

MINnD s2 GT1.4 IFC-Tunnel Commentaires AFTES GT45  
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Chapte	Subject	Page	Date	Comm. nbr	Comments	Associated doc/img/lnk	Author	Date	Reviewer GT45	Decision GT45	Transmission bSI
1	Overview and methodology	6									
2	Scope	8									
		8	26/01/2021		Increase font size of the diagram		ETO				
		8	26/01/2021		Immersed tunnel construction --> IFC Maritime Project Prefabricated DiKE elements?		ETO		To be checked at IfcP&H		
2.1	Tunnel types	8	22/02/2021		IFC tunnel compenents: should include "existing structures model" or should be clearly mentionned as part of the Geotechnical model		OCU		Préciser la notion de surroundings		
		8	26/01/2021		Deep tunnel (as ANDRA project) is in the scope?		ETO		Characteristics in case of realization at deep depth Shaft & vertical drilling not in scope 1		
2.2	Tunnel subsystems	9	26/01/2021		Vertical drilling tunnel vis-a-vis (=towards)		ETO				
		9	26/01/2021		Increase font size of the diagram (and other afr diagram : general remark for all)		ETO				
		9	26/01/2021		What does mean Traction out of scope		ETO		Traction is part of IfcRailway Remplacer Structural Support par Support		
		9	22/02/2021		Distinction Structural Support / Lining not relevant ? Where would be items such as doors, guardrails, walkways, etc ? Could be included in Emergency, but might not always be for emergency		OCU				
		9	22/02/2021		Systems should also include rail, road, etc. Or not part of the scope ?		OCU		Système à ajouter ?		
		9	22/02/2021		Emergency (evacuation / access) not sure taht it can be considered as a "system", rather as a "function". In other words, many objects that concur to this function are also part of oterh systems (doors, lighting, ventilation, etc.)		OCU		Voie hébergée exclue Ajouter une phrase d'introduction expliquant que cette fonction est assurée par divers systèmes		
3	Use cases	10	22/02/2021		For UC 1 - Initial State Modelling - Required semantic information for existing structures should include: loads brought to the ground + sensitiveness to displacement		OCU		Vérifier que c'est détaillé dans la fiche		
		10&11	22/02/2021		UC 2x - ISO standards for Geotechnics should be mentioned similarly as for UC 15b		OCU		OK		
		12	22/02/2021		UC 4c - Safety visualization - Would consider Priority medium or high (often requested by customers) UC 6b - Design to Design w. full model logic - Not sure whether my understanding is correct, but for me, this cannot be out of scope. Parametric designing of tunnels must be the target. Being able, for example, to model support for electrical appliance (with an "electrical" software) from an axis and civil structure description (from a "tunnel specific software") is mandatory.		OCU		OK		
		13	22/02/2021		UC 7 - Structural & geomechanical analysis - would consider Priority medium or high		OCU		Exemples: piquetages de supports caténares, paramètres d'une chlotoide, équation de variation de PT.		
		13	22/02/2021		UC 8a -Air Flow simulation - would consider Priority medium or high		OCU		OK		
		14	22/02/2021		UC 9 - Standards Compliance - Difficulty might be variable depending on various sub-topics. Some of them might be more easy than others and more interesting: e.g. emergency egress requirements which are already available for buildings, etc.		OCU		OK		
		14	22/02/2021		UC 10 - Quantity Take Off - I would not consider this as low difficulty due to the multiplicity of classification systems or Costs Breakdown Structures (hence Qties Breakdown Structures) around the world		OCU		Commentaire secondaire		
		14	22/02/2021		UC 12a - Design to Tender Construction Model - I don't see this as a use case with specific requirements in itself, it is more a combination of several use cases.		OCU		Mettre une alerte car difficile à généraliser Ce Use Case a pour objectif de faire avancer la gestion contractuelle		
		15	22/02/2021		UC 12b - Design to Tender - Geotechnical Model - Contractual and risk allocation issues may lead this use case to be highly difficult...		OCU		Ce Use Case a pour objectif de faire avancer la gestion contractuelle		

		15	UC 13 - Design to Construction: Same comment as 12a: It is rather a combination of several use cases. Also, I don't see how this use case could be consider of low difficulty while 12a is considered medium The particular activity of excavation might need some specific information. It is the unusual case of "removing" objects instead of "adding" objects Missing use case (or included in 13 ?): Material supply			
		22/02/2021		OCU	Renommer l'UC14 pour intégrer le material supply	
		16	UC 16 - Machine Guidance and control - Why limiting this to a TBM ? Driving a jumbo or a punctual boring machine is also of interest. But probably not hat easy a UC...			
		22/02/2021		OCU	Modifier la description	
		17	UC 17 - Damages recording - I would consider this UC as Medium priority			
		22/02/2021		OCU	OK	
		18	UC 18 - Settlement Monitoring - I would consider this UC as Medium priority			
		22/02/2021		OCU	OK	
		18	Handover to Asset Management: What interface does the model provide to enable analysis of risk scenarios ... Identification and research of data on combustible mass of platform station floor, wall, roof materials, electrical cable groups, equipment lubrication oil inflammability grading ...? Does model provide for easy data extraction, data search, ...			
		26/01/2021		TCW		
4	Use cases prioritization	19	15c : should be High (more and more clients require this during construction)			To be assessed w. bSI Tunnel / Consideration of scan data
		26/01/2021		ETO		To be re-discussed w. bSI Tunnel / Potential i mpact on geometries (semantic+geom)
		20	6b : why out of scope if some tunnel parts are modelised in procedural geometry? Modify parameters			
		26/01/2021		ETO		
5	Process map and exchange scenarios	21	Schema is not readable			
		26/01/2021		ETO		
6	Georeferencing, geometries and positioning requiremei	23	Is really in this document RAR ? Not in IFC Common Schema?			Start-from-fresh assem done by bSI Tunnel
6.1	Overview	23				
6.2	Georeferencing	23				
		25	I don't understand the diagram with "Distorted = not"			To be clarified by bSI Tunnel
6.3	Alignment and tunnel axis	27				
		29	<i>Straight-line segments = only for TBM method? (ETO to check)</i> <i>Boring axis : maybe it could be intersting describing here how this axis has been obtained (Laser-Scan, informations from the TBM?)</i>			
		26/01/2021		ETO		
		28	<i>On some projects, linear refrence system may not be continuous (to avoid changing ref. of an object each time the alignment changes in another part of the project. linear ref such as XXkm+xxx may be used, with: XX being a fixed point on the alignment ans xxx possibly being bigger or smaller than 999.</i>			OK
		22/02/2021		SBR		
6.4	Geometry	30				Vérifier que possible (cf IFC alignement)
		22/02/2021		OCU		
		30	General for this chapter: One big topic that may not be covered is the way traditional tunnels (or cut-and-cover tunnels) are poured by segments (usually in the range of 10 - 15 m long). The formwork is usaully straight. in the curved parts of the alignment, it is necessary to precise how this strait formwork is placed: either the extremity of the pouring is perpendicular to the axis or it is the middel of the axis.			A considérer le guidage de l'implantation des ouvrages réalisés en place (coffrages) en tranchée couverte ou tunnel tradi
		22/02/2021		OCU		
6.4.1	Explicit Geometry	30	"Due to the construction methods applied" only for traditionnal excavation method (triangle mesh or Brep), and not for TBM			To be clarified by bSI Tunnel
		26/01/2021		ETO		
		31	"Ring = one instance" : NO, because there is an ovalization of the ring			Ring: is not an instance / As-built documentation of each ring realized
		26/01/2021		ETO		
6.4.2	Procedural Geometry	31				
		34	Figure 6-13 : don't understand?			
		26/01/2021		ETO		
		39	How define in procedural geometry the ovalization of the ring? The As-Built ring arangement is important for Systems			
		23/03/2021		ETO		

6.5	Voxel grids and octrees for representing geological data	40	23/03/2021	Why is this chapter placed here? Be careful with the use of voxels which do not allow the creation of a geological surface used as a target for linear projects.	ETO		
7	<b>Spatial structure and spaces</b>	41					
7.1	Spatial Structure / Project Hierarchy	42	22/02/2021	Not sure whether this covers connection with e.g. metro stations, shafts, niches, By-Pass	OCU	OK	
		45	23/03/2021	How are objects referenced linearly along the axis? How can we do a spatial (or linear) query in IFC? Spaces in conventional tunneling :	ETO		
7.2	Spaces	46	22/02/2021	Maybe a reference to the figure 9-7 in chapter 9.3.1 could be interesting, to describe the different spaces during the excavation	SBR	Make reference to longitudinal and transversal spaces	
		46	22/02/2021	For some spaces, the utility can change between the excavation phase and the exploitation phase. Does the possibility to change the affectation of a space exist? For example a logistic cavern which becomes a technical cavern	SBR	phase = phase? (ETO)	
8	<b>Geology and geotechnics modelling requirements</b>	50	23/03/2021	General remark : this part should be reviewed by the BRGM?	ETO		
8.1	Introduction	50					
8.1.a	Requirements in a tunnel lifecycle	50					
8.1.b	Special characteristics of the geological/geotechnical mo	50					
8.1.c	Terminology	51					
8.1.d	Abbreviations	52					
8.1.e	Focal points: exchanged geological/geotechnical informa	52					
8.1.f	Ground classification and risk assessment for tunneling: I	55		How is the vulnerability and the position of existing buildings integrated into the tool? The Book B (fig8.2) data about hazards close to the tunnel alignment (existing building piles, different networks, other tunnels), are they integrated in 2D/3D?	TCW		
		58	26/01/2021	Please repeat header table on all pages	ETO		
		58	23/03/2021	How are gases and polluted water represented in the IFC model?	ETO		
8.2	Semantics	64					
8.3	Geometry	66	23/03/2021	What is exactly a parametric surface? ifcBsplineSurface? For which purpose?	ETO		
8.4	Uncertainty	69	26/01/2021	Can the unknown dimensions / positions of existing objects be represented as a variable?	TCW		
8.5	Existing standards	70					
8.5.a	OGC-standards	70					
8.5.b	Inspire	72					
8.5.c	IFC-geotech by Ifc4.3 (Common-schema) project	72	26/01/2021	If the Geotech model represents diffuse geotechnical hazards, will this information be accurately displayed in the tool from a BIM system that is not identical to the IFC system?	TCW		
		72	23/03/2021	Where is the appendix [report "Geotechnical Use Cases, Requirements and Implementation" ]?	ETO	Needs to be expressed (tunnel requirements) and to be covered by the domain-specific Ifc	
			Rq6	What about the surrounding structures / networks / buildings characteristics (related to risks)			
9	<b>Excavation requirements</b>	76					
9.1	Overview	76	Rq7	What about realization/manirating/evacuation tools		Should be identified	
		76		To complete Rq 7 : all the temporary infrastructures for realization of the tunnel : - ventilation ducts, ventilators; - climatization equipments; - conveyors for marinating, conveyors for the aggregate used for concrete; - underground concrete producing installation; - inner lining formworks; - underground installation for the manpower; - underground installation for the maintenance of the different evacuation tools; - communication system during construction; - safety system during construction (shelters, water pipes system,...) - temporary groudwater drainage system and all associated equipments; - temporary power supply.	SBR	Recommandation to reorganize the chapter with construction specific equipments and tools	
			22/02/2021				

	76	23/03/2021	Could this part not be the subject of an annex/appendix ? No link with IFC	ETO	
9.1.1 Abbreviations	76				
9.1.2 Conventional tunnelling	76				
9.1.3 Mechanised tunnelling	78				
9.1.4 Cut-and-cover tunnelling	80				
9.2 Semantics	81				
9.2.1 Conventional tunnelling	81				
9.2.2 Mechanised tunnelling	82				
9.2.3 Cut-and-cover tunnelling	82				
9.3 Geometry	82				
9.3.1 Conventional tunnelling	82	22-févr	For conventional tunneling as-built, but also for quantity take offs, it is necessary to be able to describe the accuracy of the actual baring against the theoretical one: "hors profils", etc.	OCU	OK
9.3.2 Mechanised tunnelling	83				
9.3.3 Cut-and-cover tunnelling	84				
<b>10 Excavation support, ground improvement, waterproofing</b>	86				
10.1 Excavation support	86				
10.1.1 Conventional tunnelling	86	26/01/2021	P.95 : Error! Reference source not found. :	ECH	
	87	22/02/2021	Important missing solution for pre-support: freezing (whitch, by the way, may require specific géotechnical data) ETO (also)	OCU	OK See also p.116
	98&99	22/02/2021	One of the top issue regarding anchor bolts or shotcrete is to be able to specify clearly whether re representation is theoretical (regular spacing / location / thickness, etc.) or actual ETO (also, but both existing : theorical and as-built)	OCU	OK
		10/03/2021	Make reference to factual data acquired during construction (longitudinal drillings)	MRI	
	102		For cast-in-situ inner lining: - One big topic that may not be covered is the way traditional tunnels (or cut-and-cover tunnels) are poured by segments (usually in the range of 10 - 15 m long). The formwork is usaully straight. in the curved parts of the alignment, it is necessary to precise how this strait formwork is placed: either the extremity of the pouring is perpendicular to the axis or it is the middel of the axis.		
		22/02/2021	- same comment as for temporary support regarding distinction between theoretical thickness / real in-situ	OCU	Same comment as for §6.4
10.1.2 Mechanised tunnelling	106	Rq9	Case of tunnel realization through station		
10.1.3 Cut-and-cover tunnelling	106	23/03/2021	It ins't always "a pressurized shielded TBM" ?	ETO	
	112	Rq8	Butons and other temporary tools used for realization		
	112	22-févr	Here also, distinction to be made between theoretical (excavation / backfill) and real	OCU	OK
10.2 Ground improvement and water control	116				
10.2.1 Conventional tunnelling	116				
10.2.2 Mechanised tunnelling	119		Permanent ground treatment around the tunnel alignement could be integrated in the tool: JetGrouting / injections for entry / exit points to stations or adits or for treatment inside a station box to stabilize the ground and allow TBM passage through the soil before excavation	TCW	
10.2.3 Cut and Cover tunnelling	120	26/01/2021			
10.3 Waterproofing	120				
10.3.1 Conventional tunnelling	120				
10.3.2 Mechanised tunnelling	123				
10.3.3 Cut and cover tunnelling	123				
10.4 Tunnel Linings	124		Are tunnel protection devices against fire like "Promat" included here? Or maybe in IFC Building?		to include in the fire-fighting chapter
10.4.1 Conventional Tunnelling	124	22/02/2021	If not, it could be interesting to add a chapter here	SBR	
10.4.2 Mechanised Tunnels	131				
10.4.3 Cut-and-cover Tunnels	132	22-févr	Missing a scketch with slabs anchored in diaphragm walls	OCU	OK
<b>11 Tunnel systems requirements</b>	135				

11.1	Systems, sub-systems, components & characteristics	135	19/02/2021	<p>l'objectif est aussi d'assurer la sécurité des usagers  Un chapitre spécifique "tests et essais" serait utile  Un chapitre spécifique Maintenance des équipements serait utile  La rénovation n'est pas traitée.  Comment vont être abordés les contrôles sur un ensemble de système ? (séquences particulière de sécurité par exemple)  Et les contrôles réglementaires ? (extincteurs, détection incendie des bâtiments, installations électriques...)  Pour les équipements retrouver ces 4 phases  (design/installation/tests/maintenance dans 4 chapitres distincts serait utile</p>	CETU	
11.2	Systems required during construction	136		<p>Tout ce qui concerne les dispositions de construction de l'ouvrage (éclairage de chantier, ventilation de chantier, etc) serait mieux dans un chapitre spécifique qui serait intégré dans la partie GC, mais pas dans la partie Equipements</p>	CETU	
11.3	Existing Ifc4.3 objects vs specific IfcTunnel objects	137	22/02/2021	<p>Je partage la remarque du CETU. D'autant plus que les attentes en terme de niveau de définition sont différents entre la phase construction (plutôt utile pour les concepteurs et l'entrepreneur pour penser l'organisation et la logistique de chantier) et la phase exploitation (maintenance, exploitation, renouvellement)  Ces commentaires sont valables pour tous les sous-systèmes des différents paragraphes du chapitre 11 en fait</p>	SBR	
11.3.1	Existing Ifc Railway objects	138				
11.3.2	Existing IfcRoad objects	143				
11.3.3	IFC4 (buildings) objects	145	22/02/2021	<p>To complete the Rq4:  Maybe the following items are in the IFC Building, if not, they should be integrated here :  - metallic walkways;  - cable raceways; (chemin de câble)  - handrail, sometimes with integrated lighting (main courante qui peut intégrer un éclairage).  in case of fire</p>	SBR CETU	to be considered in a special metallic topic
11.4	Ventilation	145	19/02/2021			
11.4.1	Ventilation systems under tunnel operation	145				
11.4.2	Ventilation systems during tunnel construction	147				
11.4.3	Main components and characteristics	149	22/02/2021	<p>Are the door of the by-pass or the cross passages included here?  Or maybe in the IFC Building?  If not, a dedicated chapter could be interesting.  Fig 11-12 don't understand the purpose ?  Silencers are not specific for tunnels ? (ifcductsilencer?)</p>	SBR	OK
11.5	Power supply – High voltage	151	23/03/2021		ETO	
		151	19/02/2021	<p>Ce § concerne également la basse tension  Le découpage haute et moyenne tension n'existe plus en France.  Quelles sont les plages de tension ?  + boîtes de dérivation</p>	CETU	
11.5.1	Power supply under tunnel operation	151				
11.5.2	Power supply during tunnel construction	151			CETU	
11.5.3	Main components and characteristics	152	19/02/2021	<p>Medium voltage facilities : A quoi cela correspond ?  MV cables : Il manque HV cables  Pressure relief facilities : A quoi cela correspond ?  LV distribution : Identique au titrell manque les armoires électriques  Extra low voltage distribution : Qu'est ce que cela comprend ?  Cables : Ajouter boîtes de dérivation, chemins de câbles  Autonomous production plant : Différence avec "Emergency Power Generator" ?  Low voltage distribution : Redondant avec plus haut</p>	CETU	
		153	22/02/2021	<p>The last table seems not to belong to this chapter (NB: same comment for the following chapters)</p>	OCU	
11.6	Energized equipments	153				
11.6.1	Energized equipments under tunnel operation	154	19/02/2021	<p>Automatic Incident Detection (DAI en français)  oversize vehicule detection (détection de hors-gabarit)  barrières de fermeture  DAI  Variable Message Signs (PMV en français)</p>		
11.6.2	Energized equipments during tunnel construction	154	23/03/2021	<p>Control access for manpower ?</p>	ETO	
11.6.3	Main components and characteristics	155	19/02/2021	<p>Voir fichier pdf joint sur le tableau figure 11-14</p>		

11.7 Drainage	155	22/02/2021	Are the equipments for the security (sûreté) included here?	SBR	Reference to protection against intrusions	
	158					
11.7.1 Drainage system during tunnel operation	158	19/02/2021	ce paragraphe ne fait pas suffisamment la distinction entre le drainage de l'ouvrage, la collecte des eaux de la chaussée et la collecte des liquides épandus sur la chaussée suite à déversement (caniveau + regards siphoniques pour TMD, notamment)	CETU		
11.7.2 Drainage system during tunnel construction	159	22/02/2021	Pour compléter la remarque du CETU : Dans le cas du tunnel de TELT, il y a 3 réseaux côté Italie : - eaux de drainage; - source d'eau chaude et potable; - eaux de plateforme Pour le réseau de MD, des niches spécifiques sont prévues. Est-ce que ce sujet est abordé dans la partie GC?	SBR	le cas des sources naturelles d'eau est évacué par un système dédié de drainage	
11.7.3 Main components and characteristics	160	19/02/2021	Dans ce paragraphe, on ne voit pas bien la distinction entre relevage des eaux de drainage et collecte gravitaire de ces mêmes eaux de drainage Pourquoi avoir choisi ce découpage ? Certains équipements peuvent être mis dans les 2 chapitres (risque de redondance ou d'oubli)	CETU		
11.8 Safety & evacuation	161	19/02/2021	es garages sont abordés dans la partie GC ? Même question pour les intertubes réservés aux services de secours ?	CETU		
11.8.1 Safety & evacuation during tunnel operation	161					
11.8.2 Safety & evacuation during tunnel construction	162					
11.8.3 Main components and characteristics	163	19/02/2021	Il manque les équipements pour les SP : ligne de vie fixe, anneaux de relevage, prises pompiers Voir pdf sur tableau figure 11-16	CETU		
11.9 Fire protection	165				Characteristics of components identified in separate xls files	
11.9.1 Firefighting during tunnel operation	165	19/02/2021	Rq5 Characteristics Ce sujet (collecte des liquides dangereux) mériterait un paragraphe spécifique	CETU		
11.9.2 Firefighting during tunnel construction	166					
11.9.3 Main components and characteristics	167	26/01/2021	How does the model deal with the research of a specific risk data: Fire, Flooding, Explosion ...?	TCW	Creation of category of other equipments like: metallic wkways, cables paths	
			Rq4 Metallic equipemnts?			
12 Model View Definitions	169	26/01/2021	We will get back to you with a collegial view of insurance aspects for this project	TCW		
13 Next Steps	171					
14 Conclusion	172					