**REPORT RD0**

**RISK DEFINITION**

**TECHNICAL RISK ANALYSIS**

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| **REFERENCE:** 105213 | | | **TIS AGENCY:** CPV ARABIA |
| **TECHNICAL/S RESPONSIBLE/S:**  **DESIGN:** Mohamed Roshdi  **SITE INSPECTIONS:** Ahmed Mansour (CIVIL ENGINEERING) | | | |
| **REVISION:**  Draft | **CONTACT:**  Mahmoud Elmasry. | | |
| **DATE OF ISSUE:**  03-Oct-2024 | **FAX:** | **PHONE:** 00966553304612 | **EMAIL:** [mmasry@cpvarabia.com](mailto:mmubark@cpvarabia.com) |

**TITLE I**

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| **PRINCIPAL/OWNER:** ﺳﻔﺮ ﻧﺎﻳﻒ ﻏﺰﺍﻱ ﺍﻟﻨﻔﻴﻌﻲ  **PROPOSER (IF DIFFERENT):** ﻣﺆﺳﺴﺔ ﺃﺑﺮﺍﺝ ﺍﻟﻬﻔﻮﻑ ﻟﻠﻤﻘﺎﻭﻻﺕ ﺍﻟﻌﺎﻣﺔ**.**  **PROJECT TITLE:** ﻣﺸﺮﻭﻉ ﺳﻜﻨﻲ  **ADDRESS:** ﺍﻟﺮﻳﺎﺽ ﺃﻣﺎﻧﺔ ﻣﻨﻄﻘﺔ ﺍﻟﺮﻳﺎﺽ ﺑﻠﺪﻳﺔ ﺍﻟﺮﻭﺿﻪ ﺣﻲ ﺍﻟﻤﻌﻴﺰﻳﻠﻪ.  **PROPOSED USE/OCCUPATION:** المباني السكنية.  **NUMBER OF BUILDINGS:** 1 |
| **SCOPE OF MISSION:**  **DESIGN**  **DESIGN + SITE INSPECTIONS**  **- Date of TIS involvement:** 03-Oct-2024   * **Inspections from the commencement of Works**   **YES**  **NO** * **Missions:**   **S**  **W.1**  **E**  **W.2**   **Q**  **W.3 X, specify:**  **S:** Solidity and stability, including the envelope elements  **W.x:** Waterproofing (**1**- Roofs, **2**- Façades, **3**-Basements)  **E:** Existing structures  **Q:** Works already started  **X:** Other  The TIS controls, inspections and checks marked with an X above are based on as analysis of the project, according to the requirements of the demander. |

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| **PARTIES INVOLVED**  **(Full name + Address)**  **DESIGN:** |
| * **ARCHITECT:** ﺍﻟﻤﻨﻮﺍﻝ ﻟﻼﺳﺘﺸﺎﺭﺍﺕ ﺍﻟﻬﻨﺪﺳﻴﺔ - ﺍﻟﺮﻳﺎﺽ * **STRUCTURAL DESIGNER:** ﺍﻟﻤﻨﻮﺍﻝ ﻟﻼﺳﺘﺸﺎﺭﺍﺕ ﺍﻟﻬﻨﺪﺳﻴﺔ - ﺍﻟﺮﻳﺎﺽ * **SOIL REPORT:** مختبر اتقان البناء لفحص التربة والمواد   **CONSTRUCTION:** |
| * **MAIN CONTRACTOR:** ﻣﺆﺳﺴﺔ ﺃﺑﺮﺍﺝ ﺍﻟﻬﻔﻮﻑ ﻟﻠﻤﻘﺎﻭﻻﺕ ﺍﻟﻌﺎﻣﺔ * **SUBCONTRACTORS:** ﻣﺆﺳﺴﻪ ﺍﺑﺮﺍﺝ ﺍﻟﻬﻔﻮﻑ ﻟﻠﻤﻘﺎﻭﻻﺕ ﺍﻟﻌﺎﻣﻪ * **PROJECT SUPERVISOR:** ﺍﻟﻤﻨﻮﺍﻝ ﻟﻼﺳﺘﺸﺎﺭﺍﺕ ﺍﻟﻬﻨﺪﺳﻴﺔ - ﺍﻟﺮﻳﺎﺽ * **QUALITY TESTING FIRMS:** * **OTHER (SPECIFY):**   **COMMENTS ON REFERENCES OF ARCHITECTS, ENGINEERING CONSULTANTS AND CONTRACTORS OF THE OPERATION, PURPOSE OF THE INSPECTION, IF ANY:** NO REFERENCES AVAILABLE |
| **DOCUMENTS USED IN THIS REPORT**   * STRUCTURAL DRAWINGS. * ARCHITECTURAL DRAWINGS. * BILLS OF QUANTITY. * SOIL INVESTIGATION REPORT. * PROPOSAL FORM FOR INHERENT DEFECT INSURANCE.   Is there any other document or information missing which is needed for the completion of this report?  **YES**   **NO**  If YES, please specify:  - Structural analysis design files (Software models, Calculation note, etc...) - Construction schedule - Foundation section plans - Type of concrete used for foundationCast in situ columns, has not been mentioned in the structure plans. - Type of steel reinforcement used for foundation, Cast in situ columns, Cast in situ slabs, has not been mentioned in the structure plans. - Detailing of how the parapet will be tied into the main structure - The roof drainage Slopes are not indicated on the plans. - Ground slope % - Quality assurance procedures - Method statement |

**CODE TABLE**

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| **NATURE OF WORKS** | **SOIL RISKS** | **STRUCTURE TYPE** | **SPECIFICATIONS** |
| **CODE N°1: CONSTRUCTION TYPE**  **A**  DETACHED OR SEMI-DETACHED  HOUSES UP TO GF+2 AND B-1  **B**  TERRACED HOUSES UP TO GF+3 AND B-1  **C1**  RESIDENTIAL BUILDINGS FROM  GF+4 TO GF+14 AND UP TO B-2  **C2**  RESIDENTIAL BUILDINGS FROM  GF+15 AND/OR FROM B-3  **D1**  OFFICES, HOTELS, SCHOOLS  **D2**  HOSPITALS, CLINICS  **D3**  COMMERCIAL BUILDINGS, RESTAURANTS, SHOPPING MALLS  **E1**  OTHER  PUBLIC BUILDINGS: THEATERS, RELIGIOUS  BUILDINGS, STATIONS  **E2**  STADES  **F1**  COMMON INDUSTRIAL  BUILDINGS, FACTORIES  **F2**  LOGISTIC PLATFORMS  **G1**  RESERVOIRS  **G2**  SPECIAL INDUSTRIAL  BUILDINGS, SMOKESTACKS,  TANKS, RETAINING WALLS, ETC  **H**  BRIDGES, FOOTBRIDGES,  JUNCTIONS AND OTHER WORKS | **CODE N°2: SLOPE**   |  |  |  |  |  | | --- | --- | --- | --- | --- | | 0 | 1 | 2 | 3 | 4 | | <5% | 5 to 10% | 10% to 20% | 20 to 30% | >30% |   **CODE N°3: GROUND WATER AND AGRESSIVENESS**   |  |  | | --- | --- | | 0 | no water table | | 3 | works below water table | | 4 | works above water table |  |  |  | | --- | --- | | N | non-aggressive water or soil | | Y | aggressive water or soil |   **CODE N°4: FOUNDATIONS**   |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | | A | footings | | | | | | B | raft | | | | | | final settlement | 0 | 1 | 2 | 3 | 4 | | <2 cm | 2 to 5 cm | >5 cm |  |  | | C | piles or contiguous piles wall | | | | | | D | friction piles | | | | | | E | diaphragm wall | | | | | | F | shafts | | | | | | depth | 0 | 1 | 2 | 3 | 4 | | 0 to 3 m | 3 to 10 m | 10 to 25 m | 25 to 30 m | >30 m | | Z | Other foundation type | | | | |   **CODE N°5: GROUND SPECIFIC RISKS**   |  |  | | --- | --- | | O | no ground specific risks | | P | underground quarries, sinkholes, karsts | | Q | mining ground | | R | Anchored earth retaining structure.  (h > 3 meters) | | S | underpinning, basement construction | | T | ground consolidation (grouting compaction; dynamic compaction/vibration) | | U | hazardous storage, concentrated surcharge loads, embankment | | V | Compressive layer | | W | founding on fill | | X | other ground risk | | Y | at least 2 ground specific risk | | Z | new foundation type | | CODE N°6: STRUCTURE  A  VERTICAL STRUCTURES MASONRY  B  REINFORCED CONCRETE CAST IN-SITU  **C**  PRECAST REINFORCED CONCRETE - PREFABRICATED IN FACTORY RESIDENTIAL BUILDINGS FROM  GF+4 TO GF+14 AND UP TO B-2  **D**  PRECAST REINFORCED CONCRETE - ON SITE  **E**  PRESTRESSED CONCRETE EXCL. POST-TENSIONED CONCRETE  **F**  STEEL WORKS - SITE ASSEMBLY  **G**  PRE-ASSEMBLED STEEL WORKS  **H**  ON SITE WELDING  **I**  TIMBER STRUCTURE  **X**  TRADITIONAL COMPOSITE STRUCTURE  **Y**  WORKS ON EXISTING STRUCTURES - BASEMENT CONSTRUCTION - NEW FLOORS  **Z**  NEW STRUCTURAL SYSTEMS INCL. POST-TENSIONING | **CODE N°7: FACADE**   |  |  | | --- | --- | | A | concrete wall or masonry | | B | sandwich or timber panels | | C | curtain walls – steel frame glazing | | D | curtain walls – glazing fixed with glue | | E | curtain walls – glazing fixed bolts | | F | breathable glazed curtain wall | | G | cable curtain wall | | Z | other type |   **CODE N°8: HEIGHT**   |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | |  | 0 | 1 | 2 | 3 | 4 | | Height - Ho | <25m | 25 to 35m | 35 to  60m | 60 to 100m | >100m | | Maximum Headroom - Hp | <8m | 8 to 15m | 15 to  35 m | 35 to 50m | >50m |   **CODE N°9: DEPTH**   |  |  |  |  |  | | --- | --- | --- | --- | --- | |  | 1 | 2 | 3 | 4 | | Depth | <5m | 5 to 10m | 10 to 15m | >15m |   **CODE N°10: SPANS**   |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | |  | 0 | 1 | 2 | 3 | 4 | | Spans | <15m | 15 to 20m | 20 to 30m | 30 to 40m | >40m | | Spans (timber) | <10m |  |  |  | >10m |   **CODE N°11: CANTILEVER**   |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | |  | 0 | 1 | 2 | 3 | 4 | | Cantilever | None | 0 to 2m | 2 to 5m | 5 to 10m | >10m |   **CODE N°12: SITE EXPOSED**   |  |  |  | | --- | --- | --- | |  | 0 | 1 | | Distance to the sea | >5km | <5km |   **CODE N°13: WND SENSITIVITY**   |  |  | | --- | --- | | 0 | Concrete or masonry structure | | 1 | Steel, timber or composite structure |   **CODE N°14: WATERPROOFING OF ROOFS**   |  |  | | --- | --- | | A1 | pitched roof - tiles | | A2 | pitched roof - steel roof-deck | | A3 | pitched roof - sandwich panels | | B1 | flat roof-non practicable normal waterproofing | | B2 | flat roof-non practicable inverted waterproofing | | B3 | flat roof-practicable normal waterproofing | | B4 | flat roof-practicable inverted waterproofing |   **CODE N°15: WATERPROOFING OF BASEMENT**   |  |  | | --- | --- | | A | External treatment (PVC, bitumen based,  polyurethane membranes) | | B | Crystallization technology by concrete additive | | C | Other | | Z | No basement | |

**PROJECT OVERALL VIEW**

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| **CODE** | **1** | **2** | **3** | **4** | **5** | **6** | **7** | **8** | **9** | **10** | **11** | **12** | **13** | **14** | **15** |
| **BUILD.1** | A | 0 | 0 N | A 0 | O | B | A | 0 0 | 1 | 0 | 1 | 1 | 0 | B4 | Z |
| **Concerning the code table above, please complete one line per building/structure and explain each code below. PLEASE EXPLAIN IF SEVERAL CODES INDICATED IN THE SAME CASE.**  CODE 1: The project is Residential. It consists of 2 floors with annex  CODE 2: No value has been indicated in the geotechnical report, so it is estimated that due to the geology of the area it is less than 5%.  CODE 3: Ground water level was not detected in the boreholes. Non-aggressive due to water or soil ( Chloride in Soil= 0.0035 % , Sulfate in Soil= 0.0251 % )  CODE 4: The foundation type: Isolated Footings,Strip Footings,Tie beams,Combined Footingsand the settlement value:4.51 mm  CODE 5: No Ground Specific Risks  CODE 6: reinforced concrete cast in-situ, in columns, reinforced concrete cast in-situ, in foundation, reinforced concrete cast in-situ, in ground floor slab, reinforced concrete cast in-situ, in last floor slabs  CODE 7: Concrete wall or masonry  CODE 8: The total height is:14.4 m and the maximum headroom (Hp):3.45m  CODE 9: Level of Foundation from street level: -2 m  CODE 10: The maximum span is, approximately: 6.6 m  CODE 11: Maximum cantilever of the balconies: 1.4 m  CODE 12: The distance to the sea < 5 km  CODE 13: Concrete or masonry structure  CODE 14: Details of roof waterproofing of the project flat roof-practicable inverted waterproofing,  CODE 15: No basement  **Summary description of the work, nature of the foundations and of the structure, specify the particularities (for example the presence of a ground water level and its position in relation to the last basement, the presence of basements or existing buildings along an excavation).**  The project is Residential. It consists of 2 floors with annex , Total Building height = 14.4 m  The project consists of reinforced concrete beams and columns, founded on Isolated Footings,Strip Footings,Tie beams,Combined FootingsThe floor slab of all slabs, including roof slab, are 32cm thick reinforced concrete hollow block slabs with beams, and reinforced concrete solid slabs but not mentioned | | | | | | | | | | | | | | | |

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| **DRAWINGS**  **Please annex the following drawings, if available:**  **LOCATION**  **GENERAL DRAWING**  **PLANS**  **SECTIONS**  **FACADES & ROOFS & TERRACES**  **FOUNDATIONS**  **OTHER, PLEASE SPECIFY:**  THESE DRAWINGS ARE ATTACHED IN ANNEX I. DRAWINGS. |

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| **PROVISIONAL TOTAL COST OF WORKS**     |  |  | | --- | --- | | Are Architect and Engineering Consultants fees included in the cost of the works: | YES  NO |  1. Total cost of the works: 1,092,500.00 SAR 2. Structural works: 450,000.00 SAR 3. Envelope: 20,000.00 SAR 4. Non-structural works: 400,000.00 SAR 5. Equipment, fixtures, and fittings: 30,000.00 SAR 6. External works: 20,000.00 SAR 7. Design and professional fees: 30,000.00 SAR 8. Taxes: 142,500.00 SAR  |  |  | | --- | --- | | Is there any special equipment (industrial machinery used in the manufacture of products or services) included in the cost other than those usually used in common constructions? | YES  NO |   If so, please specify: Nature:  Cost:  **DATES AND CONSTRUCTION TIMES**  Expected duration of work (months): 1month  Date of commencement of construction: 07-May-2022  Date of the first on-site visit of the Inspection Agency: 22-May-2022  Expected date of practical completion: 07-Jun-2022 |

**TITLE II**

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| **SITE DESCRIPTION**  Is the building likely to be flooded (river, lake or sea, ground water level)?  YES  NO  Maximal level of the ground water level to ground floor and to the last basement:  - Ground water level was not detected in the boreholes  - Ground floor level is +0.45 m.  - No Basement    Is there a system to prevent the effect of the water under-pressure?   YES  NO  If YES, please specify:  Is the building located in a seismic area?  YES  NO  If YES, could you specify the level of protection? (Specify: statutory or contractual?): statutory  Acceleration value: PGA=0.9 g. .  Indicate in % the ground slope: No value has been indicated in the geotechnical report, so it is estimated that due to the geology of the area it is less than 5%..  If >15%, was the landslide risk evaluated in the Geotechnical Report and/or the design? NA  YES  NO  If NO, please make a reserve in conclusions.  Is the building located in a cyclone area?  YES  NO  Wind speed considered in the calculations (km/h): approximately km/h  Is snow load applicable?  YES  NO  If so, snow load value:  Is the site located in a hostile environment (<5 km sea, soil, and underground water)?  YES  NO  If YES, specify the nature and the protection provided:  The nature:  The protection provided:  - Use of (SRC) sulfate resisting cement type v, Minimum Cement Content 350 kg/m3, the maximum water-cement ratio in the concrete mix is 0.45, and the minimum reinforcement concrete cover is 75 mm according to the geotechnical report. - Foundation elements should be coated below the ground surface with Bitumen. |

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| **GEOLOGY - TOPOGRAPHY – FOUNDATIONS**  Has a geotechnical engineer been involved in the design?  YES  NO  Is there a geotechnical report?  YES  NO  (If YES, please indicate the scope, number, and type of geotechnical tests and describe the layers including thickness).  Number of boreholes: 3  - Borehole 1: BH-1, depth of: 10m - Borehole 2: BH-2, depth of: 8m - Borehole 3: BH-3, depth of: 8m  Type of tests and trials:  - Atterberg Limits - Soil Quality Degree Test - Chemical Analysis - Particle Size Distribution  Description of the layers including thickness: |

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| Are the adopted foundations founded on natural soil?  YES  NO  Depth of excavation: -2 m from the street level.  Depth of soil supporting foundations: -2 m from the street level.  Nature of soil supporting foundations: poorly graded sand, yellowish brown.medium to very dense,dry  All earthworks to be performed shall be compliant with the recommendations indicated in the geotechnical report.  Please describe the foundations (level of foundation, bearing capacity, bearing pressure):   * Foundation type: Isolated Footings,Strip Footings,Tie beams,Combined Footings * Bearing Capacity: 1.5 kg/cm2.   Are the conclusions of the Geotechnical Report relevant?  YES  NO  If NOT, please explain the reason:  depth of excavation in report of soil don’t equal depth of excavation in structure plans  Is the ultimate settlement indicated in the geotechnical report?  YES  NO  Please indicate the value: 4.51 mm.  Is the foundation system in line with the soil report?  YES  NO  If NOT, please precise the differences and the reason:  Has the RD1 report been filled in?  YES  NO  If YES, please mark below the reason:  Presence of back fill or compressible or expansible layers being used as foundations for the works  Presence of piles, diaphragm walls or shafts superior to 3 m deep  Presence of ground slopes exceeding 30% or cliffs sides  Risk of ground sliding after soils excavation  Are additional surveys needed?  YES  NO  If YES, please precise:  - Shear Test Parameters |

**TITLE III**

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| **The items below must be descripted briefly but detailed enough to include any relevant information.**  The used technologies must be specified where is possible: traditional construction, prefabricated structural elements, steel/concrete mixed structures, pre-tensioned (factory or site), welding (factory or site), etc  It is a traditional system.  **Please indicate if innovative materials or technics are used which means (completion of RD2 report mandatory).**  No innovative materials or technics are used.  **VERTICAL STRUCTURES**  Full description of the adopted model.    Are there non-vertical loads/transfer structures?  YES  NO  **VERTICAL ELEMENTS (COLUMNS, BEARING WALLS)**  **Nature (reinforced or prestressed concrete, metal, timber...):**  **- Cast is situ Columns:** Fc= Not Mentioned Fy= Not Mentioned  **HORIZONTAL STRUCTURAL ELEMENTS**  **FOUNDATIONS**  **Nature (concrete, masonry, ..):** Cast in situ.  - Use of (SRC) sulfate resisting cement type v, Minimum Cement Content 350 kg/m3, the maximum water-cement ratio in the concrete mix is 0.45, and the minimum reinforcement concrete cover is 75 mm according to the geotechnical report. - Foundation elements should be coated below the ground surface with Bitumen.  **Footings**  fc`: Not Mentioned  Fy: Not Mentioned  **FLOOR SLABS**  **Nature (reinforced or prestressed concrete, metal, timber...):**  - Cast is situ slabs: Fc= Not Mentioned Fy= Not Mentioned Maximum span for beams (m): 6.6 m Maximum span for slabs (m): 6.6 m - Maximum cantilever of the balconies (m):1.4 m  **ROOF STRUCTURAL ELEMENTS**  Please note if those are:  FLAT  PITCHED  If flat, similar to floor slab?  YES  NO  If NO indicate modifications:  If pitched, please note its main characteristics: |

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| HEAVY FACADES  Type, total thickness, rendering, cladding...  (Specify load-bearing facades or not, precast, or not.)  **Façade details:**  Concrete wall or masonry  **LIGHT-WEIGHT FACADES**  Not Applicable  Frame (aluminum, steel, timber or other):  Filling (glass, composite wall, in this case, specify the constitution):  Total surface of each type of façade:  Possibility to replace the façade elements easily:  YES  NO  **HORIZONTAL STABILITY**  Traditional structural elements (frame, inner walls, bracings...)?  YES  NO  If not: fill in the complementary report RD2  Traditional structural elements are reinforced concrete frames.  **BASEMENT WATERPROOFING**  The project doesn´t include basement  Presence of water (water flow, water table)?  YES  NO  If YES: solution chosen (waterproofness, drainage, and shaft lining...)  waterproofing system:  **FACADE WATERPROOFING** |

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| ROOF WATERPROOFING  **Roof details:**   |  | | --- | |  | |
| GROUND SLAB  Is the ground slab suspended?  YES  NO  If NOT, is the ground slab bearing on backfill?  YES  NO  Maximum thickness of backfill: 2.25 m from the bottom of the foundation to the bottom of the slab on grade.  Loads:  Spread:  YES  NO Value: not informed  Concentrating/rolling:  YES  NO Value:  Other:  YES  NO Value: |

**TITLE IV**

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| **IDENTIFIED AGGRAVATING RISKS AND ADDITIONAL INFORMATION:**  (For example, large span beams or slabs, foundation for heavy and/or vibrating machinery, etc.)  It is necessary to submit the documents indicated in title I, referring to the documents used in this report.  **Design (RD5):**  - The soil classification and site investigation have not been conducted in compliance with SBC 303-2018 (Ch. 2, Sec. 2.3 & 2.4) and SBC 1101 (Sec. 704).  Please Conduct a new soil investigation in accordance with SBC 303-2018 and SBC 1101 requirements, update the project design based on the new findings, Please send us the updates once completed. - The site investigation and report have not been expanded to include property boundaries, grading dimensions, drainage plans, building locations, and the impact of geological conditions as per SBC 303, Section 3.1.  Please update the investigation and report to include grading dimensions, drainage plans, building locations, and geological impact, and send us the updates once - The minimum footing depth below natural ground level and the minimum concrete cover to reinforcement not comply with SBC 303, Section 5.2 and Section 5.4.2.6  Ensure footing depth and concrete cover comply with SBC 303, Section 5.2 and Section 5.4.2.6, and update the design accordingly. - The soil report does not justify the use of soil parameters for calculating bearing capacity according to SBC 1101, Section 705, nor does it confirm that the contact design bearing capacity is equal to or less than the soil bearing capacity as per SBC 303, Section 8.9.3.1 and Section 4(B).  Review the soil report to ensure it justifies the use of soil parameters for calculating bearing capacity according to SBC 1101, Section 705. Additionally, confirm that the contact design bearing capacity is equal to or less than the soil bearing capacity as per SBC 303, Section 8.9.3.1 and Section 4(B). Update the report accordingly and resubmit for review. - The columns or walls are not located at the centroid of the footing area according to SBC 1101, Section 707 and Section 708.  Redesign the footings to ensure that the columns or walls are located at the centroid of the footing area according to SBC 1101, Section 707 and Section 708. - The mat foundations, combined footings, and strap footings are not designed and constructed in accordance with SBC 1101, Section 709, SBC 303, Sections 8.6.1 through 8.6.2, Section 8.6.4, and SBC 1101, Sections 707.2.5 and 707.2.  Review the design and construction of mat foundations, combined footings, and strap footings to ensure compliance with SBC 1101, Section 709, SBC 303, Sections 8.6.1 through 8.6.2, Section 8.6.4, and SBC 1101, Sections 707.2.5 and 707.2.6. - The foundation reinforcement ratio does not comply with SBC 1101, Sections 707.10.1.1, 707.10.1.2, 707.10.2, 709.1.7, and 707.10.  Review the foundation reinforcement ratio to ensure compliance with SBC 1101, Sections 707.10.1.1, 707.10.1.2, 707.10.2, 709.1.7, and 707.10, and adjust the design accordingly. - The settlement mentioned in the geotechnical report does not comply with SBC 1101, Section 706, and SBC 303, Section 8.5  Review the settlement mentioned in the geotechnical report to ensure compliance with SBC 1101, Section 706, and SBC 303, Section 8.5, and update the report accordingly. - The minimum mat thickness has not been calculated based on punching shear and diagonal-tension shear according to SBC 303, Section 8.9.3.2, including investigations for columns at the mat edge and perimeter load-bearing walls as specified in SBC 304, Chapter 15.  Calculate the minimum mat thickness based on punching shear and diagonal-tension shear according to SBC 303, Section 8.9.3.2, and conduct the necessary investigations for columns at the mat edge and perimeter load-bearing walls as specified in SBC 304, Chapter 15. - The concrete cover for the steel reinforcement has not been verified according to SBC 1101, Section 4A7.1.  Verify that the concrete cover for steel reinforcement complies with SBC 1101, Section 4A7.1 requirements, and adjust any non-compliant designs. - The longitudinal bars and ties for columns do not comply with SBC 1101  Review the design of longitudinal bars and ties for columns to ensure compliance with SBC 1101 - The column dimensions and design do not comply with SBC 1101, Sections 604.1.1, 604.1.2, 604, 606, 4B6, 403.6 to 403.7, 410, 410.4.3, Table 4.5, Figure 4.1, and Section 607.  Review the column dimensions and design to ensure compliance with SBC 1101, Sections 604.1.1, 604.1.2, 604, 606, 4B6, 403.6 to 403.7, 410, 410.4.3, Table 4.5, Figure 4.1, and Section 607, and make necessary adjustments. - The dimensions of hollow block slabs do not comply with SBC 1101, Sections 5A4.1.2, 5A4.1.3, 5A4.1.4, 5A4.1.5, and 5A4.1.6.  Review the dimensions of hollow block slabs to ensure compliance with SBC 1101, Sections 5A4.1.2, 5A4.1.3, 5A4.1.4, 5A4.1.5, and 5A4.1.6, and make necessary adjustments. - The additions to existing buildings do not comply with SBC 201 requirements for new construction, and the conditions for exemptions from Chapter 11 compliance as specified in Sections 1101.2, 1103.1, 1103.2, 1103.3, 1103.3.1, 1103.3.2, 1103.3.3, and 1103.3.4 have not been met.  Review the additions to existing buildings to ensure compliance with SBC 201 requirements for new construction, and verify that the conditions for exemptions from Chapter 11 compliance as specified in Sections 1101.2, 1103.1, 1103.2, 1103.3, 1103.3.1, 1103.3.2, 1103.3.3, and 1103.3.4 are met, and make necessary adjustments. - The structural model does not comply with the design requirements for bending moment, shear, immediate deflection, and long-term deflection as stated in SBC 1101, Sections 4B5, 4B11, 4C3.1 to 4C3.4.1.3, and Tables 4C-1 and 4C-2.  Review the structural model to ensure compliance with design requirements for bending moment, shear, immediate deflection, and long-term deflection as stated in SBC 1101, Sections 4B5, 4B11, 4C3.1 to 4C3.4.1.3, and Tables 4C-1 and 4C-2, and make necessary adjustments. - The foundation waterproofing is not in compliance with SBC 1101, Section 711, and does not ensure that the parts of the building below ground level are damp-proofed using approved waterproofing materials.  Apply waterproofing in accordance with SBC 1101, Section 711, ensuring all parts of the building below ground level are properly damp-proofed using approved waterproofing materials. - The damp-proofing and waterproofing are not compliant with SBC 303, Sections 13.1-13.5, SBC 1101, Sections 711.1 to 711.2.3, Figure 7.21, and SBC 303, Chapter 13, using approved materials and specifications.  Ensure that the damp-proofing and waterproofing comply with SBC 303, Sections 13.1-13.5, SBC 1101, Sections 711.1 to 711.2.3, Figure 7.21, and SBC 303, Chapter 13, by utilizing approved materials and specifications. - The waterproofing of the underground water-retention structures does not comply with SBC 303, Section 13.5.  Ensure that the waterproofing of the underground water-retention structures complies with SBC 303, Section 13.5, by using approved materials and conducting thorough inspections. - The structural model does not comply with the design requirements for general stability, loads, bending moment, and shear force as specified in SBC 306, Sections 2.2, 3.1, and Chapters 4, 5, 6, 7, and 8. Additionally, the minimum densities for design loads and the minimum design loads in the structural model do not meet the requirements of SBC 306, Section 2.2.  Review and revise the structural model to ensure compliance with the design requirements for general stability, loads, bending moment, and shear force as specified in SBC 306, Sections 2.2, 3.1, and Chapters 4, 5, 6, 7, and 8. Additionally, verify that the minimum densities for design loads and the minimum design loads meet the requirements of SBC 306, Section 2.2. - The design of the connections does not comply with the connection design requirements specified in SBC 306, Chapter 10.  Review and revise the connection design to ensure compliance with the requirements specified in SBC 306, Chapter 10, by conducting a detailed analysis and implementing necessary modifications. - Openings and embedded conduits and pipes in structural members are not done in accordance with SBC 1101, Section 7A8.  Review and modify the design of openings and embedded conduits and pipes in structural members to ensure compliance with SBC 1101, Section 7A8, and implement necessary changes. - The walls or partitions constructed from adobe units do not comply with the requirements of SBC 201, Section 2109.3.4.5.1.  Ensure that all walls and partitions constructed from adobe units are properly designed and built in compliance with SBC 201, Section 2109.3.4.5.1, and conduct regular inspections to verify adherence to these standards. - The minimum densities for design, design loads, and load combinations in the structural model do not comply with the requirements of SBC 301, Section 4.3, Section 4.4, Tables 3.1, 3.2, and 4.1, Chapter 11, SBC 303-2018, Chapter 2.6, SBC 301, Section 1.5, Section 2.3, and Section 2.4.  Revise the structural model to ensure compliance with the requirements of SBC 301, including the minimum design densities, loads, and load combinations as specified in Sections 4.3, 4.4, Tables 3.1, 3.2, 4.1, Chapter 11, SBC 303-2018, Chapter 2.6, and Sections 1.5, 2.3, and 2.4.  **Inspection (RD5):**  - The built-up roof covering does not comply with the material standards specified in SBC 1101, Section 905.9.2.  **Technical reservations:**  - Technical reservation: The ground slab is supported on a backfill of more than 30cm.  The contractor must execute the filling following a procedure approved by a geotechnical firm, which will oversee the monitoring too (for instance by making regular compaction tests). The TIS must be informed about the compaction procedure and check the process/results (The inspection team will check at the site). - Technical reservation: There is a water tank, septic tank close to the foundations.  A) It is preferable that the side walls be built in the form of insulated concrete walls. Please provide a warranty certificate for the internal and external insulation of (water tank, septic tank) after implementation. B) All foundations near water tank, septic tank should be attached with tie beams to prevent the differential settlement. C) It is preferable that the upper level of water tank, septic tanktank must be lower than the level of the foundations.  **Notes:**  - Structural analysis report should be provided. - In waterproofing roof system, there is no protection layer for waterproofing membrane .(Inspection team will check at site). - The warranty of facades insulation must be provided by the client before issuing (RD3). - Project located in a seismic zone (PGA is in-between 0.04-0.10g); A seismic calculation must be provided in these cases. - Type of concrete used for foundation has not been mentioned in the structure plans.  **Aggravating risks:**  - It was not specified how the connection between the masonry of the facade and the concrete structure is made. - No specification has been found regarding insulation and waterproofing of the joints between different types of facades. - The roof drainage slopes are not indicated in the plans. - Type of steel reinforcement used for foundation, Cast in situ columns, Cast in situ slabs, has not been mentioned in the structure plans. - Foundation section plans are not provided. - Parapet walls do not show how they will be fixed to the main structure; so, due to the high wind velocity it may detach from the structures. - There are no details about lintels (dimension and reinforcement). - The soil study doesn't present shear test parameters. - In waterproofing roof system, the heat insulation can not be executed directly after membrane layer. |

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| **TECHNICAL STANDARDS USED IN THE PROJECT:**   * 301 Structural – Loading and Forces. * 302 Structural – Testing and Inspection. * 303 Structural – Soil and Foundations. * 304 Structural – Concrete Structures. * 305 Structural – Masonry Structures. * 306 Structural – Steel Structures.   Are they relevant?  YES  NO  If NOT, please specify why: |

**TITLE V**

**CONCLUSIONS**

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| Additional reports needed to estimate the risks and issuing date:  RD1 Special Foundation Report – Expected date:  RD2 Innovative materials/procedures report – Expected date:  RD3 Waterproofing assessment report (Waterproofing Certificate Approval) – Expected date: 07-Jun-2023  RD5 Works interruption report – Expected date: It will be issued to highlight major deviation noted on site during inspection or failure to submit the required documents  RD6 Final risk assessment report (Certificate of Approval) – Expected date: 08-Jun-2022  **RISK TECHNICAL ASSESSMENT**  (Risk assessment based on the checked documents. Please specify topics requiring special focus).  Within the scope of its mission, the CPV, based on the technical documentation received from the project and after its general preliminary analysis and reflected in this report, it is considered that the TECHNICAL RISK IS AGGRAVATED However, If the questions raised in this report are clarified, some of the aggravating situations can be reduced to a normal risk situation.  A list of AGGRAVATING RISKS is included in title IV of this document.   |  | | --- | | TI302-105213 | | TI307-105213 |   technical reserves were opened: |
| Does the risk require the involvement of any TIS headquarter expert?  YES NO  If YES, specify the reason:  Minimum number of site visits: 5  Of which:  -Foundations visits: 01  -Structure visits: 02  -Waterproofing (if relevant): 01  -Final inspection: 01 |

Riyadh, 03-Oct-2024

THE TECHNICIAN/S IN CHARGE OF THE CONTROL



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Civil engineer

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Civil engineer

# ANNEX I. DRAWINGS.

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**LOCATION**