'save full path' option shall not be used when attaching reference files. All project data shall be created in the default model of the CADD files. If attachment of the raster image reference files is required, prior acceptance of DOTr shall be obtained.

In case the reference clip boundary technique is used, the boundaries defined for the clipping should be placed in Level 081_ _, and the reference file should be named logically to facilitate the future reference.

The reference-file capabilities of AutoCAD shall be used for the Model File concept of drawing production. The Originator creating the Model Files shall comply with the following principles:

1. Keep separate and maintain the design works that are being carried out by different disciplines and allow different disciplines to share the common background drawings.
2. Keep separate texts, grids, and construction dimensions from design elements.
3. Carry out the design works on a whole model file(s) and use the drawing border to create master drawing files (with proper drawing numbers) for plots.
4. Allow one discipline to control the displaying and plotting of the reference-background drawing created by another discipline (by using reference-file-level symbology).
5. All layout that cannot be covered by a single general arrangement drawing (say Al size) shall use the Model File concept to develop the drawings.
6. Overall views of section and elevations shall use the Model File concept to develop the drawing.
7. For Diagrams and Schematics that cannot be covered by a single general arrangement drawing (say A1 size), e.g. the signaling diagrams and guideway schematic diagrams, the Model File concept shall be used to develop the drawings; and

8. Model filename has its own filename format that is different from the standard drawing numbering. Version control and revision history shall be recorded inside the model file.

6.5 Drawing Arrangement

6.5.1 Drawing Size

Drawing sizes shall be conformed to the ISO-A series sizes. The standard and maximum plotting size of drawings shall be in A1 (594mm x 841mm) size (including the page size of PDF drawing). Any deviation from these standards is not permitted unless prior concession approval in writing by DOTr is obtained.

For those drawings that require the use of irregular longer drawing size, such as the trackwork drawings, the vertical side of these drawings should be matched with the height of A1 (841mm) or A3 (420mm). However, the orientation (portrait or landscape) will also depend on the clarity of the presentation drawings.

6.5.2 Drawing Borders

DOTr's Standard Drawing Arrangement is in A1 drawing border size, landscape orientation, and title block pressed with DOTr's identities. These details will be supplied to Originator in CADD format in file "DOTrA1. DWG and DOTrA3. DWG", which is to be used as a standard reference file for all drawings. CAD Templates to be provided to the Contractor on a separate Transmittal.

6.5.3 Language

All descriptions shall be in English except for the following drawing types where both English and Filipino descriptions shall be used if required:

- gazettal drawings.
- public consultation drawings.
- presentation drawings to the government departments, and authorities in Philippines; and
- operation and maintenance drawings where specified.

6.5.4 Colors

Colour is used to identify individual elements or groups with separation. The default AutoCAD colour table shall be used. Only colours 250-254 shall be used as grey scales.

6.5.5 Notes

Notes shall generally be included near the top right-hand comer of the drawing. Where required, the Legends for symbols shall preferably be positioned below the drawing notes. If Notes and Legends are inevitable, they shall be superimposed onto

the drawing details such as the map-base background, and such area shall be clipped with a blank / white background to ensure legibility.

Where notes are extensive and to be repeated for many drawings, "Drawing(s) for General Notes" can be used to contain all the standard and common notes. Any deviation from the General Notes, if required, can be specified clearly in the Notes section of individual drawing. Where a General Notes Drawing is used, the first note on every applicable drawing shall be written as follow:

FOR GENERAL NOTES, REFER TO DRAWING NO. XXXXX

6.5.6 General Arrangement Drawing Layout

All plans shall include a key location plan in the upper right corner of the drawing border; and the portion or section regarding the limits to the drawing contents should be highlighted in the key plan. If the drawing's content is a map-base or orientation plan, a north point / arrow should be placed at the upper-right hand comer of the plan.

6.5.7 Sections and Elevations

In general, sections through plans shall be taken as looking to the left, and upward. In general, sections through elevations shall be taken as looking to the left, and downward.

The exceptions to this are the Rolling Stock drawings, which shall use the Third Angle Projection where applicable. For architectural drawings, the direction of view for sections may vary to suit for the details being shown, e. g. reflected ceiling plans. Sections (and Details) shall be numbered and tagged with the appropriate drawing(s) cross reference where required. Cranked sections should be avoided as far as possible but, where unavoidable, the section lines should not be stepped more than once step. Sections shall not be viewed or drawn at unnatural angles.

6.5.8 Projection

All drawings shall be drawn in First Angle Projection with proper orientation indicated. Third Angle Projection shall be permitted for Rolling Stock drawings.

6.6 CADD Standard for drawing production

6.6.1 Working units (CADD system)

The working unit for AutoCAD is using the default setting, choosing either metres and millimetres.

In case there is a need to overlay or match with other drawings, all elements should be drawn in full size (scale 1:1) except for drawings of Rolling Stock components.

6.6.2 Decimal point accuracy

In dimensioning where the master unit is metres, 2 decimal point accuracy shall be used to indicate the accuracy down to millimetres; and all the 2 digits shall be listed out including all zeros, for example: 4320mm. In normal circumstances where the master unit is millimetres, no decimal point should be required. However, for those Rolling Stock components drawings where the highest precision of dimension is required, accuracy to 2 decimal places with proper mm suffix e.g. 123.45mm.

6.7 Line work

6.7.1 Line styles

AutoCAD has its own library of line types which is quite sufficient for most of the common drawings. Any customized line styles initiated by Originators, such as multi-lines styles, or incorporated with texts/ special graphic attributes, shall not be used without prior approval from DOTr.

Every pair of dashed lines shall be jointed with “snap-able” point or angle.

6.7.1 Line thickness

Line thickness shall be assigned by colour and not by weight. The line thickness values follow the pen table in Section 6.12 The use of line style, thickness, weight and colour shall be constant throughout the whole project / contract drawings production.

6.8 Text and Lettering

6.8.1 Lettering Orientation and Front Face

Lettering orientation shall be aligned from left to right, and from bottom to top; slanting or inclined lettering shall be avoided. All numbers and text should over the dimension lines. Font face should use the standard upright font. Others such as italic, embossed, or distorted font faces shall not be used.

6.8.2 Placement of texts in the CADD file

Texts, text leaders and leader heads should be combined and placed in a separated layer (level) so as to be distinguished from the graphic elements.

6.8.3 Text font and sizes

English and Filipino font faces and their sizes shall be in accordance with the tables below. English and Filipino text should be upright, uppercase lettering. All texts should be aligned as top left justified. Centre-justified text shall only be used in title-boxes.

Text Height	Thickness
2.00mm	0.25mm
2.50mm	0.25mm
3.50mm	0.35mm

5.00mm	0.50mm
7.00mm	0.70mm
10.00mm	1.00mm
20.00mm	2.00mm

Facet	AutoCAD
Font	Arial, All caps
Style Name in AutoCAD	STANDARD
Line Spacing	Line Spacing between Multi-line text shall be set using the single (1.0x) setting.
Width Factor	A width factor of 0.8 x text height shall be used.

Using of non-standard types of text sizes, fonts, and cases shall only be allowed for particular drawings for statutory, presentation, public consultation, customer related poster, media, or similar purposes. For drawing in A1-size format, the nominal text height for any drawing notes and annotations should be 3.5mm for English text.

6.9 Dimension

6.9.1 Linear Dimensions

Linear dimensions for millimetre units shall be in whole numbers, generally without decimal point except as specified in 5.3.2 above; and for metre unit, dimensions shall be shown in three decimal places, illustrated as follows:

millimetres			**metres**		
12345	or	12345mm	12.34	or	12.34m
678	or	678mm	0.67	or	0.678m

Levels shall be in metre units with two decimal places, with the prefix of the positive (+) or negative (-) in respect to the mean sea level (mSL) of Philippines.

6.9.2 Area, Volume and Weight Measurements

Area, volume and weight measurement shall be specified with the suffix of its unit designation.

6.9.3 Dimension Standards

Dimension should be applied consistently throughout the whole drawing set. Some guidelines are given below for reference:

a) Dimension Orientation shall be aligned from left to right, and from bottom to top; slanting or inclined lettering shall be avoided. If it is required to place dimension

on an angle, that angle shall be aligned on the quadrant and capable of being read from normal upright orientation or looking from the right-hand side.

b) Dimension Text shall be placed above the dimension line and centre justified.
c) Dimension Reading shall be the exact measured reading with the adjustment in respect of the element's scale. Any self-defined reading that does not reflect the actual element's measured dimension is not allowed.
d) Dimension Line shall be a continuous line across the exact measuring length of the line segment or element to be dimensioned.
e) Dimension Leader Line shall be pointed or closed to the element. Inevitably, Where the leader line is required to cross another line, it can be broken at the crossing point for clarity.
f) Dimension Line Starting & Ending termination shall use either arrowheads or 45° slashes throughout a drawing. The inscribed angle of arrowhead should be at 45° maximum and 15° minimum. The DOTr standard solid arrowhead, expressed as a factor of text height, is 1.0 of width and 0.5 of height.

6.9.4 Placement of Dimensions in CADD File

Dimension Components shall be placed in a separated layer (level) to distinguish them from the graphic elements.

6.9.5 Drawing Scales

Drawing scales shall be in "Metric Scale Standard", i.e. irregular scales such as 1:123, 1:150, 1:33 should not be used. The DOTr has established a common drawing scales standard as illustrated in Table in Section 6.9.6 "Standard Drawing Scales" for the use of railway related industries. Any use of other drawing scales shall require prior approval from DOTr. The scale put in the title block shall be the master scale applied for all the elements / portions within the drawing. If the scale of an element / portion is different from the master scale, it should be specified under the title heading of such element / portion

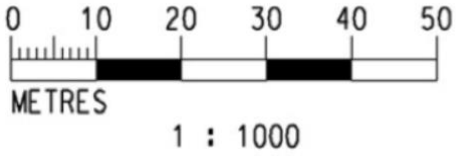
6.9.6 Standard Drawing Scale

All elements shall be drawn at scale 1:1 in the CADD files. The CADD data can be plotted at different scales as shown below:

Drawing Type	Scale 1 : X													
	5000	2000	1000	500	400	250	200	100	50	20	10	5	2	1
Location Plan	X	X	X	X										
Gazettal Drawings			X											
Site Surveys and Site Plan	X			X			X	X						
Construction Plan/Layout				X	X		X	X						
Utilities plans			X	X	X		X							
General Arrangements				X	X		X	X						
Architectural Sections and Elevations							X	X						
Archtectural Detailed Plans, Section and Elevations					X		X		X	X				
Architectural Details					X		X				X	X		
Structural Sections and Elevations				X	X		X	X						
Detailed Plans, Sections and Elevations Details							X	X	X					
Details										X	X	X	X	X
Engineering Plan & Profile (Horiz)			X	X										
Engineering Plan & Profile (Vert)				X		X								
Rail. Align. Plan & Profile (Horiz)		X	X											
Rail. Align. Plan & Profile (Vert)			X	X										
Steel Reinforcement Details								X	X	X			X	X
Steelwork Details										X	X		X	X
E & M Drawings (Plan and Layout)							X	X	X	X			X	X
CSD / SEM Layouts								X	X	X				
E and M Details									X	X			X	X
Geological Maps		X	X											
Geological Cross-Section (Horiz)			X											
Geological Cross-Section (Vert)							X							
Geological Plan & Profile (Horiz)		X	X	X										
Geological Plan & Profile (Vert)			X	X	X									

6.9.7 Graphical Scale Bar

Graphical scale bar shall be placed in the lower right-hand comer of the drawing where applicable.



6.9.8 Scale Specified in the Title Block

Scale(s) specified in the title block should be concise and representable.

- If the drawing is required to be submit in reduced or enlarged drawing size, then the scale shall be specified with the suffix "@ (original size)". For example, if an original A1 size drawing is to be submitted in A3 size format, it shall be specified as "1:100 @ A1".
- When the drawing contents are not drawn to any scale, specify Not to Scale "NTS" in the title block.
- Where different scales should be used for horizontal and vertical vertex, such as the alignment profiles, both scales shall be specified clearly with suffix "H" for horizontal and "V" for vertical.
- If many different scales are used in a drawing and cannot be represented by a common master scale, the drawing should be specified as "AS SHOWN".

6.9.9 Drawing Numbering

All drawings and sketches shall each be assigned a unique number, which shall comply with the convention specified below:

Container Name	Project	Originator	Location/Zone/ Contract	Area	Document Type	Discipline	Sequence Number
Min. Characters	2	3	2	3	3	1	6
Max. Characters	6	6	4	6	3	2	6
Example	NSCR	GCR	N01	CLPSTN	DWG	A	000001
Example with Delimiter	**NSCR-GCR-N01-CLPSTN-DWG-A-000001**						
	Final Document Number						

Appendix C contains the permissible suite of codes for the various fields.

6.9.10 Revision Coding Definition

The Revision Code identifies the version after each revision of the drawing. In general, it is a 1-digit code unless an interim release identifier is required.

The revision for the first issue of a drawing shall be "A"; and its subsequent revisions shall be in alphabetical sequence, i.e. "B", "C", etc. After the "Z" revision, the coding shall restart by adding a second letter prefix starting from "A"; e.g. "AA", "AB", etc. Accordingly, after the "AZ" revision, a new cycle will start from "BA", "BB", etc. (Note: numeric digits shall not be used in revision coding except for interim release revision).

6.9.11 Revision Code for Interim Releases

Prior to finalizing a revision, a drawing will typically go through several amendment and verification cycles (such as the advance check prints, working drafts, etc.). Hence, a numeric suffix will be appended to that revision for version control and release distinction. For example, interim releases such as B1, B2 and B3, etc. will be used for version reference during the development period until the drawing has been formalized to revision B. After then, all the interim revisions, and their respective descriptions, triangles and clouds shall be removed from the drawing.

6.9.12 Drawing File Naming Convention

The file naming convention shall correspond to the drawing number, except that the individual codes shall be separated by an underscore instead of "-", and shall not have an underscore or space in-between the sequential no. and the revision character(s) as illustrated below: -

XXXX_XXX_XNN_XXXXXX_XXX_NNNNNN_XX.dwg

If the revision is having 2 characters: -

XXXX_XXX_XNN_XXXXXX_XXX_NNNNNN_XX.dwg

6.10 Coordinates and Orientation

6.10.1 Coordinates

All co-ordinates and levels stated on drawings shall be based on the Philippine Reference System of 1992 (PRS-92) and Philippine Geoid Model (PGM2014) separately. PRS92 is a homogeneous national network of geodetic control points (GCPs), marked by survey monuments, that have been established using GPS technology. GPS is an all-weather, high precision, global satellite positioning system that revolutionized navigation and surveying operations.

All "co-ordinate-related" drawings (both Model files and Master drawing files) shall be drawn with true co-ordinate locations based on PRS-92 in a global co-ordinate system.

All sections and elevations in Model files shall be based on PGMZOI4, and the 0.0mPD shall generally coincide with 'O' of the y-axis for 2D sections, profiles, and elevations where applicable. As far as possible, all the sections and elevations should be aligned with the same datum level for ease of reference.

Detail drawings and drawing files not directly related to the global co-ordinate system may use a local co-ordinate system.

General Arrangements and Site Plans shall incorporate either a l00m or 500m grid system in respect to the drawing scale. Annotation of northing and easting values shall also be marked on the appropriate grids.

6.10.2 Orientation

All the key plans, site plans, and drawings containing map-bases shall maintain the map orientation as far as practical, with the "north direction" pointing upward.

For alignment drawings, orientation shall be aligned in accordance with the alignment objects and in its horizontal direction, i.e. the alignment objects such as railway tracks are placed in parallel to the x-axis.

The North point indicator shall be placed on the upper-right hand comer as far as practical.

6.10 Hatching and Shading

The use of hatching or shading shall be kept to a minimum. All hatching, shading and their boundary graphics shall be placed in a separated layer (level) so as to be distinguished from the graphic elements.

6.11 Revision Description

A concise description of each approved and issued revision, i.e. Rev. A, Rev. B, etc. shall be entered into the revision-description column to record the development history of the drawing. The revision date, designation of the originator and the responsible person (to approve this revision) shall also be stated.

When there is no space to enter the current revision information, the earliest revision descriptions can be superseded by the latest updated revision.

6.12 Plotting

Whenever a hard copy drawing is required, it shall be plotted from the PDF drawing. Where applicable, plotting date and time shall be printed vertically outside the lower-left corner of the drawing border.

Plot Setting		
Paper Size	Format	Size
	A0	841 x 1189
	A1	594 x 841
	A2	420 x 594
	A3	297 x 420
	A4	210 x 297
	B0	1000 x 1414
	B1	707 x 1000
	Double Crown	508 x 762 *(20 x 30 in)*

Some plotting requirements are listed as follows:

- The line weight should be selected into “Use Object Line weight” and “Default” line weight must not be use.
- Colour plots shall follow the colour setting in the AutoCAD default colour table.

The plotting pen table in the format of CTB for A0 and A3 should be provided by DOTr. Below is the example of one of the setting

Name	Color 1	Color 2	Color 3	Color 4
Description	Description_1	Description_2	Description_3	Description_4
Color	Black	Black	Black	Black
Enable dithering	On	On	On	On
Convert to grayscale	Off	Off	Off	Off
Use assigned pen #	Automatic	Automatic	Automatic	Automatic
Virtual pen #	Automatic	Automatic	Automatic	Automatic
Screening	100	100	100	100
Linetype	Use object linetype	Use object linetype	Use object linetype	Use object linetype
Adaptive adjustment	On	On	On	On
Lineweight	0.1300 mm	0.1300 mm	0.2000 mm	0.2300 mm
Line End Style	Use object end style	Use object end style	Use object end style	Use object end style
Line Join style	Use object join style	Use object join style	Use object join style	Use object join style
Fill Style	Use object fill style	Use object fill style	Use object fill style	Use object fill style

6.12 Revision clouds and triangles

Any revised / amended portions of a drawing shall be fenced with a cloud for easy recognition of the changes. In addition, the latest sequential revision code shall be put in an equilateral triangle to be placed adjacent to the revision cloud for identification.

Only the latest revision clouds with their corresponding revision code shall be shown in the drawing content area.

REVISION CLOUD

REVISION TRIANGLE

6.13 Drawing Title Block and Signatures

6.13.1 Drawing Title Block

The Drawing number and title shall be prominently displayed within the appropriate boxes. Revision box is piled up at the bottom left-hand side of the title block. A standard DOTr title block is illustrated as follows:

SUBMITTED BY:			
	TITLE	NSTREN	DEPARTMENT OF TRANSPORTATION
	PREPARED BY:	-	PHILIPPINE NATIONAL RAILWAYS
	CHECKED BY:	-	
GENERAL CONSULTANT	NOTED BY:	-	

VER	DATE	DESCRIPTION	DRAWN	PROJECT TITLE	DATE: MMM YYYY
-	DD MMM YYYY	-	-		SCALE: 1 : 1000 @ A1 SIZE
				STATUS: DETAILED DESIGN	SHEET No.: 1 OF 2
				DRAWING TITLE	DRG No.
					DRG S. / REV

6.13.2 Drawing Title

The drawing title consists of four lines of left-justified data fields as follows:

- The first line shall be the respective area, section, location, portion or subject for this drawing. If none is applicable, this line shall be left blank.
- The second line shall be the type of drawing such as Architectural Layout, Sections & Elevations, HVAC Arrangement, Alignment Profile, etc.
- The third and the fourth line shall be the detailed correspondences under the above subjects.

6.13.3 Other Parts of Title Block

Other parts of the title block shall be filled up as follows:

- The Scale shall provide the relevant scale of the drawing
- The Drawing No. and Rev. refers to the identification of this drawing
- The project title or the title of the A&A / C&R Works shall be filled in the box which is located beneath the DOTr Logo.
- The CADD Ref. is the CADD file name for this drawing (refer Section 7 for details).
- The Designed, Drawn, Checked and Approved box data fields shall be filled in with the initials of the responsible person for the works.
- For entrusted Works, Government Submission or Statutory drawings, the title block arrangement shall be altered to meet the requirement of the respective Authority.
- The date shall be in year 2000 compliance format — either DD/MMM/YYYY (02/DEC/2007) or DDMMMYY (O2DECO8).

6.14 Layer

6.14.1 Layer Assignment

Some requirements on the assigning layers (levels) to the drawing and model files are specified as follows:

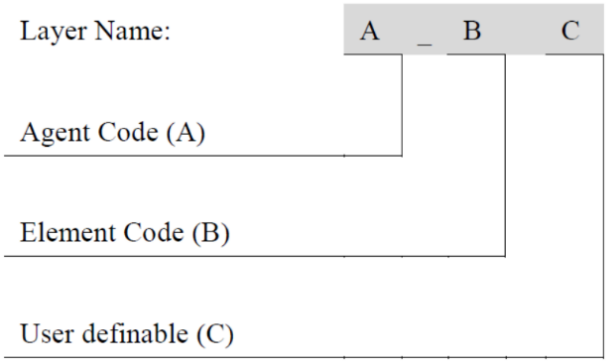
1. Layers shall be separated from the graphics elements.
    a. The text layers.
    b. The dimension layer including the texts, dimension lines, leaders and arrowheads, etc.
2. All the layers coding shall be in accordance with the Element Coding section of CSWP.
3. Levels nos. and names shall maintain consistency throughout the whole project, contract or drawing set.
4. If the user definable suffix code is required, the Originator shall submit the user-assigned coding to DOTr for endorsement and attached it as part of the Drawing Issue for reference.

6.14.2 Layer per Drawing File

There is no limitation on the quantity of layers that can be used per CADD drawing file.

6.14.3 Layer naming

Layer names (levels) shall be assigned as follows:



It applies to all drawings production related to the external parties such as Government Departments, Consultants, and other companies .

6.14.4 Agent Code (A)

Each project participant will be assigned a unique Agent Responsible Code which will have a fixed length of 4 alphanumeric upper-case characters. This code Will enable the Originator of the data to be identified. Originators shall propose a new originator code and seek the approval from DOTr if the code has not been assigned. If the new coding is deemed to be applicable and beneficial to DOTr, it will be adopted and appended to related document.

6.14.5 Element Code (B)

Element Code defines the element of the layer. The element coding tables can be obtained from the appendices. There are three ways in which the element coding can be applied, the choice of which will depend on the degree to which it is required to break down the project data:

Example 1:
Group the generic elements under the first number in each main class, e.g.:

210_ can be used for all external wall elements.

Example 2:
Group elements under their particular sub-class, e.g.:

211_ Load bearing external walls
213_ Non-load bearing walls

Example 3:
Further sub-divide the sub class. This provides flexibility, allows for greater sub-division of elements and allows for future expansion, e.g.:

2111 Load bearing external walls with l-hour fire protection
2113 Load bearing external walls with 3-hour fire protection

6.14.6 Use of definable field

This field provides users with a means of further breaking down data and gives a degree of flexibility within the layer naming system. The way in which the field is used at the discretion of the user. Some examples of how the field can be used follow:

Example 1
The field could be used to distinguish between different options/phases, e.g.:

DOT140_I Tunnel Option/Phase I (Created by DOTr)

Example 2
The field could be used to assign ownership to particular elements, e.g.:

DOT511_O Fresh Water Pipes — Other Department owned (Created by DOTr)

6.15 Drawing Submission/Issuance

6.15.1 Drawing submissions requirements

DOTr's acceptance of a drawing issue or a drawing submission shall be dependent on their compliance with requirements stated.

6.15.2 Submission Documentation and Data

Each Drawing Issue shall consist of the documents and data as described below:

Documentation	Format	Quantity
Drawing Issue Register – comprising of Drawing Issue History (DIH) and Drawing Issue List (DIL)	Soft copy (Excel Workbook)	1 set
Drawing Prints	Sizes as specified in the Contract	As specified in the contract
Drawing Files and Model Files	DWG (AutoCAD) and PDF (Acrobat) converted from DWG drawing files individually. (i.e. one drawing one PDF file with file name same as DWG drawing file except the file extension to be .pdf)	1 set, unless specified otherwise in the contract

Software version of the submission documentations and data shall be agreed by DOTr.

6.15.3 Drawing Records

The drawings submitted as part of each Drawing Issue shall be accompanied by a set of drawing records comprising:

- Drawing Issue History (DIH)
- Drawing Issue List (DIL)

Templates of the record forms shall be provided by DOTr for the Originator's use (refer Appendices A & B).

6.15.3.1 Drawing Issue History (DIH)

A DIH is a series of drawing lists which provides a concise and continuous record of drawing revisions and issues in format of EXCEL workbook.

A soft copy of the DIH shall accompany each Drawing Issue and submission. The Originator shall continuously update and maintain the DIH for a "Drawing Stage". A new DIH shall be established upon the commencement of a new "Drawing Stage". Drawings of different discipline shall register in separated worksheet of same file.

When all revision columns in a sheet have been used up, the same block of drawings shall continue on an additional sheet bearing the same sequential number but with a letter suffix commencing with "A", then "B" etc. Sufficient gaps between drawing list entries shall be included to allow room for insertion of additional drawings in sequential order where required. Unused or deleted drawing numbers or pages shall be designated "NOT USED" for reference purpose .

6.15.3.2 Drawing Issue List (DIL)

The DIL is a list of drawings contained within a Drawing Issue in format of EXCEL workbook. A DIL shall be submitted in soft copy format for every Drawing Issue, which shall be referenced with the relevant Issue Reference Number or Submission Number.

6.15.4 CADD Data Format for Submission

AutoCAD format is the standard CADD software adopted by DOTr for the production of all drawings. The standard drawing file format of AutoCAD contains the extension 'DWG'. All submission softcopies of drawing files, model files, reference files and other necessary files shall be submitted to DOTr in this AutoCAD 'DWG' format; and the software version shall be agreed by DOTr.

6.15.5 CADD Data Delivery

DC shall pass the CADD files, drawings in PDF format and the associated documentation to DOTr for registration, verification and loading into the DMS. The CADD files can be submitted in media formats as follows:

- Compact Disc (CD) is the preferred delivery media. High-speed (minimum 4x) CD in Mode l format shall be used to transfer files. Multiple Drawing Issues shall not be contained within the same disc. All the CADD files' related reference files and model files shall be contained in the same folder of the same disc, i.e. all the drawings shall be directly opened from the disc without missing any of its linked reference files.

- The use of Digital Versatile Disc (DVD) is subject to the need of large quantity drawings submissions and shall be agreed by DOTr.

Each drawings submission\ issuance shall consist of two set of drawings in .dwg and .pdf (in original size) formats with an updated drawing register. The CAD files can be submitted in media formats such as compact disc (CD) and digital versatile disc (DVD). CAD files for drawings shall include drawing files, model files, reference files etc. to be located in the same directory as the parent drawing files. The "Save Full Path" option for all reference files shall not be used.

The submitted electronic media shall be verified for its integrity including readability, correctness of the file structures and file name format. The file name shall be derived from the drawing number and revision. An "Automated Plot Date and Time Stamp" shall be properly laid in the bottom left corner of drawing.

6.15.6 Acceptance of Deliverables in Digital Format

DOTr's acceptance of the set of drawing prints contained in a Drawing Issue shall not be interpreted to mean an acceptance of the drawings in digital format. The Acceptance of the Drawing Issue shall only be given following verification of the drawing deliverables in digital format. The file verification requirements which shall be undertaken by the Originator, to ensure that the Drawing & CADD standards stipulated in this Manual are met prior to the Drawing Issue submission to the DOTr. Any deviations from the requirements of this document will result in rejection by DOTr shall be remedied in accordance with the provisions of the Contract.

6.15.7 Drawing Issue Verification Checks

Verification checks of CADD standards compliance shall be conducted for each of the Drawing Issue submissions for conformity with all the requirements as illustrated below:

Check for the completeness of the submission package such as the Drawing Issue History (DIH), Drawing Issue List (DIL), drawing prints; and ensure their softcopies are all contained in the submitted electronic media.

1. The submitted electronic media shall be verified for its integrity including readability, correctness of the file structures and file names format. The file name shall be derived from the drawing number, i.e. file name such as PLATFORM_LIGHTING.DWG is not acceptable.

2. CADD files shall be in AutoCAD file format. All drawing files such as master drawings, model and reference files must be in genuine AutoCAD design files, in which all data content is manipulatable. It is NOT acceptable for an AutoCAD title box with the entire drawing contents to be attached with reference files in raster image format.

3. Drawing arrangement shall follow the DOTr's standard format, as shown in reference drawings DOTr-A1.DWG. Special entities can be tailor-made by Originator such as the consultant's or contractor's company information and logo; however, prior DOTr approval shall be obtained.

4. Drawing title block shall be filled in correctly with CADD filename, Drawing Number, Revision Letter(s), and Revision Description.
5. Automated Plot Date and Time Stamp shall be properly laid in the lower left-hand comer.

6. The specified text/letter sizes and font types for title box, notes, descriptions, dimensions, etc. shall be strictly adhered to.

7. Co-ordinates and orientation shall be placed correctly.

8. The layer structure and naming codes shall comply with the standards of this document.

9. Elements shall be drawn/placed on their corresponding designated layers.

10. Drawings containing unrelated elements shall not be included in the drawing files.

11. All the reference files attachment of parent drawing files shall be located in the same directory as the parent drawing files. The 'Save Full Path' option for all reference files shall not be used; and the file name of all reference files shall not be changed regardless of any revision changes of its parent drawing.

12. Unused reference files shall not be attached to master drawing.

6.15.8 CADD Archiving

Combined service drawings will be archived onto EDMS and will include the following files:

- Drawings in PDF files of agreed combined works, signed off by all parties
- Drawing files and model files containing and indicating the above information

Details refer to Document Management Manual.

7. COBie Standards

7.1 PURPOSE

This Document describes the contactor's strategy in fulfilling COBie Requirement in the contract for Design and As-Built Stage aligning with BIM level 2, BS 1192-4 2014 using COBie version 2.4, and PAS 1192 series.

7.2 SCOPE

The scope of this document is to extract MMS parameters, Design and As-Built Information for Maintainable Assets aligning with Level of Definition - LOD Matrix and Catalogue "In-progress will partially be sent to DOTr by May 2021" from BIM Models in COBie Schema format in Design and As-Built stages.

7.3 RESPONSIBILITY

It is the responsibility of all NSCR-EX Project Team Members (including NSCR-EX's subcontractors) to comply with the processes set out in this document.

These processes are stablished and maintained by the Consortium Technical Office and the Consortium BIM Team, being the BIM Manager, and the BIM Coordinators the ones responsible for its implementation. Also, the BIM Managers of each Project stakeholder oversee the correct application of these processes within their respective organizations.

7.4 DEFINITIONS

Names	Definitions
DOTr	Department of Transportation
The Employer	The Department of Transportation and the legal successors in title to this entity
NSCR-EX	North-South Commuter Railway Extension, sanctioned by the Department of Transportation
The Engineer	GCR Consortium. Appointed by the Employer to act as the Engineer for the purposes of the Contract.
The Contractor	The person(s) named as contractor in the Letter of Acceptance and the Contract Agreement, and the legal successors in title to this person(s).

The Project	The NSCR-EX Project, consisting in this contract and the works that are part (the NSCR-EX works + provision of new trains + Systems Enhancement works)
BIM Model	Design of the infrastructure asset created using Building Information Modelling (BIM) technology.

7.5 ABBREVIATIONS

Abbreviations	Definitions
AIM	Asset Information Model
BEP	BIM Execution Plan
BIM	Building Information Modelling
CAD	Computer Aided Design
CDE	Common Data Environment
CDRL	Contract Data Requirement List
COBie	Construction Operation Building and Information exchange
CTO	Consortium Technical Office
CWJV	Civil Works Joint Venture
DMP	Design Management Plan
DSP	Data Shortcut file
DTM	Digital Terrain Model
EDMS	Electronic Document Management System
GIS	Geographic Information System
IFC	Industry Foundation Class
LOD	Level of Development
Lod	Level of detail (geometry)
Loi	Level of information (Attributes)
MMS	Maintenance Management System
MIDP	Master Information Delivery Plan
MPDT	Model Production Delivery Table
PKT	Files created using Autodesk Subassembly Composer. PKT files are imported into Civil 3D.
PIM	Project Information Model
RTA	Roads and Transport Authority
TIDP	Task Information Delivery Plan
WBS	Work Breakdown Structure
WIP	Work in Progress
DLP	Defect Liability Period

7.6 REFERENCES

Reference	Title
270235_REP_0002_D1	Inception Report
270235_REP_0008_D2	Project Management Plan
270235_REP_0006A_D3	Construction Management Plan_Rev. B
270235_REP_0003_D4	Risk Management Plan
270235_REP_0009_D5	Project Administration Manual
270235_REP_0011B_D6	Document Management System Manual_Rev. C
270235_REP_0004A_D7	Planning and Programme Manual_Rev. B

270235_REP_0007_D8	Computer-Aided Design (CAD) Manual Revision B
270235_REP_0010_D9	Information Management Plan

7.7 COBIE METHODOLOGY

7.7.1 Data Collection Strategy

Asset database has Six sources as an input then they are imported to MMS Maximo, MMS team has Provided parameters required from BIM Model refer to BIM-MMS ICD document ref (To be developed)

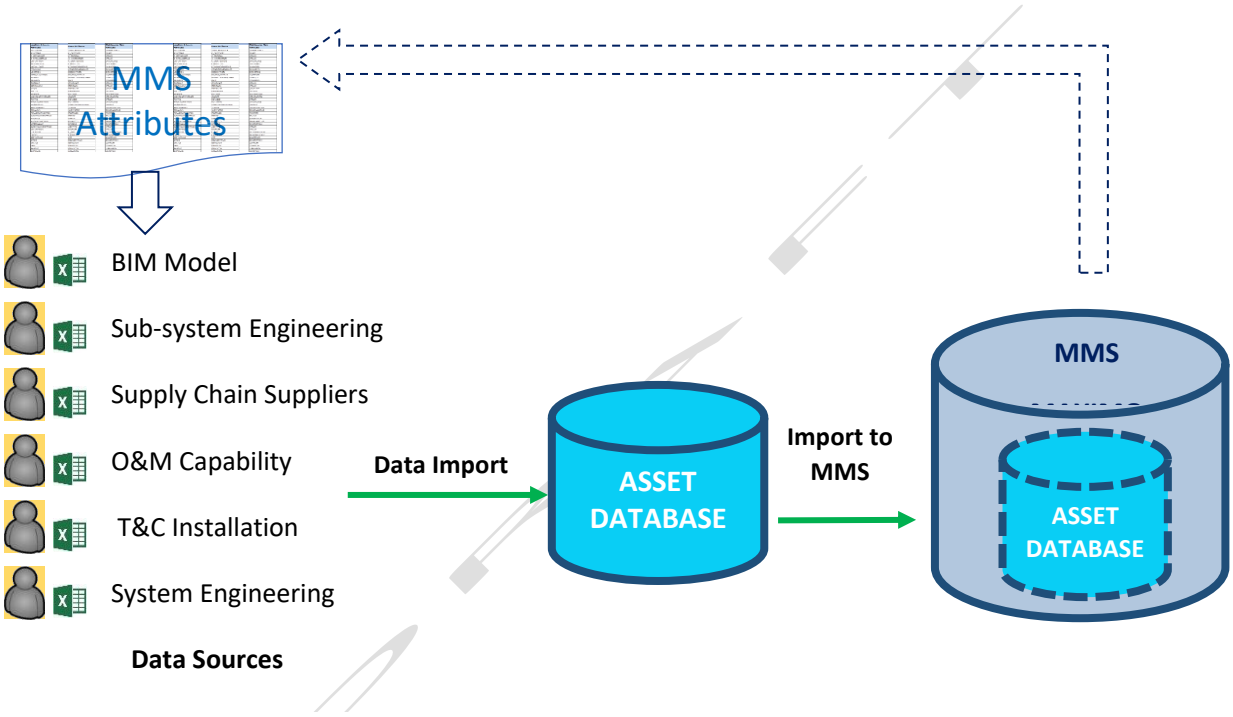


Figure 1: Data Collection Strategy

7.7.2 COBie Information

The COBIE data sheet provides Design information in DCP4 and Technical information, As-Built Information and MMS attributes in Data Drop 6 for Maintainable Assets

As shown in table 1, MMS attributes will follow BIM-MMS ICD document ref (To be developed) and Asset Information BIM Model document ref (To be developed).

No.	Attributes	Description	Data Drop	Reference Documents	Remarks
1	Asset Yes/No	This Field Is to identify Maintainable assets.	DCP4 & Data drop 6 For Rail system Data Drop 5 & 6 for Civil work	MMS Template	
2	Functional Location Code	This Field is a concatenation of the location code 1 to 5.	DCP4 (Only LOC1-LOC3) for Rail system Data Drop 6 (LOC1-LOC5) for Rail system Data Drop 5 & 6 (LOC1-LOC5) for Civil work	Location Numbering System: To be developed	
3	System Drill down	System Drill down Code, for Example, RSK, SIG, COM, COM-MSN, COM-VBR etc.	DCP4 & Data drop 6 For rail system Data Drop 5 & 6 for Civil work	Global data list: To be developed	
4	Location Code 1	1st level of the Location Code: Station, depot building or vehicle code	DCP4 & Data drop 6 For rail system Data Drop 5 & 6 for Civil work	Building Numbering System Strategy: To be developed	
5	Location Code 2	2nd level of the Location Code: - Room or Escalator well or Lift shaft code - Train Car code - Track Side code	DCP4 & Data drop 6 For Rail system Data Drop 5 & 6 for Civil work	1-Room Numbering System Strategy for Non-Station Buildings. To be developed. 2-Room Numbering System Strategy for Stations. To be developed	
6	Location Code 3	3rd level of the Location Code: - Sub-System code	DCP4 & Data drop 6 For Rail system Data Drop 5 & 6 for Civil work	Global data list: To be developed	

7	Location Code 4	4th level of the Location Code: - Asset identification	Data Drop 5 & 6 for Civil work Data Drop 6 for Rail system	MMS Template	
8	Location Code 5	5th level of the Location Code: - Asset identification	Data Drop 5 & 6 for Civil work Data Drop 6 for Rail system	MMS Template	For important parent assets located where their respective LOC4 is a sub-system
9	Functional Location Description	Summary description of the Geographical Location plus the function of the asset that is assigned to that location.	Data Drop 5 & 6 (LOC1-LOC5) for Civil work DCP4 (Only LOC1-LOC3) for Rail system Data Drop 6 (LOC1-LOC5) for Rail system	MMS Template	
10	Chainages Start	Applicable for maintainable assets installed on wayside station, Tunnel & Viaduct. 6 digits prefixed with leading zeroes.	DCP4 & Data drop 6 for Rail system Data Drop 5 & 6 for Civil work	BIM Model	(Applicable for Wayside maintainable Assets only)
11	Chainages End	Applicable for maintainable assets installed on wayside station, Tunnel & Viaduct. 6 digits prefixed with leading zeroes.	DCP4 & Data drop 6 for Rail system Data Drop 5 & 6 for Civil work	BIM Model	(Applicable for Wayside maintainable Assets only)
12	Chainage Type	Trackwork, ATC and COM Equipment will follow Track chainage.	DCP4 & Data drop 6 for Rail system Data Drop 5 & 6 for Civil work	BIM Model	(Applicable for Wayside maintainable Assets only)

		All other services will follow Civil chainage.			
13	BIM Model Document Number	Project BIM model number	Data Drop 5 & 6 for Civil work Data Drop 6 for Rail system	BIM Model	
14	Drawing Number (Location or Station)	Drawing Number which indicates the Asset	Data Drop 6	BIM Model	
15	Child Item	A code that uniquely identifies that kind of item. There may be multiple instances of this kind of item in the railway, for example, a motor car for a train set.	Data Drop 6	MMS Template	
16	Item Description	Description of the item.	Data Drop 6	MMS Template	
17	Category (C_Category)	Spares Type	Data Drop 6	MMS Template	
18	Nominal Length (mm)	Value in "mm"	Data Drop 6	MMS Template	
19	Nominal Width (mm)	Value in "mm"	Data Drop 6	MMS Template	
20	Nominal Height (mm)	Value in "mm"	Data Drop 6	MMS Template	
21	Nominal Weight (kg)	Value in “kg"	Data Drop 6	MMS Template	
22	Classification Level 1	According to the codes in the Global Data list. If no Part Number is provided, a minimum of three Attribute Values are required.	Data Drop 6	MMS Template	

23	Classification Level 2	According to the codes in the Global Data list. If no Part Number is provided, a minimum of three Attribute Values are required.	Data Drop 6	MMS Template	
24	Classification Description	Classification description	Data Drop 6	MMS Template	

Table 1: MMS Parameter

7.7.3 COBie Requirements

7.7.3.1 Design Stage

CWJV

All COBie sheets for Maintainable Assets will be extracted from all Models following the required information stated in Table 2 using Autodesk COBie Plugin.

RAIL SYSTEMS

COBie data sheets will only be extracted at As-Built stage for Rail Systems.

Required information as per BS 1192-4 and PAS 1192 series will be populated in COBIE worksheets, which will be limited to Worksheet Tabs provided, stated and specified in below table.

Worksheet	Required Content	Specified Requirements
Instruction	Showing a general information	
Contact	One row for the BIM Manager	
Facility	One row to be filled with Facility Data	Site Name and Name column to be unique following Building Numbering System Strategy Document Reference (In-progress)
Floor	One row for each vertical level.	Structure to follow SSL. Architecture, MEP to follow FFL. Description and Elevation to be filled.

		Not Applicable for Tunnel & Viaduct
Space	One row for each functional Room.	Architecture Models only. Not Applicable for Tunnel & Viaduct Room Tag, Gross Area and Net Area are Required in Architecture only. Description column to be filled with Station Department data in Architecture only
Zone	Sheet will be empty. Zone data already filled under description Column in Space Worksheet for Architectural Only.	
Type	All types in the models to be populated.	Nominal Length, Width and Height to be provided in Attribute worksheet. Applicable for All Asset models Only
Component	One row for each individual product to be populated.	Applicable for All Asset Models Only
System	All Systems to be populated.	Applicable for Mechanical disciplines only (HVAC, FPS, DRN & WTS)
Attribute	One row for each parameter per each element showing all required information.	Structural, Architectural & MEP to export information for Maintainable Assets following LOD Matrix Ref. (To be developed).
Coordinate	GIS Coordinates will be populated using GIS Applications in As-Built Stage	Refer to BIM GIS strategy with Ref. (To be developed).

Table 2: COBie Design Requirements

7.7.3.2 As-Built Stage

CWJV

In As-Built Stage, all COBie sheets for Maintainable Assets will be extracted from all Models following the required information stated in the Table 3 using Autodesk COBie Plugin

RAIL SYSTEMS

COBie data sheets will be extracted for Maintainable Assets at As-Built stage using Autodesk COBie Plugin and COBie tool.

Required information as per BS 1192-4 and PAS 1192 series will be populated in COBIE worksheets, which will be limited to Worksheet Tabs provided, stated and specified in below table. System Tab will be populated only for Mechanical disciplines only (HVAC, FPS, DRN & WTS), for other disciplines it's not possible to create systems and populate system Tab data in COBIE work sheet due to following reasons.

- To create a system inside a Revit model and populate system Tab data in the COBIE worksheet, it is required that all the equipment related to a specific system must be in same model and connected to each other, which is not the case with RSY subsystems models and CWJV Electrical BIM models.
- In some cases, RSY subsystem model like PDS providing power to CWJV equipment and the equipment belongs to same system resides in different BIM models due to which a system can't be created.

Worksheet	Required Content	Specified Requirements
Instruction	Showing a general information	
Contact	One row for the BIM Manager	
Facility	One row to be filled with Facility Data	Site Name and Name column to be different.
Floor	One row for each vertical level.	Structure to follow SSL. Architecture, MEP and RSY to follow FFL. Description and Elevation to be filled. Not Applicable for Tunnel, Viaduct & Trackwork.
Space	One row for each functional Room.	Applicable to Architecture Models only. Room Tag, Gross Area and Net Area are Required in Architecture only.

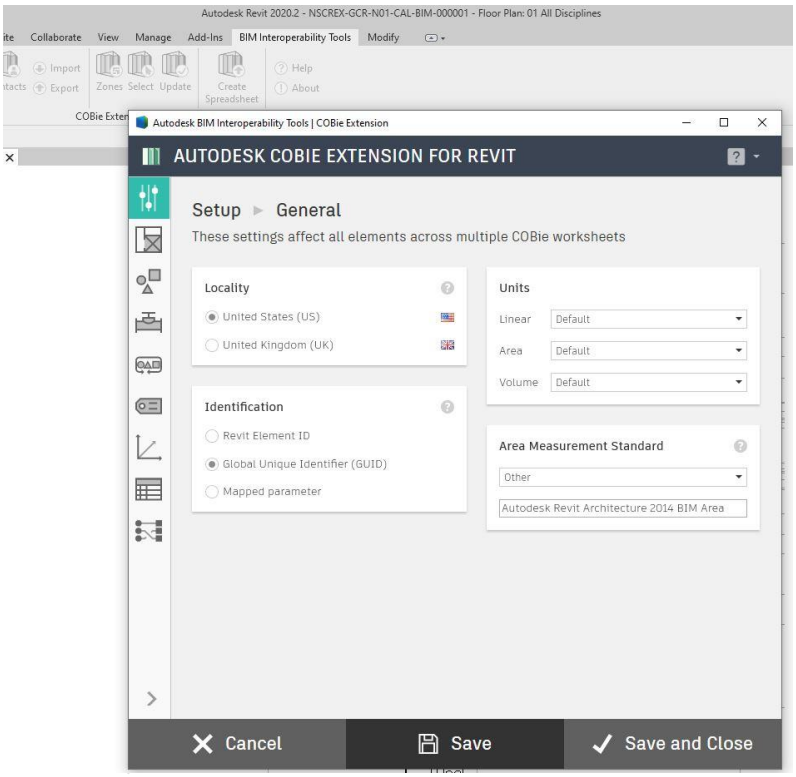
		Description column to be filled with Station Department data in Architecture only Not Applicable for Tunnel, Viaduct & Trackwork.
Zone	Sheet will be empty. Zone Data already filled under description Column in Space Worksheet for Architectural Only.	
Type	All types in the models to be populated.	Nominal Length, Width and Height to be provided in Attribute worksheet.
Component	One row for each individual product filling (RTA Information and MMS Parameters If applicable)	
System	All Systems to be populated.	Applicable for Mechanical disciplines only (HVAC, FPS, DRN & WTS)
Attribute	One row for each parameter per each element showing all required information.	Structural, Architectural & MEP to export information for Maintainable Assets following LOD Matrix Ref. (To be developed).
Coordinate	GIS Coordinates will be populated using GIS Applications	Refer to BIM GIS strategy with Ref. (To be developed)
Spare	Sheet will be empty. Included in Master Data Management Plan Document with Ref. (To be developed).	
Resource	Sheet will be empty. Included in Master Data Management Plan Document with Ref. (To be developed).	
Job	Sheet will be empty. Included in Master Data Management Plan Document with Ref. (To be developed)	

Table 3: As-Built COBie Requirements

7.7.4 Autodesk COBie Plugin

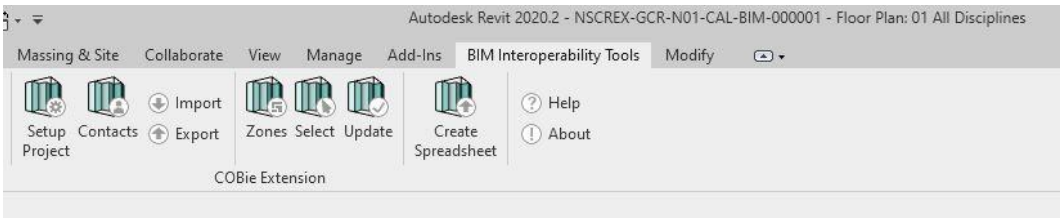
7.7.4.1 Input

The Input for Autodesk COBie Plugin is the information inside the Revit model. The tool will allow you to set up your Revit models and families to capture COBie data and then export that data to a COBie compliant spreadsheet following BIM Manual ref (to be developed) and Level of Definition - LOD Matrix and Catalogue ref (to be developed)

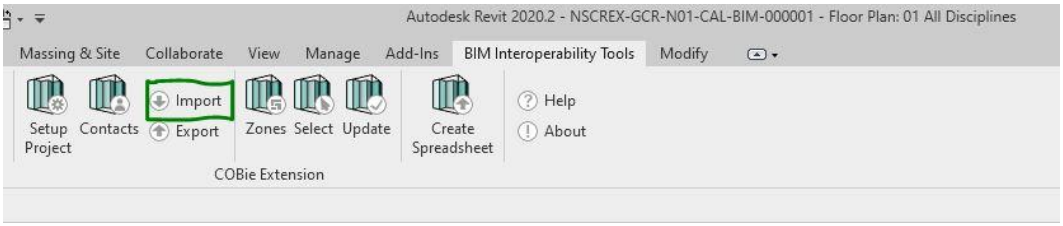


7.7.4.2 Set-up

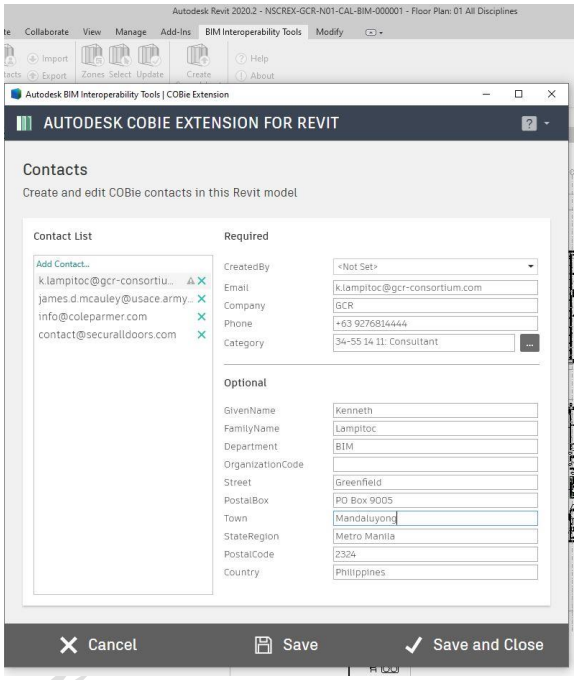
The Input for Autodesk COBie Plugin is the information inside the Revit model. The tool will allow you to set up your Revit models and families to capture COBie data and then export that data to a COBie compliant spreadsheet following BIM Manual ref (To be develop) and Level of Definition - LOD Matrix and Catalogue ref (To be developed).



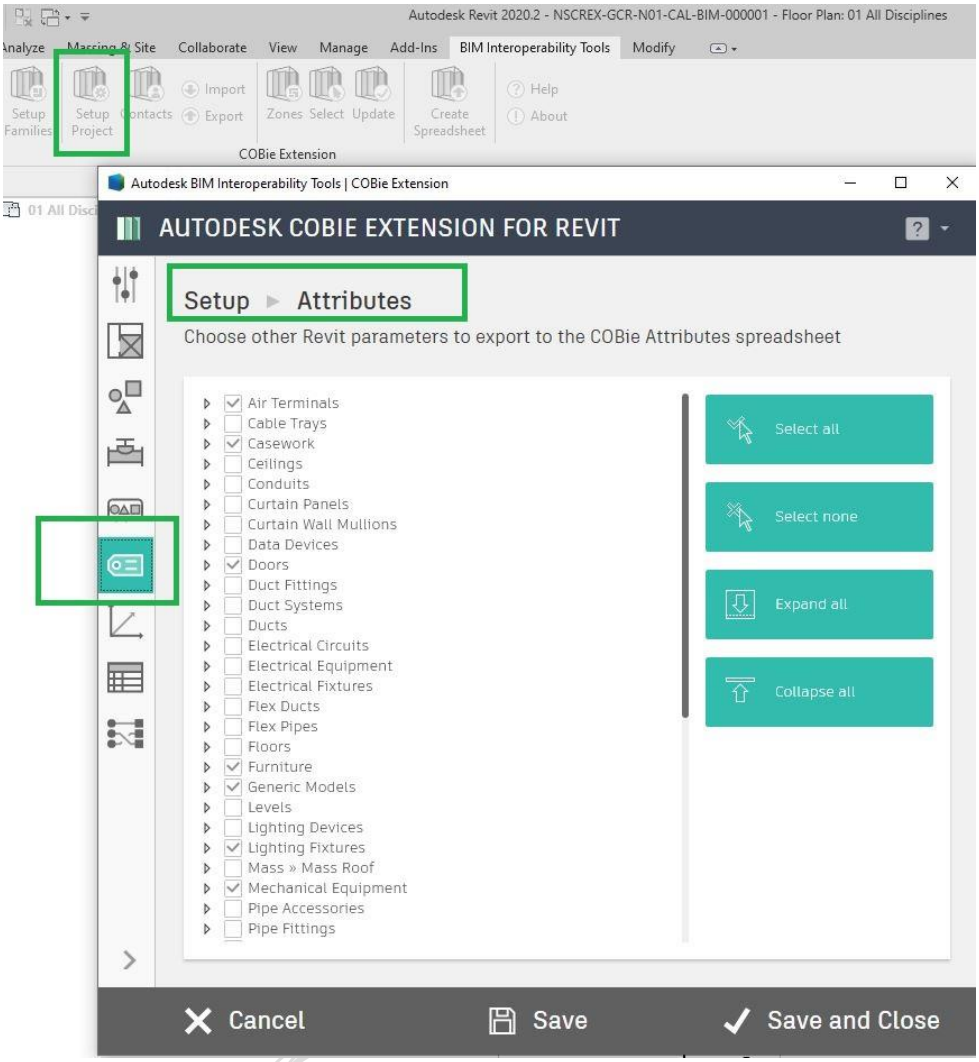
Import the COBie Generic Configuration file "Attached" for the required project stage



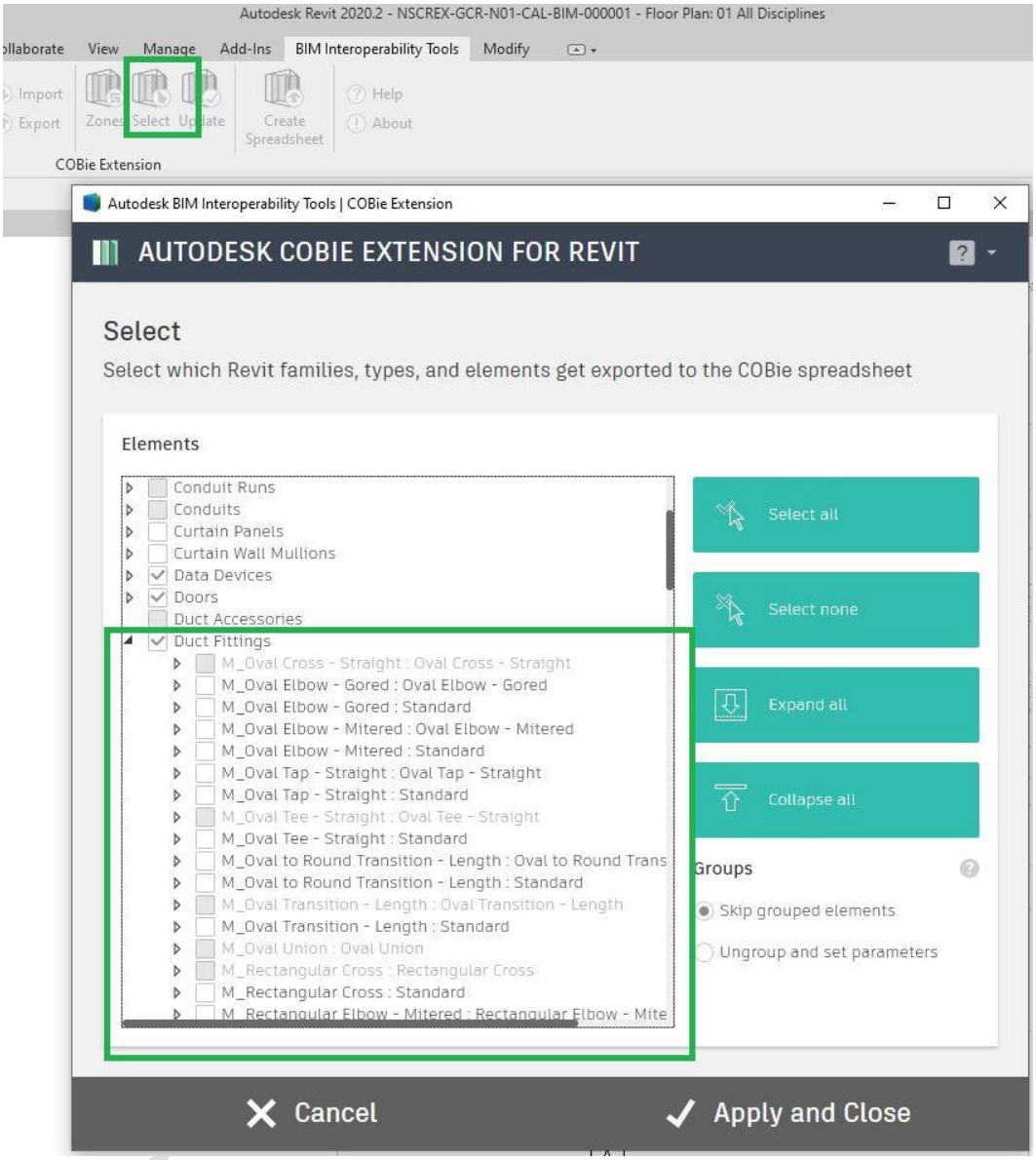
Setup the required organization contact information by clicking on Contacts Icon



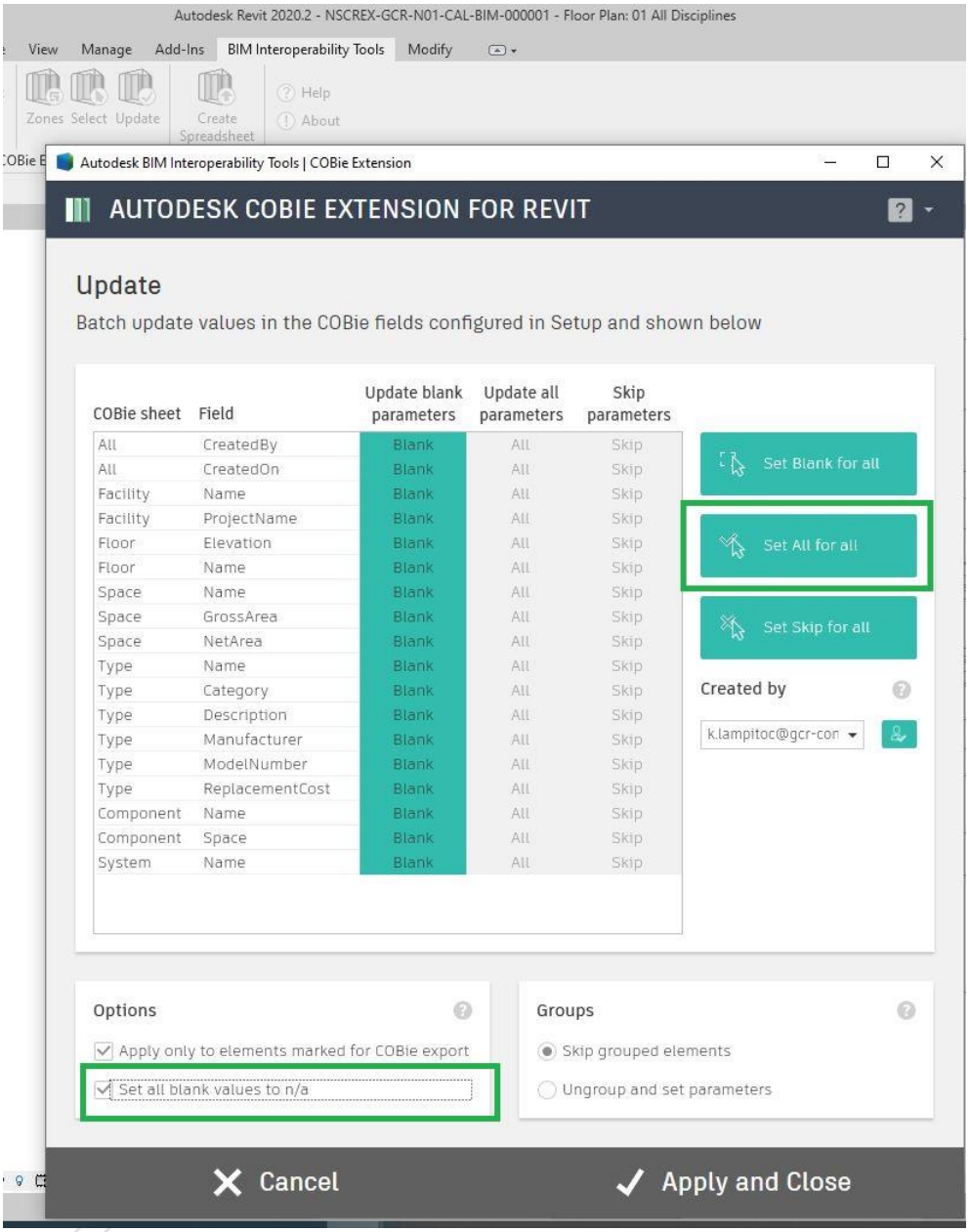
By clicking on the Setup Project icon, user will have accesses to the COBie spreadsheet tabs settings. The configurations were modified to align with project requirements. Only Attributes tab need to be modified by the user to export only the agreed parameters mentioned in the Level of information sheets which is part of Level of Definition - LOD Matrix and Catalogue ref (To be developed).



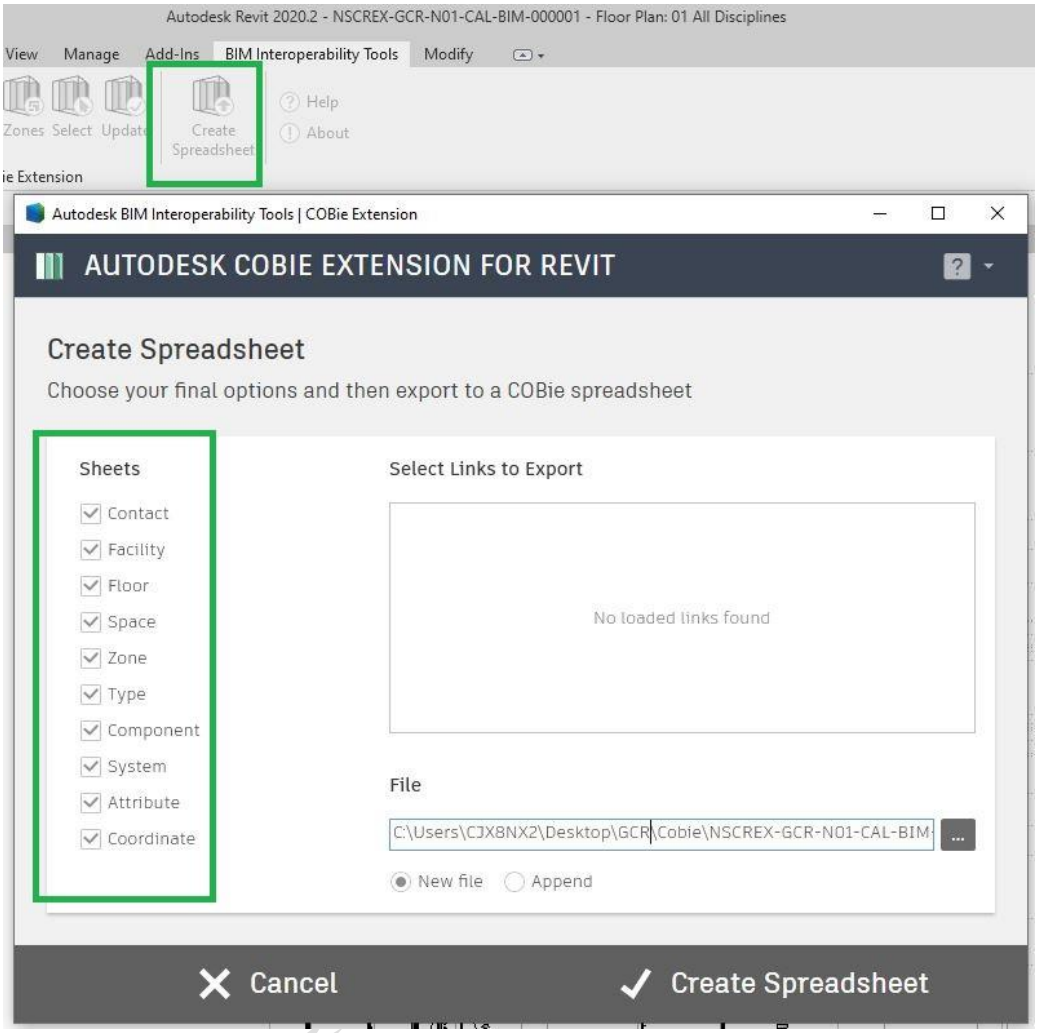
Now the user must open Select icon to choose which are the categories and families that will be exported in COBie following Section 4 and according to Level of Definition Matrix which is part of Level of Definition - LOD Matrix and Catalogue ref (To be develop)



The user now must update the model to match the settings selected. This will be done using Update Icon. Select all attributes to be updated and tick “Set all blank values to n/a”



After checking all defined COBie attributes and filling the required, the model now is ready for the export. To export COBie Spreadsheet click on Create Spreadsheet icon and select the applicable sheets for the requested model as mentioned in section 7.7.3.



7.7.4.3 Output

The output from Autodesk COBie Plugin is Excel sheet contain different worksheets following COBie schema where all Design information will be populated in different worksheets as stated under Section 7.7.3.

7.7.4 BIM Deliverables Strategy

1. In Design Stage, All COBie sheets will be extracted from CWJV Models which have Maintainable Assets following the required information under Section 7.7.3 using Autodesk COBie Plugin
    a. For Non-Asset elements, COBie Yes/No parameter will be set to no with empty COBie parameters
    b. For Asset elements, COBie Yes/No parameter will be set to Yes with data filled in COBie parameters
    c. For Models where no assets exist in the scope of the model, no COBie sheets to be extracted from the model

2. In As-Built Stage (CWJV/RSY), COBie sheets will be extracted from the Models for Maintainable Assets only following section 3.3.2.
    a. For Non-Asset elements, COBie Yes/No parameter will be set to no with COBie parameters filled N/A
    b. For Asset elements, COBie Yes/No parameter will be set to Yes with data filled in COBie parameters
    c. For Non-Asset models, COBie (Yes/No) to be added and set to No and all COBie parameters will be deleted
    d. For Models where no assets exist in the scope of the model, no COBie sheets to be extracted from the model
3. The DLP is intended to deliver all changed and amended information based on the outstanding works list. This is can be miscellaneous information depending on the comments received from the stakeholders after the As-Build stage. After the DLP phase all information will be considered as handed over to the Employer.
4. COBie sheets will be issued from
    a. Autodesk Revit using Autodesk COBie Plug-in

7.7.5 COBie Parameters

Following attributes for COBIE will be provided in the BIM models.

7.7.5.1 COBie Object Level Parameters

Following object level attributes will appear in BIM model.

Data	
COBie	☑
COBie.CreatedBy	someone@example.com
COBie.CreatedOn	2020-05-19T14:55:40

7.7.5.2 COBie Details in Project Information

In order to extract data into COBIE worksheet, following information regarding COBIE will be provided in project information.

Data	
COBie.CreatedBy	someone@example.com
COBie.CreatedOn	2020-05-19T15:01:30
COBie.Facility.Name	ITPS-7
COBie.Facility.Category	TPS
COBie.Facility.ProjectName	NSCR-EX
COBie.Facility.SiteName	ITPS-7
COBie.Facility.LinearUnits	Millimeters
COBie.Facility.AreaUnits	Square Meters
COBie.Facility.VolumeUnits	Cubic Meters
COBie.Facility.CurrencyUnit	None
COBie.Facility.AreaMeasurement	Revit default area calculation method

7.7.6 COBie Deliverables Verification

For COBie information verification refer to BIM COBie Strategy.

8. Uniclass 2015

Each element shall be classified according to Uniclass 2015 table. The specific Parameters will be implemented in all project stages starting from DCP 3 stage. The elements classification is part of the Level of Definition - Lod Matrix and Catalogue document ref. (To be developed).

A separate Uniclass parameter code shall be assigned to the components in accordance with the parameters outlined below and in the shared parameter file - Shared parameters overview excel file

Classification.Uniclass.Pr.Description
Classification.Uniclass.Pr.Number
Classification.Uniclass.Ss.Description
Classification.Uniclass.Ss.Number

List of Uniclass Parameters used

9. Asset/MMS Information

9.1 Asset Information Model

An asset register is a schedule of component information that form part of a built asset such as a building and equipment. It may form part of operation and maintenance manual or O&M manual for a building/equipment which contain all the information required for operation, maintenance, decommissioning and demolition.

An asset information model (AIM) is an operational BIM model that complies the data and information (asset register) necessary to support asset management, that is, it provides all the data and information related to, or required for the operation of an asset.

An asset register may contain a wide range of information. For NSCR BIM Manual, below information has been identified as required for BIM Model information.

a) Asset Tag
   i. Originator code
   ii. System code
   iii. Sub-system code
   iv. Equipment Type (LRU)/Component Code

v. Equipment code ID

b) Location Tag
   i. Location Code/ Train Number/ PSD Door Number
   ii. Building Code / Train Car Number
   iii. Floor Code/ Train Door Number
   iv. Room Number/ Code
   v. Rack Number
c) Equipment Name
d) Equipment Description
e) Manufacturer ID
f) Warranty
   i. Start Date
   ii. End Date
g) Dimensions (Size)

Above information is the list to be integrated with BIM Model and to be submitted to the CMMS database by each package contractor.

Note:

Asset Elements – Are items which is maintainable and replaceable (Compressor, AHU, etc.)

Non-Asset Elements – are assets which is non-maintainable but replaceable (example: Light Bulbs, Chairs, etc.)

10. Submission Requirements

10.1 Preliminary Design Stage

During the Preliminary Design Stage, the model elements shall be modelled as overall massing models with indicative dimension, are, height, volume, location and orientation. The contractor shall prepare the following deliverables:

- BIM Execution Plans;
- BIM Libraries – Elevated, At-Grade & Line wide;
- Massing Model of Depots;
- Massing Model of Proposed TPSS, Utility Building, Elevated and At-Grade Stations & Viaducts; and
- Massing Model of Proposed Underground Station and Tunnel etc.

10.2 Pre-Final Design Stage

At this stage, individual BIM Models shall be created and merged to provide clash detection and resolution also to be used for drawing production before the

Construction Stage, regulatory submission preparation and coordination. The contractor shall be Model Author for System BIM Models at LOD 200.

10.3 Final Design Stage

Similar to the Pre-Final Design Stage, during the Final Design Stage, the individual BIM Models shall be further improved and merged for clash detection and resolution and also used for drawing production before the Construction Stage, regulatory submission preparation and coordination. The contractor shall be Model Author for System BIM Models at LOD 300.

10.4 Construction Stage

During Construction Stage, the contractor shall be the Model Author for Construction System BIM Models at LOD 400. In addition to that, the contractor shall be Model User for the following:

- Construction Maintenance Strategy BIM Models;
- Coordination & Clash Detection

10.5 As-Built Stage

During the As-Built Stage, the contractor shall be the Model Author for the as- built system BIM Models at LOD 500.

11. Information Exchange

11.1 Purpose

This section describes the methodology for integrating BIM with the design, construction and management processes implemented by GCR Consortium for the North-South Commuter Railway Extension (NSCR-EX) Project.

11.2 Scope

As a BIM framework for ensuring Project compliance with the EIR, the BEP facilitates BIM deliverables management in line with the Program and includes the management, planning and documentation exchange processes, standard methods and procedures and the related IT solutions.

This document is binding on all Project Team Members responsible for authoring, checking and verifying BIM Models and associated data. All Project Team Members shall comply with this BEP in its entirety. A thorough understanding of DOTr Information Requirements is a prerequisite for using this document.

The BIM Execution Plan is a live document and will be subject to change during the Project's duration. More information regarding the deliverables of this document and the contents to

be updated can be found in Section 10 of this document and section 1,2,1 of the 270235_REP_0010_D9_Info Mgt Plan.

This BIM Execution Plan shall be the only BIM plan used by the Project Team Members. All relevant organizational standards, information and methods of working shall be incorporated into this BEP.

11.3 Responsibility

It is the responsibility of all NSCR-EX Project Team Members (including Consultant's subcontractors) to comply with the processes set out in this document.

These processes are stablished and maintained by the Consortium Technical Office and the Consortium BIM Team, being the BIM Manager, Deputy BIM Manager and the BIM Coordinators the ones responsible for its implementation. Also, the BIM Managers of each Project stakeholder oversee the correct application of these processes within their respective organizations.

11.4 Appendices

	Name	Definition	Document Number
1		BIM EXECUTION PLAN	To be developed by CWJV
		BIM DELIVERY PROGRAMME	To be developed by CWJV
2		BIM USES	To be developed by CWJV
3		BIM CAPABILITY ASSESSMENT	To be developed by CWJV
4		MASTER INFORMATION DELIVERY PLAN (MIDP)	To be developed by CWJV
5		QA/QC MANAGEMENT PLAN	To be developed by CWJV
6	Appendix A	DRAWING ISSUE LIST (DIL) SAMPLE	
7	Appendix B	DRAWING ISSUE HISTORY (DIH) SAMPLE	
8	Appendix C	DRAWING NUMBERING CONVENTION	
9	Appendix D	AUTODESK CIVIL 3D	
10	Appendix E	AUTODESK REVIT	
11	Appendix F	ACONEX	
12	Appendix G	ACONEX – ANNEX A	
13	Appendix H	AUTODESK NAVISWORKS	
14	Appendix I	COMMON DATA ENVIRONMENT PROJECTWISE	
15	Appendix J	N1, N2 and SC CLUSTERS	

11.5 Definitions

Name	Definition
DOTr	Department of Transportation and Railway (Philippines)
The Employer	Department of Transportation and Railway (DOTr)

Consultant	Greater Capital Railway Consortium (GCR)
The Engineer	Appointed by the Employer to act as the Engineer for the purposes of the Contract.
The Contractor	The person(s) named as contractor in the Letter of Acceptance and the Contract Agreement, and the legal successors in title to this person(s)
The Project	North-South Commuter Railway Extension

11.6 Abbreviations

Name	Definition
GCR	General Consultant (Greater Capital Railway Consortium)
NSCR-EX	North-South Commuter Railway Extension
AIM	Asset Information Model
BEP	BIM Execution Plan
BIM	Building Information Modelling
BOM	Bill of materials
BS	British Standard
CAD	Computer Aided Design
CDE	Common Data Environment
CDRL	Contract Deliverables Requirements List
CTO	Consortium Technical Office
COBie	Construction Operation Building and Information exchange
CW	Civil Works
CWJV	Civil Works Joint Venture
DCP	Design Control Point
DMP	Design Management Plan
DOORS	Dynamic Object-Oriented Requirements System
DRS	Document Review Sheet
EDMS	Electronic Document Management System
EIR	Employer's Information Requirements
HSE	Health, Safety and Environment
GIS	Geographic Information System
IFC	Industry Foundation Class
ISO	International Organization for Standardization
LOD	Level of Definition
Lod	Level of detail (geometry)
Loi	Level of information (Attributes)
MMS	Maintenance Management System
MIDP	Master Information Delivery Plan

MPDT	Model Production Delivery Table
NOC	No Objection Certificate
PIM	Project Information Model
RSY	Rail Systems - Alstom
TBD	To Be Defined
TIDP	Task Information Delivery Plan
WBS	Work Breakdown Structure

11.7 Project Details

PROJECT NAME:

North – South Commuter Railway Extension (NSCR-EX)

CLIENT:

DOTr

PROJECT CONTRACT FORM:

Build – Civil Works

Design and Build – E&M and Rail Systems

PROJECT ADDRESS:

North and South Luzon, Philippines

11.8 Project Description

Please refer to Section 2.2 of DOTr document 270235_REP_0002_D1_Inception Report

11.8.1 Project Schedule and Major Milestones

This section gives a summary of the information of Baseline Programme which is submitted as a separate document as well as the major milestones required for the completion of the works,

Since the design and drawing extraction are being processed in BIM from DCP 2 onwards the as-built stage, the corresponding activity dates are the same as the BIM activity dates.

11.8.2 Project Goals, Project Challenges and Risks

The NSCR-EX Project aims to achieve Level 2 of BIM maturity as defined within ISO 19650 suite. Based on this, all Project stakeholders shall work following a continuous, integrated, multi-disciplinary collaboration process which will intend to enhance design and construction methods with regards to quality, execution time and cost.

Apart from meetings, effective collaboration shall be assured through information exchange within the Common Data Environment (CDE). Design, construction, As-built and management.

Information will be shared amongst Project stakeholders with appropriate access rights by using defined file formats (native, IFC) and discipline-specific software fit for each BIM use and deliverable (e.g. design, coordination, As-built, COBie, etc.). The end goal is to generate a federated model through which clashes between different systems and disciplines will be identified and resolved, thus assuring coordination and collaboration before construction activities commence, as well as to deliver As Built and AIM. To achieve this goal, the Project's supply chain shall be engaged through BIM.

11.8.3 BIM Delivery Organization Chart

GCR has addressed the BIM key roles for the Project, defined as follows:

EIR Role	Corresponding GCR Role
Information Manager	BIM Director/BIM Manager
BIM Coordinator	BIM Coordinator
CDE Manager	CDE/PIMS Manager
Design Coordination Manager	Design Manager
Lead Designer	Architect Team Lead / Engineer Team Lead
Task Team Managers	BIM Manager
Interface Manager	Interface Manager
CAD Manager	CAD Manager
CAD Co-Ordinator	CAD Coordinator

The following table and chart represent the Project's BIM delivery organization:

	NAME	CONTACT DETAILS
The Employer: DOTr Engineering Support Manager / BIM Manager		
The Engineer: Consultant BIM Manager		
CTO BIM Manager		
CDE Manager		
GIS Specialist		
BIM Lead / Captain		
BIM Engineer		
BIM Coordinator		
4D Specialist		

The BIM organization chart below shows the integration of GCR BIM team with other teams from the Technical Department. Key collaborations between BIM and other teams include but are not limited to:

11.8.3.1 BIM Manager – 4D Specialist – Project Control Manager – Construction Manager:

The Project Control Manager provides the schedule and progress to the 4D Specialist to update the 4D progress reporting model. The above team reviews the construction methodology via the 4D simulations and then the Project Control Manager updates the construction schedule as required.

11.8.3.2 BIM Manager – HSE Manager:

The HSE Manager reviews the 3D model and the 4D simulations with the BIM Manager, highlights potential risks and hazards to the BIM Manager who in his turn provides relative model snapshots capturing the HSE Manager's comments to be used in the HSE report.

11.8.3.3 BIM Manager – BIM Coordinators – Construction Manager – Technical Manager:

The BIM Manager, supported by the BIM coordinators review the design models during design coordination meetings with the Design and Technical Managers in the presence of design package leads to review progress, discuss critical design issues and identify solutions. Occasionally, the Construction Manager attends the meeting to discuss construction issues and solutions.

11.8.3.4 BIM Manager – LEED Manager (Optional)

The BIM Manager reviews the BIM Model with the LEED Manager with regard to materials and Project LEED - related parameters provided by the LEED Manager to assess and monitor the achievement of design sustainability criteria.

11.8.3.5 BIM Manager – Interface Manager:

The BIM Manager meets frequently with the Interface Manager to discuss model development status, model and design information exchange across stakeholders and compliance with ICDs.

11.8.3.6 BIM Manager – QA/QC Manager:

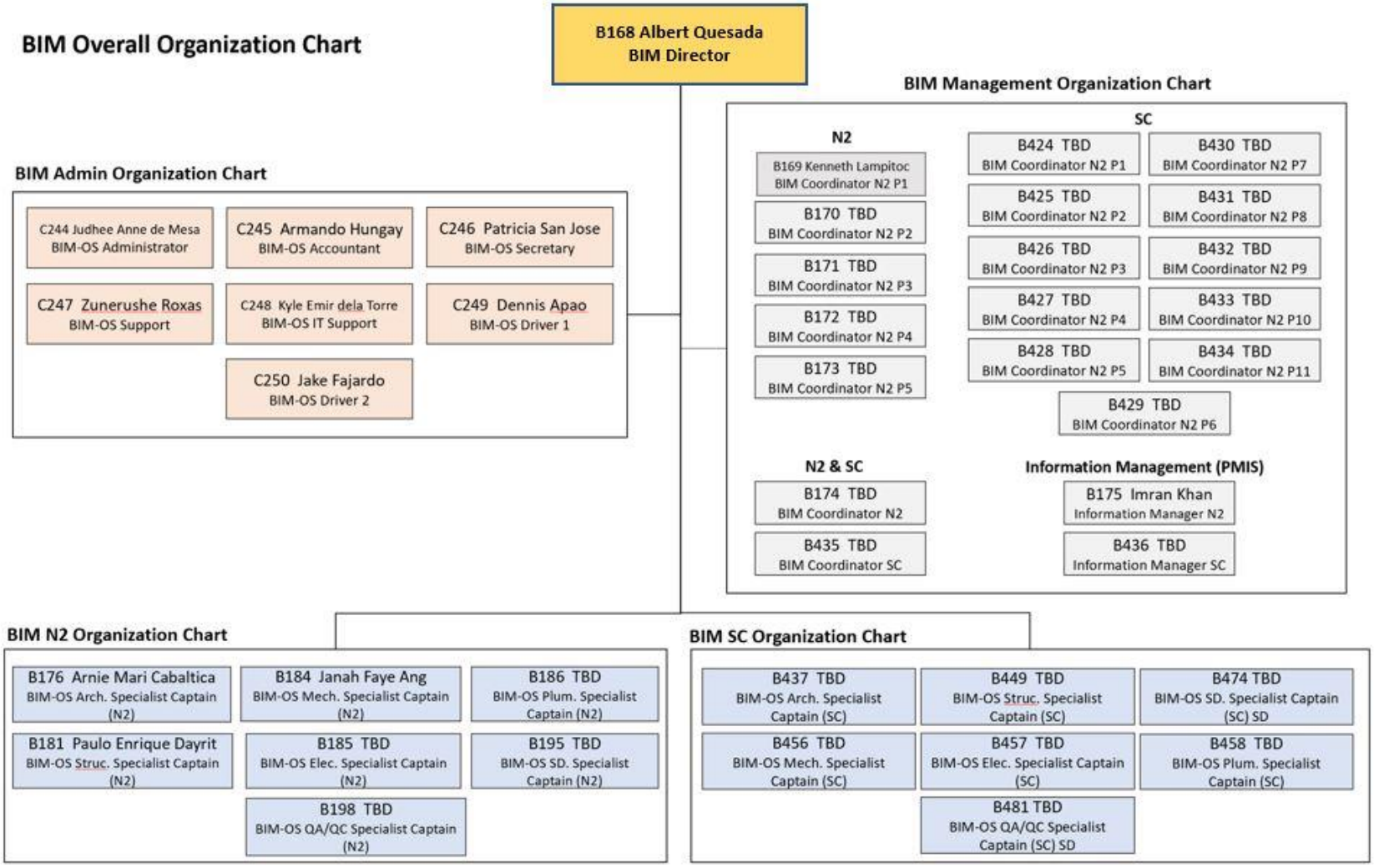
The QAQC Manager provides the QA/QC and KPIs procedure frameworks. The BIM Managers occasionally meet with the QAQC Manager to discuss non-conformances and plan corrective actions. The QA/QC Manager plans and chairs BIM audits where the BIM

Manager is asked to showcase conformance to Project standards and procedures.

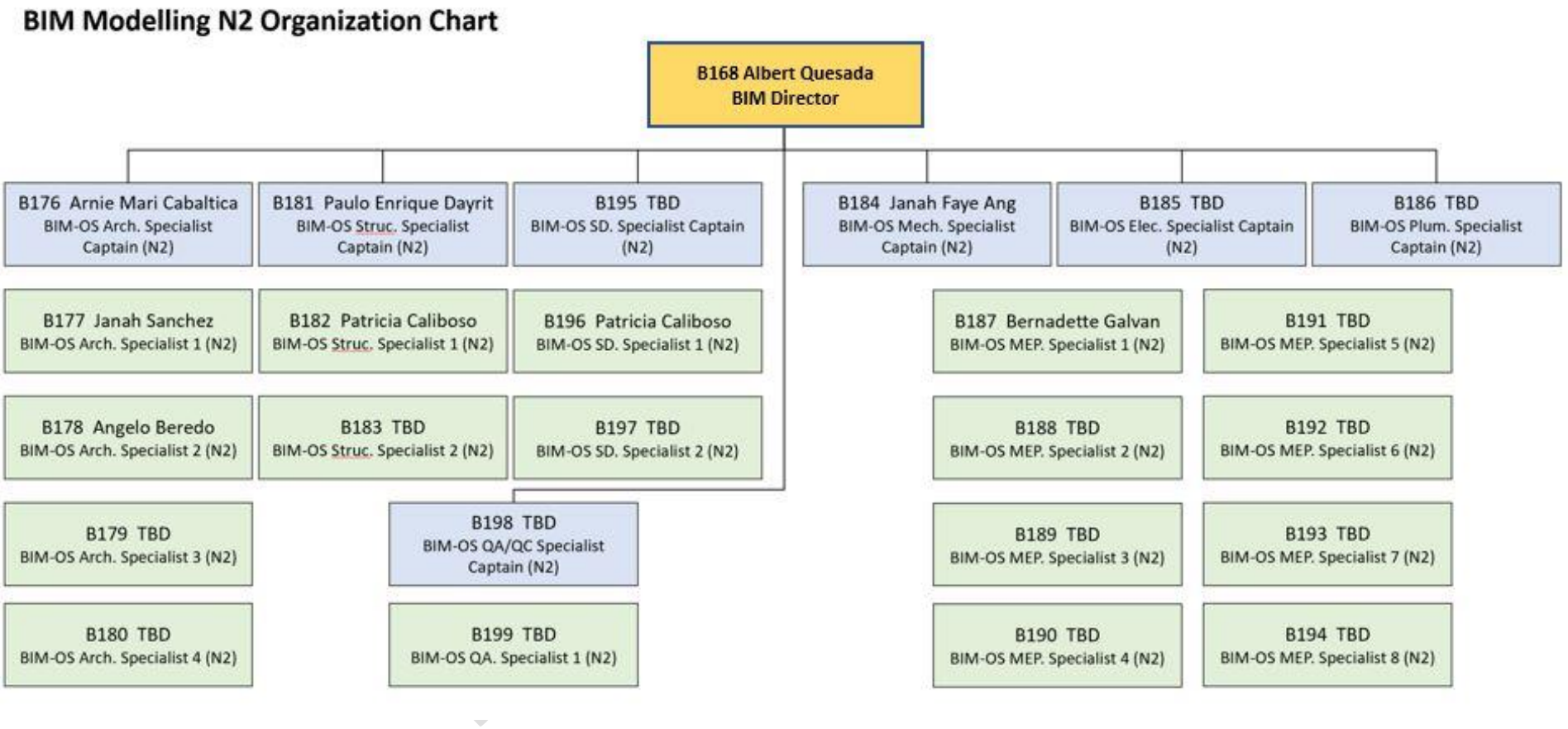
11.8.3.7 BIM Manager – CAD Manager:

The BIM Manager occasionally meets with the CAD Manager to review compliance with the Project's BIM and CAD standards.

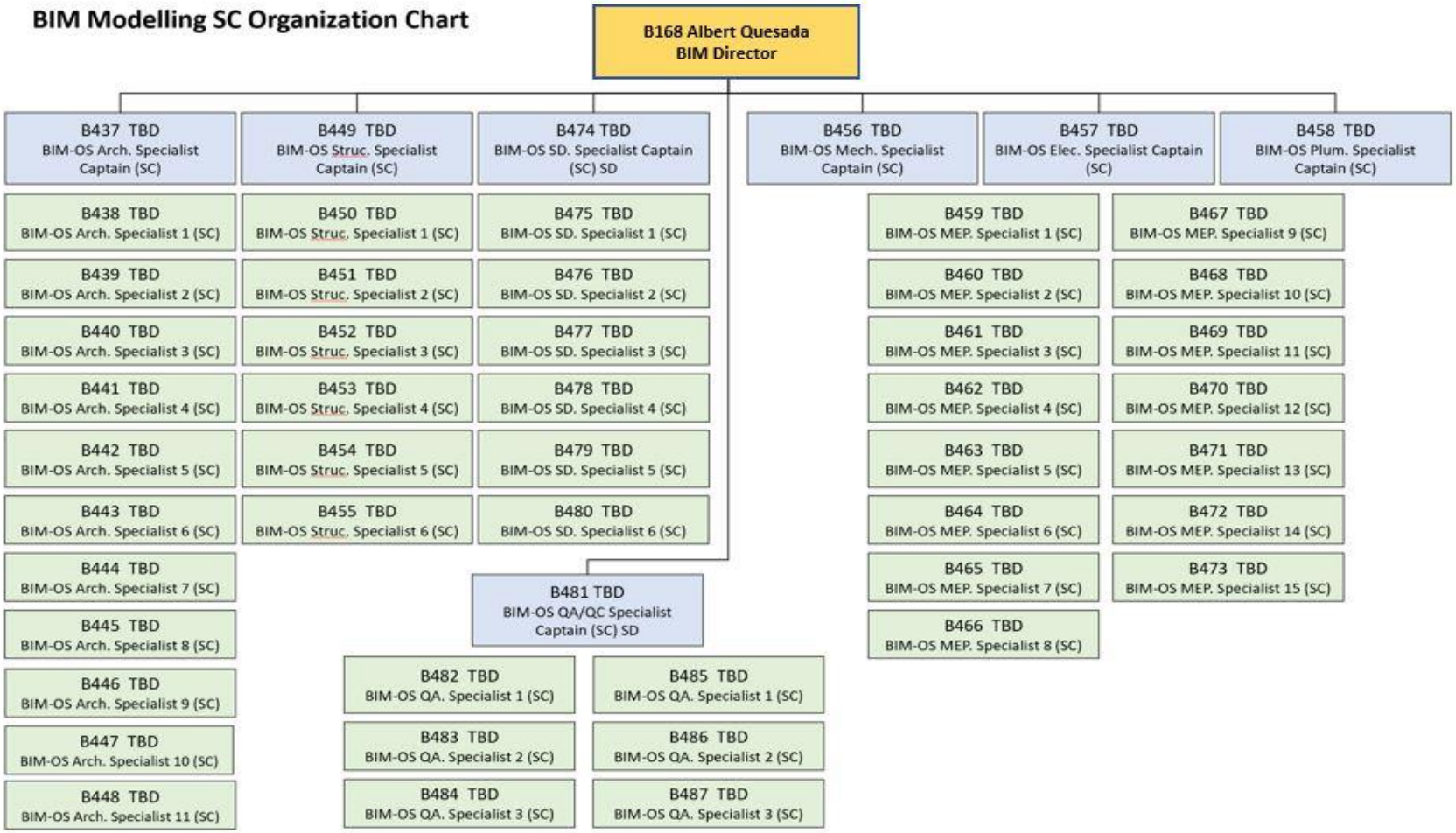
BIM Overall Organization Chart



11.8.4 BIM Modelling NSCR (North Section) Organization Chart



11.8.5 BIM Modelling NSCR (South Section) Organization Chart



11.9 Roles and Responsibilities

The following RASCI matrix describes the roles of Project stakeholders creating, coordinating and managing BIM models. TBD

Ref.	Responsibilities		BIM Manager	BIM Coordinator	CDE Manager	Design Manager	Lead Designer	Interface Manager	CAD Manager	CAD Coordinator	IT Hardware	IT Software
1. 0	**Project Discipline Scope of Works**											
1.1	Alignment (Track and Tunnel) Civil		I	I	C	C	R	C	S	S	N/A	N/A
1.2	Viaduct Civil		I	I	C	C	R	C	S	S	N/A	N/A
1.3	Tunnel Civil		I	I	C	C	R	C	S	S	N/A	N/A
1.4	Cut & Cover Civil		I	I	C	C	R	C	S	S	N/A	N/A
1.5	Roads and Highways Civil		I	I	C	C	R	C	S	S	N/A	N/A
1.6	Utilities		I	I	C	C	R	C	S	S	N/A	N/A
1.7	Stations Architectural		I	I	C	C	R	C	S	S	N/A	N/A
1.8	Stations Structural		I	I	C	C	R	C	S	S	N/A	N/A
1.9	Viaduct, Tunnel and Cut & Cover - Architectural		I	I	C	C	R	C	S	S	N/A	N/A
1. 10	Depot Structure - Architecture and Structural		I	I	C	C	R	C	S	S	N/A	N/A
1.11	Rail Systems (BIM Production)		C	I	S	C	C	R	S	S	N/A	N/A
2. 0	**External Project Communication / Interface**											
2.1	External Stakeholders		I	S	I	I	R	I	I	I	N/A	N/A
2.2	Engineers BIM Team Manager		C	S	I	I	R	I	I	I	N/A	N/A
2.3	Engineers BIM Team Counterpart		C	S	I	I	R	I	I	I	N/A	N/A
3. 0	**Deployment (Engineer and Contractor)**											
3.1	Resources		C	I	C	C	I	C	I	I	R	S
3.2	Hardware		C	I	C	C	I	C	I	I	R	S
3.3	Software		C	I	C	C	I	C	I	I	S	R
3.4	Arrange Training for the Engineer		A	R	I	I	I	I	I	I	S	S
3.5	Arrange Training for the BIM team		A	R	I	I	I	I	I	I	S	S
3.6	Other IT Infrastructure		C	I	A	I	I	I	I	I	R	S

4. 0	**Meetings**											
4.1	Engineer Monthly Meeting (BIM)		R	S	C	C	I	C	I	I	N/A	N/A
4.2	Asset Information Model		R	A	C	C	C	C	I	I	N/A	N/A
4.3	Engineer Clash Coordination Internal Meeting		C	R	I	C	C	C	I	I	N/A	N/A
4.4	Engineer Internal Design Progress Meeting		C	I	I	R	S	C	I	I	N/A	N/A
4.5	Contractor Weekly Design Progress - Programme		C	I	I	R	S	C	I	I	N/A	N/A
4.6	Contractor Weekly Design Progress - Discipline Specific		C	I	I	R	S	C	I	I	N/A	N/A
4.7	Interface Progress Meeting		C	I	C	C	C	R	I	I	N/A	N/A
4.8	Stakeholder Progress Meeting		C	I	C	C	C	R	I	I	N/A	N/A
4.9	Contractor Weekly Progress Meeting (BIM)		R	A	C	C	C	C	I	I	N/A	N/A
4. 10	Contractor Clash Coordination Meeting		C	S	C	C	C	R	I	I	N/A	N/A
5. 0	**General Deliverables**											
5.1	Weekly Plan / Schedule		R	A	I	I	I	I	I	I	N/A	N/A
5.2	Action List and Log		R	A	I	I	I	I	I	I	N/A	N/A
5.3	Ongoing Work File / Folder		R	A	I	I	I	I	I	I	S	S
5.4	Server Documentation and Maintenance		C	I	C	C	I	C	I	I	R	S
5.5	Correspondence (Letters)		A	I	A	A	I	R	I	I	N/A	N/A
5.6	Request of Information		A	I	A	A	A	R	I	I	N/A	N/A
5.7	BIM Model Submission Tracker		R	A	I	I	I	I	I	I	N/A	N/A
5.8	Project RFI and Correspondence Register		C	I	C	A	R	C	I	I	N/A	N/A
5.9	BIM Delivery Programme and Reporting (CDRL)		R	A	I	I	I	I	I	I	N/A	N/A
5. 10	BIM Review and comment		R	A	I	I	I	I	I	I	N/A	N/A
5.11	BIM Contractual / Commercial Issues		R	A	I	I	I	I	I	I	N/A	N/A
5.12	Contractor Model Submission (BIM Content)		R	A	I	I	I	I	I	I	N/A	N/A
5.13	Contractor Model Submission (BIM QAQC)		R	A	I	I	I	I	I	I	N/A	N/A
5.14	Contractor Model Submisison (BIM Design Technical)		R	A	I	I	I	I	I	I	N/A	N/A
5.15	Change Management BIM		C	A	I	I	R	R	I	I	N/A	N/A
5.16	Non-Conformance Notices		I	I	S	R	A	I	I	I	N/A	N/A
5.17	Contractor QA/QC Audit (Internal)		I	I	S	R	A	I	I	I	N/A	N/A
5.18	Contractor QA/QC Audit (External)		I	I	S	R	A	I	I	I	N/A	N/A
5.19	Engineer's QA/QA Audit (Internal)		I	I	S	R	A	I	I	I	N/A	N/A
5. 20	Contractor's DCP / Project Stage Compliance Review		I	I	A	R	A	I	I	I	N/A	N/A

6. 0	EIR Deliverables											
6.1	Common Data Enviroment (including data drops)		A	I	R	A	I	A	I	I	N/A	N/A
6.2	BIM Deployment		R	A	I	I	I	I	I	I	N/A	N/A
6.3	BIM Execution Plan		R	A	I	I	I	I	I	I	N/A	N/A
6.4	Model breakdown Strategy		R	S	I	I	I	I	I	I	N/A	N/A
6.5	Task Information Delivery Plan		A	S	A	A	S	R	S	S	N/A	N/A
6.6	Master Information Delivery Plan		A	I	A	A	I	R	I	I	N/A	N/A
6.7	BIM Project Manual		R	A	C	C	C	C	N/A	N/A	N/A	N/A
6.8	Sub-contractor Assesment		I	S	I	I	C	R	N/A	N/A	N/A	N/A
6.9	Geographical Information (GIS)		I	S	R	I	C	I	N/A	N/A	N/A	N/A
6. 10	Existing Site Conditions (Utilities, Topo and Structure)		I	S	I	A	R	I	N/A	N/A	N/A	N/A
6.11	Existing Line Enhancement works		I	S	I	R	A	I	N/A	N/A	N/A	N/A
6.12	Health and Safety/Construction Design Management (CDM)		I	I	I	I	I	R	N/A	N/A	N/A	N/A
6.13	Clash Interface and Clearance		C	C	C	R	A	C	N/A	N/A	N/A	N/A
6.14	Quantity Take Offs		C	C	C	R	A	C	N/A	N/A	N/A	N/A
6.15	Energy Use Models		R	A	I	A	A	I	I	I	N/A	N/A
6.16	Construction BIMs (Installation Vs Design Model)		R	A	I	A	A	I	I	I	N/A	N/A
6.17	As-Built BIMs (Installation Vs As-Built Model)		R	A	I	A	A	I	I	I	N/A	N/A
6.18	Whole lifeclycle Cost Data		R	A	I	A	A	I	I	I	N/A	N/A
6.19	Asset Information Model		R	A	I	A	A	I	I	I	N/A	N/A

Responsible	R
Accountable	A
Consulted	C
Informed	I
Support	S

11.10 Key BIM Stakeholders

Project Stakeholders are defined in the Stakeholder Management Plan, (To be developed) and in Section 11.8.3: BIM Delivery Organization Chart.

11.11 BIM Uses

Project BIM uses are defined in the EIR, for more information, please refer to Section 1.3.1 to 1.3.4 of the EIR document 270235_REP_0010_D9_Info Mgt Plan

11.12 Collaboration meetings and workshops

The table below mentions the Project's BIM meetings and workshops with regards to frequency, scope and participants.

	BIM Summit Meeting	BIM Mgmt Progess Meeting	BIM Coordination Progress Meeting	BIM Team Internal Meeting	BIM Design Meeting	Design Progress Meeting	Clash Detection Meeting	Interface Meeting	CDE Migration & Plan Status Meeting	As-Built Meeting
	Monthly with the Engineer:	BI-Weekly with the Engineer:	Monthly between Contractors and Engineer:	Weekly internal meeting for the contractor:	Weekly with the Desingers:	Weekly with Design teams:	Bi-weekly with Design teams and Designers:	Weekly with Interface Manager:	Monthly meeting the Contractors, Engineer & DOTr:	Internal weekly meeting:
	High level progress review and key issues analysis	Review weekly progress reports, EIR deliverables and contractual issues	Review and check all coordination issues and the submissions progress	Review and cehck all pending and coordination issues	Review submissions, EIR deliverables, WIP model status and Action log	Review cycle to corrdinate design, chnages and issues	Review cycle to corrdinate design and resolve clashes	Review cycle to coordinate information exchange and design compliance	Review the Migration of the Data and the Handover states	Internal weekly meeting for the the As-built submissions and progress:
	Monthly	**BI-Weekly**	**Monthly**	**Weekly**	**Weekly**	**Weekly**	**BI-Weekly**	**Weekly**	**Monthly**	**Weekly**
DOTr Eng. /BIM Manager	Required	Optional	N/A	N/A	N/A	N/A	N/A	N/A	Required	N/A
Consultant BIM Manager	Lead	Lead	Lead	N/A	N/A	N/A	Optional	Required	Lead	N/A
Contractor BIM Manager	Required	Required	Required	Lead	Lead	N/A	Required	Required	N/A	N/A
CDE Manager	N/A	N/A	N/A	N/A	Required	N/A	N/A	N/A	Required	N/A
4D Specialist	N/A	N/A	N/A	Required	Required	Required	N/A	N/A	N/A	N/A
BIM Coordiantors	N/A	N/A	Required	Required	Required	Lead	N/A	Lead	N/A	Required
BIM Engineers	N/A	N/A	N/A	Required	Required	Required	N/A	N/A	N/A	Required
Technical Managers	N/A	N/A	N/A	N/A	Lead	Optional	Lead	Required	N/A	Lead
Design Managers	N/A	N/A	N/A	N/A	Required	Optional	N/A	N/A	N/A	N/A
Interface Managers	N/A	N/A	N/A	N/A	Required	Optional	Required	N/A	N/A	Required

12. Project Information Model (PIM) Deliverable Strategy

The purpose of this section is to define the strategy for information delivery at each stage of the project.

The PIM consists on a set of federated building information models with associated non-graphical data and documentation which shall be progressively developed by GCR and JDT and delivered to the Engineer through a series of information exchanges as defined by the EIR.

- Design Control Point 1 (DCP1) – Preliminary Engineering
- Design Control Point 2 (DCP2) – In Process (approx. 66% level of design completion)
- Design Control Point 3 (DCP3) – Pre-Final (approx. 85% level of design completion)
- Design Control Point 4 (DCP4) – Design is 100% complete including Issue for Construction Drawings.
- Data Drop 5 (DD5) – Construction Models
- Data Drop 6 (DD6) – As-built Model

Models will start as design intent models and then will be developed into construction and As-built models as ownership passes from design consultants to the construction teams. Non-graphical information required and agreed in the Employer Plan of Works will be included in the models.

BIM Data Drops shall be undertaken to provide the DOTr with design model files for the deliverables and DCP stages marked in the CDRL (submitted separately). At each data drop, the design report of each package shall contain a summary of the BIM related information (e.g. clash detection summary).

Information to be delivered to the Employer by Consultant at each data exchange will include Native format BIM Models, documents (including drawings) extracted and published from the BIM Models and under strict version control from within the CDE.

Consultant shall prepare construction drawings based on the Engineer approved DCP4 submissions, incorporating amendments as necessary to suit the Contractor's working methods and to include updated and more detailed requirements for the Interfacing Parties.

12.1 Model Management

The BIM model is being developed as per the Project's standards. The following points summarize the main considerations:

- Each design discipline (Architecture, Structure, MEP, Civil) authors and owns its models
- 3D models are setup per discipline as per BIM best practices and authoring tool guidelines.
- Authoring tool central models use work-sharing to allow multiple disciplines to collaborate via the same central model. Models are organized as per Clusters and Construction Zones.
- If a discipline uses multiple models defining a structure (building or linear asset), a container model is set up to allow the structure to be imported into the federated model.

This practice ensures required models are included in and coordinated via the federated model. Each design discipline owns its container model(s) and by adding a model into it indicates it is fit for sharing and coordination via the federated model.

- Discipline models will be federated into a Navisworks model (. nwf/. nwd format) for clash detection and visualization purposes.

12.2 Standards

The following standards and guidelines will be considered for reference during the development of the Project. International standards (BS) are listed below, in case there is duplicated information in two different documents, RFI should be raised.

Standard	Description
ISO 19650-1:2018	Organization and digitization of information about buildings and civil engineering works, including building information modelling (BIM) — Information management using building information modelling — Part 1: Concepts and principles
ISO 19650-1:2018	Organization and digitization of information about buildings and civil engineering works, including building information modelling (BIM) — Information management using building information modelling — Part 2: Delivery Phase of Assets
BS 1192-4:2014	COBie (Construction Operations Building Information Exchange (COBie Version 2.4)
BS ISO 12006-2-2015	Building construction — Organization of information about construction works — Part 2: Framework for classification
BS 1192-5:2015	Specification for Security-Minded Building Information Modelling, Digital Built Environments and smart Asset management
AIA E203-2013	Building Information Modelling and Digital data Exhibit – Using Uniclass 2015
BIM Forum	Level of Detail (LOD) Specification Part 1 and Commentary for Building Information Models and Data (2018)
PAS 55-1-2008	Asset Management
ISO55000	Asset Management

12.3 Model Management

Below is a description of the standard / common practice model types to be used in the Project. Model types may be implemented as per the definitions in figure 1 below, or adjusted in order to fit the Project's requirements (e.g. adherence to model file size requirements/limitations, number of design BIM team members working on the same discipline model file, design strategies and constraints, delivery programme constraints etc.). These model types are linked and monitored in order to allow for controlled authoring within a single discipline model (e.g. architecture) and for intra/inter- disciplinary coordination purposes (e.g. coordination of elements within the architectural model and between the architectural, structural and MEP models also all models have been listed in the model register for the three stages design, construction and as-built.

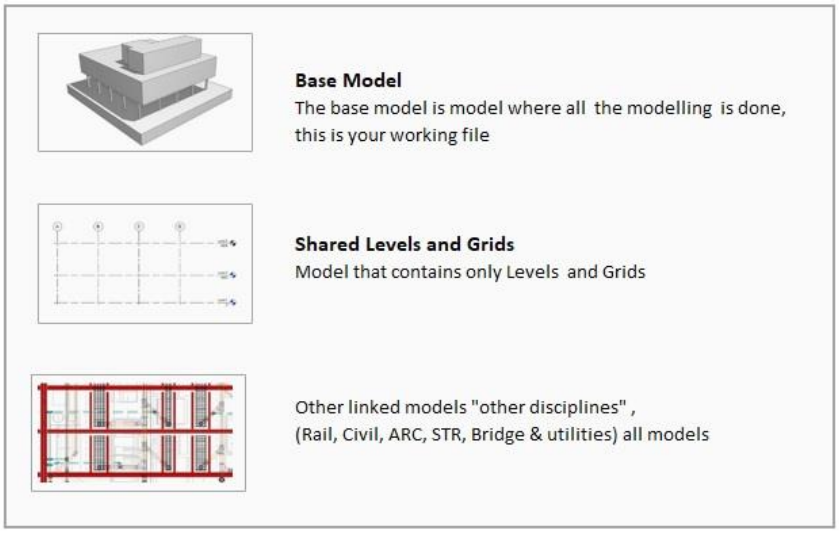


Figure: Model Types

12.4 Interdisciplinary Model Referencing

BIM project is a multi-disciplinary project, meaning that the model files are large and complex. For optimizing operability and performance, the Project should be broken down into sub-models. Some projects require that models of single buildings/ structures are split into multiple files and linked back together to maintain manageable model file size. The following factors will be taken into consideration in order to divide the project in multiple models:

- Project's design
- complexity
- team size
- milestone requirements / programme

Key points to consider when linking files are:

- Task allocation shall be considered when dividing the model so as to minimize the need for users to switch between models.
- Model division shall be determined by BIM Manager and Coordinator in collaboration with the lead architect / engineer responsible for each design package the
- Model Lines shall be used to create crosshairs in open space prior to duplication of the model. They then serve as a quick check to ensure that the sub-models are aligned after Linking.
- When first linking the models back together, 'shared coordinates shall be used as the insertion mechanism.
- Before split and linked models are shared with the rest of the team:
- The real-world co-ordinates of a point on the project shall be defined and published to all linked models using the 'Shared Coordinate' tools.
- Each sub-model shall be reopened, and the other sub-models Linked in as required using the 'By Shared Coordinates' insertion method.

- The relationship between True North and Project North is correctly established.

Each separate discipline whether internal or external, involved in a project shall have its own model and will be responsible for the contents of that model. A discipline can link another discipline's Shared model for reference.

- Shared Coordinates and Project North rotation shall be agreed and documented at the outset. No deviation from these shall occur without permission of the BIM Manager.
- Details of any discipline-specific requirements, such as the difference between Finished Floor Level (FFL) and Structural Slab Level (SSL), shall be fully documented.
- The Copy and Monitor tools in authoring software shall be used to duplicate and relate Levels and Grids only.
- The Copy Monitor tools shall not be used for other element categories without a full understanding of limitations, such as the creation and update of certain elements is not reflected in the monitoring process.
- Ownership of elements shall be properly communicated and tracked through the project timeline (e.g. floors may be created by the Architectural team, but are then adopted by the Structural team to form part of the load-bearing structure).
- Each discipline shall be conscious that referenced data has been produced from the perspective of the author and may not be modelled to the required specification for other purposes. In this case, all relevant parties, with input from the BIM Manager(s) shall convene to discuss the potential re-allocation of ownership.
- Should a team develop a 'starter model' for a partner discipline, such as defining the structural model in conjunction with the architecture, this shall be done in a separate model which shall then be linked in.

This starter model may be passed to the partner discipline who shall then assume ownership of it. The partner discipline shall open this starter model and link in, by shared coordinates, the originator's model as a reference.

With models produced for Building Services, several disciplines may be collated in a single model, as a single piece of equipment may require connection to various services. In this scenario, the model may be split in various ways. The BIM Manager and Coordinator shall be consulted in defining the project-specific strategy.

12.5 Data Security and Saving

All BIM models are shared and published between all parties (Contractor-CWJV, Engineer-GCR and Employer-DOTr) through a Common Data Environment (CDE). All information managed through it as per the CDE procedure.

With regards to the internal work for the Contractor, all BIM project data shall reside on network servers which are subject to regular back-ups. Staff access to BIM models held on the network servers shall be through controlled access permissions.

- Files backup should be set to 3
- Local files shall be saved back to central hourly, at a maximum.

- Files save reminder interval shall be set to 30mins

All BIM models are shared with subcontractors and other parties through CDE on during design, construction and As-built stages.

DRAWING RECORDS

APPENDIX A: DRAWING ISSUE LIST (DIL) SAMPLE

DRAWING ISSUE HISTORY (DIH)

Contract Number:	
Contract Title :	
Originator	
Discipline	
Sub-Discipline	
Originator Reference Number:	
Issue Date:	
Purpose of issue and distribution: P-Comment/I-Information/A-Approval/T-Tender/W-Construction/Z-As Built	

Drawing No.	**Drawing Title**	**Revision**															

APPENDIX B: DRAWING ISSUE HISTORY (DIH) SAMPLE

DRAWING ISSUE LIST (DIL)

Contract Number:	
Contract Title :	
Originator Reference Number:	
Issue Date:	

Purpose of issue and distribution: P-Comment/I-Information/A-Approval/T-Tender/W-Construction/Z-As Built

Drawing No.	Drawing Title	Rev.	Remarks

APPENDIX C: DRAWING NUMBERING CONVENTION

a) Project

MCRP	N2
NSCR-South	SC
General/Line Wide	NS

b) Discipline

Rolling Stock	ROL
Depot facility	DEF
Power Substation System	PSS
Power Distribution System	PDS
Power Grid Line	PGL
Overhead Catenary Line	OCS
Signal System	SIG
Communication System	COM
Automatic Fare Collection System	AFC
Operation Control Center	OCC
Training Center	TRC
CMMS	CMM
Platform Screen Doors	PSD
Training	TRG

c) Component

MCRP	
NEW CLARK CITY	NCC
	N/C
CLARK INTERNATIONAL AIRPORT	CIA
	C/C
CLARK CITY	CRK
	C/A
ANGELES	ANG
	A/S
SAN FERNANDO	SFD
	S/A
APALIT	APA
	A/C
CALUMPIT	CAL
	C/M
MALOLOS	MAL
ROLLING STOCK DEPOT	DEP

NSRP-South	
SOLIS	SOL
	S/B
BLUMENTRITT	BLM
	B/E
ESPANA	ESP
	E/S
SANTA MESA	SAM
	S/P
PACO	PAC
	P/B
BUENDIA	BUE
	B/E
EDSA	EDS
	E/N
NICHOLS	NIC
	N/F
FTI	FTI
	F/B
BICUTAN	BIC
	B/S
SUCAT	SUC
	S/A
ALABANG	ALA
	A/M
MUNTINLUPA	MUN
	M/S
SAN PEDRO	SAP
	S/P
PACITA	PAC
	P/B
BINAN	BIN
	B/S
SANTA ROSA	SAR
	S/C
CABUYAO	CAB
	C/G
GULOD	GUL
	G/M
MAMATID	MAM
	M/C
CALAMBA	CAL
ROLLING STOCK DEPOT	DEP

NSCR		
MALOLOS	MAL	
		M/G
(MALOLOS SOUTH)	MAS	
GUIGUINTO	GUI	
		G/B
(TUKTUKAN)	TUK	
BALAGTAS	BAL	
		B/B
BOCAUE	BOC	
		B/M
(TABINGILOG)	TAB	
MARILAO	MAR	
		M/M
MEYCAUAYAN	MEY	
		M/V
VALENZUELA	VAL	
		V/C
(VALENZUELA POLO)	VAP	
(MALABON)	MAB	
CALOOCAN	CAL	
		C/S
SOLIS	SOL	
		C/T
TUTUBAN	TTB	

d) Stage

Conceptional Design	CD
Basic Design	BD
Preliminary Design	PD
Detailed Design	DD
Final Design	FD

APPENDIX D: AUTODESK CIVIL 3D

1. Model Set Up and Requirements

1.1 General Requirements for BIM Models

- All BIM models must be developed using only the object-oriented elements such as alignments, corridors, slopes, etc., containing the appropriate parametric information.
- All objects and elements of the BIM model must have dimensions corresponding to the actual construction elements (except elements shown schematically in the form of symbols).
- Objects from different disciplines need to be coordinated with respect to reference points.
- Units must be the same for all BIM models. As a standard, the metric system is adopted.

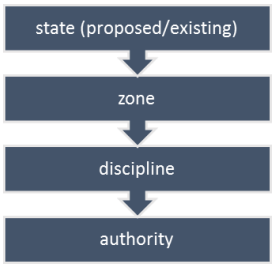
1.1.1 Model Setup

The Design BIM Coordinator is responsible for initial model setup that will define the Project information such as model origin, orientation, project level datum and units. The Design BIM Coordinator will create a key plan, base project grid, base origin points and any other elements required to complete project coordination. All model submissions by the Project BIM team must adhere to the setup maintained by the Design BIM Coordinator throughout the project lifecycle.

1.1.2 Model Structure

The success of a BIM project delivery process is highly dependent upon the level at which the project team can communicate and collaborate for the duration of the project. The BIM Coordinator will liaise with the Task Managers and agree a suitable BIM setup.

- Road models are split according to the Work Packages Zones to increase software efficiency. This model breakdown improves the way of creating models since more team members can work on the same model. The project team may also split the model further, into several smaller parts, such as junctions, local roads, main roads.
- Utility models will be split as per the 0 Utilities model's breakdown strategy



Utilities model's breakdown strategy

Zone/Area	Discipline	Authority_Stakeholder	Name
Existing			
Z01	Communications	PLDT	Z01 - Existing Communicaitons - PLDT
		Globe	Z01 - Existing Communicaitons - Globe
	Power	Meralco	Z01 - Existing Communicaitons - Meralco
	Water Supply	MWSS	Z01 - Existing Communications - MWSS
	Stormwater	MWSS	Z01 - Existing Communicaitons - MWSS
Proposed			
Z01	Communications	PLDT	Z01 - Proposed Communicaitons - PLDT
		Globe	Z01 - Proposed Communicaitons - Globe
	Power	Meralco	Z01 - Proposed Communicaitons - Meralco
	Water Supply	MWSS	Z01 - Proposed Communications - MWSS
	Stormwater	MWSS	Z01 - Proposed Communicaitons - MWSS

Utilities model's breakdown sample

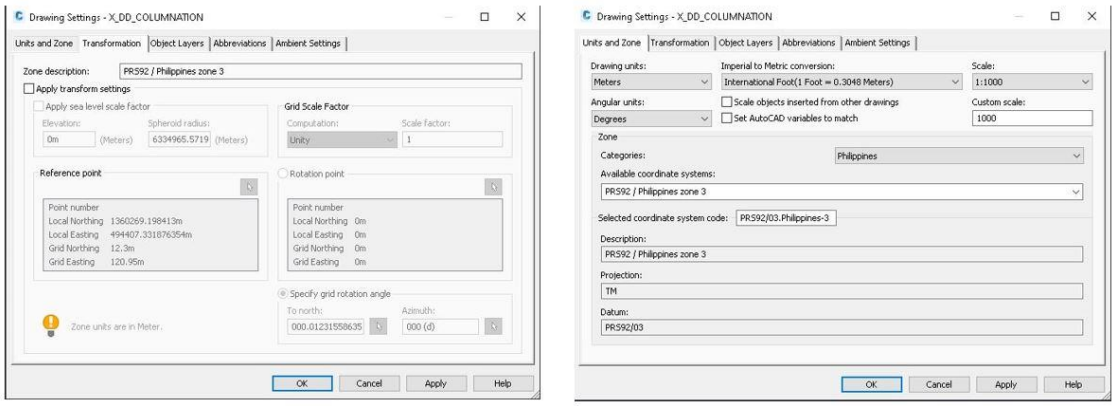
1.1.3 Coordinate System

All coordinates and levels stated on drawings shall be based on the Philippine Reference System of 1991 (PRS-92).

All "coordinate-related" drawing (both Model files and Master drawing files) shall be drawn with true coordinate location based on PRS-92 in a global coordinate system.

All section and elevations in model files shall be based on PRS-92, and the "Railway elevation, +0.000m" shall generally coincide with "0" of the y-axis for 2D sections, profiles, and elevations where applicable. For ease of reference, all sections and elevations shall be aligned with the same datum.

All models and CAD files will be linked 'Origin to Origin' (0.000 Degrees Rotation). UCS set up as World.



Correct Coordinate System in Civil 3D

1.1.4 North

Model is presented in real coordinates. North is directed vertically up. Arrow North on layout is connected to viewport and rotate according to angle of viewport to show correct direction.

1.1.5 Units and Dimensioning

The metric system will be used for the project.

Civils models should be in meters.

Precision dimensions on views (plans, sections, profiles) is set up in template styles

The correct units must be set in the relevant software (meters in Civil 3D for a civil alignment model). Once the units are correctly set, software such as Civil 3D and Navisworks will automatically convert any units on model insert to ensure all models are inserted at the correct scale. The software also has the option of manually setting unit conversion if required.

1.1.6 Model Configuration

All Templates for the Civil 3D models (Roads, proposed Utilities and Existing Utilities) as per the below list and all these templates are embedded with the submission folder:

MMSP – Documents > 1_Correspondence > 20190506_CP101 CAD Drawings > 01_Civil > 018_General > 0185_Utilities, Site Utilization and Transport Management Plan folder

File Name	File type	File Description
SITE UTILIZATION PLAN	.dwg	Civil 3D template for Proposed Utilities
EXISTING UTILITIES ABOVE GROUND	.dwg	Civil 3D template for Existing Utilities Above Ground
EXISTING UTILITIES UNDERGROUND	.dwg	Civil 3D template for Existing Utilities Underground
TRAFFIC MANAGEMENT PLAN	.dwg	Civil 3D Roads template

2. Element Naming Convention

2.1 Civil 3D Elements Description

Correct name and layer organization improve usage and understanding of model elements. Civil 3D standard elements and AutoCAD are used as a base for the model. Those are placed on designated layers for creating sets in Navisworks and correct drawing presentation.

For more information, please see Appendix 4 for all CAD layers and definitions defined for Civil 3D.

2.2 IFC

It is recommended to create a list of objects & items requiring a special naming convention such as:

- ✓ Terrain models (surface)
- ✓ Alignments / profiles
- ✓ Corridors
- ✓ Custom models

Zone's number		Cluster Number		Drawing S.No.		Corridor/Surface		Type of element		Side of alignment (Right/Left)		Chainage
Z1	_	001	_	01	_	C3D	_	MC	_			
Z1	_	002	_	01	_	C3D	_	J	_	R	-	To be checked
Z1	_	003	_	01	_	S	_	J	_	R	-	To be checked

Surface, Corridor convention name

Example:

1. Z1_001_01_C3D_MC
2. Z4_001_01_C3D_J_R_Chainage to be checked

*Type of elements:

- J- Junction
- P – Parking
- S - Service Road
- B – Bay
- P&S - Parking and Service Road

Zone's number		Tyoe of roads (Main/Local)		Side of alignment (Left/Right)		Status (Existing/Proposed)		Type of elements*		Auxiliary number
Z5	_	M	_	R	_	E	_	C	_	01

Alignments of main and parallel (local) roads convention name

Example:

1. Z1_M_R_E_C_01

*Type of elements:

- C – Carriageway
- F – Footpath
- B - Bicycle Path
- S - Service Road

Zone's number		Type of roads (Main/Local)		Side of alignment (Left/Right)		Chainage		Side of alignment		Status (Existing/Proposed)		Auxiliary number
Z1	_	M	_	R	_	To be checked	_	M	_	E	_	01

Example:

1. Z5_M_R_Check Chainage_M_E_01

2.2.1 Sub-assemblies

One of the most important parts for building corridors are sub-assemblies. Those are collected here: TBC. As the Project develops, more sub-assemblies are added. Every model author should add it to their own palette in Civil 3D. Name is given, so it is not necessary to name it. However, for newly created sub-assemblies, the naming convention is presented below:

Type (K - Kerb, F - Foundation)	i (auxiliary number)		Name				Version number
K	1	_	Kerb	_	v	_	1
K	1	_	Upstand_Kerb	_	v	_	1

Sub-assemblies naming convention for kerbs and foundations

Example:

1. K1_Upstand_Kerb_v_1

2.2.2 Assemblies

Assemblies are a basic part of the corridor and should use the name corresponding to the corridor.

3. Volume Strategy

3.1 Model Structure

As aforementioned, road models are split according to the Work Packages Zones and possibly further into smaller parts, such as junctions, local roads, main roads.

3.1.1 ProjectWise Structure Organization (To be confirmed)

Name	Description
C3D-Zone-1A	Zone 1A Area
C3D-Zone-1B	Zone 1B Area
C3D-Zone-2	Zone 2 Area
C3D-Zone-3	Zone 3 Area
C3D-Zone-4	Zone 4 Area
C3D-Zone-5A	Zone 5A Area
C3D-Zone-5B	Zone 5B Area
C3D-Zone-5C	Zone 5C Area
C3D-Zone-5D	Zone 5D Area
C3D-Zone-6	Zone 6 Area
C3D-Zone-7	Zone 7 Area
C3D-Zone-8	Zone 8 Area
C3D-Zone-9	Zone 9 Area
C3D-zone-10	Zone 10 Area
Corridor Extraction	Corridor model extracted
DTM	Existing Ground Surfaces
MX	
Source Files	Profiles and Alignments

NSCR or CWJV ProjectWise BIM Model folder organization

Proper organization of BIM model files is key for achieving success. Thus, in the BIM Model Folder, a subfolder for each zone is created. Those folders contain additional folder for Existing Ground Surface in .dwg extension (DTM) and .xml extension (XML). An additional folder called Source Files is designated for placing alignments and profiles which are shared with every file inside the dedicated zone via DataShorctut.

3.1.2 Datashortcut Organization

Each zone has its own designated DSP file which is used only for one zone. It is obligatory to check if the correct DSP file is associated with the file.

Name	Description
Zone10	Zone10 Data Shortcut
Zone9	Zone9 Data Shortcut
Zone8	Zone8 Data Shortcut
Zone7	Zone7 Data Shortcut
Zone6	Zone6 Data Shortcut
Zone5D	Zone5D Data Shortcut
Zone5C	Zone5C Data Shortcut
Zone5B	Zone5B Data Shortcut
Zone5A	Zone5A Data Shortcut
Zone4	Zone4 Data Shortcut
Zone3	Zone3 Data Shortcut
Zone2	Zone2 Data Shortcut
Zone1B	Zone1B Data Shortcut
Zone1A	Zone1A Data Shortcut

List of prepared DataShortcut files

4. Drawing Format

4.1 File Creation

Every created file is based on template from seed.

- ✓ 123456_C3D_2020-MOD.dwg for 3D model
- ✓ 123456_C3D_2020-DLV.dwg for deliverable

4.2 Title block

The Title block is set up and linked to the drawing template. Valid information as per the drawing must be added using ProjectWise. For those interfaces must be switched into ProjectWise Interface CAD.v.2.2

4.3 Drawing Sheet Scales

All drawings must be setup as per the approved scales defined in the table below. Scales other than those approved shall not be used.

4.4

Scale	Description of detail
1:1250	1:1250 Scale Detail shows shape and layout
1:750	1:750 Scale Detail shows location layout
1:200	1:200 Scale Detail shows shape and layout
1:100	1:100 Scale Detail shows shape, layout and construction elements
1:50	1:50 Scale Detail shows how the construction elements meet at junctions
1:5	1:5 Scale detail show shape, dimensions and assembly of the separate construction elements
1:2	1:2 Scale detail show shape, dimensions and assembly of the separate construction elements
1:1	All model files must be modelled at 1:1 Scale

Templates

Sheet Size	File Name	Description	Remarks'
A1	NSCR-GCR-CLPSTN-BIM-TMP-000001	Civil 3D template for Proposed Utilities	The File contains the Splash screen and title block
	NSCR-GCR-CLPSTN-BIM-TMP-000002	Civil 3D template for Existing Utilities	The File contains the Splash screen and title block

A1	NSCR-GCR-CLPSTN-BIM-TMP-000003	Civil 3D Roads template	The File contains the Splash screen and title block

5. Information Exchange

5.1 Export Settings for Each File Format (Navisworks)

Each civil model containing 3D proposed geometry should be exported to Navisworks.

5.1.1 Preparing for Export & Creating NWC File

Prior to exporting the model to. nwc file, the following steps should be followed:

- ✓ Turn off all AutoCAD Civil 3D data you don't want to export by applying the style "No Display" or through the AutoCAD layers.
- ✓ All AutoCAD data should be turned off or frozen through the AutoCAD layers.
- ✓ Export corridor to solid and save as another .dwg file with suffix "E" at the end of file's name.
- ✓ Open the exported drawing with Navisworks, the. nwc file will be created.
- ✓ Export a. nwc file from AutoCAD Civil 3D using the command NWCOUT. If AutoCAD Civil 3D does not recognize the NWCOUT command, the Navisworks and exporters must be installed from Install Wizard.
- ✓ Check if the surface is set up with appropriate style and export it using NWCOUT command.

5.1.2 Uploading Files After NWC Exporting

- ✓ Dwg files which contain 3D solids (elements of corridor) should be placed in: Corridor Extraction
- ✓ Ready .nwc files should be placed in: FEDERATED. It is important to update the description every time you update the .nwc file. It should contain discipline, stage and status.
- ✓ Exporting to. nwc must be done every Wednesday till end of working day.

6. Project Submittal Requirements

6.1 Model Delivery

All quality control procedures must be carried out by the Task Manager prior to any submission of deliverables. A Project BIM QA/QC form shall be submitted.

6.2 File transfer protocol

Task Managers are to upload updated copies of their files, provide notification and to make collaboration comments and annotations as often as necessary to maintain the Project schedule.

Model files shall be available for download by any approved party involved in the design & construction of the Project. However, only Task Managers are authorized to upload or overwrite their own model files.

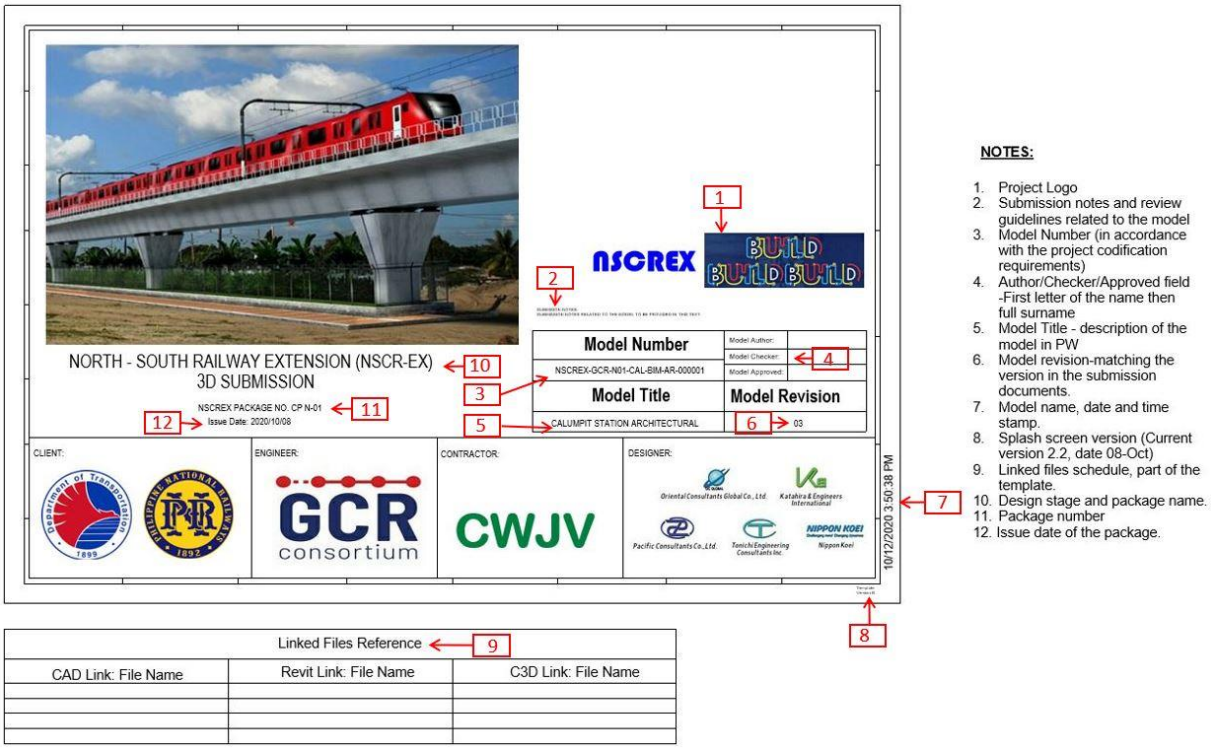
6.3 Delivery Documentation

The BIM deliverables indicated below are required to be submitted with the standard phase deliverables for each Project phase unless noted otherwise.

BIM Deliverable	Format	Notes
Model(s)	.xml Terrain format .dwg Civil 3D format .nwc Navisworks format .ifc IFC format .xlsx COBie sheets	
Drawings	.pdf .dwg	

List of extensions files required for submission

7. Splash Screen



Linked Files Reference		
CAD Link: File Name	Revit Link: File Name	C3D Link: File Name

PROJECT SPECIFIC PROCEDURE

APPENDIX E: AUTODESK REVIT

1. Master Grid File

1.1 Master Grid File Definition

All models will be linked using Shared Coordinate system. All shared coordinates define the true-world positioning of the project, and are to be defined regardless of whether a project is fully coordinated to use origin-to-origin linking or not.

The purpose of this procedure is to identify one file, and only one, that is the sole source for sharing coordinates with all other models in Revit environment. From this file the location of different models is transferred to them, and after that all files will be sharing coordinates, and can be linked with the "Shared Coordinates option". That file is defined as URS (Universal Reference file – as defined by Autodesk), or master grid file.

Master Revit Grid File shall be: MMSP-OCGJV-CP101-URS-000010.rvt

On this project, it shall be used as the URS/master grid file, and all other models shall use coordinate system acquired from this file.

It is recommended to keep staggering of acquiring (Master File > File01 > File02) to one level beyond, since it could lead to coordination issues, and corruption of coordinate systems.

The coordinate system in MMSP-OCGJV-CP101-URS-000010.rvt is acquired from the file Aerial_Topo_Map_PO_CP101.dwg, which is "projected" (refer to the previous chapter), and the CAD files that are supposed to be linked into this coordinates system by shared coordinates must be projected, otherwise, they have to be manually located.

RSY Revit Models will acquire coordinates for from CWJV Contractors BIM Models.

1.1.1 PROJECT SHARED GRIDS FOR LINEAR STRUCTURES

In case of linear structures, Track alignment shall be used as main grid system.

The master geolocation file is used as the sole source of information for the coordinates acquiring (including the Revit master geolocation file), and is located in the link below.

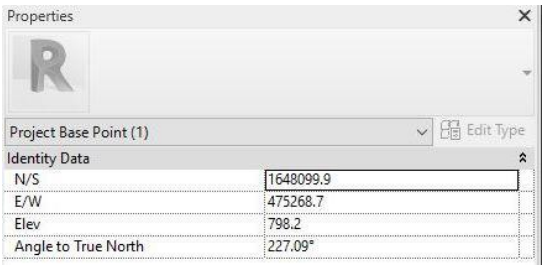
TEMPLATE to be provided.dwg (Softcopy to be provide to all CWJV Contractor's)

1.1.2 PROJECT SHARED GRIDS FOR BUILDING STRUCTURES

Each building structure shall have a separate *grid file*, which will be utilized for coordination. The grid files are copy/monitored from architectural/structural models, depending on the lead discipline, as shown in the **Error! Reference source not found. Error! Reference source not found.**

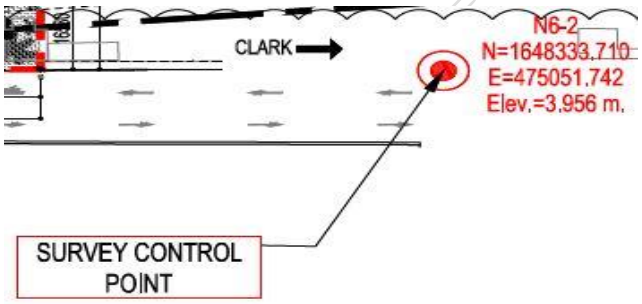
1.1.3 SURVEY AND ORIGIN POINTS

Survey control points stated on drawings shall be based on the Philippine Reference System of 1992 (PRS-92) and Philippine Geoid Model (PGM2014) separately. The coordinates 'and chainage information is obtained from the files to be provided by the alignment team.



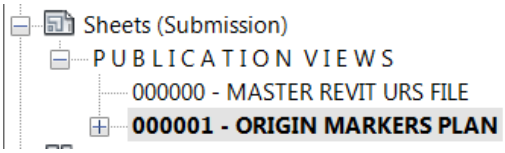
Survey point and Project origin coordinates

Coordinates of the survey point will vary from each station for example N6-2:
N: 1648333.710
E: 475051.742
Z: 3.956 m.



Position of the Survey and Project origin points in the master URS file

The coordinates' overview is placed in the file view 000001 – ORIGIN MARKERS PLAN:



View Orientation: True North

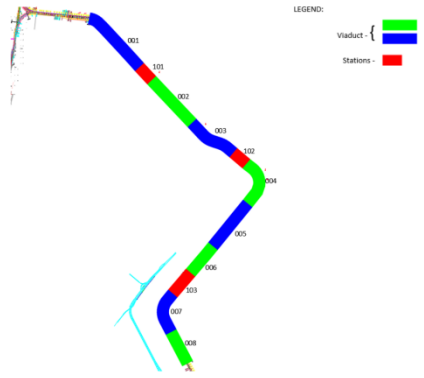
1.1.4 ASSET POSITIONING

The asset positioning shall be performed by linking the separate models into the master grid file, aligning them, and then publishing coordinates and saving position to the target files.

The master URS file contains the points acquired form the alignment files that defines the positions of each asset. Due to the design constrains and changes, the points are defined in x, y planes only, with design teams coordinating the elevations as required.

The list of origin base points is provided in the URS file as shown in the 0 List of facilities with base points northing and easting coordinates

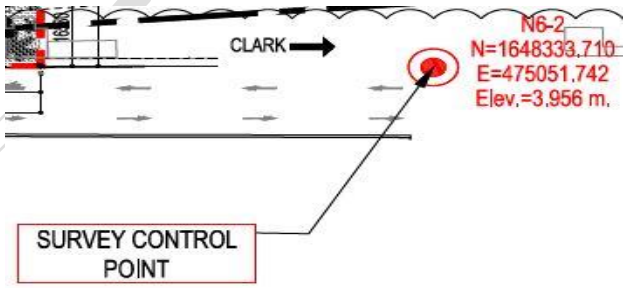
NSRP CPS02 Station Clusters			
Cluster Number	Name of Station	From Pier No.	To Pier No.
101	España Station	N= 1616333.86, E= 499245.51 | P-61	N= 1616108.70, E= 499455.17 | P-69
102	Santa Mesa	N= 1614865.22, E= 500858.84 | P-116	N= 1614679.83, E= 501076.61 | P-124
103	Paco Station	N= 1612805.84, E=500119.44 | P-169	N= 1612454.45, E= 499818.09 | P-182



NSRP-CPS02 Cluster Key Plan

Assets set up layout in Master URS file

Each asset coordinates are set up in such a way that the information is presented as a coordinate and dead text. This allows for quick checks during files setup for the intent vs. the actual state.



Asset Coordinates

MCRP-CPN01 Viaduct Clusters		
Cluster Number	From Northing, Easting | Pier No.	To Northing, Easting | Pier No.
001	N=1643392.40, E=479384.46 | PR7-120	N=1644205.81, E=478687.89 | P-27
002	N=1644205.81, E=478687.89 | P-27	N=1644895.23, E=478093.92 | P-50
003	N=1644895.23, E=478093.92 | P-50	N=1645633.91, E=477457.54 | P-75
004	N=1645633.91, E=477457.54 | P-75	N=1646376.87, E=476810.93 | P-100
005	N=1646376.87, E=476810.93 | P-100	N=1647069.96, E=476175.98 | P-124
006	N=1647069.96, E=476175.98 | P-124	N=1647897.76, E=475421.87 | P-154*
007	N=1648446.13, E=474906.62 | P-174	N=1649457.00, E=474682.83 | P-201
008	N=1649457.00, E=474682.83 | P-201	N=1650446.40, E=474579.92 | P-224
009	N=1650446.40, E=474579.92 | P-224	N= 1651323.80, E=474146.23| P-249
010	N= 1651323.80, E=474146.23| P-249	N=1652094.40, E=473509.19 | P-273
011	N=1652094.40, E=473509.19 | P-273	N=1652662.10, E=473058.34 | P-292**
012	N=1653021.88, E=472763.75 | P-304	N=1653630.12, E=471987.44 | P-330
013	N=1653630.12, E=471987.44 | P-330	N=1654133.06, E=471123.13 | P-355
014	N=1654133.06, E=471123.13 | P-355	N=1654708.86, E=470337.55 | P-380
015	N=1654708.86, E=470337.55 | P-380	N=1655534.97, E=469938.83 | P-407
016	N=1655534.97, E=469938.83 | P-407	N=1656542.41, E=469796.46 | P-428

List of facilities with base points northing and easting coordinates for the station and non- station

FACILITY	BASE POINT NORTHING	BASE POINT EASTING
STATION	1648333.71	475051.742

List of base points northing and easting coordinates for Linear facilities

1.2 REVIT PROJECT MARKERS

Every Revit file has a **project base point** and a **survey point**, although they might not be visible in all views, because of visibility settings and view clippings. They cannot be deleted.

The **project base point** defines the origin (0,0,0) of the project coordinate system. It also can be used to position the building on the site and for locating building elements during construction.

Spot coordinates and spot elevations that reference the project coordinate system can be displayed relative to this point.

The **survey point** represents a known point in the physical world, such as a geodetic survey marker. The survey point is used to correctly orient the building geometry in another coordinate system, such as the coordinate system used in a civil engineering application.

The project base point and the survey point can be (clipped) or (unclipped). By default, they are clipped in all views. To switch between the clipped and unclipped states, first click the point, and then the icon.

The following table describes how clipping and unclipping affects these points when you move them in a view.

Clipped	Unclipped
Project Base Point	
Moving a clipped project base point is the same as using the Relocate Project tool. See Relocating a Project. Project coordinates do not change for the model elements. Shared coordinates change for the model elements.	Moving an unclipped project base point repositions the project coordinate system relative to both the model geometry and shared coordinate system. Project coordinates change for the model elements. The shared coordinates of the project base point change in the shared coordinate system. (The project coordinates of the project base point never change.) Shared coordinates do not change for the model elements.
Project Survey Point	
Moving a clipped survey point repositions the shared coordinate system relative to the model geometry and the project coordinate system. Project coordinates do not change for the model elements. Shared coordinates change for the model elements.	Moving an unclipped survey point moves only the survey point relative to the shared coordinate and the project coordinate systems. Project coordinates do not change for the model elements. Shared coordinates do not change for the model elements. Only the shared coordinates of the survey point itself change.

2. Naming Convention

2.1 Family Naming Convention

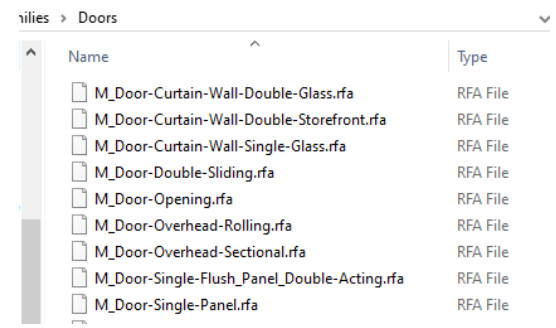
Elements provided by Autodesk Revit Library shall remain in their default family names. Model elements, downloaded, custom created or modified by the BIM Modeler, shall be utilizing the appropriate BIM authoring family template. This requires families to be delimited by an underscore and hyphen in the following format:

Family Name shall provide clear understanding such as functional type, sub type, manufacturer, or material type.

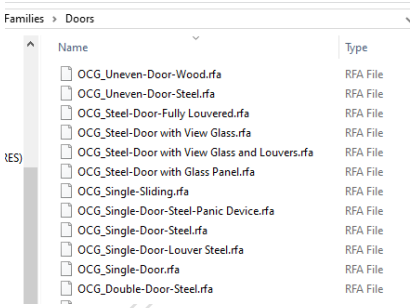
List of all family names are provided in separate reference files in the Appendix 6.

Originator	_	Additional 1 Type/Product (Mandatory)	-	Additional 2 Detail Description (Optional)
OCG	_	Downlight	-	Recessed Can
OCG	_	Double-Door	-	Steel
OCG	_	Louvers		

Sample Family Naming



Built-in Revit Families



Custom created Families

Family Naming Convention examples

Loadable families are families used to create the following:

- Building components that would usually be purchased, delivered, and installed in and around a building, such as windows, doors, casework, fixtures, furniture, and planting.
- System components that would usually be purchased, delivered, and installed in and around a building, such as boilers, water heaters, air handlers, and plumbing fixtures.
- Some annotation elements that are routinely customized, such as symbols and title blocks.

2.2 WORKSET NAMING CONVENTION

Worksets are used to be able to have a better control over model elements & also to separate elements which belong to different packages (e.g. the structural model contains different packages for substructure, piling a superstructure). Worksets prevent conflicts and errors between 2 or more users working on 1 Revit project (Central File) simultaneously.

Worksets should be named in a consistent and logical manner to aid navigation through the project.

Regarding to the as-built stage approval content inside submission will be given in a specific workset which named as per N as built submission package code of project.

System (Mandatory)	-	Sub System (Mandatory)	-	Location/Package number (Optional)	-	Descriptions (Optional)
VDT	-	FND	-		-	Viaduct foundations
VDT		PIR			-	Viaduct Piers
VDT		PIR-GRID			-	Viaduct Pier Grids
VDT		ISP			-	Viaduct Isospan

Workset Naming Convention examples specific for linear structures for Design stage

Subsystem (Optional)	-	Description (Not part of the name)
M-HVAC		Mechanical – HVAC
M-CHWP		Mechanical - Chilled Water
M-CHWP-Legacy		Mechanical - Chilled Water-Legacy
M-Equipment		Mechanical – Equipment
M-AHU		Mechanical – Air Handling Unit
M-Drainage		Mechanical - Drainage Work
M-Demolishing work		Mechanical - Demolishing Work
M-HVAC EXISTING		Mechanical – Existing Work
M-Valve Packages		Mechanical – Valve assembly package
E-Containment		Electrical – Containment
E-Earthing		Electrical – Earthing
E-Demolishing Containment		Electrical - Demolishing Containment
E-Demolishing ECS		Electrical - Demolishing ECS
E-Demolishing Fire Alarm/Emergency		Electrical - Demolishing Fire Alarm/Emergency
E-Demolishing Lighting		Electrical - Demolishing Lighting
E-Demolishing Small Power		Electrical - Demolishing Small Power

Subsystem (Optional)		Description (Not part of the name)
E-ECS		Electrical – Environmental Control System
E-ECS Containment		Electrical – Environmental Control System Containment
E-ECS Panel		Electrical – Environmental Control System Panel
E-Equipment		Electrical – Equipment
E-Existing Containment		Electrical – Existing Containment
E-Existing ECS		Electrical – Existing ECS
E-Existing Equipment		Electrical – Existing Equipment
E-Existing Fire Alarm		Electrical – Existing Fire Alarm
E-Existing Small Power		Electrical – Existing Small Power
E-Emergency Lighting		Electrical - Emergency Lighting
E-Fire Alarm		Electrical - Fire Alarm
E-Lighting		Electrical – Lighting
E-Power		Electrical – Power
E-DU containment		Electrical-DU containment
E-FOH Lighting Fixture		Electrical -FOH Lighting Fixture
E-Telecom Equipment		Electrical-Telecommunication Equipment
E-Telecommunication		E-Telecommunication Cable containment
P-Drainage		Plumbing – Drainage
P-Water		Plumbing - Water Supply
P-Gas		Plumbing – Gas
P-Existing		Plumbing – Existing
P-Equipment		Plumbing – Equipment
P-Demolishing work		Plumbing - Demolishing Work
F-Fire Protection		Fire Protection - Fire Protection

Subsystem (Optional)		Description (Not part of the name)
F-Fire Protection Dry		Fire Protection - Fire Protection Dry Extinguishers
F-Fire Protection Gas		Fire Protection - Fire Protection Clean Agent Gas
F-Fire Protection Sprinkler		Fire Protection - Fire Protection Sprinkler System
F-Fire Protection Standpipe		Fire Protection -Fire Protection Standpipe System
F-Fire Protection-Pump Room		Fire Protection - Fire Protection-Pump Room
F-Fire Protection-Legacy		Fire Protection - Fire Protection-Legacy
F-Demolishing		Fire Protection-Demolishing
F-Equipment		Fire Protection- Equipment

Discipline, System, Subsystem (Optional)	-	Additional Designation Description (Optional)	-	Description (Not part of the name)
A-Architecture				All Elements relating to Architecture
A-Demolition				All Elements to be demolished
A-Existing				Existing Elements
A-Scope Box				Scope boxes
A-Matchlines				Matchlines
A-ROOMS				Rooms
I-Interior Design				All Elements relating to Interior Design
A-Base Origin Marker				Base Origin Marker
PH_FHC				Placeholder for Hire Hose Cabinet
PH_MEP				Placeholder for MEP Elements
PH_PSD				Placeholder for PSD Elements
PH_Structure_Viaducts				Placeholder for Viaducts
PH_CW_T				Placeholder for Curtain wall

Discipline, System, Subsystem (Optional)		Additional Designation Description (Optional)	-	Description (Not part of the name)
PH_CW_M+G				Placeholder for Curtain wall
PH_TVS				Placeholder for TVS Elements
PH_Option 'xxx'				Placeholder for any options. Used in Expo Cladding
PH_Third Party				Placeholder for Third Party elements. Used in NSS
A-B.O.H-CEL		Fixation		Construction model for the ceiling fixation
A-F.O.H-FLO				Construction model for the F.O.H Flooring
A-GLA				Construction model for the external glazing
Workset1				Built-in Revit workset

Workset Naming Convention for station and other facilities examples for all stages

CDRL Package No.	-	CDRL Package Description, CamelCase no spaces (Optional)	-	Additional Designation Description (Optional)
11.2.1	-	R73-RetainingWalls		
11.3.1	-	R73-TopSlabDesign		
11.3.2	-	R73-BottomSlabDesign		
11.3.4	-	R73-Columns,StructuralWalls		

Workset Naming Convention examples specific for structural models - station and facility (Design Stage)

NSCR Package No.	-	Additional Designation Description (Optional)
CPN01-ST-VIA-SUP-02		
CPN02-ST-VIA-SUP-04		
CPN03-ST-VIA-SUB-02		
CPN04-ST-VIA-SUB-03		
CPN05-ST-R70-CON-26		
CPN05-ST-NCC-GEN-53		

Workset Naming Convention examples specific for STR As-built stage

Worksets with a '+' at the start of the name should be closed when the host model is linked into other models (note - Adding a '+' to the beginning of the workset name places the worksets at the top of the work set dialogue box for ease of identification and use)

Placing each Revit link on its own workset also assists with day to day working and model load performance as the links to be loaded during opening can be specified before Revit opens the model.

Workset Name	Description
+Link CAD	Linked CAD Files
+Link 'Model Name'	Linked Model
+Levels and Grids	Levels and Grids

Special Workset Naming Convention

For construction & As-built stage it will be one workset for all linked Models

Workset Name	Description
+Link CAD	Linked CAD Files
+Link Models	Linked Models
+Levels and Grids	Levels and Grids

Special Workset Naming Convention for Construction and As-built

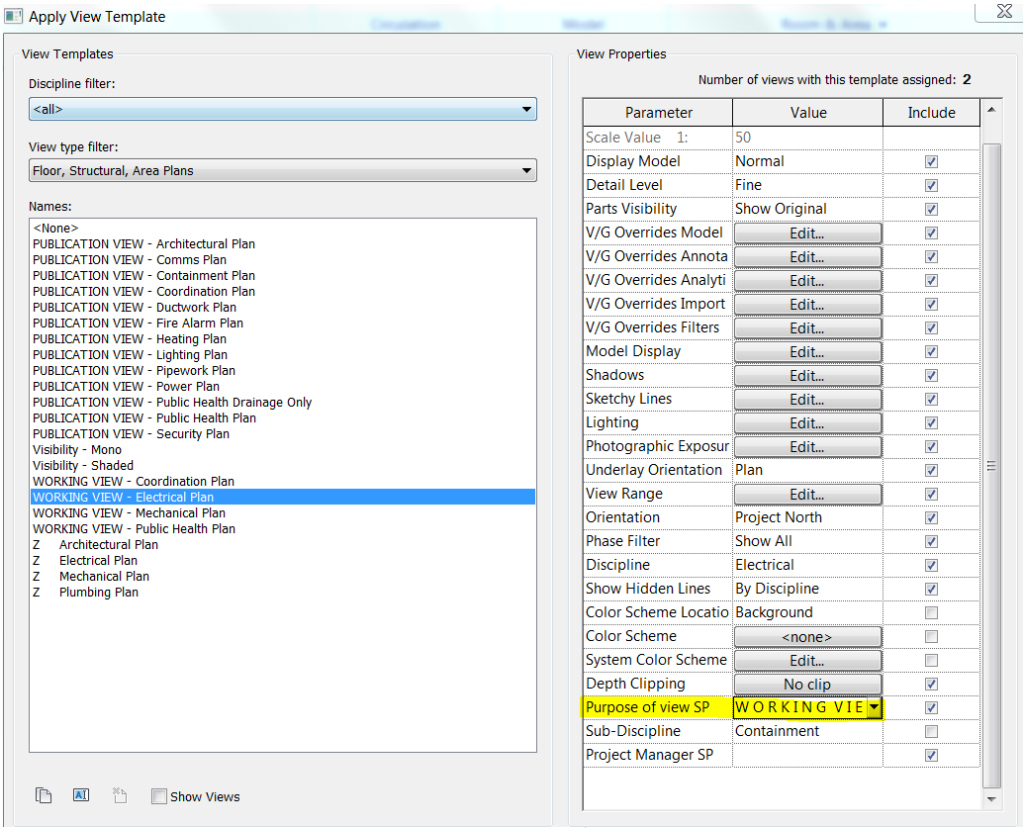
2.3 VIEWS TYPE AND NAMING CONVENTION

Conventions in the naming and use of views are necessary to coordinate team activity and prevent inadvertent changes in the output documents.

2.3.1 WORKING VIEW AND PUBLICATION VIEW

In order to distinguish views used for modeling and drafting, user shall select 'Purpose of View SP' in View Properties and to be used with the following key principles:

- All modeling to be carried out within **W O R K I N G V I E W S**
- All project delivery sheets (drawings) to be created from **P U B L I C A T I O N V I E W S**
- All views are controlled with predefined view template settings containing associated filter data sets
- All project annotation to be created within **P U B L I C A T I O N V I E W S**
- Annotation based on the True Type font Arial with preset standard heights, as required by CAD standard file.



Revit working View and Publication View

2.3.2 VIEW NAMING

This standard is limited to draughting views and sheet views (although the Project Browser includes other kinds of elements

Level Or Area (Mandatory*)	-	Description (Optional)
L00	-	General Arrangement
T01	-	
L02	-	Mechanical Duct Layout

View Naming Convention

(*) – the field is mandatory for applicable view types (i.e. floor plans, layouts). In case of section, the level field is not applicable

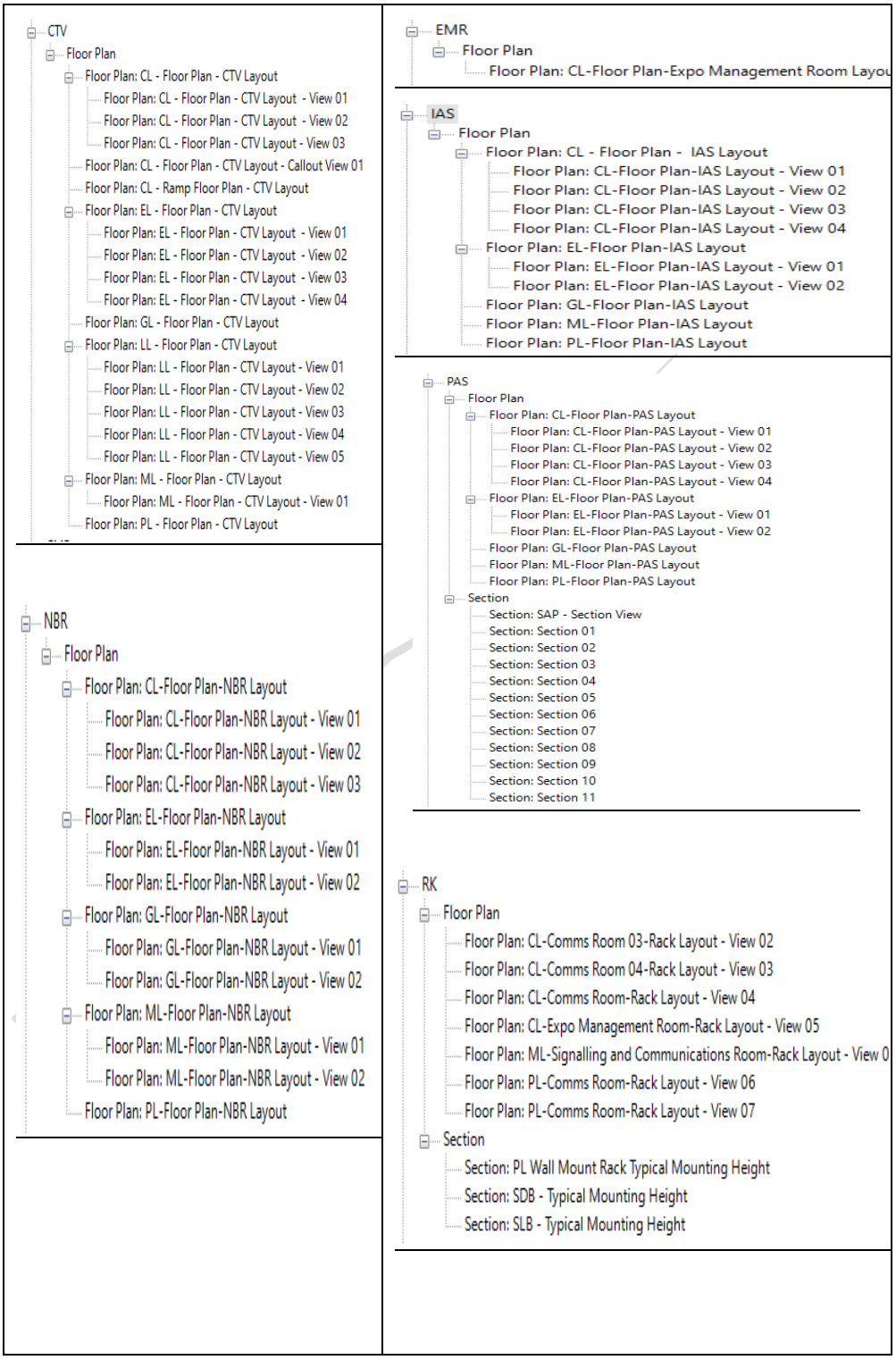
ZONE INFORMATION (Mandatory*)	-	RPN INFORMATION (Optional)
ZONE 1A	_	RPN 977C-3
ZONE 1A	_	RPN 977D-1

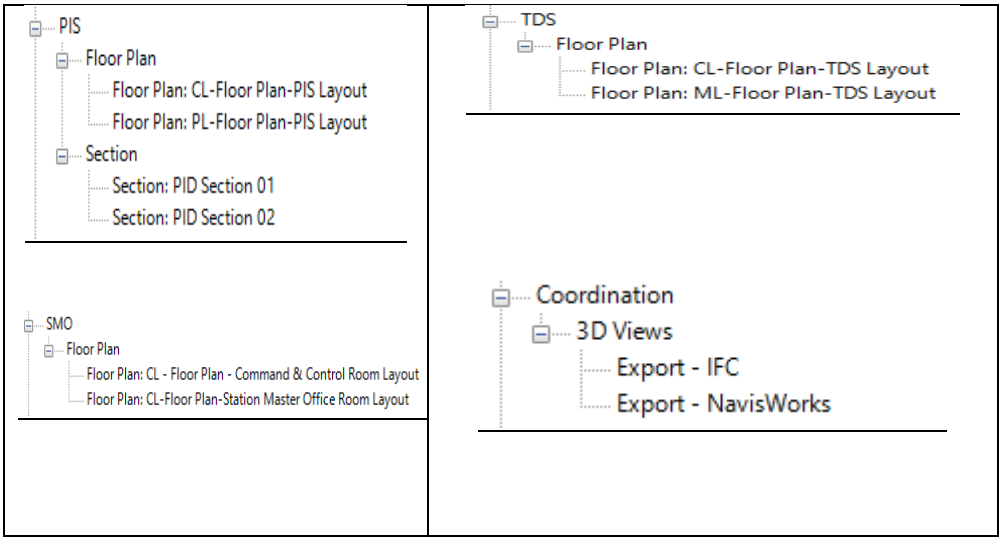
View Naming Convention- Linear Structures As-Built

- RSY VIEW NAMING

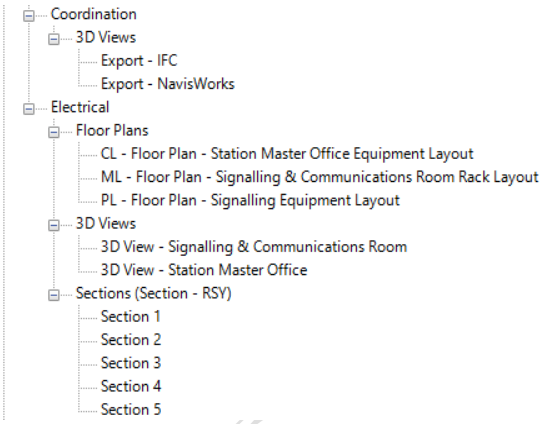
Rail systems view naming convention

- **COMMUNICATION EQUIPMENT:**

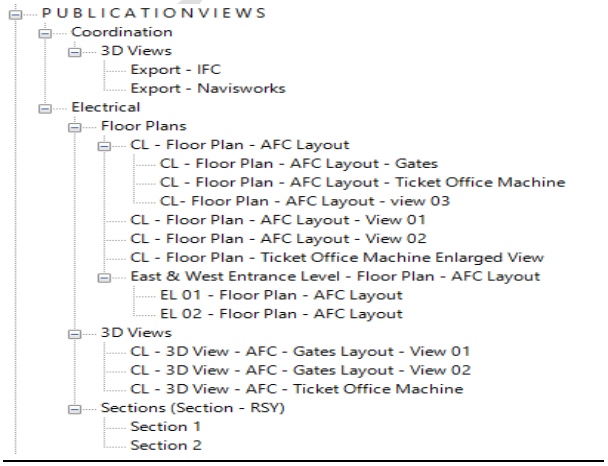




- **AUTOMATIC TRAIN CONTROL ATC:**

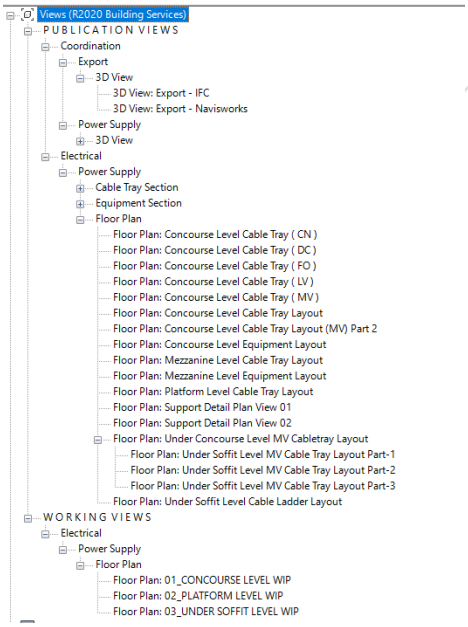


- **AUTOMATIC FAIR COLLECTION AFC:**

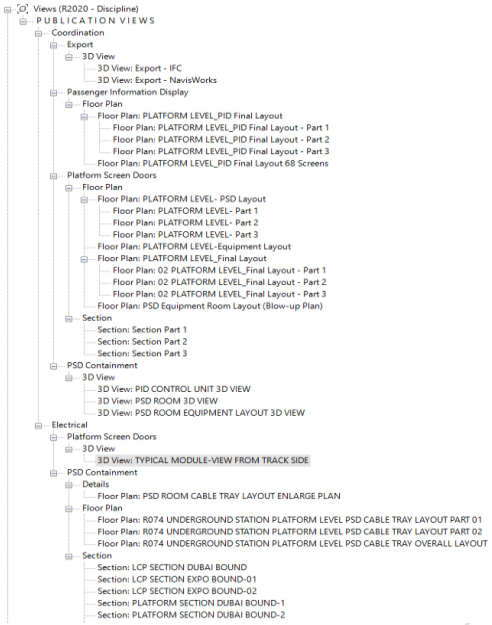


- **OPERATION CONTROL SYSTEM OCS:**

- **POWER DISTRIBUTION SYSTEM PDS:**



- **PLATFORM SCREEN DOOR PSD:**



2.3.3 SCHEDULE VIEWS NAMING

The schedules are developed as the project progresses, however the baseline naming and most common schedule types are shown below:

SCHEDULE - AREA (COST ESTIMATING) SCHEDULE - AREA (GROSS BUILDING) SCHEDULE - AREA (GROSS INTERNAL AREA) SCHEDULE - AREAS - (RENTABLE) SCHEDULE - COBIE2-COMPONENT SCHEDULE - COBIE2-COMPONENT-DOOR SCHEDULE - COBIE2-COMPONENT-WINDOW SCHEDULE - COBIE2-COMPONENTSTOSCHEDULE SCHEDULE - COBIE2-SPACE SCHEDULE - COBIE2-SYSTEM SCHEDULE - COBIE2-TYPE SCHEDULE - COBIE2-ZONE SCHEDULE - DOORS SCHEDULE - DOORS - ALUMINIUM SCHEDULE - DOORS - EXTENDED SCHEDULE - DOORS - STEEL SCHEDULE - DOORS - TIMBER SCHEDULE - ROOM AREAS SCHEDULE - ROOMS SCHEDULE - WALLS SCHEDULE - WINDOWS SCHEDULE - WINDOWS - ALUMINIUM SCHEDULE - WINDOWS - EXTENDED SCHEDULE - WINDOWS - STEEL **SCHEDULE - WINDOWS - TIMBER**	LIST - SHEETS - CURRENT REVISION LIST - SHEETS - FOR DRAWING LIST - SHEETS - LAST ISSUED REVISION LIST - SHEETS - SKETCHES SCHEDULE - COLUMN TYPES SCHEDULE - CONCRETE BEAMS SCHEDULE - FOUNDATION TYPES SCHEDULE - FOUNDATIONS SCHEDULE - LEVELS SCHEDULE - LINK BEAMS SCHEDULE - METAL DECK SLAB TYPES SCHEDULE - PILES - EURO CODES SCHEDULE - PILES - Old Version SCHEDULE - PILES - TOTALS SCHEDULE - PLUNGE COLUMNS SCHEDULE - SITE BOREHOLES SCHEDULE - SITE SURVEY POINTS SCHEDULE - SITE TRIAL PITS SCHEDULE - SLAB JOINT TYPES SCHEDULE - STEEL BEAM OPENINGS	_SAMPLE_SHEET_SCHEDULE LIST - SHEETS - CURRENTREVISION LIST - SHEETS - ISSUED LIST - SHEETS - PURPOSE AND PACKAGE LIST - SHEETS - TITLEBLOCK DATA LIST - VIEWS SCHEDULE - ELECTRICAL - LUMINAIRES SCHEDULE - ELECTRICAL CIRCUITS SCHEDULE - ELECTRICAL EQUIPMENT SCHEDULE - LINKED MODELS SCHEDULE - MECHANICAL - AIR TERMINALS SCHEDULE - MECHANICAL - FANS SCHEDULE - MECHANICAL - PUMPS SCHEDULE - MECHANICAL AIR HANDLING UNITS SCHEDULE - MECHANICAL EQUIPMENT SCHEDULE - SPACES SCHEDULE - UNICLASS DUCT SYSTEMS SCHEDULE - UNICLASS PIPE SYSTEMS SCHEDULE - UNICLASS PRODUCTS	**SCHEDULE - BEARING** SCHEDULE - PIER SCHEDULE - PIER CAP & PORTAL BEAM SCHEDULE - PILE SCHEDULE - PILE CAP SCHEDULE - STATION VIADUCTS
Architectural schedules samples	Structural schedules samples	MEP schedules samples	Viaduct validation schedules samples

And regarding to RSY scope please refer to the below (Examples):

RSY COM EQUIPMENT

- SCHEDULE - CTV - ALL LEVELS SECURITY DEVICE REF
- SCHEDULE - ELECTRICAL EQUIPMENT
- SCHEDULE - IAS - INTRUSION ALARM SYSTEM
- SCHEDULE - LOI - CTV SECURITY DEVICE
- SCHEDULE - LOI - ELECTRICAL EQUIPMENT
- SCHEDULE - LOI - IAS SECURITY DEVICE
- SCHEDULE - LOI - NBR EQUIPMENT
- SCHEDULE - LOI - PAS EQUIPMENT
- SCHEDULE - LOI - PIS EQUIPMENT
- SCHEDULE - LOI - RK EQUIPMENT
- SCHEDULE - LOI - TDS EQUIPMENT
- SCHEDULE - LOI - TEB EQUIPMENT
- SCHEDULE - MMS
- SCHEDULE - NBR EQUIPMENT
- SCHEDULE - PASSENGER INFORMATION SYSTEM EQUIPMENT
- **SCHEDULE - PUBLIC ADDRESS SYSTEM**
- SCHEDULE - STATION MASTER OFFICE EQUIPMENT
- SCHEDULE - TDS EQUIPMENT REF
- SCHEDULE - TELEPHONE & EMERGENCY CALL BOX EQUIPMENT
- SCHEDULE - TELEPHONE EQUIPMENT REF
- SCHEDULE - TIME DISTRIBUTION SYSTEM EQUIPMENT

RSY COM CABLE TRAY

- SCHEDULE - Cable Tray
- SCHEDULE - Cable Trunking
- SCHEDULE - Clash Group
- SCHEDULE - Conduits
- SCHEDULE - LOI Generic
- SCHEDULE - LOI Technical Information
- SCHEDULE - Support

RSY POWER DISTRIBUTION SYSTEM

- SCHEDULE - CABLE TRAY LIST
- SCHEDULE - EQUIPMENT
- SCHEDULE - EQUIPMENT1
- SCHEDULE - LOI GENERIC
- SCHEDULE - LOI TECHNICAL INFORMATION
- SCHEDULE - MMS
- SCHEDULE - SUPPORT

RSY OCS, SIG, AFC

- SCHEDULE - ELECTRICAL EQUIPMENT
- SCHEDULE - LOI - TECHINCAL INFORMATION
- SCHEDULE - LOI - GENERIC INFORMATION
- SCHEDULE - MMS

RSY PLATFORM SCREEN DOORS

- SCHEDULE - Cable Tray
- SCHEDULE - Equipment
- SCHEDULE - LOI - Generic
- SCHEDULE - LOI - Technical Information
- SCHEDULE - MMS Parameters

- Regards the construction and as built stages, technical information schedules to be created as per the assigned minimum level of information defined in the LOD/LOI matrix, for the purpose of information verification by the BIM teams that all the required information exists in the models & the design teams to ensure the information is filled as per the actual values as per the approved material submittals.
- For LOI value check for different categories, it is advised to use Revit live schedules to be populated as per category instead of multi category schedules for Revit users. Since required parameter sets are different per category, in multi category schedule views if designated parameters is not in LOI parameter list of any category; value field for this parameter will appear empty in multi category schedule for this category, which is normally expected.

2.4 GROUP NAMING

As the groups are developed for different reasons and are used mostly to enhance and speed up project development process. Since the groups are not visible in the model renditions (. nwc and .ifc files), the naming convention requires only to have a clear description of the group contents/function in the CamelCase format. Samples below:

Typical Furniture
Diffuser_Layout_Concourse
Wall_Sockets_Entry_Wall etc…

2.5 SHEET NAMING

Sheet naming shall be in accordance with the latest document naming and codification convention.

Drawing Number (FULL) (Mandatory)	-	Description (Mandatory)
NSCR-GCR-N01-CLPSTN-DWG-A-000001	-	CALUMPIT STATION STRUCTURES LOCATION PLAN AND SETTING OUT

Sheet View Naming Convention

NOTE: This naming will have impact on the available free space for annotation, so precaution is advised.

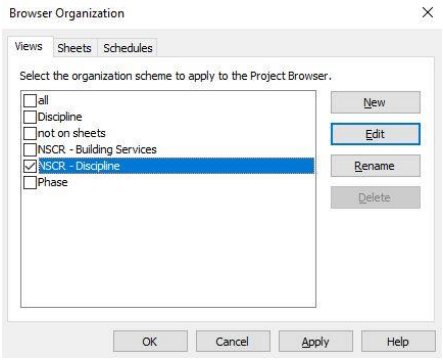
Drawing Number (Mandatory)	-	Description (Mandatory- Full)
000001	-	NSCR-GCR-N01-CLPSTN-DWG-A-000001-STATION AS-BUILT DRAWING LIST & REFER. MODEL LIST GEN. ARRANGEMENT - CPN01

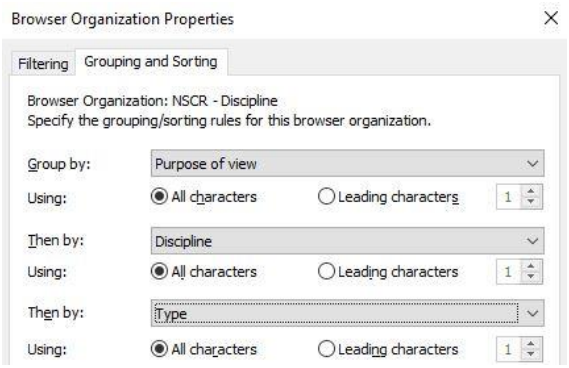
Sheet View Naming Convention- Stations – As Built

In as built stage drawing number will be kept as numeric code only, complete sheet number and title will be integrated to the sheet name parameter

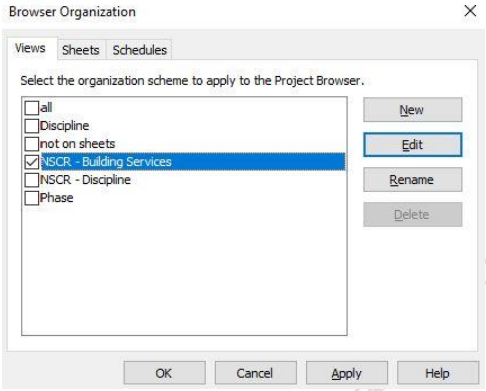
2.6 PROJECT BROWSER

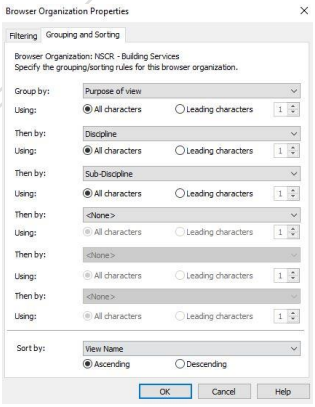
The preset project browser is named “NSCR – Discipline” which is grouped by shared parameter “Purpose of view SP”, then by Discipline, then finally by Family and





For MEP, project browser is named “NSCR – Building Services” which is grouped by shared parameter “Purpose of view SP”, then by Discipline followed by Sub-Discipline, then finally by Family and Type.





Users are encouraged to maintain this browser organization as the base minimum amongst project teams, with further named organizer filters added as needed. This will promote a more cohesive model environment to navigate when sharing of the model files.

2.7 STARTING VIEWS / SPLASH VIEWS

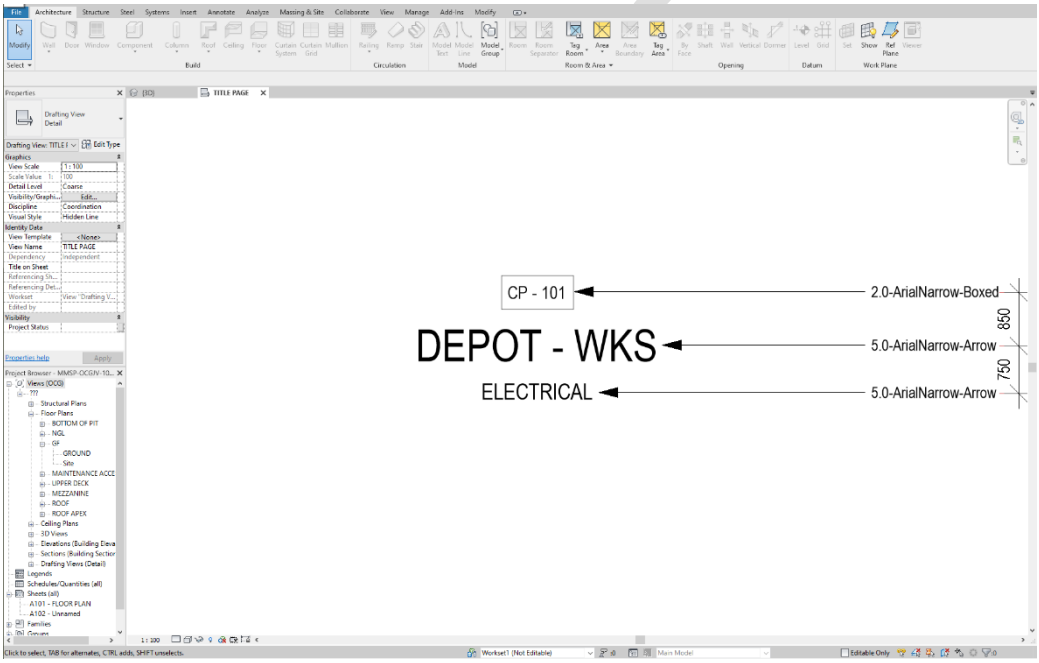
The Splash View page shall be set as the default opening view for all 3D model files. This page contains basic information about the:

- Contract Package
- Building Name
- Discipline

Project Splash Screen Layout for Design stage & As-built - Sample

M3D Reference Statistic List			
No.	Model Number	Model Title	Rev.

DCP/DPReference Statistic List			
No.	Model Number	Model Title	Rev.



Project Splash Screen Layout for Construction

Project Submission Cover Sheet Layout - Sample

3. Model Practices

This chapter is describing the common best practices to be followed, in order to maintain the models healthy and light.

When modelled with Revit all inserted 3D elements shall be part of a category. In order to meet EIR, each modeler shall develop model using Revit System family, and shall minimize to use following families:

- Mass/Site Family: Not To Use - these families are not translated into IFC file format
- Generic Model : Attributes are required per Data Drop definition
- In-Place Family : Proper family type and attributes are required.

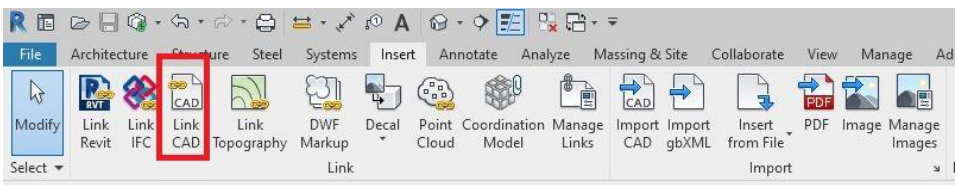
If the above family types are required to facilitate the modeling process, coordinate with BIM Manager before use in order to obtain exception case from Client with justification.

3.1 Inserted CAD Files and Images

CAD files shall always be linked in the document, instead of imported. Embedded CAD can be easily lost in the views. Even after deletion the CAD file will leave data inside model that is very hard to delete, like line weights and other things. Make “Current view only” box is checked when linking a CAD file.

When imported into the model, an image will maintain its original size even if it is scaled down in the view. Only the images necessary shall be kept in the model and the rest to be delete using the manage images tab.

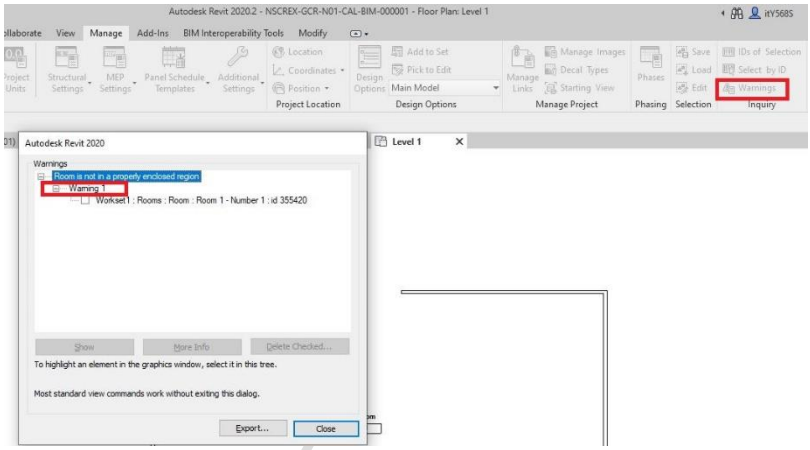
3.2 Over-Complicated Components



Revit can model many complicated things and make them parametric (changeable). Items that come from Revit City or manufacturers, are typically modelled with a lot of detail. If the detail of a family in a specific view needs enhancement it is a good practice to use model lines or detail components instead of modelling that detail enhancement as 3D geometry.

3.3 Warnings

Model shall be checked for warnings on regular basis and prior to submission. If left unchecked for too long, it can amass 700, 800 or even 1000 warnings—which significantly slows the model performance, because it keeps looking to see if the "problems" have been fixed. Take a moment to check how many you have in the model and the "quality" of those warnings. The most common, benign and easiest to fix are warnings about room separation lines overlapping each other or walls and warnings saying that two items have the same type mark. More complicated warnings like ramp slope and stair riser warnings should get reviewed right away, since they require more complex calculations and can have a bigger impact on performance.



3.4 Unused View and Section Views

An excessive amount of views—especially 3D perspective or isometric views—can weigh a model down. Once one is done using the section cut to quickly check something, one is to make sure to delete it. Other option is to use one section for all check views.

The philosophy of "name it or delete it" when it comes to views is recommended in order to keep the model in check.

Section views' view depth should be kept at the lowest necessary value, usually beyond the first wall or other view barrier, since it consumes memory and time every time the view is open.

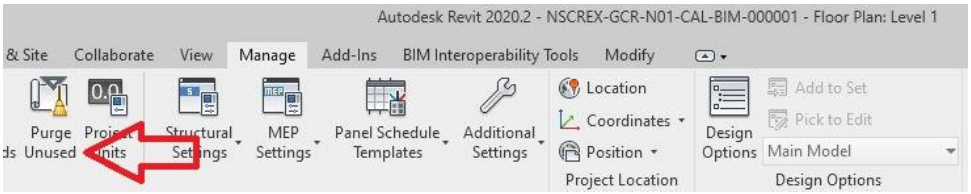
3.5 Large or complicated sketch-based items

Roofs, floors, ceilings, filled regions, ramps, stairs and any other item that is used to create through sketch mode. Complicated sketches using a lot of splines require Revit to process more information.

3.6 Unused Families

The families are kept outside of the model in a separate location. Keeping a small collection of items for everyday work is allowed but keeping every piece of casework you loaded just in case you need it someday is not. If a component you need accidentally gets purged, it can always be

loaded back in. The purge unused procedure is to be performed once a week and prior to submission.



3.7 Unnecessary locking of Elements

When you create important things like grids or levels, the tendency is to want to lock them (locked dimensions, do not confuse with pinning). Locking components to other components causes Revit to review the locked relationship every time one of the items locked is modified. Try using locks only when building families in the family editor.

3.8 Groups

Groups are to be used sparingly and with good reason. If it seems like group could be made into a loadable family, it probably should be. Also, be wary of the types of components you're grouping together. Wall hosted items like doors can have issues when they're grouped away from their host (the wall), or in with non-wall hosted items like sinks or casework. Avoid using groups as much as possible.

If you really need to group some elements of your model be aware that once grouped, all the elements that are part of that group will belong to whatever workset you had active at the time you created the group. And once ungrouped, all those elements will still belong to that workset, so if you grouped elements that originally belonged to different worksets and you ungrouped them after, you'll have to manually reselect those elements and change their worksets to the original worksets where they belonged. For size management of the file it is also a good practice to create a workset specifically for groups and place all the groups inside that workset.

3.9 In-place Families

Modelling in an outside family is easier than using the family editor inside a project. Also, when an in-place family is copied, another family is created. Only use an in-place family if it's something that can't be modelled outside of the project in the family editor.

3.10 Design Options

Once you are done using a design option, delete it. When there is a large amount of design options in the model, Revit has to think about how each option influences the objects around it. The more you have, the more thinking that occurs and the slower your model.

3.11 Auditing once or twice a week and compacting the file at the end of the day

Checking this box will give you a warning that it will take a long time. However, I've never seen it take much longer than the usual load time. If you are ever having issues with your file crashing or behaving strangely, try auditing it and see if that helps. Often it will.

Compacting the file isn't much slower normal save to central and can help keep the file trim and efficient.

3.12 Overwriting the model with a fresh copy

This should be done by an experienced Revit user on an as needed basis. It will help clean up older back up and temp files, which will make the file size smaller. If the file is too slow even with all these best practices followed, ask your BIM Coordinator or BIM Manager to create a fresh file for you.

3.13 In case the file is still too big

- Open the file with the Audit option selected.
- On the File menu, click Purge Unused.
- In the Purge Unused dialog box, delete all the definitions not required for your projects.
- On the File menu, click Manage Links.
- In the Manage Links dialog box, remove all the CAD, Revit and DWF files not required for your project.
- Go to Ribbon > Insert > Manage Images
- In the Manage Images dialog box, remove all raster images not required for your project.
- Save the project with a different name, so the file database can be recompiled.

Solution source: Autodesk Knowledge Network

3.14 VIEW TEMPLATES

It is highly advisable to use the view templates as much as possible in the modelling and documentation creation process on the project.

Below are the sample lists of view templates used on the project per discipline.

3.14.1 ARCHITECTURE VIEW TEMPLATES

ViewTemplateName
ARC_AcousticStrategy_Plan
ARC_Detail_View
ARC_Dimension_Plan
ARC_Elevation
ARC_Fire_Strategy_Plan
ARC_GA_Plan
ARC_Reflected_Ceiling_Plan
ARC_Section
ARC_Site_Plan
ARC_Site_Section
CSR_Export_Plan

CSR_WIP_Plan
CSR_WIP_Section
FRS_Export_Plan
FRS_WIP_Plan
SEM_Plan

3.14.2 STRUCTURAL VIEW TEMPLATES

View Template Name
Analytical Off
Analytical On
AutoCAD Colours - Temporary Use Only
Coordination - Plan View
Coordination - Section-Detail-Elevation Views
Demolition Phase Plan 1 to 100
Demolition Phase Plan 1 to 50
Demolition Phase Section 1 to 10
Demolition Phase Section 1 to 100
Demolition Phase Section 1 to 20
Demolition Phase Section 1 to 50
Existing Phase Plan 1 to 100
Existing Phase Plan 1 to 50
Existing Phase Section 1 to 10
Existing Phase Section 1 to 100
Existing Phase Section 1 to 20
Existing Phase Section 1 to 50

View Template Name
Fire Protection Plan
Legacy - Structural Framing Plan
Modelling Marks - Hide
Modelling Marks - Show
Structural Analytical Stick
Structural Building Elevation
Structural Core Wall Elevation
Structural Core Wall Key Plan
Structural Detail 1 to 10
Structural Detail 1 to 100
Structural Detail 1 to 20
Structural Detail 1 to 50
Structural Drafting View
Structural Forces Plan
Structural Foundation Plan
Structural Framing Elevation
Structural Framing Elevation - Secondary Steelwork
Structural Framing Plan (Working)
Structural Framing Plan 1 to 100 - Coarse Detail Level (Documentation)
Structural Framing Plan 1 to 100 - Coarse Detail Level with Site Basepoints
Structural Framing Plan 1 to 100 - Fine Detail Level (Documentation)

View Template Name
Structural Framing Plan 1 to 100 - Fine Detail Level with Site Basepoints
Structural Framing Plan 1 to 100 - Secondary Steelwork - Fine Detail Level (Documentation)
Structural Framing Plan 1 to 50 - Fine Detail Level (Documentation)
Structural Loading Plan
Structural Pilecap Detail 1 to 20
Structural Pilecap Plan
Structural Piling Plan
Structural Reinf Req - Core Wall Plan - 1 to 50
Structural Reinf Req - Slab Plan - 1 to 100
Structural Section 1 to 10
Structural Section 1 to 100
Structural Section 1 to 20
Structural Section 1 to 50
Temp - Coordination Discipline
Temp - Detail Level - Coarse
Temp - Detail Level - Fine
Temp - Detail Level - Medium
Temp - Phase - Demolition
Temp - Phase - Existing
Temp - Remove Filters
Temp - View All
Temp - View Range Extended

3.13.3 MEP VIEW TEMPLATES

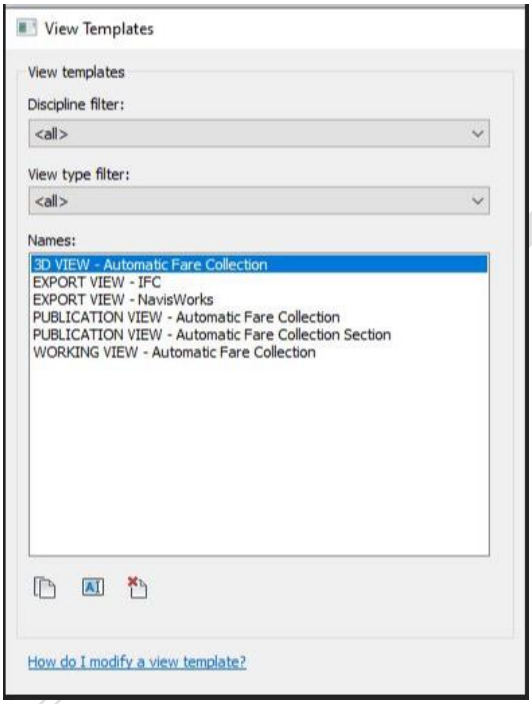
View Template Name
00 Manage_GridCopyMonitor
00 Manage_LevelCopyMonitor
00 Manage_ScopeBoxes
00 Manage_SitePlanProjectNorth
00 Manage_SitePlanTrueNorth
01 WIP_Colour
01 WIP_ColourShaded
01 WIP_ColourSolid
02 Review_CombinedServices
02 Review_Electrical
02 Review_Fire
02 Review_Mechanical
02 Review_PublicHealth
03 Document_ChilledWater
03 Document_CombinedServices
03 Document_CombinedServicesSection
03 Document_Comms
03 Document_Containment
03 Document_CoolingPhilosophy
03 Document_DomesticWater
03 Document_FireAlarm
03 Document_FireProtection
03 Document_Gas

View Template Name
03 Document_Heating
03 Document_HeatingPhilosophy
03 Document_Lighting
03 Document_LightingControlPhilosophy
03 Document_LightningProtection
03 Document_MedicalGas
03 Document_MEPDistribution
03 Document_NurseCall
03 Document_Oil
03 Document_PneumaticTube
03 Document_Power
03 Document_PublicHealth
03 Document_Rainwater
03 Document_Security
03 Document_SmokeExtract
03 Document_Steam
03 Document_Ventilation
03 Document_Ventilation Philosophy
03 Document_ChilledWater (Key Plan)
03 Document_Ventilation (Key Plan)
03 Document_Drafting view (Scale X/XX)
03 Document_Drainage
03 Document_Drainage (Key Plan)
03 Document_Water Supply

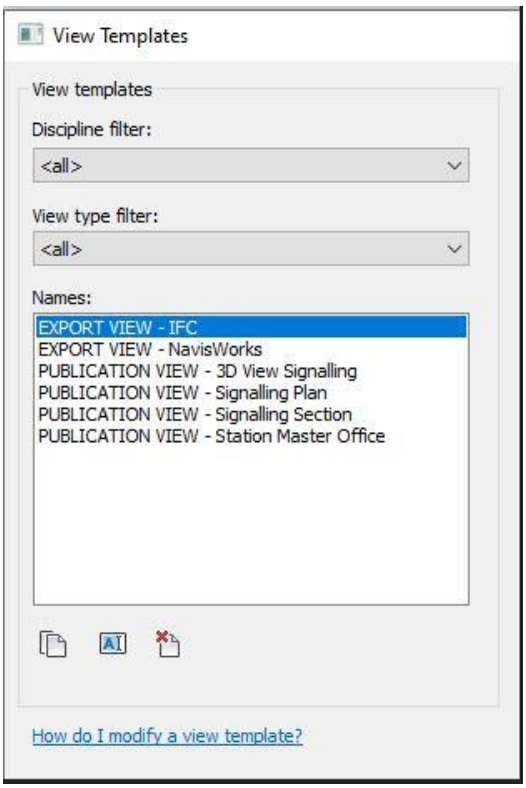
View Template Name
03 Document_ Water Supply (Key Plan)
03 Document_Electrical Containment
03 Document_Electrical Containment (Key Plan)
03 Document_Fire Alarm
03 Document_ Fire Alarm (Key Plan)
03 Document_ECS
03 Document_ECS_Demolition
03 Document_ ECS (Key Plan)
03 Document_Legend (Scale X/XX)
03 Document_Section (Scale X/XX)
03 Document_Fire protection (Key Plan)
03_Document_Small Power_Demolition
03_Document_Small Power_New Built
03_Document_Electrical_Containment_Demolition
03_Document_Containment_New Built
03_Document_Lighting_Demolition
03_Document_Lighting_New Built
03_Document_FireAlarm & Emergency Lighting_Demolition
03_Document_Fire Alarm & Emergency Lighting_New Built
03 Document_PublicHealth_ Demolition
03 Document_PublicHealth_ New Built
03 Document_FireProtection_Demolition
03 Document_FireProtection_ New Built
03 Document_ChilledWater_Demolition

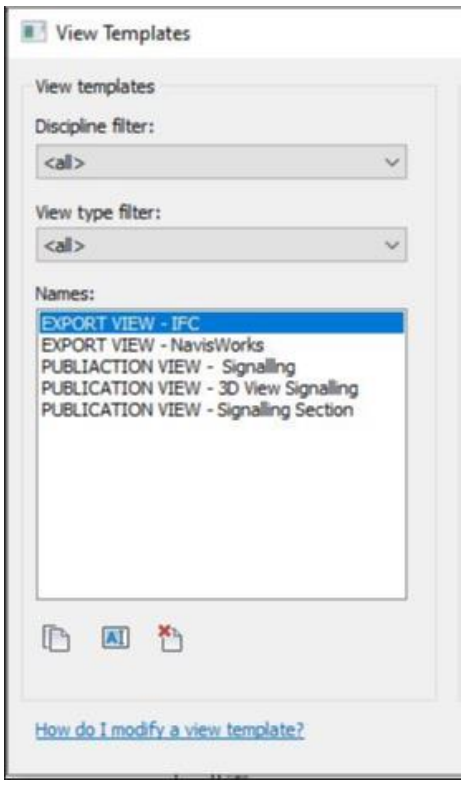
View Template Name
03 Document_ChilledWater_ New Built
03 Document_Ventilation_Demolition
03 Document_Ventilation_ New Built

3.13.4 AFC VIEW TEMPLATES

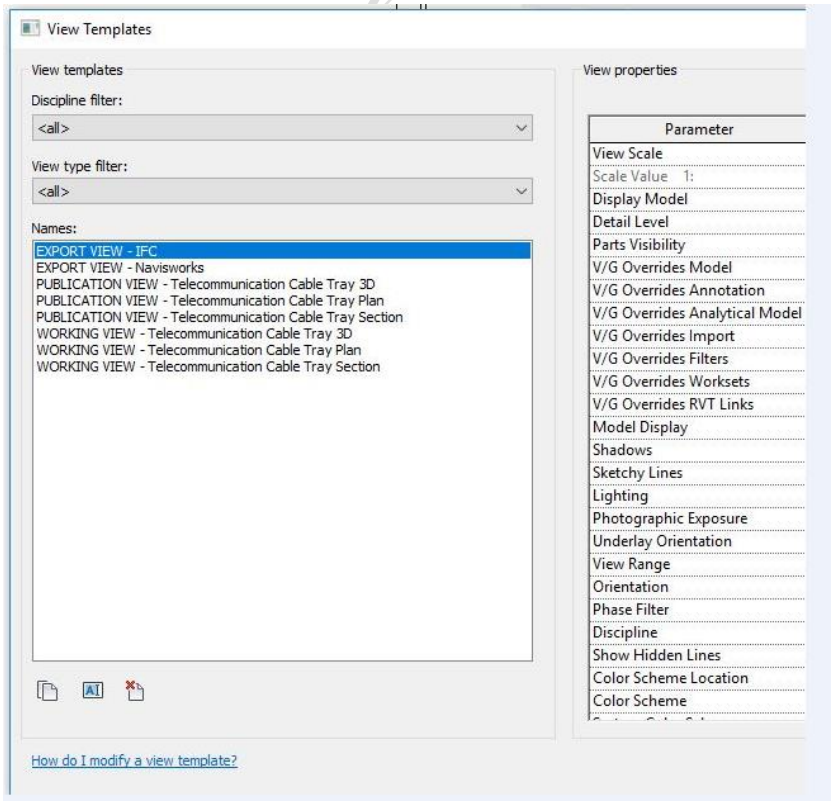


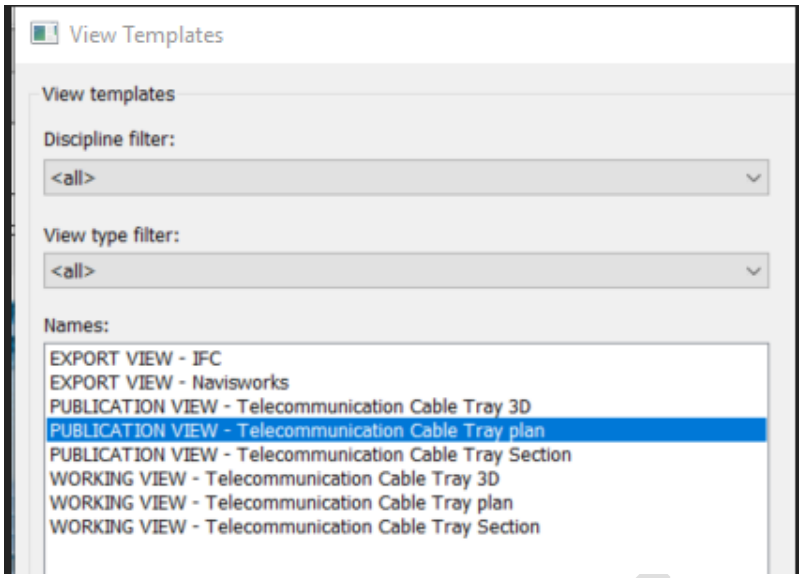
3.13.5 ATC VIEW TEMPLATES (station & wayside)



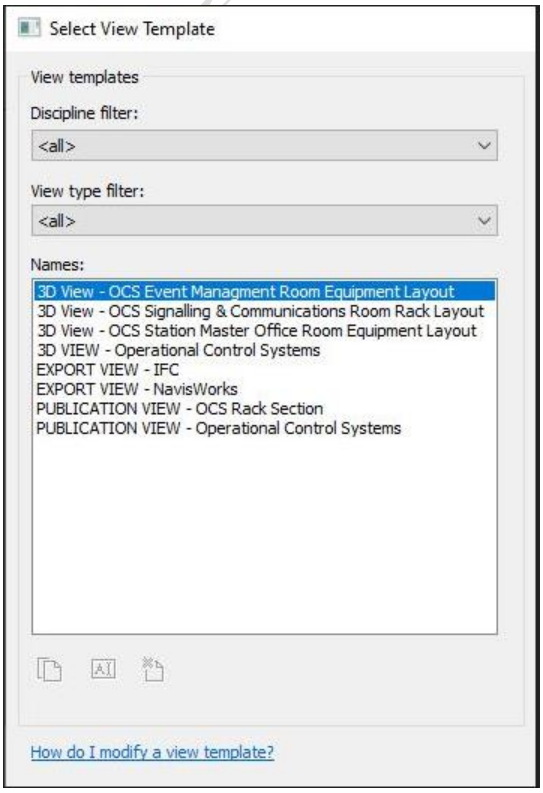


3.13.6 COM cable tray VIEW TEMPLATES (station & wayside)

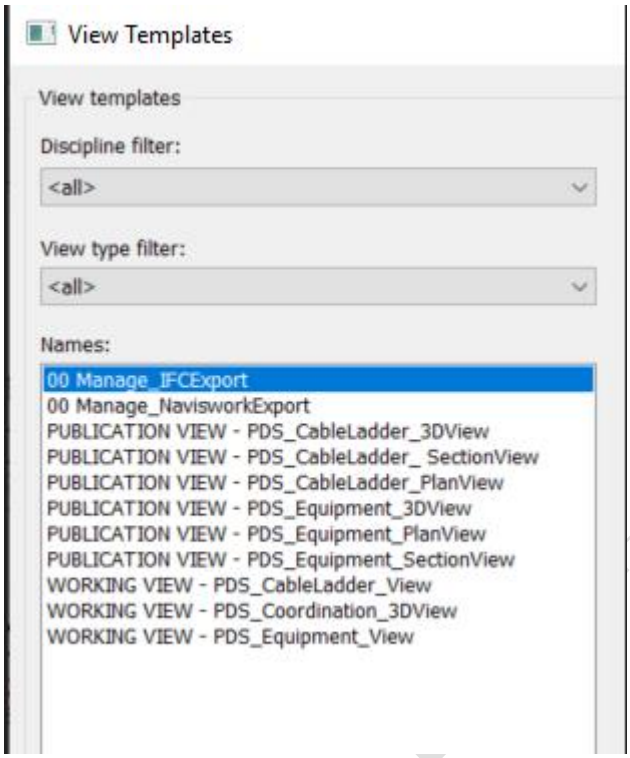


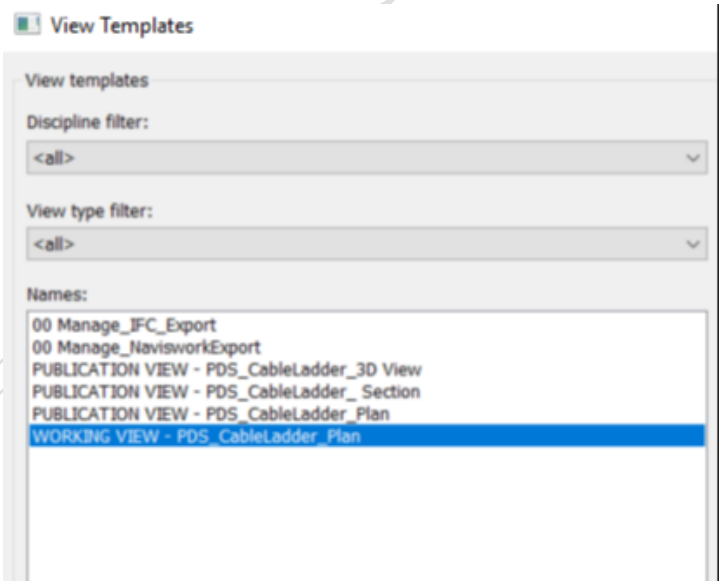


3.13.7 OCS VIEW TEMPLATES

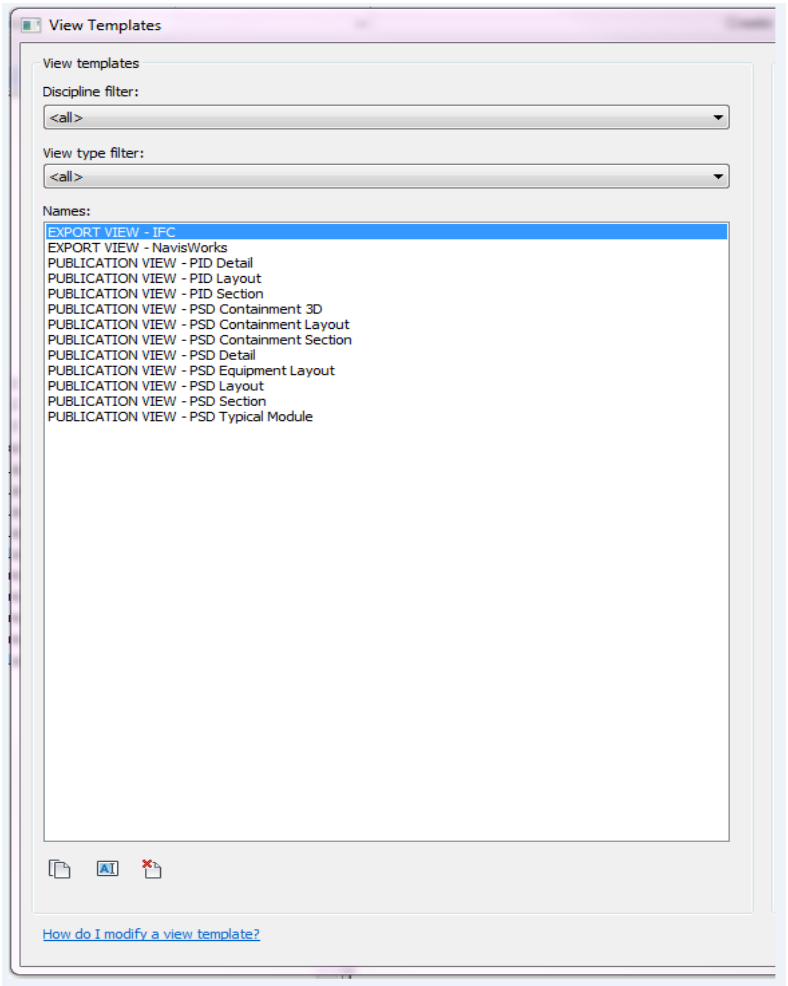


3.13.8 PDS VIEW TEMPLATES (station & way side)

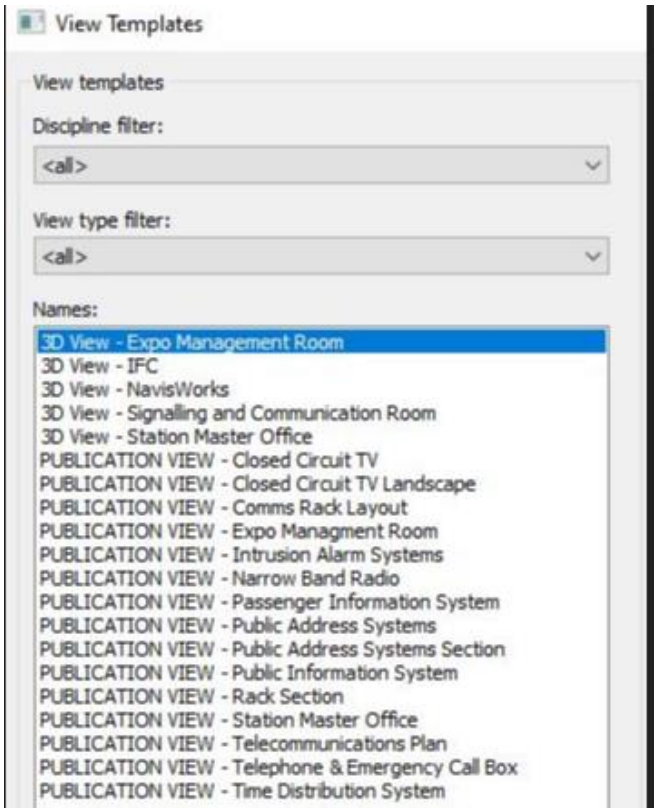


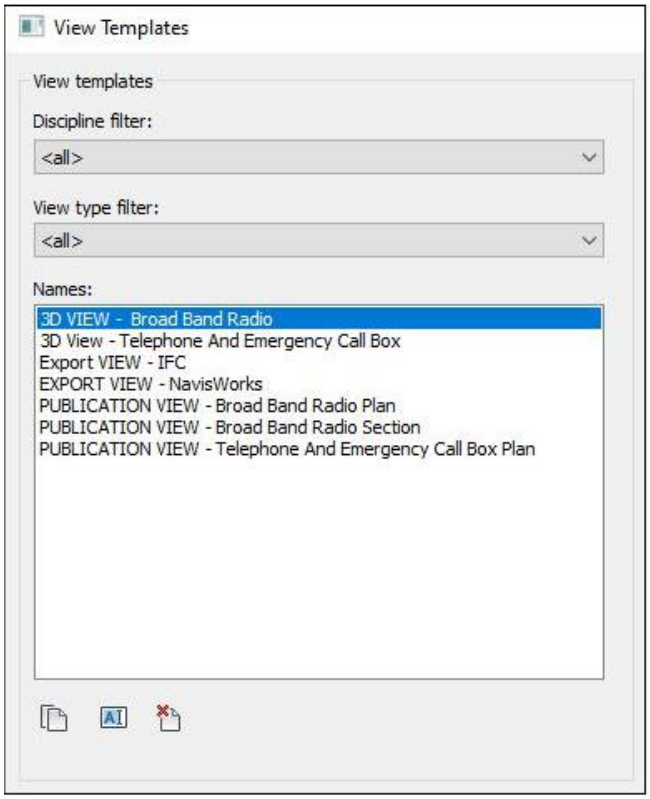


3.13.9 PSD VIEW TEMPLATES

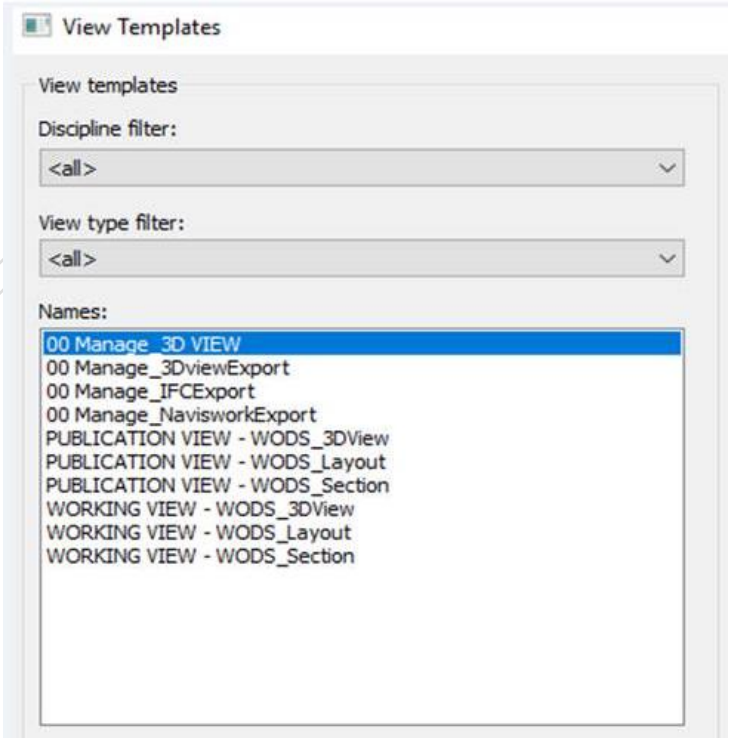


3.13.10 COM EQUIPMENT VIEW TEMPLATE (station & way side)





3.13.11 WODS View template



4. Export Settings for Each File Format

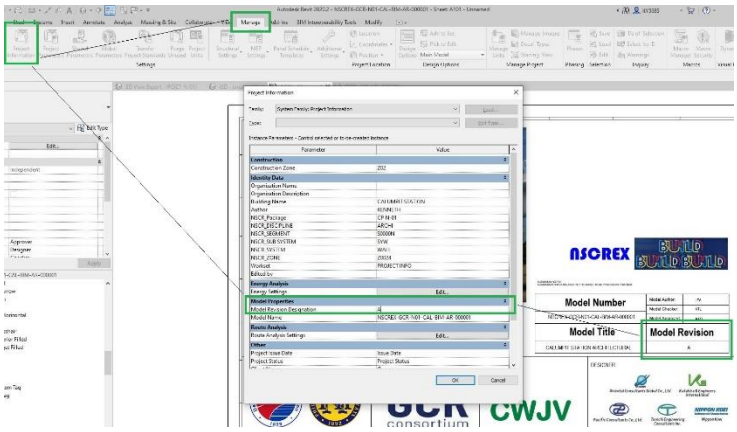
4.1 Revit – Exporting and Submitting Central Files

The submitting party is advised to utilize Revit e-transmit add-in which is freely available to subscription customers. Please follow the procedure for submission:

The submitting party is instructed to ensure proper revisions by updating Model Revision Designation parameter

A1, A2, B1, B2 – Minor revisions

A, B, C - Submission to Engineer

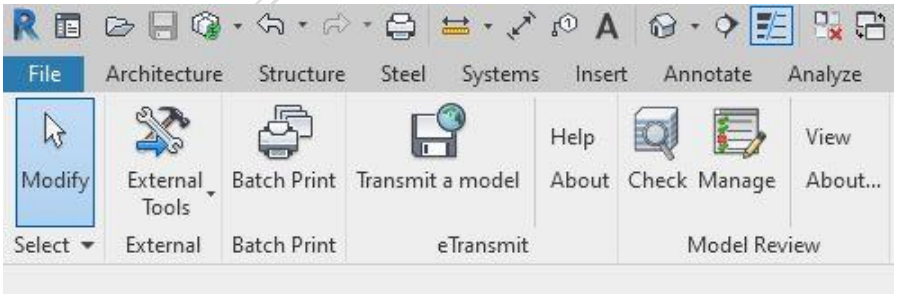


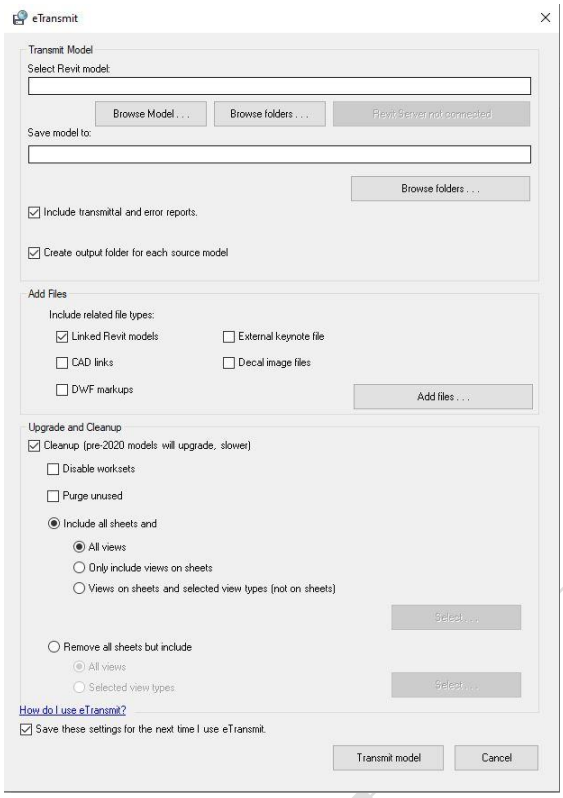
Before you submit the revit model:

1. Export the model from PW to the desktop

2. Close all projects in Revit – DO NOT CLOSE REVIT fully, just get a blank screen

3. Go to addins>e-transmit>transmit a model

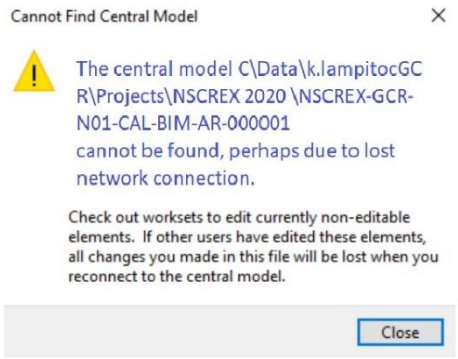




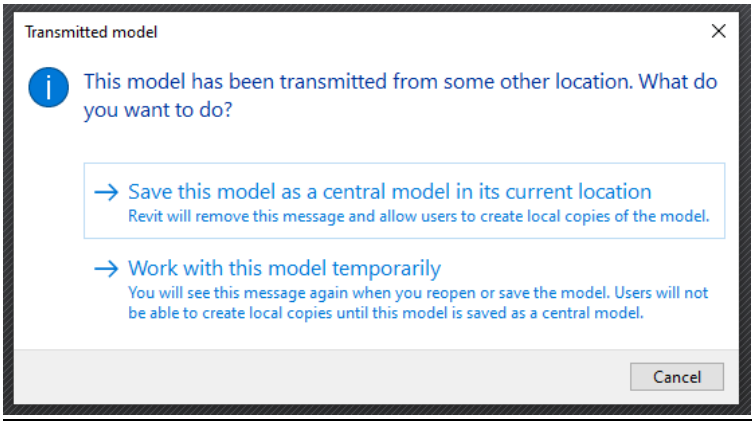
Disable worksets feature is unchecked for submission

After e-transmit add-in is used for detach process of central revit files with enabled worksets, when detached model copied to any different computer than original computer which used for e-transmit detach add-in applied, two message screens are expected to appear normally as shown below.

1- Central Model cannot be found message appears, since central model is left within the machine which used for etransmit add in.

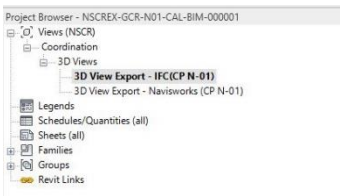


2- User notified with message “this model has been transmitted from some other location, what do you want to do?” This is expected result from detached model for re-centralization approval of end user. This message shows detach process is successful.



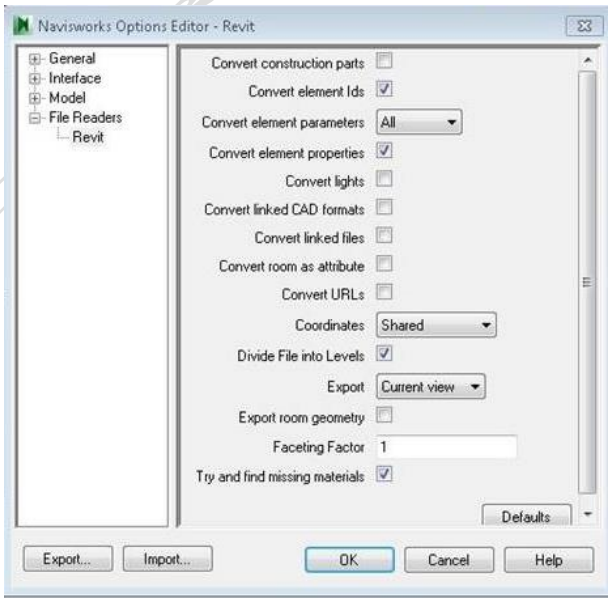
4.2 REVIT - NAVISWORKS EXPORT SETTINGS

Each Revit model which contains 3D Geometry should have one 3D view specifically for exporting to Navisworks (see below sample, 'EXPORT - '). This view should have a view template applied which is set to project requirements (E.g. Detail Level = Fine, 'Imported Categories' turned off, Scope and Section boxes turns off etc.).



Export View Naming

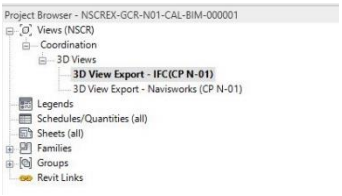
The below is the standard for exporting Revit models to nwc for 'project review' and '3D Coordination' BIM Uses. The most important option is that the 'Shared Coordinates' option is selected. This will allow all project parties to link in other discipline nwc files.



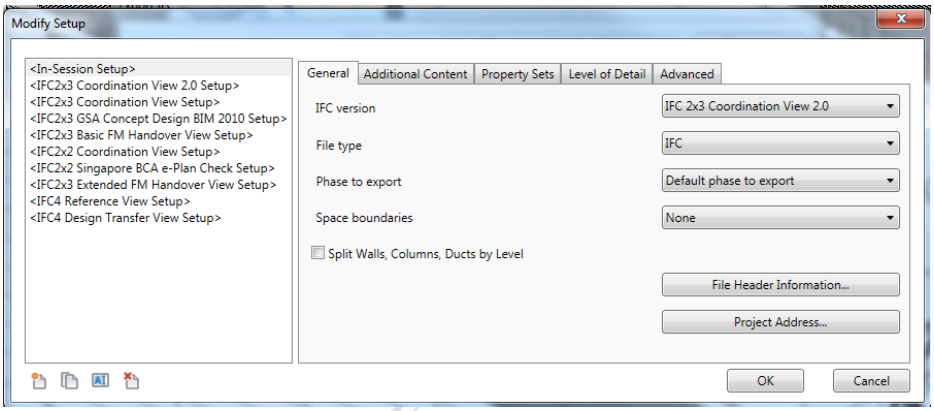
Navisworks Export Setting

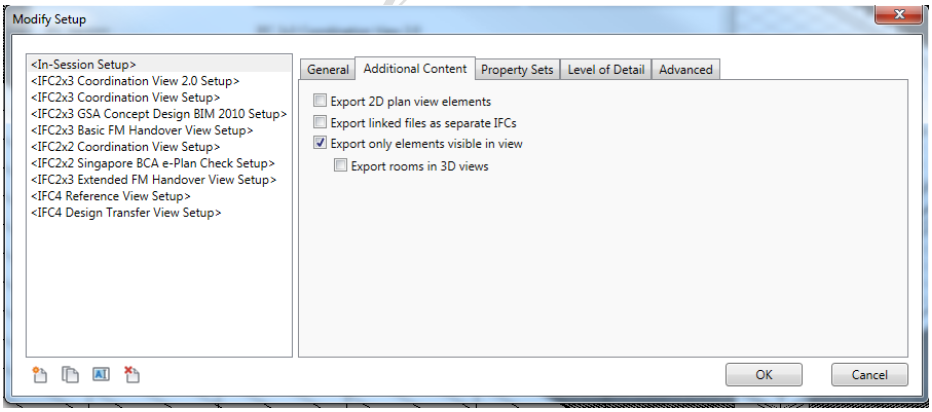
4.3 REVIT – IFC EXPORT SETTINGS

We should have one view in Revit views as per figure 48 with level of detail "Low "and we have to be sure that all the elements which related to the package only shown in the view .and regarding to the IFC export we should use '**IFC 2x3 Coordination View 2.0**'. In addition to default setting, following options shall be setup as per the below steps for the setups as shown in figure 49. and for the verifications of the IFC content, the team shall verify IFC export using Autodesk Navisworks.



IFC Export Setting





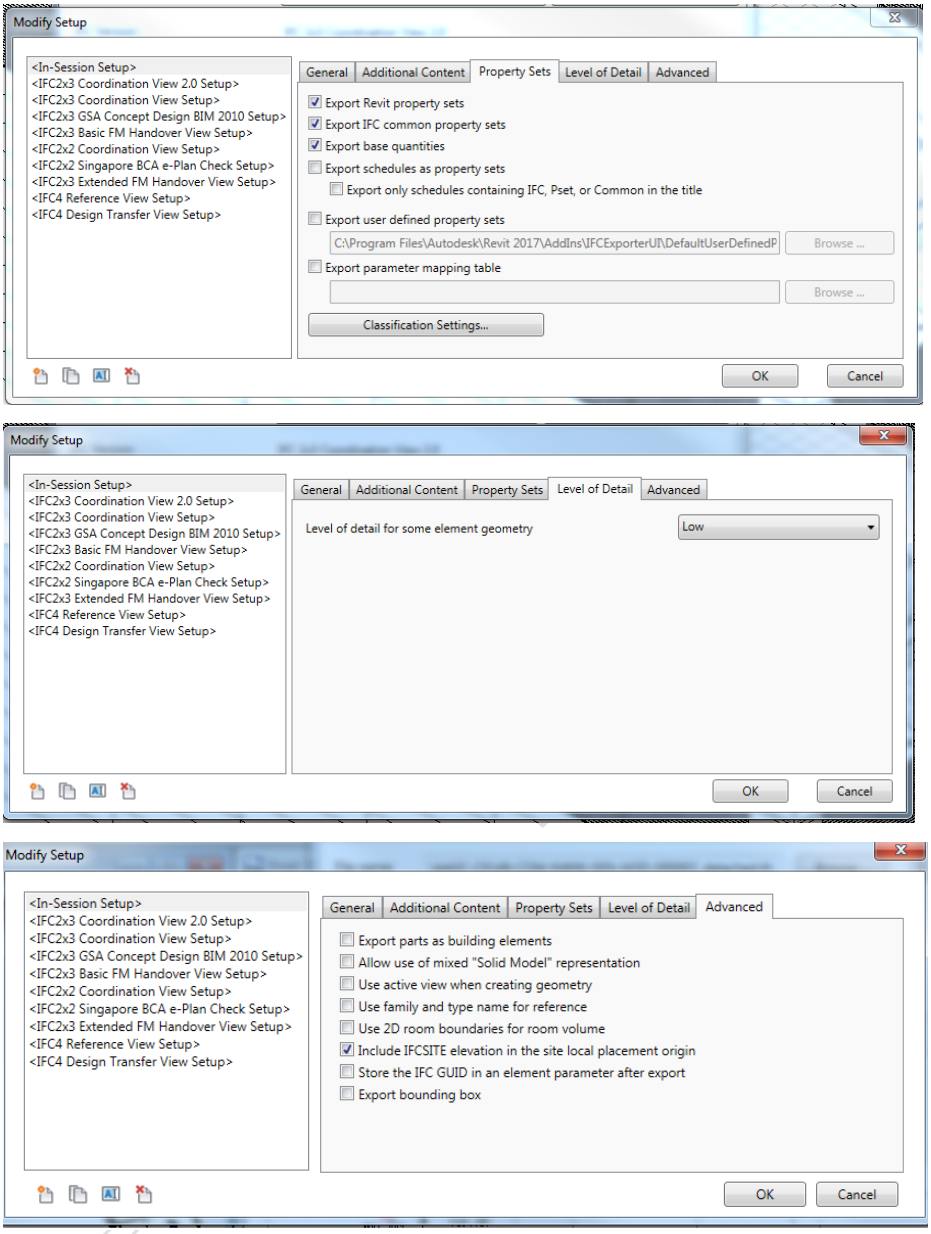


Figure 1: *IFC Export Setting*

4.4 REVIT – DWG EXPORT SETTINGS

It is known issue that DWG files exported from Revit do not align with the traditional 2D CAD standard requirements in terms of presentation quality and layering setup, when compared to CAD files which have been generated in native AutoCAD.

It is, therefore, not feasible to fully align the DWG files exported from Revit with the NSCR CAD standards documents. However, the project team have endeavored to develop a Revit to CAD export mapping file which aligns as closely as possible with the NSCR CAD standards. This standard mapping file must be used by all consultants / Sub-Contractors who will be exporting CAD files from Revit.

To plot soft or hard copies of Revit drawings the plots should either be sent from within the Revit software itself or from PDFs which have been generated from within the Revit environment. CAD

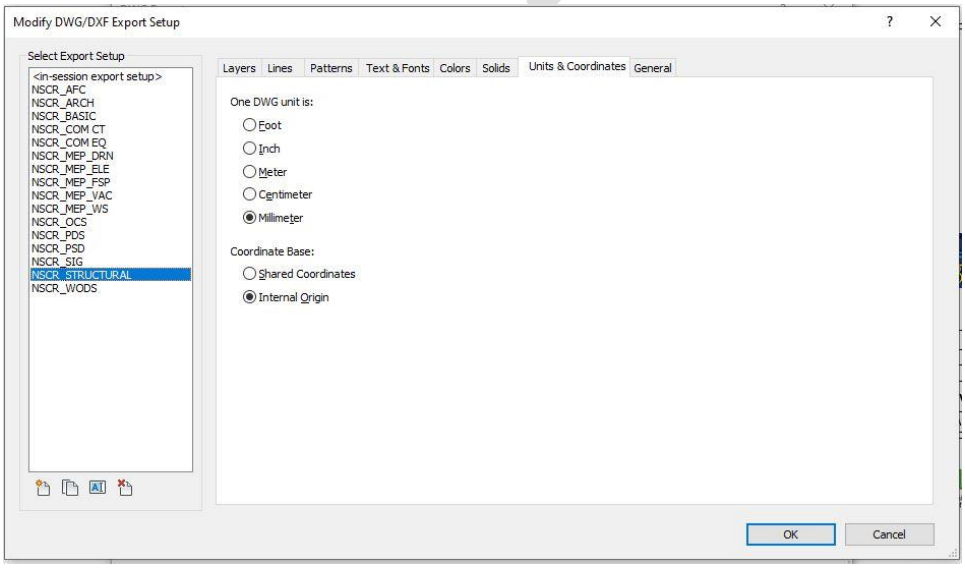
files exported from Revit must be used only for overlay and coordination purposes and are not to be relied on for plotting to soft or hard copies.

4.4.1 REVIT SHEET FILES

Revit sheet files which are exported to DWG files do not contain any geo-referencing data, and these CAD files cannot be used to overlay with other CAD files which are set to the correct project coordinates. It must also be noted that Revit Sheet files when exported to DWG only contain AutoCAD model information for the viewport shown on the sheet CAD file in Paper Space. Therefore, to view an entire floorplan, Revit Views shall be exported from Revit.

4.4.2 REVIT VIEW FILES

Revit views exported to DWG from Revit will contain geo-referencing data, only one view for each floor plan per discipline or sub discipline will be provided. For non-station building and linear facilities one view will be exported for each cluster for every system or sub-system, following the below export settings as shown in fig 55. These DWG files can be used to overlay with other CAD files which are set to the correct project coordinates. These views will be mentioned in the CDRL as it will be submitted officially as it can be used by any external stakeholder. And for the export setting for this please refer to 14.2.4.3



Revit to CAD View Export Settings

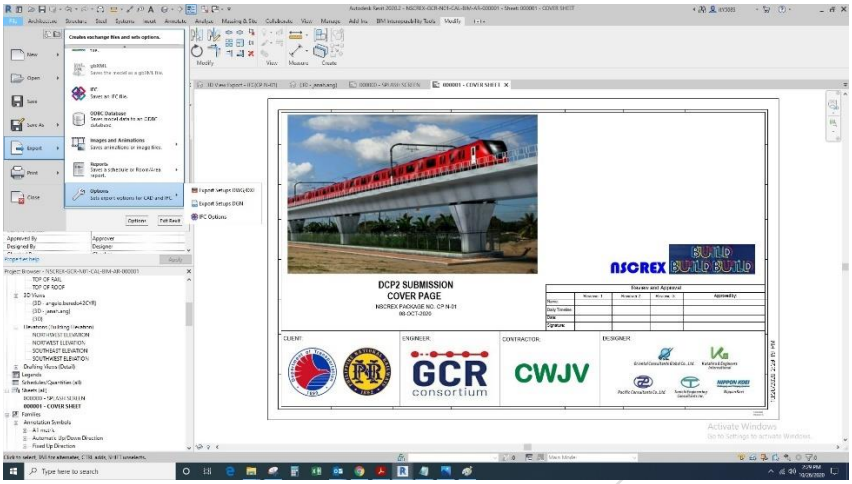
4.4.3 DWG EXPORT SETTINGS

There are different export setups in the template file which includes, **NSCR_BASIC, NSCR_ARC, NSCR_MEP_SN, NSCR_MEP_PL, NSCR_MEP_FS, NSCR_MEP_EL, NSCR_STR, NSCR_PID, NSCR_PSD, NSR_SIG, NSCR_AFC, and so on**. Each template has been configured to extract DWG

as per CAD standards and will be used by each discipline while exporting DWGs from Revit models.

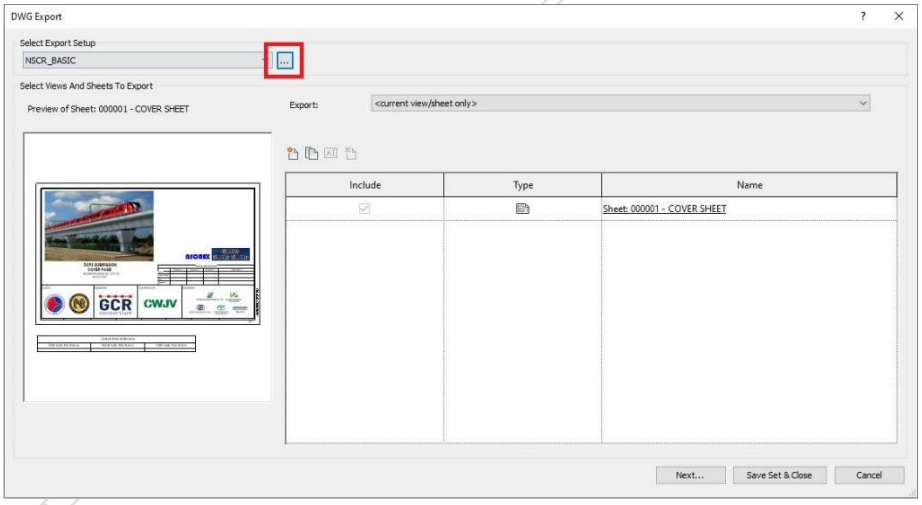
The process is illustrated bellow,

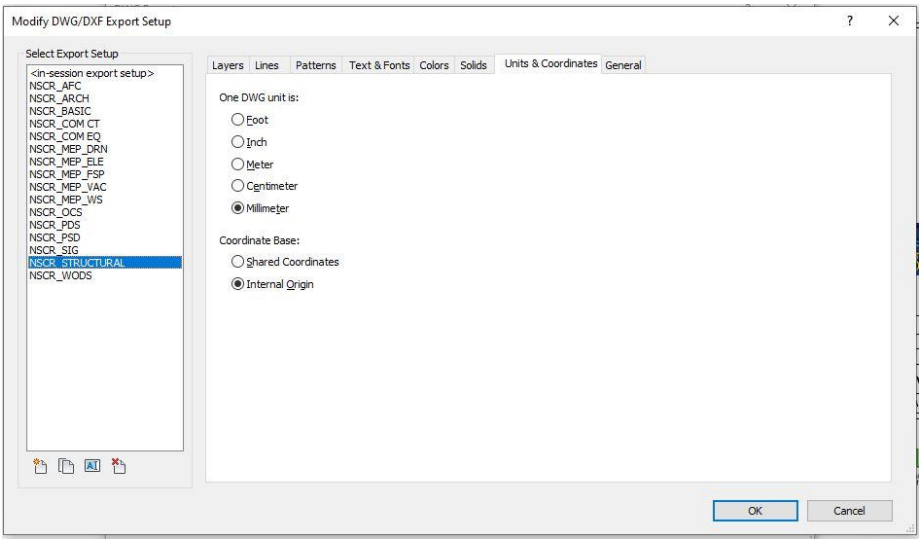
- **Step 01:**



DWG Export Settings Path

- **Step 02:**



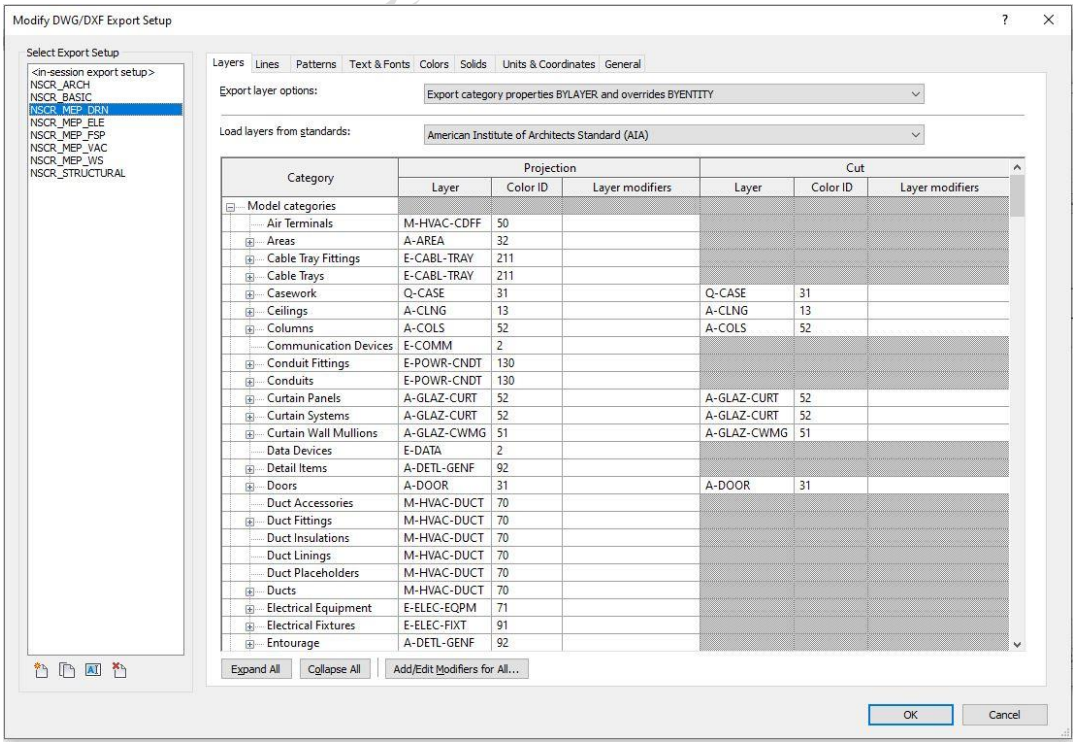


DWG Export Setup Options

NSCR CAD Standard Layers are defined by 'Discipline – System', which means each type of facility has different prefix. In order to meet this, user shall set 'Custom 1' under 'Modifiers' per each facility type.

Category	Projection			
	Layer	Color ID	Layer modifiers	Layer
Structural Load C...	LOAD-CASE	2	{Custom 1}-{Structur...	
Structural Loads	LOAD	2	{Custom 1}-{Structur...	
Imported categories				
Imports in Families	G-XREF-___-OT...	8		
Modifiers				
Analyze As				
Custom 1	CS-VB			CS-VB
Custom 2	BS-CS			BS-CS

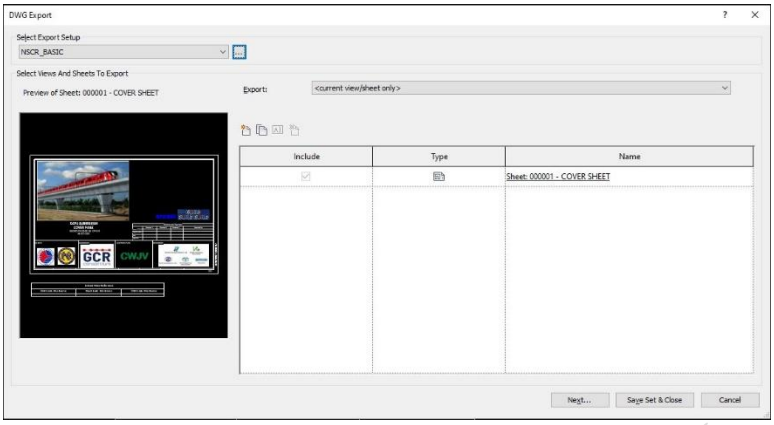
Facility DWG Export Customization



Category	Projection			Cut		
	Layer	Color ID	Layer modifiers	Layer	Color ID	Layer modifiers
Model categories						
Air Terminals	M-HVAC-CDFF	50				
Areas	A-AREA	32				
Cable Tray Fittings	E-CABL-TRAY	211				
Cable Trays	E-CABL-TRAY	211				
Casework	Q-CASE	31		Q-CASE	31	
Ceilings	A-CLNG	13		A-CLNG	13	
Columns	A-COLS	52		A-COLS	52	
Communication Devices	E-COMM	2				
Conduit Fittings	E-POWR-CNDT	130				
Conduits	E-POWR-CNDT	130				
Curtain Panels	A-GLAZ-CURT	52		A-GLAZ-CURT	52	
Curtain Systems	A-GLAZ-CURT	52		A-GLAZ-CURT	52	
Curtain Wall Mullions	A-GLAZ-CWMG	51		A-GLAZ-CWMG	51	
Data Devices	E-DATA	2				
Detail Items	A-DETL-GENF	92				
Doors	A-DOOR	31		A-DOOR	31	
Duct Accessories	M-HVAC-DUCT	70				
Duct Fittings	M-HVAC-DUCT	70				
Duct Insulations	M-HVAC-DUCT	70				
Duct Linings	M-HVAC-DUCT	70				
Duct Placeholders	M-HVAC-DUCT	70				
Ducts	M-HVAC-DUCT	70				
Electrical Equipment	E-ELEC-EQPM	71				
Electrical Fixtures	E-ELEC-FIXT	91				
Entourage	A-DETL-GENF	92				

Export Customization settings sample

Geolocated views will be extracted as per section 14.2.4.2 it will exported separately not sheet view from Revit to CAD.



View export setting

5. Revit and ProjectWise Integration

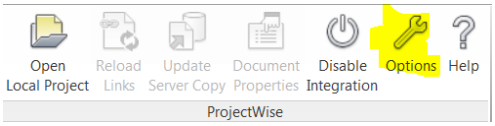
All project teams must have same versions of software to work properly with Revit and ProjectWise as following. The models that are performed in worksharing environment shall use the settings below.

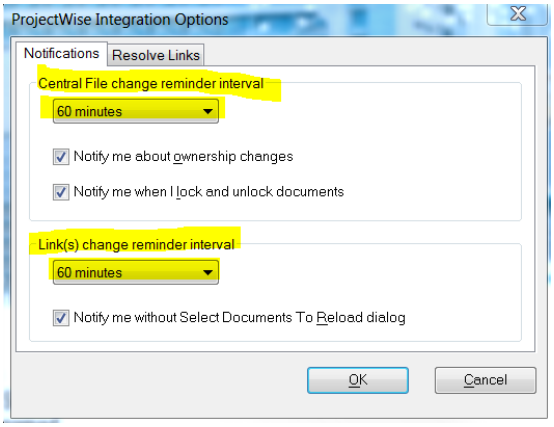
Software Versions

- Autodesk Revit: 2020
- Bentley ProjectWise Design Integration: 10.00.01.71
- Bentley ProjectWise Integration for Revit 2020

5.1 REVIT NOTIFICATIONS SETTINGS

ProjectWise will check central Revit file with defined interval time. By default, it is set '3 minutes. User shall modify this to appropriated time. To do this, Click Options at 'Bentley' Tab in Revit.

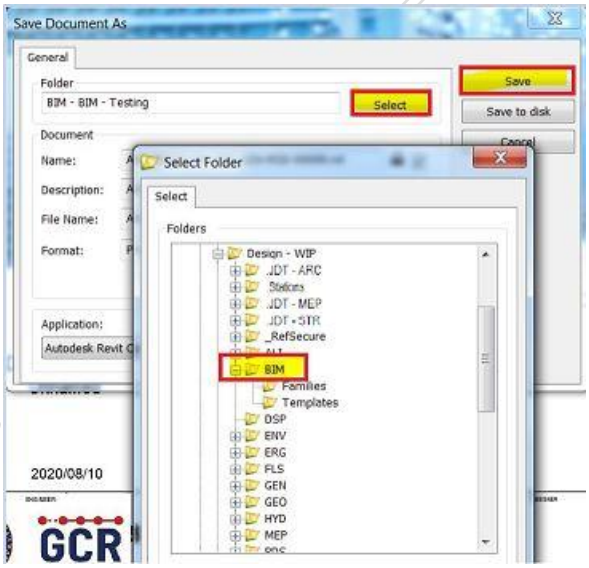




5.2 HOW TO UPLOAD EXISTING REVIT FILE TO PROJECTWISE AT FIRST TIME.

1. Open local Revit File with Revit 2020
2. From Menu > Save As, then Log in ProjectWise.

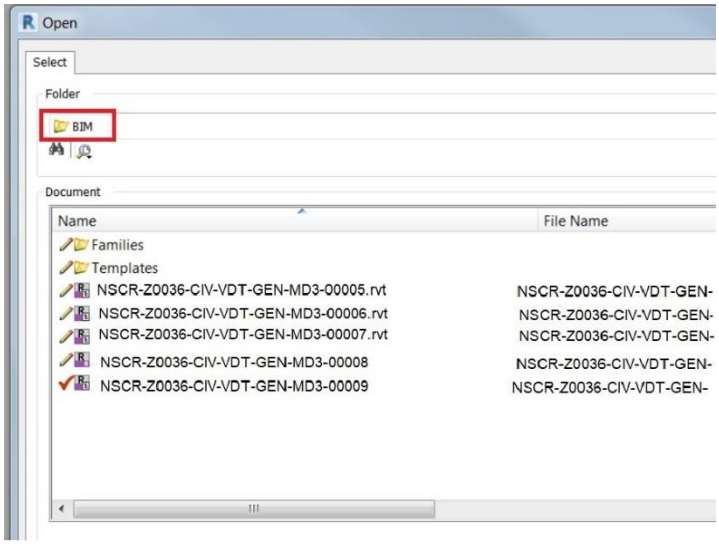
3. From ProjectWise, Select Folder to Save



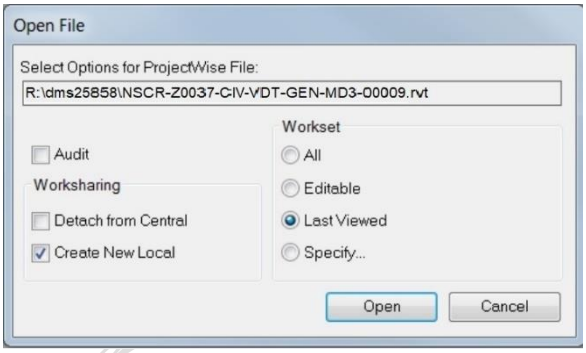
5.3 HOW TO OPEN REVIT FILE FROM PROJECTWISE

User can open Revit from ProjectWise Explorer; however, in this case, Revit File Link/CAD Link are not working properly. In order to work with links in ProjectWise:

1. Start Revit 2020 from desktop
2. From Revit Menu > Open, then ProjectWise Dialog box will pop-up.



3. Once Select Revit file, then ProjectWise will prompt use to select options as below.



Once opened, then Work sets can be used with Central file. Also, DWG file can be attached from ProjectWise even using version. In addition to this integration, family files can be opened/saved/loaded from ProjectWise.

PROJECT SPECIFIC PROCEDURE

APPENDIX F: ACONEX

1. Introduction

The British Standards Institute (BSI) defines the **CDE** as "***a single source of information for any given project or asset, used to collect, manage and disseminate all relevant approved files, documents and data for multidisciplinary teams in a managed process***". A CDE provides a platform upon which information in relation to project infrastructure is managed. Better information management will improve the decisions we make, how we plan, deliver and operate which will ultimately improve the effectiveness and efficiency of the services.

1.1 Need for CDE's

- A CDE is a fundamental part to deliver DOTr BIM policy.
- A CDE will improve efficiencies through the whole project life cycle.
- Good information management and collaborative systems will save time and money.
- Improve ability of organization to respond in the event of emergency.
- Enable a robust information management system which is a foundation to future working practice and infrastructure technology.

1.2 Benefits of a CDE

During Design & Construction Stage

- Greater reliability of data and reduced risk.
- Support more efficient processes in the creation and management of information.
- Reducing the time and effort required to check, version and reissue information.
- Reducing the time and cost of producing coordinated information.
- Enable to improve collaboration and improved outcomes.

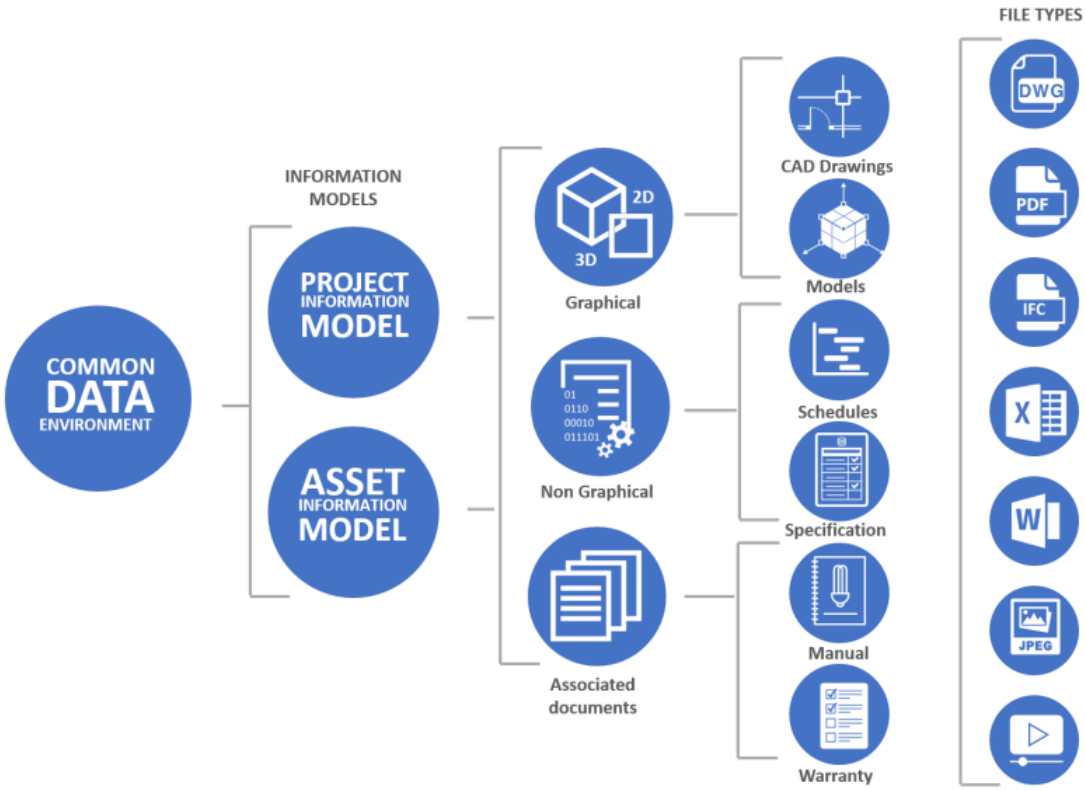
During Operational Stage

- Save time to transfer accurate and complete information from construction to operational stages.
- Easy access to relevant and reliable information in the event of failure.
- Enable improved estate planning, procurement and maintenance.
- Support improved analysis across portfolio of built assets.

1.3 Scope of CDE

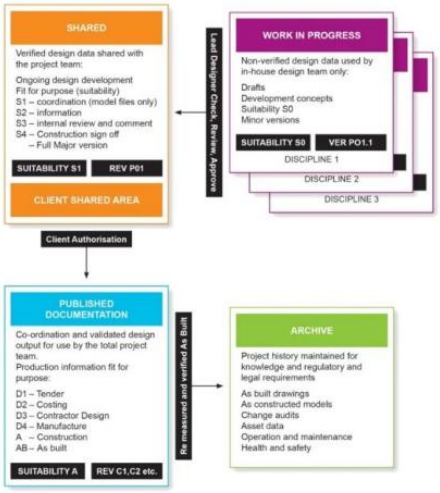
Collaborative working involves tasks being carried out in a particular order for the mutual benefit of all. It is within a collaborative working environment that teams produce information using standard processes and agreed standards and methods. This ensures data can be communicated, reused and shared efficiently, without loss, change or interpretation. A CDE is a technology solution to enable this collaborative way of working.

Essentially collaborative working means everyone benefits more than they would individually. Everyone reduces waste, generates more money and creates a better environment. Through improving data management and collaboration within projects, this will support the industry to deliver greater efficiencies through the design, construction and operational stages of project. A CDE is a fundamental part to project deliverable by providing a digital repository to store, manage and engage with project information. (Figure 1-1).



The CDE provides the mechanism for making the project information available to the team. It also allows for a managed workflow for the creation, sharing and re-purposing of data.

A British Standard in relation to BIM, ISO 19650 and PAS 1192-2 (BSI, 2013) provides a logical framework for the production of pertinent information at discrete stages of the whole building lifecycle. Its focus is on BIM in the delivery phase of a project and the Project Information Model (PIM).



Section	Description
Work in progress	Area of the CDE where team carries out their own work using their organization's software systems. Non-verified design data used by in-house design team only:
Shared	Area of the CDE where the team shares verified design data with other members of the project team.
Published	Area of the CDE for coordination and validated design output for use by the total project team.
Archive	Area of the CDE for project history maintained for knowledge and regulatory and legal requirements. It is also a repository of the project information for non-asset portfolio employers.

Functional sections of the CDE

2. Purpose

2.1 Purpose

The procedure describes the project CDE centralized document control processes carried out electronically for the following activities:

- Correspondence
- Transmittal
- Document
- Drawings
- Response Form (RF)
- Request For Inspection (RFI)
- Management System Procedure (PRO)

The procedure also defines the way how documentation shall be classified and managed throughout the project. Project data are managed in a consistent, structured and stored in secure manner. The referenced documents are controlled in terms of distribution, submissions, internal circulation and internal verification processes to ensure that they remain current, legible and readily identifiable, traceable and to prevent the unintended use of obsolete documents.

Refer to the Appendices for the detailed listing of the descriptions as referenced to the above. The list will be updated whenever there are any additional identifiers for these referenced documents.

2.2 Scope

This procedure covers the process control of the following:

- All correspondences send, received or transmitted for the project by the Project Team whether at the Project's Head Office or at any of the Project Site Offices, to Employer or to sub-contractor.
- Creation of system-based number referencing for correspondences, drawings & documents for the project.

- Sending, receiving, verification, internal circulation & submission process & of the incoming & outgoing correspondences.
- Sending, receiving, verification, internal circulation & submission process for Technical & Engineering documents.
- Preparation, internal review and submission of Quality, Health, Safety & Environmental, Technical & Engineering documents.
- Handling of Private & Confidential documents.

2.3 Definitions

Name	Definition
DOTr	Department of Transportation and Railway (Philippines)
The Employer	Department of Transportation and Railway (DOTr)
Consultant	Greater Capital Railway Consortium (GCR)
The Engineer	Appointed by the Employer to act as the Engineer for the purposes of the Contract.
The Contractor	The person(s) named as contractor in the Letter of Acceptance and the Contract Agreement, and the legal successors in title to this person(s)
The Project	North-South Commuter Railway Extension

2.4 Abbreviations

Name	Definition
GCR	Greater Capital Railway Consortium (General Consultant)
NSCR-EX	North-South Commuter Railway Extension
AIM	Asset Information Model
BEP	BIM Execution Plan
BIM	Building Information Modelling
BOM	Bill of materials
BS	British Standard
CAD	Computer Aided Design
CDE	Common Data Environment
ACP	Advance Check Print
Bcc	Blind Carbon Copy

Name	Definition
C&C	Contracts & Commercial
CD-R	Compact Disc-Recordable
DC	Document Controller
DDC	Detail Design Consultant
DL	Distribution List
DM	Distribution Matrix

DOC	Document
DWG	Drawing
EDMS	Electronic Document Management System
HOD	Head of Division/Department
HQ	Head Quarters
IFC	Issued For Construction
LOD	List of Drawing
PRO	Management System Procedure
ORG	Organisation
P&C	Private & Confidential
PD	Project Director
PDF	Portable Document Format
PDP	Project Delivery Partner
PDPi	PDP Instruction
PDPR	PDP Representative
PE	Professional Engineer
PKG	Package
PRN	Practice Note
SC	Supervising Consultant
SHE	Safety, Health & Environment
TBA	To Be Advise
WPC	Work Package Contractor

3. Responsibilities

i. The Project Director (PD) is responsible to approve all Management System Procedures (PRO) and Practice Notes (PRN). All other Project Documents prior to implementation may be approved by the PD or as delegated by him to the HOD/PDPR.

ii. The PD/PDPR is responsible to sign and approve all external correspondences involving defined parties for the project.

iii. The PD/PDPR may assign his/her representatives to review, approve and sign the project documents where appropriate.

iv. The HOD/PDPR must review the Distribution Matrix (DM) in regular basis, and the matrix must be approved by PD.

v. The Document Controller (DC) is responsible to manage all project documents according to the defined procedures and other documentation guidelines.

vi. The DC is responsible to ensure all outgoing and incoming Documents/ Drawings/Correspondences are registered, distributed and delivered to the intended recipient via Aconex EDMS.

vii. The originator is responsible to provide sufficient copies (including acknowledgment copy) for all out going correspondence sealed in envelopes for each recipient complete with the mailing address.

viii. The originator to ensure all outgoing Correspondences/Transmittals/Response Form (RF) must be sent via delegated GCR DC Centre/Aconex EDMS gate keeper.

ix. The originator of the Correspondence/Document/Drawings is fully responsible for the content of the Correspondence/Document/Drawings uploaded in the system.

x. The originator is responsible to ensure documents such as PRO, PRN and other live documents are being review and updated regularly (recommended once a year).

xi. The despatcher to ensure that the acknowledgement copy is return on the same day or the latest next day

3.1 Responsibility of the Individual Aconex EDMS Users

All project team members are responsible for ensuring that documents and correspondence are created in such a way that they have the following characteristics:

Authenticity	The information can be proven to be what it purports to be, to have been created or sent by the person that created or sent it, and to have been created or sent at the time purported.
Reliability	The information can be trusted as a full and accurate representation of the transactions to which they attest, and can be depended on in the course of subsequent transactions.
Integrity	The information is complete and unaltered, and protected against unauthorized alteration.
Usability	The information can be located, retrieved, preserved and interpreted easily.

These characteristics form the foundation for ISO 15489: Records Management. This standard provides guidance on creating records policies, procedures, systems and processes to support the management of records in all formats (e.g. documents and correspondence). It is widely used internationally in both private and public organizations.

In this way, the team ensures that all project information generated provides an accurate record of the relevant documents and related correspondence.

3.2 Distribution of controlled documents

All project-related documents must be distributed to external parties via Aconex EDMS. This will ensure that all relevant documents are captured and stored in one, single, central location. The NSCR-EX Project will also maintain hard copies of each document submitted via Aconex EDMS.

3.3 Documentation for Review/Approval

When documents are sent for review or approval it is essential that documentation / drawings are sent via Workflows to ensure the correct response and review code is given. Native files of documentation can also be submitted where applicable.

3.4 PDF Format for Review/Approval

It is essential that each document / drawing sent by workflow is sent in PDF format, if a native file is to be sent it can be transmitted via a normal transmittal to help with reviews or for information. PDF format of documents / drawings will be required for review / approval in Workflows.

3.5 ZIP Files/RAR Files

It is imperative that ZIP files or RAR files are not sent via workflows for review / approval, only individual PDF's of Documents or drawings are sent for approval, again if ZIP files are received via workflow they will be rejected, only individual document or drawing are acceptable.

3.6 Document tagging and Document fields

All project participants must apply the appropriate document tags defined by the fields in the project. These are key pieces of information (or metadata) that are used to identify each document such as Number, Title and Revision. Certain fields are mandatory.

4. Correspondence

4.1 Incoming Correspondence – "Mail"

a) All parties involved in the project shall route all project-related correspondence to / through the GCR DC Centre based at HQ or the relevant Project Offices.
b) Definition of Mail:
   - Letter
   - Facsimile & Memorandum
   - PDPi
c) All incoming correspondence must be addressed to PD or PDPR only.
d) The original of all project-related correspondence received by fax, mail or courier is stamped by the GCR DC with the correspondence date and time receipt stamp designed for the project. Master documents, original certificates; licenses etc. shall not be stamped or hole-punched.
e) GCR DC shall process incoming correspondences according to Distribution List (DL) or approved Distribution Matrix (DM) and notification will be sent through the Aconex EDMS.
f) The respective actioners identified in the DL/DM may print hardcopies of the correspondence for their own monitoring and tracking for items requiring their action.
g) The manner of circulation of the incoming correspondence would be adjusted to suit the nature/importance of the correspondence.
h) If the correspondence refers to another piece of correspondence, this link is to be recorded by the DC/gate keeper in the field "Attach — Project Mail "of the Register Incoming Mail menu of the Aconex EDMS. This is to provide historical link to all related

correspondences which provides faster and easier chronological events for the said correspondence.

i) The original of all correspondences are filed in the respective master file and is available for use by project staff if need arises (refer Practice Note - Control of Record).

j) Any attachment to the correspondence will be deemed as attachment only and will not be registered separately.

k) Any incoming correspondence or records related to commercial, contracts, and financial matters may be treated as P&C subject to agreement of C&C personnel. Should the correspondences be P&C, then:

Private & Confidential (P&C):	After stamping & registering of the subject matter only into the Aconex EDMS, the DC/gate keeper will then pass the letter directly to the concerned person with a note in the Aconex EDMS on the location of the original documents.
Urgent Action Required:	The DC/gate keeper makes an additional copy and sends the letter /memo directly to the person for action either by email or fax, while another copy will be in normal circulation process.

4.2 WPC Hardcopy Submission

Must print in single sided. Must submit softcopy (PDF) in 1 CD Rom for each correspondence. Combination is not accepted. — to be confirmed.

4.3 Outgoing Correspondence

a) Each correspondence initiated in the project shall be assigned with a unique reference number generated automatically via the Aconex EDMS.

b) The originator or its representative shall prepare the draft correspondence via General Communication and final draft correspondence must be generated through Project Mail (refer to Mail Process Flow).

c) The originator shall scan, register and upload the correspondence into the Aconex EDMS.

d) If a correspondence is coded not in accordance with the system or the code is a duplicate or is otherwise incorrect, the DC contacts the sender and advises of the correction before taking any other action with the correspondence.

e) The HOD shall approve the correspondence, and decide the internal parties to be informed. Correspondence not approved shall be returned to the initiator and the outgoing number shall be cancelled as remarks.

f) Any cancellation correspondence must go through GCR DC Centre based at HQ or the relevant Project Offices.

g) The Originator shall scan and upload the approved signed correspondence into the Aconex EDMS.

h) The originator or its representative shall provide the original signed correspondence with sufficient copies such as acknowledgement copy, carbon copy to external parties,

envelope provided with mailing address to respective DC Centre for dispatch arrangement, while a hardcopy is made for the DC.

i) BCC to 3rd parties is not allowed.

j) Handling of specific outgoing P&C correspondence shall be dealt with in accordance to special arrangement.

NOTE: Only the PD/PDPR or their authorize delegated person(s) will sign the correspondences.

*** Please contact DC Manager to obtain the name.*

4.4 Project General Correspondence (Mail Module)

All project correspondence is to be sent via Aconex. This will ensure that all relevant project correspondence is captured and stored in one, single, central location. Formal letters for the project will be registered via the Aconex Mail Module. Compiled letters will be visible in the Mail Module for searching and reporting.

4.5 Mail Subject Convention

All project team members must use meaningful and consistent subject lines. To facilitate efficient mail retrieval and reporting in Aconex, here are some guidelines:

Examples based on good practice would be as below:

- Re: Main building, proposed layout
- Acoustic panel detail drawings
- Building references
- Stage or Design Phase names or references

Avoid the following vague subject lines:

- Query
- Re: Drawings

An internal reference can be added to the subject line if your company requires this but this should be consistent for reporting purposes.

4.6 Mail Numbering System

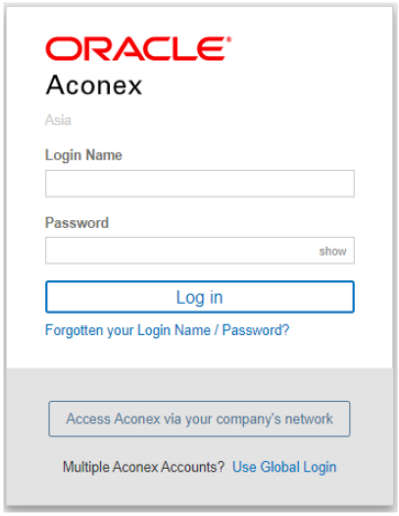
All controlled mail correspondence (Letter, Memorandum, etc.) produced on this project are required to have a unique number assigned in accordance with the numbering convention defined below. Please refer to the relevant reference tables for codes applicable to the numbering parts. Please note that all correspondence (Letter, Memorandum) numbers on this project are required to have a unique number.

Originator	Doc. Type	Sequence Number
GCR	**RESP**	**000001**

Example: GCR-RESP-000001

4.7 Create Project Mail

Log in to Aconex https://hk1.aconex.com/Logon



Note: For online help visit: https://help.aconex.com/walkthru?walk=gs_createmail

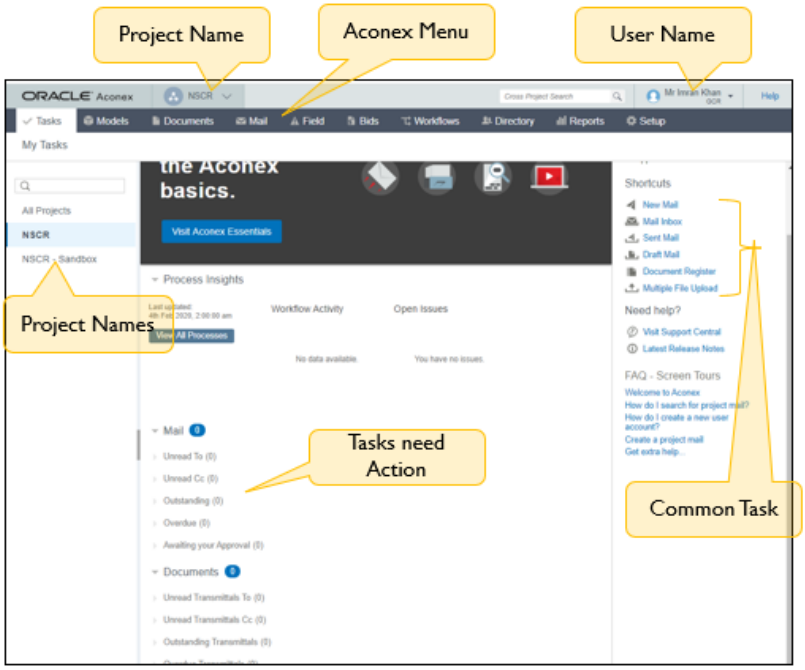


Figure 4.7-2

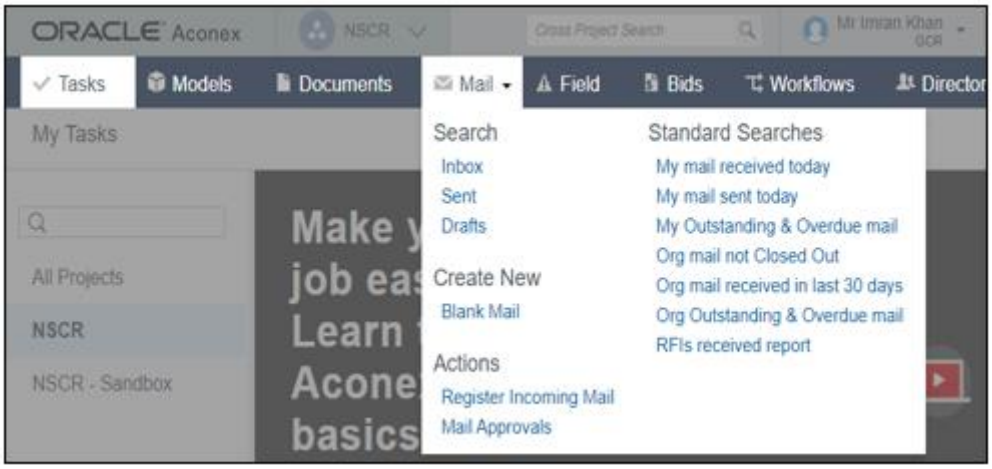


Figure 4.7-3

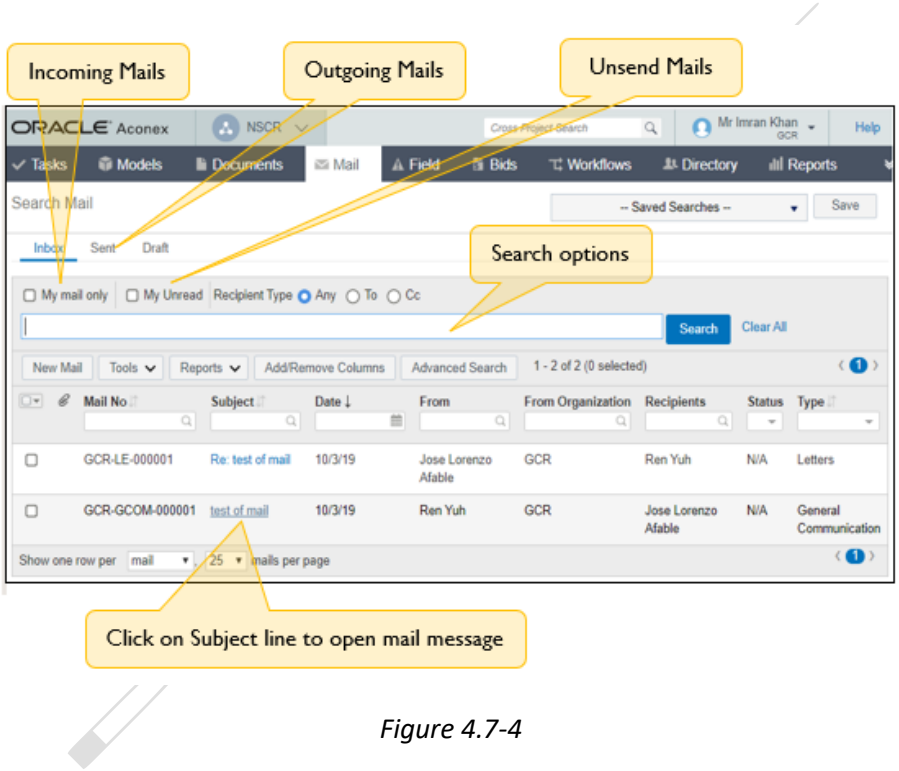


Figure 4.7-4

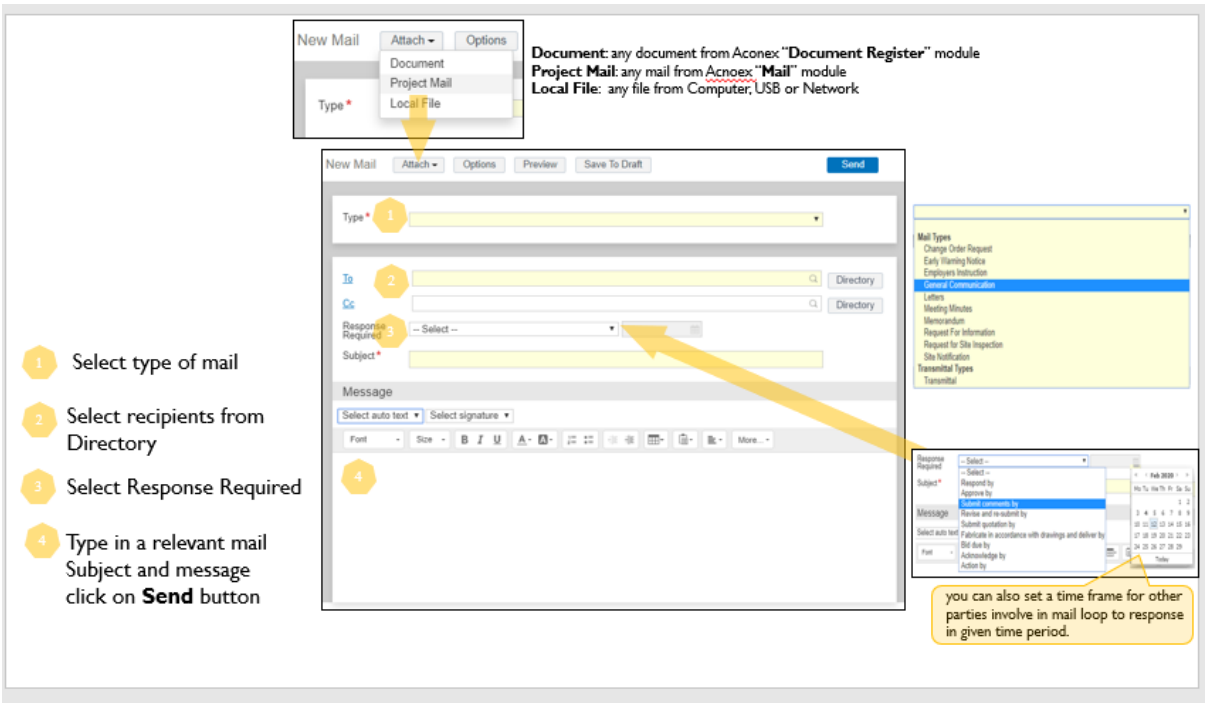
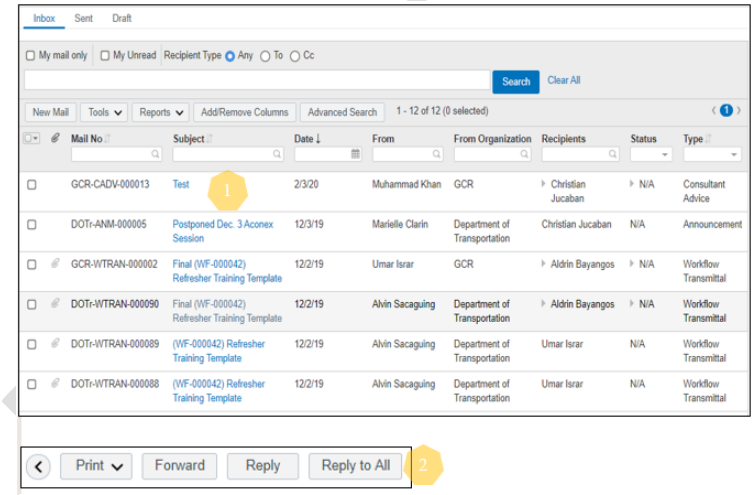
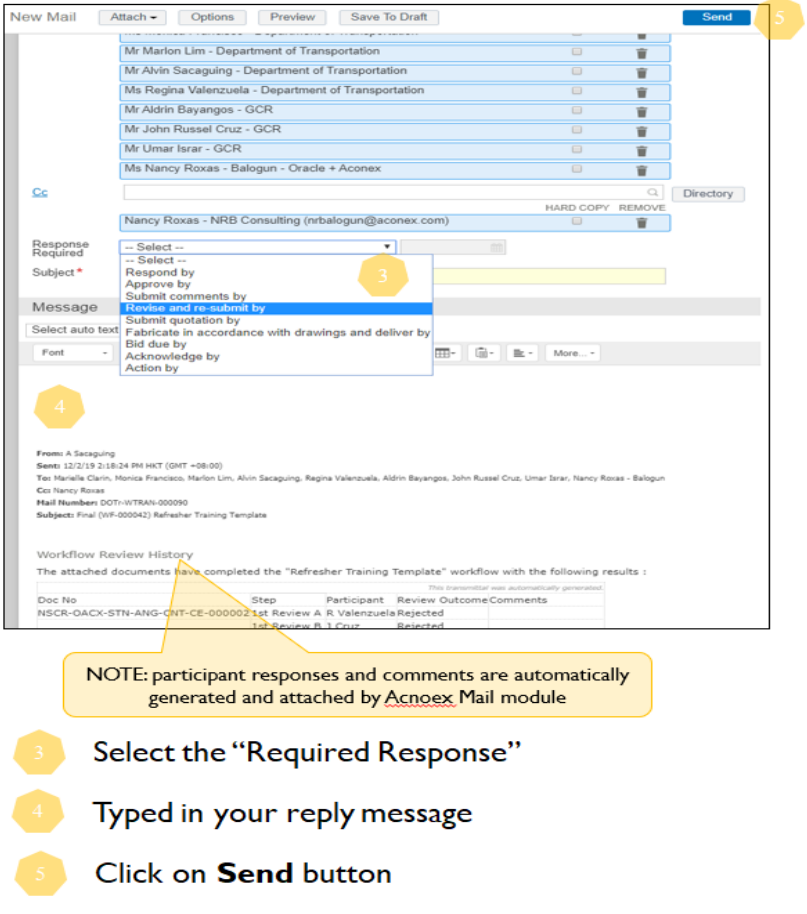


Figure 4.7-5

4.8 Reply to an Email





NOTE: participant responses and comments are automatically generated and attached by Acnoex Mail module

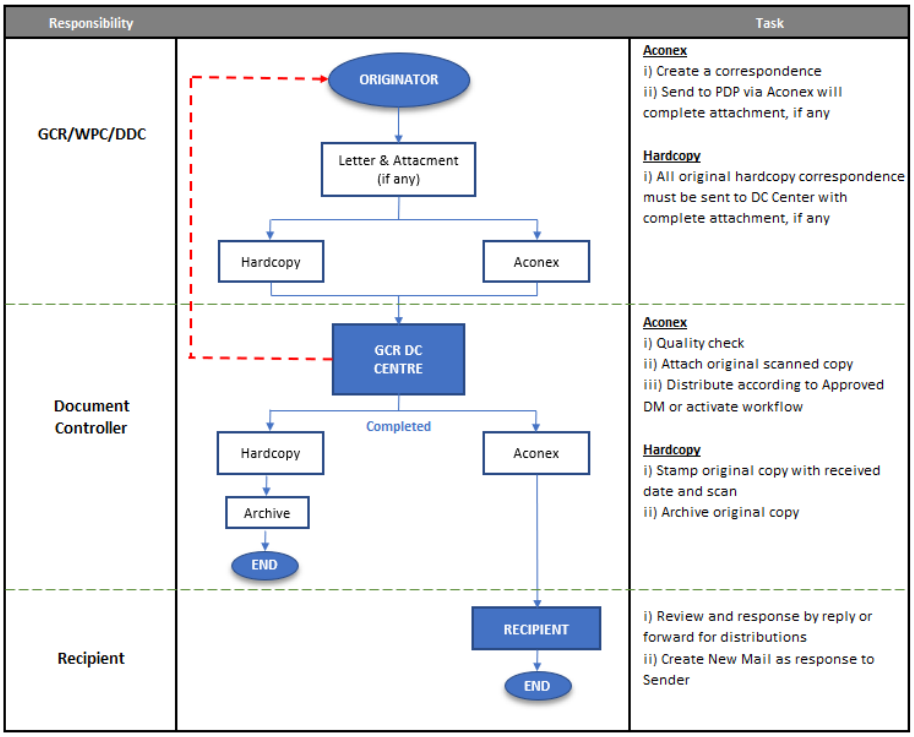
3 Select the "Required Response"

4 Typed in your reply message

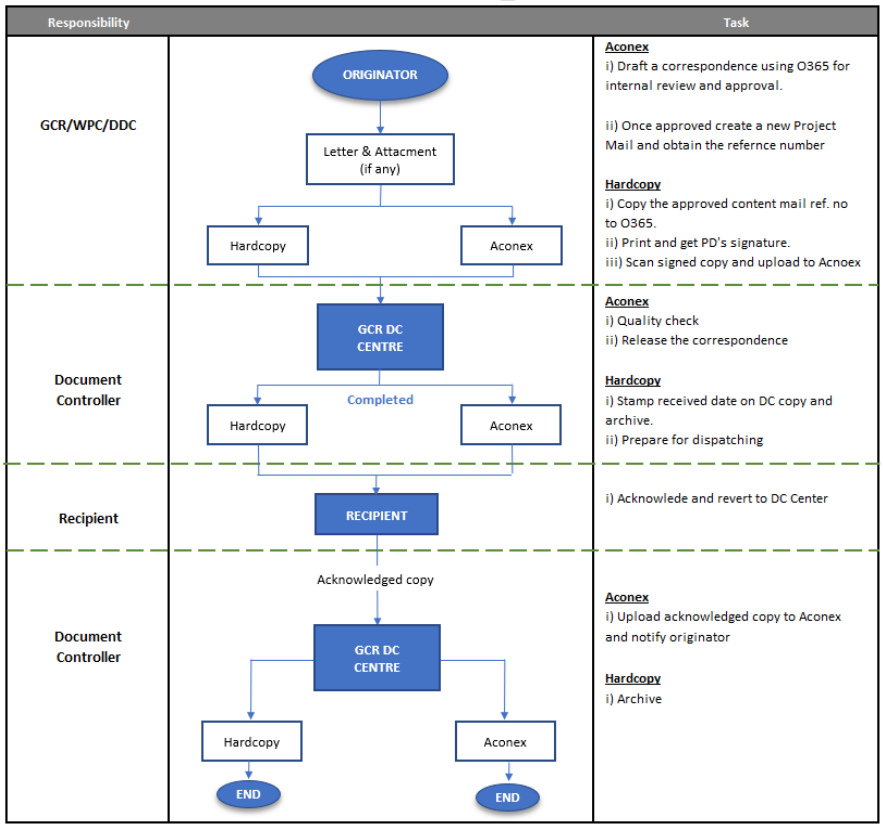
5 Click on **Send** button

Figure 4.8-1

4.9 Incoming Correspondence Process Flow



4.10 Outgoing Correspondence Process Flow



5. Transmittal

5.1 Incoming Transmittal

a) All project documents must be submitted via Transmittal unless otherwise advise by GCR DC Centre to submit via different medium i.e. letter.
b) All incoming transmittals must go through GCR DC Centre based at HQ or the relevant Project Offices.
c) The DC shall stamp the official DC Centre stamp for the time and date receipt of complete incoming transmittals.
d) DC shall process incoming transmittals and notification will be sent thru Aconex EDMS.
e) The recipient may print a hardcopy of the transmittal with the attachment as circulate via Aconex EDMS for their action, monitoring and tracking.
f) The manner of circulation of the incoming transmittals could be adjusted to suit the nature/importance of the document.
g) Transmittal for internal inter department distribution shall be used for the distribution of the controlled project documents/drawings to the respective departments.
h) The original of all transmittals are filed in the respective master file and is available for use by project staff if need arises.
i) Aconex user must use transmittal via Aconex EDMS system.

5.2 Outgoing Transmittal

a) Each transmittal initiated in the project shall be assigned with a unique reference number generated automatically via the Aconex EDMS.
b) Transmittals for internal inter department distribution shall be used for the distribution of the controlled project documents to the respective departments.
c) Transmittals shall be used for the submissions of all Project Documents and are to be prepared by the originator or its representative.
d) The originator shall scan, register and upload the transmittals into the Aconex EDMS before sent to GCR DC Centre for dispatching process.
e) The HOD or his representative must approve transmittals that are intended for the official submission.
f) If a transmittal is coded not in accordance with the system or the code is a duplicate or is otherwise incorrect, the DC contacts the sender and obtains a correction before taking any other action with the transmittal.
g) All outgoing transmittal must through GCR DC Centre based at HQ or the relevant Project Offices.
h) The originator or its representative shall send the original signed transmittals with sufficient copies such as acknowledgement copy, carbon copy to external parties, envelope provided with mailing address to DC for dispatch arrangement.
i) DC shall get the hardcopy of DC copy with its attachment to file in the designated Master file.
j) Handling of specific outgoing P&C documents such as tender documents shall be dealt with in accordance to special arrangement.
k) Project Documents submitted for information must also be submitted via Transmittal.

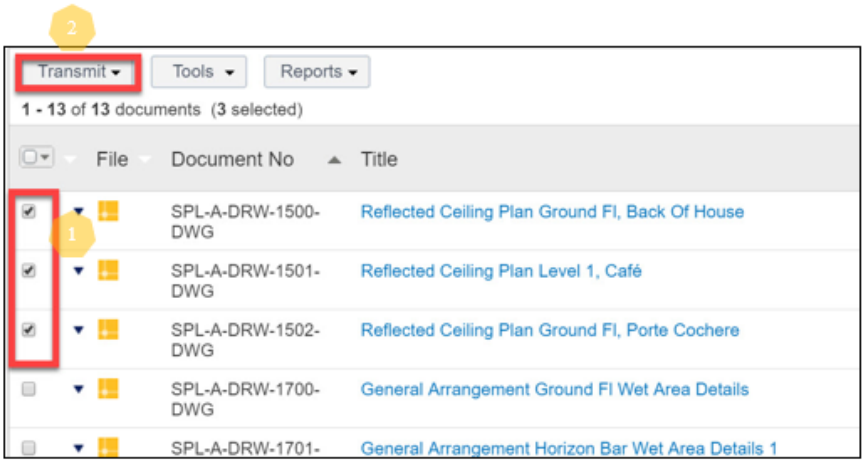
5.3 Transmittal Numbering System

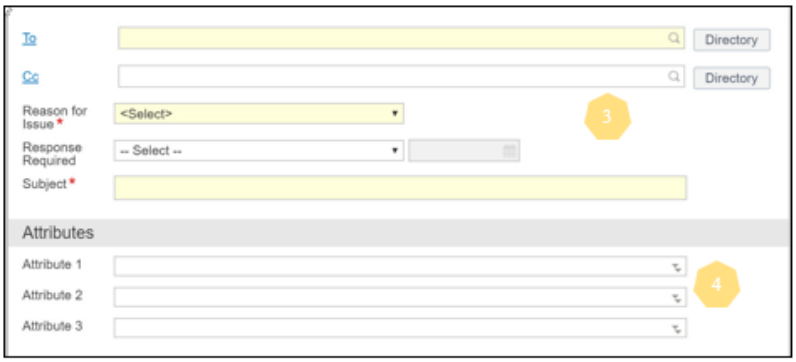
Mail generated in Aconex is automatically assigned a prefix indicating the selected mail type and a unique sequential number. It also adds an organizational prefix to each mail item created. This prefix is managed by each organization administrator.

Originator	Mail Type	Sequence Number
GCR	**TRANSMIT**	**000001**

Example: GCR-TRANSMIT-000001

5.4 Making a Transmittal





1. Select the checkbox next to the documents you want to transmit
2. Click on Transmit button
3. Complete all the mandatory fields
4. Select any Attributes you want to associate with the transmittal.
5. Click the **Send** button

Figure 5.4-1

6. Document

6.1 Project Document

a) All project documents shall be prepared according to Contractual requirements.
b) The HOD shall review and approve all project documents prior to their release.
c) All Project Documents noted in the client requirements shall be submitted to the Client for their review prior to use via Transmittal.
d) Project documents shall be identified uniquely with a document number and revision numbers where required.
e) Originator must use projects template in preparing project documents. Softcopy project templates are available and can be downloaded through PDP-SSP Portal.
f) Submission of project documentation required for approval shall be tracked and monitored to ensure timely approvals for the next course of action to be initiated.
g) Project documents within the project are unique and generated automatically via the Aconex EDMS. Project documents cannot be modified once issued by the GCR DC Centre. Every Project Document shall be numbered in accordance with the agreed and approved project coding system. The coding rules are to be strictly applied. Use of the project coding system is compulsory for all parties involved in the project when issuing project- related documents.

6.2 Maintenance of Master Copies of Project Documents

a) The Quality HOD shall assign the GCR DC Centre to maintain and keep the master copies of the Project Documents.
b) Storage of master copies depends on the originating / distributing location i.e. if a document is created in HQ or the original document is being distributed from HQ, then the document will be kept in HQ only and the copy of the document will be circulated accordingly. Other regional office DC do not need to keep a master copy of the said document unless its vice-versa.
c) Master list of the said documents shall be maintained.

6.3 Project Document Revision

a) Originator may revise project documents to reflect the current practice.
b) Revisions of Documents must always be marked as such and must be registered by the originator as a new Document according to the naming conventions and codes defined within the project coding system. A two-digit number is used to identify the revision. The first version of a Document shall always be defined as 00, with subsequent revisions identified as increments of 1. Change of status for a document does not automatically mark it as a revision change as this may involve only the current stage of a document (example from approval stage to approved stage) without any alteration or amendments to the current document.
c) When revisions are made to a project document, the previous revision is deemed as superseded.
d) Where applicable, for documents prepared in Excel, revisions shall need to be bolded and in Italics.

e) If any change is made in a multi-page Document, that Document must be re-issued in its entirety as a revision.
f) The revised document shall be reviewed by HOD and approved by the PD before reissue.
g) Details of changes are recorded in amendment record by the originator or its representative of which a copy shall be maintained by the GCR DC Centre.
h) The revised document shall then be forwarded and reissued to the controlled copyholders by the GCR DC Centre.

6.4 Document Revision Convention

The document revision practices in use on this project are:

Each Technical Document is associated with a revision index showing its evolution status which can circulate either in Major or Minor Versions (Internal).

The revision number is not part of the document identification number. However, the document should always be identified by its number and the revision number and it should be tagged as a metadata and displayed in the cover page and in the whole document.

Minor Version

Minor Versions of a Technical Document are internal working versions which undergo an extensive review process with Technical Managers and Project Managers preceding the production of the Major Version of the Technical Document.

6.5 Document Title Convention

All project team members must use meaningful and consistent titles when uploading documents. To help facilitate efficient document retrieval and reporting in Aconex, here are some guidelines:

- DO make the title the same as the hardcopy
- DON'T duplicate other document titles
- DON'T use vague titles like: "Document 1", "Document 2", "Document 3"
- DON'T include dates or revisions information
- DON'T use or repeat the document number

6.6 Incoming Document

a) All parties involved in the project shall route all incoming project-related documents through the GCR DC Centre based at HQ or the relevant Project Offices.
b) Any submission project documents must indicate document reference number.
c) Transmittal shall be used by the WPC/Consultant for any submission of documents for information, review, approval/action is required.
d) DC/Gate keeper shall perform quality check to ensure the reference number, revision, template is correct and the softcopy tallies with the hardcopy(s).
e) The respective reviewers identified in the distribution list/distribution matrix should print a hardcopy of the document if the circulation is made by way of email for their own monitoring and tracking for items requiring action.

f) The manner of circulation of the incoming documents could be adjusted to suit the nature/importance of the document.
g) All documents printed out from the Aconex is deemed uncontrolled copy.
h) The GCR DC/gate keeper shall then file the original document into the allocated Master file.

6.7 Outgoing Document

a) Each project documents shall be assigned with a unique document reference number generated automatically via the Aconex EDMS.
b) The originator or its representative shall prepare the draft document, scan, registered and upload the draft document into the Aconex EDMS. Reference numbers are to be obtained from Aconex EDMS.
c) The DC/gatekeeper shall perform quality check to ensure the revision of document and template is correct.
d) If a document is coded not in accordance with the system or the code is a duplicate or is otherwise incorrect, the DC contacts the originator and obtains a correction before taking any other action with the document.
e) The PD/HOD shall approve the document and decide the internal parties to be informed. Document not approved shall be returned to the initiator for removed.
f) The originator shall scan and upload the approved signed document into the Aconex.
g) All outgoing document must through GCR DC Centre based at HQ or the relevant Project Offices.
h) The originator or its representative shall send the signed document via transmittal/RFI with sufficient copies such as acknowledgement copy, carbon copy to external parties, envelopes provided with mailing address to GCR DC for dispatch arrangement, while a hardcopy is made for the DC to file in the designated Master file.
i) Handling of specific P&C document such as tender document shall be dealt with in accordance to special arrangement.
j) If there is any internal distribution identified, the originator or its representative shall distribute to the identified personal via internal transmittal.

6.8 Document Numbering System

All controlled documents on this project are required to have a unique number assigned in accordance with the numbering convention defined below. Please refer to the relevant reference tables for codes applicable to the numbering parts.

Please note that all document numbers on this project are required to have a unique number. All technical document numbers will be generated by Aconex.

Project	Originator	Contract / Zone	Area	Doc. Type	Discipline	Sequence Number
NSCR	**GCR**	**N01**	**CLPSTN**	**RPT**	**A**	**000001**

Example: NSCR-GCR-N01-CLPSTN-RPT-A-000001

For more detail on Correspondence Number System please refer to Appendix A.

6.9 Uploading a Document

1. Click **Documents.** Select **Upload a new document**. Note: This option is not be available to all users. If it isn't, you do not have permission to upload documents. Please see your Organization Administrator for more details.
2. Complete all mandatory fields which are shown in yellow.
3. Now select either **Drop file here**, to use drag and drop, or select **click to upload**.
4. Finish adding any other details, then click **Upload**.

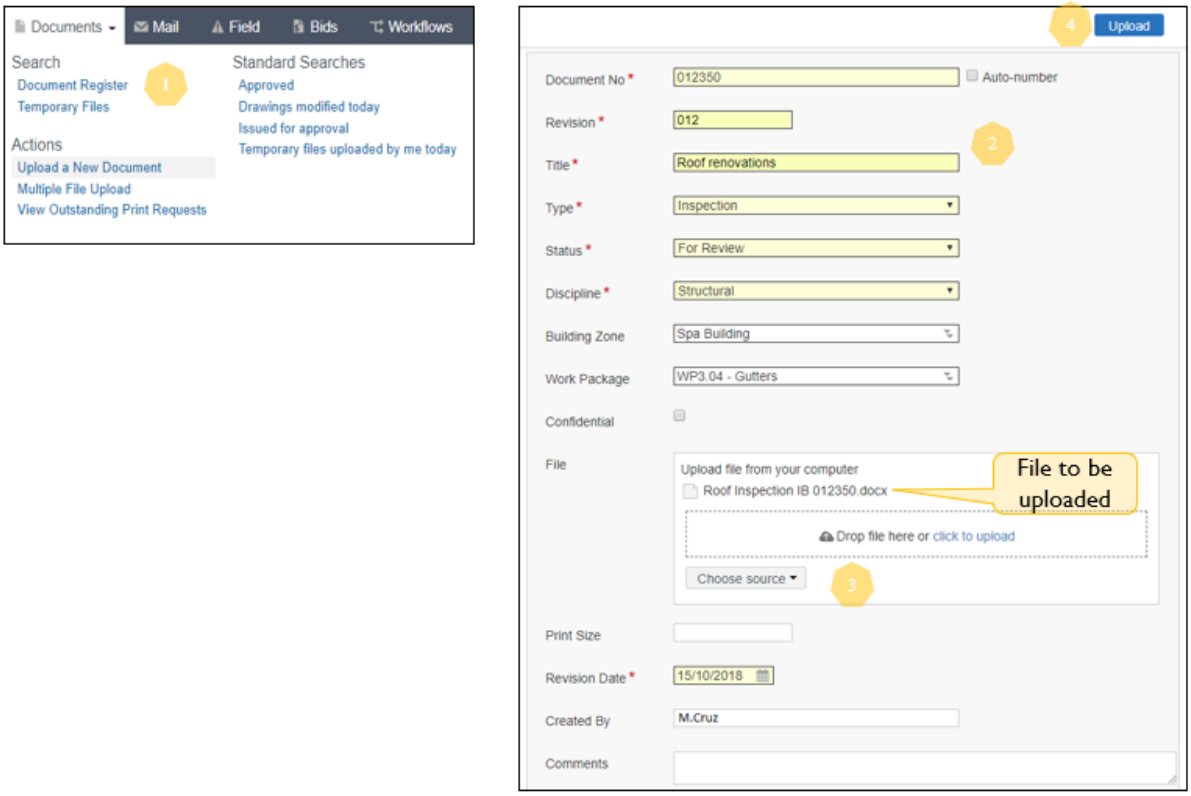


Figure 6.9-1

6.10 Downloading a Document

1. Find the document you want to download using the Aconex document search.
2. A file icon appears alongside each document in the search results list.
3. Click the file icon to download the file.

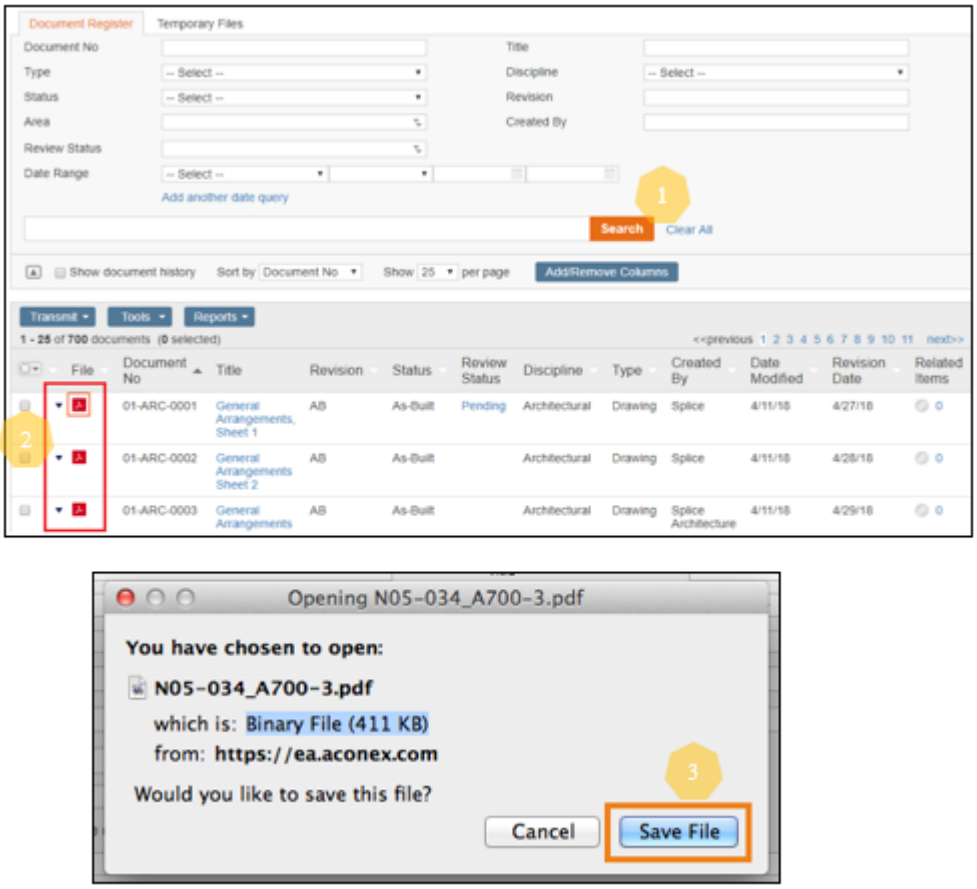


Figure 9.10-1

In some browsers, you'll see a window that asks you to confirm the download. Click the **Save File** button.

6.11 View Document Activity

The Document Activity tool lets you see who's made changes to documents in your Document Register. The Document Activity window displays, showing a list of the documents that have been changed recently. Updates are displayed in order, with the most recently updated documents at the top.

1. Click the Document Activity button under the menu bar at the top of the page
2. Click anywhere in that document's details row, and click the **View Document Properties**

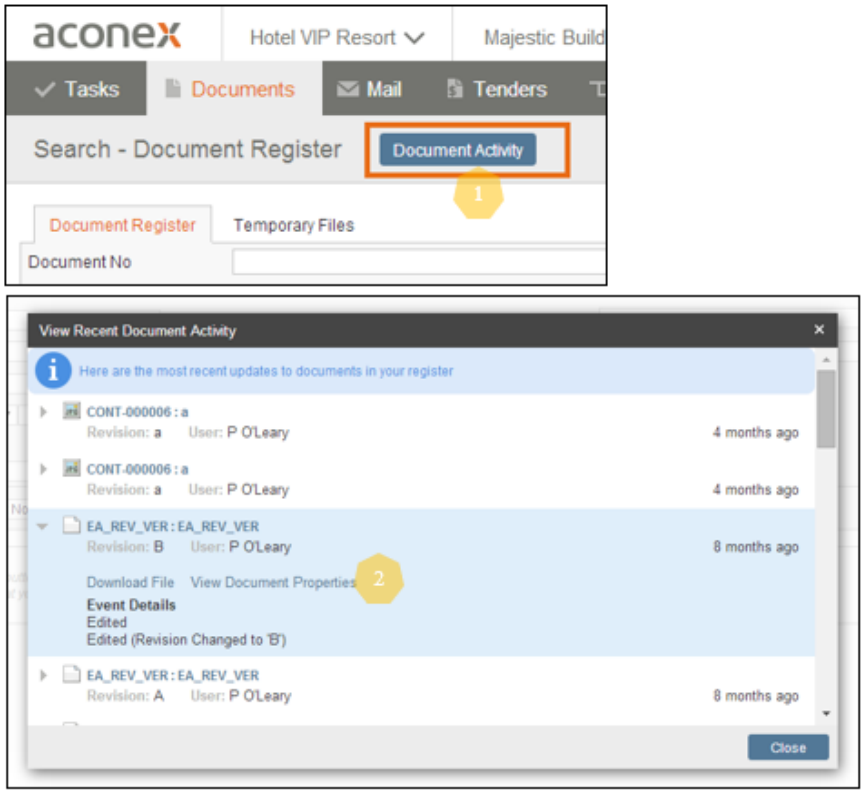


Figure 6.11-1

6.12 Update (Supersede) Document

In Aconex updating a document is called 'superseding'. All versions of a document are kept in Aconex automatically. If you need to upload a newer version of a document that is already in Aconex follow these steps.

1. Click on the document row. Select **Supersede.**
2. Make sure all the mandatory fields are filled in.
3. Drag and Drop file or click the click to upload link to upload file.
4. Click the **Supersede Document** button

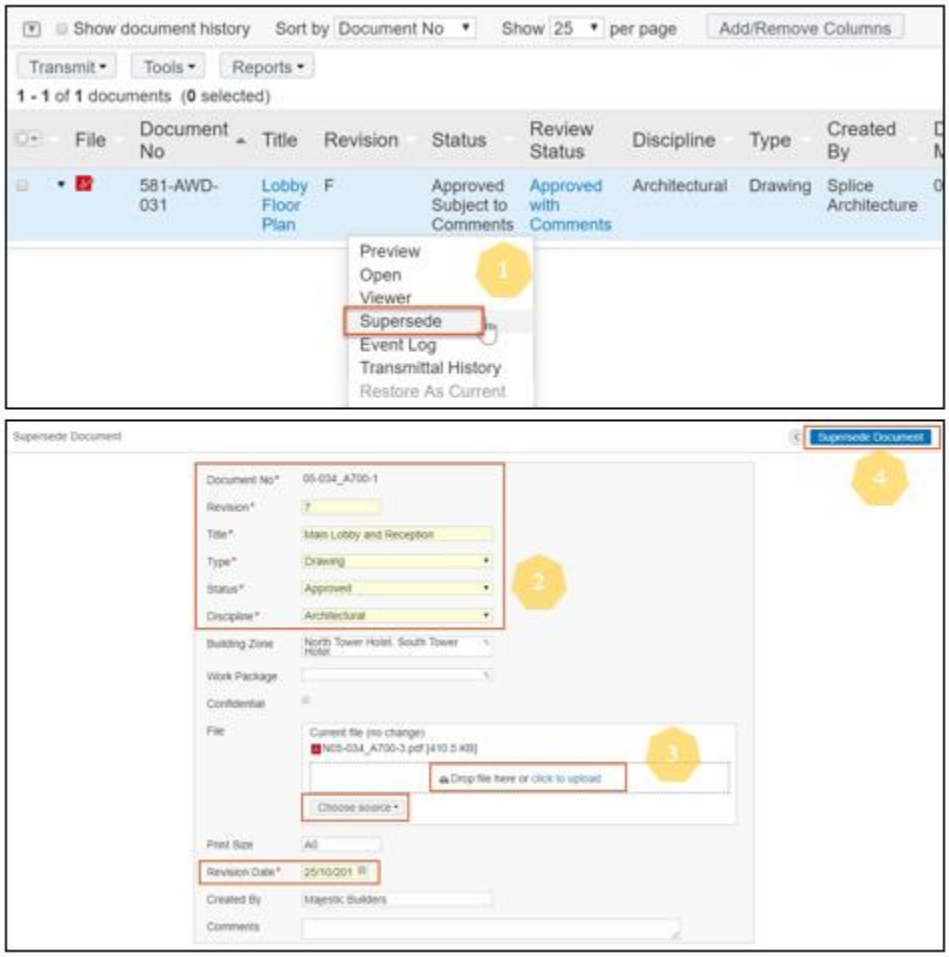

Show document history
Sort by Document No
Show 25 per page
Add/Remove Columns
Transmit
Tools
Reports
1 - 1 of 1 documents (0 selected)
File
Document No
Title
Revision
Status
Review Status
Discipline
Type
Created By
581-AWD-031
Lobby Floor Plan
F
Approved Subject to Comments
Approved with Comments
Architectural
Drawing
Splice Architecture
Preview
Open Viewer
Supersede
Event Log
Transmittal History
Restore As Current
1
Supersede Document
Supersede Document
4
Document No*
05-034_A700-1
Revision*
7
Title*
Main Lobby and Reception
Type*
Drawing
Status*
Approved
Discipline*
Architectural
2
Building Zone
North Tower Hotel, South Tower Hotel
Work Package
Confidential
File
Current file (no change)
N05-034_A700-3.pdf [410.5 KB]
Drop file here or click to upload
Choose source
3
Print Size
A0
Revision Date*
25/10/201
Created By
Majestic Builders
Comments

Figure 6.12-1

PROJECT SPECIFIC PROCEDURE

APPENDIX G: ACONEX – ANNEX A

1. Document Type

Code	Definition
ADM	Administration
BRF	Brief
CON	Contract
DWG	Drawing
ENV	Environmental Management
FIN	Financial
LEG	Legal
LTR	Letter
MTG	Meeting
MMO	Memorandum
CFP	Payment Claim
PPT	Presentation
PRC	Procurement
PRD	Public Relations
RPT	Report
ROW	Right of Way
SCH	Schedule
STT	Statutory Document
STY	Study
TDC	Technical Document
UTL	Utilities

2. Discipline

Code	Definition
AC	Accessibility
A	Architectural
AF	Automated Fare Collection
CE	Civil Engineering
X	Contractors
CT	Crops and Trees
D	Designer
DM	Digital Management
K	DOTr
E	Electrical
GD	Environmental Graphic Design
EN	Environmental Management and Monitoring
EE	Escalators and Elevators
FP	Fire Protection
GN	Gender and Development
Z	General (Non-specific discipline)

GDE	Geodetic Engineering
Code	**Definition**
GTE	Geotechnical Engineering
GRM	GRM
HS	Health and Safety
H	Heritage and Archeology
HAN	Human Resources
IS	Informal Settlers Resettlement
IP	Indigenous Peoples
ID	Interior Design
LQ	Land Acquisition
LA	Landscape Architectural
M	Mechanical
DA	Official Development Assistance
OM	Operations and Maintenance
PS	Plumbing and Sanitary
QA	Quality Assurance and Quality Control
QNT	Quantity Surveying
RS	Rolling Stock
SE	Security
SI	Signaling
Y	Specialist Designer
SC	Station Interconnection
S	Structural
W	Subcontractor
T	Telecommunications
TW	Temporary Works
TW	Trackwork
TO	Transit Oriental Development
Utilities	Utilities

3. Zone

Code	Definition
CP01	Contract - N1 - CP01
CP02	Contract - N1 - CP02
CP03	Contract - N1 - CP03
CP04	Contract - N1 - CP04
CP05	Contract - N1 - CP05
NST	Contract - N1 - NSTren
N01	Contract - N2S - N01
N02	Contract - N2S - N02
N03	Contract - N2S - N03
N04	Contract - N2S - N04
N05	Contract - N2S - N05
N06	Contract - N2S - N06
GCR	Contract - N2SC - GCR
NS02	Contract - N2SC - NS02
NS03	Contract - N2SC - NS03
S01	Contract - SC - S01

S02	Contract - SC - S02
S03A	Contract - SC - S03A
S03B	Contract - SC - S03B
S04	Contract - SC - S04
S05	Contract - SC - S05
S06	Contract - SC - S06
S07	Contract - SC - S07
NS01	Contract - SC- S07
DOTR	DOTr
ATG	Facilities - All At-Grade Works
ELE	Facilities - All Elevated Works
ESD	Facilities - All External Site Developments
OSD	Facilities - All Over Ground and Topside Developments
SFT	Facilities - All Shafts
STN	Facilities - All Stations
TRS	Facilities - All Transition Structures
TUN	Facilities - All Tunnels
UGN	Facilities - All Underground Works
VIA	Facilities - All Viaducts and Bridges
NCC	Project - NCC Extension (NCC)
N1	Project - North 1 (N1)
N2	Project - North 2 (N2)
N2SC	Project - North 2 (N2) and (SC)
NSS	Project - NSCR System
PSLH	Project - PNR South Long Haul
SC	Project - South Commuter (SC)
SCR	Project - Subic Clark Railway
RAIL	Railway Sector

4. Area

Code	Definition
ANG	LGU - Angeles
APL	LGU - Apalit
BAL	LGU - Balagtas
BAM	LGU - Bamban
ZW	ZONE Wide
BIN	LGU - Binan
BOC	LGU - Bocaue
CBY	LGU - Cabuyao
CMB	LGU - Calamba
CAL	LGU - Caloocan
CLP	LGU - Calumpit
CAP	LGU - Capas
GUI	LGU - Guiguinto
MAB	LGU - Mabalacat
MKT	LGU - Makati
MLB	LGU - Malabon
MAL	LGU - Malolos
MNL	LGU - Manila

MAR	LGU - Marilao
MEY	LGU - Meycauayan
MIN	LGU - Minlain
MTN	LGU - Muntimlupa
PRN	LGU - Paranaque
CSF	LGU - San Fernando
SPD	LGU - San Pedro
STR	LGU - Santa Rosa
STO	LGU - Santo Tomas
TAG	LGU - Taguig
VAL	LGU - Valenzuela
BUL	Province - Bulacan
LGN	Province - Laguna
PAM	Province - Pampanga
TLC	Province - Tarlac
NCR	Region - NCR
REG3	Region - Region III
REG4A	Region - Region IV-A
ALASTN	Station - Alabang
ANGSTN	Station - Angeles
APLSTN	Station - Apalit
BALSTN	Station - Balagtas
BANSTN	Station - Banlic
BCTSTN	Station - Bicutan
BINSTN	Station - Binan
BLUSTN	Station - Blumentritt
BOCSTN	Station - Bocaue
BCLSTN	Station - Bucal
BUESTN	Station - Buendia
CBYSTN	Station - Cabuyao
CMBSTN	Station - Calamba
CALSTN	Station - Caloocan
CLPSTN	Station - Calumpit
CRKSTN	Station - Clark
CIASTN	Station - Clark International Airport
EDSSTN	Station - EDSA
ESPSTN	Station - Espana
FTISTN	Station - FTI
GUISTN	Station - Guiguinto
MABSTN	Station - Mabalacat
MLBSTN	Station - Malabon
MALSTN	Station - Malolos
MLSSTN	Station - Malolos South
MARSTN	Station - Marilao
MEYSTN	Station - Meycauayan
MTNSTN	Station - Muntinlupa
NC1STN	Station - New Clark City 1
NC2STN	Station - New Clark City 2
NC3STN	Station - New Clark City 3
NICSTN	Station - Nichols

PCTSTN	Station - Pacita
PACSTN	Station - Paco
CSFSTN	Station - San Fernando
SPDSTN	Station - San Pedro
STMSTN	Station - Santa Mesa
STRSTN	Station - Santa Rosa
STOSTN	Station - Santo Tomas
SDLSTN	Station - Sindalan
SOLSTN	Station - Solis
SCTSTN	Station - Sucat
TBISTN	Station - Tabing Ilog
TKTSTN	Station - Tuktukan
TUTSTN	Station - Tutuban
VALSTN	Station - Valenzuela
VLPSTN	Station - Valenzuela Polo
CMBDPT	Depot - Calamba
CRKDPT	Depot - Clark
MLDDPT	Depot - Malanday

PROJECT SPECIFIC PROCEDURE

APPENDIX H: AUTODESK NAVISWORKS

1. Project Coordination

1.1 Clash Detection and Conflict Resolution

Navisworks is a separate Autodesk software that can read 3D models and CAD drawings. A conversion plug-in is automatically added in Revit when Navisworks is installed.

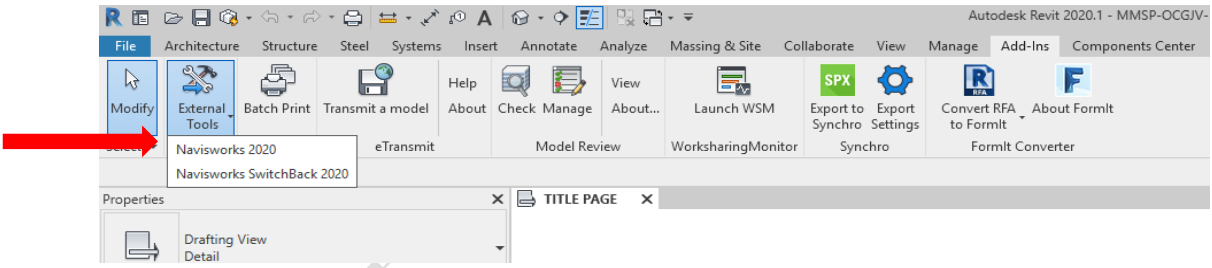
WIP Revit files can be loaded directly to Navisworks but large files have a potential to slow down the software's ability to generate results. Each project's discipline will be modelled separately per Revit file (Architectural, Structural, Electrical, Mechanical, Plumbing, and Fire Protection). This will help easily categorize elements in their respective disciplines when conducting clash detection.

The project sample used here will be DEPOT OCC Building.

Steps to Clash Detection:

Figure 1: **Convert Revit to Navisworks File**

- Unload any **Revit Links** via Manage Links
- Convert each discipline as **NWC** (Navisworks Cache File)



Navisworks Plugin for Revit

Revit>Add-ins>External Tools>Navisworks

*Navisworks Plug-in can only convert to **NWC**

Save NWC files in the **WIP** of the designated project folder in **02_BIM_Clash_Report** folder:

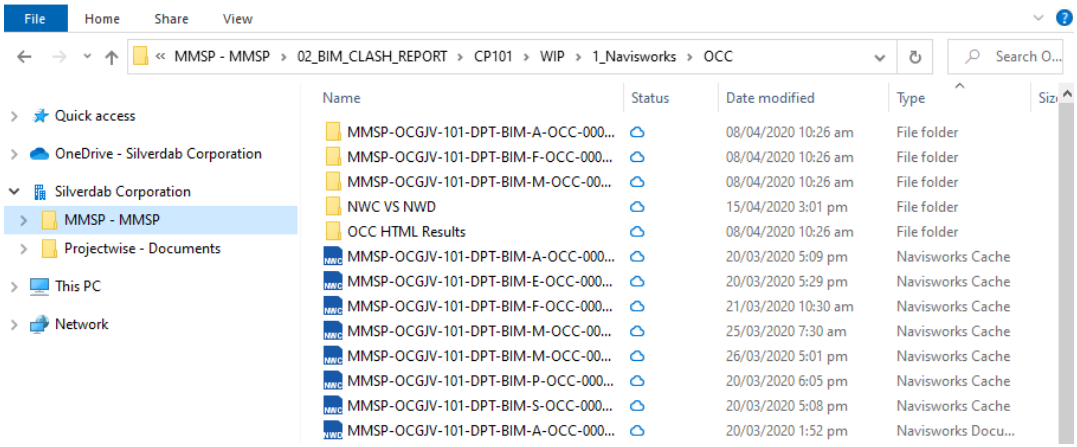
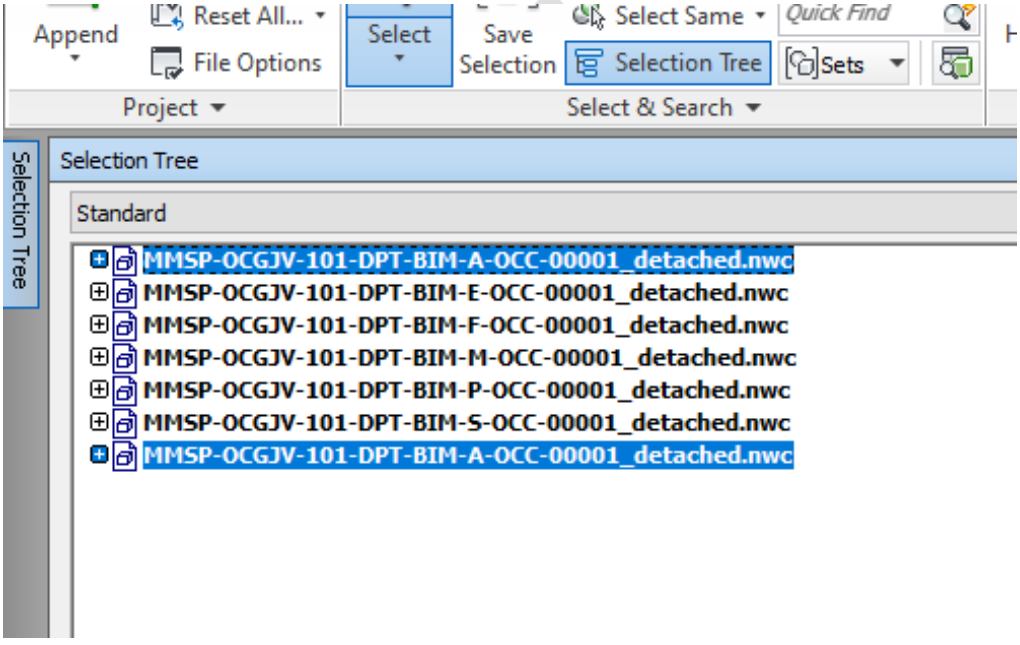


Figure 2: **Append/Merge to Navisworks**

Both Append and Merge are ways to import 3D and CAD files into Navisworks. The difference happens when re-importing same file.

- **Append NWC files** to load all disciplines in Navisworks
- **Merge updated NWC files** to overwrite the existing appended file

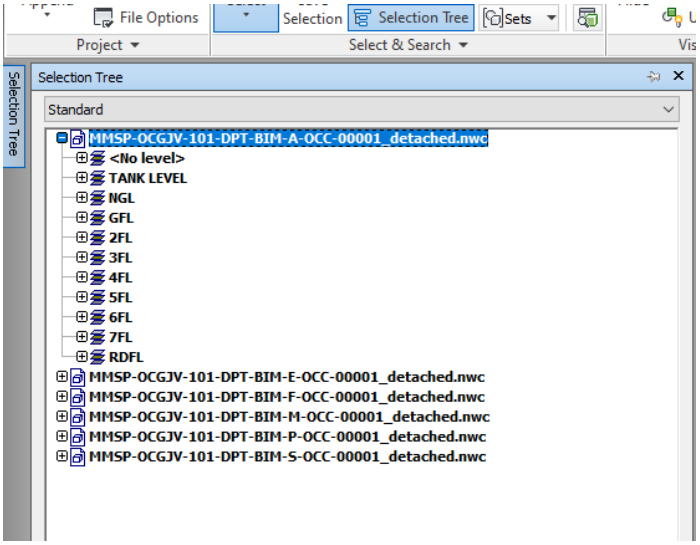
*this is to avoid duplicate files of the same filename in the Selection Tree:



Files and 3D model will be duplicated when you re-append an updated file of the same name

Figure 3: **Organize Set List**

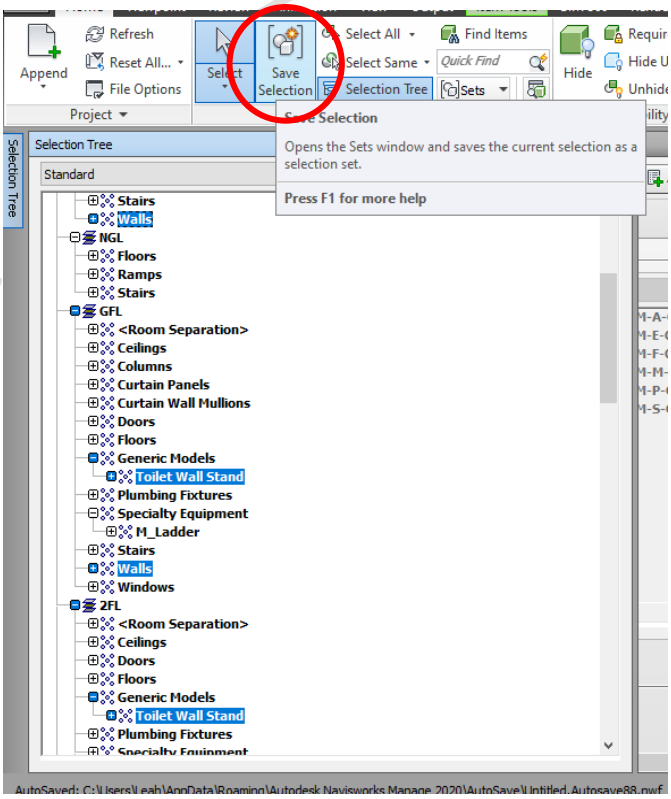
Initially, when breaking down the contents of a 3D model in Navisworks, elements are sorted by floor levels, which takes time to locate when performing clash detection.



Creating set list will sort elements under their respective discipline. This will efficiently isolate, locate and select a certain group of similar elements needed to run clash detection.

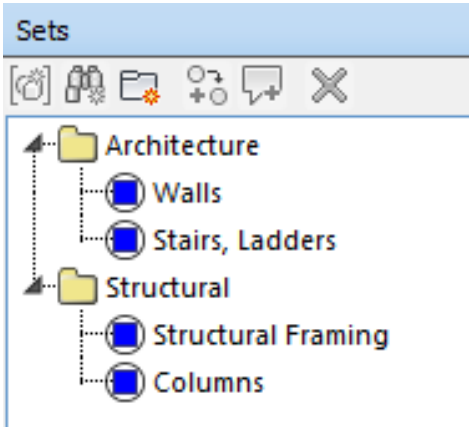
Steps to create Sets:

1. Open all layers under one discipline.
2. Highlight all similar elements and click **Save Selection.**



Creating a set in Navisworks

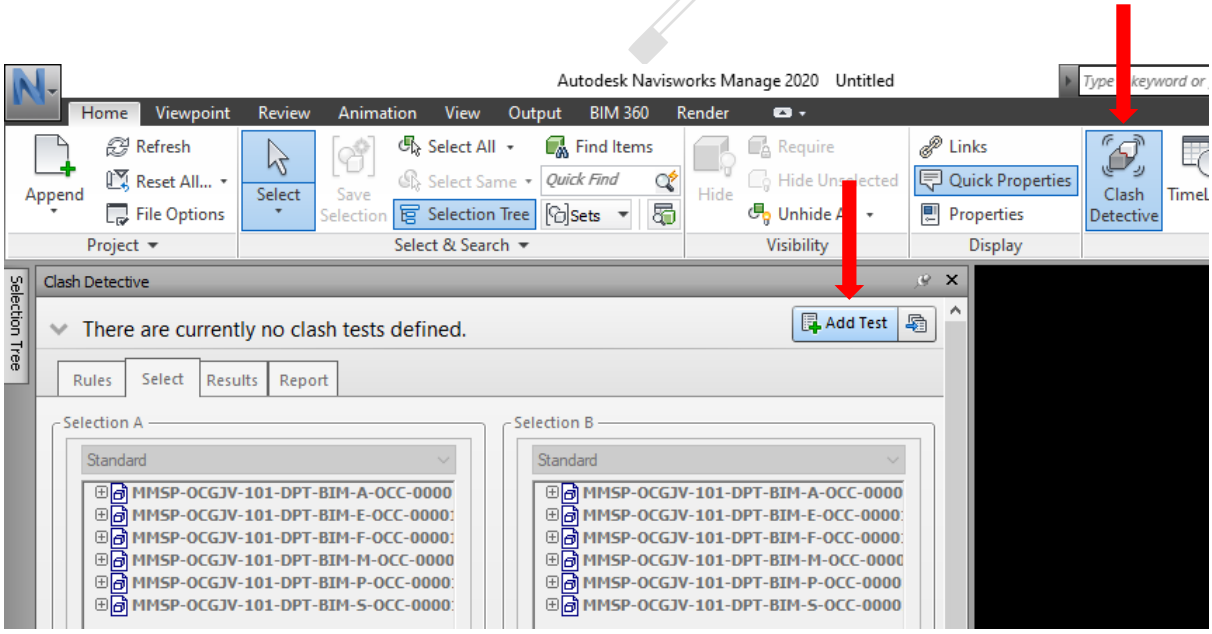
3. This will be saved in **Manage Sets.**
4. **Rename** the saved set and create folders per discipline.



5. Drag sets to respective folders.

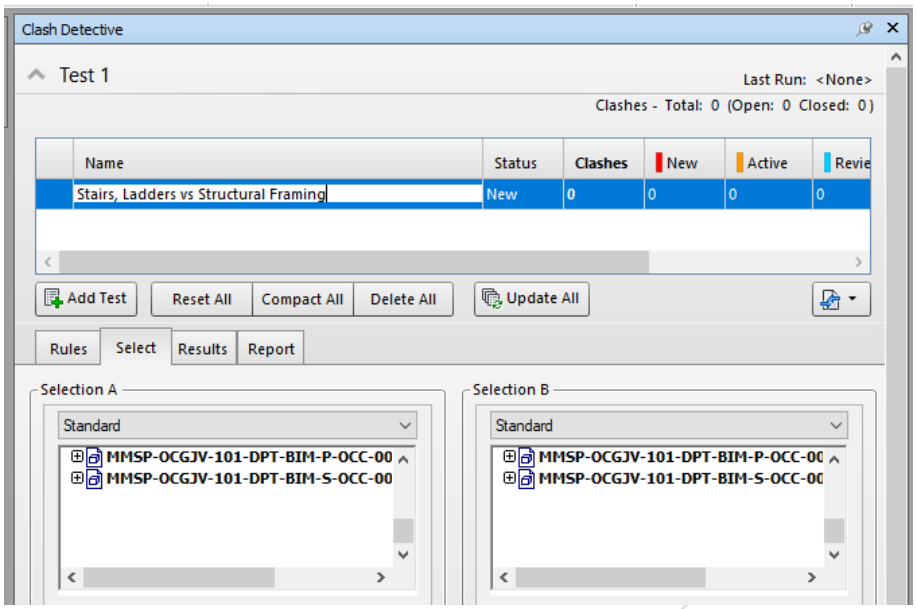
Figure 4: **Perform Clash Detection**

- In Home>Clash Detective, click **Add Test**

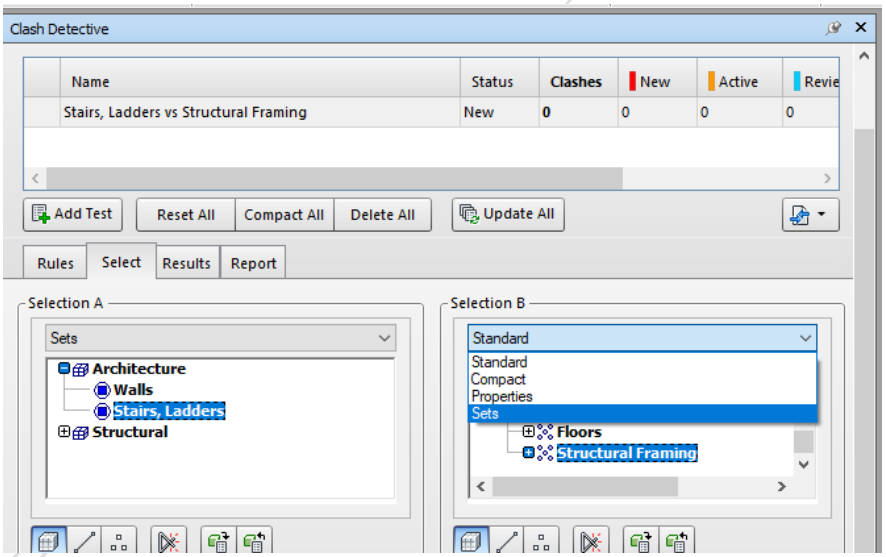


Starting Clash Detection in Navisworks

- **Rename** "Test 1" to the 2 sets you are going to test



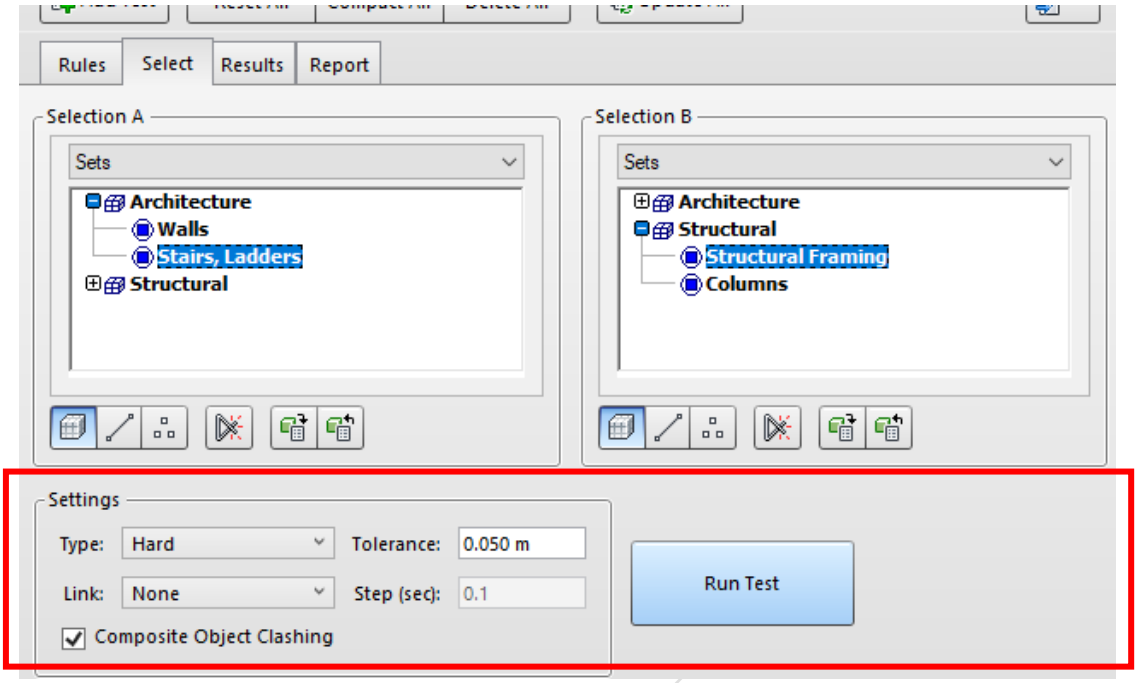
- Under **Select Tab**, change Standard option to Sets



*Standard is the same as the contents from the Selection Tree

*Sets are the saved selections in Manage Sets

- Under Settings set the **Type** of clash and **Tolerance**
- Then **Run Test**



The default Type of clash is Hard

Hard = collision or intersection between elements.

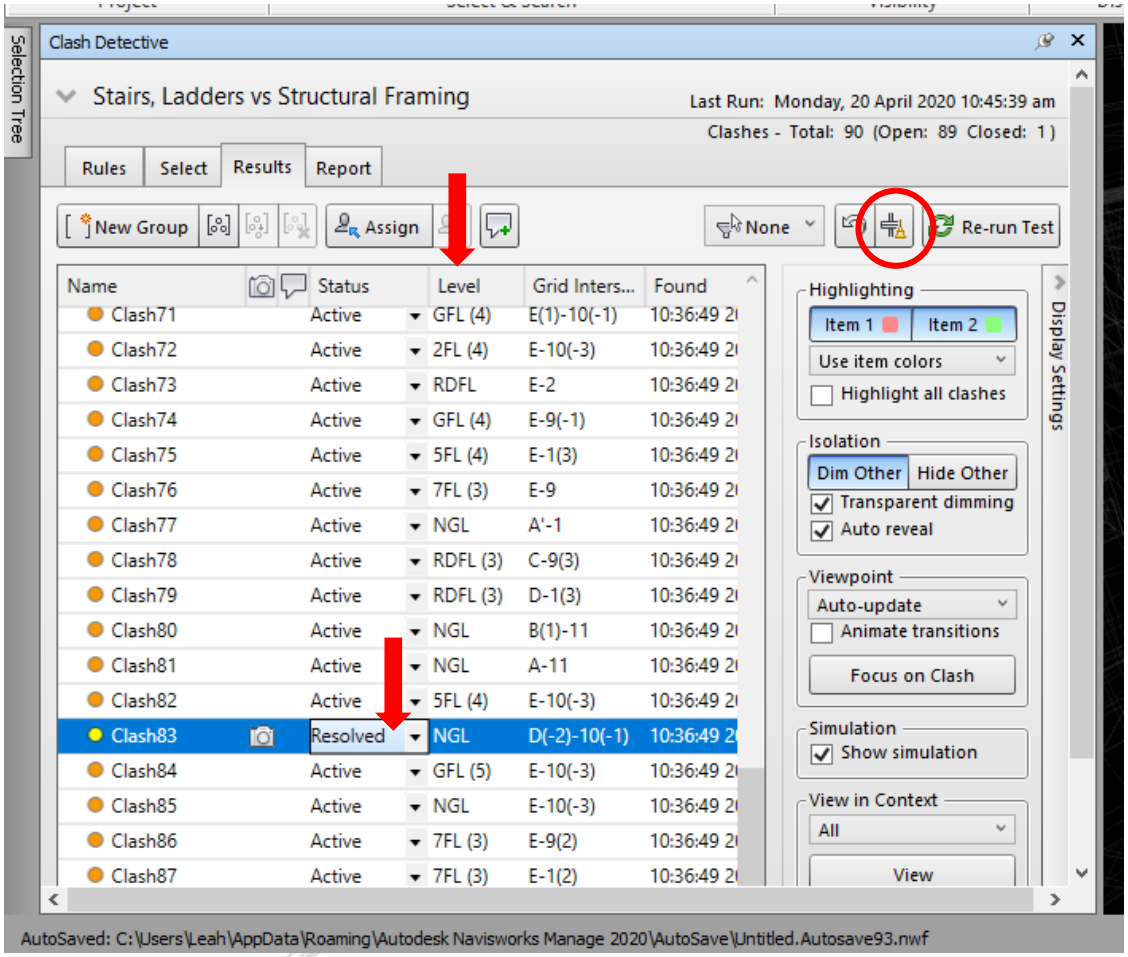
Tolerance is the maximum amount of distance that the clash detective will ignore.

Figure 5: **Review Results and Clash Group**

Some clash results still need filtering or not needed to be submitted as a clash item.

To remove an item from clash results, change the status to **Resolve** then click the **Compact Icon** located at the upper-right of the results window.

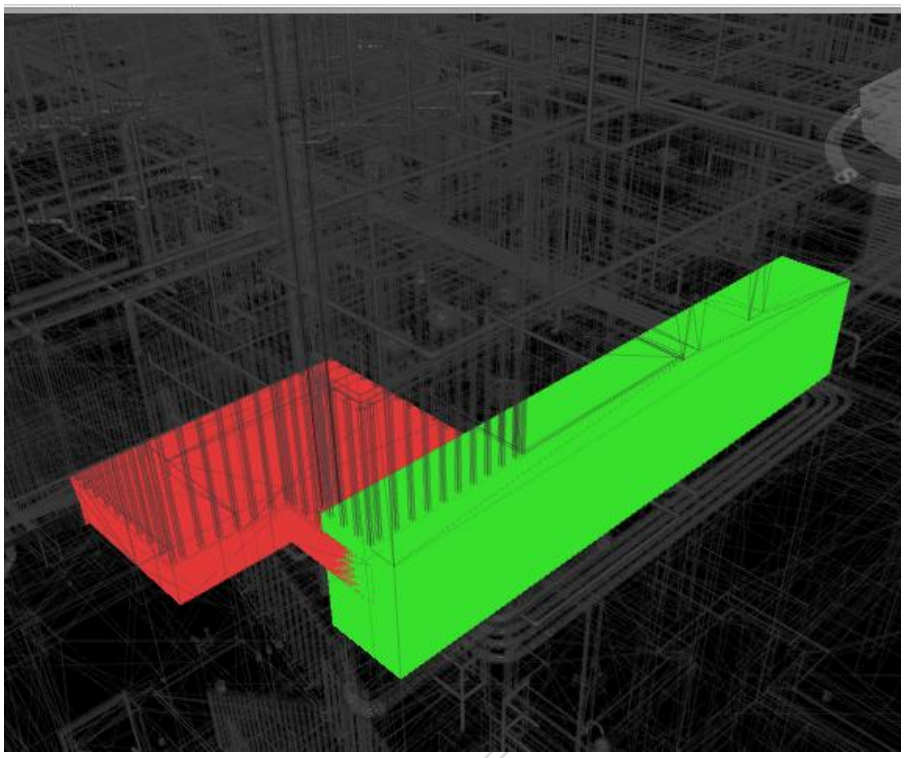
See to it that the results are in ascending order, from ground floor to roof deck. Sort out the results by clicking the "Level" column as seen below:



Review and sorting clash results in Navisworks

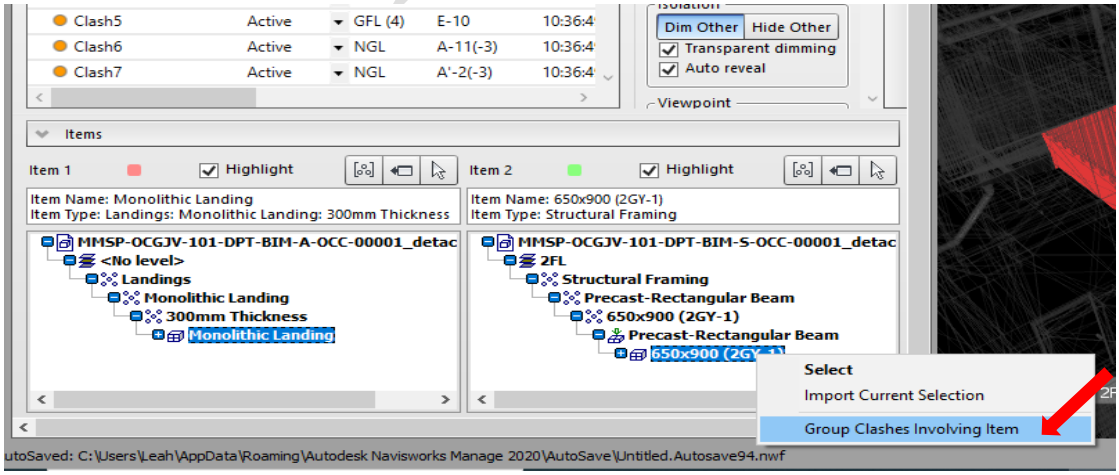
There are multiple clashes revolving around 1 element that contribute to a large number of clash items. Compressing these similar clash results can generate a more précised and straightforward clash report. Creating **Clash Groups** can compress and decrease the number of results as they will be counted as one clash item.

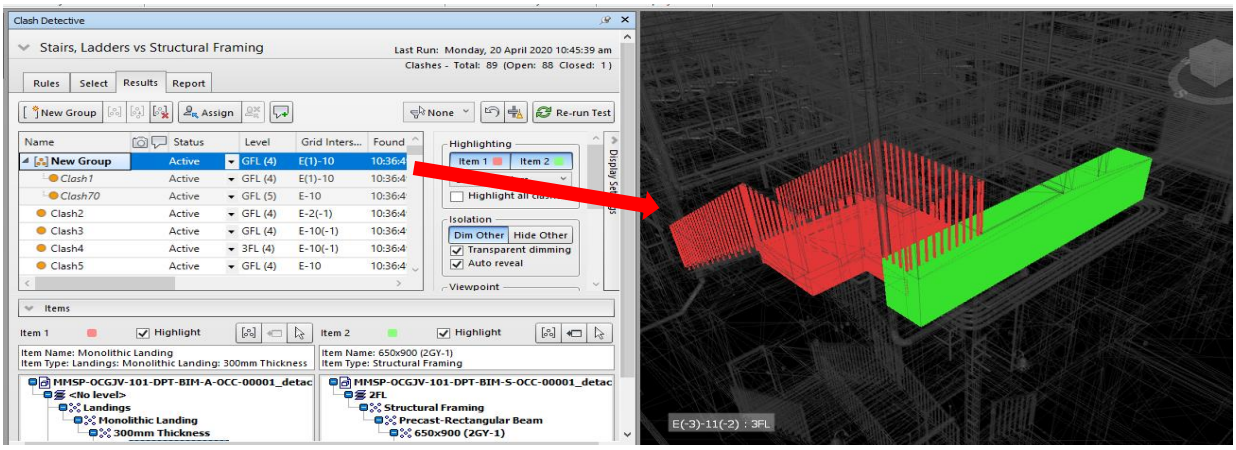
In the sample clash *Stairs, Ladders vs Structural Framing*, Landing and Railing are visibly clashing with the beam.



Example of clash result in Navisworks, Stair vs Beam

To create a Clash Group of both Landing and Railing conflicting with the Beam, right-click the specific name of the Beam and click **Group Clashes Involving Item.**





A clash group of 2 stair elements vs 1 structural framing element

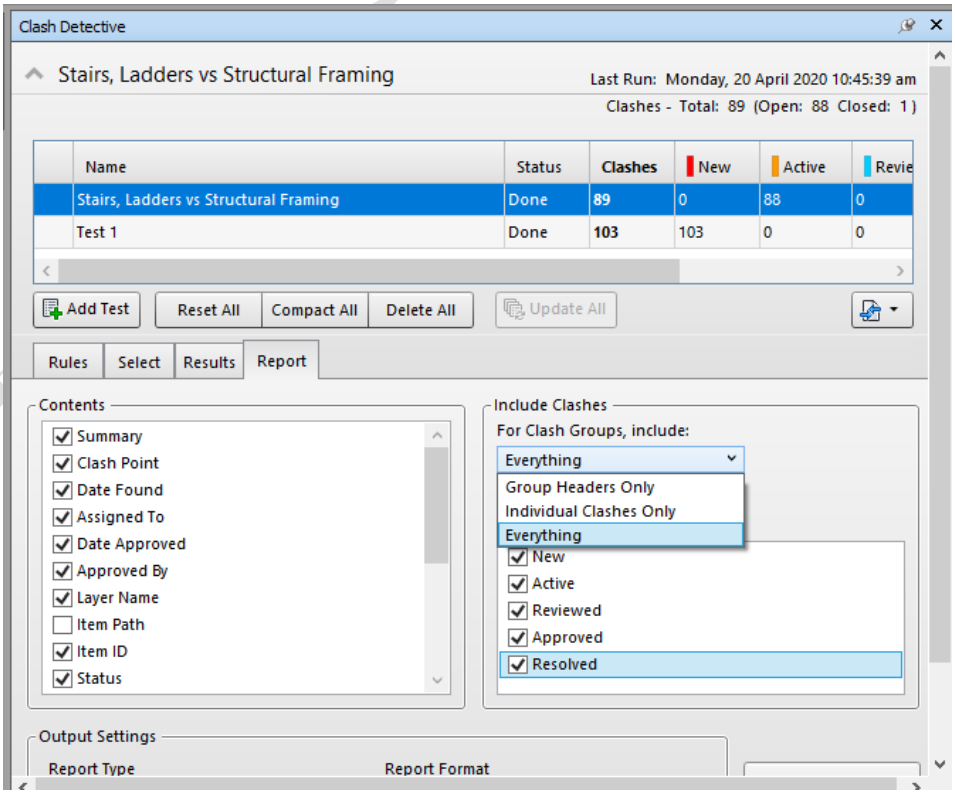
Common clashes on the beam is now counted as one clash item.

Figure 6: **Export Clash Results**

Report Tab shows settings and other contents you want to include before exporting the Clash Results:

For Clash Groups you can show the breakdown of each clashes in a group by choosing **"Everything"** otherwise, "Group Headers Only".

Filter out the Clash Results by clash status.



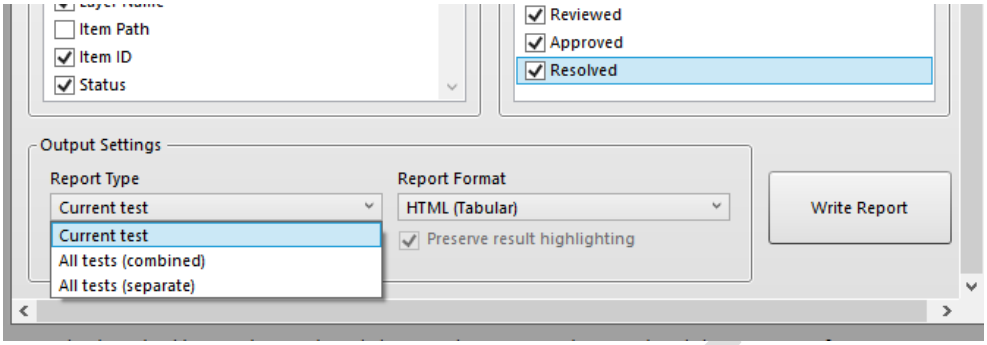
Output Settings provides exporting options before executing **Write Report**

- In Report Type:

  Select **Current Test** or **All Tests (separated)**

- In Report Format:

  Select **HTML (Tabular)** *this can be opened in Excel



It is recommended to finalize all Clash Results before exporting to generate all tabulated results in one click.

Click **Write Report** to export Clash Results in HTML file. Save the results in a new folder under the same file location of the NWC files.

Figure 7: **Saving Navisworks File**

Save the whole Navisworks file as **NWF** to retain the 3D files and clash results. To re-open Navisworks Project, click the Navisworks logo, then Open to load the NWF. Once loaded, no need to re-append or re-merge the NWC files per discipline.

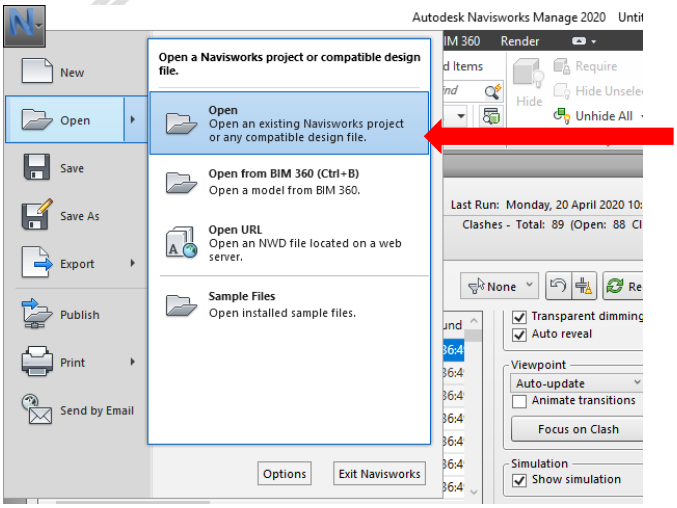
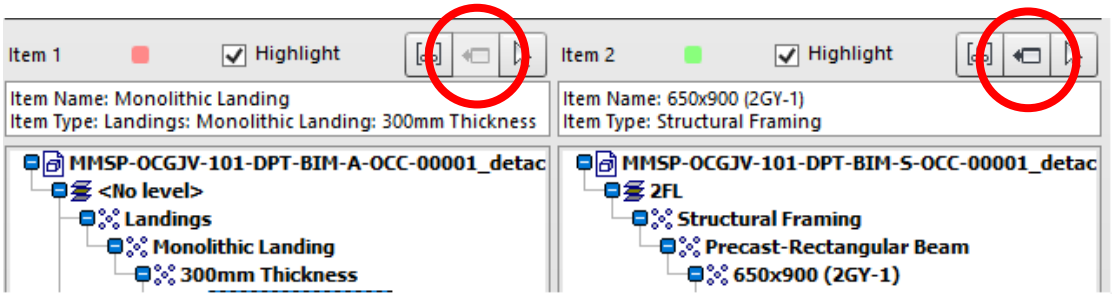


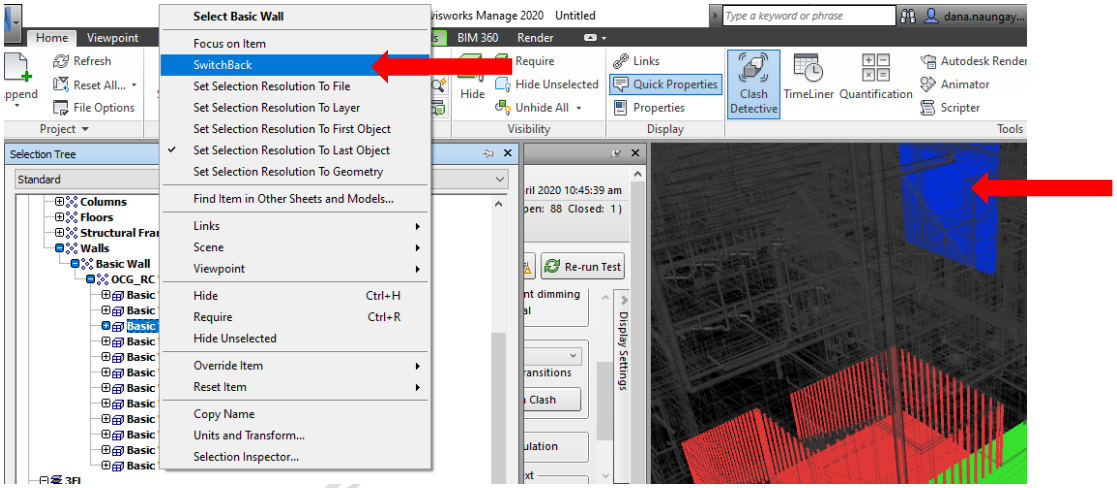
Figure 8: **Switchback**

Switchback function allows Navisworks users to directly locate the clashing element in the corresponding Revit file. Only one element can be selected per switchback.

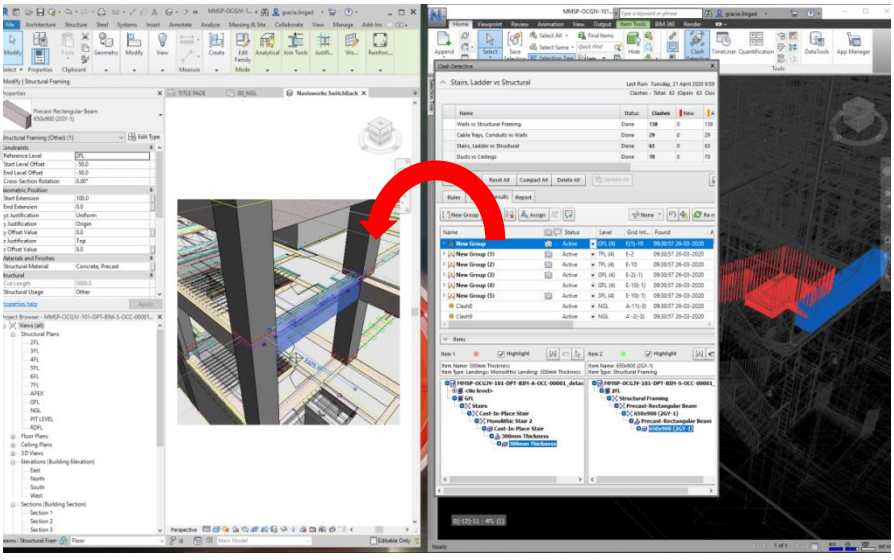
Two ways to conduct Switchback is to (1) click the **Switchback icon** encircled below located in the Results tab;



or (2) directly select in the element in 3D view or Selection Tree then **Right-click>Switchback**.



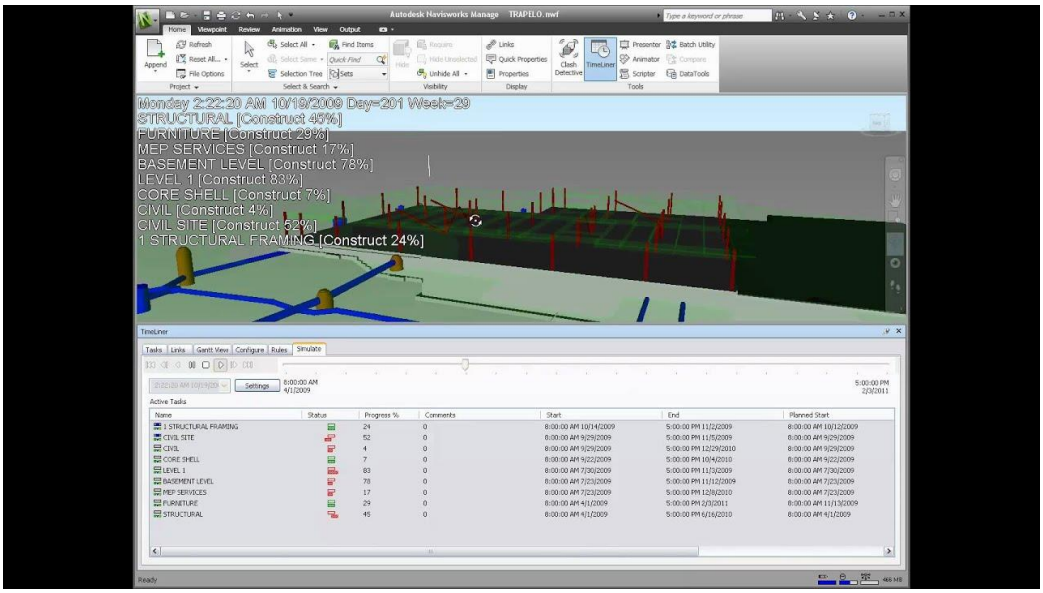
Once Switchback is clicked, the original Revit file will automatically open and load to highlight the target element.



Switchback from Navisworks to corresponding Revit file

1.2 4D BIM Modeling for visualization

Model data is put into a timeline, the construction progress, procedures, can be simulated and visualised for a period of days, weeks or months. The integration of this process and its' stages are represented in the diagram. Primavera data will be linked with the BIM models facilitating analysis of progress.



2. Information Exchange

2.1 Content Organization

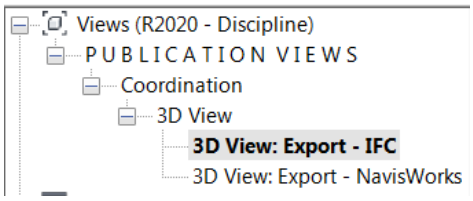
In order to maintain the data of the Building Information Model for future use, all submissions through project phases, shall require submission of following formats:

- RVT: Autodesk Revit files
- NWC: Autodesk Navisworks Cache Format
- IFC: Industrial Foundation Class file.
- DGN: Bentley Aecosim
- NWD: Federated Autodesk Navisworks file.

No family shall be added to the project without prior review and approval of the Respective Discipline Task Manager.

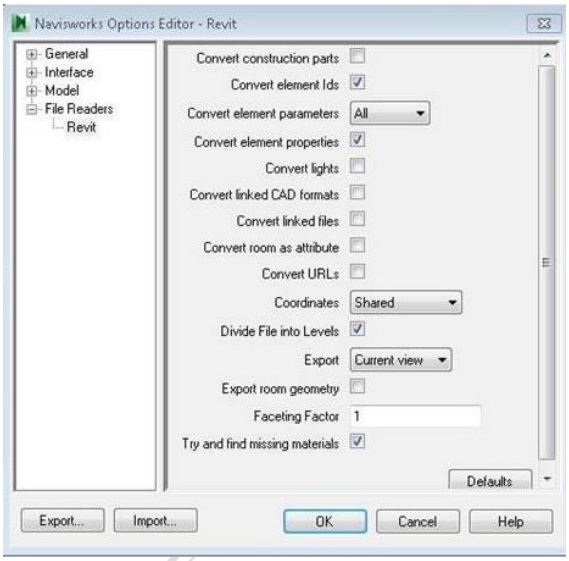
2.2 Revit-Navisworks Export Setting

Each Revit model which contains 3D Geometry should have one 3D view specifically for exporting to Navisworks (see below sample, 'EXPORT - '). This view should have a view template applied which is set to project requirements (E.g. Detail Level = Fine, 'Imported Categories' turned off, Scope and Section boxes turns off etc.).



Export View Naming

The below is the standard for exporting Revit models to nwc for 'project review' and '3D Coordination' BIM Uses. The most important option is that the 'Shared Coordinates' option is selected. This will allow all project parties to link in other discipline nwc files.



Navisworks Export Setting

PROJECT SPECIFIC PROCEDURE

APPENDIX I: CDE PROJECTWISE (OPTIONAL)

1. Project Data Management

1.1 Purpose

The purpose of this appendix is to provide guidance on managing electronic project documents throughout the life of a project until a project's acceptance. During the project development and delivery process many documents, drawings and exhibits are created in electronic format. At NSCREx Project multiple program areas work concurrently on projects. Frequently a Design Group will work on part of the project, while another Functional Unit will work at the same time on another part of the project. Sometimes two Regions may need to work together on a project. Electronic project documents need to be stored in a way that all project contributors have access to the most current information at all times, no matter where they are located geographically or organizationally. This is accomplished using ProjectWise.

1.2 Introduction

This appendix provides basic knowledge regarding engineering document management and usage within the whole project life cycle. Document management is how documents are organized and stored in order to facilitate a collaborative work environment. Its primary purpose is to have a safe repository for information, to minimize the possibility that information is lost, and to effectively share information. Electronic document management is designed to ensure that in the event of an unforeseen damaging situation, only minimal work might be lost. Dependable methods of electronic document management ensure transferability, provide ease of record keeping, and ensure availability and access to information in electronic formats.

1.3 ProjectWise

ProjectWise is used to organize and manage electronic project documents for the NSCREx Project. Exhibit 14-1 describes document types and formats stored in ProjectWise. All electronic project documents shall reside in ProjectWise. A project's electronic documents typically include reports, studies, permits, mapping, terrain models, control, correspondence, and more. Items such as e-mail, if it contains project decisions, or pertinent information, should also be retained in ProjectWise. NSCREx staff should return documents to the checked in status in ProjectWise each time a document is closed. Consultants shall submit corresponding documents into ProjectWise for any paper or email submissions made to their Project Manager/ Job Manager/ Consultant Manager. Consultants shall submit electronic documents containing the information stated in Table 14-1 ProjectWise Workflow States and Archive Data to the folder designated by their Project Manager/ Job Manager/ Consultant Manager.

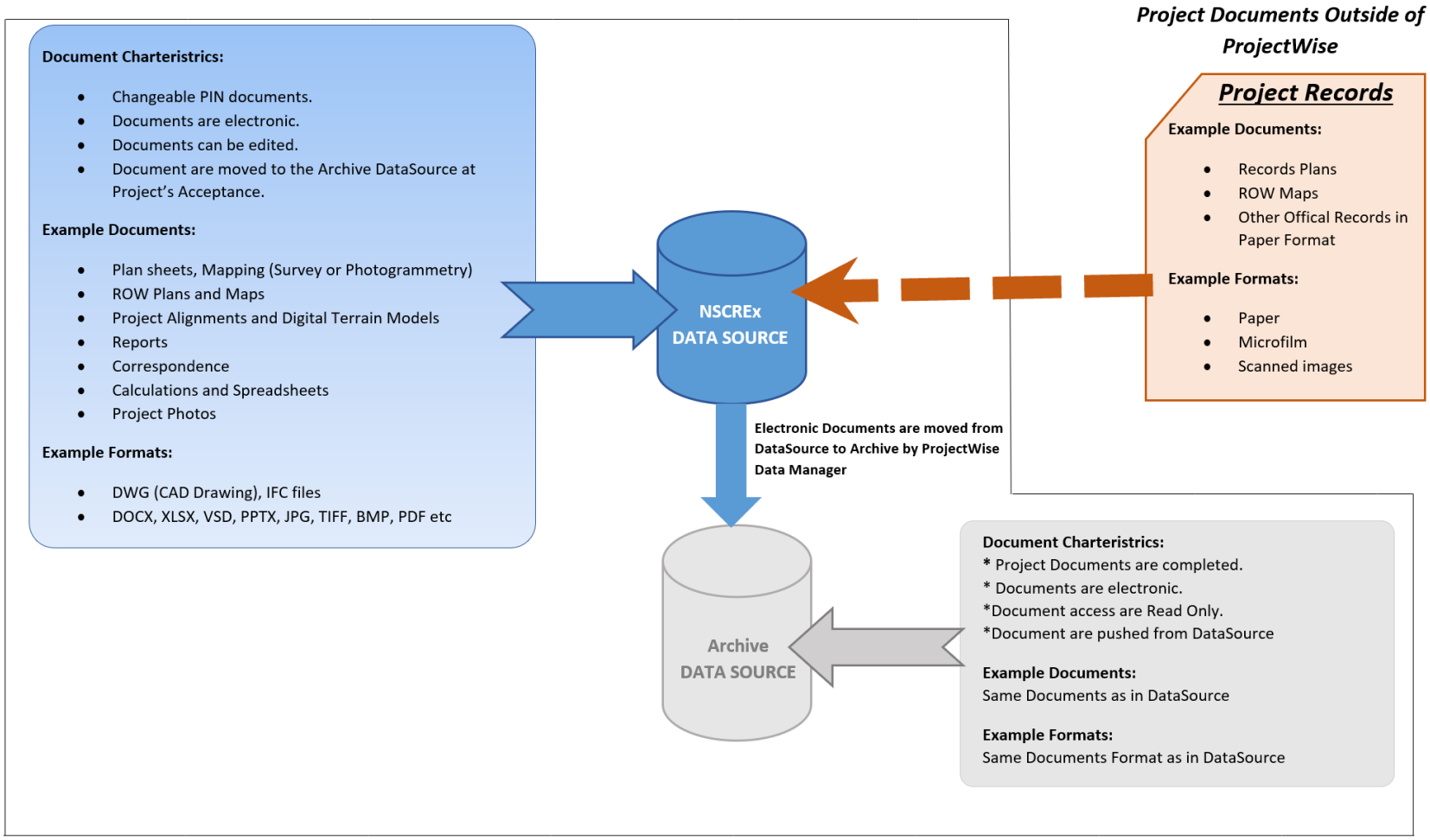


Exhibit 14-1 Document Types and Formats Stored in ProjectWise

1.3.1 ProjectWise Data sources

A ProjectWise Data Source is a container of folders, documents, and their supporting database. The Department's ProjectWise System consists of two Data Sources, one for active electronic project documents and one for archived electronic project documents. All active Project electronic documents are stored in the **NSCREX_DATA** Data Source. All electronic project documents for projects that have been accepted are stored in the Archive Data Source.

Project Folder Structure

The **NSCREX_DATA** Data Source folder structure is as follows:

Folder structure Image will be added once ProjectWise available for NSCREX

In the **NSCREX_DATA** Data Source each contract package folder contains project folders. All projects are stored under their appropriate contract package folder. The Main Project folder contains other program area data. Each project folder contains folders for each work group assigned to the project. Work groups located in main project folder, the project documents they create under the appropriate PIN folder, located under the Contract Package folder. Each individual may see more or fewer subfolders depending on the number of groups working on a particular project and his or her access rights.

In the Archive Data Source, each project folder contains a folder for each work group requesting an archive. The work group folders contain the documents as they existed at the conclusion of the project. Each archive is named by requesting group, date and reason for archive.

Folder structure Image will be added once ProjectWise available for NSCREX

1.5 Subfolders for BINs, Multiple Sites and Consultant Firms

If a project contains more than one bridge, typically a subfolder will be created for each BIN under both the Structures Design and the Structures Construction folders. Similarly, if a contract package contains more than one site, a subfolder may be created under a specific work group if warranted.

Folder structure Image will be added once ProjectWise available for NSCREX

If a contract package has consultants working on it, there will be a folder created under the work group folder for the portion of the contract package that the consultant is working on.

The folder will be named for the consultant firm. For example, if "Consultant A" is responsible for the highway design work a folder called "Consultant A" will be created under the project's Highway Design work group folder. Separate folders will be created for each work type and each consultant firm working on a particular project; for which the Department has an active consultant agreement in place.

Folder structure
Image will be added once ProjectWise available for NSCREX

1.3.4 Folders for Electronic Review

An additional folder may be created to make available documents for review under the Project PIN folder. This folder is created by the Data Manager at the request of a work group for official reviews, such as, ADP review. Documents posted for review should be in Adobe pdf format. At the conclusion of the review period, the review folder and documents should be archived by the Data Manager.

1.3.5 ProjectWise Accounts, Users and Work Groups

In order to access information in ProjectWise, a ProjectWise account is needed. A ProjectWise account is how individuals are identified in ProjectWise; how document and project creations and revisions are tracked, and how access to information is provided.

Users of ProjectWise include GCR staff, consultants, contractors and project partners. In ProjectWise, users are members of work groups. Work groups are one or more individuals responsible for portions of the project work. Examples of ProjectWise work groups include; Regional survey, Photogrammetry, Regional ROW Mapping, Design squads/teams, Landscape, Structures Design squads/teams, etc. ProjectWise work groups may be divided into sub groups.

1.3.5.1 GCR Staff Accounts

For all GCR staff, ProjectWise user account names, ProjectWise work groups and work group members will be created by IT staff. To assure accountability users of ProjectWise accounts names should have naming conventions as follows:

j.delacruz (First name initial; and Last name, separated by a period, no space)

The majority of GCR staff accounts and work groups have been defined. GCR staff requiring accounts, or who need to have their work group adjusted should contact the GCR's Helpdesk. If a work group member leaves the GCR or transfers to another work location, their supervisor should notify the Helpdesk.

1.3.5.2 Non- GCR Staff Accounts

Non-GCR users of ProjectWise may include consultants, contractors, and project partners. A project partner is any organization which has a direct business involvement with the project contract.

To assure accountability, Consultant, Contractor, and Project Partner users of ProjectWise have ProjectWise accounts created indicating the specific name (first name initial and last name) utilizing the account creation convention as follows:

For Consultants and Contractors:

> co_name (first name initial, last name, with no spaces in between; separated by underscore)

For Project Partners:

> Agency or company name (first name initial, last name, separated by underscore)

At the time of account creation, each consultant/contractor/project partner is assigned a password and provided their specific account information. Consultants/contractors/ project partners shall change their password upon receipt of account information. Consultants/contractors/project partners should periodically change their passwords. ProjectWise accounts are specific to individuals. Consultants/contractors/project partners shall not share ProjectWise accounts/passwords. If the GCR suspects account sharing, accounts will be disabled.

1.3.5.3 Consultants

Consultants may obtain a ProjectWise account by contacting their Project Manager/ Job Manager/ Consultant Manager and by providing their first and last name, the firm they are employed by, an active PIN, phone number, firm address where each individual is located, email address, and the duration of their involvement in the project. Project Managers/ Job Managers/ Consultant Managers then forward this information along with a brief description of the type of access needed to the GCR's Helpdesk. Consultants should not contact the GCR's Helpdesk directly.

Consultant firms must notify Project Managers/ Job Managers/ Consultant Managers of personnel changes for their staff with ProjectWise accounts. By obtaining a ProjectWise account an individual is able to submit material to the Department on his or her firm's behalf. Consultant firms should consider carefully who they select to submit information for a particular project. Consultant firms should also be aware should an individual leave their firm, they will still have access to that firm's project data until the Department is notified to disable the individual's account. No ProjectWise accounts will be provided to sub-consultants. Prime Consultants are responsible for uploading/managing all project data from the consultant team.

1.3.5.4 Contractors

Contractors may obtain a ProjectWise account by contacting the Structures Design and Construction Team (for Fabricators) and the Construction Team (for all other Contractors) and by providing their first and last name, the firm they are employed by, an active PIN, phone number, firm address where each individual is located, email address, and the duration of their involvement in the project. The Structures Design and Construction Team or the Construction Team then forwards this information along with a brief description of the type of access needed to the GCR's Helpdesk.

Contractors must notify the Structures Design and Construction Team/Construction Team of personnel changes for their staff with ProjectWise accounts. By obtaining a ProjectWise account an individual is able to submit material to the GCR on behalf of their firm. Contractors should consider carefully who they select to submit information for a particular project. Contractors should be aware that an individual who left their firm will continue to have access to the project data until the contractor requests the Department to disable the individual's account.

1.3.5.5 Project Partners

Occasionally during the course of working on a project access is granted to a project partner. Examples of project partners include other agencies, utility companies, and municipalities. ProjectWise accounts may be granted to individuals representing a project partner. Project partners must provide their first and last name, the organization they are employed by, an active PIN, phone number, organization address where each individual is located, email address, and the duration of their involvement in the project.

1.3.5.6 Data Manager and Administrator Accounts

To assure accountability, ProjectWise Administrators and Data Managers will have ProjectWise accounts created indicating the specific name (first name initial and last name) utilizing the account creation convention as follows:

pw_name

(first name initial, last name, with no spaces in between, with underscore) ProjectWise administrator account name

dm_name

(first name initial, last name, with no spaces in between, with underscore) Data Manager account name

1.3.6 Data Manager and ProjectWise Administrator Responsibilities

The following defines the roles of Regional Data Managers, ProjectWise Administrators, and System Administrators in context to ProjectWise.

- **Data Manager(s)** – IT or engineering staff, responsible for creating new projects in their area of responsibility by copying the project security model. Data Managers have the following capabilities within ProjectWise to manage project data:

    - Adjust security model on a project level.
    - Adjust security permissions for the project folders, work group folders, and documents.
    - Import recovered data into ProjectWise.
    - Archive data.

    A Data Manager's primary purpose is to assure availability of project data to applicable project work groups for a particular project. Data Managers should work with document creators to assure that access is only provided to the appropriate project work groups.

- **ProjectWise Administrator(s)**- ProjectWise Administrators have the following responsibilities:
    - ProjectWise software support.
    - Set up and maintenance of the ProjectWise environment.
    - Maintenance of project security models.
    - Maintenance of Work Flow States.
    - ProjectWise accounts creation and management.

- **System Administrator(s)** – IT staff, responsible for file backup and recovery, managing accounts, groups, and group members.

1.3.7 ProjectWise Security

Once documents are placed in ProjectWise, ProjectWise security controls who has access to which documents. Project security is initially set according to the following conventions:

- Every staff with ProjectWise account in a particular team will have read access to all of documents of projects depending on the project's workflow and which work group they are a member of.
- If an individual is a member of a particular work group (Civil, Survey, ROW Mapping, Structures, Landscape, etc.) they will have read/write access to the corresponding work group folder.

A ProjectWise workflow is a collection of security settings. Each collection of security settings, or states, provides different work groups access to a project at a particular time in the project's life cycle. For example, Survey and Photogrammetry may begin to work on a project sooner than a structures, landscape or construction group. Prior to reaching a state where a particular work group is a member, a work group will have read only access to a project.

1.3.8 Consultant, Contractor and Project Partner Access

Non-GCR employees, such as consultants, contractors, and project partners that the GCR has elected to provide access to ProjectWise are granted the minimum access needed to complete their work.

No ProjectWise access is provided to sub-consultants. Individuals from a particular firm will be granted read/write access to the documents within their firm's designated folder. Consultant firms may be granted read access to other project documents and folders deemed necessary to complete their work. The Project Managers/Job Managers/ Consultant Managers have read access to the consultant firm folders.

2. Working with ProjectWise

2.1 ProjectWise Through NSCREx Network

All staff should have ProjectWise open and running during all project related work sessions. On the NSCREx's Network, to start ProjectWise, double click on the **ProjectWise Explorer** icon on the desktop, or through the Windows Start Menu. ProjectWise is integrated with many applications on each PC. Staff are prompted to save documents to ProjectWise when accessing the File > Save option of integrated applications. For non-integrated application, documents should be added to the appropriate folder location in ProjectWise through the drag and drop method. Once a document has been added to ProjectWise, the copy left on the PC should be deleted to avoid confusion. In general, new documents for all applications should be initiated in ProjectWise using the seed documents provided in each project, located in the **Project Seed Documents** folder, in order to capture the document attributes at document creation.

2.2 ProjectWise using the ProjectWise Web Client

ProjectWise is accessed through the Internet, by using Internet Explorer. A link to the ProjectWise Web Client is available through the link to be added later. The ProjectWise Web Client has similar but limited capabilities to the ProjectWise Explorer Client. All staff who do not have access to the NSCREx's Network (such as some construction and maintenance staff) may access ProjectWise using the Web Client. Consultants and contractors access ProjectWise through the Web Client at the following link:

link to be added later

2.3 Consultants

Consultants should export and import documents directly from the ProjectWise web client. Consultants should export documents to their own network and import them back into ProjectWise as updates are completed, such as at project milestones, or as project needs dictate.

New documents created by consultants should be initiated in ProjectWise using the project seed documents in order to capture document attributes. As Consultants add, update, and import documents into ProjectWise, the Data Manager should be notified, in order to run the Scan References Utility on the project. This assures that reference relationships are kept up to date. The Consultant shall assure that any new references are added to ProjectWise.

2.4 Contractors

Contractors/Fabricators to submit electronic shop drawings through ProjectWise. A folder is provided for each firm to submit documents. The folder will be named for the firm, and placed

under the Structures Construction work group folder. Separate folders will be created for each firm working on a particular project. Under each firm folder there will be a folder for either the Concrete or Metals Unit, to provide comments to the contractor, as applicable.

2.5 Accessing Documents Using ProjectWise Explorer

Once logged into ProjectWise, documents are accessed by selecting and double clicking on them. This will check out and open the document, while automatically downloading a copy to the PC. The document is placed in Checked Out status. Once a document is checked out, it cannot be modified by anyone other than who the document is checked out to. When opening a MicroStation file, ProjectWise automatically copies out associated reference files to the PC. All project related documents shall be checked in to ProjectWise at the closing of the document. This assures that the latest copy of the document is on the server. Users also have the option of using the Update Server Copy command, which will assure the latest copy of the document is on the server, but retain a document's Checked Out status. When a checked-out document is closed, ProjectWise prompts to check the document back in.

2.6 Document Properties and Attributes

Each document has general properties associated with it. Document properties include the document name and file name, the document description, the application, state, status, updater, and creator. Document properties can be accessed by selecting a document and choosing **Document> Properties** from the **ProjectWise Explorer** Window. General properties are found in the **General Tab**.

Each document in ProjectWise has attributes associated with it. Attributes are a tool to organize information in ProjectWise. Attributes provide common identifiers to reflect the document content, which can later be used to search for a document. All applicable attributes to a particular document should be completed by the document creator for each document in ProjectWise.

2.7 Attribute Interfaces

Attribute Interfaces are a collection of attributes displayed for the user which share a common theme. Standard attribute interfaces have been created to make it easier for document creators to complete and update pertinent attributes. The following standard attribute interfaces are available by choosing **Tools> Interface** from the **ProjectWise Explorer** Window:

- Map - ROW
- Map - Survey
- Plans - Detail Sheet Border
- Plans - Plan Sheet Border
- Plans - Shop Drawings
- Project - Info for Construction
- Project - Location
- System - All Attributes
- System - PW Reports

2.8 Searching for Documents

In ProjectWise, documents can be located by using document attributes and document properties. To search for a document, or group of documents, select a folder and right click, and choose the **Find Documents**. Choose the **Search Form** option. ProjectWise will return all of the documents an individual has access to, using the search criteria specified. Searching for documents is most efficient when multiple search criteria are identified.

2.9 Project Data Archive

To efficiently access and organize documents, and to ensure electronic copies of officially approved documents are kept, a method of archiving has been developed. As a project progresses, project data needs to be archived. Archiving is an important part of managing project data and managing the ProjectWise system. Once safely moved to the ProjectWise Archive, completed project data and inactive project data can be removed from the **NSCREX_DATA** Data Source. The archiving process should include electronic documents used to create officially approved documents. Initiating the archive process is the responsibility of the data owner at the work group level. During the archiving process it is the data owner's responsibility to decide which documents are needed to continue progressing the project and which documents to mark for deletion, and to communicate this information to the ProjectWise Data Manager. Electronic copies of data that has been transmitted to another work group or that has been officially approved should be copied to the appropriate archive folder based on the data's place within the Project workflow; for each ProjectWise Workflow state, key data that must be stored in the ProjectWise archive is outlined in Table 14-1 ProjectWise Workflow States and Archive Data. At the project's conclusion, all project data is moved from **NSCREX_DATA** Data Source to **Archive** Data Source.

State Name	State Description	State Ending Point	Data to include in Archive
01_Scoping	Project Scoping	Data is Transmitted to Design	Approved Scope Closure Document- (Consistent with Project Development Manual) data transmittal to Design
02_Design	Final Design (from Design Approval until Award)	**Project is awarded**	Draft Design Report Approved Design Approval Document ROW Mapping Transmittal to Design ROW Mapping Transmittal to Real Estate Advanced Detail Plans Contract Documents
03_Construction	Final Design (from Design Approval until Award)	Project is accepted	Record Plans including As-Builts

Table 14-1 ProjectWise Workflow States and Archive Data

2.10 Resource Information

The Resource Information folder is a document sharing location that can be accessed using ProjectWise. The Resource Information folder can be accessed by all ProjectWise users (including consultants, contractors, and project partners).

2.11 File and Document Naming Convention

The efficient sharing and transfer of information relies on the use of a systematic document naming convention. The document naming convention has been developed to be inclusive of the many document needs of the various work groups that contribute to project data. The general format of the naming convention divides similar documents into easily identifiable commonly used categories, such as correspondence, images, bridge plans, station plans, and reports. Once documents have been named according to categories, they can easily be sorted or searched for by that category.

Project	Originator	Contract / Zone	Area	Doc. Type	Discipline	Sequence Number
NSCR	**GCR**	**N01**	**CLPSTN**	**RPT**	**A**	**000001**

Typically, individuals from specific work groups will use only a portion of the categories and subcategories outlined in **Table 14-2** when creating documents.

Type	Code	Definition
Document Type	ADM	Administration Document
	BOQ	Bill of Quantities
	BRF	Briefer
	CFP	Claim for Payment
	CON	Contract
	DWG	Drawings
	ENV	Environmental Management Document
	FIN	Finance Document
	FRM	Forms
	GUI	Guidelines
	HOD	Hand Over Document
	IPC	Interim Payment Certificate
	LEG	Legal Document
	LTR	Letter
	MAN	Manuals
	MMO	Memorandum
	MSA	Material Submission Approval
	MST	Method Statement
	MTG	Meeting Document
	PLN	Plan
	PMT	Permit
	PPT	Presentation
	PRC	Procurement Document
	PRD	Public Relations Document

	PRO	Procedure
	REQ	Requirements
	RFI	Request for Inspection
	ROW	ROW Document
	RPT	Report
	SCH	Schedule
	STT	Statutory Document
	STY	Study
	SUP	Supplier Approval
	TDC	Technical Documents
	UTL	Utilities Document
Discipline	A	Architectural
	AC	Accessibility
	AF	Automated Fare Collection
	CM	CMMS
	CN	Construction
	CO	Commercial
	CT	Crops and Trees
	D	Designer
	DA	Official Development Assistance
	DC	Document Control
	DE	Depot Equipment
	DS	Power Distribution
	E	Electrical
	EE	Elevators and Escalators
	EM	E&M
	EN	Environmental Management and Monitoring
	FP	Fire Protection
	GD	Environmental Graphic Design
	GN	Gender and Development
	H	Heritage and Archeology
	HR	Human Resources
	HS	Health and Safety
	ID	Interior Design
	IM	Interface Management
	IP	Indigenous Peoples
	IS	Informal Settler Family Resettlement
	K	DOTr (Client)
	LA	Landscape Architectural
	LQ	Land Acquisition
	M	Mechanical
	MV	Maintenance Vehicles
	OC	OCC/IOCC
	OM	Operations and Maintenance
	OV	Overhead Contact System
	PD	Platform Screen Doors
	PR	Procurement
	PS	Plumbing and Sanitary
	PW	Power Supply
	QA	Quality Assurance and Quality Control

	RS	Rolling Stock
	S	Security
	SA	System Assurance
	SC	Station Connections
	SI	Signaling
	ST	Structural
	SU	Survey
	T	Telecommunications
	TI	Traffic Impact Assessment (S-02)
	TK	Trackworks
	TO	Transit Oriented Development
	TR	Training
	TW	Temporary Works
	UT	Utilities
	W	Subcontractor
	X	Contractor
	Y	Specialist designer/contractor
	Z	Non-Disciplinary
Zone	CP01	Contract - N1 - CP01
	CP02	Contract - N1 - CP02
	CP03	Contract - N1 - CP03
	CP04	Contract - N1 - CP04
	CP05	Contract - N1 - CP05
	NST	Contract - N1 - NSTren
	N01	Contract - N2S - N01
	N02	Contract - N2S - N02
	N03	Contract - N2S - N03
	N04	Contract - N2S - N04
	N05	Contract - N2S - N05
	N06	Contract - N2S - N06
	GCR	Contract - N2SC - GCR
	NS02	Contract - N2SC - NS02
	NS03	Contract - N2SC - NS03
	S01	Contract - SC - S01
	S02	Contract - SC - S02
	S03A	Contract - SC - S03A
	S03B	Contract - SC - S03B
	S04	Contract - SC - S04
	S05	Contract - SC - S05
	S06	Contract - SC - S06
	S07	Contract - SC - S07
	NS01	Contract - SC- S07
	DOTR	DOTr
	ATG	Facilities - All At-Grade Works
	ELE	Facilities - All Elevated Works
	ESD	Facilities - All External Site Developments
	OSD	Facilities - All Over Ground and Topside Developments
	SFT	Facilities - All Shafts
	STN	Facilities - All Stations
	TRS	Facilities - All Transition Structures

	TUN	Facilities - All Tunnels
	UGN	Facilities - All Underground Works
	VIA	Facilities - All Viaducts and Bridges
	NCC	Project - NCC Extension (NCC)
	N1	Project - North 1 (N1)
	N2	Project - North 2 (N2)
	N2SC	Project - North 2 (N2) and (SC)
	NSS	Project - NSCR System
	PSLH	Project - PNR South Long Haul
	SC	Project - South Commuter (SC)
	SCR	Project - Subic Clark Railway
	RAIL	Railway Sector
Area	CMBDPT	Depot - Calamba
	CRKDPT	Depot - Clark
	MLDDPT	Depot - Malanday, Valenzuela
	ANG	LGU - Angeles
	APL	LGU - Apalit
	BAL	LGU - Balagtas
	BIN	LGU - Binan
	BOC	LGU - Bocaue
	CBY	LGU - Cabuyao
	CMB	LGU - Calamba
	CAL	LGU - Caloocan
	CLP	LGU - Calumpit
	CAP	LGU - Capas
	GUI	LGU - Guiguinto
	MAB	LGU - Mabalacat
	MKT	LGU - Makati
	MLB	LGU - Malabon
	MAL	LGU - Malolos
	MNL	LGU - Manila
	MAR	LGU - Marilao
	MEY	LGU - Meycauayan
	MIN	LGU - Minalin
	MTN	LGU - Muntinlupa
	PRN	LGU - Paranaque
	CSF	LGU - San Fernando
	SPD	LGU - San Pedro
	STR	LGU - Santa Rosa
	STO	LGU - Santo Tomas, Pampanga
	TAG	LGU - Taguig
	VAL	LGU - Valenzuela
	BUL	Province - Bulacan
	LGN	Province - Laguna
	PAM	Province - Pampanga
	TLC	Province - Tarlac
	NCR	Region - NCR
	REG3	Region - Region III
	REG4A	Region - Region IV-A
	ALASTN	Station - Alabang
	ANGSTN	Station - Angeles
	APLSTN	Station - Apalit

	BALSTN	Station - Balagtas
	BANSTN	Station - Banlic
	BCTSTN	Station - Bicutan
	BINSTN	Station - Binan
	BLUSTN	Station - Blumentritt
	BOCSTN	Station - Bocaue
	BCLSTN	Station - Bucal
	BUESTN	Station - Buendia
	CBYSTN	Station - Cabuyao
	CMBSTN	Station - Calamba
	CALSTN	Station - Caloocan
	CLPSTN	Station - Calumpit
	CRKSTN	Station - Clark
	CIASTN	Station - Clark International Airport
	EDSSTN	Station - EDSA
	ESPSTN	Station - Espana
	FTISTN	Station - FTI
	GUISTN	Station - Guiguinto
	MABSTN	Station - Mabalacat
	MLBSTN	Station - Malabon
	MALSTN	Station - Malolos
	MLSSTN	Station - Malolos South
	MARSTN	Station - Marilao
	MEYSTN	Station - Meycauayan
	MTNSTN	Station - Muntinlupa
	NC1STN	Station - New Clark City 1
	NC2STN	Station - New Clark City 2
	NC3STN	Station - New Clark City 3
	NICSTN	Station - Nichols
	PCTSTN	Station - Pacita
	PACSTN	Station - Paco
	CSFSTN	Station - San Fernando
	SPDSTN	Station - San Pedro
	STMSTN	Station - Santa Mesa
	STRSTN	Station - Santa Rosa
	STOSTN	Station - Santo Tomas
	SDLSTN	Station - Sindalan
	SOLSTN	Station - Solis
	SCTSTN	Station - Sucat
	TBISTN	Station - Tabing Ilog
	TKTSTN	Station - Tuktukan
	TUTSTN	Station - Tutuban
	VALSTN	Station - Valenzuela
	VLPSTN	Station - Valenzuela Polo

Table 14-2: Document Numbering System

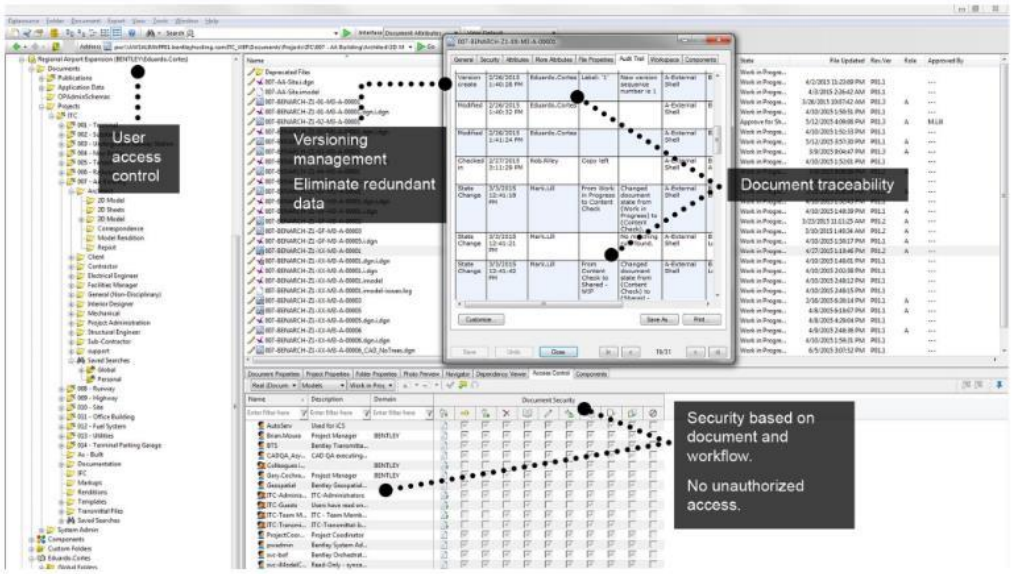
3. ProjectWise

3.1 Introduction

ProjectWise is configured with the intention to collect, manage, and share information in a single source or platform. In short, ProjectWise is a digital place where all the information comes together. As the vast amount of data and documentation being created and shared during a project's lifecycle, ProjectWise will bridge the gap from conventional towards a collaborative working culture. It promotes a digital working environment and reduce dependency on paper-based working environment.

ProjectWise is much like Windows Explorer for storing and working on documents. The documents are stored in a folder structure and are associated with appropriate application for opening and editing. ProjectWise also offer users with instant access to the information needed in real time and access control based on document and workflow which eliminates unauthorized access to folder or document. It also provides versioning management, eliminating redundant data, document traceability, and easy browsing and searching. With some administrative flexibility, users are able to configure and match standard practice with the system practice.

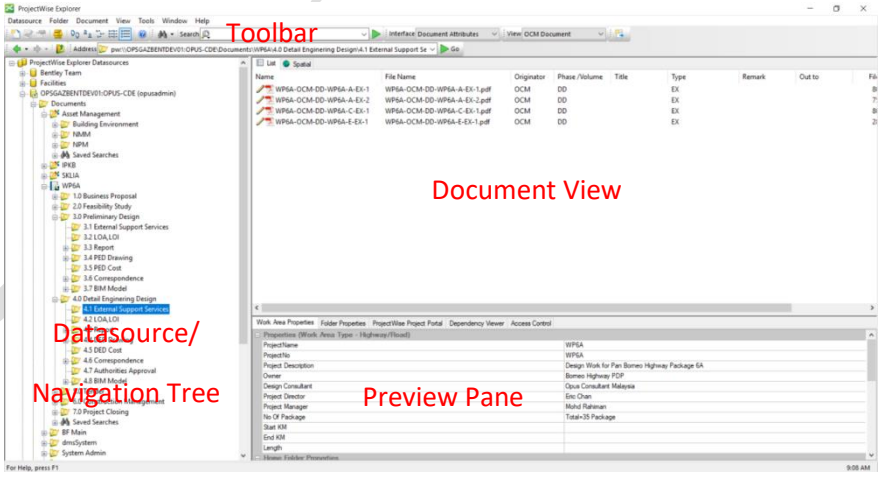
3.2 ProjectWise Explorer User Interface



PROJECTWISE EXPLORER is implemented with Bentley ProjectWise as its system platform. To access the system, user will use ProjectWise Explorer. It is the **primary interface** for document repository. Its interface is similar to the Windows Explorer which provides a hierarchical view of the file system. The tasks you can perform in ProjectWise Explorer can be initiated from an item on the menu bar, or through the standard toolbar.

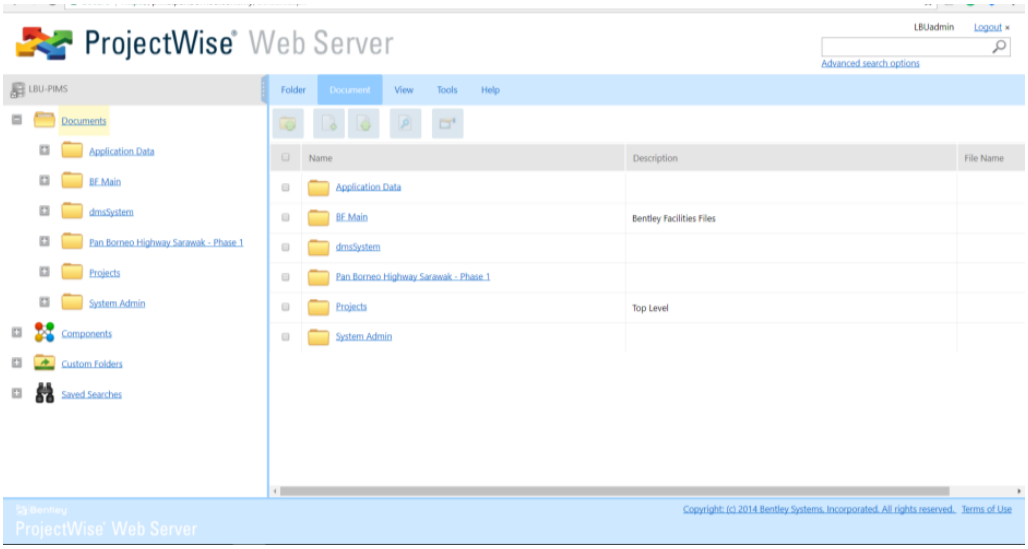
1) ProjectWise Explorer

A desktop application where users can access to ProjectWise Explorer.



2) ProjectWise Web Browser

The web based of ProjectWise primary for web-based user to have access to ProjectWise Explorer.



The following sections will explain and elaborate more about:

- Data source
- Default Data source list icons
- Interface
- Working Directory

3.3 Data source

Before you can use ProjectWise Explorer, you must log into a data source. For quick access, you can right click any item in the data source list (left pane) or document list (right pane) and select items from the pop-up menu that appears. During login, ProjectWise Explorer verifies your username, password and determines your access rights. These access rights depend on your user group assignment, the access control settings assigned to you by the administrator, the security on a particular folder or document, and other settings.

In its simplest form, each data source represents a working area. When ProjectWise Explorer is launched, the available working areas, or data sources, will be listed in ProjectWise Explorer's data source list, which is on the left side of the application window. Each data source is associated with a separate database and one or more storage locations.

3.3.1 Default data source list icons

The following is a list and description of the default icons that appear in the navigation tree.

Icon	Description
	Data source: Indicates an individual data source.
	Active data source: The check mark indicates that the data source is open and in use.
	Open data source: An open icon indicates that the data source is open but not in use.
	Folder: Indicates folders and sub-folders.
	Saved Searches parent folder

	Saved Searches folder: Each user has a Personal folder
	Custom Folders: This folder is only displayed if your administrator gives you access to this option.
	Message folders allow you to view the contents of messages sent and received using ProjectWise Messenger

***Note**: The plus ("+") symbol preceding an icon indicates that the item can be expanded to display subitems. The minus ("-") symbol preceding an icon indicates that the folder can be collapsed. Click the "+" or "-" symbol to expand or collapse the item.*

3.3.2 Interfaces

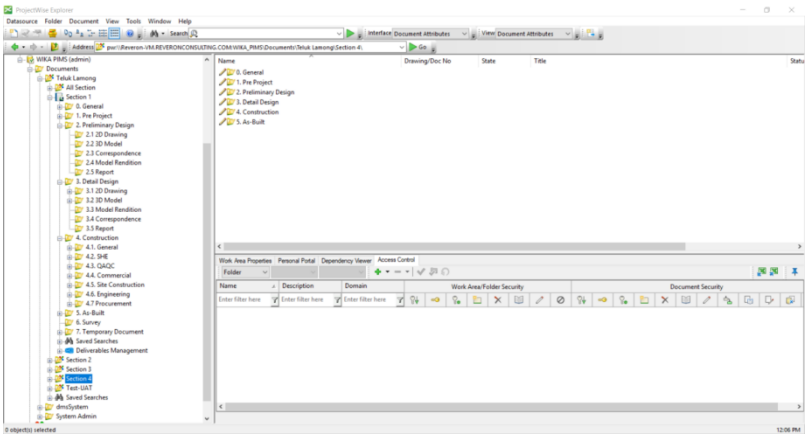
An interface is a predefined arrangement by the administrator of attributes found in the file properties' Attributes and More Attributes tabs. Typically, interfaces are used to provide alternate attribute page layouts on these tabs. One interface may be more appropriate for one group of users, or perhaps for one set of tasks versus another set of tasks, such as creation vs. review or approval.

3.3.3 Working Directory

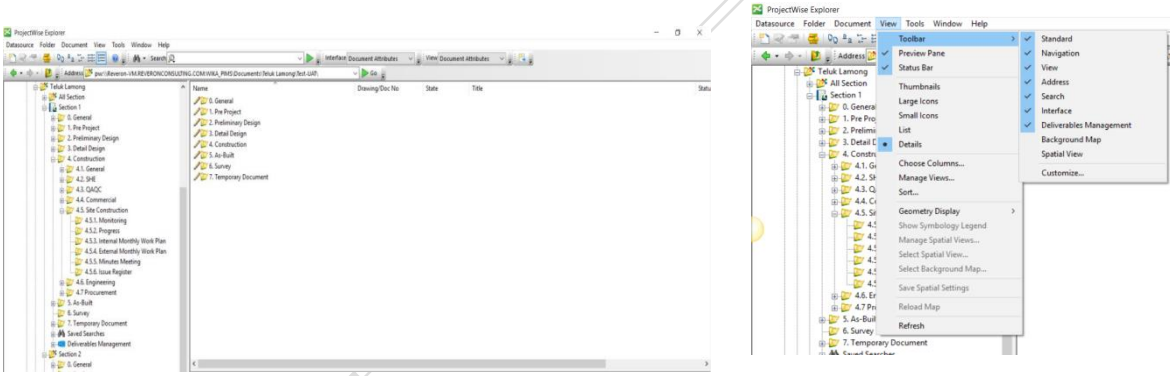
A working directory is a location that contains temporary copies of the files that you check or copy out from a ProjectWise server. It can be on your local hard drive or a network drive so administrators can back up files. Applications launched from ProjectWise Explorer will use these files automatically.

3.3.4 Login to ProjectWise

1) Double-click the ProjectWise Explorer icon available on the Desktop or choose it from the Start Menu.
2) Once the ProjectWise Explorer is opened, double click on the ProjectWise Explorer data source.
3) You will be prompted to login.
4) Enter your Username and Password. Once logged in successfully, the Documents folder or the last folder you were working in will be opened.
5) If this is your first-time opening ProjectWise, expand Documents and you will see the projects you have access to. You may need to expand other folders depending on the data source you are working in. When you select a folder, its contents are listed in the document list. If you do not have the necessary permissions for a document or sub-folder, the document or sub-folder will not appear in the document list.



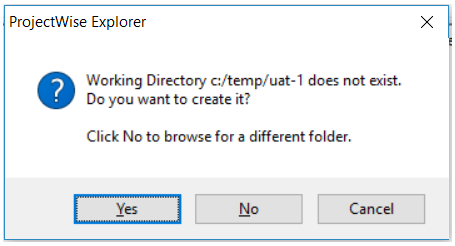
6) When you select a folder, the folder's documents will display in the document list. When **View > Preview Pane** is enabled, a preview pane displays in the lower portion of the document list when a document, folder, or project is selected. It shows properties of the selected item.
7) Once you are logged into ProjectWise Explorer, select the Interface you are instructed to use in the Interface menu bar. To open the Interface menu bar, go to View>Toolbar>Interface. Select interface called Document Attribute.



Notes:

If a working directory was not defined by your administrator, you will see a browse dialog when you first log in to a data source. You can then browse to the location in which you want to store the local files. Or, if a defined working directory does not exist yet, you will see a dialog asking you to confirm its creation. The option to change your working directory is set by the administrator.

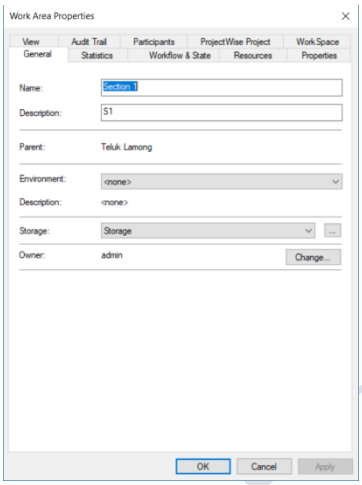
When logging into ProjectWise Explorer for the first time, you will be prompted to create a working directory. Example: C:/temp/uat/uat-1

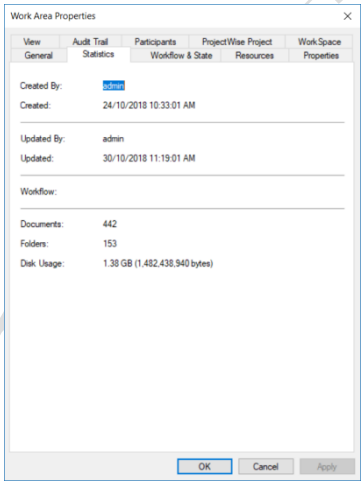


Click Yes to create this directory. This will be the local working directory used by ProjectWise. Do not open or delete files directly from this directory. Use the Local Document Organizer inside ProjectWise Explorer to manage the local working directory.

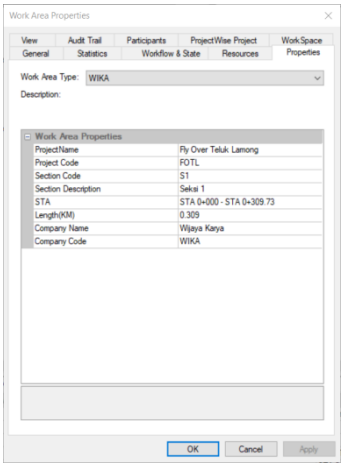
3.3.5 Working with Preview Pane

1) From the tool bar, select View menu and ensure that Preview Pane is selected or ticked. If it is not, select it and it will display on the right bottom pane of the ProjectWise Explorer.
2) Select the Section 1 Folder and right click on it. Select Properties. Observe that the General properties and Statistics tabs are displayed.





3) Observe that besides the tabs listed above, there is an additional tab, named Properties. It displays the project specific properties. It is the same one you would see if you opened the properties dialog, except that they are not editable from this location.



4) Switch over to the Access Control tab. You can then see the access control security permissions set for the document. Comparing with the Access Control tab displayed for Folder or Project, the Access Control tab for Document, displays the access control details for both document and folder or project.
5) Switch over to the Photo Preview tab. It lets you preview the image of documents, without opening the document itself. When you select an image document and then select the Photo Preview tab, a copy of the document is downloaded to your working directory and a preview of

the image displays. You can open the document properties dialog and use the forward and backward arrows to move through a slideshow.

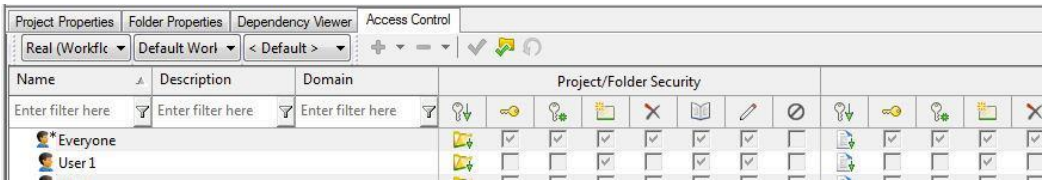
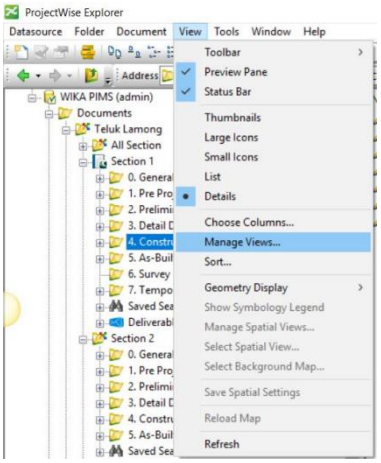
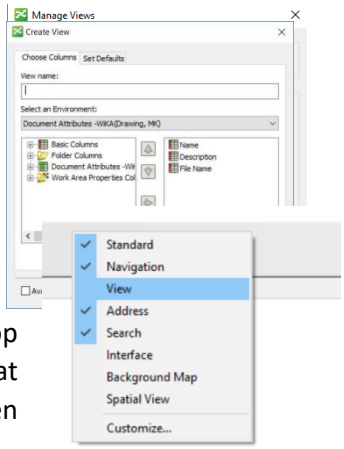


Photo Preview supports standard image file formats, including BMP, JPEG, GIF, TIFF, and PNG. You can add additional plug-ins to your browser to view other file types. Photo Preview uses Internet Explorer controls to display content, which lets these additional file types to be displayed either natively or through an Internet Explorer plug-in. You can use the Photo Preview tab to display the contents of non-image files, such as text files, PDFs, HTML files, and Microsoft Office documents. To display any Microsoft Office files in the Photo Preview tab, the respective application must be installed. To display PDF files, Acrobat Reader must be installed. When you select an Office document, a read-only view of the document is displayed.

3.3.6 Document View Creation



1) Observe the Document windows which is above the Preview Pane. All documents are listed with a set of document record – e.g. file size, created by, project name etc. The control of the document record displayed is called View.
2) Select **the View menu → Toolbar → View**. A View dialog box will be displayed. You may choose items to dock at the top area of the GUI.
3) Observe the current active View.
4) Select **View > Manage Views** from the ProjectWise Explorer main menu bar.
5) In the Manage Views dialog box, tick on Show global box and click **New** to create a new view.
6) In the Create View dialog box, expand the **Select an Environment** option and set the environment to **Your Suitable Environment**.
7) In the **View Name** field, type a name to identify your created view e.g. Drawings. In the left frame, expand Basic Columns by clicking the +. To add a column, double click the column name or highlight the column name and then click the green arrow pointing to the right frame. Or, drag and drop the column into the Show Columns of frame. Add columns that provide information that you, personally, want to see. When the desired columns have been added, click **OK**.



3.3.7 Managed View

Views allow you to manage what columns to display which helps filter the list down to information that is relevant.

There are 2 (Two) views option provided;

- **Global Views**: Created by administrator and available to all users in the ProjectWise data source.
- **Personal Views**: Created by users in ProjectWise Explorer, and only available to the user who created them.

To enable View at the toolbar;

1) Right click on the toolbar, click on View to enable it.
2) Right click on the toolbar, click on View to enable it.

To create Personal View;

3) To create a personal view, select **View > Manage Views** from the pull-down menu.
4) The Manage Views window will display. To list the Global views available, check the **Show** global checkbox at the bottom of the window.

   You can use the available views as a template if desired by selecting it and clicking on the **Copy** button.

   If you wish to start from scratch, click the **New** button at the top.

5) The **Create View** window will display. You need to provide a **View** name at the top. Make sure to select an Environment if desired.
6) Selecting a column name on the left side and clicking the right arrow will add it to your new view. Selecting a column name on the right side and clicking the left arrow will remove it from your view.
7) The up and down arrows change the order of the list on the right side. Just select one of the column names on the right and move the column name up or down in the list which controls the display of the column in ProjectWise Explorer from left to right.
8) Once you have all the columns selected and ordered as you wish, click OK to create the new view and to close the Create View window.
9) To make modifications to the personal view, open the Manage Views window from the View menu, select the personal view in the list, and click the Modify button.

To modify Personal View;

10) Modify the view as needed. Once finished, click **OK** to apply the changes.

To use Personal View;

11) Now that you have a new personal view, you can use it in ProjectWise Explorer. In the View Toolbar, choose your personal view in the drop-down list. You will see the columns in the top right panel change according to your settings.

3.4 Work Area and Folders

This section aims to introduce the concept of Work Area and Folder used in ProjectWise to the users. It provides a general overview of both Work Area and Folder and differences between them.

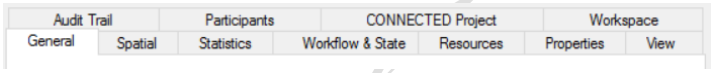
3.4.1 Overview

The documents root folder is the top-level folder in any data source. All work area and folders are created under the Documents root folder.

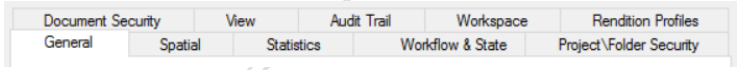
- Work Area are intended to complement your existing project management by providing one place to organize a project's documents, data, and resources. Work Area can contain or reference saved searches (every project has its own Saved Searches folder), documents, folders, components, and links to other sources of data. Work Area are "smart" folders.
- A folder is primarily a tool for organizing documents, but folders can contain document sets, other folders, or even projects.

3.4.2 Difference Between Work Area and Folder Properties

Work Area Properties:



Work Area Properties:



Tab Name	Work Area	Folder
General	✓	✓
Spatial	✓	✓
Statistics	✓	✓
Statistics	✓	✓
View	✓	✓
Audit Trail	✓	✓
Workspace	✓	✓
Work Area\Folder Security		✓
Document Security		✓
Rendition Profiles		✓
Participants	✓	
CONNECTED Project	✓	
Resources	✓	
Properties	✓	

The table above illustrates all tabs available in both Work Area and Folder. Work Area contains most of the tabs that a Folder will have, except for Work Area /Folder Security tab, Document Security tab and Rendition Profiles tab. As Work Area has Participants tab, the Folder and Document Security are handled there while Rendition Profiles is only applicable at Folder level only to determine the PDF rendition configuration. The CONNECTED Project is newly introduced during the CONNECT Edition of ProjectWise. By associating a work area in ProjectWise to a CONNECTED Project, the CONNECTED Edition web services such as Deliverables Management, Document Dashboard etc. are made available in the Work Area.

3.4.3 Work Area

ProjectWise enable users to organize project information and document into Work Area folders. It is possible to establish a project hierarchy (e.g. a main project that hosts several sub-projects) and classify projects into types according to business needs to store different set of project information.

The Work Area Properties is available in the Work Area folder of ProjectWise Explorer. A work area Folder is used to store all digital/softcopy project documentation in the ProjectWise according to its folder structure. It is one of the best practices of storing project documents for construction, infrastructure, engineering projects in the ProjectWise system. Technically, the Work Area Properties is presented in one of the tabs in the dialog box of a Work Area folder.

By capturing the relevant project details in the Work Area Properties, it helps to provide project insight to all the project participants. With ProjectWise, it helps to standardize the project details required for all users to be captured and stored electronically.

3.5 Document in ProjectWise

This chapter aims to introduce the concept of document in ProjectWise. Several aspects of the document such as its access, check-in/out, properties, attributes etc. are introduced and elaborated. This helps to provide a solid understanding of document in ProjectWise to the user to make their work easier in future while using ProjectWise Explorer.

3.5.1 Overview

When an electronic file (e.g. pdf, jpeg, docx etc.) is uploaded from a file system into ProjectWise, it becomes a document. Documents contain metadata about the file in the form of general properties, such as description, the associated application, the date the file was imported, and custom supplemental environment attributes. The files themselves are stored on a file server, whereas document metadata is stored in the ProjectWise database.

You can create something called a placeholder document, which is simply a container of metadata that does not have an electronic file assigned to it. Placeholder documents can be used to represent electronic files you are planning to import into ProjectWise, or hard copy documents or drawings that are stored in a file cabinet.

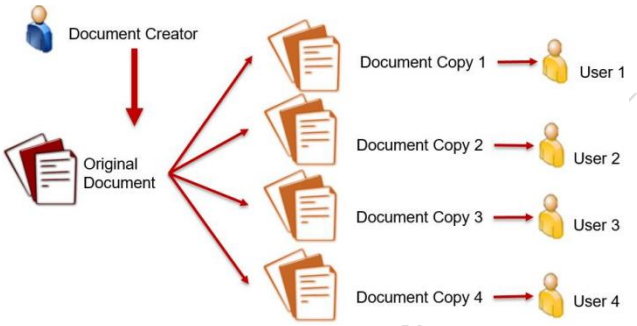
The following sections will explain and elaborate more about:

- Document Access

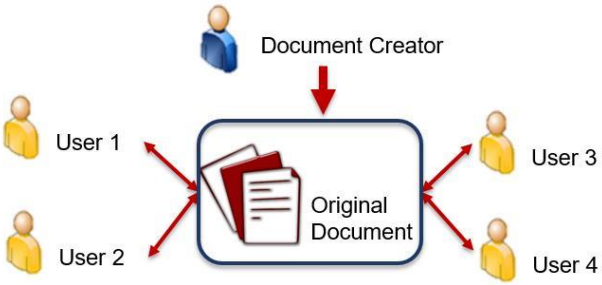
- Check in and Check out
- Document Properties
- Document Security Properties
- Document Attributes
- Document listing icons
- Audit trail

3.5.1.1 Document Access

Documents are generally passed from their creator to the necessary members of a team during the life of a project. This involves making copies of the original document and giving a copy to each of the team members.



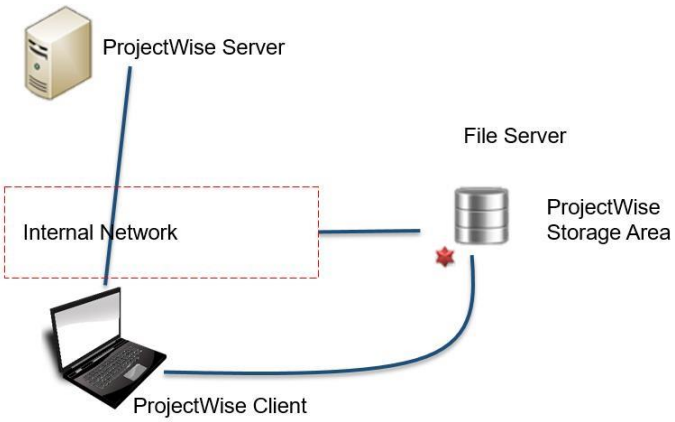
This creates many individual copies of the same document, which increases the potential for inconsistency. Someone must keep track of the file that contains the most up to date information and coordinate all changes.



Using ProjectWise, documents exist in a managed environment. During projects, a single instance of a document is available to members of the project team. The document is stored in a location accessible to all team members. It can be viewed by all members, but it can be checked out for use by one team member at any time.

3.5.1.2 Check out and check in

When a team member wants to edit a document, they can check it out. Checking out a document downloads a copy of the document to your working directory. When you perform a check-out, the database record for the document is marked accordingly.



When another team member need access to the file, or when all work is completed, the document is checked-in. A team member can always refresh the server's copy using tools in ProjectWise Explorer or an integrated application so that other team members can view or reference the latest version.

3.5.1.3 Document properties

The document properties dialog is used to view or modify properties of documents, one at a time. The dialog shows all properties of a document, which include general properties, environment attributes, file properties, the document's history (audit trail), any related components, associated workspace settings, and which users have which permissions to the document. When using the Create Document dialog, the moment you save the new document for the first time, the Create Document dialog becomes the document properties dialog. The name and description of the currently selected document displays in the title bar of the dialog. You can step through all the documents in the current folder by using the forward and backward arrows at the bottom of the dialog.

3.5.1.4 Document security properties

The document security type and properties can be viewed or changed on the Security tab of the properties dialog. If no security is set, everyone has complete access to the document. If there is at least one access control set on the document, any individual or group that is not given explicit access is denied access. Permissions are assigned as follows.

- **Full control**: You can perform every document function
- **Change permissions**: You can change document permissions
- **Delete**: You can delete documents

- **Read**: The document is visible in document list, you can view the document's properties and attributes
- **Write**: You can modify document properties and attributes
- **File Read**: You can open the document in Read-only mode, you can copy out the document, but not check it out
- **File Write**: You can modify the document, you can check out the document, make changes, and then check it back in
- **No access**: You have no access to the document.

Whether you can change these settings depends on the rights granted by your administrator, and possibly by the owner of the document.

3.5.1.5 Document Attributes

Document attributes are supplemental to the general document properties that all documents have, such as file name, size, and date and time last updated. They exist so that an organization can tailor document attributes to the requirements of their projects. Attributes are used to track document information, to search for documents, or to enter information in the title blocks of designs. Selecting the Attributes tab in the properties dialog displays any custom attributes in a form that is created by the administrator.

Additional custom attributes can be shown on the More Attributes tab. You can edit any value that is not greyed out by selecting it, entering a new value, and then saving the change. The new attributes are applied to the document.

3.5.1.6 Document listing icons

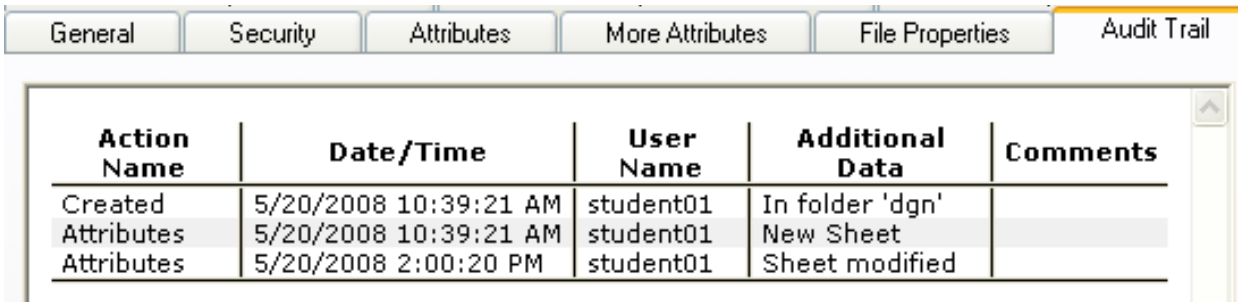
Icon	Description
	Pencil: The document is checked-in and you have permission to modify the document or the document's properties.
	Open book: You have read-only access to this document.
	Lock: Document either is checked out exclusively or has been exported exclusively by another user. You can still open this document as read-only.
	Disk: Document has been exported exclusively by you. Other users will see a lock.
	Check mark: Document is checked out exclusively to you. Other users will see a lock.
	Final: Document is in Final Status.
	The Default icon indicates a document is associated to an application, but the application itself has no associated icon.
	The Un-associated icon indicates a document not associated to any application, or to one that has no file attached.

3.5.1.7 Audit Trail

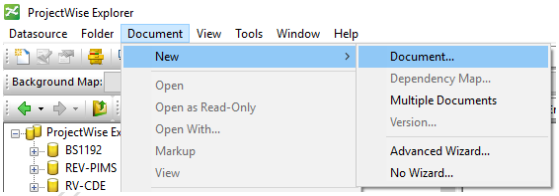
This is the mechanism for recording document and folder activity in the data source. The items tracked by an audit trail are specified in ProjectWise Administrator. The audit trail itself is viewed in ProjectWise Explorer. A document's audit trail provides you with a list of all activities that have taken place regarding the document. An audit trail record is created as an action or

activity takes place. Your administrator determines which document activity is recorded, and whether you have permission to see the audit trail.

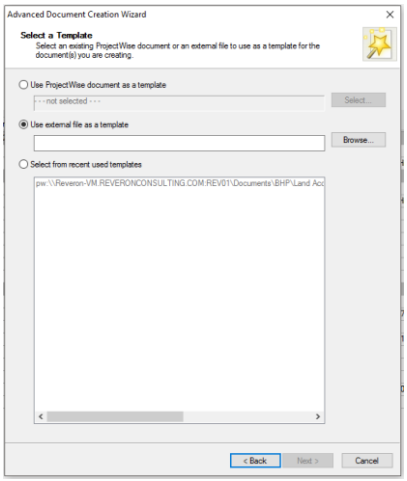
If enabled, select the Audit Trail tab in the properties dialog to see the audit trail.



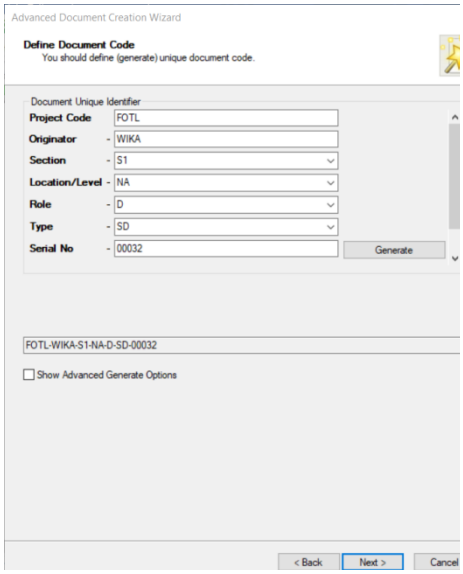
3.6 Uploading a Document



1) Log in to the ProjectWise Explorer and right click on ProjectWise Explorer where the new document needs to be located.
2) Select the related folder to import the new file.
3) Navigate to **Document toolbar > New > Advanced Wizard**.
4) The Advanced Wizard will be displayed. Click Next.

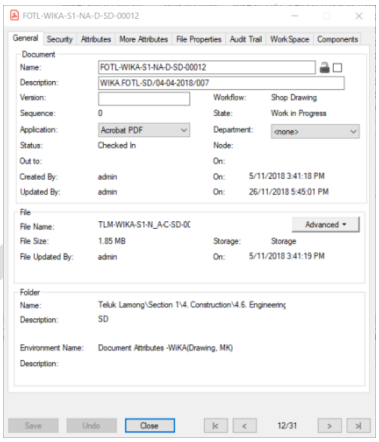


5) Choose the location of the document and select the document by clicking **Browse**, then Next.
6) Fill in the details in Define Document Code. Complete all the fields before continuing. Click **Next** when finished.
7) Summary of the document properties dialog will be displayed. Click Next to continue.
8) 8. Summary of the document summary will be displayed. Click Next to continue.
9) 9. Click Next again. Document will be transferred and created in the desired folder. Click Finish to exit the wizard.

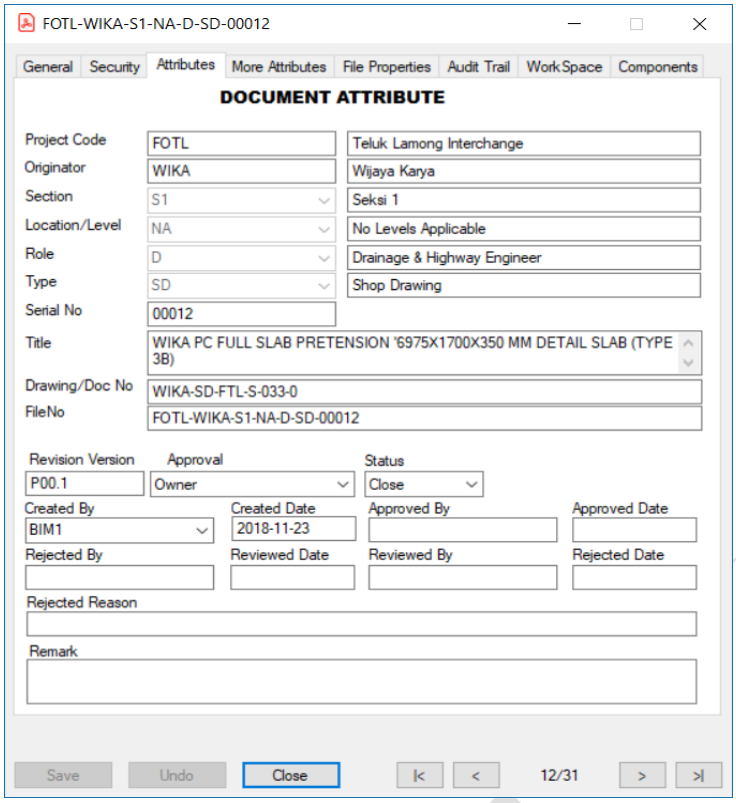


3.7 Updating Document Attribute

1) Select documents that needs to be updated. Right click and select properties or click on the spacebar.
2) Document information dialog box will appear.



3) Go to the Attribute tab and update your document information (e.g.: Document Title)



3.8 Document Workflow

Workflows are created in ProjectWise Administrator and are assigned to folders and projects in ProjectWise Explorer. They guide documents through different milestones, known as states. For ProjectWise Explorer project user, there are two (2) workflows that have been created in the system namely DED drawing and 3D Model.

The document workflow is a workflow that governs the process of project document registration and utilization in ProjectWise Explorer. It helps to keep track of the status of the documents in ProjectWise Explorer.

These are the states in each of the Workflows:

No	Workflow Name	Department	State
1	Documents	Documents Control	Work In Progress (WIP)
			Content Check
			Shared
			Approve for Publication
			Published Documentation
			Superseded – Shared
			Superseded - Work in Progress
2	Drawings	Engineering	Work in Progress
			Content Check
			Approve for Sharing

			Shared
			Approve for Publication
			Published Documentation
			Superseded – WIP
			Superseded – Shared
3	3D Model	Engineering	Work in Progress
			Content Check
			Shared – WIP
			Approve for Sharing
			Superseded-Shared
			Shared
			Approve for Publication
			Published Documentation
			Superseded - WIP
			Superseded - Shared

3.9 Document Approval

Initiator Change State to Content Check

1) Open ProjectWise Explorer and login.
2) Expand on **Documents > Teluk Lamong > Section # > Detail Engineering Design>** (go to any folder that contain document which require approval).
3) Right click on the document and select **Change State > Approve**. Click yes to proceed.
4) Specify the recipients at the message dialog box for the next action and click send.

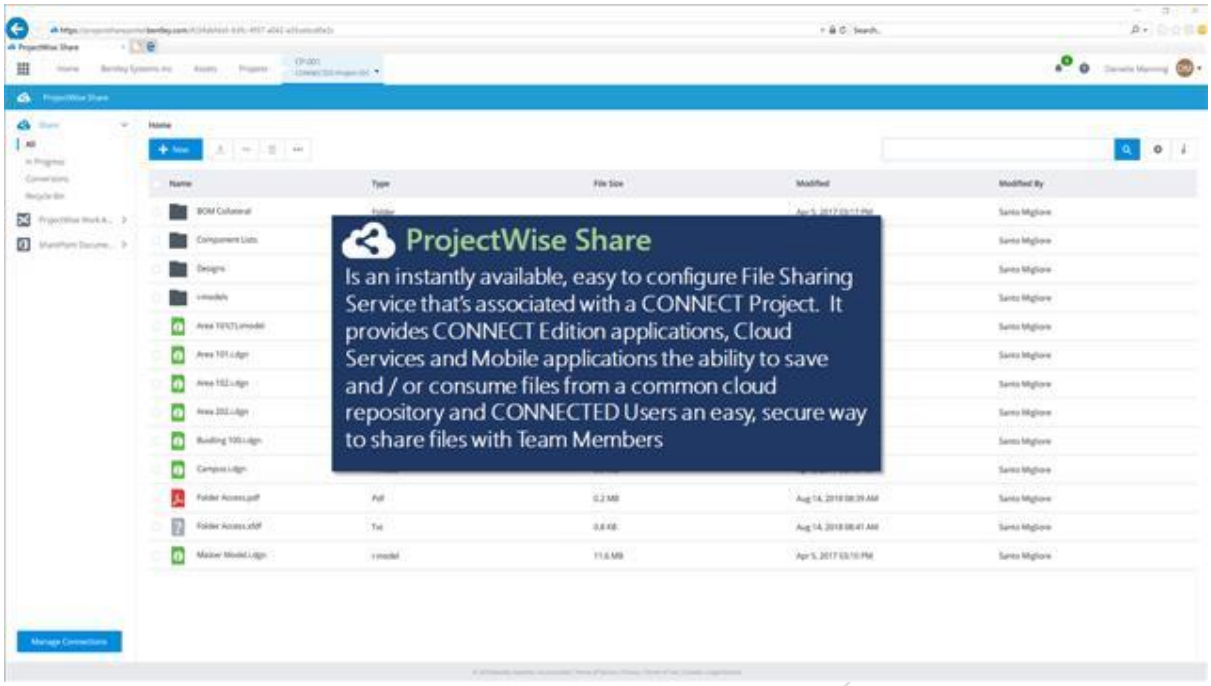
First Reviewer to Approve/Reject the document

5) The reviewer will review the document and click **Change State > Approve** or Reject once ready. Notification will be sent to the Next person for action.

3.10 ProjectWise Share

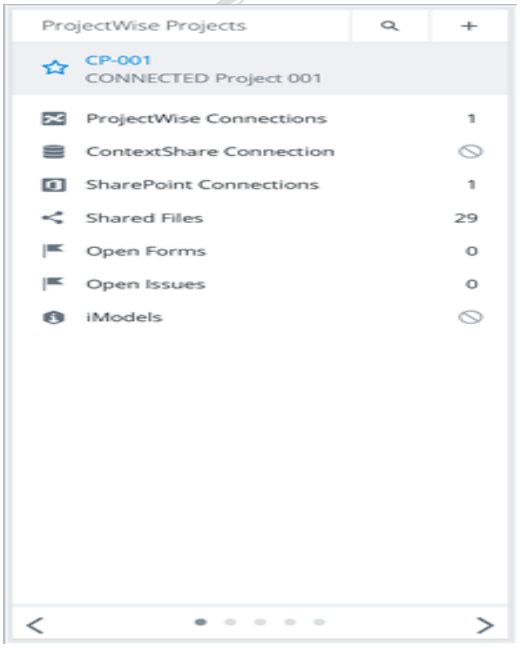
ProjectWise Share is an instantly available, easy to configure File Sharing Service that's associated with a CONNECT Project. It provides CONNECT Edition applications, Cloud Services and Mobile applications the ability to save and / or consume files from a common cloud repository and CONNECTED Users an easy, secure way to share files with Team Members.

Please note that all users do not have access to all of the Share functionality.

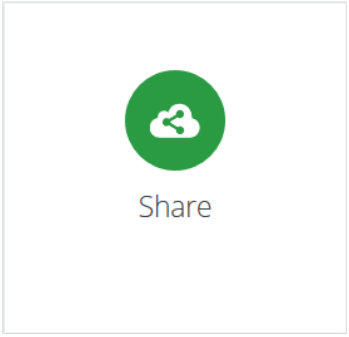


3.10.1 Accessing Share

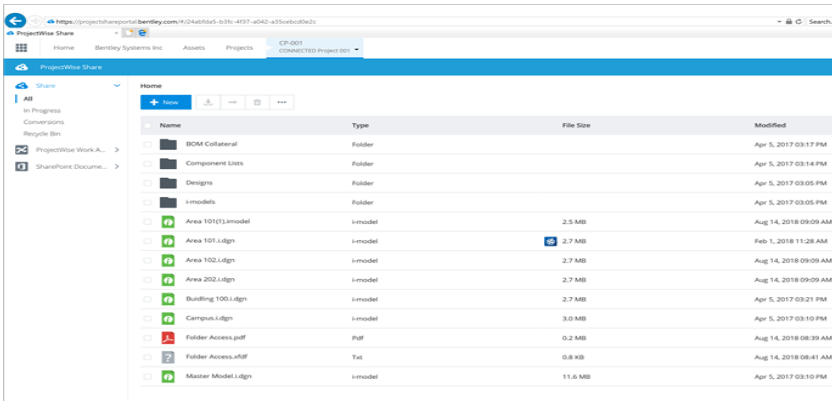
1. Once you have signed into the CONNECT Portal using your Bentley CONNECT account, select your project from the Recent Projects tile, or select the View More Projects icon to see a list of all available projects.



2. When you select your project, the Project Portal opens. From the ProjectWise Connection Services pane, select the Share tile.

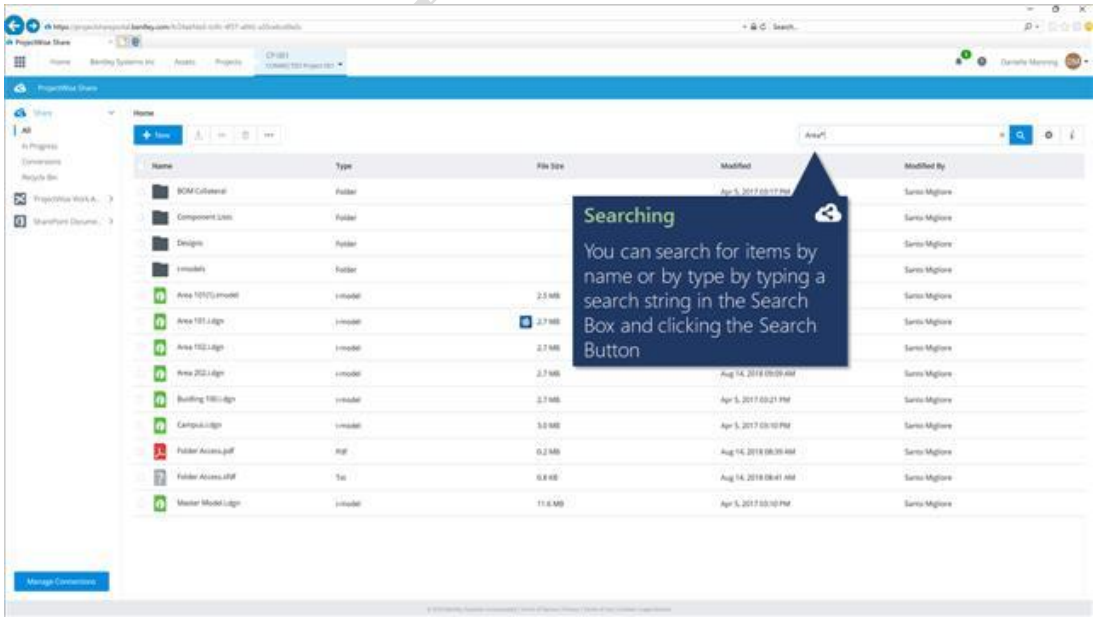


The ProjectWise Share Work Area opens. From this page, you can access the contents of your Project Share.



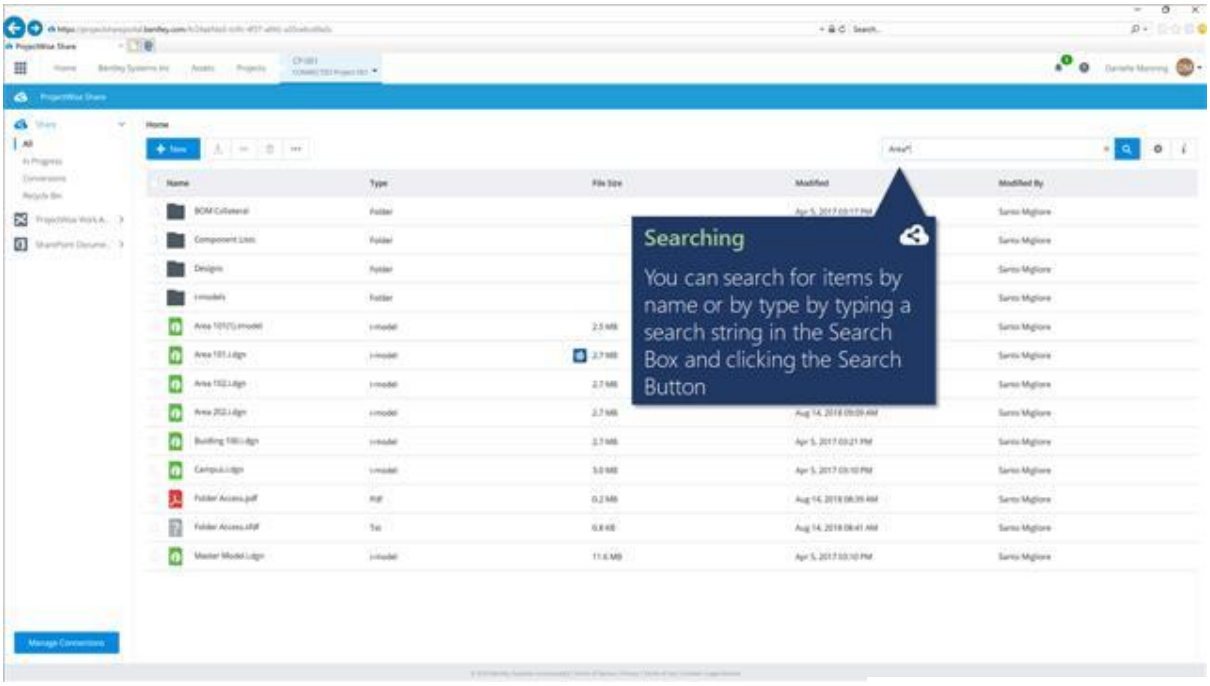
3.10.2 Navigating

Use the breadcrumbs to navigate backwards from inside a folder hierarchy.

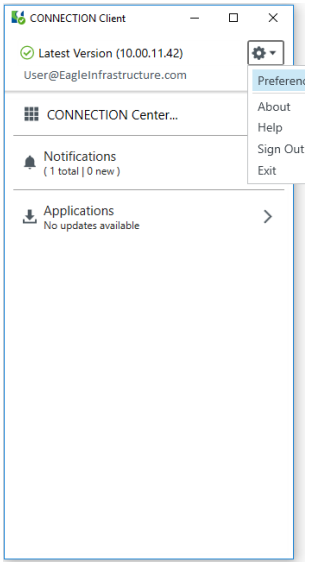


3.10.3 Searching

You can search for items by name or by type by typing a search string in the Search Box and clicking the Search Button.

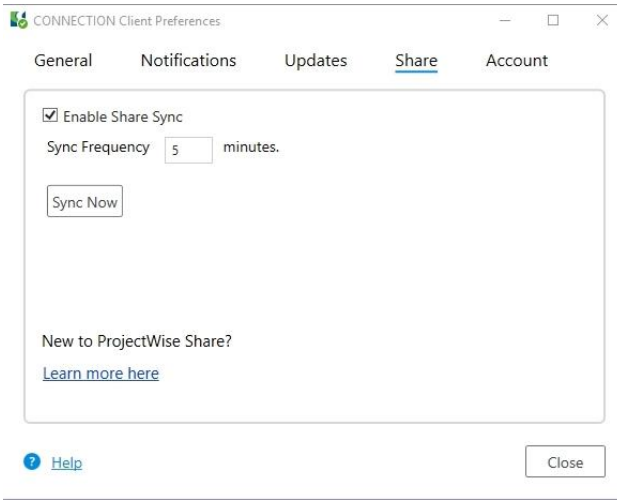


Share Sync allows you to synchronize files from ProjectWise Share to your computer. Using Share Sync you can upload files to ProjectWise Share for project members to access, or you can access files that have been uploaded to ProjectWise Share by project members.



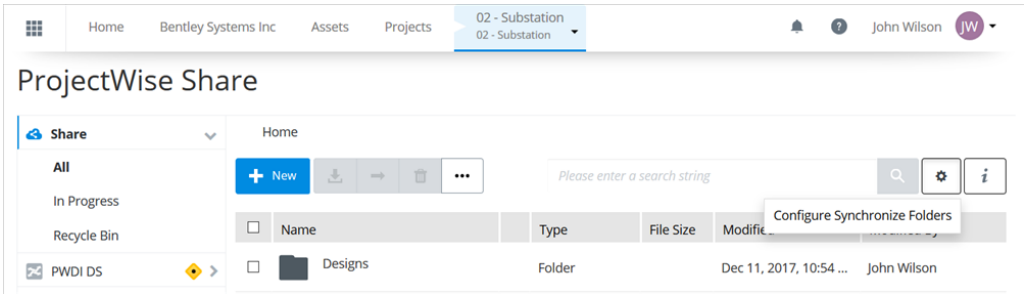
Before you can use Share Sync, you must first ensure you are using the most recent version of Connection Client, which is available from the Fulfillment Center.

Next, open Connection Client and select the gearbox icon in the top right. From the menu that displays, select Preferences.

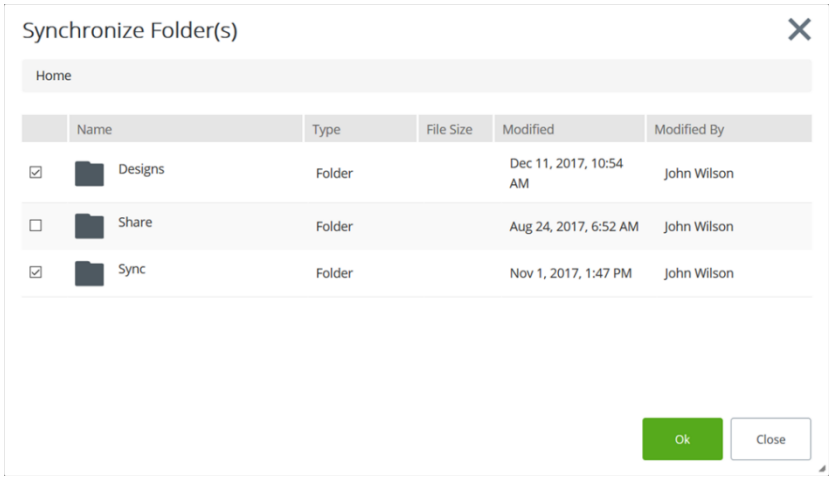


Select the Share tab at the top of the Preferences dialog box that displays. Under the Share tab, turn on the Enable Share Sync checkbox to create a Share folder on your device. In the Sync Frequency field, enter a time greater than 5 minutes. This time will define how frequently the contents of ProjectWise Share Sync will be synchronized with the contents of the Share folder on your device. For example, if you enter 10 minutes, the folders will be synchronized with each other every ten minutes.

A project with ProjectWise Share enabled can have one or multiple folders configured for use with Share Sync. To configure the folders, open ProjectWise Share, select the gearbox icon in the top right, and select Configure Synchronize Folders.



From the Synchronize Folder(s) dialog box that displays, select the folder or folders you would like to
synchronize and select OK. The Share folder on your device will include a corresponding folder for each folder you select for synchronization. The folders will be synchronized with each other as frequently as you specified above in the Sync Frequency field.



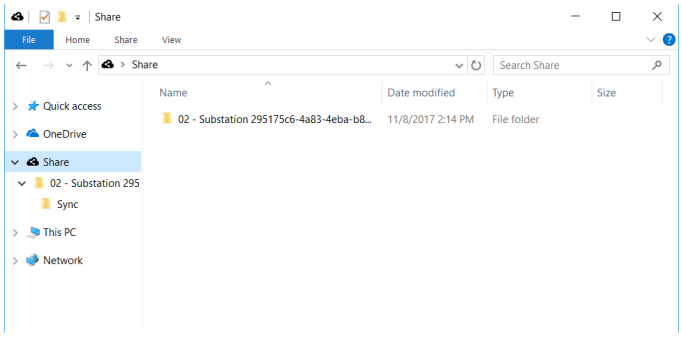
To synchronize the folders immediately, navigate to the Share tab of Connection Client as described above and select Sync Now.

If you are associated with multiple projects, you can configure separate folders for each project by opening ProjectWise Share for each project and configuring folders as described above. The synchronized folders for each project can be found on your device inside of the folder with the name of the project, which can be found inside of your Share folder in Windows Explorer.

Note: *If you cannot access ProjectWise Share, please contact your* ***Administrator****.*

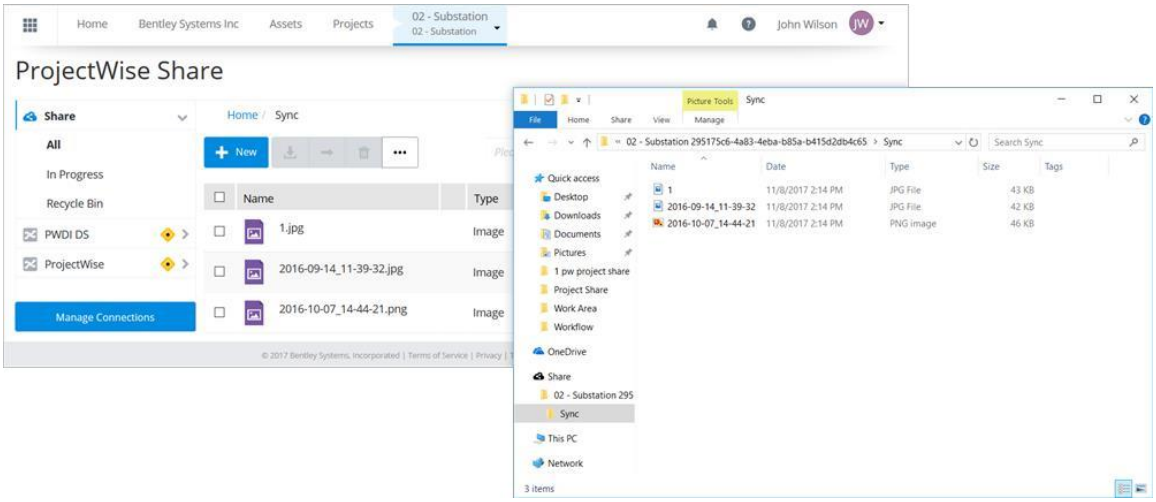
3.10.5 Accessing Files from ProjectWise Share Using Your Local Device

To use your local device to access files that have been uploaded to ProjectWise Share, open the Share folder in Windows Explorer. Open the folder with the name of the project you would like to open. If you are associated with only one project, there will only be one folder available here.



Inside of the project folder in Windows Explorer is the folder or folders that you configured for synchronization, as described above. When you open this folder, you find all the files that have been added to that folder in ProjectWise Share.

If the files are not present, ProjectWise Share may not have synchronized yet, as determined by the Sync Frequency time. To immediately synchronize ProjectWise Share, select Sync Now from the Share tab of the Preferences dialog box of the Connection Client.



3.10.6 Uploading Files to ProjectWise Share from Your Local Device

To upload files to ProjectWise Share from your local device, first navigate to the appropriate folder in Windows Explorer. Copy the files you would like to upload to the folder. The files will be uploaded to the corresponding ProjectWise Share folder for the project on https://connect.bentley.com/ when the Sync Frequency time has passed. If you do not wish to wait, you can also immediately synchronize ProjectWise Share by selecting Sync Now from the Share tab of the Preferences dialog box of the Connection Client.

When ProjectWise share has synchronized, the files will be available in the appropriate folder of the ProjectWise Share for everyone associated with the project.

3.10.7 Limitations with ProjectWise Share

You can sync up to 25 folder hierarchies. These folder hierarchies can be in one project or in multiple projects, if you are associated with more than one project. Each folder hierarchy can be configured for Share Sync up to 25 times, and the maximum total size of a folder hierarchy is 8GB. Each folder hierarchy can contain up to 100 nested subfolders. Subfolders can be nested to a maximum depth of 25. Folders can contain individual files up to 2GB in size.

the following folder hierarchies are supported by ProjectWise Share:

- A folder hierarchy containing four 2GB files. If one of the files was greater than 2GB, it would not be supported.
- A folder hierarchy containing eight 1GB files. If the total size exceeded 8GB however, it would not be supported.
- A folder hierarchy containing sixteen 500MB files.
- A folder hierarchy containing 100 subfolders, each subfolder containing one 1MB file. If the folder hierarchy contained more than 100 subfolders, it would not be supported.

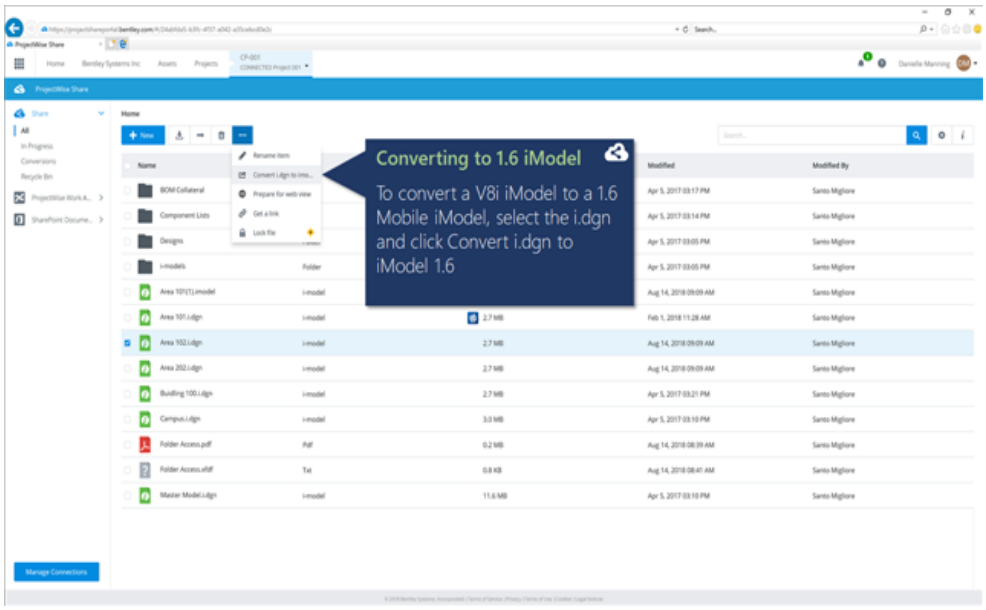
The following folder hierarchies are not supported by ProjectWise Share:

- A folder hierarchy containing one 3GB file. Even though the total size is under 8 GB, one of the files is over 2GB in size; therefore, this is not supported.

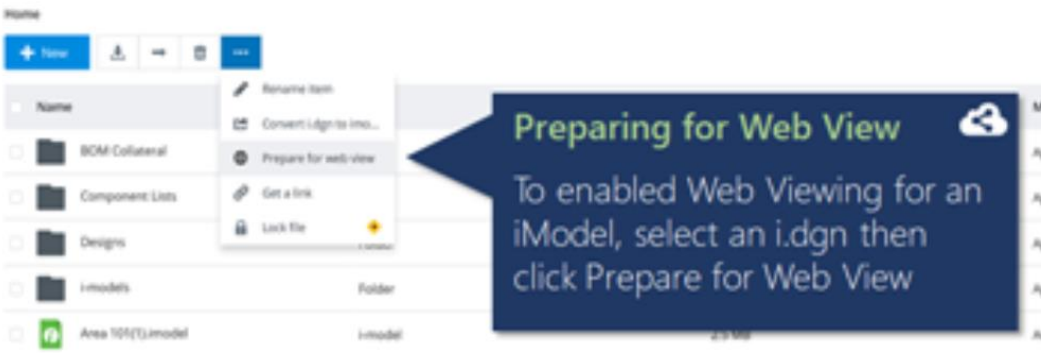
- A folder hierarchy containing nine 1GB files. Even though all of the files are under 2GB in size, the total size is over 8GB; therefore, this is not supported.
- A folder hierarchy containing 101 subfolders, each subfolder containing one 1MB file. Even though the total size is under 8GB and no individual file is greater than 2GB, the number of subfolders is greater than 100; therefore, this is not supported.

3.10.8 Converting to 1.6 iModel

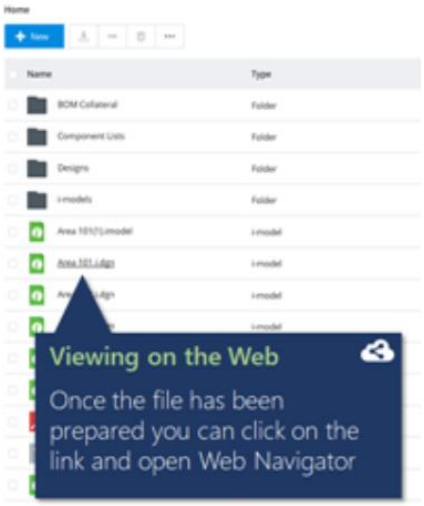
1. To convert a V8i iModel to a 1.6 Mobile iModel, select the i.dgn and click Convert i.dgn to iModel 1.6.

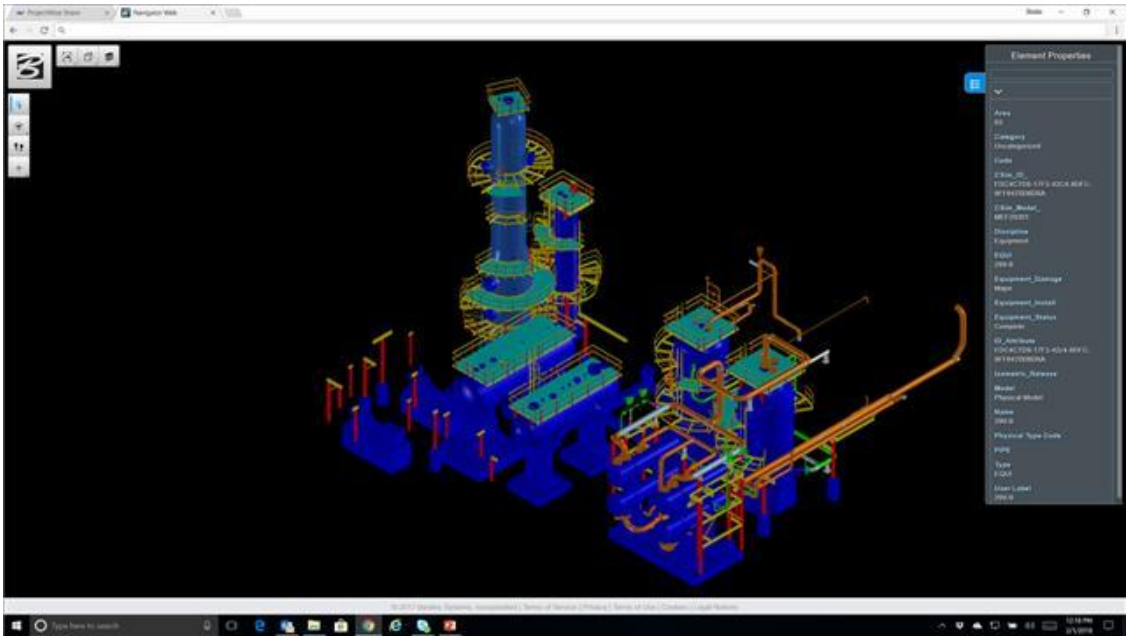


2. To enabled Web Viewing for an iModel, select an i.dgn then click Prepare for Web View.

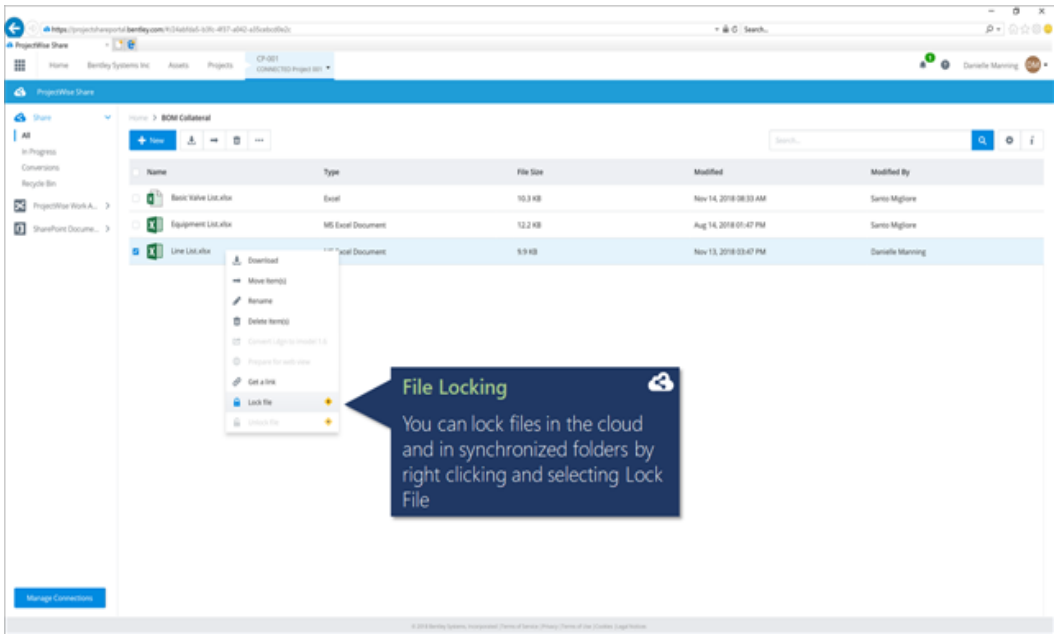


3. Once the file has been prepared you can click on the link and open Web Navigator.





You can lock files in the cloud and in synchronized folders by right clicking and selecting Lock File. The file is locked for your use in the cloud and on the desktop. You can unlock from either the cloud or the desktop as well.

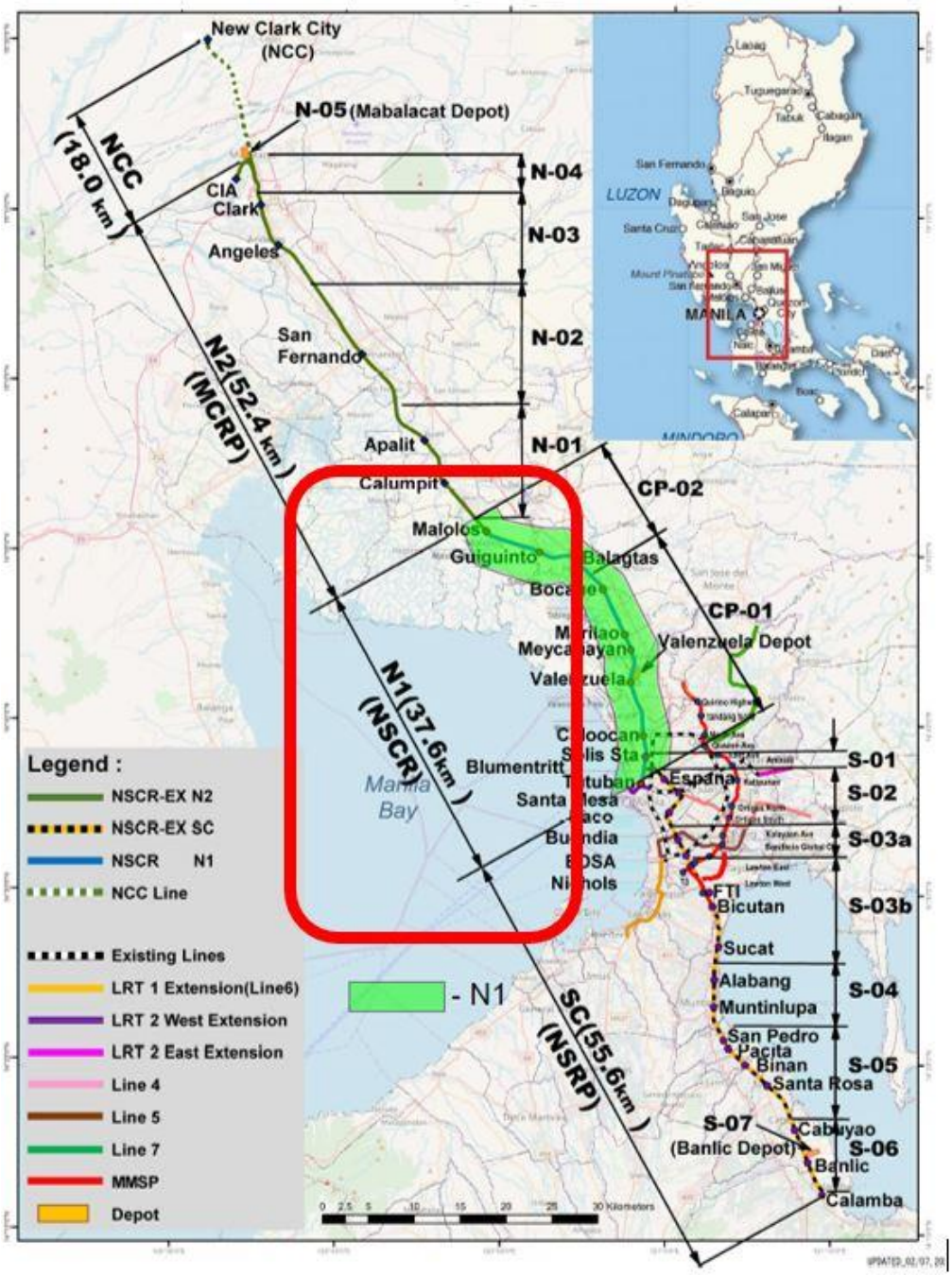

File Locking
You can lock files in the cloud and in synchronized folders by right clicking and selecting Lock File

PROJECT SPECIFIC PROCEDURE

APPENDIX J: N1, N2 and SC CLUSTERS

1. North South Railway Project – South Line (Commuter)

1.1 NSCR – N1 CLUSTERING



Document No.: NSCR-GC-LWD-ZWD-TDC-BM-000001, Rev 1, 22-Feb-2021
Printed copy is uncontrolled. Always refer to the electronic copy as the latest version.

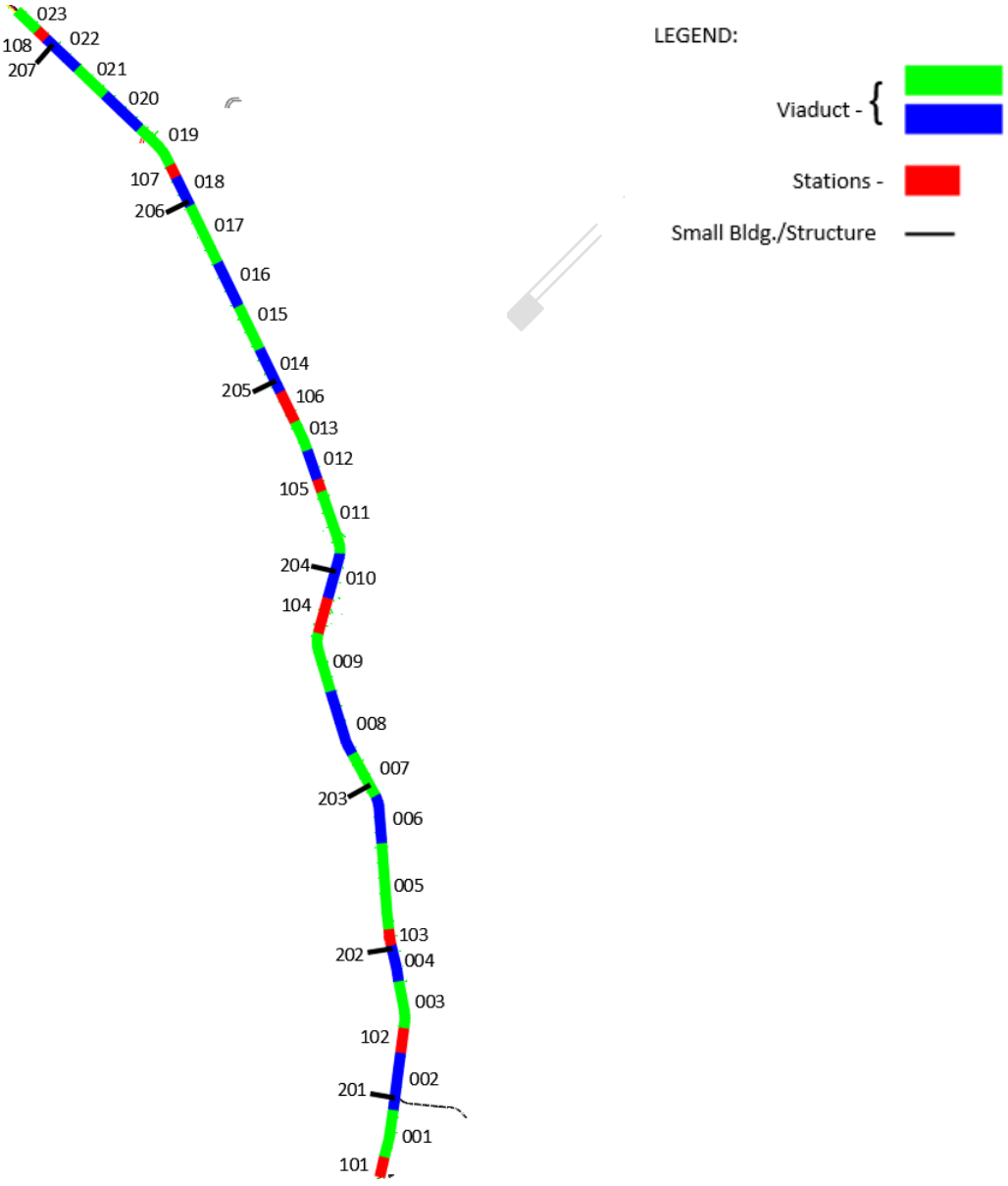
1.2 N1 NSCR CP-01 (VIA01 TO VI05) CLUSTERS

NSCR CP-01 Viaduct Clusters		
Cluster Number	From Pier No.	To Pier No.
001	N= 1616522.981, E= 497045.185 | PR1-13	N= 1617146.294, E= 497146.709 | PR1-40
002	N= 1617146.294, E= 497146.709 | PR1-40	N= 1618335.832, E= 497304.742 | PR1-70*
003	N= 16188511.182, E=497374.123 | PR1-84	N= 1619827.696, E= 497260.664 | PR1-106
004	N= 1619827.696, E= 497260.664 | PR1-106	N= 1620573.233, E= 497104.063 | PR1-125
005	N= 1620914.417, E= 497053.976 | PR1-9	N= 1622707.462, E= 496910.997 | PR2-10
006	N= 1622707.462, E= 496910.997 | PR2-10	N= 1623692.258, E= 496774.453 | PR2-32
007	N= 1623692.258, E= 496774.453 | PR2-32	N= 1624568.177, E= 496292.008 | PR2-57
008	N= 1624568.177, E= 496292.008 | PR2-57	N= 1625888.025, E= 495836.713 | PR2-92
009	N= 1625888.025, E= 495836.713 | PR2-92	N= 1627086.988, E= 495591.563 | PR3-35
010	N= 1627919.761, E= 495793.149 | PR3-55	N= 1628748.102, E= 496033.525 | PR3-79
011	N= 1628748.102, E= 496033.525 | PR3-79	N= 1630033.726, E= 495653.594 | PR3-115
012	N= 1630294.081, E= 495563.679 | PR3-122	N= 1630877.490, E= 495362.195 | PR3-139
013	N= 1630877.490, E= 495362.195 | PR3-139	N= 1631491.722, E= 495096.105 | PR4-17
014	N= 1632149.763, E= 494776.579 | PR4-35	N= 1633007.365, E= 494361.283 | PR4-60
015	N= 1633007.365, E= 494361.283 | PR4-60	N= 1633150.988, E= 494290.778 | PR4-85
016	N= 1633150.988, E= 494290.778 | PR4-85	N= 1633150.988, E= 494290.778 | PR4-110
017	N= 1633150.988, E= 494290.778 | PR4-110	N= 1635995.829, E= 492915.129 | PR4-143
018	N= 1635995.829, E= 492915.129 | PR4-143	N= 1636593.795, E= 492621.630 | PR5-17
019	N= 1636842.394, E= 492500.520 | PR5-24	N= 1637447.721, E= 492033.237 | PR5-50
020	N= 1637447.721, E= 492033.237 | PR5-50	N= 1638778.303, E= 490645.383 | PR5-66
021	N= 1638778.303, E= 490645.383 | PR5-66	N= 1638861.273, E= 490558.688 | PR5-86
022	N= 1638861.273, E= 490558.688 | PR5-86	N= 1639462.801, E= 489930.155 | PR5-108
023	N= 1639656.398, E= 489727.867 | PR5-115	N= 1640015.935, E= 489352.190 | PR5-129

N1 NSCR CP-01 Station Clusters			
Cluster Number	Name of Station	From Pier No.	To Pier No.
101	TUTUBAN STATION	N= 1615781.416, E= 496878.818 | PR1-1SB	N= 1616522.981, E=497045.185 | PR1-13
102	SOLIS STAION	N= 1618335.832, E= 497304.742 | PR1-70*	N= 16188511.182, E=497374.123 | PR1-84
103	CALOOCAN STATION	N= 1620573.233, E= 497104.063 | PR1-125	N= 1620914.417, E= 497053.976 | PR2-9
104	VALENZUELA STATION	N= 1627086.988, E= 495591.563 | PR3-35	N= 1627919.761, E= 495793.149 | PR3-55
105	MEYCAUAYAN STATION	N= 1630033.726, E= 495653.594 | PR3-115	N= 1630294.081, E= 495563.679 | PR3-122
106	MARILAO STATION	N= 1631491.722, E= 495096.105 | PR4-17	N= 1632149.763, E= 494776.579 | PR4-35
107	BUCAUE STATION	N= 1636593.795, E= 492621.630 | PR5-17	N= 1636842.394, E= 492500.520 | PR5-24

108	BALAGTAS STATION	N= 1639462.801, E= 489930.155 | PR5-108	N= 1639656.398, E= 489727.867 | PR5-115

N1 NSCR CP-01 Small Building/Structure Clusters		
Cluster Number	Name	Chainage
201	Substation No.1	KM 1+215.864
202	Substation No.2	KM 1+935.805
203	Substation No. 3	KM 5+400.815
204	Substation No. 4	KM 10+120.654
205	Substation No. 5	KM 14+360.654
206	Substation No. 6	KM 18+515.349
207	Substation No. 7	KM 22+885.850



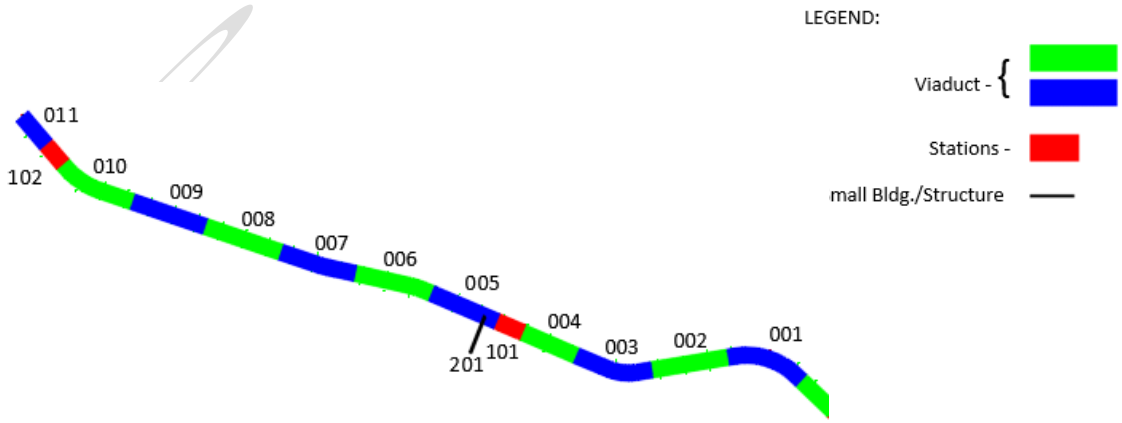
N1 NSCR CP-01 Cluster Key Plan

1.3 CP-02 (VIA06 TO VIA07) CLUSTERS

N1 NSCR CP-02 Viaduct Clusters		
Cluster Number	From Pier No.	To Pier No.
001	N= 1640015.935, E= 489352.190| PR5-129	N= 1640015.935, E= 489352.190| PR6-26
002	N= 1640015.935, E= 489352.190| PR6-26	N= 1640172.263, E= 487399.526| PR6-51
003	N= 1640172.263, E= 487399.526| PR6-51	N= 1640361.098, E= 486440.879| PR6-77
004	N= 1640361.098, E= 486440.879| PR6-77	N= 1640653.950, E= 485764.496| PR6-96
005	N= 1640794.814, E= 485433.200| PR6-105	N= 1641152.234, E= 484593.310| PR6-126
006	N= 1641152.234, E= 484593.310| PR6-126	N= 1641400.467, E= 483636.829| PR7-20
007	N= 1641400.467, E= 483636.829| PR7-20	N= 1641669.323, E= 482687.599| PR7-40
008	N= 1641669.323, E= 482687.599| PR7-40	PR7-61
009	PR7-61	N= 1642315.226, E= 480777.324| PR7-81
010	N= 1642315.226, E= 480777.324| PR7-81	N= 1642797.595, E= 479889.469| PR7-102SB
011	N=1643026.460, E= 479694.815| PR7-110	N= 1643392.399, E= 479384.460| PR7-120ST

N1 NSCR CP-02 Station Clusters			
Cluster Number	Name of Station	From Pier No.	To Pier No.
101	Guguinto Station	N= 1640653.950, E= 485764.496| PR6-96	N= 1640794.814, E= 485433.200| PR6-105
102	Malolos Station	N= 1642797.595, E= 479889.469| PR7-102SB	N=1643026.460, E= 479694.815| PR7-110

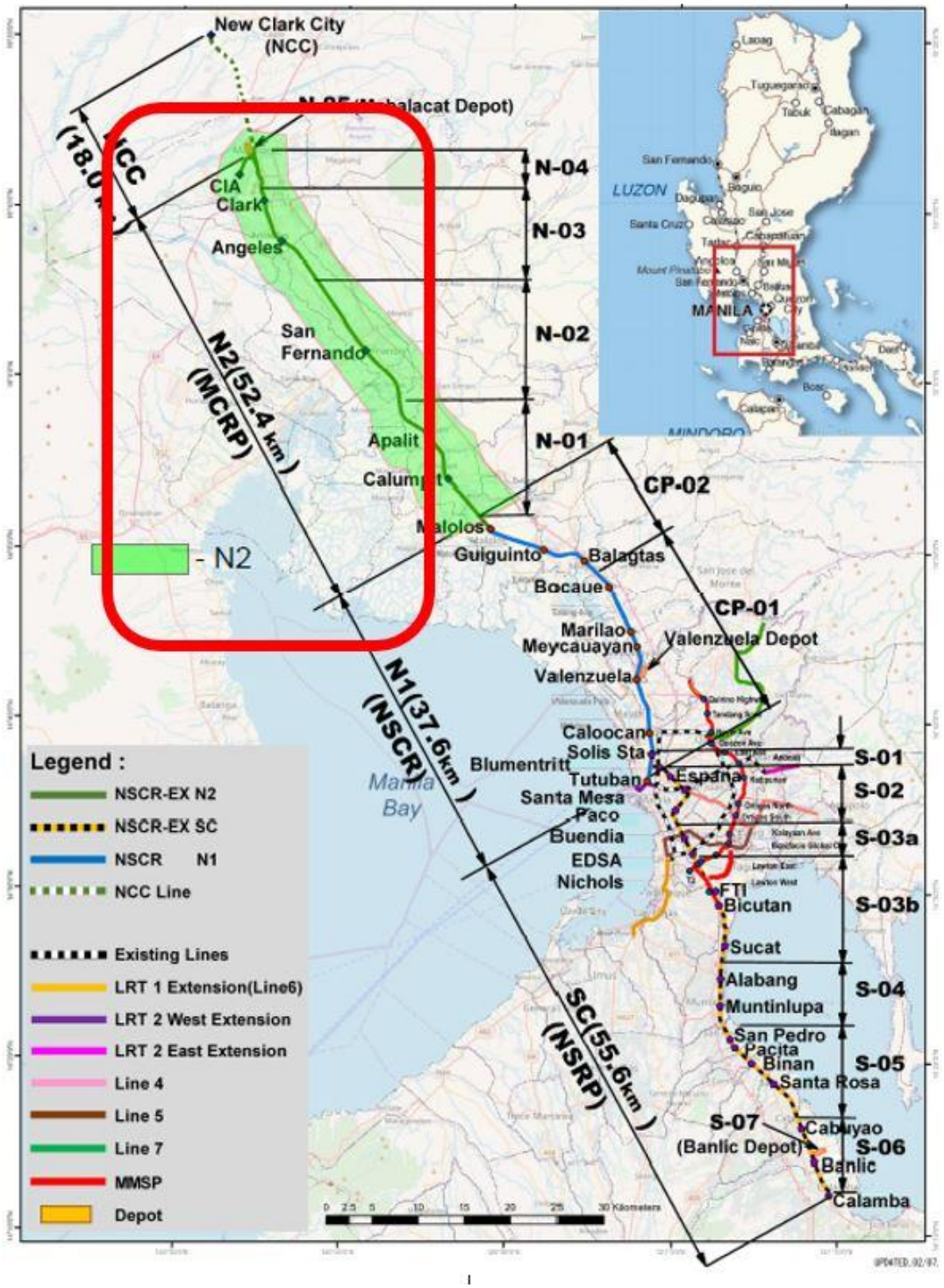
N1 NSCR CP-02 Small Building/Structure Clusters		
Cluster Number	Name	Chainage
201	Substation No.8	KM 28+191.989



N1 NSCR CP-02 Cluster Key Plan

2. Malolos-Clark Railway Project

2.1 MCRP – N2 CLUSTERING



2.2 CPN01 (Contract Package 1) CLUSTERS

MCRP-CPN01 Viaduct Clusters		
Cluster Number	From Northing, Easting | Pier No.	To Northing, Easting | Pier No.

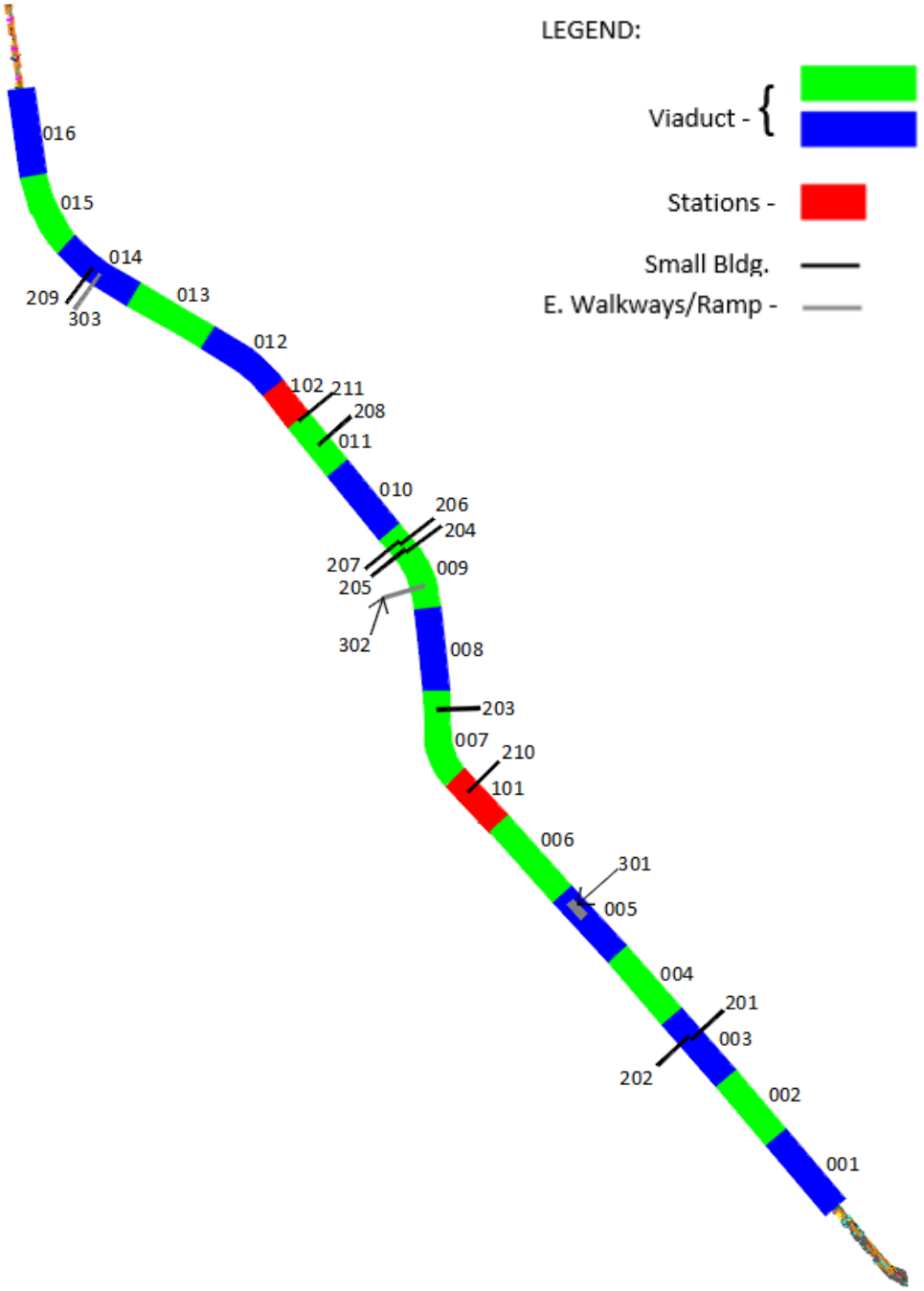
001	N=1643392.40, E=479384.46 | PR7-120	N=1644205.81, E=478687.89 | P-27
002	N=1644205.81, E=478687.89 | P-27	N=1644895.23, E=478093.92 | P-50
003	N=1644895.23, E=478093.92 | P-50	N=1645633.91, E=477457.54 | P-75
004	N=1645633.91, E=477457.54 | P-75	N=1646376.87, E=476810.93 | P-100
005	N=1646376.87, E=476810.93 | P-100	N=1647069.96, E=476175.98 | P-124
006	N=1647069.96, E=476175.98 | P-124	N=1647897.76, E=475421.87 | P-154*
007	N=1648446.13, E=474906.62 | P-174	N=1649457.00, E=474682.83 | P-201
008	N=1649457.00, E=474682.83 | P-201	N=1650446.40, E=474579.92 | P-224
009	N=1650446.40, E=474579.92 | P-224	N= 1651323.80, E=474146.23| P-249
010	N= 1651323.80, E=474146.23| P-249	N=1652094.40, E=473509.19 | P-273
011	N=1652094.40, E=473509.19 | P-273	N=1652662.10, E=473058.34 | P-292**
012	N=1653021.88, E=472763.75 | P-304	N=1653630.12, E=471987.44 | P-330
013	N=1653630.12, E=471987.44 | P-330	N=1654133.06, E=471123.13 | P-355
014	N=1654133.06, E=471123.13 | P-355	N=1654708.86, E=470337.55 | P-380
015	N=1654708.86, E=470337.55 | P-380	N=1655534.97, E=469938.83 | P-407
016	N=1655534.97, E=469938.83 | P-407	N=1656542.41, E=469796.46 | P-428

MCRP-CPN01 Station Clusters			
Cluster Number	Name of Station	From Northing, Easting | Pier No.	To Northing, Easting | Pier No.
101	CALUMPIT STATION	N=1647897.76, E=475421.87 | P-154*	N=1648446.13, E=474906.62 | P-174
102	APALIT STATION	N=1652662.10, E=473058.34 | P-292**	N=1653021.88, E=472763.75 | P-304

MCRP-CPN01 Small Building Clusters		
Cluster Number	Name	Chainage | Pier No.
201	ISER 1	KM 37+358.4506755 | P-65 to P-66
202	SS10	KM 37+390.591363 | P-66 to P-67
203	SS11	KM 42+350.902639 | P-195 to P-196
204	BP1-1	KM 44+260 | P241-P242
205	BP1-2	KM 44+300 | P242-P243
206	BP1-3	KM 44+380.000 | P244-P245
207	BP1-4	KM 44+420 | P245-P246
208	SS12	KM 45+900.6034032 | P-281 to P-282
209	SS13	KM 49+320.646259 | P-369 to P-370
210	SIG/COM Calumpit	| P-167 to P-169
211	SIG/COM Apalit	| P-290 to P-292

MCRP-CPN01 Emergency Walkway Clusters		
Cluster Number	Name	Chainage | Pier No.
301	Maintenance Ramp	39+700 | P-126
302	Emergency Staircase-1	43+820 | P-230 to P-231

303	Emergency Staircase-2	49+202 | P-366 to P-367



MCRP-CPN01 Clusters Key Plan

2.3 CPN02 (Contract Package 2) CLUSTERS

MCRP-CPN02 Viaduct Clusters		
Cluster Number	From Northing, Easting | Pier No.	To Northing, Easting | Pier No.

Document No.: NSCR-GC-LWD-ZWD-TDC-BM-000001, Rev 1, 22-Feb-2021
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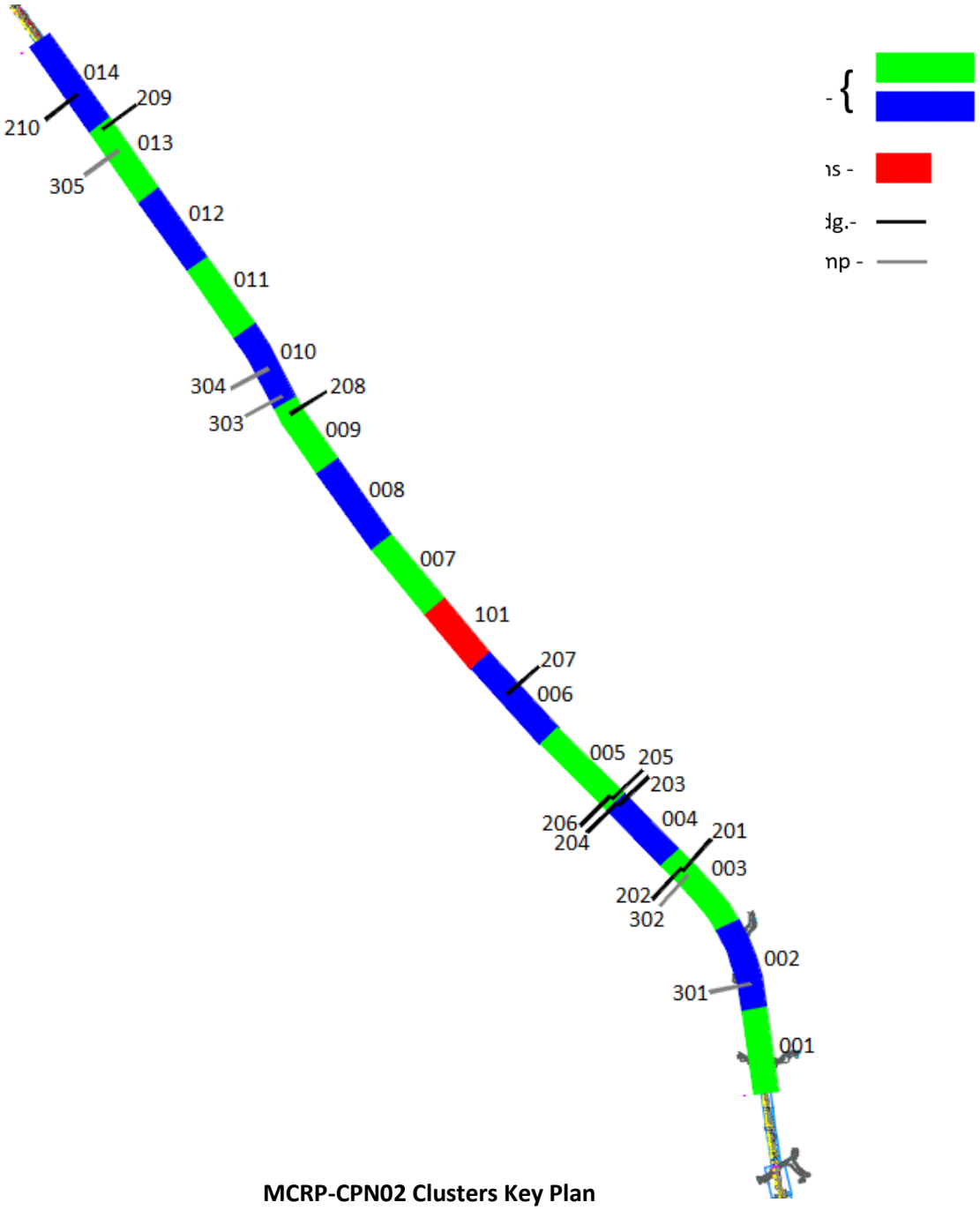
001	N= 1656542.41, E= 469796.46 | P-428	N= 1657565.18, E= 469655.05 | P-454
002	N= 1657565.18, E= 469655.05 | P-454	N= 1658574.17, E= 469330.68 | P-479
003	N= 1658574.17, E= 469330.68 | P-479	N= 1659393.80, E= 468633.69 | P-506
004	N= 1659393.80, E= 468633.69 | P-506	N= 1660071.02, E= 467967.52 | P-530
005	N= 1660071.02, E= 467967.52 | P-530	N= 1660875.35, E= 467159.73 | P-559
006	N= 1660875.35, E= 467159.73 | P-559	N= 1661790.33, E= 466324.26 | P-592*
007	N= 1662451.14, E= 465773.86 | P-614	N= 1663240.95, E= 465116.63 | P-640
008	N= 1663240.95, E= 465116.63 | P-640	N= 1664156.32, E= 464467.11 | P-664
009	N= 1664156.32, E= 464467.11 | P-664	N= 1664919.71, E= 463954.83 | P-688
010	N= 1664919.71, E= 463954.83 | P-688	N= 1665799.68, E= 463462.19 | P-715
011	N= 1665799.68, E= 463462.19 | P-715	N= 1666616.49, E= 462885.27 | P-740
012	N= 1666616.49, E= 462885.27 | P-740	N= 1667463.60, E= 462290.63 | P-767
013	N= 1667463.60, E= 462290.63 | P-767	N= 1668300.82, E= 461699.30 | P-793
014	N= 1668300.82, E= 461699.30 | P-793	N= 1669330.00, E= 460972.39 | P-825

MCRP-CPN02 Station Clusters			
Cluster Number	Name of Station	From Northing, Easting | Pier No.	To Northing, Easting | Pier No.
101	SAN FERNANDO STATION	N= 1661790.33, E= 466324.26 | P-592*	N= 1662451.14, E= 465773.86 | P-614

MCRP-CPN02 Small Building Clusters		
Cluster Number	Name	Chainage | Pier No.
201	ISER 2	KM 54+639.829 | P-500 to P-501
202	SS14	KM 54+670.607 | P-501 to P-502
203	BP2-1	KM 55+740.000 | P528-P529
204	BP2-2	KM 55+780.000 | P529-P530
205	BP2-3	KM 55+860.000 | P531-P532
206	BP2-4	KM 55+900.000 | P532-P533
207	SS15	KM 57+660.591 | P-577 to P-578
208	SS16	KM 61+970.598 | P-684 to P-685
209	ISER 3	KM 66+120.250 | P-791 to P-792
210	SS17	KM 66+640.594 | P-804 to P-805

MCRP-CPN02 Emergency Walkway Clusters		
Cluster Number	Name	Chainage | Pier No.
301	Emergency Staircase-3	53+005 | P-460 to P-462
302	Emergency Staircase-4	54+550 | P-498 to P-499
303	Emergency Staircase-5	62+200 | P-690 to P-691
304	Maintenance Ramp	62+500 |P-700 to P-701
305	Emergency Staircase-6	65+800 | P-783 to P-784



MCRP-CPN02 Clusters Key Plan

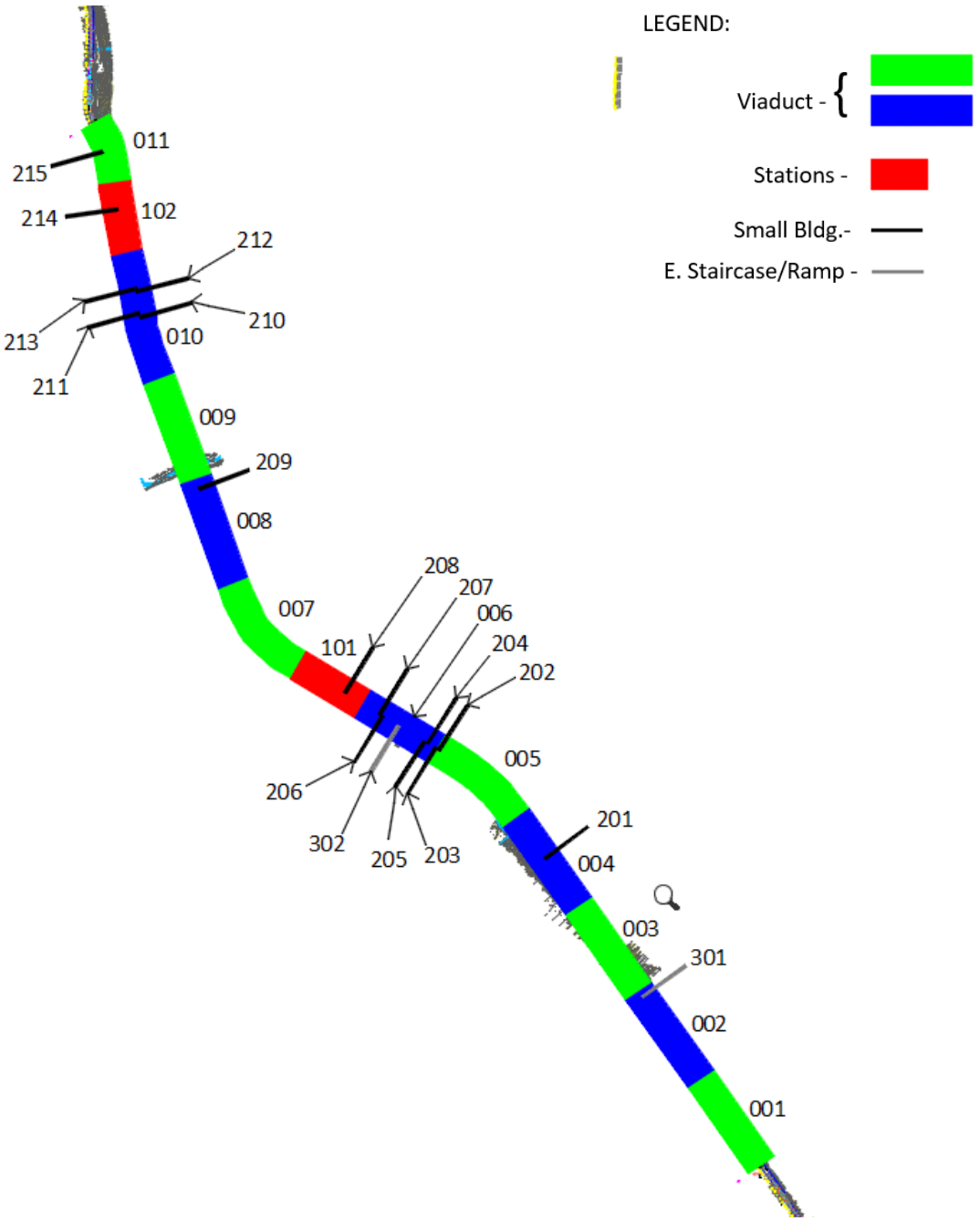
2.4 CPN03 (Contract Package 3) CLUSTERS

MCRP-CPN03 Viaduct Clusters		
Cluster Number	From Northing, Easting | Pier No.	To Northing, Easting | Pier No.
001	N= 1669330.00, E= 460972.39 | P-825	N= 1670146.81, E= 460395.48 | P-850
002	N= 1670146.81, E= 460395.48 | P-850	N= 1670963.61, E= 459818.57 | P-875
003	N= 1670963.61, E= 459818.57 | P-875	N= 1671780.42, E= 459241.66 | P-900
004	N= 1671780.42, E= 459241.66 | P-900	N= 1672597.23, E= 458664.74 | P-925
005	N= 1672597.23, E= 458664.74 | P-925	N= 1673252.48, E= 457909.38 | P-952
006	N= 1673252.48, E= 457909.38 | P-952	N= 1673678.47, E= 457208.71 | P-973*
007	N= 1674077.19, E= 456552.91| P-993	N= 1674825.98, E= 455980.83 | P-1019
008	N= 1674825.98, E= 455980.83 | P-1019	N= 1675794.60, E= 455630.86 | P-1047
009	N= 1675794.60, E= 455630.86 | P-1047	N= 1676757.73, E= 455280.20 | P-1073
010	N= 1676757.73, E= 455280.20 | P-1073	N= 1677927.98, E= 454982.64 | P-1105**
011	N= 1678614.54, E= 454863.01 | P-1124	N= 1679167.22, E= 454680.79 | P-1142

MCRP-CPN03 Station Clusters			
Cluster Number	Name of Station	From Northing, Easting | Pier No.	To Northing, Easting | Pier No.
101	ANGELES STATION	N= 1673678.47, E= 457208.71 | P-973*	N= 1674077.19, E= 456552.91| P-993
102	CLARK STATION	N= 1677927.98, E= 454982.64 | P-1105**	N= 1678614.54, E= 454863.01 | P-1124

MCRP-CPN03 Small Building Clusters		
Cluster Number	Name	Chainage | Pier No.
201	SS18	KM 70+980.594 | P-913 to P-914
202	BP3-1	KM 72+435.000 | P951-P952
203	BP3-2	KM 72+470.000 | P952-P953
204	BP3-3	KM 72+550.000 | P954-P955
205	BP3-4	KM 72+590.000 | P955-P956
206	SS19A	KM 73+055.150 | P-967 to P-967A
207	SS19B	KM 73+080.000 | P-967A to P-968
208	SIG/COM ANGELES	KM 73+470.000 | P-978 to P-980
209	SS20	KM 75+943.094 | P-1044 to P-1045
210	BP4-1	KM 77+660.000 | P1089-P1090
211	BP4-2	KM 77+700.000 | P1090-P1091
212	BP4-3	KM 77+966.267 | P1094-P1095
213	BP4-4	KM 77+998.431 | P1095-P1096
214	SIG/COM CLARK	KM 78+800.000 | P-119 to P-1120
215	SS21	KM 79+420.595 | P-1135 to P-1136

MCRP-CPN03 Emergency Walkway Clusters		
Cluster Number	Name	Chainage | Pier No.
301	Emergency Staircase-7	69+380 | P-873 to P-874
302	Maintenance Ramp	73+000 |P-962 to P-963



MCRP-CPN03 Clusters Key Plan

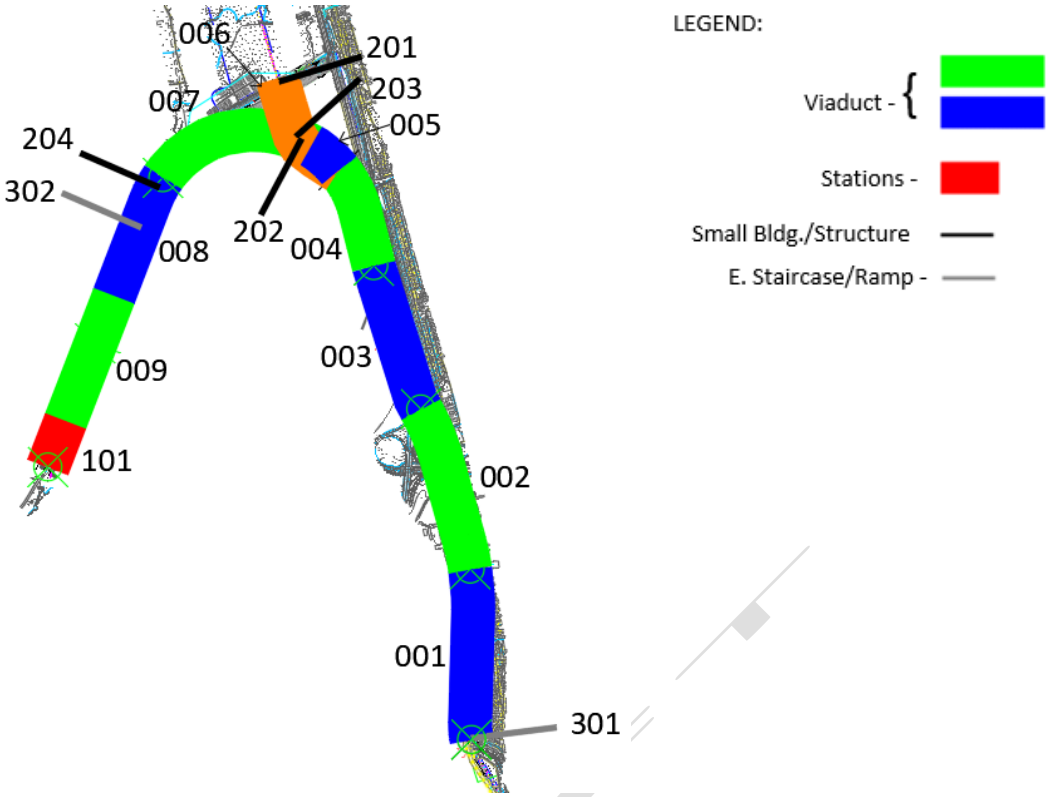
2.5 CPN04 (Contract Package 4) CLUSTERS

MCRP-CPN04 Viaduct Clusters		
Cluster Number	From Northing, Easting | Pier No.	To Northing, Easting | Pier No.
001	N=1679279, E=454637 | P-1142	N=1680277, E=454629 | P-1156
002	N=1680277, E=454629 | P-1156	N=1681215, E=454340 | P-1180
003	N=1681215, E=454340 | P-1180	N=1682055, E=454065 | PLK-50
004	N=1682055, E=454065 | PLK-50	DEP01-ABUT/DEP02-ABUT/VIA04-UND
005	VIA04	KM 83+420
006	DEP01-ABUT/DEP02-ABUT	KM 1+320
007	KM 83+420	KM 84+080
008	KM 84+080	KM 85+220
009	KM 85+220	KM 85+890

MCRP-CPN04 Station Clusters			
Cluster Number	Name of Station	From	To
101	CIA STATION	KM 85+900	KM 85+980

MCRP-CPN04 Small Building/Structure Clusters		
Cluster Number	Name	Chainage
201	Gil Puyat Ave. Underpass	KM 1+290
202	Sectioning Post	KM 83+430.678
203	Sump Pump	KM 83+460
204	SS22	KM 84+445.845

MCRP-CPN04 Emergency Walkway Clusters		
Cluster Number	Name	Chainage
301	Emergency Staircase	KM 79+690
302	Emergency Staircase	KM 84+650



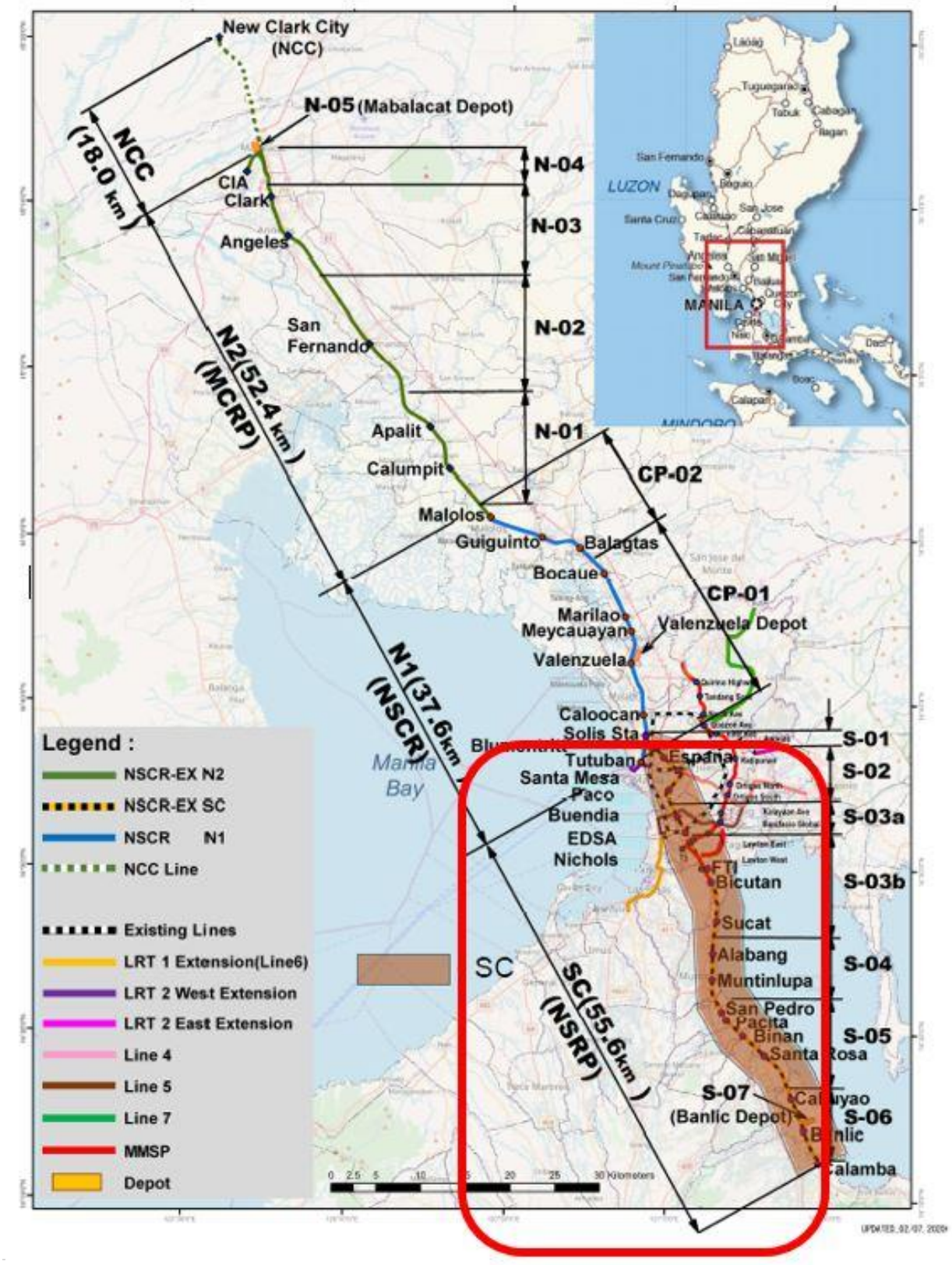
MCRP-CPN04 Clusters Key Plan

2.6 CPN05 (Contract Package 5) CLUSTERS

Cluster Number	Name
001	Package 5

3. North-South Railway Project – South Line (Commuter)

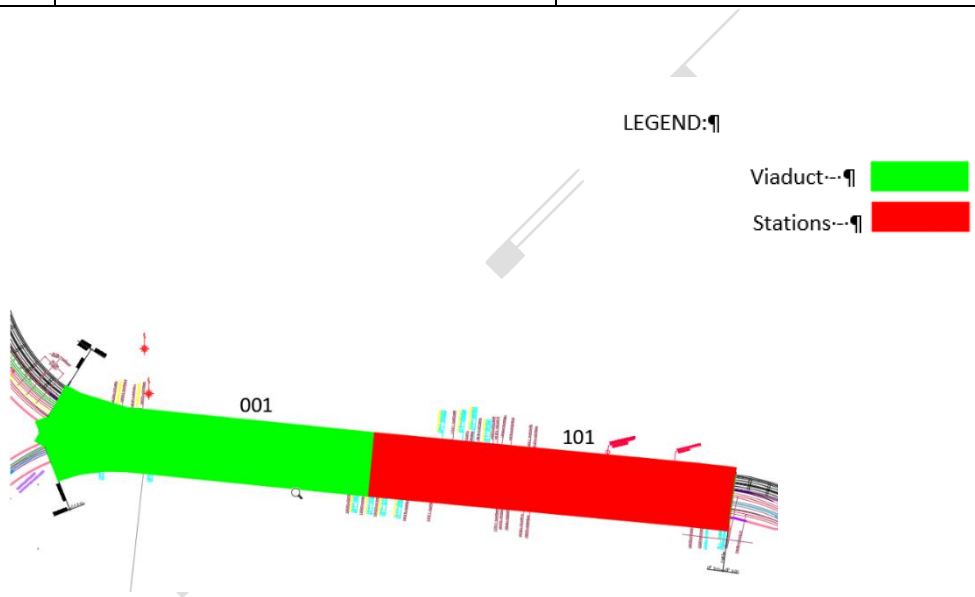
3.1 NSRP- SC CLUSTERING



3.2 CPS01 (Contract Package 1) CLUSTERS

NSRP CPS01 Viaduct Clusters		
Cluster Number	From Northing, Easting | Pier No.	To Northing, Easting | Pier No.
001	N= 1617305.01, E= 497315.11 | P-1S CP-01a|CP S-01 Boundary	N= 1617231.12, E= 497821.68 | P-12
	N= 1617251.59, E= 497313.64 CP S-01b| CP S-01 Boundary	

NSRP CPS01 Station Clusters			
Cluster Number	Name of Station	From Northing, Easting | Pier No.	To Northing, Easting | Pier No.
101	Bluementrit Station	N= 1617231.12, E= 497821.68 | P-12	N= 1617171.19, E= 498381.55 | P-29S

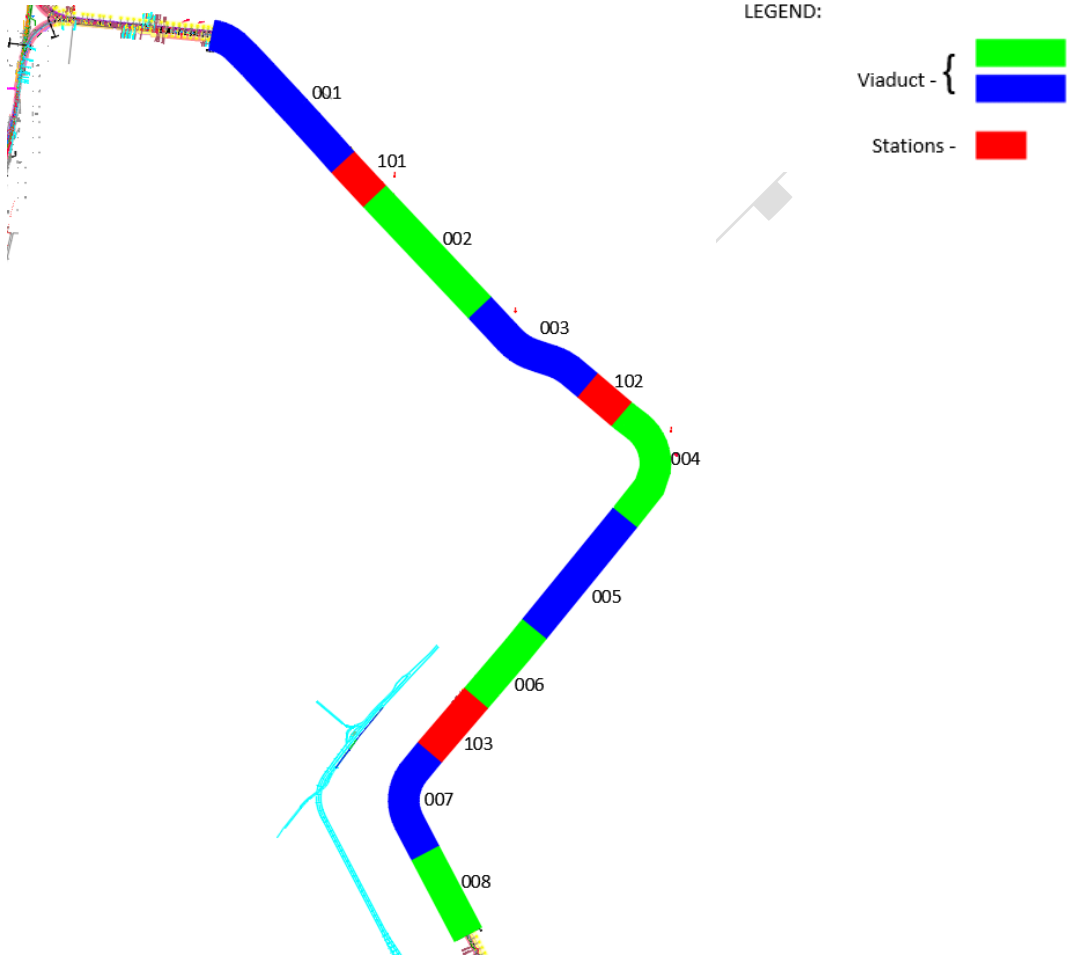


NSRP-CPS01 Cluster Key Plan

3.3 CPS02 (Contract Package 2) CLUSTERS

NSRP CPS02 Viaduct Clusters		
Cluster Number	From Pier No.	To Pier No.
001	N= 1617171.19, E= 498381.55 | P-29	N= 1616333.86, E= 499245.51 | P-61
002	N= 1616108.70, E= 499455.17 | P-69	N= 1615382.24, E= 500142.23 | P-95
003	N= 1615382.24, E= 500142.23 | P-95	N= 1614865.22, E= 500858.84 | P-116
004	N= 1614679.83, E= 501076.61 | P-124	N= 1613994.08, E= 501100.36 | P-144
005	N= 1613994.08, E= 501100.36 | P-144	N= 1613265.17, E= 500497.17 | P-157
006	N= 1613265.17, E= 500497.17 | P-157	N= 1612805.84, E= 500119.44 | P-169
007	N= 1612454.45, E= 499818.09 | P-182	N= 1611785.54, E= 499788.61 | P-202
008	N= 1611785.54, E= 499788.61 | P-202	N= 1611254.38, E= 500067.66 | P-217

NSRP CPS02 Station Clusters			
Cluster Number	Name of Station	From Pier No.	To Pier No.
101	España Station	N= 1616333.86, E= 499245.51 | P-61	N= 1616108.70, E= 499455.17 | P-69
102	Santa Mesa	N= 1614865.22, E= 500858.84 | P-116	N= 1614679.83, E= 501076.61 | P-124
103	Paco Station	N= 1612805.84, E=500119.44 | P-169	N= 1612454.45, E= 499818.09 | P-182



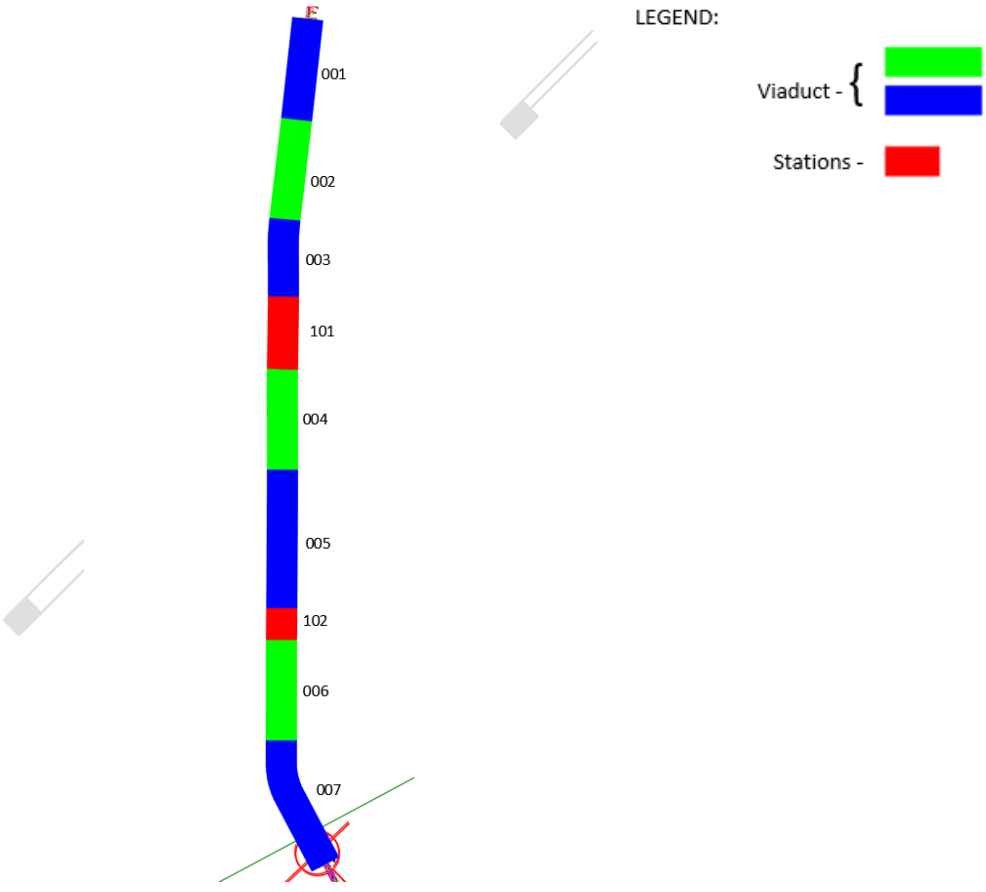
NSRP-CPS02 Cluster Key Plan

3.4 CPS04 (Contract Package 4) CLUSTERS

NSRP CPS04 Viaduct Clusters

Cluster Number	From Pier No.	To Pier No.
001	N= 1597524.30, E= 505239.17 | P-461	N= 1596518.37, E= 505128.46 | P-490
002	N= 1596518.37, E= 505128.46 | P-490	N= 1595525.21, E= 505011.73 | P-514
003	N= 1595525.21, E= 505011.73 | P-514	N= 1594753.40, E= 504997.98 | P-536
004	N= 1594027.28, E= 504988.31 | P-555	N= 1592847.33, E= 504987.21 | P-586
005	N= 1592847.33, E= 504987.21 | P-586	N= 1591647.38, E= 504980.86 | P-617
006	N= 1591329.88, E= 504978.82 | P-625	N= 1590327.39, E= 504976.74 | P-650
007	N= 1590327.39, E= 504976.74 | P-650	N= 1589101.85, E= 505414.37 | P-684

NSRP CPS04 Station Clusters			
Cluster Number	Name of Station	From Pier No.	To Pier No.
101	ALABANG STATION	N= 1594753.40, E= 504997.98 | P-536	N= 1594027.28, E= 504988.31 | P-555
102	MUNTINLUPA STATION	N= 1591647.38, E= 504980.86 | P-617	N= 1591329.88, E= 504978.82 | P-625



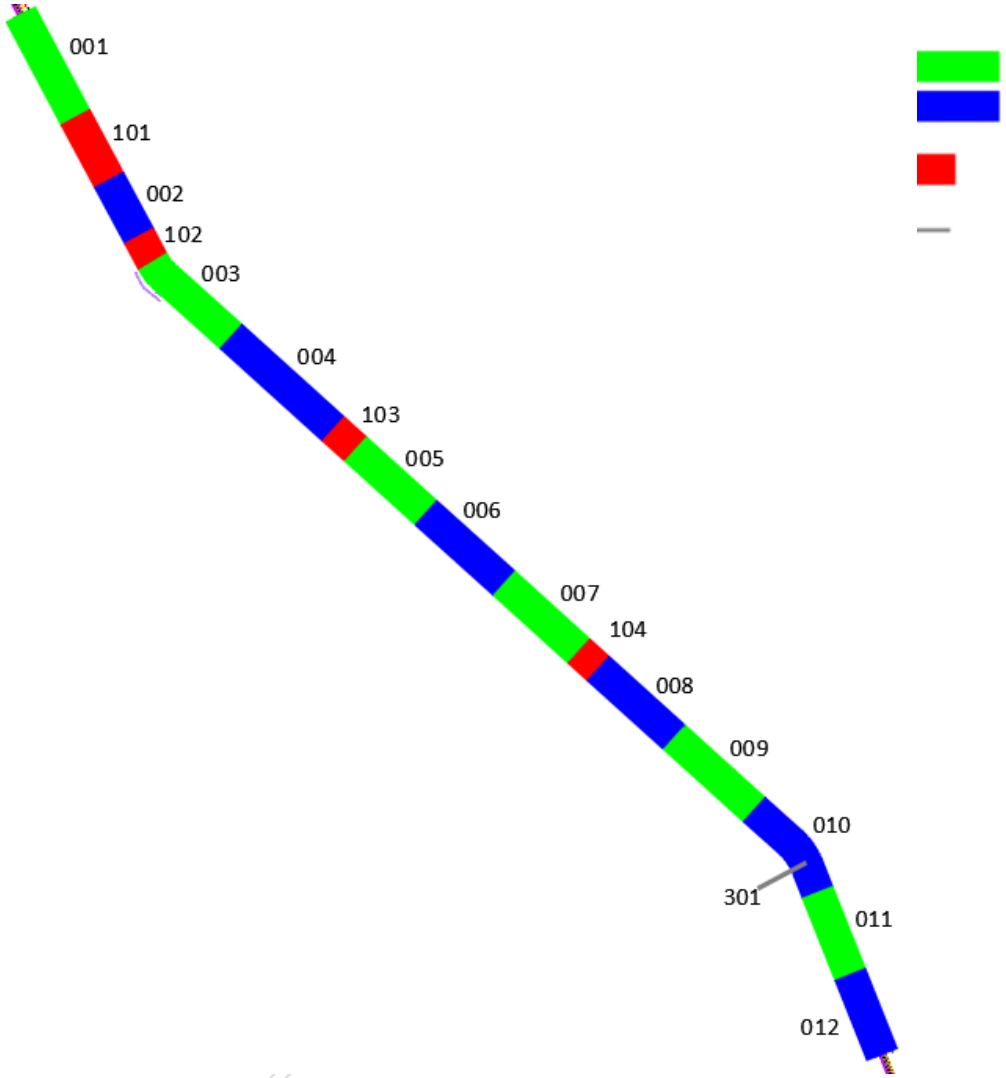
NSRP-CPS04 Cluster Key Plan

3.5 CPS05 (Contract Package 5) CLUSTERS

NSRP CPS05 Viaduct Clusters		
Cluster Number	From Pier No.	To Pier No.
001	N= 1589101.85, E= 505414.37 | P-684	N= 1588146.18, E= 505922.58 | P-707
002	N= 1587564.74, E= 506234.57 | P-726	N= 1587044.67, E= 506513.10 | P-740
003	N= 1586804.19, E= 506641.85 | P-747	N= 1586109.85, E= 507370.58 | P-773
004	N= 1586109.85, E= 507370.58 | P-773	N= 1585251.35, E= 508319.99 | P-806
005	N= 1585063.55, E= 508527.67 | P-813	N= 1584473.33, E= 509180.39 | P-833
006	N= 1584473.33, E= 509180.39 | P-833	N= 1583817.22, E= 509908.31 | P-858
007	N= 1583817.22, E= 509908.31 | P-858	N= 1583187.52, E= 510602.03 | P-880
008	N= 1583024.86, E= 510781.88 | P-886A	N= 1582385.92, E= 511489.07 | P-911
009	N= 1582385.92, E= 511489.07 | P-911	N= 1581715.03, E= 512230.63 | P-937
010	N= 1581715.03, E= 512230.63 | P-937	N= 1580944.53, E= 512818.56 | P-963
011	N= 1580944.53, E= 512818.56 | P-963	N= 1580182.72, E= 513121.94 | P-984
012	N= 1580182.72, E= 513121.94 | P-984	N= 1579444.13, E= 513416.07 | P-1005

NSRP CPS05 Station Clusters			
Cluster Number	Name of Station	From Pier No.	To Pier No.
101	SAN PEDRO STATION	N= 1588146.18, E= 505922.58 | P-707	N= 1587564.74, E= 506234.57 | P-726
102	PACITA STATION	N= 1587044.67, E= 506513.10 | P-740	N= 1586804.19, E= 506641.85 | P-747
103	BIñAN STATION	N= 1585251.35, E= 508319.99 | P-806	N= 1585063.55, E= 508527.67 | P--813
104	STA ROSA STATION	N= 1583187.52, E= 510602.03 | P-880	N= 1583024.86, E= 510781.88 | P-886A

MCRP-CPN05 Emergency Walkway Clusters		
Cluster Number	Name	Chainage | Pier
301	Emergency Staircase	44+799.663 to 44+834.663 | P-955 to P-956



NSRP-CPS05 Cluster Key Plan

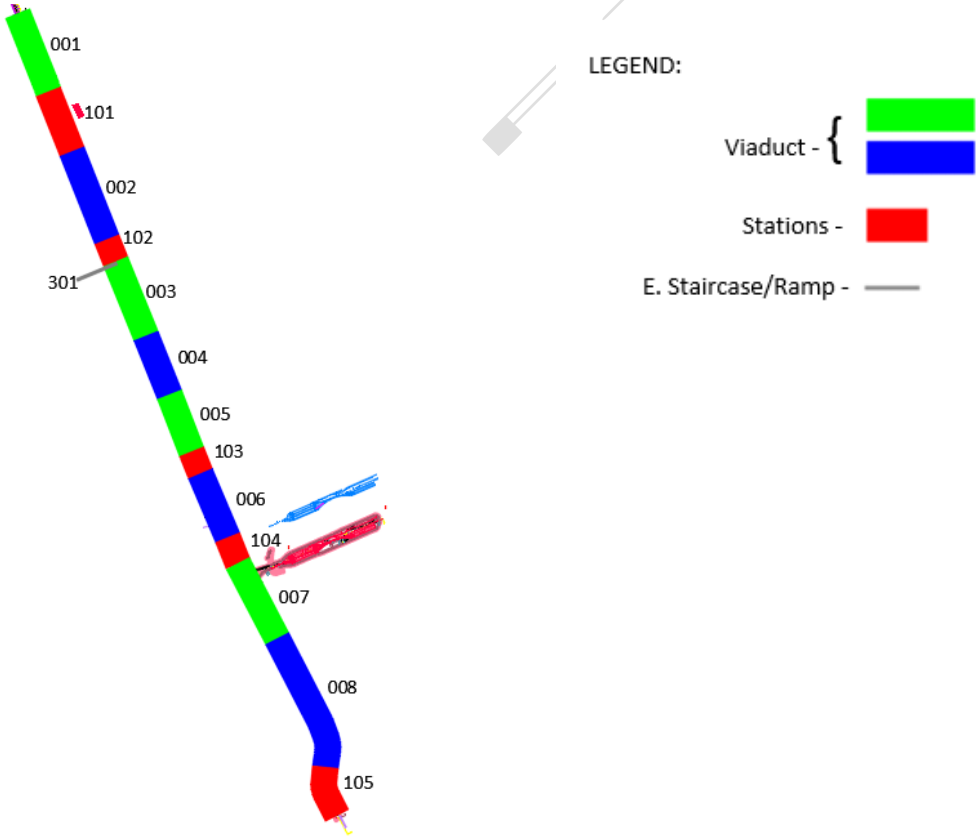
3.6 CPS06 (Contract Package 6) CLUSTERS

NSRP CPS06 Viaduct Clusters		
Cluster Number	From Pier No.	To Pier No.
001	N= 1579444.13, E= 513416.07 | P-1005	N= 1578522.36, E= 513776.80 | P-1030
002	N=1577818.48, E=514056.39 | P-1051	N= 1576782.42, E= 514467.54 | P-1079
003	N= 1576522.54, E= 514571.75 | P-1086	N= 1575647.34, E= 514927.72 | P-1110
004	N= 1575647.34, E= 514927.72 | P-1110	N=1574955.79, E=515204.81 | P-1129
005	N=1574955.79, E=515204.81 | P-1129	N=1574284.37, E=515464.81 | P-1147
006	N= 1574024.49, E= 515569.01 | P-1154	N= 1573271.86, E= 515889.32 | P-1173
007	N= 1572968.16, E= 516010.58 | P-1181	N= 1572082.63, E= 516473.13 | P-1204
008	N= 1572082.63, E= 516473.13 | P-1204	N= 1570568.95, E= 517038.28 | P-1244

NSRP CPS06 Station Clusters

Cluster Number	Name of Station	From Pier No.	To Pier No.
101	CABUYAO STATION	N= 1578522.36, E= 513776.80 | P-1030	N=1577818.48, E=514056.39 | P-1051
102	GULOD STATION	N= 1576782.42, E= 514467.54 | P-1079	N= 1576522.54, E= 514571.75 | P-1086
103	MAMANID STATION	N=1574284.37, E=515464.81 | P-1147	N= 1574024.49, E= 515569.01 | P-1154
104	BANLIC STATION	N= 1573271.86, E= 515889.32 | P-1173	N= 1572968.16, E= 516010.58 | P-1181
105	CALAMBA STATION	N= 1570568.95, E= 517038.28 | P-1244	N= 1570006.88, E= 517174.40 | P-1259

NSRP CPS06 Emergency Walkway Clusters		
Cluster Number	Name	Chainage | Pier
301	Emergency Staircase	49+873 to 49+913 | P-1086 to P-1087



NSRP-CPS06 Cluster Key Plan

3.7 CPS07 (Contract Package 7) CLUSTERS

Cluster Number	Name
001	Package 07