



AMUR GCC PROJECT

KICK-OFF Meeting EPSS Phase
May, 13-14 2020

CIVIL
SIBUR
AMUR GCC

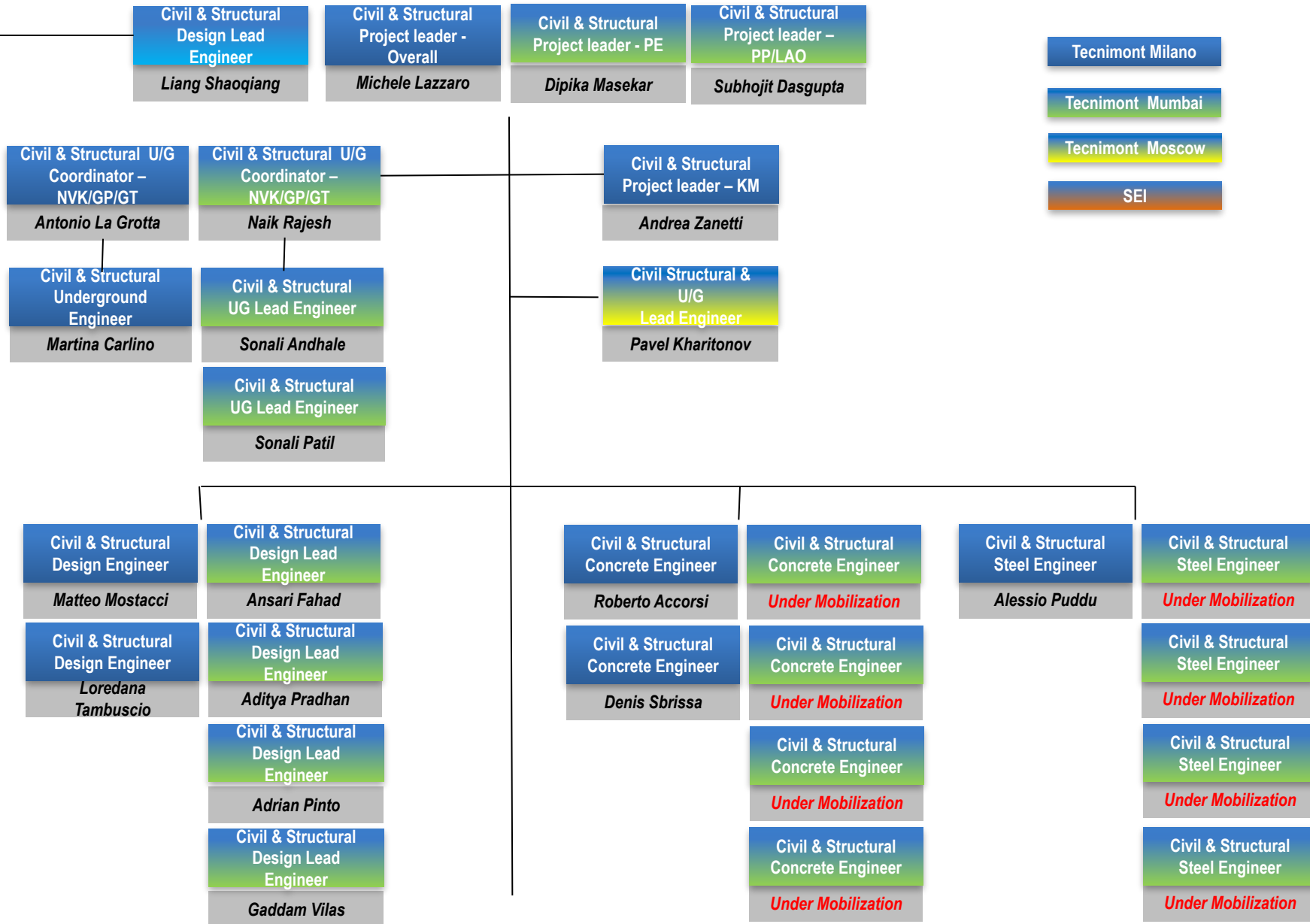


SUMMARY

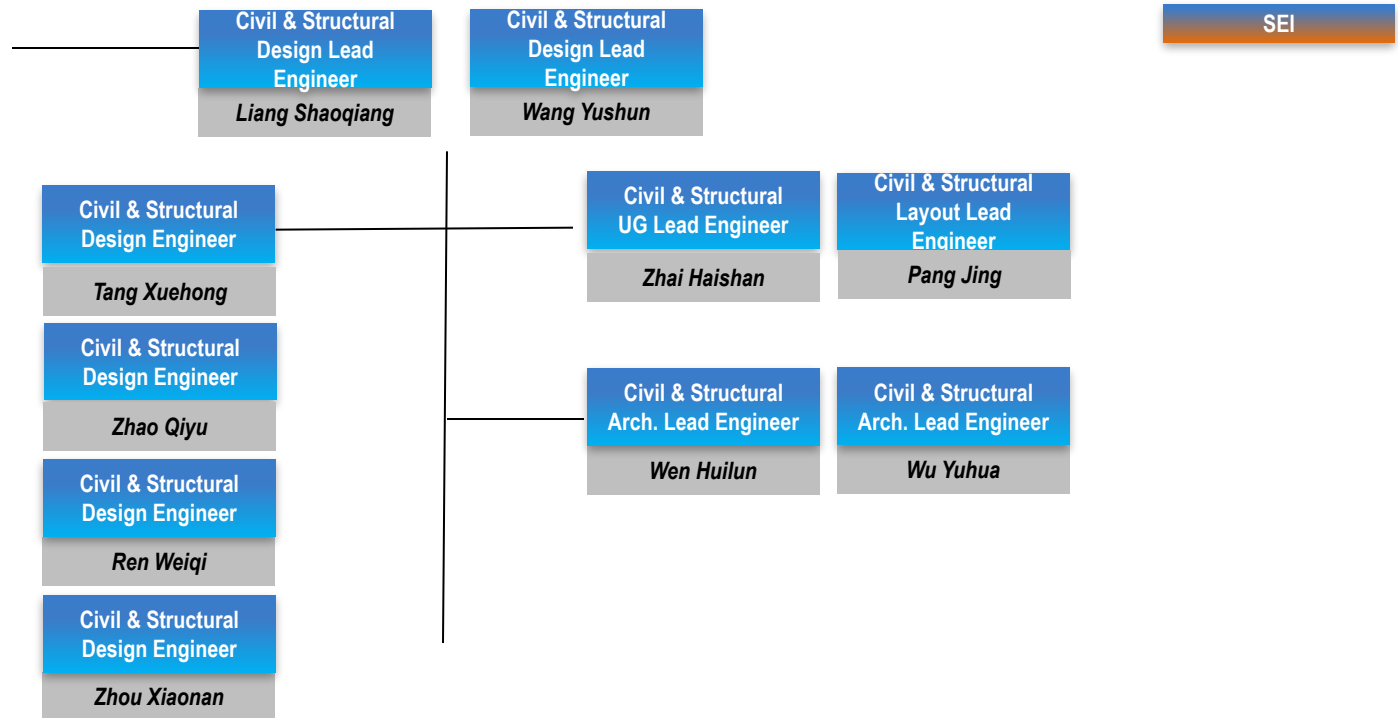
1. Organization / Presentation of the Team
2. Interface with SINOPEC
3. Split of work TCM - TCMLP
4. Key activities / schedule for the next 3 months
5. Agenda of Technical meeting



ORGANIZATION / PRESENTATION OF THE TEAM TCM TCMPL



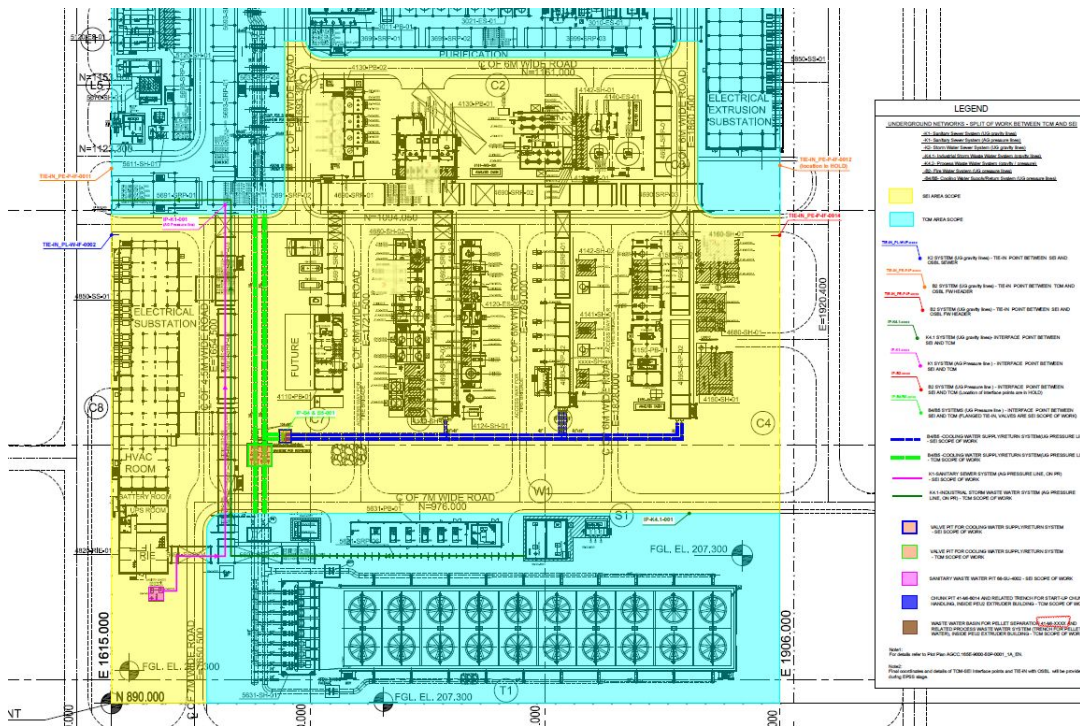
ORGANIZATION / PRESENTATION OF THE TEAM SEI



SEI

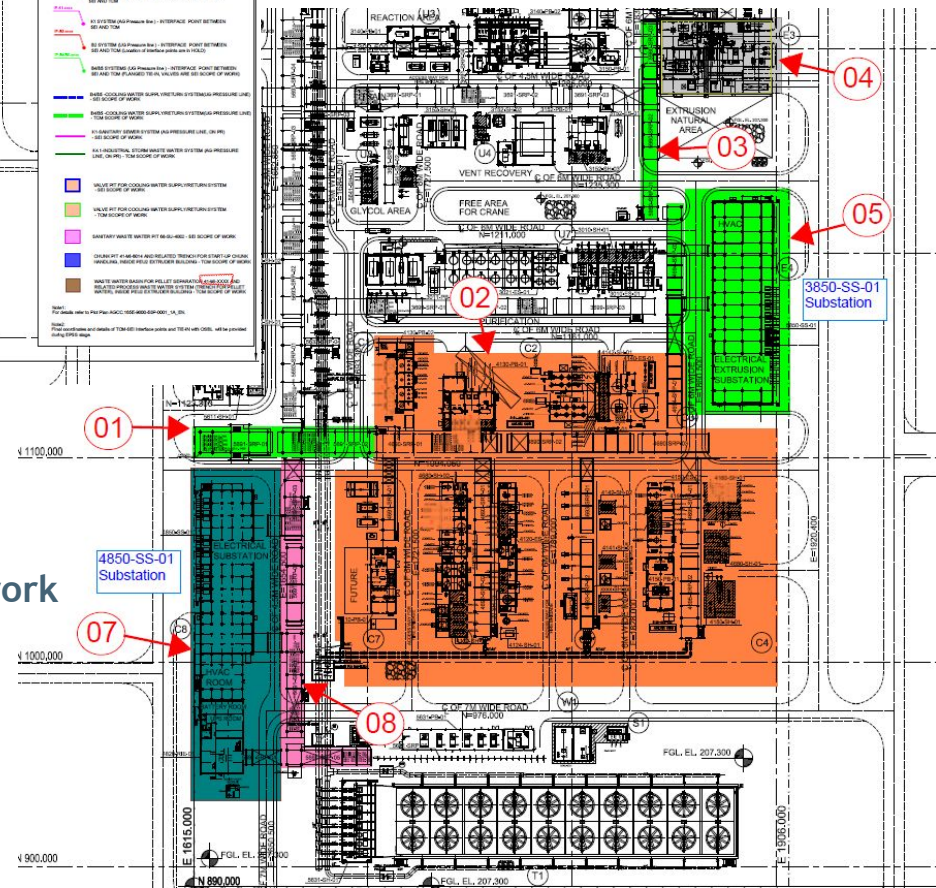


INTERFACE WITH SINOPEC - SPLIT OF WORK



Building & Structure split of work

U/G / Road / Paving split of work



INTERFACE WITH SINOPEC - COMMON DOCUMENTATION

Common Documentation prepared by TECNIMONT and Jointly issued with SINOPEC

- ✓STRUCTURAL DESIGN CRITERIA FOR STEEL AND REINFORCED CONCRETE STRUCTURES
- ✓GENERAL SPECIFICATION FOR STRUCTURAL REINFORCED CONCRETE
- ✓GENERAL SPECIFICATION FOR STRUCTURAL STEEL
- ✓GENERAL SPECIFICATION FOR UNDERGROUND WORKS
- ✓GENERAL SPECIFICATION FOR ROADS - PAVED AND UNPAVED AREAS

- ✓CIVIL STANDARD DRAWINGS (anchor bolts, embedded plates, grout...)
- ✓STEEL STANDARD DRAWINGS (handrails, staircases, Ladders, standard connection Album, auxiliary platforms...)
- ✓UNDERGROUND STANDARD DRAWINGS (Pits, manholes, catch basin...)
- ✓ROADS & PAVING TYPICAL SECTIONS DRAWING

- ✓WR CIVIL WORKS
- ✓WR STEEL STRUCTURES ERECTION WORKS

- ✓SPECIFICATIONS FOR RDI SUBCONTRACTING

SPLIT OF WORK TCM - TCMPL

TCM

- ✓ Client interface
- ✓ RDIs management/Follow up
- ✓ TCMPL Coordination
- ✓ General Specification & standard including follow up of RDI russification
- ✓ Work Requisitions
- ✓ 3D Model set up

TCMPL

- ✓ Preparation of Inputs for RDI detail design (multidisciplinary interface)
- ✓ Preparation of documents to be russified by RDI
- ✓ Detailed squad check of RDI IFR and IFC documentation in compliance with TCM requirements (multidisciplinary interface)
- ✓ 3D Model execution

KEY ACTIVITIES / SCHEDULE FOR THE NEXT 3 MONTHS

- ✓KOM with Client
- ✓Preparation of General Specifications & Standards for Concrete, Steel, U/G, Road, Paving
- ✓Set up of deliverable List / MDR
- ✓Start of piling & Foundations design for items identified under stage 1 Cut soil
- ✓Work Requisitions Preparation
- ✓3D Model set up and development of dummy 3D Model

AGENDA

✓1- SITE PREPARATION UNDER SIBUR SCOPE

- review of TCM comments

✓2-CIVIL & STRUCTURAL DESIGN CRITERIA

- Applicable Russian codes
- Criticality level
- Seismic design (general Approach, Aseismic joints)
- Expansion Joints
- Progressive collapse

✓3-KM ALBUM & PROJECT STANDARDS

✓4-KM AND KMD WORK FLOW (INCLUDING RDI)

- 4a - KM Management
- 4b - KMD Management

✓5-STRUCTURAL SCHEME REVIEW FOR MAJOR BUILDINGS AND STRUCTURES

✓6-CIVIL DESIGN APPROACH WITH RDIS

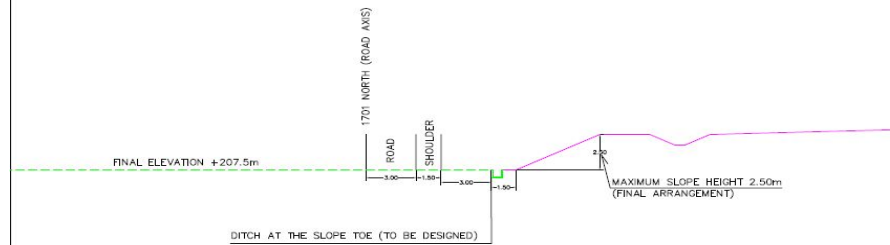
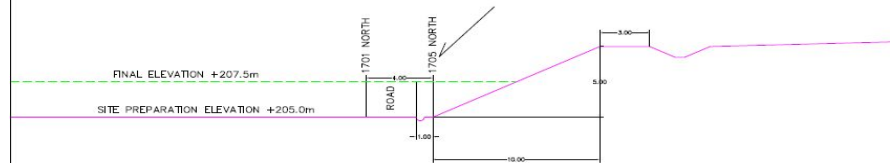
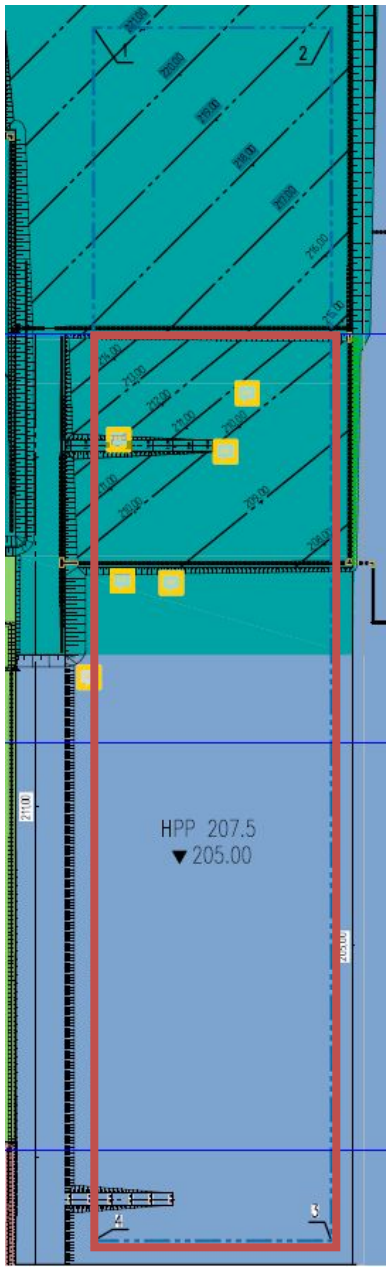
- KJ
- NVK-GT-GP

✓7-PACKAGES DESCRIPTION

- OD documentation content

✓8-UG, ROAD & PAVING

1 - SITE PREPARATION UNDER SIBUR SCOPE 1/1



Pending clarifications by OWNER (reference AGCC_165-TCM-AGCC-EMA-00432-ENG:

- ✓ Interference of slope with E/W road of PP Plant
- ✓ Site Prep to be adjusted as per last battery limits (plant shifted 15m)
- ✓ Elevation and position of flare ramp to be changed (EL+210.00 and N=1912,000 respectively)
- ✓ Flare Area Site Prep. Level vs Final Ground Level
- ✓ Surface drainage system to be included in Site Preparation

2- APPLICABLE RUSSIAN CODES



ПРАВИТЕЛЬСТВО РОССИЙСКОЙ ФЕДЕРАЦИИ

ПОСТАНОВЛЕНИЕ

от 26 декабря 2014 г. № 1521

МОСКВА

Reference is made to AGCC.165-TCM-AGCC-EMA-00445-ENG

CONTRACTOR will follow on mandatory basis the list of paragraphs of national standards and codes (as per mentioned edition), as indicated in:

RF Government regulation No. 1521, dated December 26th, 2014

(the edition of the codes and the relevant paragraphs).

For paragraphs not mentioned in the above Regulation, the newer edition (at Contract's signature) of the codes will be applied.

i.e. According to RF Government regulation No.1521, the following paragraphs of SP 16.13330.2011 will be followed:

5. СП 16.13330.2011 "СНиП II-23-81* "Стальные конструкции".
Разделы 1, 4 - 6, 7 (за исключением пункта 7.3.3), 8 (за исключением
пунктов 8.5.1, 8.5.9), 9 - 14, 15 (за исключением пункта 15.5.3),
16 - 18, приложения Д, Е, Ж.

*"SP 16.13330.2011 "SNiP II-23-81 *" Steel structures. Sections 1, 4 - 6, 7 (except for clause 7.3.3), 8 (except for clauses 8.5.1, 8.5.9), 9 - 14, 15 (except for clause 15.5.3), 16 - 18, annexes D, E, G."*

For all the others no mentioned paragraphs, SP16.13330.2017 will be deemed applicable.

2- CRITICALITY LEVEL

Reference is made to AGCC.165-TCM-AGCC-EMA-00446-ENG

CONTRACTOR would like to specify the applicable levels of responsibility for structures and buildings to be developed for AGCC according to article 16 - para 7 of Federal Law 384-FZ and GOST 27751-2014:

✓ HIGHER responsibility level (KS-3)

- Buildings
- Heavy and medium Pipe racks *as per Sections 3.1 and 3.2 of Doc. AMUR-9000-15S-0002_01*
- Process structures and foundations supporting hazardous equipment

✓ NORMAL responsibility level (KS-2)

- Operative shelters *(item with code SH as per Attachment 8.1 of AMUR-9000-00Z-0003_08)*
- Small pipe racks *as per Section 3.3 of Doc. AMUR-9000-15S-0002_01*
- Structures, platforms and foundations not supporting hazardous equipment
- Staircases
- Secondary supports

2- SEISMIC DESIGN - SEISMIC INPUT

Reference is made to AGCC.165-TCM-AGCC-EMA-00444-ENG

Seismic design will be carried out in accordance with spectrum of **Map C** attached to AGCC.165-AGCC-TCM-EMA-00088-ENG dated March 26th, 2019 and it is intended therefore that all the plant has seismicity rate equal to **grade 7** as per Doc. AGCC.0008-PP-CMP_0_EN.

Seismic analysis will be developed for every structure and building of both higher (KS-3) and normal (KS-2) criticality level, according to the following criteria:

- Buildings and structures with higher level of criticality (KS-3)
will be calculated as per **group 1** of Table 3 of SP 14.13330.2014
- Structures with normal level of criticality (KS-2)
will be calculated as per **group 3** of Table 3 of SP 14.13330.2014.

The aim is to avoid nonlinear analysis for minor structures which would result in a time-consuming activity without any improvement in terms of structural safety.

2- SEISMIC DESIGN - ASEISMIC JOINTS

Reference is made to AGCC.165-TCM-AGCC-EMA-00444-ENG

Aseismic joints will be provided wherever required by section 6.1.2 of SP 14.13330.2014.

However, the typical complexity of the pipe routes and equipment layout of process structures - refer to Extrusion Building as an example - makes the fulfillment of such a requirement unfeasible.

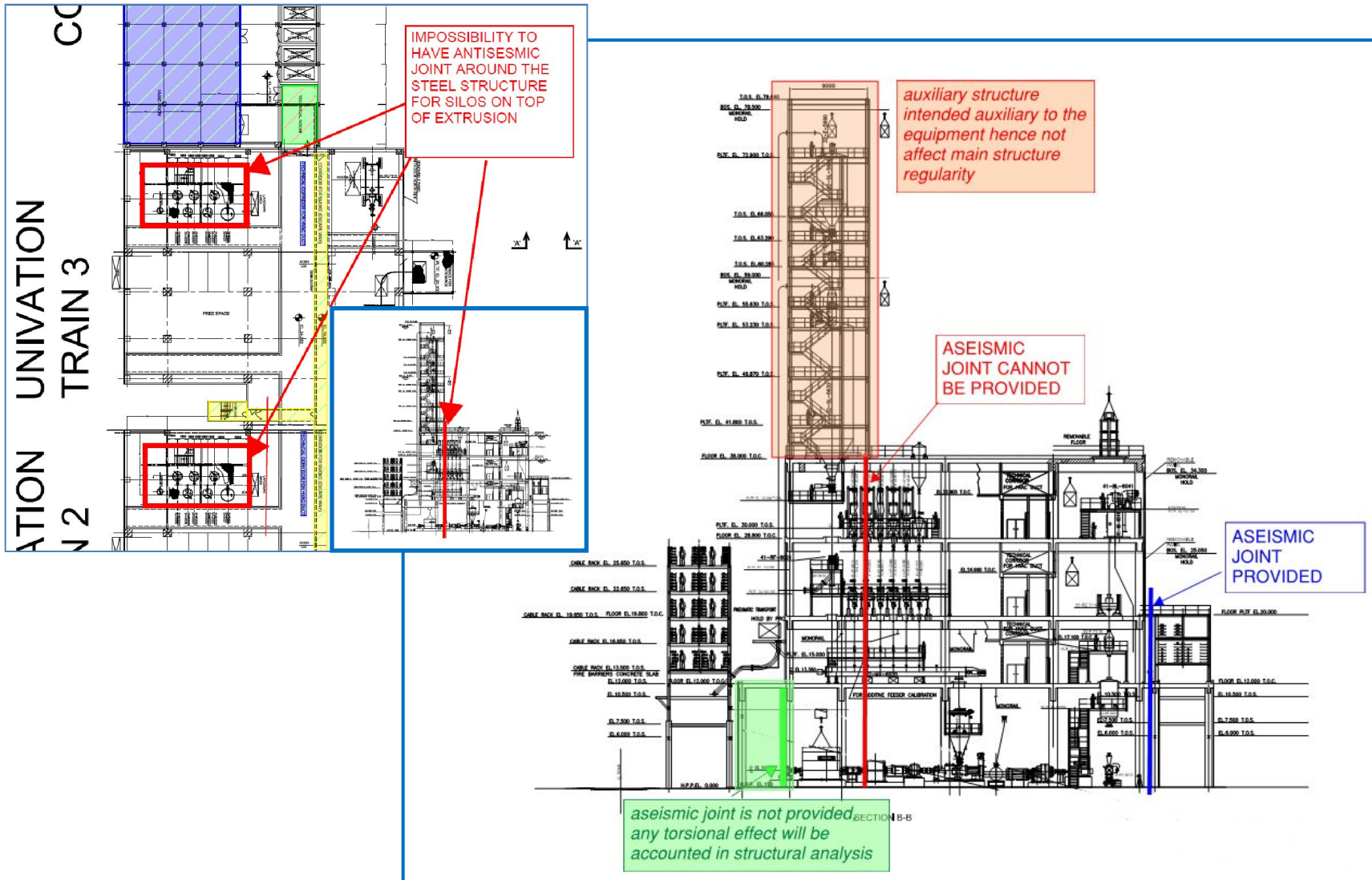
CONTRACTOR's intention is to avoid aseismic joints whereas the pipes and equipment layout does not allow to accommodate them.

Nevertheless, CONTRACTOR will take into account in the seismic structural design any measure necessary to properly consider the structural irregularity within the structural analysis model.

In detail, a spatial 3D modal analysis will be developed including all the structural members that affect overall structural behavior and considering proper location of the masses, as per actual layout, with the aim to account and to properly consider any torsional effects due to any structural irregularity.

2- SEISMIC DESIGN - ASEISMIC JOINTS

Reference is made to AGCC.165-TCM-AGCC-EMA-00444-ENG - Attachment 2



2- SEISMIC DESIGN - STAIRCASES

Reference is made to AGCC.165-TCM-AGCC-EMA-00444-ENG

As per requirements of SP 14.13330.2014:

- point 6.1.2, aseismic joint shall be put if the building or structure has a complex plan shape or parts adjacent to a building or structure have height differences of 5 m;
- point 6.1.8, a passage through aseismic joint shall not be the only escape way from buildings or structures;
- point 6.4.1, it is not allowed to make staircases as detached structures;
- point 6.4.2, staircases of frame buildings up to 5 floors at design seismicity of 7 and 8 grades may be made within the building plan as structures detached from building frame.

According to **TCM PSTS list dated 03-Apr-2020 item 30**, for “multistorey buildings of I and II fire resistant grade without permanent working places”,

“[...] 2. open 3rd type staircases shall be located outside of fire impact area [...]”

Considering the above, CONTRACTOR’s understanding is that

PSTS will prevail on abovementioned requirements of SP 14.13330.2014.

2- SEISMIC DESIGN - GENERAL APPROACH

Reference is made to AGCC.165-TCM-AGCC-EMA-00444-ENG

Seismic design approach which will be followed in AGCC is developed according to SP14.13330.2014 requirements.

The following flow chart describes:

- coefficients for defining the seismic input
- design procedure that will be followed
- design checks that will be performed
- connection design approach.

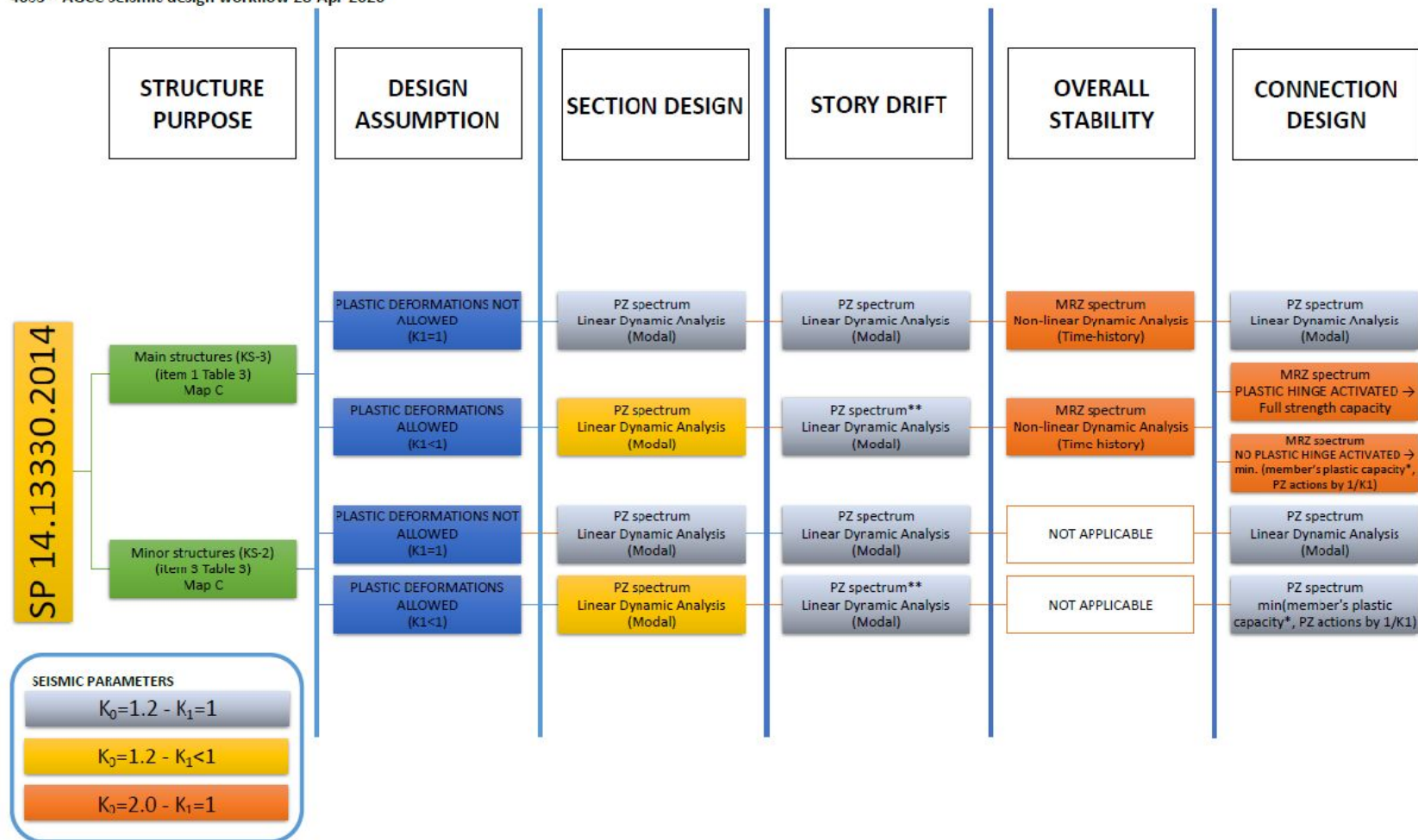
(refer to AGCC.165-TCM-AGCC-EMA-00444-ENG Attachment 1)



2- SEISMIC DESIGN - GENERAL APPROACH

Reference is made to AGCC.165-TCM-AGCC-EMA-00444-ENG - Attachment 1

4055 – AGCC Seismic design workflow 28-Apr-2020



NOTES:

* Member's plastic capacity refers to maximum plastic flexural capacity according to Sec. 8.2.3 of SP 16.13330.2011 of beams in moment-resisting frames and to maximum tensile capacity according to Sec. 7.1 of SP 16.13330.2011 of vertical and horizontal braces.

** Design actions will be calculated multiplying by $1/K_1$ the output of PZ spectrum analysis carried out with $K_1<1$.

2 - CIVIL & STRUCTURAL DESIGN CRITERIA

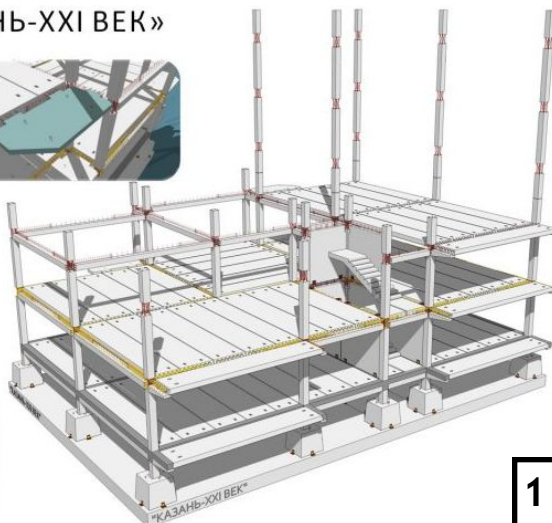
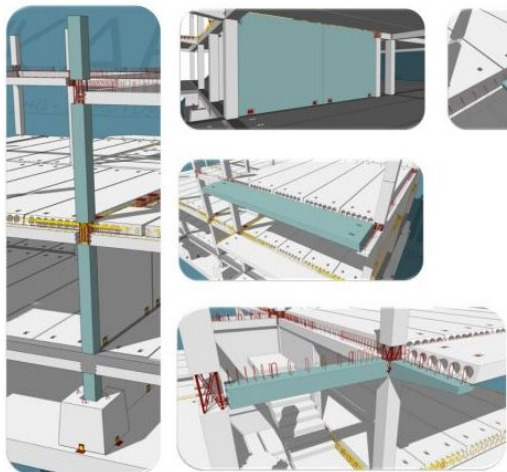
Expansion joints for reinforced concrete structures

SP 27.13330.2017

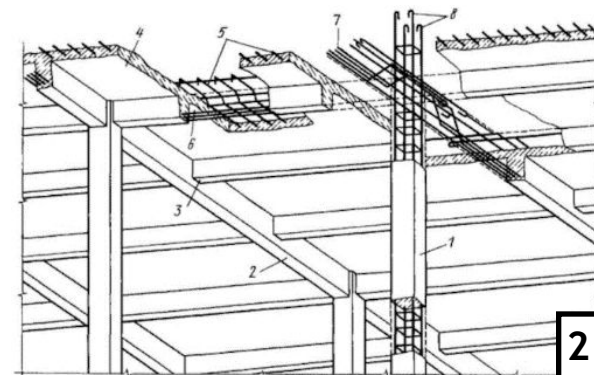
- ❑ Point 9.24 - The calculation for thermal effects will not be performed if the distance between the expansion joints does not exceed the values specified in table 9.2
- ❑ Table 9.2
 - For precast monolithic frames (1) and cast-in-situ monolithic frames (2):
 - 50 m - 100 m for heated (insulated) buildings
 - 40 m - 80 m for unheated (not insulated) buildings
 - 30 m - 60 m for buildings/structures exposed to air

According to note 2, above ranges depends on the height of the column of the ground floor.

Сборно - монолитный каркас «КАЗАНЬ-XXI ВЕК»



1



2

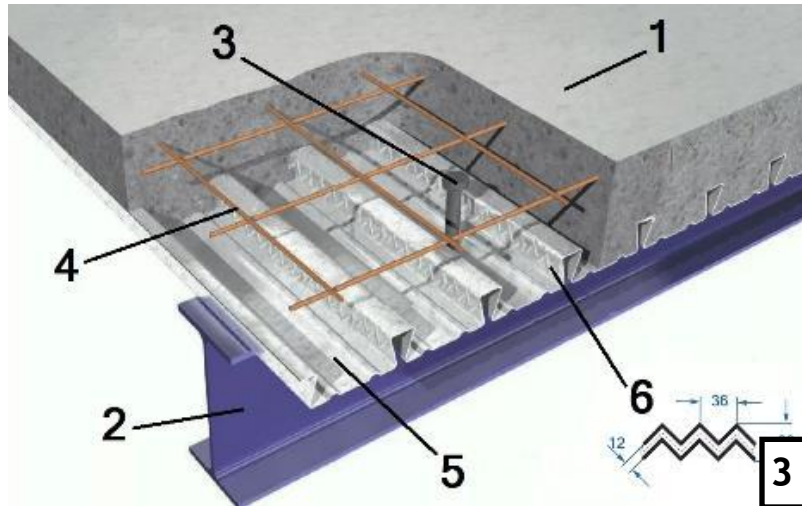
2 - CIVIL & STRUCTURAL DESIGN CRITERIA

Expansion joints for reinforced concrete structures

SP 27.13330.2017

□ Table 9.2

- For precast monolithic solid structures (3) and cast-in-situ solid structures (4):
 - 40 m for heated (insulated) buildings
 - 30 m for unheated (not insulated) buildings
 - 25 m for buildings/structures exposed to air



2 - CIVIL & STRUCTURAL DESIGN CRITERIA

Progressive Collapse

SP 385.1325800.2018

☐ General design approach

- The most critical collapse conditions will be investigated and analyzed through linear static analysis;
- A global Dynamic Load Factor (DLF) will be superimposed to the load combination factors;
- Similar structural configuration will be kept throughout the structure.

Different approaches may be adopted in case of particular structural configurations.

☐ Load Combination

$$C_m = P_d + P_l$$

- C_m is the resulting load from load combination;
- P_d includes permanent loads such as structural self-weight (DS);
- P_l includes:
 - long-term loads such as operation loads due to piping and equipment (DE+DO+OP+TF);
 - reduced short-terms loads such as:
 - reduce live load ($0.35 \cdot LL$ where $LL=2.5$ kPa - Floors and platforms for inspection purposes);
 - reduced snow load ($0.7 \cdot S$).

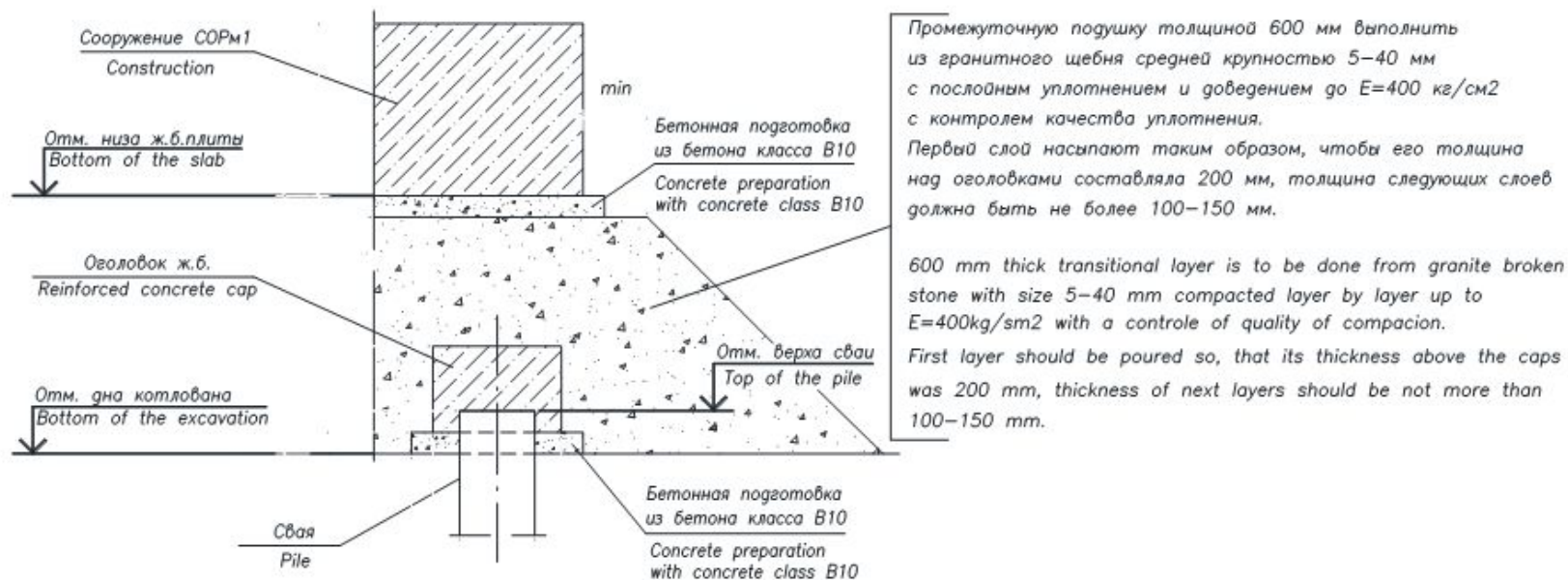
2 - CIVIL & STRUCTURAL DESIGN CRITERIA

Pile Design

❑ Disconnected pile design for blast resisting structure

Рис. 1. Пример устройства оголовка на свае с промежуточной подушкой из сыпучих материалов
Fig. 1. Example of the pile cap disconnected with the construction

ПРИМЕР УСТРОЙСТВА ОГОЛОВКА НА СВАЕ С ПРОМЕЖУТОЧНОЙ ПОДУШКОЙ ИЗ СЫПУЧИХ МАТЕРИАЛОВ
Example of the pile cap disconnected with the construction



3-ALBUM OF STANDARD CONNECTIONS 1/5

Work Requisition for execution of Album of Standard Connection was issued on 14/04/2020 to :

- ООО "СтальПроект" ТОПИНЖИНИРИНГ/StalProekt TOPENGINEERING ООО

- Severstal / GPb GIPROSHAKHT

~~- ООО "ПСК "БелЭнергоСтрой" г.Белгород/PSK BelEnergoSstroy ООО~~

No reply

RDI were selected considering:

- Previous experience on similar activities;
- Good performance on previous Project (AGPP Project) with Tecnimont;
- Strong knowledge of RF Codes as well as Client Procedures for KM development;
- Strong and recognized capability for KMD development for multiple Steel Manufacturer, that imply the selection and design of the best solution considering all related issues during fabrication and erection at site.



3-ALBUM OF STANDARD CONNECTIONS 2/5

Workflow for preparation of Work Requisition:



Total connection to be developed:

3693

(excluding those connections that requires double capacity such as - shear connection that shall be calculated with and w/o reinforcing web plate)

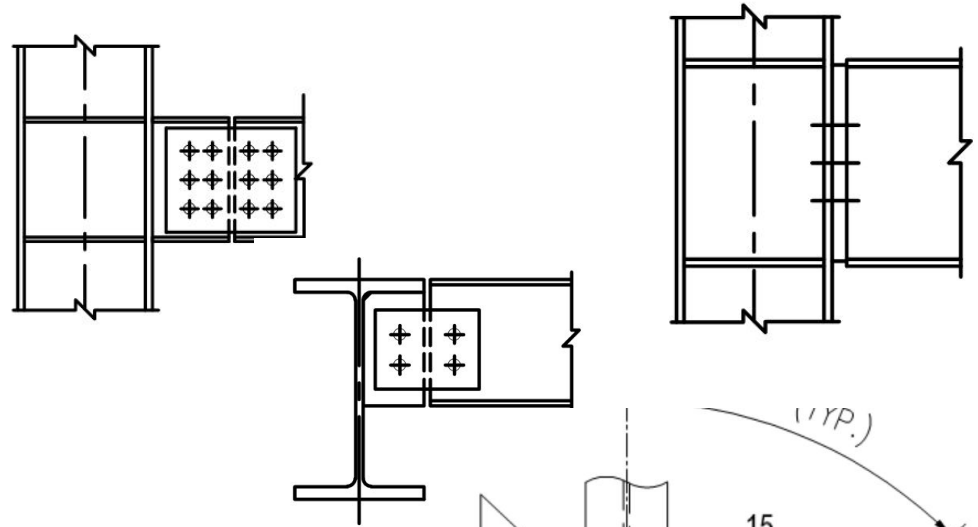
CONNECTION TYPE	Q.TY
Moment	2566
Shear Beam-to-Column flange	229
Shear Beam-to-Column web	210
Shear_BeamToBeam	216
Shear_BeamToRCCol	88
Splices	166
Vertical Bracings	83
Horizontal Bracings	45
Posts	90

CONNECTION TYPE	NAME	Q.TY
Moment	EMHF	2566
	EMHFS	
	EMF	
	EMHG	
Shear Beam-to-Column flange	SL	229
	EP	
	DCD	
	DCD-H	
	DCD-M	
	ECH-L	
	ECH-LP	
Shear Beam-to-Column web	DSD	210
	DSD-H	
	DSD-M	
	EPW	
	DSD-P	
	EJ-L	
Shear_BeamToBeam	EJ-H	216
	DS	
	DS-H	
	DS-M	
	SS	
	EPB	
Shear_BeamToRCCol	EJ-LB	88
	FTC-S	
Splices	FTC-H	166
	CS	
Vertical Bracings	CSF	83
	HY	
	HYF	
	VBH	
	VBHP	
Horizontal Bracings	VBP	45
	LP	
	LTP	
Posts	LTG	90
	PS	
	PS-M	
TOTAL	PS-S	3693

3-ALBUM OF STANDARD CONNECTIONS 4/5

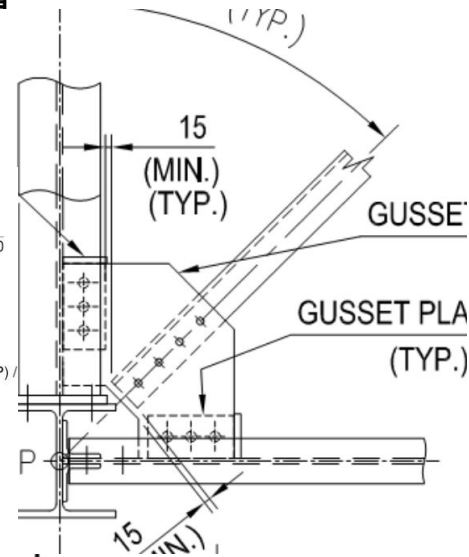
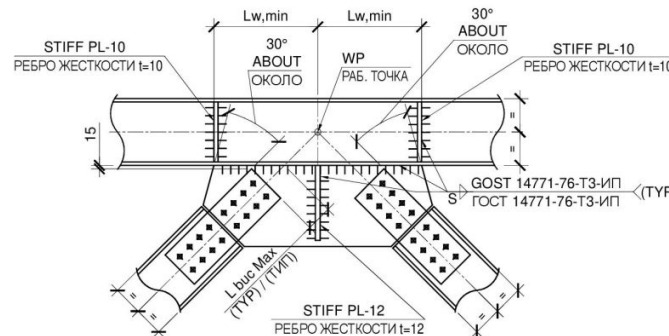
SHEAR CONNECTIONS:

Each connections is to be designed considering both the case with reinforcing web plate and w/o reinforcing web plate.



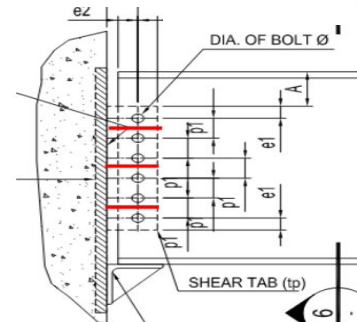
BRACING CONNECTIONS:

Selection of HSS profile (hollow pipe section) has been done in order to optimize the steel weight



CONNECTION WITH CONCRETE ELEMENT:

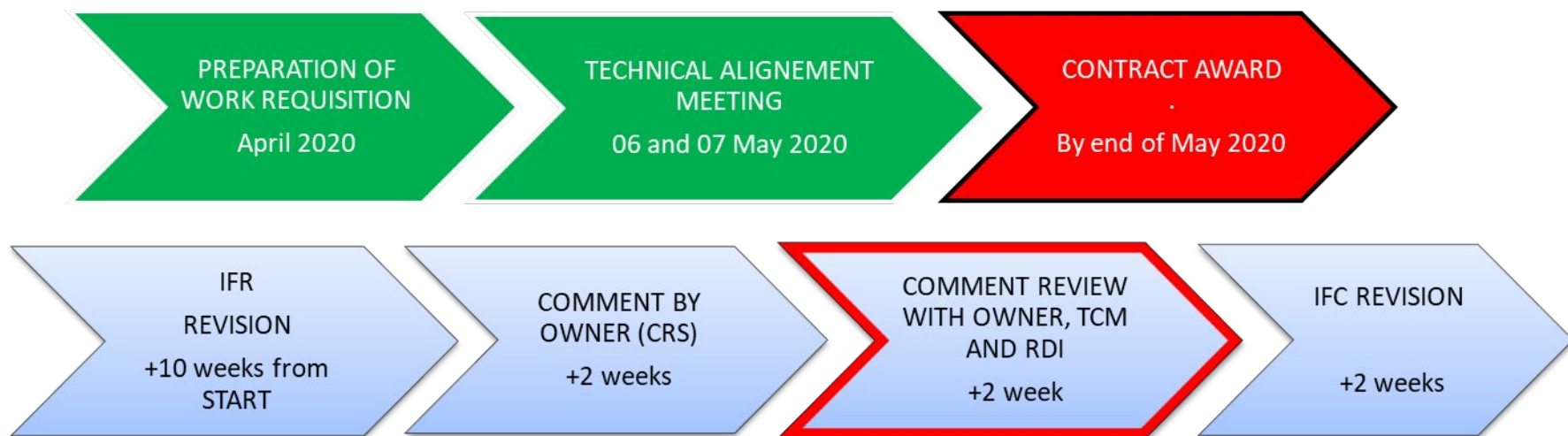
Due to presence of structures partially in concrete and steel, Connection with concrete element need to be developed





3-ALBUM OF STANDARD CONNECTIONS 5/5

Schedule and current status:





3-ALBUM OF PROJECT STANDARD FOR STEELWORK 1/1

Workflow for preparation of Work Requisition:



Project Standards to be developed:

- Steelworks General Notes
- Standard details of Ladders
- Standard details of Handrails
- Standard detail of Stairs
- Standard detail of Gratings and Chequered plates
- Standard details of Circular Platforms for Equipment
- Standard details for Davits
- Standard details for Corrugated Steel sheets and Purlin/Girt connections

Schedule and current status:

Work will be executed by the **same RDI** involved in the development of the **Album of Standard connections**, by respecting the same due dates for IFR and IFC transmission of documentation to OWNER

3-MATERIALS FOR STEELWORKS 1/2

The choice of steel type will be done in accordance to below Table (ref. AMUR-9000-15S-0001 table 3.1):

?

According to SP16.13330.2017

“When designing **flange joints** of steel structures subject to tension, bending or their joint action it is required to use steel for flanges **S355** and S390 with relative reduction of $\psi \geq 35\%$, pre-tensioned high strength steel bolts of at least 10.9 strength class, high strength nuts and washers to them.”

Structural level of responsibility (as per Federal Law №384-ФЗ) Уровень ответственности сооружения (в соотв. с Федеральным Законом №384-ФЗ)		High Повышенный	Normal Нормальный
Items	Group as per SP 16.13330.2011	Steel Grade	Steel Grade
Элементы	Группа в соотв. с СП 16.13330.2011	Марка стали	Марка стали
Bearing elements of rolling profiles (beams, columns, connections, trusses, stringers, frameworks, girders, beams of service platforms, elements with dynamic loads, etc.) Несущие элементы из прокатных профилей (балки, колонны, связи, фермы, косоуры, фахверки, прогоны, балки площадок обслуживания, элементы с динамическими нагрузками и т.д.)	Group 1...3	C345-5 по ГОСТ 27772-2015	C345-5 to GOST 27772-2015
	Группа 1...3		
The welded bearing elements from sheet steel (columns, beams, etc.) Steel welded profiles from sheet steel. Base plates, connecting plates, stiffeners, etc.	Group 1...3	345-8-09Г2С по ГОСТ 19281-2014	345-8-09Г2С to GOST 19281-2014
Сварные несущие элементы из листовой стали (колонны, балки и т.д.). Гнутосварные профили из листовой стали. Опорные плиты, соединительные пластины, ребра жесткости и т.д.	Группа 1...3		
Elements of framework (with rolled stock thickness $t > 6$ mm)	Group 3	C345-5 по ГОСТ 27772-2015	C345-5 to GOST 27772-2015
Элементы фахверка (при толщине проката $t > 6$ мм)	Группа 3		
Area fences, grating, metal flooring, step-ladders, plugs, wall framing (with rolled stock thickness $t \leq 6$ mm)	Group 4	C245 по ГОСТ 27772-2015	C245 to GOST 27772-2015
Ограждения площадок, решетчатый настил, металлический настил, стремянки, заглушки, стеновой фахверк (при толщине проката $t \leq 6$ мм)	Группа 4		
Bearing structural elements made from round pipe Несущие элементы изготовленные из круглой трубы	Group 1...4	345-8-09Г2С по ГОСТ 19281-2014	345-8-09Г2С to GOST 19281-2014
	Группа 1...4		

3-MATERIALS FOR STEELWORKS 2/2

The choice of steel type will be done in accordance to below Table (ref.

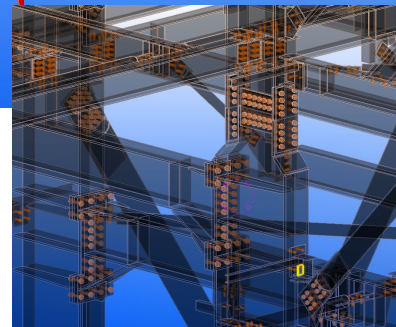
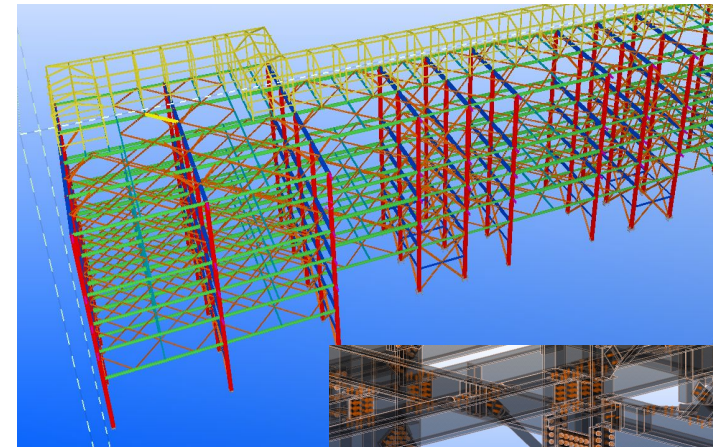
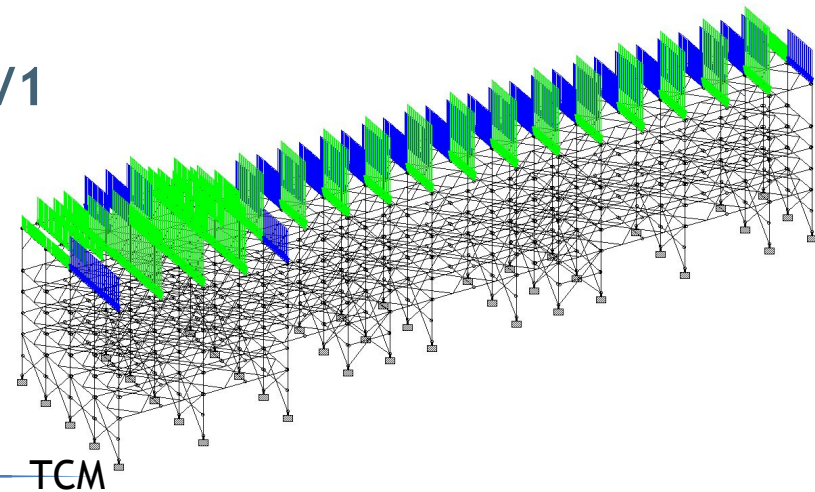
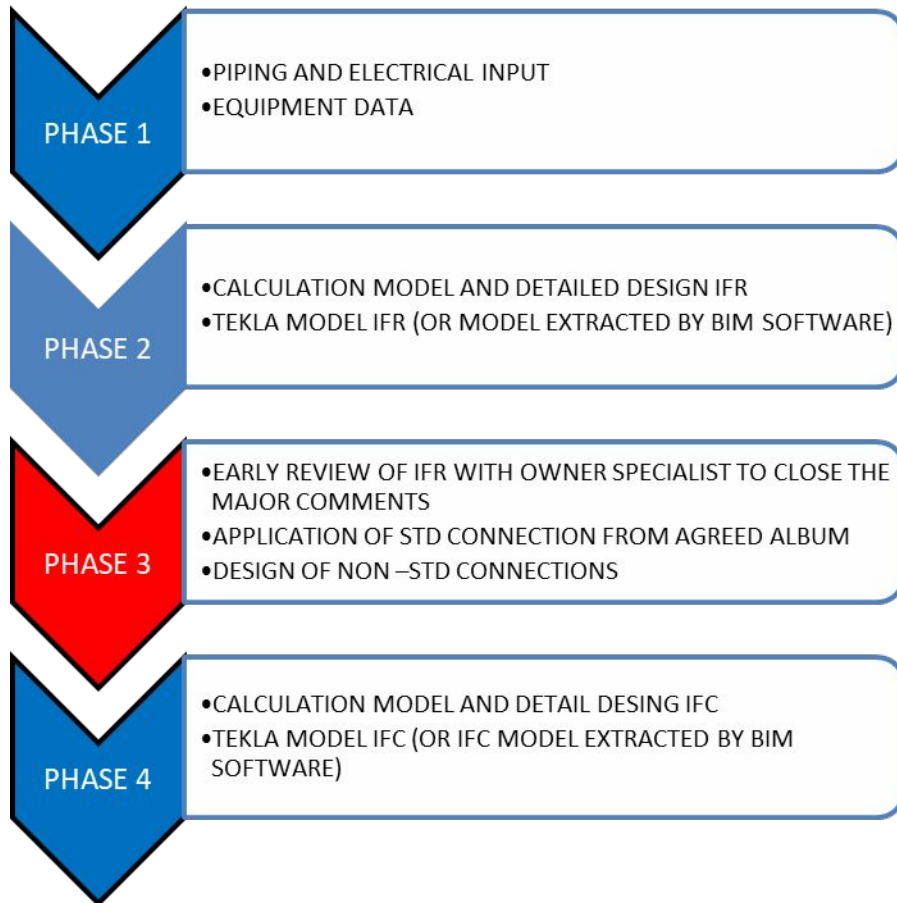
AMUR-9000-15S-0001 table 3.1):

Minimum Bolt Strength Class Минимальный Класс прочности болтов	/	8.8	8.8
High strength bolts Высокопрочные болты	/	Steel 40X (climatic design ХЛ (cold climate)). Strength Class - 10.9 Сталь 40Х (Климатическое исполнение ХЛ). Класс прочности - 10.9	Steel 40X (climatic design ХЛ (cold climate)). Strength Class - 10.9 Сталь 40Х (Климатическое исполнение ХЛ). Класс прочности - 10.9

10.9 Bolts shall be in accordance with GOST 32484.

RD1 DESIGNED TO DEVELOP THE ALBUM POF STANDARD CONNECTION WILL VERIFY PROPOSED TABLE AND, IF ANY, TECHNICAL QUERY WILL BE RAISED TO OWNER FOR RESOLUTION.

4A- WORKFLOW FOR KM-PACKAGES 1/1



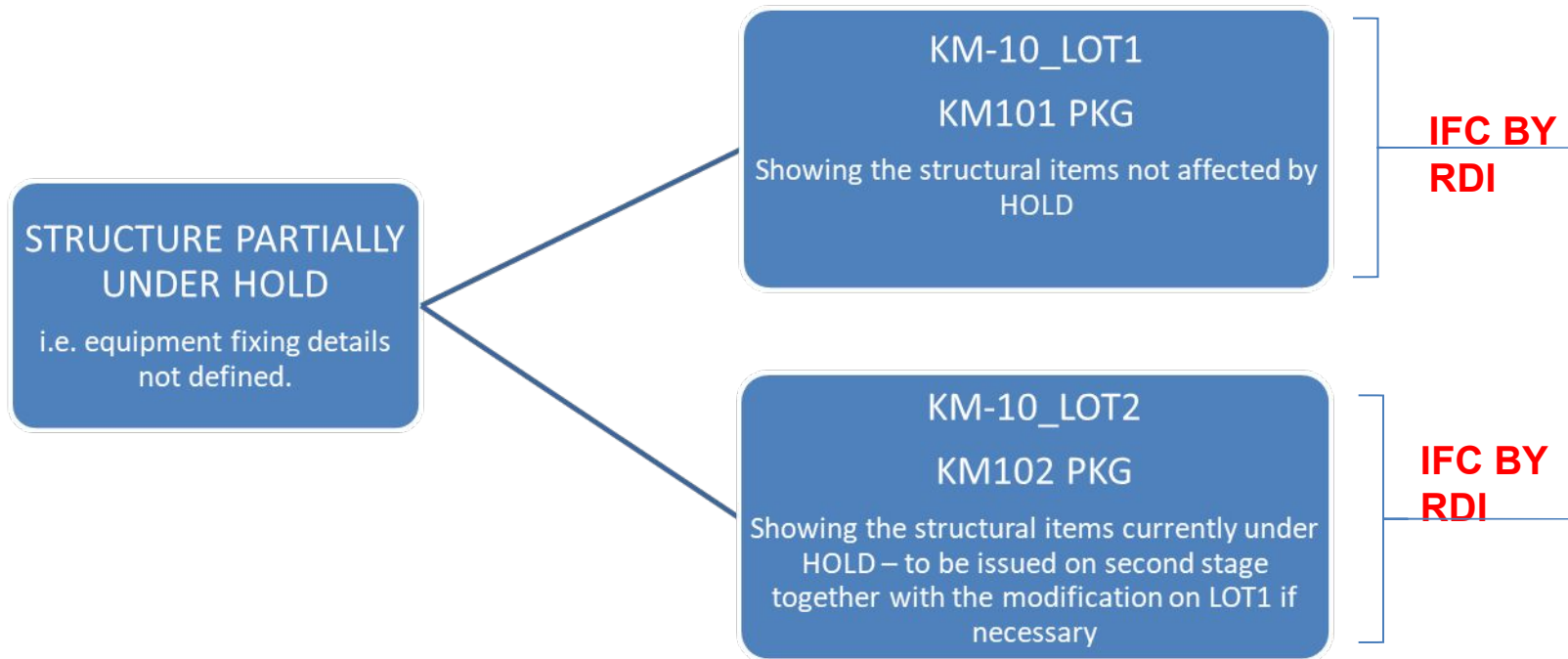
❑ **IMPLEMENTATION OF LESSON LEARNED ON PREVIOUS PROJECT**

❑ **STRICT AND CLOSE INTERACTION WITH OWNER SPECIALIST IN EARLY PHASE OF "IFR" REVISION OF KM DRAWINGS TO SMOOTH REVIEW AND APPROVAL CYCLE DOWNSTREAM AND AVOID MULTIPLE REVISION OF IFR DRAWINGS.**



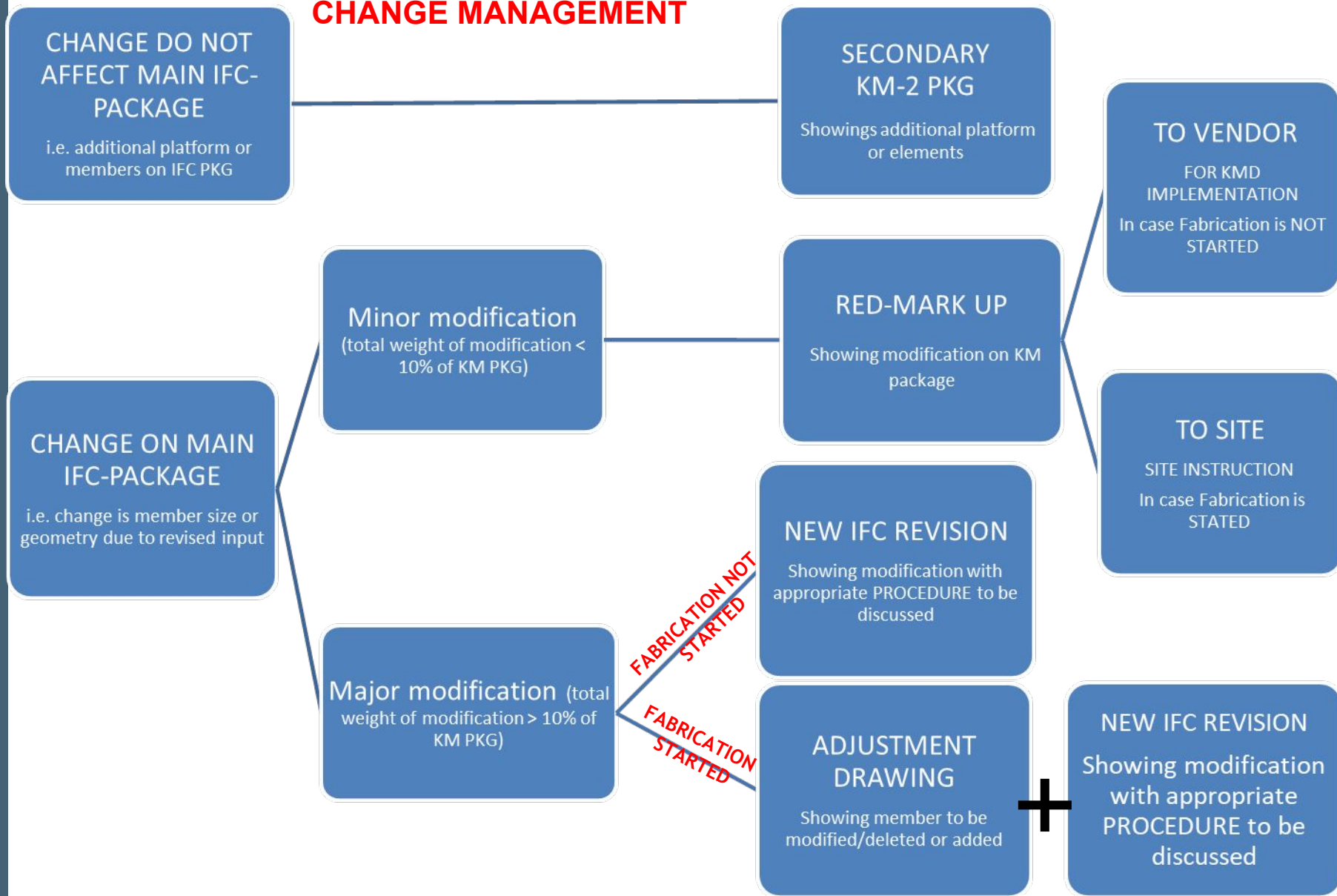
4A-HOLD AND CHANGE MANAGEMENT 1/2

HOLD MANAGEMENT

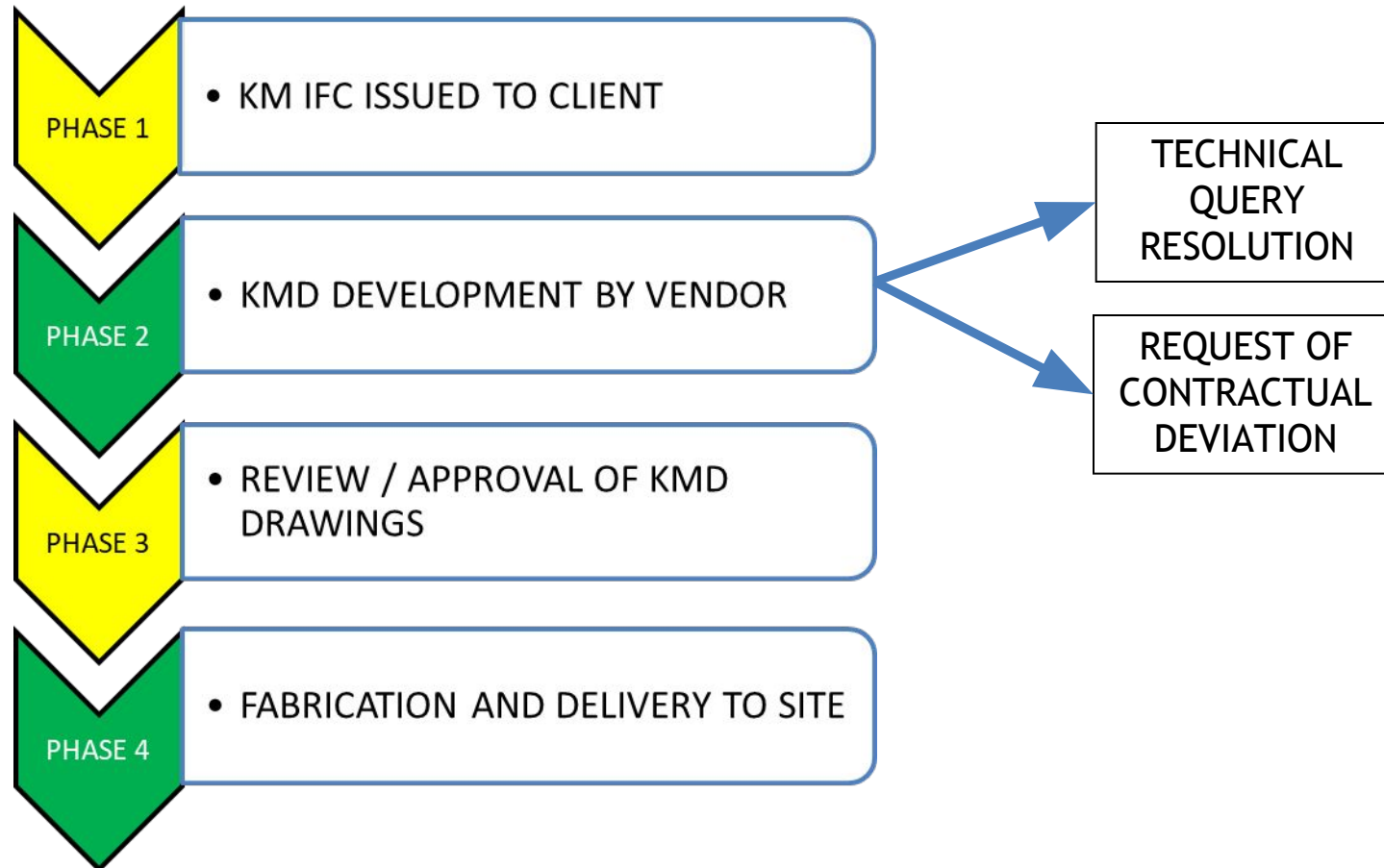


4A-HOLD AND CHANGE MANAGEMENT 2/2

CHANGE MANAGEMENT

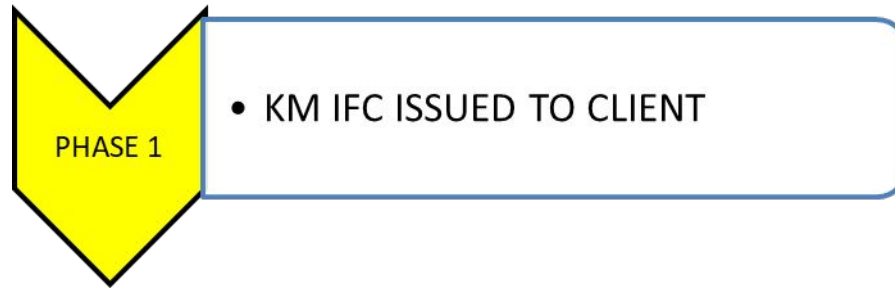


4B- WORKFLOW FOR KMD-PACKAGES 1/5



- ❑ **EXPERIENCE IN KMD DEVELOPMENT CAN BE IMPORTANT FACTORS WHICH WILL BE CONSIDERED IN THE OVERALL TECHNICAL EVALUATION FOR THE SELECTION OF THE RDI.**
- ❑ **DIRECT INTERACTION BETWEEN VENDOR AND RDI FOR TECHNICAL QUERY RESOLUTION.**

4B- WORKFLOW FOR KMD-PACKAGES 2/5



KM PACKAGE AND 3D MODEL ISSUED TO CLIENT

-KM PACKAGE IFC VALID FOR MATERIAL PROCUREMENT AND KMD DEVELOPMENT;

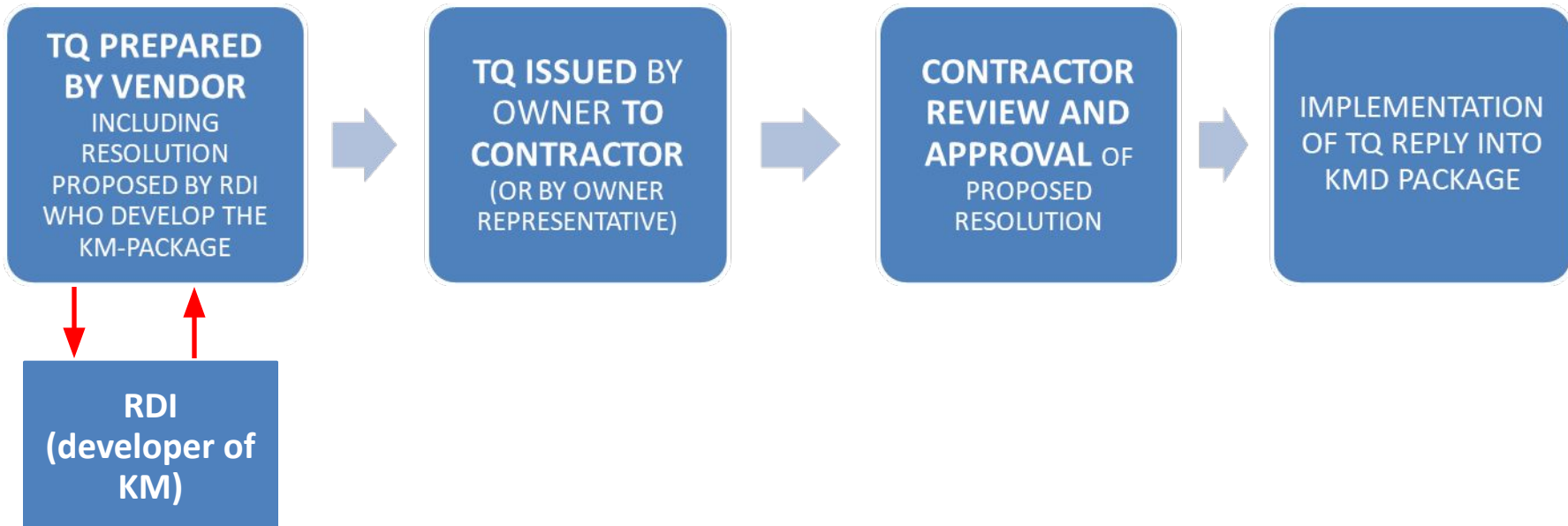
KM-PACKAGE WILL INCLUDE DEVELOPMENT OF ALL CONNECTION BY MEANS OF REFERENCE TO "ALBUM OF STD CONNECTION" AND DETAILS FOR THE NON-STANDARD CONNECTIONS.

-3D MODEL DEVELOPED IN TEKLA OR OTHER EQUIVALENT SOFTWARE TO BE IMPORTED INTO TEKLA BY VENDOR (I.E. REVIT 3D MODEL TO BE EXTRACTED TO .IFC FILE)

4B- WORKFLOW FOR KMD-PACKAGES 3/5

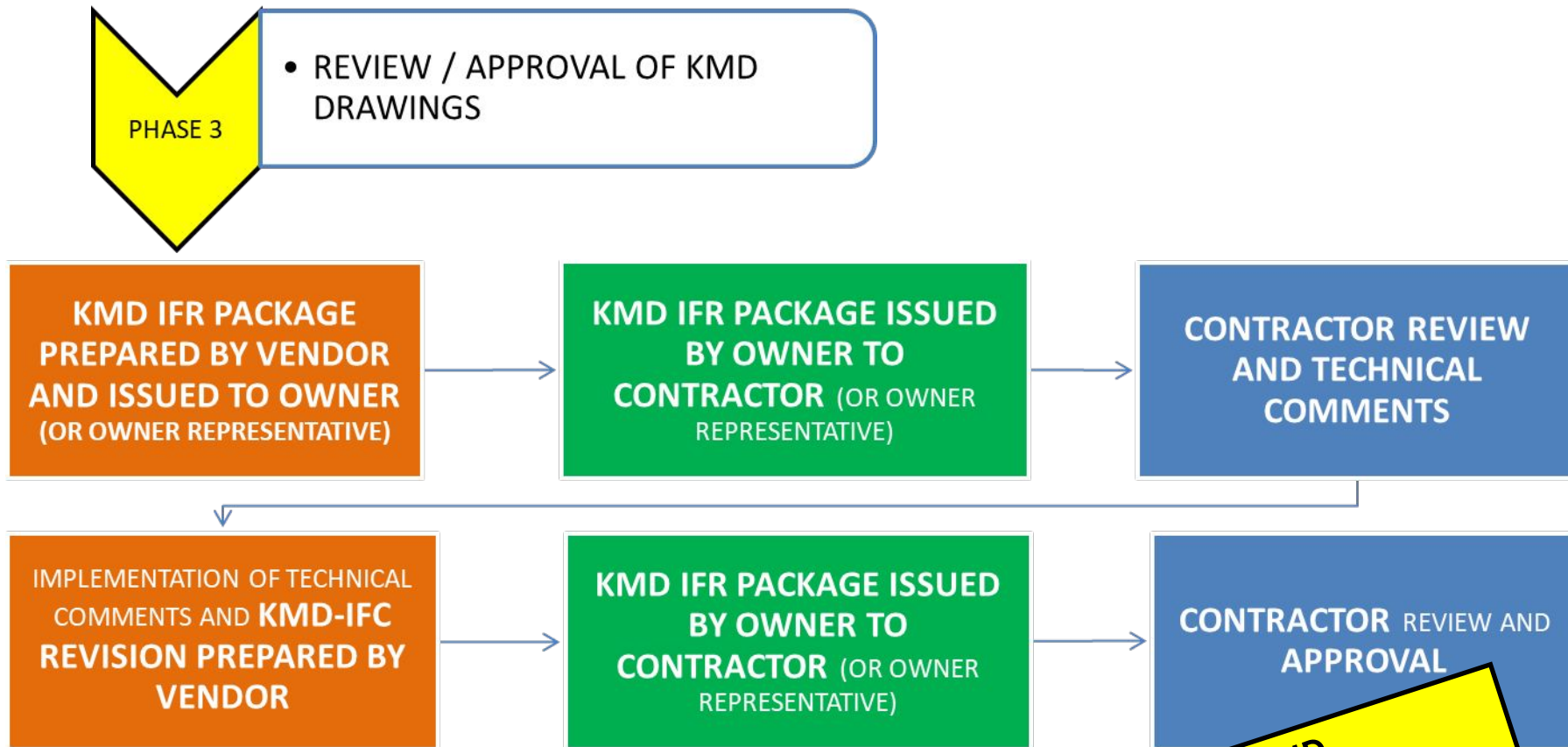


TECHNICAL QUERIES ISSUED BY VENDOR DURING KMD-DEVELOPMENT



CONTRACTURAL DEVIATION WILL BE MANAGED BY OWNER (OR OWNER REPRESENTATIVE) AND TECHNICAL FEEDBACK WILL BE PROVIDED BY CONTRACTOR, IF REQUESTED, USING THE SAME SCHEME OF TECHNICAL QUERIES.

4B- WORKFLOW FOR KMD-PACKAGES 4/5

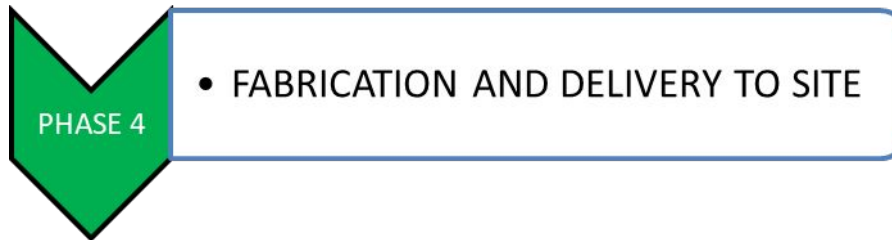


KMD SET CAN BE COMPOSED BY:

- **ERECTION DRAWINGS** : TO BE ISSUED **FOR APPROVAL**
- **TEKLA 3D MODEL**: TO BE ISSUED **FOR INFORMATION**
- **SHOP DRAWINGS**: TO BE ISSUED **FOR INFORMATION**
- **MARK AND BOLT LIST**: TO BE ISSUED **FOR APPROVAL**
- **FIELD AND BOLT LIST**: TO BE ISSUED **FOR INFORMATION**

TEMPLATE AND TECHNICAL REQUIREMENTS TO BE USED SHALL BE SET INTO SUPPLY SPECIFICATION TO BE ISSUED BY CONTRACTOR

4B- WORKFLOW FOR KMD-PACKAGES 5/5



ACTITIVIES RELATED TO POST-ORDER AND EXPEDITER, INCLUDING BUT NOT LIMITED TO:

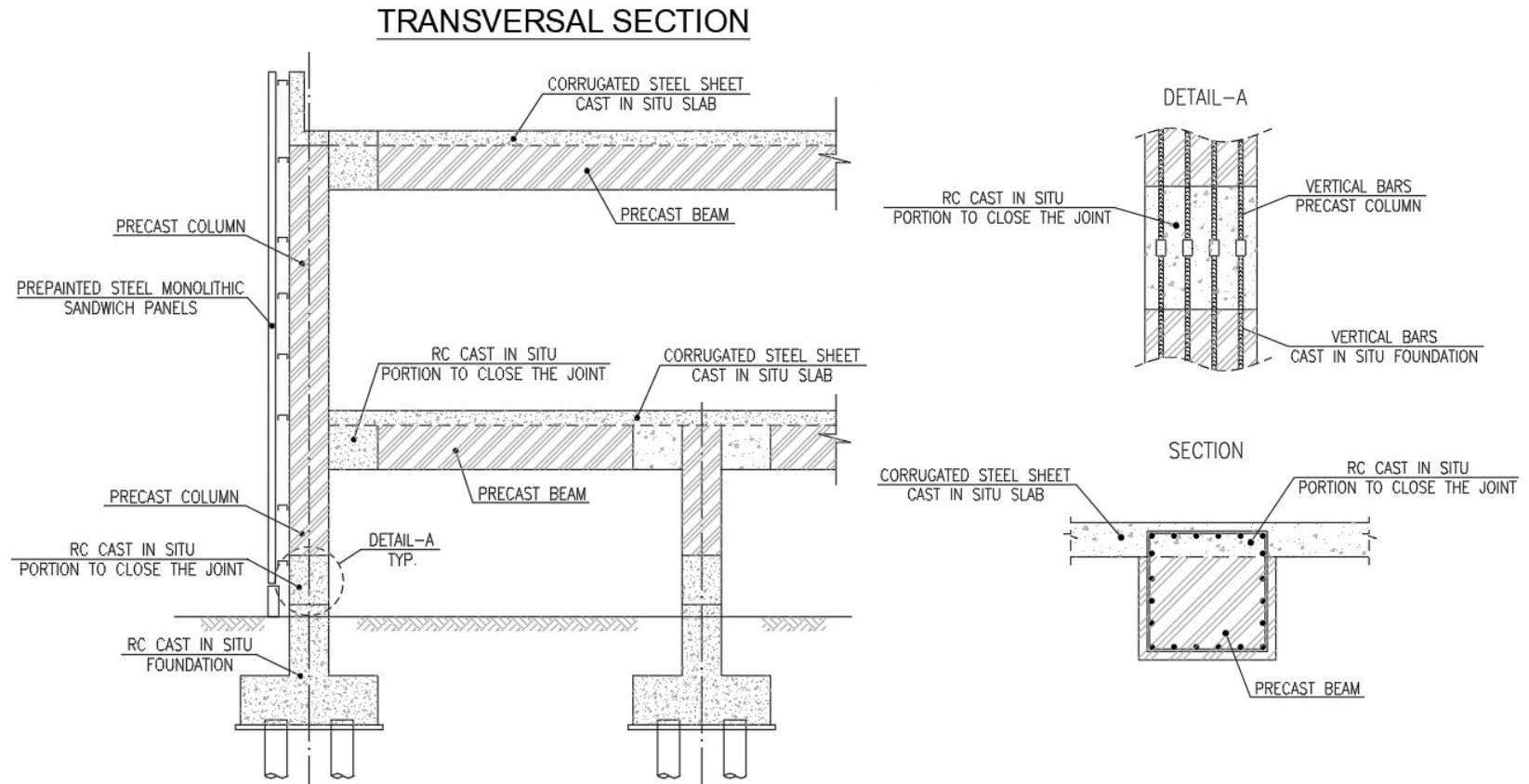
- KMD DEVELOPMENT SCHEDULE AND FOLLOW UP** (CONTRACTOR SHALL BE INFORMED IN ORDER TO MANAGE THE DOCUMENT REVIEW CYCLE).
- FABRICATION SCHEDULE MANAGEMENT;**
- INPECTIONS TO VENDOR PREMISES;**
- PACKING AND MARKING;**
- PREPARATION OF SHIPPING DOCUMENTS;**
- READY FOR SHIPMENT NOTICE;**
- RELEASE NOTE FOR SHIPPING;**
- TRASPOSTATION TO SITE;**
- INCOMING CONTROL;**
- PREPARATION OF FINAL DOCUMENTATION** (FINAL BOOKS OF MBD AND MDR);
 - FEASABILITY ANALYSES;**

ARE OUT OF CONTRACTOR SCOPE.

5-STRUCTURAL SCHEME

STRUCTURAL SCHEME FOR MAJOR BUILDING AND STRUCTURES

•SUBSTATIONS



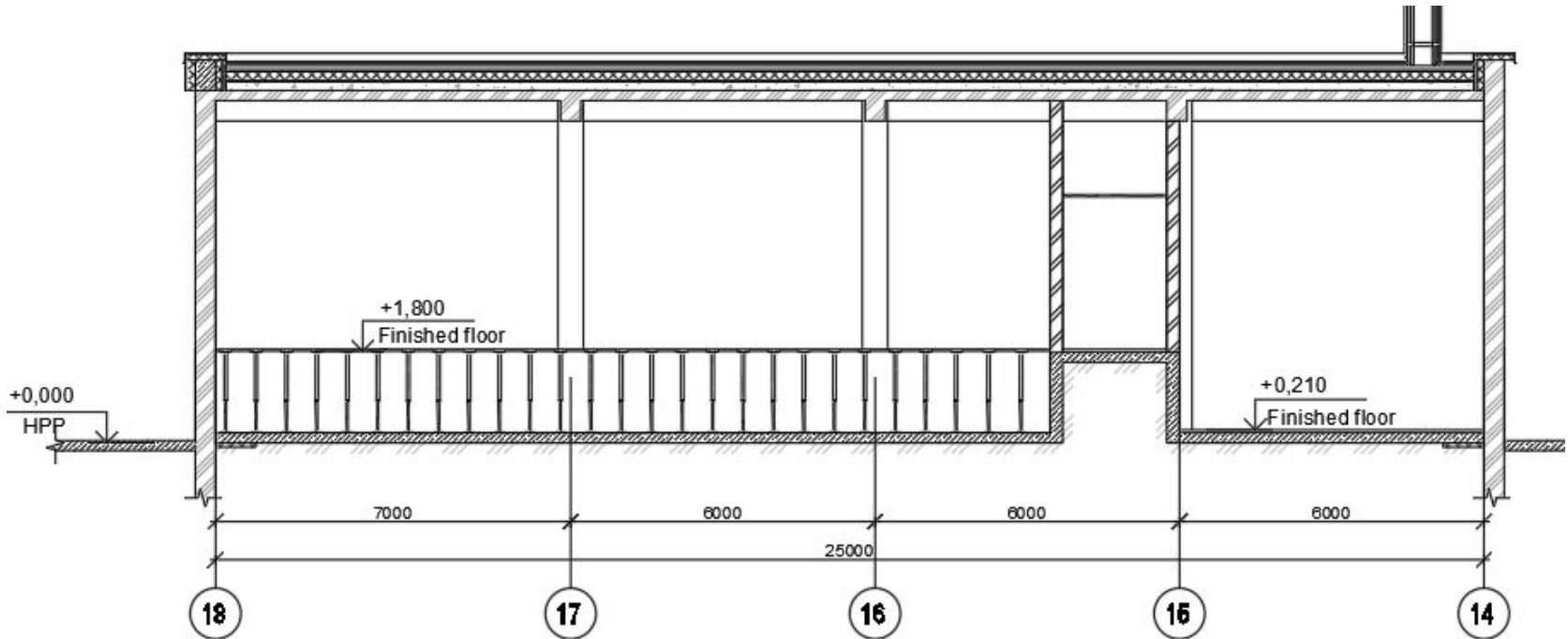
Structural scheme:

- Reinforced Concrete cast in situ foundations;
- Precast concrete columns;
- Precast concrete main beams;
- Cast in situ slab on corrugated steel sheet for roof and floors;
- Prepainted steel monolithic sandwich panels.

5-STRUCTURAL SCHEME

STRUCTURAL SCHEME FOR MAJOR BUILDING AND STRUCTURES

•RIE



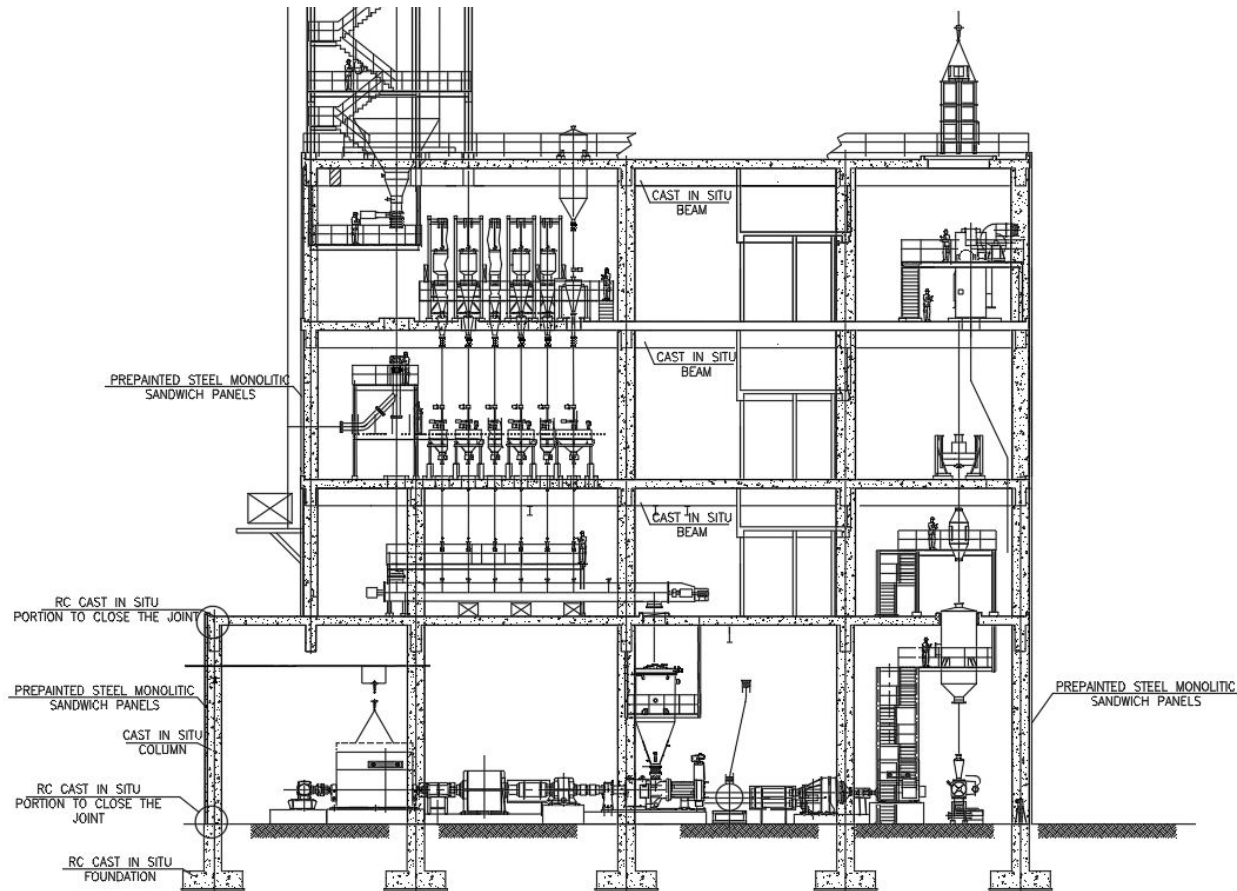
Structural scheme:

- Reinforced Concrete cast in situ foundations and elevation (blast proof);
- Reinforced Concrete cast in situ walls and roof (blast proof);.

5-STRUCTURAL SCHEME

Detailed Documentation will be prepared according to the following structural scheme.

•EXTRUSION BUILDING



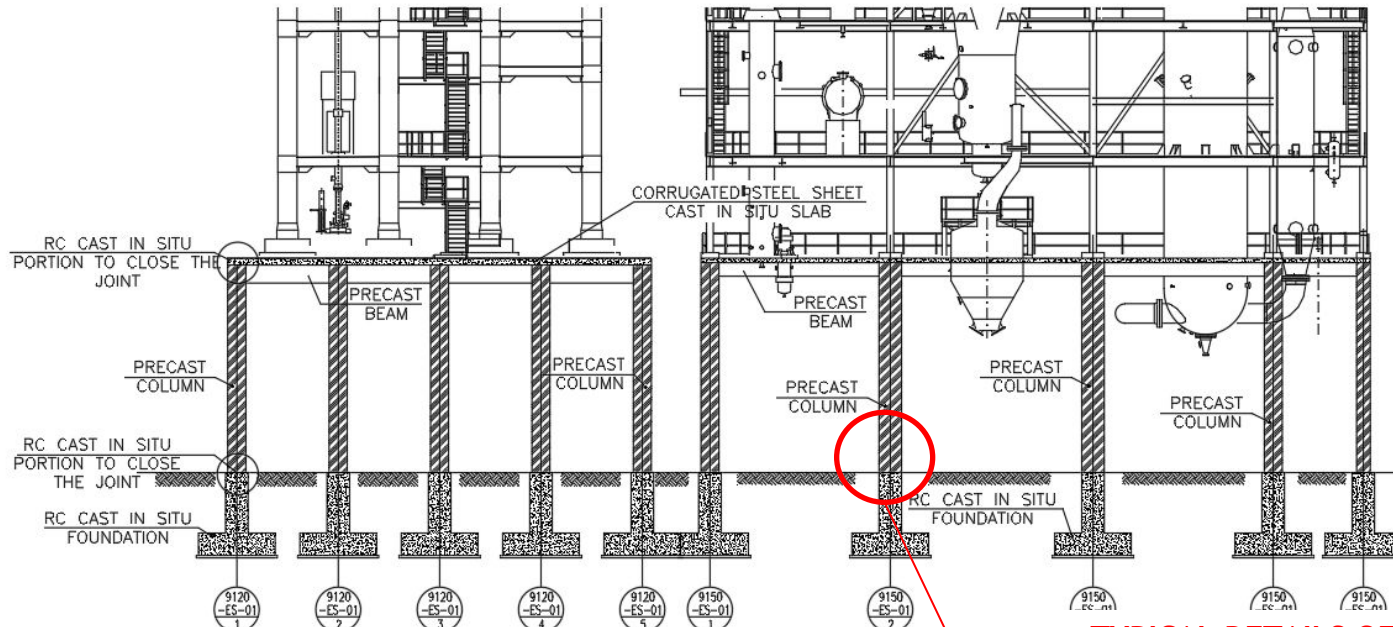
Structural scheme:

- Reinforced Concrete cast in situ Foundations;
- Reinforced Concrete Cast in situ columns, beams and slabs;
- Prepainted steel monolithic sandwich panels;

5-STRUCTURAL SCHEME

Detailed Documentation will be prepared according to the following structural scheme.

•MAIN PROCESS STRUCTURES



Structural scheme:

- Reinforced Concrete cast in situ Foundation;

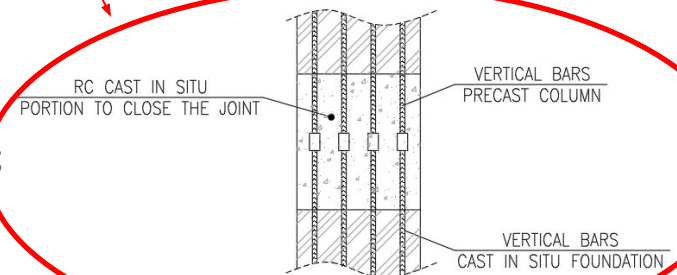
Up to first floor:

- Precast concrete column;
- Precast concrete main beams;
- Cast in situ slab on corrugated steel sheet formwork for floors;
- Prepainted steel monolithic sandwich panels;
- Structures steel stair towers and internal platform.

Above first floor:

- Structural steel framework.

TYPICAL DETAILS OF REINFORCEMENT CONNECTION

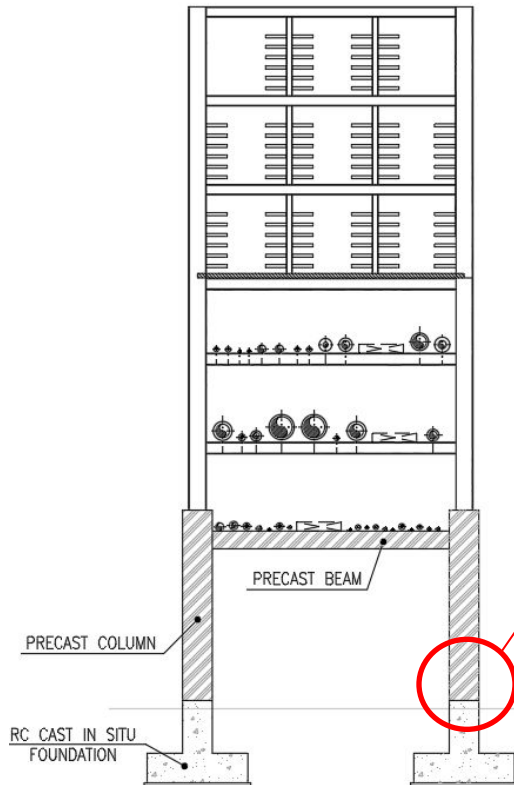


5-STRUCTURAL SCHEME

STRUCTURAL SCHEME FOR MAJOR BUILDING AND STRUCTURES

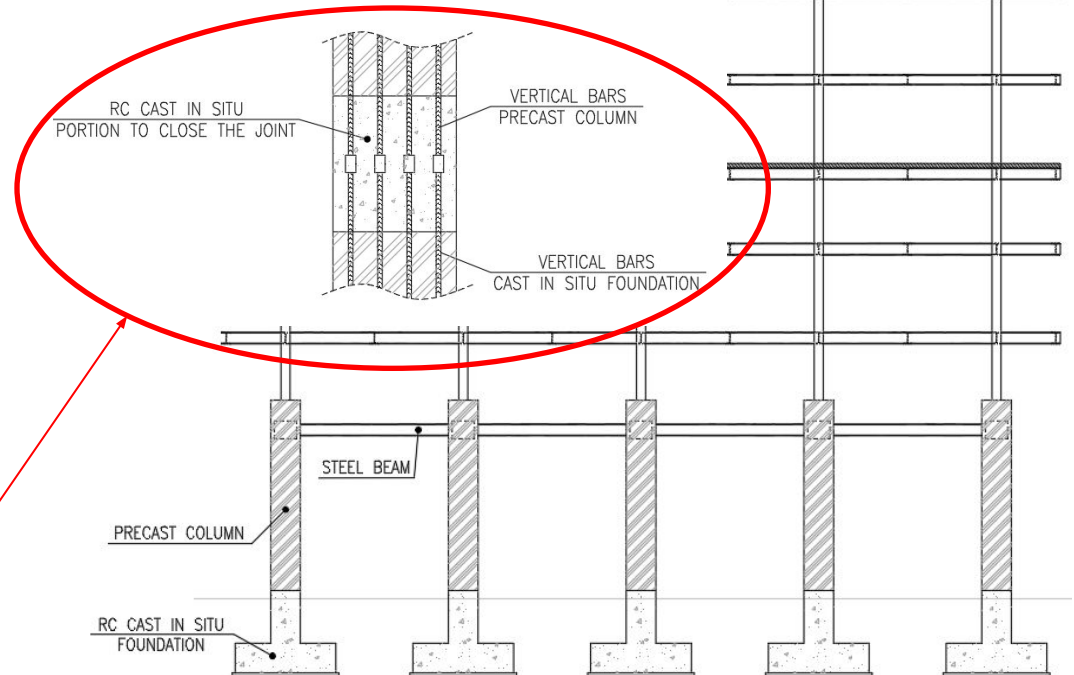
•PIPE RACK

TRANSVERSAL SECTION



LONGITUDINAL SECTION

TYPICAL DETAILS OF REINFORCEMENT CONNECTION



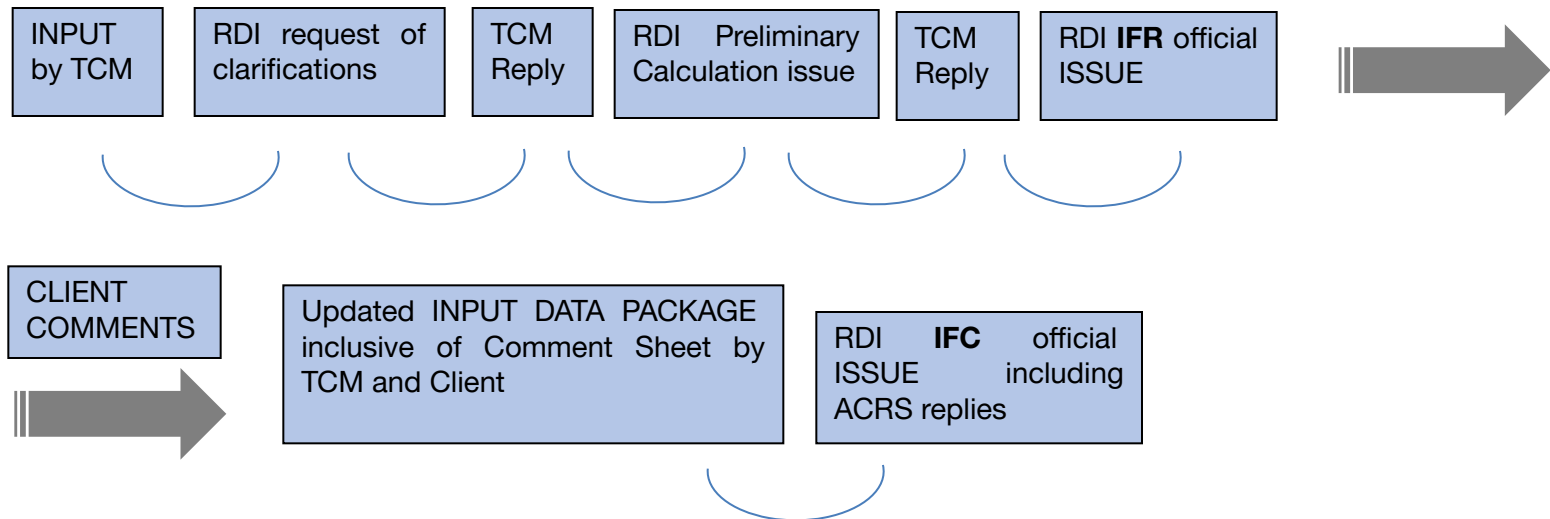
Structural scheme:

- Reinforced Concrete cast in situ Foundations;
- Precast concrete columns up to first tier;
- Precast concrete transversal beams up to first tier;
- Steel member for longitudinal beams.
- Steel member for column and transversal beam above the first tier.

6 - CIVIL DESIGN APPROACH WITH RDI - KJ

PILES & REINFORCED CONCRETE ELEMENTS (both cast in situ and precast) - KJ MARKA CODE

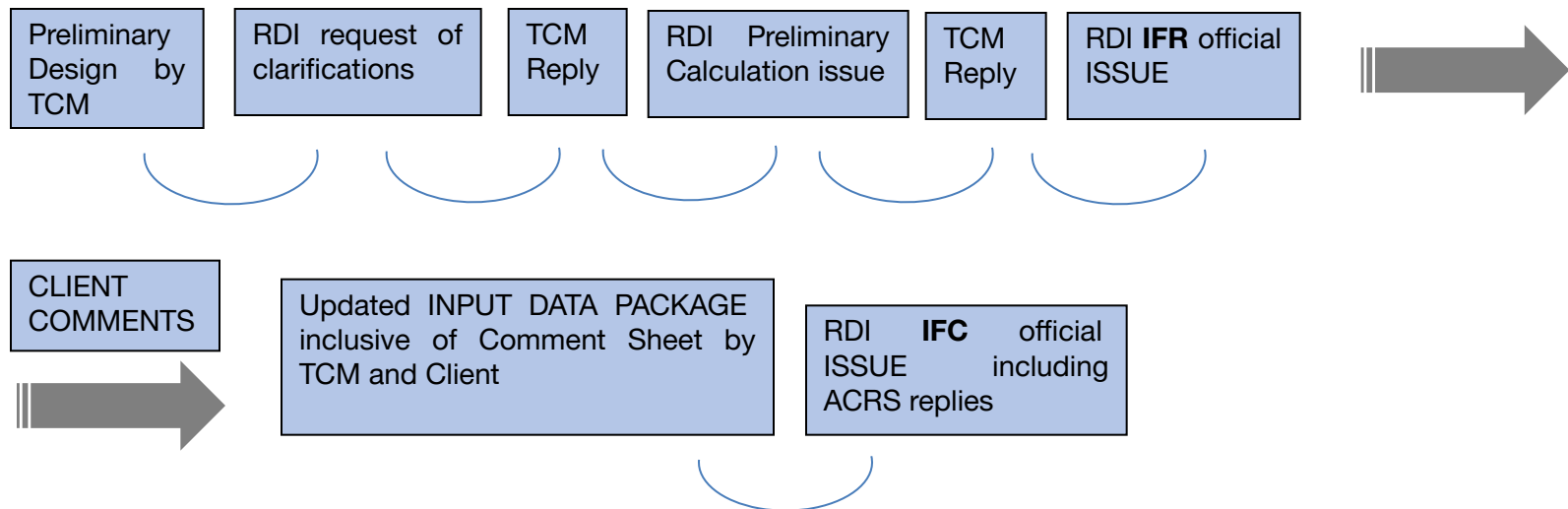
- ✓ FULL design developed by RDI starting from Input data by TCM.
 - Input to RDI includes superstructure Loads (passed in Excel format) at Top of foundation pedestal. Loads can derive from assumptions on the basis of the project status.
- ✓ 3D model excluded from RDI scope



6 - CIVIL DESIGN APPROACH WITH RDI - KJ

REINFORCED CONCRETE ELEMENTS IN ELEVATION (both cast in situ and precast) - KJ MARKA CODE

- ✓ Preliminary Design issued by TCM to RDIs. Design developed through SAP2000 (same model of the above steel structure)*
- ✓ RDI starting from Input design data by TCM develop russification of design and prepare KJ drawings
- ✓ 3D model excluded from RDI scope

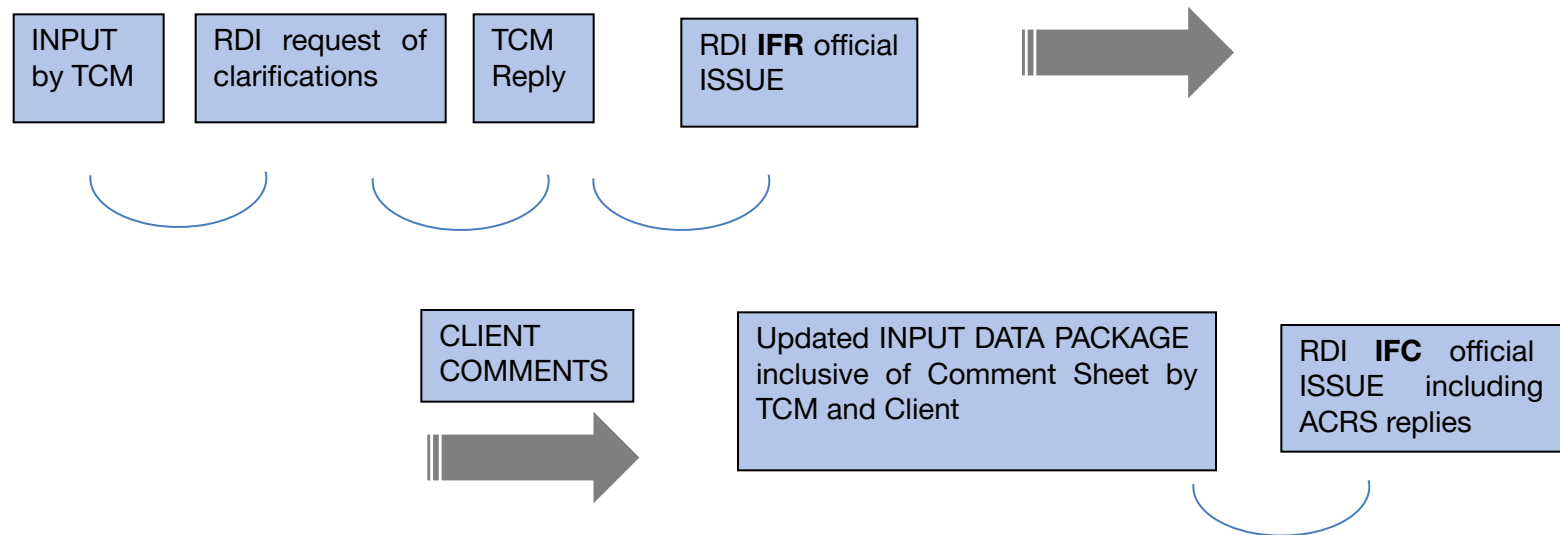


*not valid for buildings that are fully designed by RDI based on TCM inputs

6 - CIVIL DESIGN APPROACH WITH RDIS - NVK

REINFORCED CONCRETE ELEMENTS IN ELEVATION (both cast in situ and precast) - KJ MARKA CODE

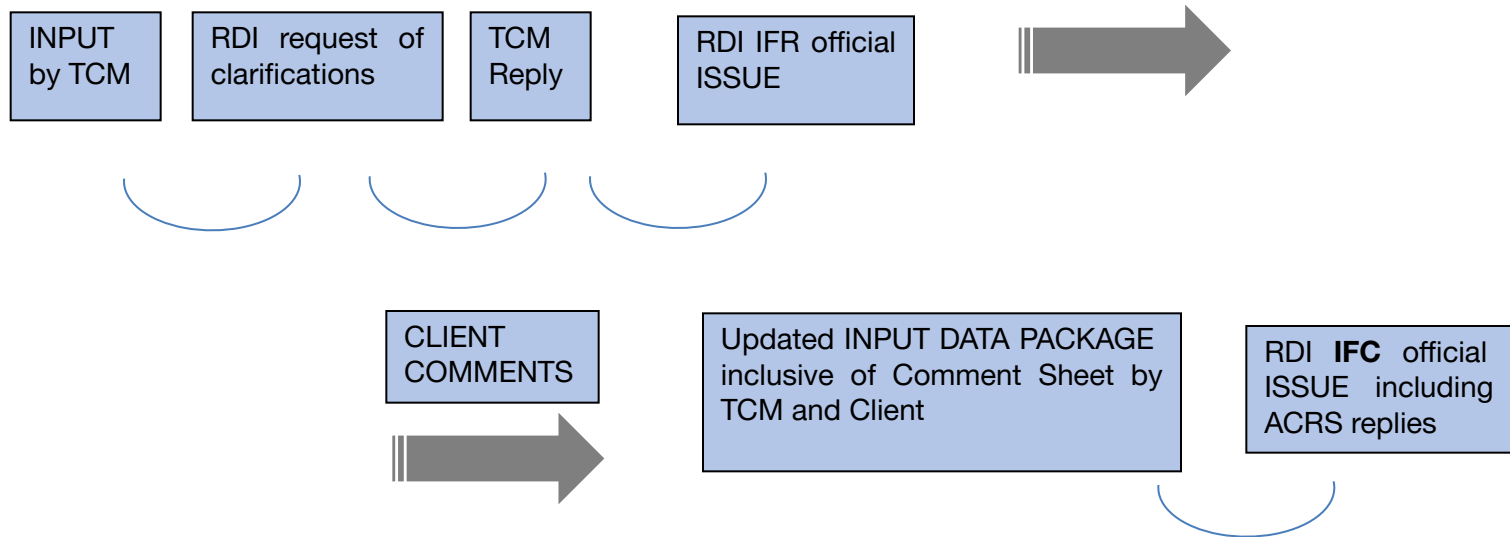
- RDI develop packages, including man-holes/pit schedules and longitudinal profiles, starting from IFR design (plan view) and 3D model developed by CONTRACTOR
- ✓ 3D model excluded from RDI scope



6 - CIVIL DESIGN APPROACH WITH RDIS - GT

REINFORCED CONCRETE ELEMENTS IN ELEVATION (both cast in situ and precast) - KJ MARKA CODE

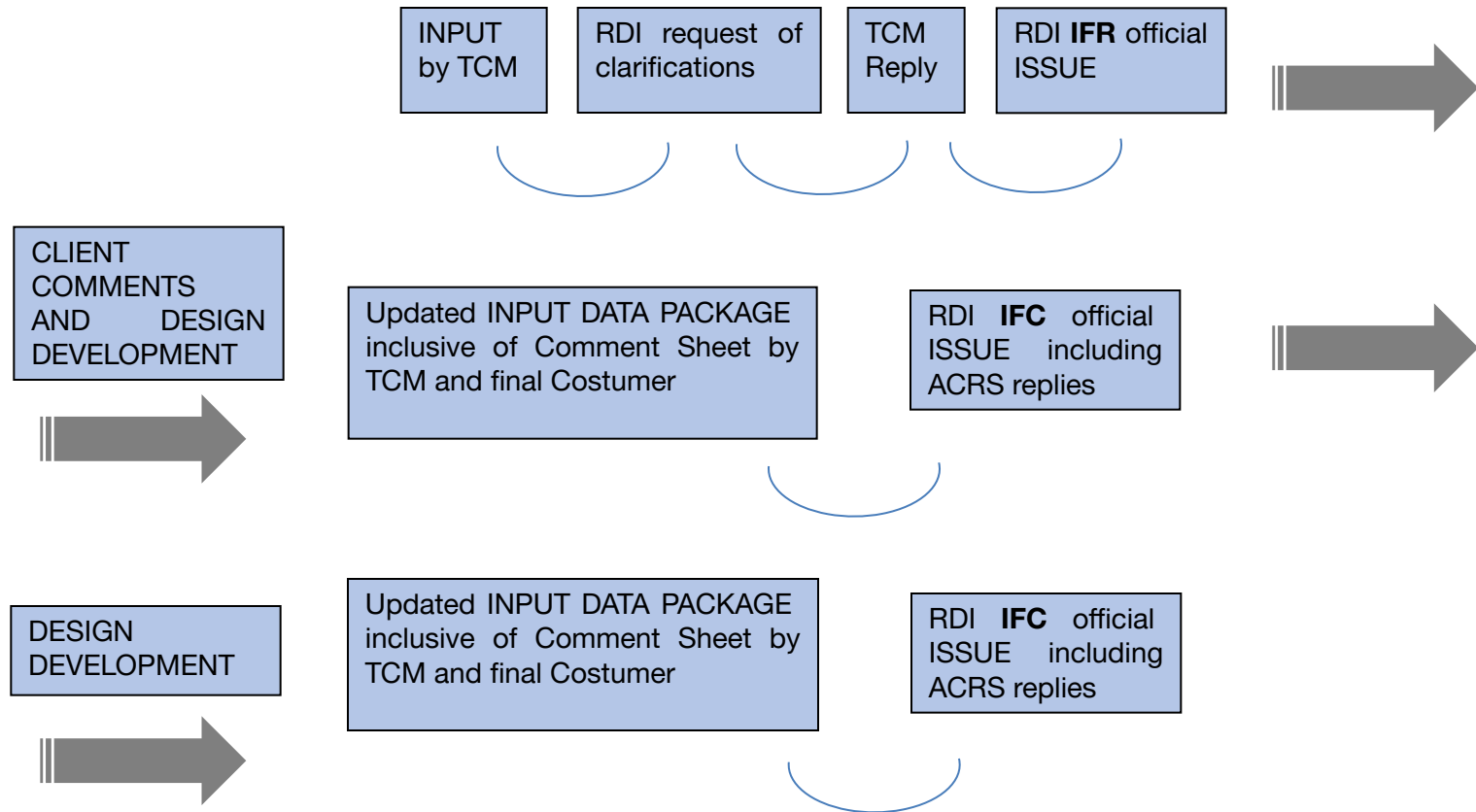
- RDI develop packages, starting from IFR design (plan view) and 3D model developed by CONTRACTOR
- ✓ 3D model excluded from RDI scope



4 - CIVIL DESIGN APPROACH WITH RDIS - GP

REINFORCED CONCRETE ELEMENTS IN ELEVATION (both cast in situ and precast) - KJ MARKA CODE

- RDI develop packages, starting from IFR design (plan view) and 3D model developed by CONTRACTOR
- ✓ 3D model excluded from RDI scope



KJ00 ... KJ09 : Reinforced Concrete Structures - Piles
 KJ10 ... KJ19 : Reinforced Concrete Structures - Foundations
 KJ20 ... KJ29 : Reinforced Concrete Structures - Above grade elevations
 KM10 ... KM19 : Primary/main Steel structures
 KM20 ... KM29 : Secondary/Miscellaneous Steel structures
 NVK1: Underground Network - Main headers
 NVK2: Underground Network - Secondary headers

7 - PACKAGES CONTENT - OD SAMPLE KJ/KM

Workflow for agreement on OD sample for KJ/KM-packages:



DURING EARLY WORKS AND OFFICIALLY
ISSUED THROUGH EMAIL
AGCC.165-TCM-AGCC-EMA-00451 dtd 5 May
2020

DURING
KOM

DURING EPSS

KM OD SAMPLE DRAFT
5/5/2020

ISSUED FOR CONSTRUCTION		Назначение документа Purpose of Issue	
00	30/04/2020	9690 PP - PIPE RACK	
Peб. Rev.	Дата Date	General information Pipe Rack 9690-SRP-01	
Amursky Gas Chemical Complex PE, PP & LAO UNITS		Stage DD	
Contractor project number: 4153 Contractor project code: AGCC.417		Sheet No 1	
Refer to protection notice G3 16016.		Total Sheets 6	
Содержание указания о назначении документа G3 16016.		Peб. Rev.	
Исполнитель/Author Образователь/Programmer		00	
Name Наименование		AGCC.417-9690-SRP-01-KM1.OD-0001	
Project Code Код проекта		Амурский газохимический комплекс	
Log No. Лог номер		Установок По Производству ПЗ, ПП и ЛАО	
Document No. Номер документа		9690	
Document Title Название документа		Состав	
Name of the Имя		Лист	
Date Дата		Листов	
Scale Масштаб		1	

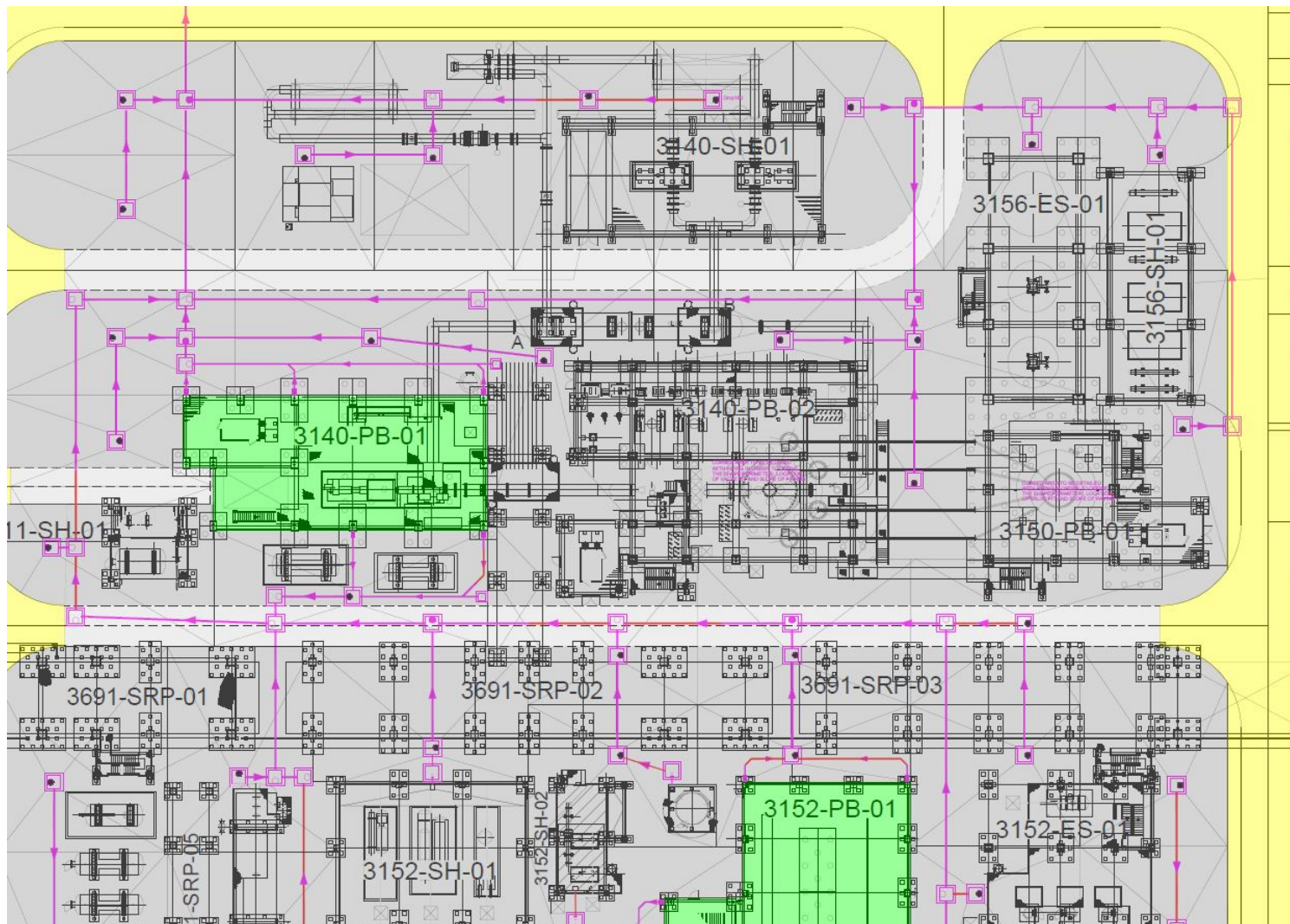
7 - PACKAGES CONTENT - OD SAMPLE KJ/KM

Discipline	marka code	TCM code	doc.No.	doc.description	doc. Attached to DDD (IF	doc. Attached to DDD (IF	doc. As REFERENCE to DDD	Notes
CIV	KM	AI-DU	001	OD	yes	yes		OD COMPREHEND THE LIST OF PACKAGE DETAIL DRAWING MAIN SET
CIV	KM	AI-SG	002	PROJECT SPECIFICATION FOR STEELWORKS			yes	
CIV	KM	VW-SG	010	PAINTING SPECIFICATION			yes	
CIV	KM	VW-SG	att.1	PAINTING SPECIFICATION FOR PFP			yes	
CIV	KM	XH-SW	003	WELDING SPECIFICATION			yes	
CIV	KM	AI-DX	att.2	STEEL WORKS - GENERAL NOTES			yes	
CIV	KM	AI-DX	004	STANDARD DETAILS OF HANDRAIL FOR STAIRS			yes	
CIV	KM	AI-DX	005	STANDARD DETAILS FOR LADDERS			yes	
CIV	KM	AI-DX	006	STANDARD DETAILS FOR GRATING			yes	
CIV	KM	AI-DX	007	STANDARD DETAILS FOR CIRCULAR PLATFORM			yes	
CIV	KM	AI-DX	008	STANDARD DETAILS FOR DAVIT			yes	
CIV	KM	AI-DX	009	STANDARD DETAILS FOR CORRUGATED STEEL SHEET			yes	
CIV	KM	AI-DX	009	ALBUM OF STANDARD CONNECTIONS			yes	
CIV	KM	AI-CS	009	CALCULATION REPORT	yes	yes		
CIV	KJ	AA-DC	001	OD	yes	yes		OD COMPREHEND THE LIST OF PACKAGE DETAIL DRAWING MAIN SET
CIV	KJ	RG-SG	002	PROJECT SPECIFICATION FOR PILING WORKS			yes	
CIV	KJ	AA-SG	003	PROJECT SPECIFICATION FOR CONCRETE WORKS			yes	
CIV	KJ	AA-DX	004	General Notes for Concrete Works			yes	
CIV	KJ	AA-DX	004	STANDARD ANCHOR BOLTS			yes	
CIV	KJ	AA-DX	004	STANDARD EMBEDDED PLATES			yes	
CIV	KJ			PSTS			yes	
CIV	KJ	AA-CS	005	CALCULATION REPORT			Yes	
CIV	KJ	AG-DA	006	EXCAVATION DRAWING			yes	

7 - PACKAGES CONTENT - OD SAMPLE NVK/GT/GP

Discipline	marka code	TCM code	doc.No.	doc.description	doc. Attached to DDD (IF	doc. Attached to DDD (IF	doc. As REFERENCE to DDD	Notes
CIV	NVK			OD	yes	yes		
CIV	NVK			Network plan - PL	yes	yes		
CIV	NVK			Network Sections - PR	yes	yes		
CIV	NVK			Manholes table - LT	yes	yes		
CIV	NVK			Standard details - DT	yes	yes		
CIV	NVK			BOQ - SP	yes	yes		
CIV	NVK			General specification for cathodic protection			yes	
CIV	NVK			Hydraulic calculation report			yes	
CIV	NVK			General coating specification for underground			yes	
CIV	NVK			Cathodic Protection System for water supply and sewer			yes	
CIV	GT			Plan - PL	yes	yes		
CIV	GT			Details - DT	yes	yes		
CIV	GT	AP-DX	001	Paving Key Plan			yes	
CIV	GT	AP-DC	002	Paving drainage system typical details			yes	
CIV	GT			Road Typical sections			yes	
CIV	GT			Coating for precast slab			yes	
CIV	GP			Plan - PL	yes	yes		
CIV	GP			Details - DT	yes	yes		
CIV	GP			BOQ - SP			yes	
CIV	GP	AP-DX	001	General Layout			yes	
CIV	GP	AR-DA	002	Paving Key Plan			yes	
CIV	GP	AQ-DA	003	underground construction drawings - main/secondary			yes	
CIV	GP			Electrical routing- ER			yes	

8 - UNDERGROUND / ROAD & PAVING



LEGEND

-  SECONDARY ROAD (width=6m)
-  PROCESS PAVED AREA
-  ACCESSWAY INSIDE PROCESS AREA DEVELOPED AS PAVING (width=4.5m)
-  BUILDING ROOF TO BE COLLECTED BY K4.1
-  PIPE NETWORK - INDUSTRIAL DRAINAGE SYSTEM (K4.1)
-  PIPE SLEEVE PROTECTION - CLEARANCE FROM FOUNDATION - (SP16 AND PTSS POINTS)
-  CATCH BASIN (K4.1 SYSTEM)
-  MANHOLE (K4.1 SYSTEM)
-  VALVE PIT FOR CURBED AREA (K4.1 SYSTEM)
-  DOWNSPOUT PIT (K4.1 SYSTEM)

Note:
When the process paved areas are extended up to the edge of the adjacent roads, and there are not anymore unpaved areas (gravel) between roads and process areas, the storm water from such roads adjacent to the process areas and from roofs of the buildings inside the same process areas will be collected by the K4.1 Industrial drainage system. Consequently, the Clean Storm water system (K2) will not be provided inside process areas.

8 - UNDERGROUND / ROAD & PAVING

Maximum Catchment Area surface dimensions

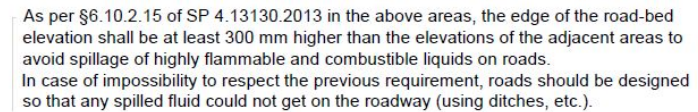
- ✓ During the design, the catchment area will be evaluated case by case on the basis of the geometry, applicable slopes, congestion of the areas involved.
- ✓ The limit of “One catch basin shall be provided every 400 m2 in paved area” can be disregarded

Storm Water collection

- ✓ Storm water from roads adjacent to the process areas and from roofs of the buildings inside the same process areas will be collected by the K4.1 Industrial drainage system. The Clean Storm water system (K2) will not be provided inside process areas

Pit

- ✓ Actual configuration with R.C. Cast in situ square/rectangular pits vs round Cast in situ/Precast Pits



8 - UNDERGROUND / ROAD & PAVING

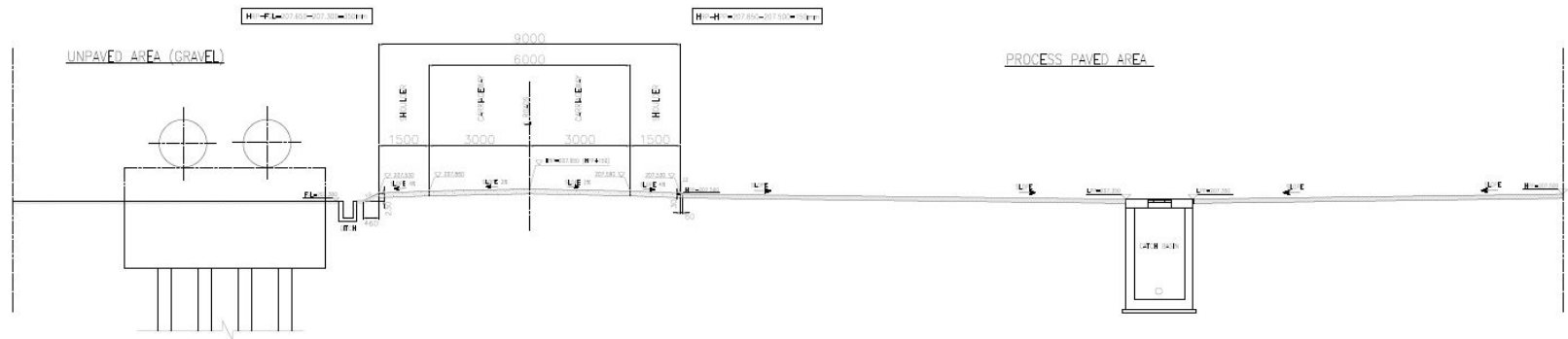
Road maximum Elevation

proposal to lower in process plan area the edge of the road-bed elevation reducing the minimum required gap of 300 mm respect to the elevations of the adjacent areas

OPTION 2 : ROAD EDGE ELEVATION 30mm HIGHER THEN ELEVATION OF ADJACENT PAVED AREAS (HIGH ROAD POINT-HIGH PAVED POINT=150mm)

SECTION A-A

SECONDARY CONCRETE ROAD





Maire Tecnimont Group's Headquarters

*Via Gaetano De Castillia, 6A
20124 Milan*

P. +39 02 6313.1

F. +39 02 6313.9052

info@mairetecnimont.it

www.mairetecnimont.com





Tecnimont