

Innholdsfortegnelse

Technical documentation	1
<i>Requirements for archiving and storage</i>	1
<i>Document plan</i>	1
<i>Design and signing of technical documentation</i>	2
<i>Naming of technical documents and drawings</i>	2
<i>Document Numbering</i>	3
<i>Document Numbering Structure</i>	3
<i>Project code</i>	3
<i>Parcel - "area / stretch"</i>	4
<i>Subject codes</i>	4
6.3.7. Løpenummer	7
6.4. Modeller	7
6.5 Modellstruktur	7
Revisjoner	7
Sluttdokumentasjon	9

Technical documentation

This is an excerpt from [PDP template](#) (Project-specific document management procedure) For a complete overview of requirements for documents, please refer to the project's PDP.

Requirements for archiving and storage

The supplier is obliged to have a project archive for technical documentation for all official audits with an electronic signature. The supplier shall use a suitable electronic system that at least takes care of numbering, audit handling, status codes, deadlines, as well as traceability of files and shipments.

The archive must be available and in accordance with requirements for safety and durability with a minimum duration beyond the warranty period or in relation to a possible maintenance agreement.

The production format for all deliveries must be handed over to Bane NOR on request and is also mandatory for 'as built' publications (D revisions), or generally for final delivery of a delivery / partial delivery to Bane NOR.

In connection with small changes, alterations, rehabilitations and modifications, Bane NOR reserves the right to change models or drawings afterwards without prior approval from the supplier.

The production format for drawings / models the original format from the CAD program the files are produced in, incl. Xref / support files, e.g. AutoCAD (.dwg), Revit (.rvt), Tekla (.db1), Bentley (.dgn), Novapoint (.dwg). BIM / 3D models are delivered in .dwg format, alternatively IFC, LandXML or other format by appointment.

Bane NOR reserves the right to make revisions of the supplier's original archive..

Document plan

Document plans are used for several purposes in the project. All participants in the project must plan their document production in accordance with current requirements, regulations and schedules. The document plan will also be used in connection with the import of metadata to Bane NOR's systems, so that manual registration is limited. Furthermore, the document plan must form the basis for status reporting from eSAM.

The supplier shall prepare a complete document plan for all technical documentation included in the delivery. The document plan must be prepared and handled as a separate technical document with a document number and technical front page. The plan must be sent officially to Bane NOR for comment and acceptance, both in PDF and XLSX format.

In connection with the construction plan and preparation of FDV and Manufacturing documentation for end customers, the document plan will also be used for import to the operating archives for reserving FDV no. (Operating number) from Bane NOR's operating organization.

FDV no. Is applied to the document plan by Bane NOR when the plan is of satisfactory quality and in good time before the FDV documentation is prepared. FDV no. and revision number must be applied

in the title block / title field for all technical documents and drawings before the documentation is transferred to operation. It is the individual supplier's responsibility that this is done.

During the process, the project will be able to change the layout of the document plan's content and structure if necessary

Design and signing of technical documentation

All documentation must be readable, this means that original files must be converted directly from originals to pdf so that it is possible to use the table of contents to browse the documentation. Technical documents shall be prepared based on Bane NOR's template for technical documents (ref. Bane NOR's Technical Regulations), see project-specific templates Appendix 2 - template for document cover. For FDV documentation, the documents must contain bookmarks for easy navigation.

The documentation must be self-explanatory and have the necessary references / references to associated documents and drawings. All technical documentation must have a unique document number, revision code, FDV number and revision number in the title block / title field.

A4 format must be used for technical text documents, see appendix 1. A3 format can be used for tables / sketches, and the like that are included in technical text documents. All pages in technical documents must have a header with the document title, document number, date, revision number and page number (page x of y). All signature fields on the front page must be filled in with initials. 2D. Signed by the person who prepared the drawing / revision. 2E. Signed by the person who checked the drawing / revision. 2F. Signed by the person who has approved the drawing / revision. Field 2E (checked by) and field 2F (approved by) can not be signed by the same person.

AutoCAD files with x-ref files must be checked and packaged (zipped) before handing over to the FDV archive.

Completion of title fields for technical drawings shall be prepared based on Bane NOR's template, see Appendix 3 - Template Title block for Technical Drawing. Project members can order / download a standard plug-in template (PTG - Project Template Generator) to AutoCAD to complete the title field from this link: <http://esam.bim2share.no/Pages/UserDocs>

The title field should be legible and should always be placed in the bottom right corner. Unless otherwise specifically agreed, technical drawings shall not consist of several pages. All signature fields on the front page must be filled in with a user ID and the supplier must send a signature list to the contract area, which must be updated at all times. The person conferencing and approving the documentation must not be the same person. Deviations from the above design requirements are only permitted after approval by Bane NOR's project manager. The approval must be documented.

Naming of technical documents and drawings

Administrative documents: <Project name> - "document type, name"

Example: ERTMS Experience section East Line - Organization map

Generic Documentation (GP / GA): Generic Product - "Product Type", "Product Name" - "Document Type" Generic Application - "Product Type", "Product Name" - "Document Type"

Example: Generic Product - EBITRACK2000, Shaft Counter System Installation Description Generic Application - CBSS_BV_L2 - ETCS Level 2 - System Description AIRTECH - TYPE XYZZA Cooling System - Maintenance Manual

Specific application (SA): Track Track, «subject» - «Product type», «Product name» - «document type»

Example: Østfold line east line, (Ski) - (Sarpsborg), ETCS / IL- LOP_01 Local Operator Space - Functional description

Site-specific documentation: Course Course section, "Location", subject "- document type "

Example: Østfold line east line, (Ski) - (Sarpsborg), Plots Station, ETCS / IL - Plan and cable plan

The file name must be the same for all versions of the document during the project's lifetime (without the use of date, rev, or other terms)

Document Numbering

All technical documents and drawings produced under the auspices of the project (suppliers, subcontractors or internally) shall bear a unique document number in accordance with this procedure. The document management manager or equivalent role administers and assigns serial number series to the project and its contracting parties.

The document number consists of: project code, parcel code (area division), subject code and a 5-digit serial number separated by a hyphen. In addition, all documentation must have an audit number to satisfy follow-up of the document's history. The revision number is not part of the document number.

Document Numbering Structure

All documents and drawings must have the following format in the code structure:

Project code	Parcel code	Document type	Serial number
XXX	- NN	- X	- NNNNN

Table 1: Document numbering structure

Examples: URH-00-A-00001, see chapter 6.3.4-7 for an overview of which codes (project code, parcel code, document type and serial number) apply to this project.

Project code

This code consists of 3 letters that tell which project in Bane NOR the document belongs to. The code must be included as part of the numbering structure for technical documentation.

Code	Description
<XXX>	<enter project name>

Table 2: Project code (The table will be expanded as needed) <Project code is defined by the document management manager in collaboration with the project manager>

Parcel - “area / stretch”

This code consists of 2 characters (numeric). The code identifies the project's area division. If the document has no reference to parcel, 00 (zero, zero) must be used.

Code	Description
00	General / Generic documentation
<XX>	<enter description>

Table 3: Parcel (The table will be expanded as needed)

<parcel codes are defined by the document management manager in collaboration with the project manager>

Subject codes

Specification of subject codes in the project is governed by requirements in the Technical Regulations. Subject codes are used to distinguish between the documentation for the various subjects in the project. There is one professional code for engineering and another for documentation for administrative purposes. The subject code for engineering shall be used to group the technical documentation into topics and consist of one character. See the table below.

Subject codes are used to distinguish between the documentation of the various subjects involved in the project. There is one professional code for engineering and another for documentation for administrative purposes. Subject code engineering shall be used to group the technical documentation to which topic they deal, and consists of one character.

The following subject codes for engineering are used:

Subject code design	Subject code documentation	Subject / application	Note
A		Home, Table of Contents, Text Documents, Drawing Lists	All text documents that include front pages, table of contents, professional text documents and drawing lists.
B	KO	Overview plans, Plan and profiles (situation plan)	Overview plan that shows the entire planning area and possibly towns and landmarks that help to locate the area. The drawing letter is also used for drawings such as line maps and station plans such as bla. is used for FDV drawing, where the drawing number is adapted to the original line map no.

Subject code design	Subject code documentation	Subject / application	Note
C	KO	Railway. Plan and profiles (line plan)	Displays vertical profile in the upper half and the planar part in the lower. The plan part shall contain coordinate network, equidistance 1 m, north arrow, execution, reference geodata, and symbol use. The profile part must be manufactured on the same scale as the plan part. Height and length ratio 1: 5. Shows the railway route together with the terrain profile. The length profile is given in ‰ rise and fall, and the radius of vertical curves. Shall show important constructions and elements that are important for the railway system
D	KO, KU	Station plans, siding, roads. Plan and profiles	Used for areas that fall outside C-drawings such as rerouted roads, operating and construction roads, parking lots and station facilities, siding, walkways and cycle paths.
E	KO, KU	Details (details belonging to D drawings)	Displays special elements in the plan, design of intersections and exits, and stations / stops.
F	KU	Normal profiles	Typical profiles where minimum dimensions for widths, lengths and heights appear. Typical electrical objects such as mast foundations for clocks, signals, cable ducts with troughs, structures, noise shielding, fences, railings and the like must be integrated. Reference lines are highlighted.
G	KU	Drainage plans	Shows both existing, conversions and new drainage systems. For drains, stream inlets / outlets, detailed drawings are made.
H	KU	Public and private water mains	Shows existing and converted public and private water supply and district heating lines. For manholes, pumping stations.
I	KU	Cables, guides and foundations	Shows guideways such as cable ducts and pipe crossings under tracks with troughs. In addition, the drawing shows all foundations related to railway technical facilities.
J	KU	Construction details	All the details of the plant that are necessary to describe the execution.
K	KU	Constructions	All constructions in the ground and in the terrain needed to establish the facility. Platform and foundations for technical facilities.
L	KO	Sign and marking plans	Sign plans with markings for signal, KL, tracks, telecommunications and public facilities.
M	TE	Telecommunication systems and customer information systems	Used for all telecommunications schematic and geographical drawings for internal and external systems, customer information and loudspeaker systems.
N	EL	Electric power	Displays all equipment for high and low voltage power supply from delivery point to installations in facilities.

Subject code design	Subject code documentation	Subject / application	Note
O	KU	Planting plans	
P	KU	Mass profile and diagram	
Q		Quality, safety (incl. RAMS), HSE / SHA and text documentation and checklists	All plans to document quality and safety, with RAMS documents, HSE and SHA, and associated checklists, control and quality plans.
R	EH	Track current. Overhead contact line and power supply	Includes all facilities connected to the railway power supply and the overhead contact line facility. Mast table can be incorporated into drawing.
S	SA	Signaling facilities	Displays all signal technical drawings schematic and geographical for internal and external systems. The drawings are given a separate drawing number related to the project in addition to a signal drawing number related to the procedure for signal drawings.
T	KO, KU	Perspective drawings and oblique photo (visual presentation)	All illustrations and 3D models used for illustration and display of the project. Also applies to professional models and coordination models for 3D modeling.
U	KU	Cross sections	Shows the facility with regular cuts in the terrain (eg every 10 meters) along the route.
V	KU	Geotechnical and geological drawings	Shows ground surveys, measurements and assessments of the ground. Shows necessary measures with ground reinforcement, bolting and other measures to achieve sufficient substructure.
W	KU	Land acquisition	Map with necessary land acquisition and landowner data and plan map for use in obtaining an approved area plan decision.
X	KO	Theme drawings	Necessary drawings, visualizations and sketches needed to illustrate the project beyond other drawings.
Y	KO	Track geometry, schematic track plan, temporary track plan, graphical route	Map showing the route with the center track, with the necessary fixed marks that have been used, and the necessary stitching data for use in the construction of the facility. Interchange drawings. Phase plan that describes the order for the implementation of necessary changes in the train operation. All phases must show the necessary measures needed to drive the train.
Z	KU	Quantity statement and summary.	Drawings and tables showing the mass and quantity lists of the plant. Drawings showing measures and an overview of risky work according to the SHA plan.
0		Other technical documents (used if no other codes are appropriate)	Should be avoided

Table 4: Document type

6.3.7. Løpenummer

Løpenummeret består av fem sifre. Dette nummeret er den unike identifikatoren som identifiserer dokumentet innenfor hvert prosjekt, parsell og dokumenttype. Det kan altså være flere dokumenter med samme løpenummer, så lenge kombinasjonen av prosjekt, parsell og dokumenttype er unik.

Produsent	Fagområde / Ansvar	Løpenummerserier
Bane NOR egenprodusert	Alle fagområder	00001-09999
<skriv inn produsent>	<skriv inn fag-/ansvarsområde>	<skriv inn serie>

Tabell 5: Løpenummer (Tabellen vil utvides ved behov)

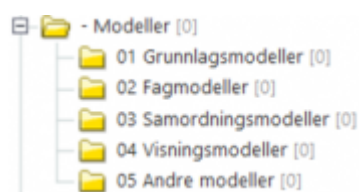
<Løpenummerserier defineres av dokumentstyringsleder eller tilsvarende rolle i samarbeid med prosjektleder >

6.4. Modeller

Avtales med dokumentansvarlig

6.5 Modellstruktur

For større 3D-modeller skal det etableres et eget tekstdokument som revisjosstyres på vanlig måte. I dokumentet skal alle modellfiler listes. Den faktiske forsendelsen skal utheves/markeres slik at de blir enkle å identifisere.



Figur 3: Modellstruktur

Leveransehyppighet og detaljrikdom kan variere fra prosjekt til prosjekt.

Revisjoner

Revisjonsnummeret for et dokument eller en tegning er et sekvensielt nummer som øker med 1 for hver gang en ny revisjon av dokumentet/tegningen blir utgitt offisielt. For offisielle utgivelser (revisjoner) vil revisjonskoden bestå også av en statuskode som forteller formålet med utgivelsen. Det benyttes to (2) sifre for å sikre en korrekt (alfanumerisk) sortering i lister og rapporter. Merk at revisjonsnummeret ikke er en del av dokumentnummeret. Det er et krav at telleren i revisjonsnummeret øker for hver utgivelse. Det betyr at det ikke skal forekomme flere varianter av

samme nummer (00C, 00D, 00U etc.) av et dokument eller en tegning. Det skal ikke forekomme hull i revisjonsserien for et dokument eller en tegning. Alle offisielle utgivelser skal håndteres som revisjoner og omfattes dermed av reglene i denne prosedyren. Revisjonsnummeret skal alltid starte på 00 (første utgivelse), deretter skal telleren fortløpende øke for hver utgivelse. En offisiell revisjon skal alltid kombineres med utgivelsesstatus (se tabell nedenfor).

Revisjons-bokstav	Beskrivelse	Eksempel
A	Konsept / løsningsforslag Ved endringer økes løpenummeret. I feltet «Revisjonen gjelder» skal det kun fremgå: Konsept/løsningsforslag og eventuell kort beskrivelse av endring fra forrige revisjon.	00A, 01A,
B	Tilbudsgrunnlag. B-revisjon skal benyttes ved utarbeidelse av tilbudstegninger/-dokumenter. Ved endringer økes revisjonens løpenummer (03B, 04B osv.) I feltet «Revisjonen gjelder» skal det kun fremgå: Tilbudsgrunnlag og eventuell kort beskrivelse av endring fra forrige revisjon.	02B, 03B,.....
C	Arbeidsdokument/ -tegning C-revisjon skal benyttes på tegninger og dokumenter som utgis for bygging og installasjon. Ved endringer etter dette økes løpenummeret (05C, 06C osv.) I feltet «Revisjonen gjelder» skal det kun fremgå: Arbeidsdokument/-tegning og eventuell kort beskrivelse av endring fra forrige revisjon.	04C, 05C,.....
D	Som bygget D-revisjon skal benyttes på tegninger og dokumenter som utgis etter bygging og installasjon. Ved endringer etter dette økes løpenummeret (07D, 08D osv.) I feltet «Revisjonen gjelder» skal det kun fremgå: «Som bygget» og eventuell kort beskrivelse av endring fra forrige revisjon.	06D, 07D,.....
E	Systemdokumentasjon og/eller dokumentasjons av generell karakter E-revisjon skal benyttes for generell/generisk dokumentasjon (styringssystem, prosjektmanualer, organisasjonskart, systemdokumentasjon / produktokumentasjon, standard brukermanualer, datablader, o.l.) og generell dokumentasjon som ikke er direkte knyttet til bygge- og installasjonsaktiviteter. I feltet «Revisjonen gjelder» skal kun årsaken til utgivelsen og eventuelt en kort beskrivelse av endring fra forrige revisjon fremgå. Beskrivelser som «For kommentar/godkjenning», «For informasjon», «For høring» og lignende bør unngås da dette skal fremgå av formålet med oversendelsen.	
U	Utgår Dokumenter / tegninger som tidligere er utgitt og som skal utgå påføres neste løpenummer og status U -utgått- på selve dokumentet (09U, 10U osv). En U-revisjon skal dermed behandles på lik linje med andre utgivelser. Merk: Dokumenter/tegninger som tidligere ikke er utgitt men som nå skal utgå skal kun påføres status U i dokumentplan. I feltet «Revisjonen gjelder» skal det kun fremgå: Utgått og eventuell kort beskrivelse av endring fra forrige revisjon.	08U

Tabell 6: Utgivelsesstatus

Figuren nedenfor viser hvordan bokstavene typisk benyttes i ulike prosjektfaser. Antallet revisjoner per fase kan variere.

	Utredning	Hovedplan	Detalj-reg.plan/tilbudsgrunnlag	Byggeplan/produksjon	Slutfase/overlevering
Generisk dokumentasjon (ikke faseavhengig)	00E	01E	02E	03E	04E
Faseoverskridende dokumentasjon	00A	01a	02B 03B	04C 05C	06D

Figur 4: Eks Revisjonskoding

Sluttdokumentasjon

Ved slutføring av prosjektet dokumenteres og arkiveres alle som bygget-tegninger etter

STY-605016

, og prosjektets PSD. Dokumentasjonen får da påført et nytt dokumentasjonsnummer med fagkode for dokumentasjon og et nytt tegningsnummer i tittelfeltet.

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