



DIOXIN REMEDIATION AT BIEN HOA  
AIRBASE AREA PROJECT – PHASE I (ODA FUNDED)

# CWI - LTSA FINAL COVER DESIGN REPORT

**MAY 2023**

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PREPARED BY  
TRIGON ASSOCIATES, LLC  
1515 POYDRAS ST. SUITE 930  
NEW ORLEANS, LA 70112  
USA

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UNITED STATES AGENCY FOR  
INTERNATIONAL DEVELOPMENT

MINISTRY OF NATIONAL DEFENSE  
AIR DEFENSE – AIR FORCE COMMAND

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PROJECT OWNER

A&E BIEN HOA CONTRACTOR  
TRIGON ASSOCIATES LLC.  
On Behalf of Souheil Mansour  
Interim Chief of Party

SUZAN SAMARA

MAY 2023

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### APPENDIX – STRUCTURAL CALCULATIONS

## LIST OF ACRONYMS AND ABBREVIATIONS

A&E Bien Hoa Contractor	Architect & Engineering Contractor for Dioxin Remediation at Bien Hoa Airbase Area – Trigon Associates, LLC.
ADAFC	Air Defense – Air Force Command
Contractor	Civil Works – Phase I Contractor
CWI	Civil Works – Phase I
D&H	Dig and Haul
DU	Decision Unit
EA	Environmental Assessment
EIA	Environmental Impact Assessment
EMMP	Environmental Mitigation and Monitoring Plan
ETL	Electrical Testing Laboratory
GVN	Government of Vietnam
HDPE	High-Density Polyethylene
HRT	Hydraulic Retention Time
ICEA	Insulating Cable Engineers Association
IMI	First Interim Measures
IM2	Second Interim Measures
IEEE	Institute of Electrical and Electronics Engineers
LED	Light Emitting Diode
LTSA	Long Term Storage Area
M	meter
m <sup>2</sup>	square meter
m <sup>3</sup>	cubic meter
MND	Ministry of National Defense
MW	Monitoring Well
NEC	National Electrical Code
NESC	National Electrical Safety Code
NETA	National Electrical Testing Association
PLC	Programming Logic Controller
Ppt	part per trillion
PTSA	Pre-treatment Storage Area
SWPPP	Stormwater Pollution Prevention Plan
TDH	Total Dynamic Head
TEQ	Total Equivalence
TMSA	Treated Material Storage Area
UCDDA	Uncontaminated Construction Debris Disposal Area
USAID	United States Agency for International Development

# **I OVERVIEW**

## **I.1 INTRODUCTION**

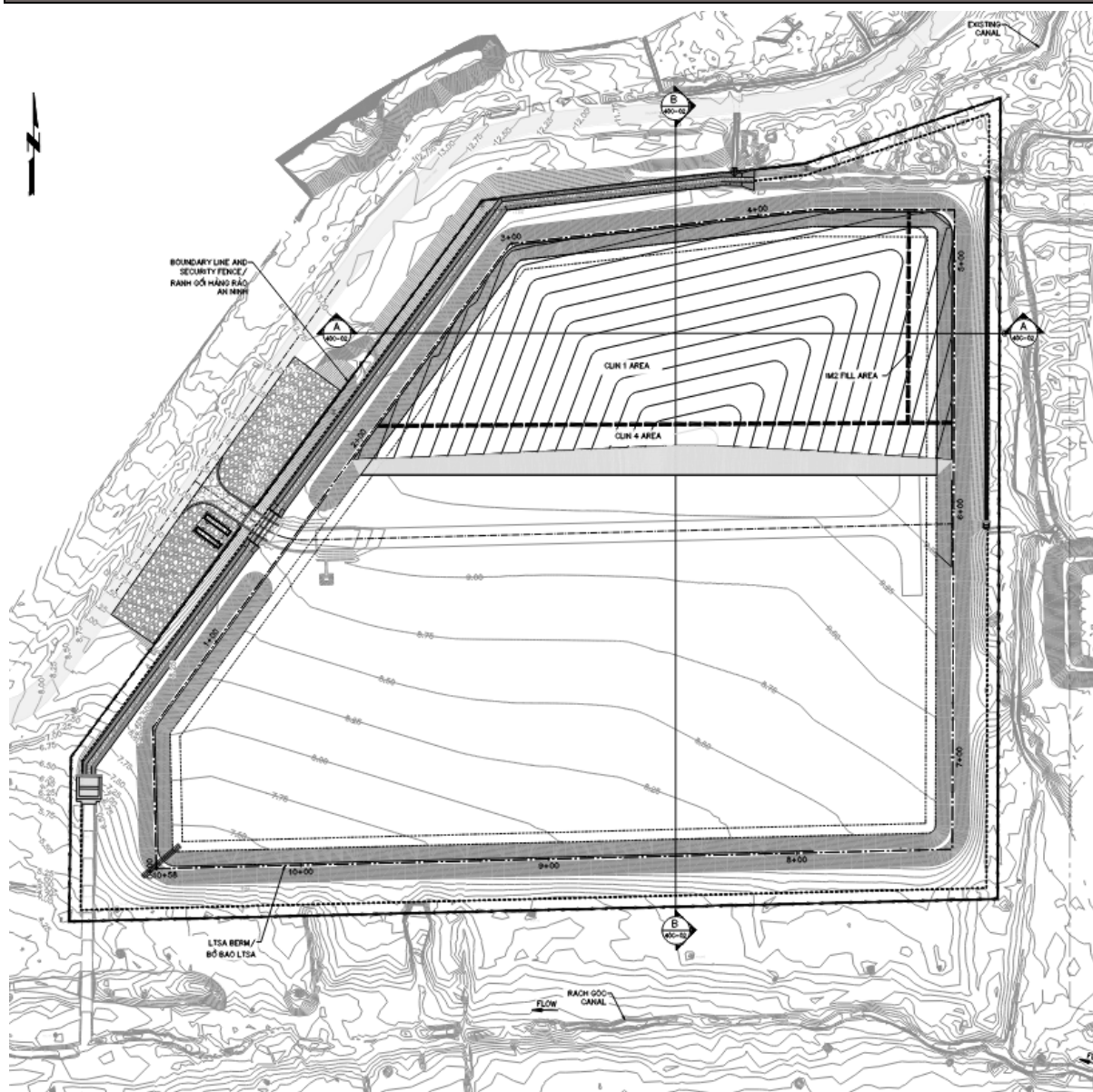
This report presents the design basis for the Long-Term Storage Area (LTSA) Irrigation System of Civil Works - Phase I Package. The Design consists of the following components:

- Groundwater wells with drilled well pump systems.
- Water storage tank
- Pump house with irrigation pumps, piping, and concrete yard
- Automatic watering nozzles and pipelines

The irrigation system will be used to wet the LTSA once it is filled with contaminated soil with low dioxin concentration transferred from the Low Concentration Storage Area (LCSA). Irrigation is required to help maintain plant cover and to promote an overall healthy environment for the fill material.

The irrigation system is a component of the LTSA final cover. The LTSA final cover area is north of the access road within the LTSA, top of fill area contours are shown in Figure I.

**FIGURE I-1 LTSA FINAL COVER AREA**



## I.2 PROJECT IMPLEMENTERS

- Governing Agency: Ministry of National Defense
- Project Owner: Air Defense - Air Force Command
- Financer and Facilitator: United States Agency for International Development (USAID).
- Design Contractor: Trigon Associates, LLC. (Constructional Operation License #80/2019/QĐ-HĐXD issued by MOC Constructional Management Department dated November 15, 2019).
- Subcontractor for Pump station and irrigation system Design and Geotechnical Survey: Asia Pacific Engineering Consultant Company (APECO) (Construction Operation capability Certificate # BXD-00001202 expiration date April 20, 2032).

## 2 LEGAL BASES

- Construction Law #50/2014/QH13 dated June 28, 2014 amending and supplementing some articles in Laws #03/2016/QH14, #35/2018/QH14, #40/2019/QH14 and #62/2020/QH14;

- Decree #15/2021/ND-CP dated March 3, 2021 of the Government detailing some contents on construction investment project management;
- Decree #06/2021/ND-CP dated January 26, 2021 of the Government detailing some contents on quality management, construction and maintenance of the Works;
- Decision #702/QD-BTNMT dated March 25, 2019 of the Ministry of Natural Resources and Environment approving the Environmental Impact Assessment Report of Dioxin Remediation at Bien Hoa Airbase Area Project; and
- Decision #3869/QD-BQP dated September 6, 2019 of the Ministry of National Defense approving the investment project and contractor acquisition plan for Dioxin Remediation at Bien Hoa Airbase Area Project – Phase I using ODA Limited Grant Scope Agreement from the United States.

### 3 APPLICABLE DESIGN SCOPE AND STANDARDS

#### 3.1 DESIGN SCOPE

The LTSA Irrigation System design addresses the following components within the LTSA Area:

- Groundwater Wells
  - Two 40 m deep groundwater wells
  - Two submersible groundwater well pumps
- Pump House
  - One underground reinforced concrete irrigation water storage tank
  - Pump house building made of enclosed brick with cement mortar with room for expansion to double pump count into Phase 2
  - Concrete paved yard for maintenance and operations tasks
- Irrigation System
  - Three irrigation supply pumps (design point  $Q = 18 \text{ m}^3$  at 48 m TDH)
  - System of stainless steel and HDPE pipes connected to a network of automatic irrigation heads

#### 3.2 APPLICABLE STANDARDS

STANDARD DESCRIPTION	CODE
<u>VIETNAMESE STANDARDS</u>	
Detailing the implementation of a number of articles of the Law on Technical Standards and Regulations.	Clause I Article 69 of the Law on Technical Standards and Regulations and Point a, Clause I Article 7 of the Government's Decree No.

STANDARD DESCRIPTION	CODE
	I27/2007/ND-CP dated August 1, 2007
Regulating experimental water pumping techniques in investigation and assessment of underground water resources	Circular No. 08/2015/TT-BTNMT dated February 26, 2015 of the Ministry of Natural Resources and Environment
Promulgating regulations national technical standards on environment	Circular No. 66/2015/TT-BTNMT dated December 21, 2015 of the Ministry of Natural Resources and Environment
Standards on water supply and drainage systems in houses and works	Construction Code of Vietnam - Volume II published in 1997
National technical regulation on the allowable limits of heavy metals in the soils	QCVN 03-MT:2015/BTNMT
National Technical Regulation on Ambient Air Quality	QCVN 05:2009/BTNMT
National Technical Regulation on Hazardous Substances in Ambient Air	QCVN 06:2009/BTNMT
National Technical Regulation on Hazardous Waste Thresholds	QCVN 07:2009/BTNMT
Technical infrastructure works - Drainage works	QCVN 07-2:2016/BXD
National Technical Regulation on technical infrastructure works - Solid waste management works and public toilets	QCVN 07-9:2016/BXD
National technical regulation on building code for urban underground structures	QCVN 08:2009/BXD
National technical regulation on underground water quality	QCVN 09-MT:2015/BTNMT
National technical regulation on domestic wastewater	QCVN 14: 2008
National technical regulation on water quality for irrigation	QCVN 39:2011/BTNMT
National Technical Regulation on Allowed Limits of Dioxin in Soils	QCVN 45:2012/BTNMT
Drainage. External networks and buildings - Design standards	TCVN 51 - 2006
Reinforced concrete	TCVN 1651-2008
Loads and Actions - Design standards - Seismic resistance	TCVN 2737-1995

<b>STANDARD DESCRIPTION</b>	<b>CODE</b>
Construction design documentation system – Water supply and drainage –External network – Construction drawings	TCVN 3989:2012
Highway – Specifications for Design	TCVN 4054-2005
Survey for construction - Fundamental principles	TCVN 4419:1987
Internal Drainage - Design Standard	TCVN 4474 - 87
Internal Water Supply - Design Standard	TCVN 4513 - 88
Concrete and reinforced concrete structures – Design standards	TCVN 5574-2018
Steel structures – Design standards	TCVN 5575-2012
Reinforced concrete tanks – Codes for construction, check and acceptance	TCVN 5641: 2012
Water quality - Sampling - Part 1: Guidelines for setting up sampling programs and sampling techniques	TCVN 6663-1:2011
External networks and structures - Design standards	TCVN 7957:2008
Irrigation works, pumping stations for irrigation water - design requirements	TCVN 8423:2020
Irrigation works - Water pumps - Technical requirements for installation and acceptance, converted from I4 BC 07: 2006: Irrigation works - Water pumps - Installation, acceptance	TCVN 8637: 2011
Technical Process of Settlement Monitoring of Civil and Industrial Building by Geometrical Levelling	TCVN 9360:2012
Foundation works – Construction and Acceptance	TCVN 9361:2012
Specifications for design of foundation for buildings and structures	TCVN 9362: 2012
Waterstops for joint in construction works - Specifications for use - Steel structure design	TCVN 9384: 2012
Design of structures for earthquake resistances. Design of reinforced concrete structures	TCVN 9386-2012
Mineral investigation, assessment and exploration - Resistive method	TCVN 9432:2012
Irrigation Works, Specifications for Design, Construction and Acceptance of Groundwater Lowering	TCVN 9903: 2014
Neoweb cellular confinement in infrastructure constructions- Requirement of design, construction and acceptance	TCVN 10544:2014

STANDARD DESCRIPTION	CODE
Temporary Works Design in Bridgeworks	TCVN 11815:2017
Water supply. Pipeline networks and structures - Design standards	TCXDVN 33-2006
Flexible pavement- Requirements and specification for Design	22TCN 211-2006
Regulations on water supply and drainage systems in houses and buildings	47-1999-QD-BXD
<u>ELECTRICAL</u>	
Electrical equipment regulations	No. 18, 19, 20, 21/BC-2006 11 BC - 19 - 2006.
National technical regulation on energy efficient construction works	QCVN 09/2013BXD
National technical regulation on electrical systems of houses and public works	QCVN 12:2014/BXD
Lighting for indoor working systems - Standards design standard	TCVN 7411: 2002
Low voltage electrical installation system	TCVN 7447: 2010
Placing equipment in houses and public works	TCVN 9206: 2012
Laying of electrical lines in houses and public works – Design standards	TCVN 9207: 2012
Lightning protection for construction - Guidelines for system design, testing and maintenance	TCVN 9385:2012
Artificial lighting outside public works and urban infrastructure engineering - Design standards	TCXDVN 333:2005
<u>Construction</u>	
Fire prevention and fighting for houses and works – Design requirements	TCVN 2622:1995
Heavy concrete mixes - Sampling, fabrication and curing of test specimens	TCVN 3105:1993
Concrete mixes - Slump test method	TCVN 3106:1993
Heavy concrete - Method of determining water resistance	TCVN 3116:1993
Construction mortar - Test methods	TCVN 3121:2003
Electric welding work – General safety requirements	TCVN 3146:1986
Toxic substances – Classification and general requirements	TCVN 3164:1979



STANDARD DESCRIPTION	CODE
Fire safety – General requirements	TCVN 3254:1989
Explosion safety – General requirements	TCVN 3255:1986
Housing and public houses - Geometric parameters	TCVN 3905:1984
Brick and stone structure - Construction and acceptance regulations	TCVN 4085:2011
Construction mortar - Technical requirements	TCVN 4314:2003
Houses and public buildings – Basic principles of design	TCVN 4319:2012
Earth work – Construction and Acceptance	TCVN 4447:2012
Housing - Basic principles for design	TCVN 4451:2012
All-block reinforced concrete and concrete structures-Construction and acceptance regulations	TCVN 4453:1995
Water for concrete and mortar - Technical specification	TCVN 4506:2012
Paving stone in construction - Technical requirements	TCVN 4732:2007
Technical regulations in construction safety	TCVN 5308:1991
Work zone air–Silicic dust–Maximum allowable concentration and dust pollution assessment	TCVN 5509:2009
Modular size regulation in construction – basic principles	TCVN 5568:2012
Civil works - Permissible geometrical errors	TCVN 5593:2012
Natural block stone for the production of paving stone	TCVN 5642:1992
Cement tiles for flooring	TCVN 6065:1995
Granite tiles	TCVN 6074:1995
Mixed Portland cement - Technical requirements	TCVN 6260:2009
Ceramic tiles – Definition, classification of technical characteristics	TCVN 7132:2002
Building glass - Technical requirements	TCVN 7455:2013
Aggregates for concrete and mortar - Technical requirements	TCVN 7570:2006
Ceramic tiles, paving and Granite bricks - Technical requirements	TCVN 7745:2007
Wooden flooring - Technical requirements	TCVN 7960:2008
Gypsum board - Technical requirements	TCVN 8256:2009

STANDARD DESCRIPTION	CODE
Concrete - Requirements for natural moisture curing	TCVN 8828:2011
Crushed sand for concrete and mortar	TCVN 9205:2012
Ready-mixed concrete mixes - Basic requirements for quality assessment and acceptance	TCVN 9340:2012
Wooden doors-Windows and doors-Technical requirements	TCVN 9366:2012 Part 1
Metal doors-Windows, doors-Technical requirements	TCVN 9366:2012 Part 2
Finishing work in construction - Construction and acceptance	TCVN 9377:2012
Classification of houses and civil works - General principles	TCXD 13:1991
Coconut leaf tiles	TCXD 85:1981
Fired clay tiles	TCXD 90:1982
Noise-proof design for housing	TCXD 150:1986
Steel structure - Processing, erection and acceptance	TCXDVN 170:2007
Allowable noise levels in public works – Design standards	TCXDVN 175:2005
Heavy concrete - Indications for strength assessment on building structures	TCXDVN 239:2006
Public works - Fundamental principles for design	TCXDVN 276:2003
Massive concrete - Construction code and acceptance	TCXDVN 305:2004
Tile adhesive mortar - technical requirements and test methods	TCXDVN 336:2005
Quality acceptance of construction works	TCXDVN 371:2006
Design and installation of electrical equipment in construction works - Electrical safety part	TCXDVN 394:2007
<u>AMERICAN STANDARDS</u>	
Standard specification for hard-pulled copper wire	ASTM B 1
Standard specification for medium-pulled copper wire.	ASTM B 2
Standard specification for soft or annealed copper wire.	ASTM B 3

STANDARD DESCRIPTION	CODE
Standard specification for concentric, hard, medium or soft concentric trapped copper conductors.	ASTM B 8
Specification for polychloroprene jackets for general purpose for wires and cables	ASTM D 753
Sheath for electrical equipment	NEMA 250

All electrical equipment must be listed and must be labeled by Underwriters Laboratories, Inc. (UL) or independent testing laboratories that are acceptable to local enforcement agencies.

The installation of electrical equipment and materials must comply with OSHA health and safety standards (29 CFR 1910 and 29 FR a926, if any), state building standards and current local rules and regulations.

In the event that the requirements of the specifications conflict with UL, NEMA, NFPA or other applicable standards, more stringent requirements must govern.

### 3.3 REFERENCED MATERIALS

Masterplan of Dioxin Remediation at Bien Hoa Airbase Area Project prepared by Trigon Associates, LLC. and approved by USAID in 2020.

Environmental Impact Assessment (EIA) Report for Dioxin Remediation at Bien Hoa Airbase Area Project made by New Technology Institute in 2019 and approved by Air Defense – Air Force Command (ADAF) - the Project Owner- and Ministry of Natural Resource and Environment (MONRE).

Environmental Assessment (EA) Report for Bien Hoa Airbase contamination environment made by CDM International, Inc. and Hatfield Consultant in 2016 and approved by USAID as the Employer.

Groundwater Monitoring System in Bien Hoa Airbase prepared by DEKONTA in 2014.

## 4 NATURAL FEATURES

### 4.1 GEOGRAPHICAL FEATURES

The Dong Nai Province, which the project area resides in, is adjacent to the Binh Thuan Province to the east, Lam Dong Province to the northeast, Binh Phuoc Province to the northwest, Ba Ria – Vung Tau Province to the south and Ho Chi Minh City to the west. The natural area is 5,905 km<sup>2</sup>. The population as of April 01, 2019 was 3,35 million people.

As the eastern gateway of Ho Chi Minh City, one of the biggest economic centers of Southern Vietnam, the location of Dong Nai is of considerable importance. It connects the Southern Central and Southern Highlands with the whole southeast region. The Dong Nai Province is considered as the gateway province to enter to the southeast economic zone – the most dynamic and developed economic zone of the nation. Accordingly, Dong Nai is one of the three angles of the development triangle, consisting of Ho Chi Minh City – Binh Duong – Dong Nai. The residents mostly concentrate in Bien Hoa City with a population of more than 1 million people, in two Districts, Trang Bom and Long Thanh.

The current administrative center of Dong Nai is Bien Hoa city, 30 km from Ho Chi Minh City in the north. It is directly under the province and is the most densely populated city in the nation.

Bien Hoa Airbase is a Vietnam People's Air Force military airfield, with a total approximate area of 1,000 ha. The airbase is located in Bien Hoa City, Dong Nai Province, with coordinates 105°58'30" northern latitude and 106°49'10" east longitude. The western side is approximately 700 m from Dong Nai River.

The Bien Hoa Airbase in Tan Phong Ward has common boundaries with the Trung Dung, Quang Vinh, and Buu Long Wards. The surrounding region of the airbase is densely populated, with the majority of the area being used for residential houses, industrial production, businesses, and infrastructural works.

## **4.2 GENERAL NATURAL FEATURES**

### **4.2.1 TOPOGRAPHY**

Dong Nai Province includes plain terrain and midland country with scattered mountains, a gradually low trend in the south-north direction, and a relative plain terrain. The terrain can be described by the following categories and characteristics: plain terrain, low terrain with marsh sediment from the sea, wavy hill terrain, low mountain, alluvial soil, clay and sandy soil of the plain terrain, and many low areas are flooded throughout the year.

### **4.2.2 CLIMATE AND METEOROLOGY**

#### **4.2.2.1 CLIMATE**

Bien Hoa area is in the hot and humid tropical monsoon climate area, with the typical characteristics of the Southeast climate region. The general climate is rainy, with seasonal rain concentration. There are two distinct seasons in the year: rainy season from May to October and dry season starting from November and lasting to end of April of the following year.

#### **4.2.2.2 TEMPERATURE**

The project area is in the low latitude, receiving plentiful radiant heat, which results in high-temperatures year-round. The yearly average temperature in the region is from 25.4 - 26.7°C.

The average temperature in the dry season is variable from 25.4 - 26.7°C. The temperature difference between the highest and lowest temperature month is 4.8°C.

The temperature in this area is frequently controlled by the circulation regime of monsoons which changes yearly. Therefore, the average temperature of the hottest and coldest months fluctuate considerably.

#### **4.2.2.3 HUMIDITY**

The annual relative humidity in the air is 80 - 82%. The humidity varies according to season. The average humidity in the dry season is lower than the rainy season by 10 - 12%.

In this climate region, humidity and temperature have an inverse relationship. Daily, when the temperature is low, the humidity is high and vice versa. The highest daily humidity is typically from midnight to early morning. In the rainy season humidity is approximately 95 - 98%, sometimes reaching up to 100%. In the dry season, humidity typically varies from 80 - 85% during the middle of season.

The lowest daily humidity usually occurs between 12:00 and 14:00 each day.

#### **4.2.2.4 RAINFALL**

Rain is a strongly divergent and variable climate factor in the project area. This variation is mainly due to topography and the circulation of monsoons. The yearly average rainfall is between 1600 – 2700 mm.

Due to the yearly variation in circulation regime, the recorded rainfall is not stable from year to year.

The rainfall in the dry season is low, 210 – 370 mm, making up 12 - 14% total yearly rainfall. The two transition months (November and April) make up 60 - 70% of the dry season rainfall. The remaining four months from December to March of the following year, only account for 30% to 40% of rainfall within the dry season. January and February are the two months with the least rainfall, there is no rain during this stage between 85 and 90% of years.

In the rainy season, total rainfall is 1500 – 2400 mm. This accounts for 86 - 88% yearly rainfall. Typically, heavy rainfall occurs in each of the rainy season months.

#### **4.2.2.5 SURFACE WATER EVAPORATION**

Yearly, the area receives considerable water inflow. However, a substantial amount of this water returns into the atmosphere by way of evaporation. The total annual evaporated water content is between 1,140 and 1,450 mm, making up 60 - 70% of yearly rainfall.

In the dry season, the monthly average evaporation is 120 – 160 mm. During the two beginning months of the season, it is approximately 70 – 110 mm. From January to April, the evaporation is above 120 mm. The highest evaporation is in March at a rate of 170 – 220 mm for the month.

#### **4.2.2.6 SUNSHINE**

- The average duration of sunshine is: 5 h/day.
- The maximum duration of sunshine: from 10-13 h daily.
- The minimum duration of sunshine: 0.5 h/day.
- The highest lighting strength is 100,000 lux.
- The direct radiation strength is 0.42 - 1.79 cal/cm<sup>2</sup>/minutes.
- The diffusion strength is 0.29 - 0.50 cal/cm<sup>2</sup>/minutes.

#### **4.2.2.7 WIND**

At the project area, the wind direction and speed are not consistent because of topography, the main wind direction is the South-Southwest. No wind is recorded 25 - 40% of the time during annual monitoring.

The daily normal average wind speed is 1.5 - 3.0 m/s (equivalent to 5 – 10 km/hr). Daily, the indication of land wind and onshore wind is clear. Wind speed is strongest from 10:00 – 19:00. Periods of no wind typically occur at night.

#### **4.2.2.8 ABNORMAL WEATHER**

In Dong Nai, there are average 80 - 140 days of rainstorms annually. High land areas have 100 -140 days with rainstorms and low land areas have 80 - 120 days.

During the year, rainstorms may occur from April to November. In the early months of the rainy season, rainstorms rarely occur but are usually strong. Thunderstorms frequently appear in May, June. At the end of the rainy season the number of days with rainstorms reduces. During the day, rainstorms usually appear from 12:00 - 21:00. Some weather systems have significant turbulence with rainstorms occurring at any time in the day. Rainstorms accompanied by squalls normally range from grade 6 to grade 7 on the Beaufort Wind Scale. Some events in Dong Nai have strong gusts up to 30 m/s, equal to grade 11, but the affected zone is narrower than the storm.

#### **4.2.2.9 HYDROLOGY**

The Dong Nai River starts from the mountainous region of Lam Dong Province and flows through Dong Nai Province from Tan Phu to Nhon Trach, with a total length of approximately 290 km. The section of

Dong Nai River running through Bien Hoa City is 10 km long and divides into the sub-branch of the Cai River creating Hiep Hoa Island. The hydrologic regime of the Dong Nai River depends on the irregular semi-tide regime of the East Sea. Before the Tri An hydro-power station was built, in the dry season, the flow of the river water was reduced to 50 m<sup>3</sup>/s. At that time, the salty water penetrated deeply all the way up to Hoa An pump station (concentration of NaCl = 397 mg/l). Since the Tri An hydro-power station has been in operation, the salt penetration has been pushed back to the downstream side of Bien Hoa City.

Dong Nai River is the sole surface water source for Ho Chi Minh City, Dong Nai Province and a partial source for the Binh Duong Province and the Ba Ria – Vung Tau Province. In addition to the Dong Nai River within Bien Hoa City region, there are also canals, streams, rivers, and ponds, such as San Mau, Linh Stream, Chua Stream, Lung Canal, Chay Canal, Cau Canal, etc. This system predominantly provides drainage for Bien Hoa City in the rainy season.

### 4.3 NATURAL FEATURES AT THE PROJECT SITE

#### 4.3.1 TOPOGRAPHY

The Bien Hoa Airbase has a minor level difference in terrain in relation to all of the wards of Bien Hoa City adjacent to the airbase. The northern portion of the airbase is slightly higher (from the north to the south) than the southern side. The surrounding areas, such as the Buu Long Tourist Area, have higher elevations than the airbase.

By the time the irrigation system is installed the site will have already been excavated, graded, filled, and covered with topsoil and native grass. The LTSA has an existing asphalt road indicating its northern and western boundaries and has a pond on its northwest corner. The southern boundary is a tree line which also separates the area from the paved runway. On the east side of the LTSA, there is another tree line separating the area from the NW-03 DU.

#### 4.3.2 GEOLOGY

During the design phase, geological survey drilling of 8 bore holes was performed. The coordinates and locations of the boreholes are shown in below:

**TABLE 4-1 BOREHOLE COORDINATES**

No.	Name of borehole	Coordinates		Depth (m)
		X (m)	Y (m)	
1	BH1	1,214,562.459	397,031.852	10
2	BH2	1,214,590.544	397,195.083	10
3	BH3	1,214,464.040	397,194.627	10
4	BH4	1,214,337.535	397,194.172	10
5	BH5	1,214,333.565	397,044.880	10
6	BH6	1,214,330.347	396,899.962	10
7	BH7	1,214,459.245	396,955.592	10
8	BH8	1,214,462.225	397,104.187	10

Analysis of the bore hole data indicated that the LTSA stratum includes the following layers:

- Layer 1A: Coarse and dusty sand, whitish gray, medium dense. The thickness of this layer varies from 4.5 - 5.0 m. The average particle composition is as follows: 10.32% gravel, 79.44% sand grains, 7.68% dust particles, and 2.55% clay particles. Compression ratio (a<sub>1-2</sub>) = 0.023 cm<sup>2</sup>/kg with Standard Penetration Test (SPT) index variable from 10 - 13. Exists in bore holes BH7 and BH8.
- Layer 1B: Sandy clay, yellowish-gray and whitish gray, hard to semi-hard state. This layer thickness varies from 3.0 - 5.7 m. The average particle composition is as follows: 3.04% gravel, 51.58% sand grains, 21.04% dust particles, and 24.35% clay particles. Compression ratio (a<sub>1-2</sub>) = 0.028 cm<sup>2</sup>/kg with SPT index variable from 9-17. Exists in six boreholes from BH1 to BH6.
- Layer 2: Clay with gravel, yellowish brown, reddish brown and whiteish gray, hard-semi-hard to stiff state. Layer thickness varies from 4.5 - 7.0 m. The average particle composition is as follows: 12.83% gravel, 27.14% sand grains, 21.76% dust particles, and 38.28% clay particles. Compression ratio (a<sub>1-2</sub>) = 0.016 cm<sup>2</sup>/kg with SPT index varies from 14-30. Appears in all eight boreholes from BH1 to BH8.

The geological condition ensures the requirements for construction and operation of the Project. Soil properties are summarized in below.

**TABLE 4-2 PARTICLE SIZE, HUMIDITY, TOTAL ORGANIC CARBON IN SOIL SAMPLES**

AREA	MATERIAL	PARTICLE SIZE						
		Sand (%)	Mud (%)	Clay (%)	Gravel (%)	Humidity (%)	pH	Organic Carbon (mg/kg)
Southwest	Soil	67.3	18.3	11.7	2.7	21.0	6.95	8,800

(Source: USAID Environmental Assessment Report for Bien Hoa Airbase)

### 4.3.3 HYDROLOGY

The Bien Hoa Airbase area is approximately 700 m from Dong Nai River in the west. Therefore, the project area is directly influenced by the hydrologic condition of Dong Nai River. The airbase area includes 32 ponds and lakes with variable surface elevations and sizes between the dry and rainy seasons. The flow of stream/surface water from the airbase to the west, south and southeast discharges to Dong Nai River. Flow model surface water and the groundwater at the Bien Hoa Airbase are described in .

The north side of the airbase is at a higher elevation than the rest of the site, so water overflows to the southeast. Water from the west and northeast runs to the airbase drainage system, then discharges to the drainage culvert of Buu Long Ward, southwest of airbase. From that culvert, the drainage discharges to Dong Nai River. The east side of the site runs to the airbase drainage system, discharges to the culvert system of Tan Phong and Thong Nhat Wards in the southeast of airbase, and then discharges to Dong Nai River. Water from the south side frequently runs to the Gate 2 Lake, flows through the drainage culvert system of Bien Hoa City at Quang Vinh and Trung Dung Wards, and finally discharge to the Dong Nai River.



**FIGURE 4-1 SURFACE WATER AND GROUNDWATER FLOWS IN BIEN HOA AIRBASE**



(Source: USAID Environmental Assessment Report for Bien Hoa Airbase)

## 5 DESIGN CONTENT

The LTSA irrigation system consists of water supply, storage, and pumping/distribution. Individual submersible pumps in two bore hole wells feed water into a storage tank located adjacent to an irrigation pump house. The storage tank feeds the irrigation pumps in the pump house which are used to send water to the irrigation system.

The irrigation sprinkler system is divided into four zones, which are watered one at a time, twice per day. The irrigation system will be installed in two phases, Phase 1 and Phase 2. Phase 1 includes the initial construction and installation of the preliminary irrigation system and will irrigate an area of 2 ha. Phase 2 will expand the water storage capacity through the installation of an additional tank and the expansion of the irrigation field as additional material is stored in the LTSA. Phase 2 has an area of 3 ha.

## 5.1 IRRIGATION WATER SUPPLY

The water for LTSA irrigation is supplied by groundwater. The groundwater is extracted by two drilled wells each with an estimated depth of 40 m for Phase I. The exact depth of the well depends on the groundwater flow encountered when the wells are drilled. The depth may be modified during construction depending on the actual groundwater depth. Each well is supplied with a submersible well pump with capacity 8 – 12 m<sup>3</sup>/h and TDH 35 – 40 m. The well pump control panels are located inside of the pump house. The diameter of the drill hole for each well is 300 mm. The well casings are made of DN 32 galvanized pipe. A protective outer casing around the wells is also galvanized pipe, size DN 80. Around each of the wells is a well pit with outside dimensions 1840 mm long by 1240 mm wide. The concrete walls of the pit are each 220 mm thick and 900 mm tall. The 8.5 MPa concrete bottom slab of the pit is 150 mm thick. Each pit is also covered with a 2 mm thick corrugated iron lid with a hinge and lock. The pit also has a steel shield around the horizontal pipe entrance. The top of the pit sits 100 mm above grade the elevation of 0.10 m, and the top of the bottom slab rests at an elevation of –0.80 m. Groundwater from the two



wells must meet quality standard 39:2011/BTNMT. If the well water does not meet the quality standard, the construction contractor must propose a water treatment plan to ensure it complies with the quality standard.

#### **5.1.1 IRRIGATION WATER STORAGE**

The irrigation water is stored in buried tanks that are rectangular and made from reinforced concrete. The top of the tank is at an elevation of -0.300 m. A 6 x 6 mm manhole (tank cap) located on the top of the tank sits at an elevation of -0.100 m. The Phase 1 tank has a capacity of 180 m<sup>3</sup> with outside dimensions 8 m x 10 m x 3.5 m. The exterior walls are 300 mm thick, while the interior walls have a thickness of 200 mm. The Phase 2 storage tank will have the same storage volume and will double the storage capacity. The tanks will be connected by two 304 stainless steel, DN125 pipelines. The soil layer underneath the tank structure will be compacted with  $K \geq 90$  original soil layer clay and semi-solid phase clay. The two stainless steel pipes connecting the Phase 1 and Phase 2 tanks will be installed during the Phase 1 tank construction and utilize end caps so they can connect to the Phase 2 tank when it is installed in the future. The second underground water tank will also be made of reinforced concrete and have a cap that is 200 mm above natural ground.

#### **5.1.2 STRUCTURAL CALCULATIONS**

Please see Appendix I for the irrigation water storage tank structural calculations.

#### **5.1.3 INSTRUMENTATION AND CONTROLS**

The water in the storage tank is supplied from the two groundwater wells. The well pumps are activated based on the water level in the tank and in the bore well. The water level in the tank is controlled by dipstick level sensors indicating the water level. The tank level sensors send a signal to the well pump control cabinet to turn on one of the well pumps. When the water level in the tank drops below the 50% full set point (90 m<sup>3</sup> or 1300 mm higher than the bottom of the tank), the bore well pumps are signaled to turn on, and when the tank reaches the 100% capacity set point (180 m<sup>3</sup> or 2700mm higher than the bottom of the tank) the pump turns off. The bore well pumps will not run if the water elevation in the well is too low (under EL -7.20 m) or the water level in the tank is above the 100% capacity set point. When the water level in the well is not enough for the bore well pump to operate, the signal light on the pump control cabinet turns on a red warning light and the warning bell sounds so that the operator can grasp it. When the water level in the storage tank is at the shallow level set point (20 m<sup>3</sup> or 300 mm higher than the bottom of the tank), the signal alerts the electrical cabinet to control the irrigation pump to stop the pump from working or stop the pump from freezing when it's time to irrigate. When this occurs, the indicator light turns red and the alarm bell in the electrical cabinet will sound so that the operator can grasp it. When the conditions for the water level in the tank are above the shallow water level set point, the irrigation pumps work normally when it is time to water.

### **5.2 IRRIGATION PUMP HOUSE**

The pump house is an enclosed brick with cement mortar building that is 8 m x 3.5 m and includes room for expansion to double the pump count for Phase 2 operations. The building has a reinforced concrete foundation and roof with a heat-resistant corrugated iron roof on top of a steel truss system. Additionally, the house has four concrete shutters to ensure ventilation and heat release when the pumps are operating. The pump house is designed in accordance with irrigation pump house standard TCVN 8423:2020. Outside of the pump house there is a 8.8 m x 6 m concrete yard made of reinforced concrete that is 0.2 m thick, which is used as an area to gather and store equipment. Inside of the pump house the following equipment is installed:

- Three Phase I water pumps each connected to a gate valve, DN 100 automatic valve, DN 100 spring check valve, DN 100 flexible joint, DN 100 x 80 reducer, DN 125 x 100 eccentric reducer, DN 125 flexible joint, DN 125 strainer, and DN 15 pressure gauge
- Two automatic DN 100 valves
- Bore well pump cabinet
- Irrigation pump cabinet
- Light switch
- Three electrical outlets
- Three concrete pump pedestals 300 mm tall
- Four single tube lights

### 5.2.1 PUMP BUILDING STRUCTURAL CALCULATIONS

Please see Appendix I for the pump building structural calculations.

## 5.3 IRRIGATION WATER PUMPS

Three irrigation water supply pumps located in the pump house will send water from the storage tanks to the LTSA cover vegetation system daily. The pumps have a duty point of 18 m<sup>3</sup>/h and TDH 48 m. The pumps will alternate operations to supply water for the four zones of the LTSA cover. Each of the four areas is irrigated 2 times per day. Zones 1 and 3 are irrigated from 5:00 am to 5:20 am and then 5:30 pm to 5:50 pm. Zones 2 and 4 are irrigated from 5:30 am to 5:50 am and then 6:00 pm to 6:20 pm.

### 5.3.1 PUMP SIZING CALCULATIONS

<b>TABLE 5-1 PUMP SIZING CALCULATIONS</b>
---

	Calculation of irrigation pump						
1	Pump flow						
2	Q <sub>bomb</sub> =				17.59 m3/h		
3	DN100 (steel)	Suction tube	V (m/s)=	0.83	Suction tube length	20	m
			1000i=	9.5			
4	DN80 (steel)	Push tube	V (m/s)=	1.25	Push tube length	15	m
			1000i=	25.6			
			q (l/s)=	4.89			
5	D90-HDPE (DN80)	Push tube	V (m/s)=	1.25	Push tube length	340	m
			1000i=	25.6			
			q (l/s)=	4.89			
6	D75-HDPE (DN65)	Push tube	V (m/s)=	1.19	Push tube length	10	m
			1000i=	18			
			q (l/s)=	4.2			
7	D75-HDPE (DN65)	Push tube	V (m/s)=	1.19	Push tube length	47	m
			1000i=	18			
			q (l/s)=	2.8			
8	D50-HDPE (DN40)	Push tube	V (m/s)=	2.04	Push tube length	33	m
			1000i=	161			
			q (l/s)=	1.4			
9	D32-HDPE (DN25)	Push tube	V (m/s)=	1.68	Push tube length	21	m
			1000i=	204			
			q (l/s)=	0.56			
10	D25-HDPE (DN20)	Push tube	V (m/s)=	1.49	Push tube length	10	m
			1000i=	222			
			q (l/s)=	0.28			
Head H <sub>Pump</sub> = (Z <sub>tank</sub> – Z <sub>pump</sub> ) + h <sub>dd</sub> + h <sub>h</sub> + h <sub>dp</sub> + h <sub>td</sub> =						46.69	m
(Z <sub> tank</sub> – Z <sub> pump</sub> ): The difference between the pump shaft and the highest point						6	m
Total pressure loss on suction pipe: hd = h1 + h2						28.50	m
Losses along the way on the push pipe						21.92	m
Road loss on push pipe 30%h1						6.58	m
Road loss on suction pipe						0.19	m

Pressure loss of station itself and backup		2	m
free pressure at pipe end		10	m
<b>Pump selection: 03 pumps, working alternately (02 activated pumps for 04 zones, 01 backup pump)</b>			
<b>Flow Q</b>	<b>4.89</b>	l/s	<b>17.59</b> m <sup>3</sup> /h
<b>Pressure head H</b>	<b>46.69</b>	m	<b>47</b> m

### 5.3.2 INSTRUMENTATION AND CONTROLS

The irrigation pumps operate based on a timer. Each zone is watered for twenty minutes, twice per day, in the early morning and then late in the afternoon. The pumps will alternate operations so that all pumps have equal operating time. Two zones will be irrigated in parallel. Each of the four irrigation zones are controlled by a separate solenoid valve which will open based on the scheduled irrigation times. One pressure regulating valves, an air release valve (ARV), and a DN80 filter is installed before the solenoid valve for each irrigation zone. Water for irrigation ensures quality according to standard 39:2011/BTNMT.

## 5.4 IRRIGATION DISTRIBUTION SYSTEM

The irrigation system uses a network of HDPE pipes to send water to the automatic irrigation heads. The flow rate is 0.35 m<sup>3</sup>/h with a pressure of 10 m, giving each sprinkler head an irrigation range of 10 m. The LTSA surface is divided into four irrigation zones, which are irrigated in parallel for 20 minutes per watering. Zones 1 and 2 each have 50 irrigation heads. Zone 3 has 47 and Zone 4 has 54 irrigation heads. The distance between the sprinklers is 10 m.

### 5.4.1 WATER DEMAND CALCULATIONS

**TABLE 5-2 WATER DEMAND CALCULATIONS**

	Content	Calculation data		
		Phase 1	Phase 2	Unit
1	Number of automatic watering heads	201	221	
2	Flow of sprinklers	0.35	0.35	m <sup>3</sup> /h
3	Total irrigation flow	70.35	77.35	m <sup>3</sup> /h
4	Irrigation zones	4	4	
5	Irrigation pump flow for 1 zone	17.59	19.34	m <sup>3</sup> /h
6	Watering volume in 1 watering (4 zones)	93.8	103.1	m <sup>3</sup>
7	Watering volume in 1 day (watering twice a day)	187.6	206.3	m <sup>3</sup>
8	The capacity of the water tank contains the volume for 1 watering and a reserve of 50% for the 2nd watering	140.7	154.7	m <sup>3</sup>
9	Choose water tank capacity	180.0	309.4	m <sup>3</sup>
10	Number of wells drilled	2.0	2.0	
11	Drilling well capacity (operating 10 hours/day)	9.4	10.3	m <sup>3</sup> /h
12	Drilling well submersible pump capacity	8-12	8-12	m <sup>3</sup> /h

## 5.5 POWER SUPPLY AND CONTROL

### 5.5.1 IRRIGATION SYSTEM ELECTRICAL REQUIREMENTS

The power for the irrigation system is supplied from an external source to the electrical cabinet by a Cu/XLPE/PVC cable (4x35) going into an HDPE 85/65 conduit. The calculated power is adequate for Phase 1 and Phase 2 works.

The power supply switchboard runs to the well pump cabinet to supply the pump load, lighting for the pump house, and outlets for the pump house and irrigation pumps. Cu/XLPE/PVC wire (3x6) mm<sup>2</sup> from the power supply runs to the irrigation pump through a HDPE 40/30 conduit. A Cu/XLPE/PVC (4x2.5) mm<sup>2</sup> cable is used to connect the well supply pumps to the bore well pump electrical cabinet. Signal wires are run using Cu/PVC/PCV (2x1.5) mm<sup>2</sup> wire in HDPE D40/30 conduit.

### 5.5.2 ELECTRICAL CONSUMPTION

**TABLE 5-3 ELECTRICITY CONSUMPTION SUMMARY**

No.	Description	Wattage (kW)	Notes
1	Extraction Well No.1	3	
2	Extraction Well No.2	3	
3	Irrigation Pump No.1	7,5	01 Stand-By 02 Active
4	Irrigation Pump No.2	7,5	
5	Irrigation Pump No.3	7,5	
6	Lighting for Pump Station	1	

### 5.5.3 ELECTRICAL EQUIPMENT

Electrical equipment must be selected to ensure technical and aesthetic requirements that are suitable for installation in the environment. Electrical equipment must be certified according to regulations.

When choosing electrical equipment, it must satisfy the luminous power density, lighting efficiency (for lighting equipment), equipment performance (of water heater), energy efficiency index (for water heating and air conditioning equipment) according to QCVN 09-2013/BXD. The selected electrical equipment must be tropicalized and work well with the environmental conditions in Vietnam. All equipment with metal housings (electrical cabinets, electrical outlets) must be safely grounded.

## 5.6 SITE RESTORATION

The site will be restored to existing or better conditions following Phase 2 of the Project.

## 6 MAJOR CONSTRUCTION METHOD

### 6.1 PREPARATION

Clearing the site. Remove plants and organic layer to organic storage area. Debris above ground will be hauled to UCDDA if Dioxin contamination less than 40ppt TEQ, otherwise, hauled to LTSA.

### 6.2 CONSTRUCTION SEQUENCE

The required construction sequence for the project is as follows:

- Install groundwater well
- Build well slab and pump house
- Install water storage tanks

- Install irrigation pipe network and automatic watering nozzles

## **7 CONCLUSION**

This LTSA Irrigation System Design Basis Report has been prepared by the A&E Bien Hoa Contractor in accordance with the approved Project, analytical and survey results, and applicable standards and statutory regulations.

The relevant authorities are kindly requested to review, appraise, and approve the LTSA Irrigation System Design Basis Report to form the basis for the follow-up works.

## **APPENDIX I- STRUCTURE CALCULATION**



## 1. Internal forces in the cross-section of the structure due to external loads and impacts

$M$	Bending moment (Nm);
$M_p$	Mô men uốn có kể đến mô men của lực nén trước đối với trọng tâm tiết diện quy đổi Bending moment including the moment of the compressive force acting on the centroid of the converted cross-section (Nm);
$N$	Axial force (N);
$Q$	Shear force (N);
$T$	Torque (Nm).

## 2. Material Characteristics

$E_b$	Initial elastic modulus of concrete under compression and tension (MPa);
$E_{b,red}$	Equivalent strain modulus of concrete under compression (MPa);
$E_{bt,red}$	Equivalent strain modulus of concrete under tension (MPa);
$E_s$	Elastic modulus of rebars rebars (MPa);
$E_{s,red}$	Equivalent strain modulus of rebars rebars in the cracked section of the structure under tension (MPa);
$R_b$	Calculated axial compressive strength of concrete for first limit state (MPa);
$R_{bond}$	Calculated bond strength of rebars with concrete (MPa); Standard
$R_{b,n}$	axial compressive strength of concrete (MPa);
$R_{b,ser}$	Calculated bond strength of rebars with concrete (MPa); Compressive
$R_{bp}$	strength of concrete under stress transmission (MPa);
$R_{bt}$	Calculated axial tensile strength of concrete for first limit state (MPa);
$R_{bt,n}$	Standard axial tensile strength of concrete (MPa);

$R_{bt,ser}$	Calculated tensile strength of concrete for the second limit state (MPa);
$R_s$	Calculated tensile strength of rebars for the first limit states (MPa);
$R_{sc}$	Calculated compressive strength of rebars calculated for the first limit state (MPa);
$R_{s,n}$	Standard tensile strength of rebars (MPa);
$R_{sw}$	Tensile strength of transverse rebars (MPa);
$R_{s,ser}$	Calculated tensile strength of rebars for second limit state (MPa);
$\alpha$	Ratio of elastic modulus of rebars $E_s$ to the that of concrete $E_b$ , $\alpha = E_s/E_b$
$\varepsilon_{b0}$	Limit relative deformation of concrete under uniaxial compression;
$\varepsilon_{bt0}$	Limit relative deformation of concrete under uniaxial tension;
$\varepsilon_{b,sh}$	Relative shrinkage deformation of concrete;
$\varphi_{b,cr}$	Creep coefficient of concrete.

### 3. Characteristics of the longitudinal rebars in the cross-section of the structure

S	Longitudinal rebars symbol:
	<ul style="list-style-type: none"> <li>– Located in the tension zone when there is both compression and tension zones in the cross-section due to external loads;</li> <li>– Located on the smaller compression edge of the cross-section when the entire cross-section is under compression due to external loads;</li> <li>– Located on the tension side closer to the edge of the cross-section when the entire cross-section is under eccentric tension;</li> <li>– Located within the cross-sectional area of the member when the entire cross for members subject to concentric tension.</li> </ul>
S'	Longitudinal rebars symbol:
	<ul style="list-style-type: none"> <li>– Located in the compression zone when the cross-section has both compression and tension zones due to external forces;</li> <li>– Located at the larger compression edge of the cross-section when the entire cross-section is subjected to compression due to external forces;</li> <li>– Located at the smaller tension edge of the cross-section when the entire cross-section is under eccentric tension due to external loads.</li> </ul>

### 4. Geometrical Characteristics

A	Total cross-sectional area of concrete (mm <sup>2</sup> );
a	Distance from the sum of forces of rebars S to the nearest edge of the cross section (mm);
a'	Distance from the sum of forces of rebars S to the nearest edge of the cross section (mm);

$A_b$	Cross-sectional area of concrete in compression zone (mm <sup>2</sup> );
$A_{bt}$	Cross-sectional area of concrete in tension zone (mm <sup>2</sup> );
$A_{loc}$	Local concrete area of compression (mm <sup>2</sup> );

$A_{red}$	Equivalent section area of the member ( $\text{mm}^2$ );
$A_s$	Sectional area of rebars S ( $\text{mm}^2$ );
$A'_s$	Sectional area of rebars S' ( $\text{mm}^2$ );
$A_{sw}$	Sectional area of stirrups lying in a plane perpendicular to the longitudinal axis of the member, passing through the inclined section ( $\text{mm}^2$ );
$b$	Width of rectangular section; width of flange of T and I section (mm);
$b_f$	Width of flange of T and I section in the tension zone (mm);
$b'_f$	Width of flange of T and I section in the tension zone (mm);
$d_s$	Nominal diameter of longitudinal rebars (mm);
$d_{sw}$	Nominal diameter of transverse rebars (mm);
$e$	Distance from the applied axial force point N to the sum of forces of rebars S (mm);
$e'$	Distance from the applied axial force point N to the sum of forces of rebars S' (mm);
$e_p$	Distance from the pre-compression force point $N_p$ , including the bending moment caused by external forces, to the centroid of rebars under less tension or compression (mm);
$e_0$	Initial eccentricity of the axial force N with respect to the centroid of the equivalent section, determined according to the Specifications in 7.3.1 and 8.1.2.2.4 (mm);-TCVN5574-2018
$e_{0p}$	Offset of the compressive force from the centroid of the equivalent section (mm);
$h$	Height of the rectangular, T-shaped and I-shaped section (mm);
$h_f$	Height of the flange of T-shaped and I-shaped section in the tension zone (mm);
$h'_f$	Height of the flange of T-shaped and I-shaped section in the compression zone (mm);
$h_0$	Effective height of the section, equals to $h - a$ (mm);
$h_0$	Effective height of the section, equals to $h - a'$ (mm);
$I$	Moment of inertia of the entire concrete section about the centroid of the structural section ( $\text{mm}^4$ );
$I_{red}$	Moment of inertia of the equivalent section about its centroid ( $\text{mm}^4$ );
$i$	Radius of gyration of the horizontal equivalent section about its centroid (mm);
$L$	Span of the structural element (mm);
$L_{an}$	Anchorage length of the rebars (mm);
$L_p$	Length of the prestress transfer zone in prestress rebars to the concrete (mm);
$L_0$	Calculated length of structural elements subject to axial compression forces (mm);
$s_w$	Stirrup spacings, measured along the length of the structure (mm);
$x$	Height of the concrete compression zone (mm);
$y$	Distance from the neutral axis to the point of application of the pre-compressive force, including the bending moment due to external loads (mm);

*W*      Bending moment resistance of the structural section against the outermost tensile layer (mm<sup>3</sup>);

- $\xi$  the relative height of the concrete compression zone, equaling  $\eta \times h_0$  ;
- $\mu_s$  Rebar proportion, determined by the ratio between the cross-sectional area of the rebar  $S$  and the cross-sectional area of the structural element (  $b \cdot h_0$  ), excluding protruding parts subject to compression and tension.

## 5. Prestressed Members Characteristics

- $P, N_p$  Pre-compressive force taking into account the pre-stressing losses in prestressed rebars corresponding to the current working stage of the member (N);
- $P_{(1)}$  Internal force in prestressed steel considering the first-order prestress loss (N);
- $P_{(2)}$  Internal force in prestressed steel considering all prestress losses (N);
- $\sigma_{bp}$  Compressive stress in concrete at the stage of pre-compression considering prestress losses in prestressed rebars (MPa);
- $\sigma_{sp}$  Ứng suất trước trong cốt thép ứng suất trước có kể đến các hao tổn ứng suất trước trong cốt thép ứng với giai đoạn làm việc đang xét của cấu kiện (MPa); Prestress in prestressed rebars considering prestress losses in prestressed rebars corresponding to the current working stage of the structural elements (MPa);
- $\Delta\sigma_{sp}$  Prestress losses in prestressed rebars (MPa).

## CALCULATE COMPONENTS OF WIND LOAD

(According to the standard TCVN 2737:1995)

VN

### \* Project features

- Building site:	Province:	Dong Nai
	District:	Bien Hoa City
	Wind zone:	II-A
	Terrain type:	REMOVE
- Elevation of the ground above the foundation (m):		1,5
- No texture on the roof		

### \* Derived parameters:

Parameter	Symbol	Value	Unit	Note
- Wind pressure value	$W_o$	0,83	kN/m <sup>2</sup>	Table 4
- Reliability factor	$g$	1,20		

**\* The calculated value of the static component of the wind load,  $W_j$ , acting on the  $j$ th floor is determined by the formula:**

$$W_j = g \times W_o \cdot k_j \cdot c \cdot H_j \cdot \text{OFFER}_j$$

In there:

- $k_j$  : coefficient taking into account the change of wind pressure with altitude
- $c$  : aerodynamic coefficient, summation for windward and leeward 1,4
- $H_j$  : wind height of the  $j$  .th floor
- $L_j$  : width to catch the wind of the  $j$ th floor

The auxiliary structural load on the roof (if any) is calculated and added to the load acting on the roof deck in the tables below.

### \* Table of wind load values in the X direction:

STT	Floor	$H_j$ (m)	$Z_j$ (m)	$k_j$	OFFER <sub><math>\gamma_j</math></sub> (m)	$W_{xj}$ (kN)
1	USA	4,9	3,4	0,824	3,5	13,7
SUMMARY						13,7

Note:  $Z_j$  is the height of the  $j$ th floor above the ground

### \* Table of wind load values in the Y direction:

STT	Floor	H (m)	$Z_j$ (m)	$k_j$	OFFER <sub><math>x_j</math></sub> (m)	$W_{yj}$ (kN)
1	USA	4,9	3,4	0,824	8,0	31,4
SUMMARY						31,4

Note:  $Z_j$  is the height of the  $j$ th floor above the ground

# CALCULATION INSPECTION OF REINFORCED CONCRETE FLOOR

1. Floor floor: **Roof deck**

2. Location :

3. Materials used:

- Concrete durability level: **B22.5**
- + CHEAP<sub>b</sub> (MI 13)
- Group of reinforcement (D ≥ ten) : **CB300-VU**
- + CHEAP<sub>s</sub> (MI 260)
- Group of reinforcement (D < ten) : **CB240-BILLION**
- + CHEAP<sub>s</sub> (MI 210)

## 4. Table of calculation and arrangement of reinforcement:

P.		H	REMOVE	A <sub>o</sub>	USA	H <sub>o</sub>	α	γ	A <sub>s_rq</sub>	Reinforcing steel					A <sub>s_d</sub>	
		(mm)	(mm)	(mm)	(kNm)	(cm)			(cm <sup>2</sup> /m)	Φ	@	+	Φ	@	(cm <sup>2</sup> /m)	
X	Inferior	100	1000	15	3,6	8,0	0,043	0,978	1,77	10	200				3,93	
X	Upper class	100	1000	15	-1,8	8,0	0,022	0,989	0,87	10	200				3,93	
Y	Inferior	100	1000	15	2,9	8,0	0,035	0,982	1,42	10	200				3,93	
Y	Upper class	100	1000	15	-3,1	8,0	0,037	0,981	1,52	10	200				3,93	



Women's Table<sup>o</sup>: Unit dead loads

Weight	Unit	Detail	a(m)	b (m)	$\gamma$ (KN/m <sup>3</sup> )	Standard load (KN/m <sup>2</sup> )
Solid brick wall 200	KN/m <sup>2</sup>	Brick	0,200	1	18,0	3,6
		Plastering mortar	0,015	2	18,0	0,5
						<b>4,1</b>
100 . solid brick wall	KN/m <sup>2</sup>	Brick	0,100	1	18,0	1,8
		Plastering mortar	0,015	2	18,0	0,5
						<b>2,3</b>
Solid brick wall 200	KN/m <sup>2</sup>	Brick	0,200	1	18,0	3,6
Side cover		Plastering mortar	0,015	2	18,0	0,5
		Wall tiles	0,010	2	22,0	0,4
						<b>4,6</b>
100 . solid brick wall	KN/m <sup>2</sup>	Brick	0,100	1	18,0	1,8
Side cover		Plastering mortar	0,015	2	18,0	0,5
		Wall tiles	0,010	2	22,0	0,4
						<b>2,8</b>
Roof deck	KN/m <sup>2</sup>	Tiles	0,010	1	20,0	0,2
		Mortar	0,050	1	18,0	0,9
		truss + respect	1,000	1	0,1	0,1
		Ceiling plaster	0,020	1	18,0	0,4
						<b>1,6</b>
<b>II: Live load</b>						
Toilet	KN/m <sup>2</sup>					<b>2,0</b>
Flat roof in use	KN/m <sup>2</sup>					<b>1,5</b>
Unused flat roof	KN/m <sup>2</sup>					<b>0,75</b>
Active load water tank	KN/m <sup>2</sup>					<b>10*H tank</b>

# CALCULATION OF CREATMENT AND EXTENSION OF FILTERS (According to TCVN 5574:2018)

**Component name:** Roof deck

## 1. Input parameters

### a. Concrete B22.5

$R_b = 13 \text{ Mpa}$        $R_{b,n} = 16,75 \text{ Mpa}$

$R_{bt} = 1 \text{ Mpa}$        $R_{bt,ser} = 1,45 \text{ Mpa}$

$E_b = 29000 \text{ Mpa}$

### b. Reinforcing steel CB300-VU

$R_s = 260 \text{ Mpa}$

$E_s = 200000 \text{ Mpa}$

$\alpha = E_s / E_b = 6,90$

### c. Section information

$b = 1000 \text{ mm}$        $a_0 = 15 \text{ mm}$        $h_0 = 85 \text{ mm}$

$h = 100 \text{ mm}$        $a'_0 = 15 \text{ mm}$        $h'_0 = 85 \text{ mm}$

$A_s = 5 \text{ EASY}$        $10 = 3,93 \text{ cm}^2$

$A'_s = 5 \text{ EASY}$        $10 = 3,93 \text{ cm}^2$

$y_t = 50,0 \text{ mm}$

$I_{red} = I + \alpha I_s + \alpha I'_s = 0,0001 \text{ m}^4$       (CT 162 TCVN 5574:2018)

$A_{red} = A + \alpha A_s + \alpha A'_s = 0,1054 \text{ m}^2$       (CT 163 TCVN 5574:2018)

### d. Moment at calculated cross-section (Assume the long-term live load accounts for $\psi$ full load)

Torque caused by static load  $M_{st} = 2,6 \text{ kN.m}$

Torque caused by live load  $M_{ht} = 0,5 \text{ kN.m}$

Coefficient  $\psi = 0,3$

$USA_{first} = 2,75 \text{ kN.m}$       (Long-term effects of  $1TT + \psi HT$ )

$USA_2 = 3,1 \text{ kN.m}$       (Short-term effects of  $1TT + 1.HT$ )

$USA_3 = 2,75 \text{ kN.m}$       (Short-term effects of  $1TT + \psi .HT$ )

### e. Check crack formation conditions

$\gamma = 1,3$

$S_{t,red} = 0,005 \text{ m}^3$

$y_c = h_0 \cdot (((\mu_s \cdot \alpha_{s2} + \mu'_s \cdot \alpha_{s1})^2 + 2 \cdot (\mu_s \cdot \alpha_{s2} + \mu'_s \cdot \alpha_{s1} \cdot a'_0 / H_0))^{0.5} - (\mu_s \cdot \alpha_{s2} + \mu'_s \cdot \alpha_{s1}))$

$y_c = 25,99 \text{ mm}$       (CT 196 TCVN 5574:2018)

$\alpha_{s1} = \alpha_{s2} = E_s / E_{b,red} = E_s \cdot \varepsilon_{b1,red} / \text{CHEAP}_{b,n} = 0.0015 \cdot E_s / \text{CHEAP}_{b,n} = 17,91$

$\mu_s = A_s / (bh_0) = 0,0046$

$\mu'_s = A'_s / (bh'_0) = 0,0046$

$\text{OFFER}_s = 0.5 \cdot A_{bt} \cdot d_s / A_s$

$(10d_s; 100\text{mm}) \text{ L } (40d_s; 400\text{mm})$

$\text{OFFER}_s : 0,4 \text{ m}$

$A_{bt} = bh_{bt} = 50000 \text{ mm}^2$

$H_{bt} = 50 \text{ mm}$

(2 a<sub>0</sub>) h<sub>bt</sub> (0.5h)

$$USA_{crc} W_{pl} \cdot CHEAP_{bt,ser} = \gamma \cdot W_{red} \cdot CHEAP_{bt,ser} = \gamma \cdot I_{red} \cdot CHEAP_{bt,ser} / y_t = \gamma \cdot I_{red} \cdot A_{red} \cdot CHEAP_{bt,ser} / WILL_{t,red}$$

(Section 8.2.2.2.4 TCVN 5574:2018)

$$USA_{crc} = 3,39 \text{ kN.m}$$

**The crack formation condition is not satisfied**

## 2. Calculate a<sub>crc1</sub>

$$\varphi_{first} = 1,4 \quad \varphi_2 = 0,5 \quad \varphi_3 = 1$$

$$\psi_S = 0,013289896$$

$$I_{red} = 0,0000 \text{ m}^4$$

$$\Sigma_S = M \cdot (h_0 - y_c) \cdot \alpha_{s1} / I_{red} = 93176,5 \text{ kN/m}^2$$

$$a_{crc1} = \varphi_{first} \cdot \varphi_2 \cdot \varphi_3 \cdot \psi_S \cdot \Sigma_S \cdot LOL_S / E_S = 0,002 \text{ mm}$$

## 3. Calculate a<sub>crc2</sub>

$$\varphi_{first} = 1 \quad \varphi_2 = 0,5 \quad \varphi_3 = 1$$

$$\psi_S = 0,12469265$$

$$I_{red} = 0,0000 \text{ m}^4$$

$$\Sigma_S = M \cdot (h_0 - y_c) \cdot \alpha_{s1} / I_{red} = 105035 \text{ kN/m}^2$$

$$a_{crc2} = \varphi_{first} \cdot \varphi_2 \cdot \varphi_3 \cdot \psi_S \cdot \Sigma_S \cdot LOL_S / E_S = 0,013 \text{ mm}$$

## 4. Calculate a<sub>crc3</sub>

$$\varphi_{first} = 1 \quad \varphi_2 = 0,5 \quad \varphi_3 = 1$$

$$\psi_S = 0,013289896$$

$$I_{red} = 0,0000 \text{ m}^4$$

$$\Sigma_S = M \cdot (h_0 - y_c) \cdot \alpha_{s1} / I_{red} = 93176,5 \text{ kN/m}^2$$

$$a_{crc3} = \varphi_{first} \cdot \varphi_2 \cdot \varphi_3 \cdot \psi_S \cdot \Sigma_S \cdot LOL_S / E_S = 0,001 \text{ mm}$$

## 5. Conclusion

Long-term crack width

$$a_{crc} = a_{crc1} = 0,002 \text{ mm} < [a]_{crc} = 0,3 \text{ mm}$$

**Ensure short-term crack width conditions (Table 17 TCVN 5574:2018)**

Short-term crack width

$$a_{crc} = a_{crc1} \cdot a_{crc2} - a_{crc3} = 0,014 \text{ mm} < [a]_{crc} = 0,4 \text{ mm}$$

**Ensuring long-term crack width conditions (Table 17 TCVN 5574:2018)**

# EXPLANATION OF CALCULATION OF WATER TANK STRUCTURE

## 1. Calculation data.

-The underground water tank has the means of circulation on the tank cover. The tank cap elevation is the natural ground level

- Tank volume 180m<sup>3</sup>

- Materials using Concrete

- Concrete grade M350

$$\begin{array}{llll} \text{B25} & R_b & = & 145 \text{ daN/cm}^2 \\ & R_{bt} & = & 10.5 \text{ daN/cm}^2 \\ & \gamma & = & 0.900 \end{array}$$

Steel AII (CII):

$$\text{AII} \quad R_s = 2600 \text{ daN/cm}^2$$

- Water tank size:

\* Tank cover thickness: 20 cm

\* Tank wall thickness: 30 cm

\* Tank bottom thickness: 40 cm

## 2. Calculated load

- TLBT: Tank body weight calculated by Sap software with overload factor 1.1

- ALNUOC: Water pressure on the walls and bottom when the tank is full of water

$$P_n = H \cdot n \quad (\text{T/m}^2)$$

- ALDAT: Soil pressure on The walls, lid and bottom extension

$$P_d = H \cdot d \quad (\text{T/m}^2)$$

- HTXE: Live load

$$P_x = n \cdot P_{tc} = 1.2 \cdot 0.5 = 0.6 \quad (\text{T/m}^2)$$

## 3. Load combination

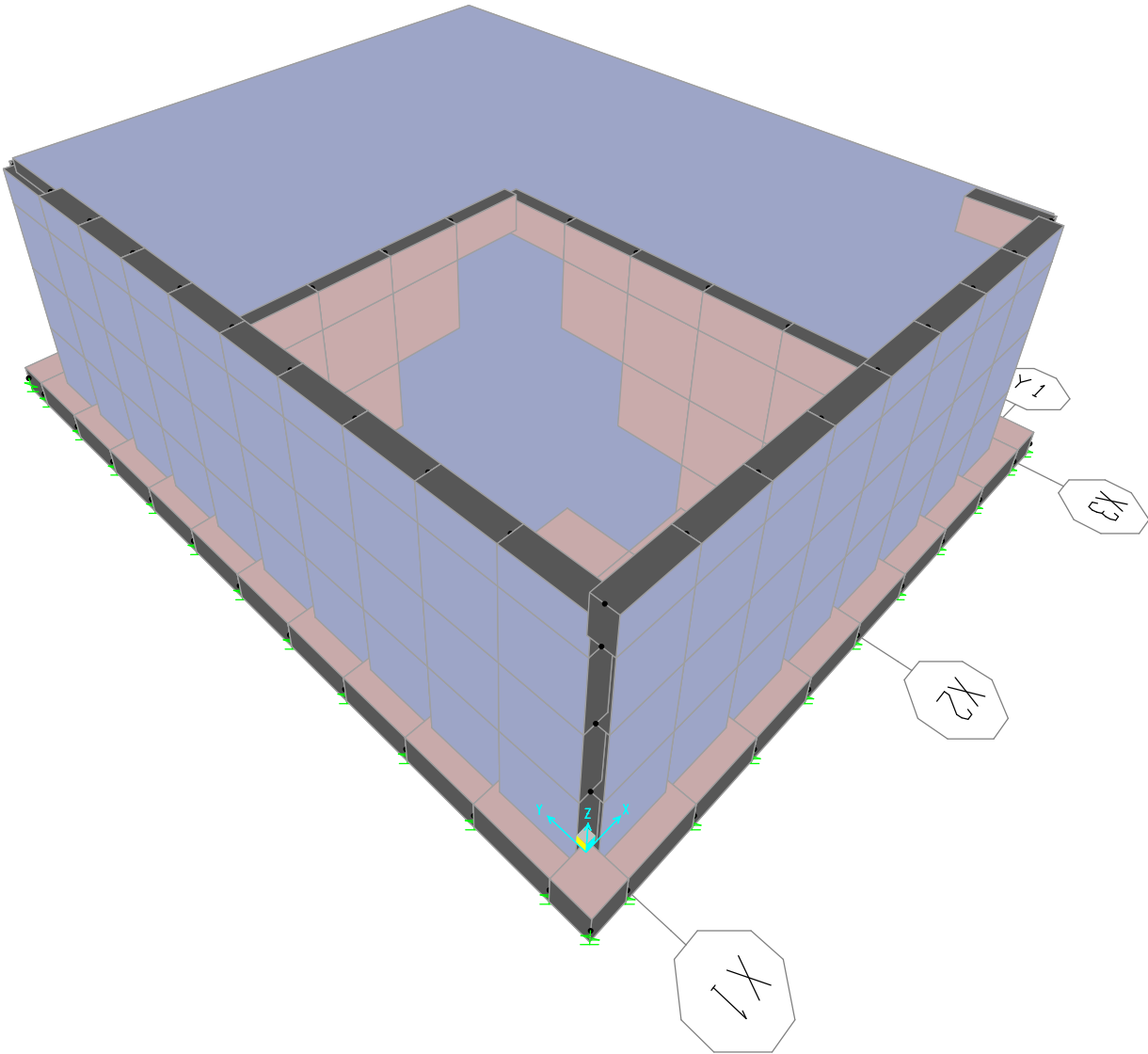
COMBO1 TLBT + ALDAT

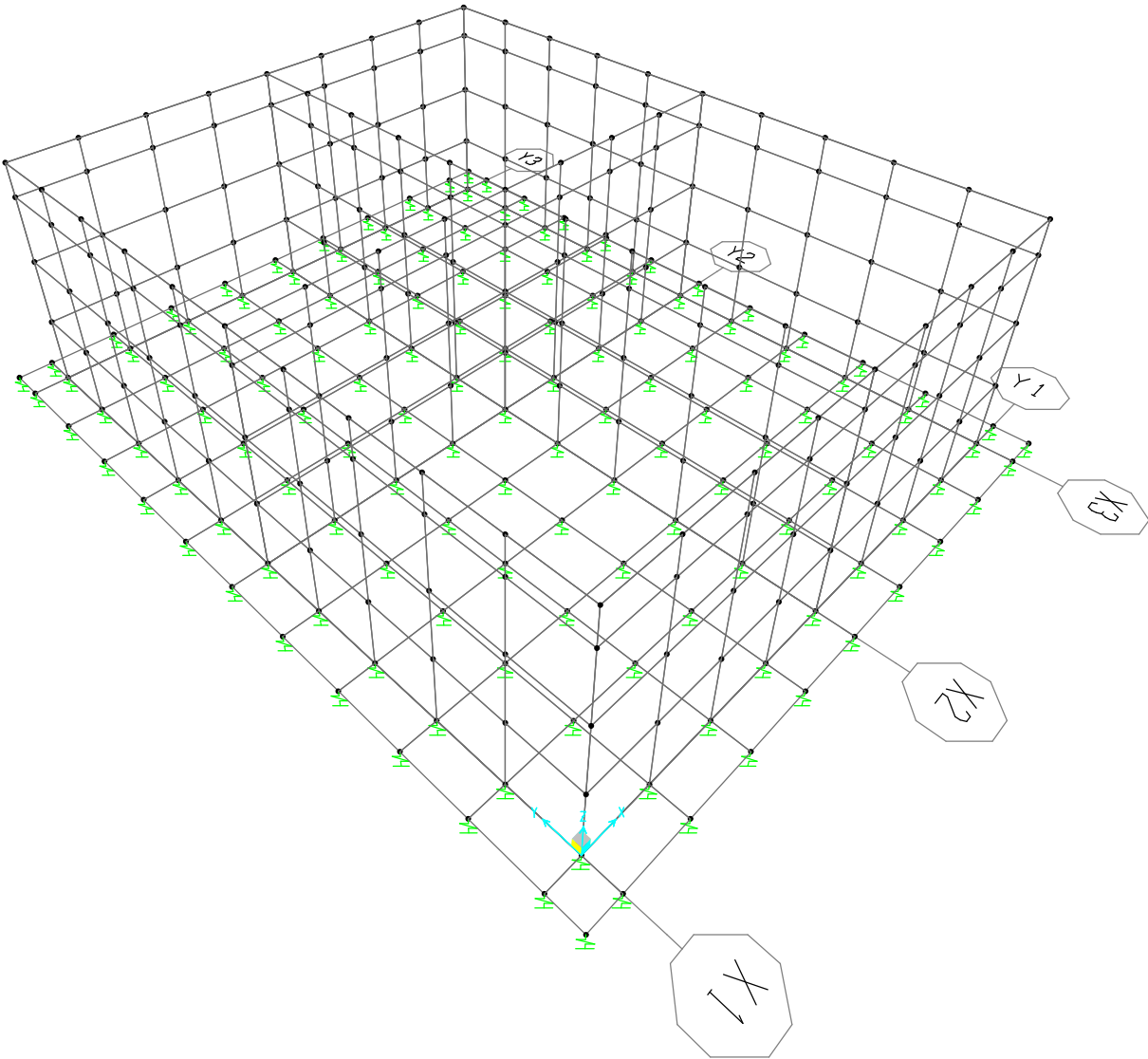
COMBO2 TLBT + ALNUOC

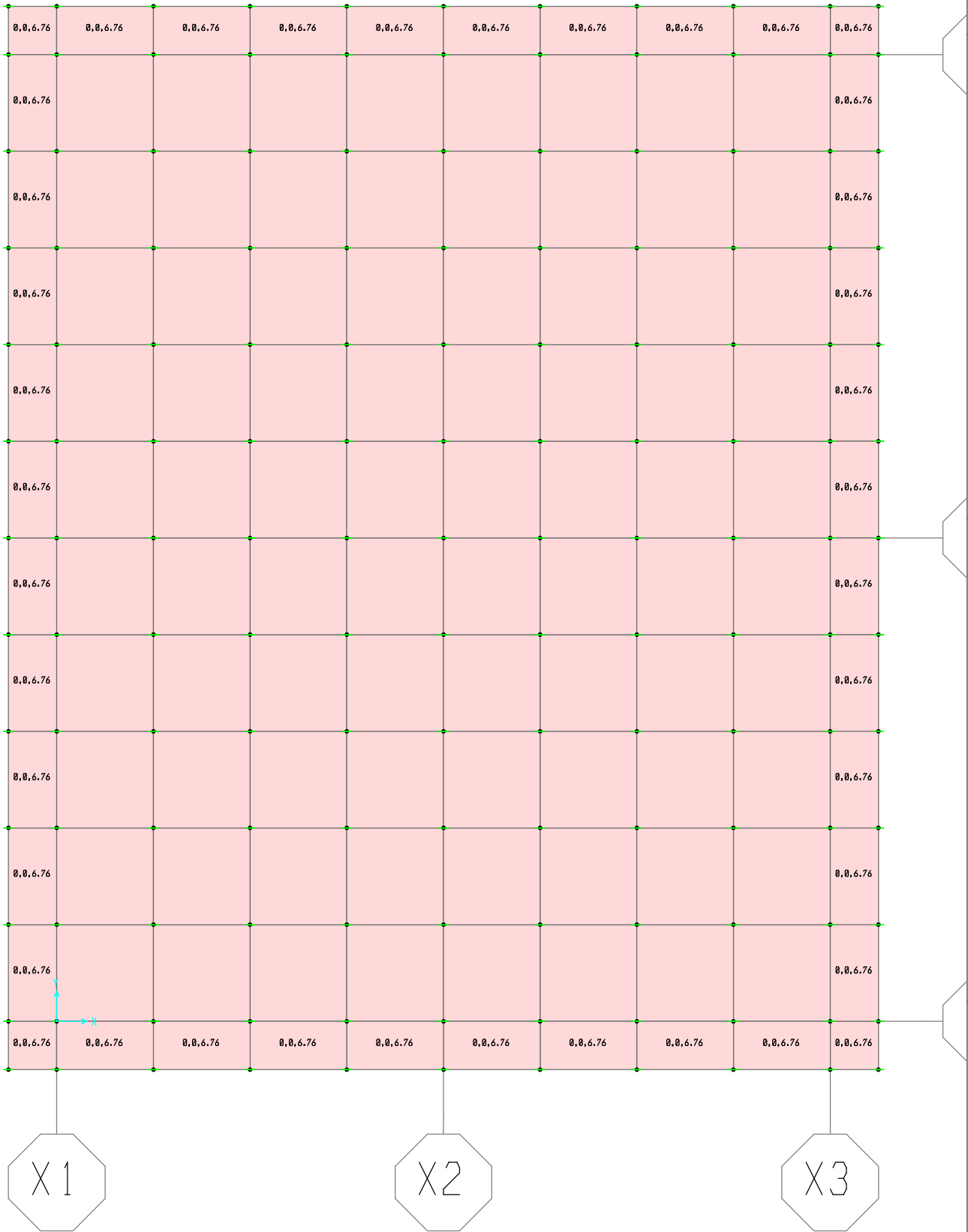
COMBO3 TLBT + ALNUOC + ALDAT

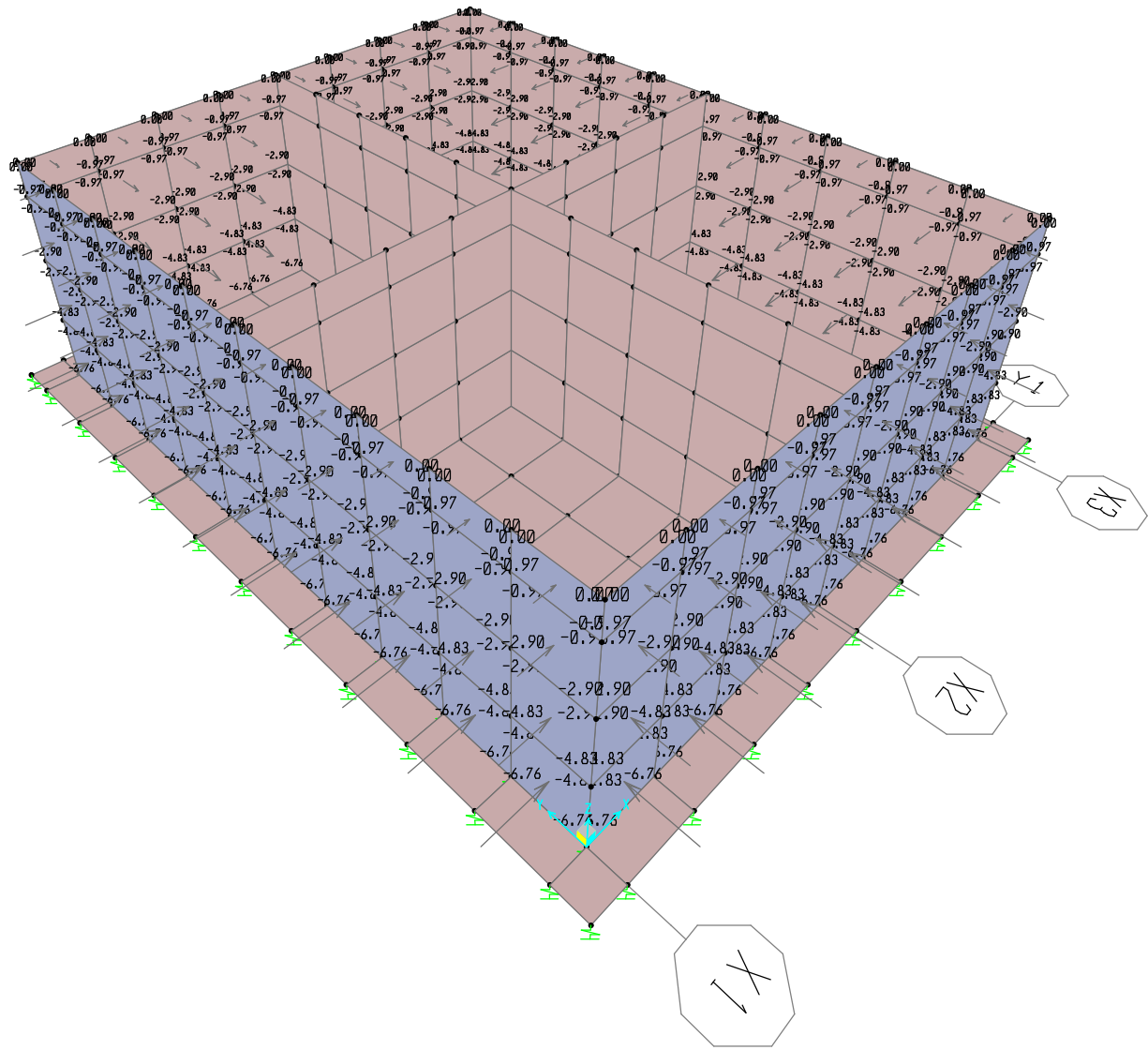
COMBO4 TLBT + ALNUOC + ALDAT +

BAO: EVELOP (COMBO1, COMBO2, COMBO3, COMBO4)

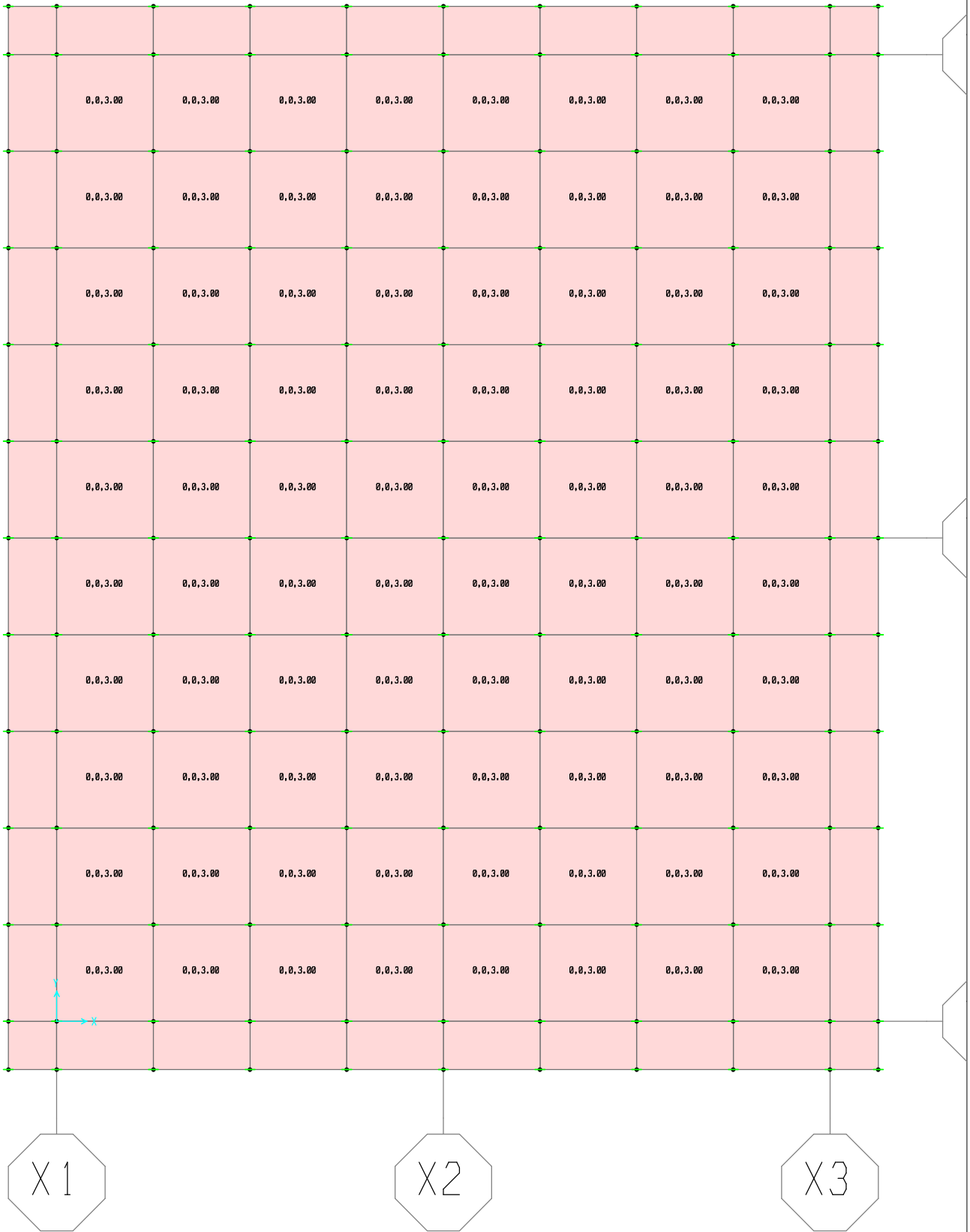


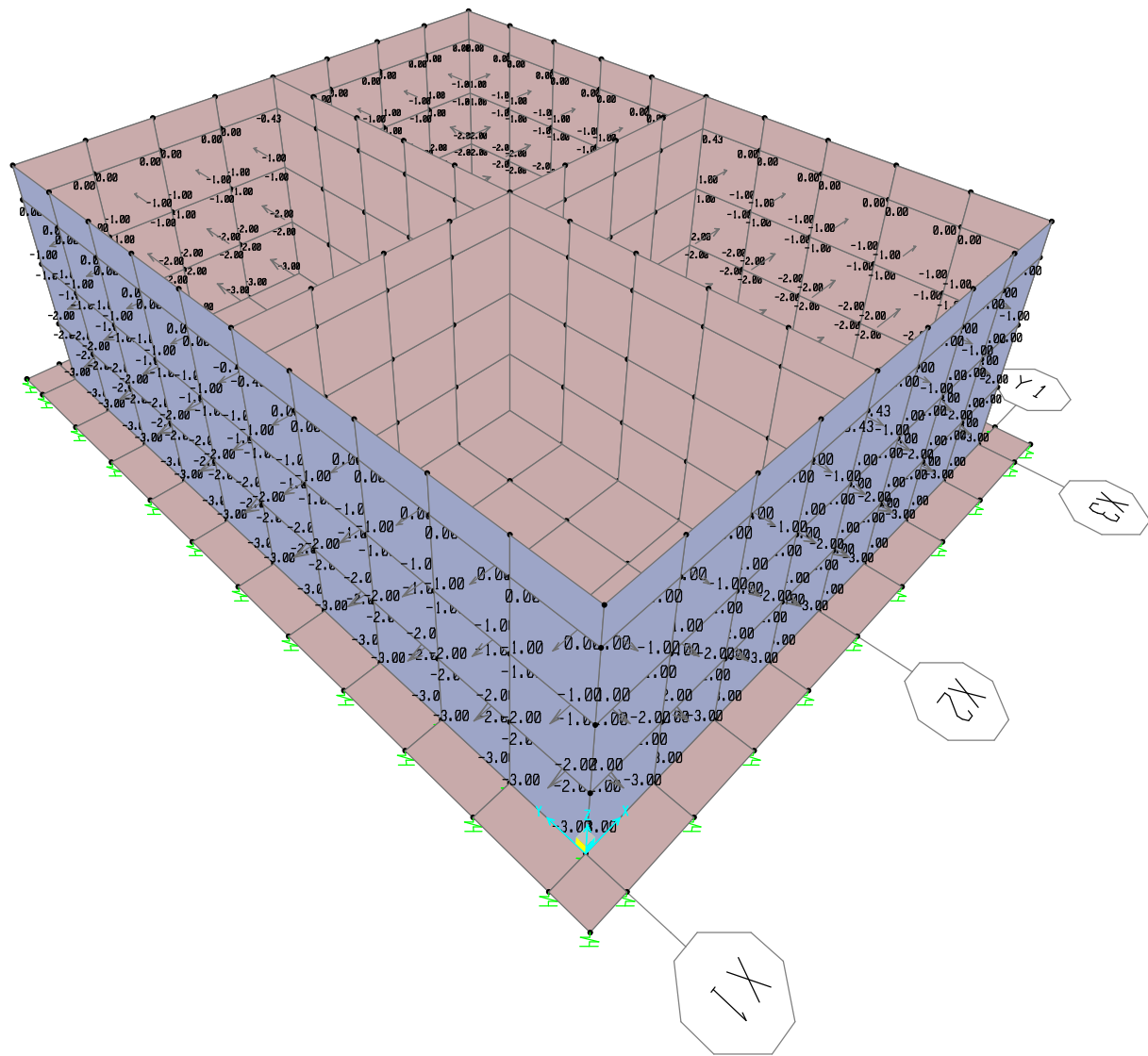


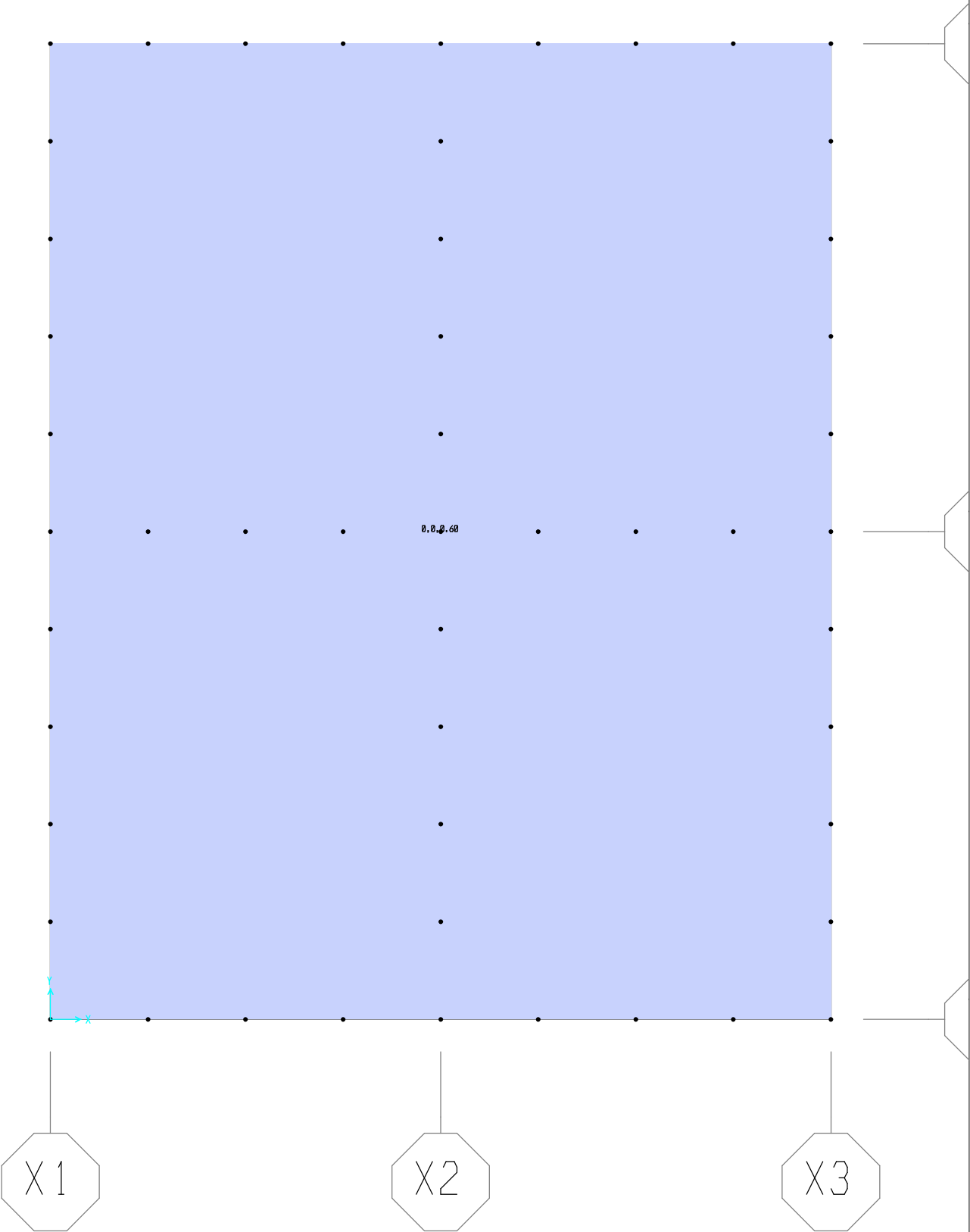




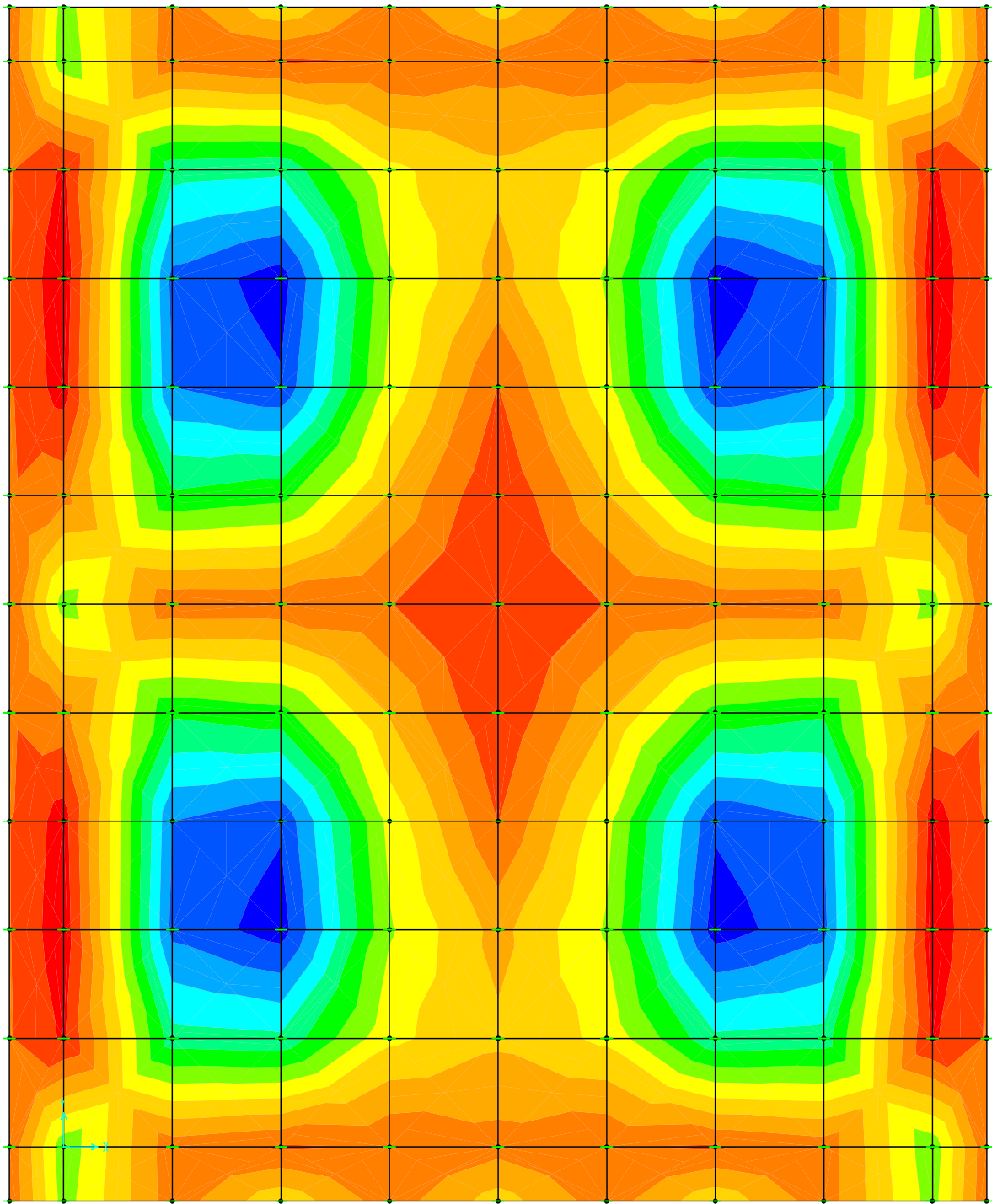




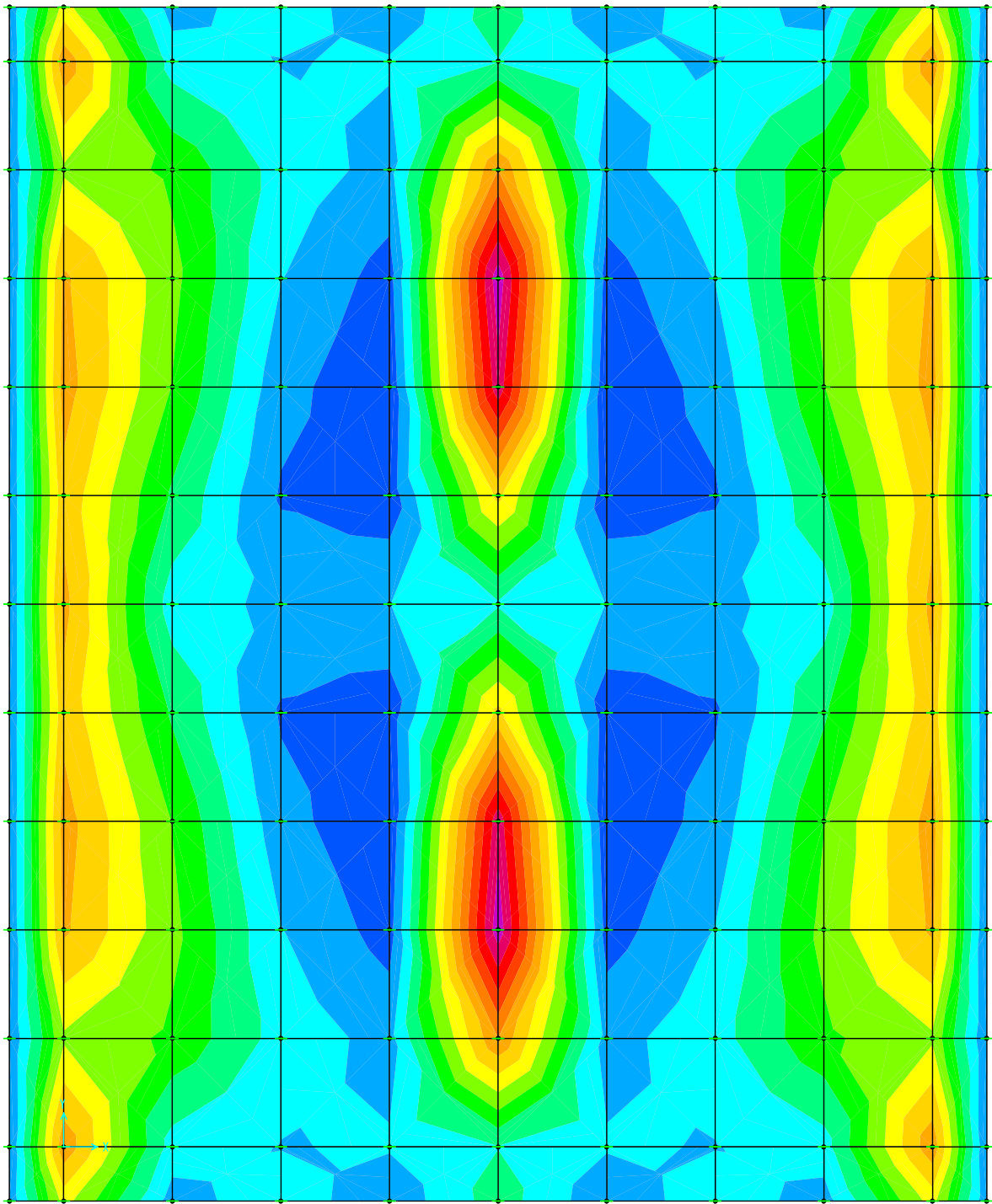


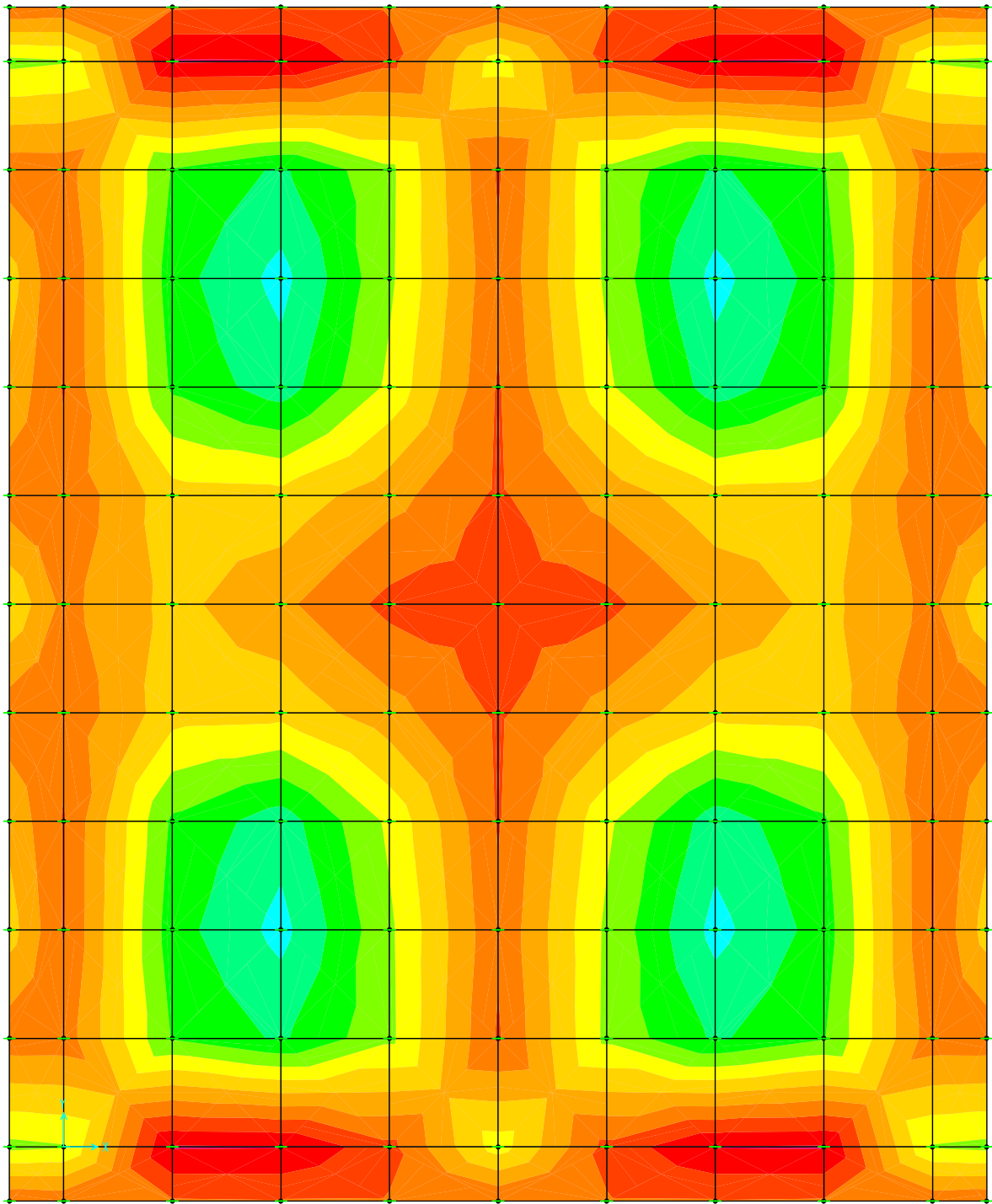


## **5. NỘI LỰC**

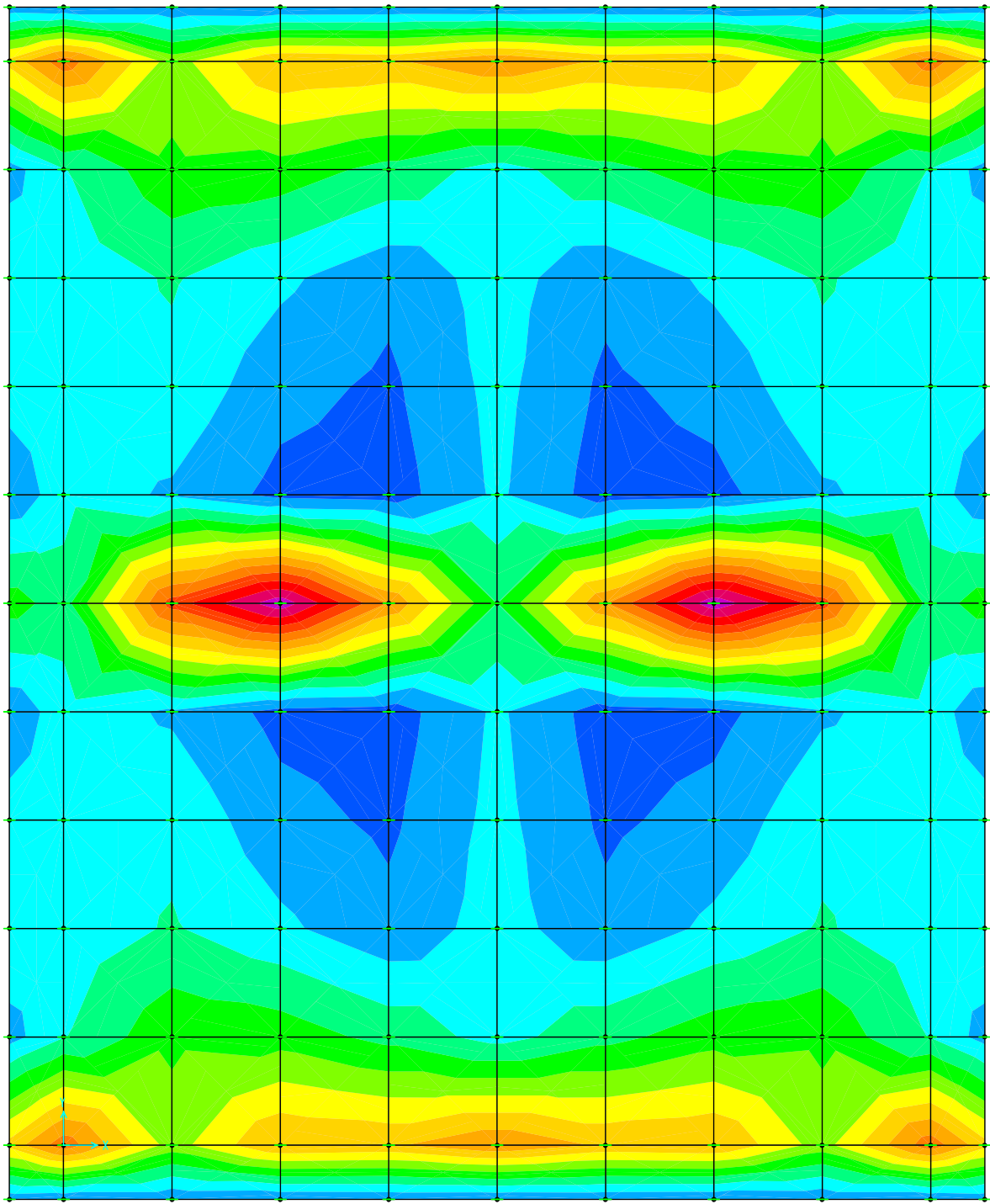


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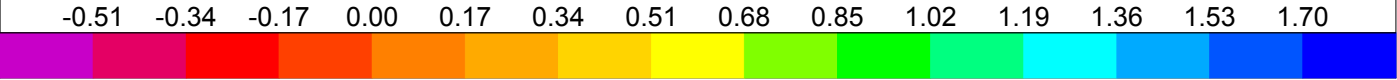
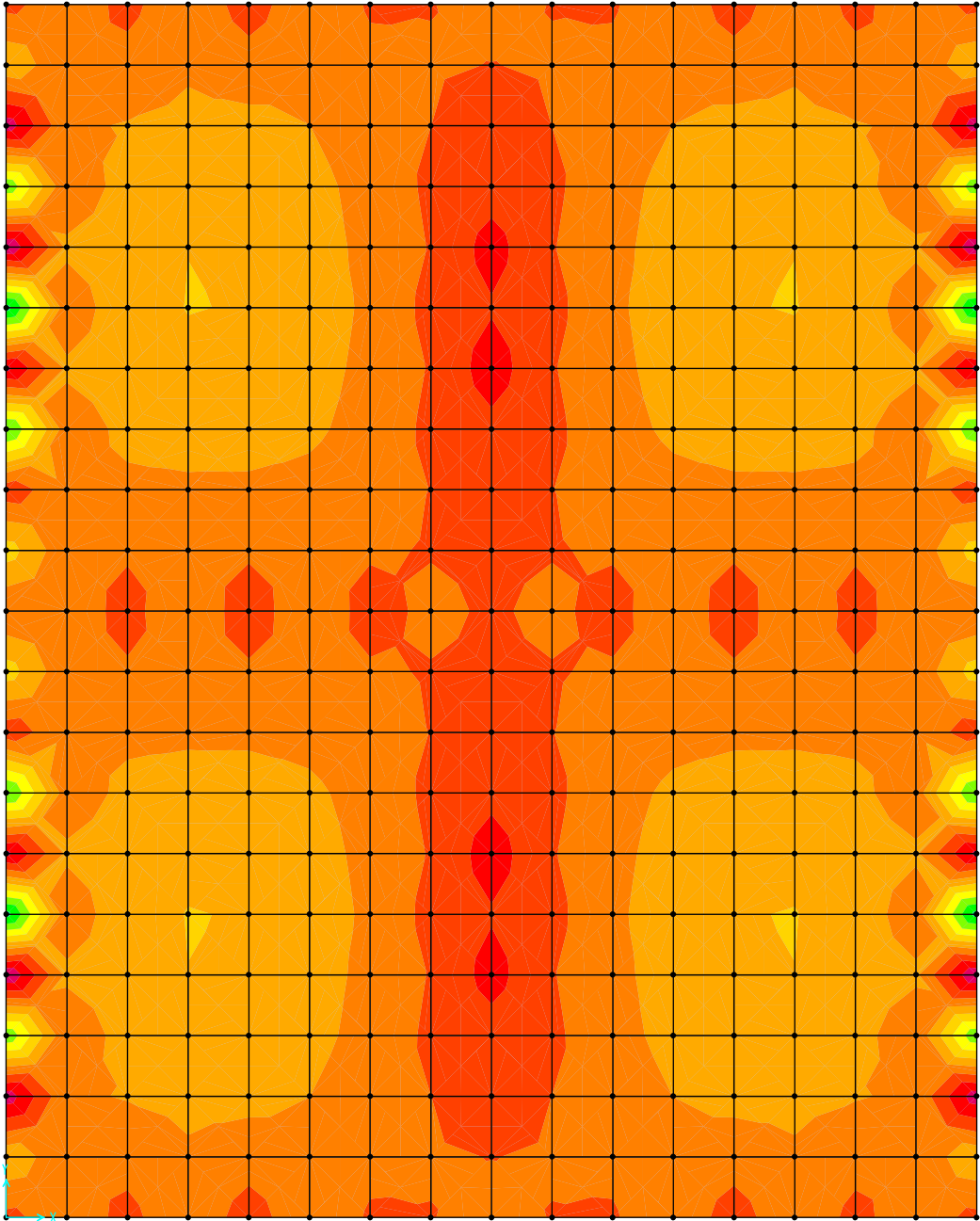


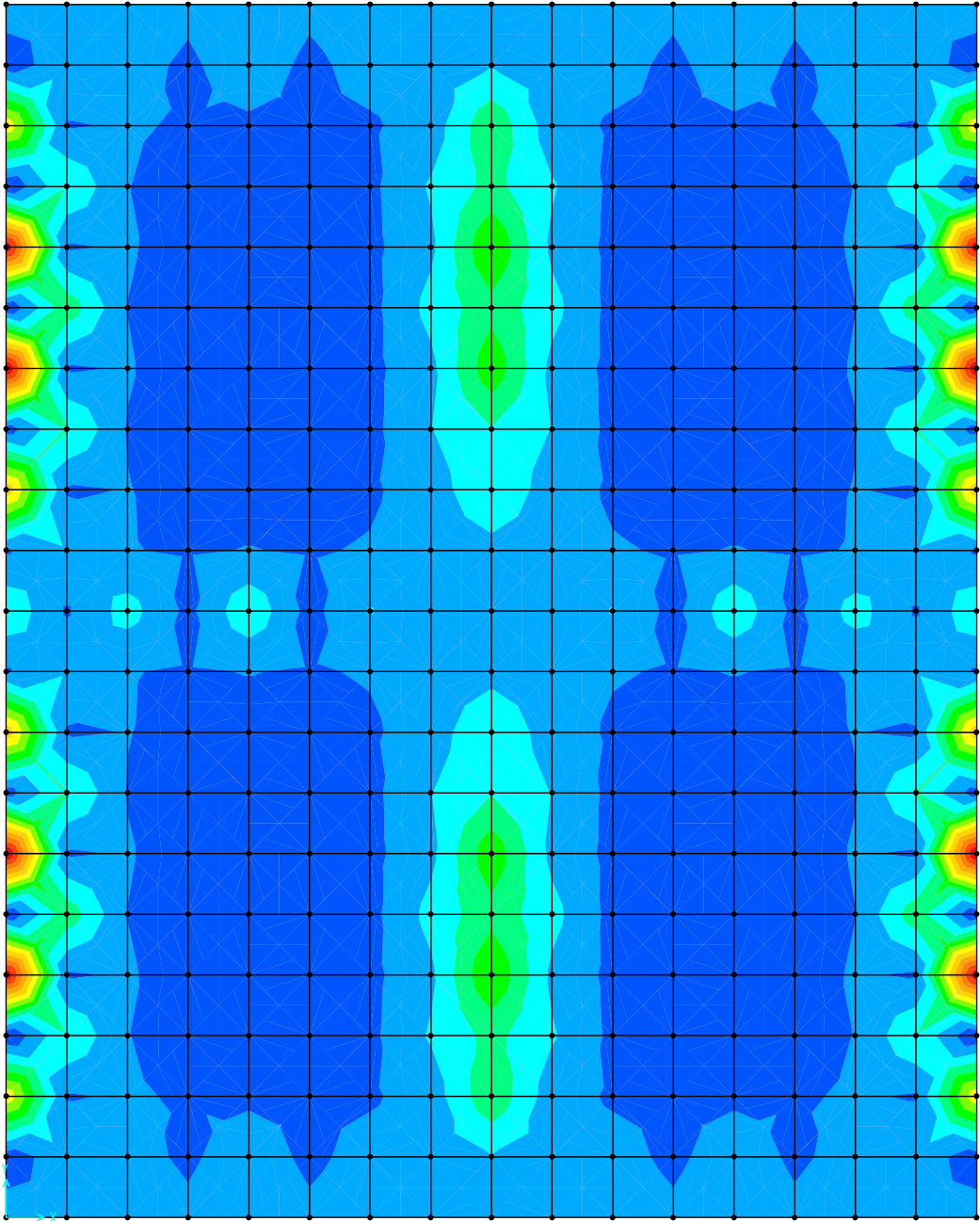
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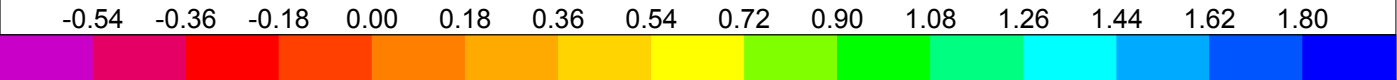
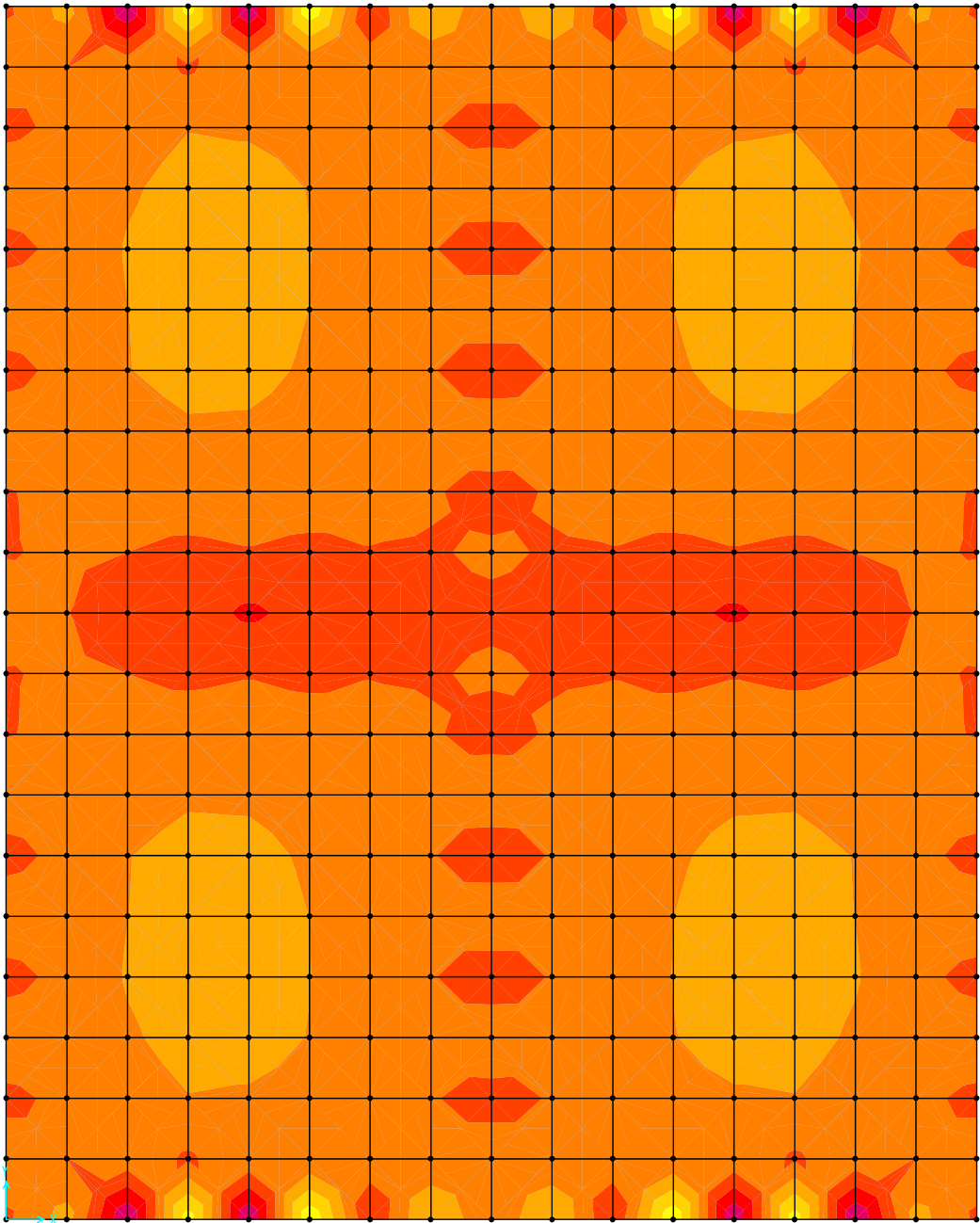
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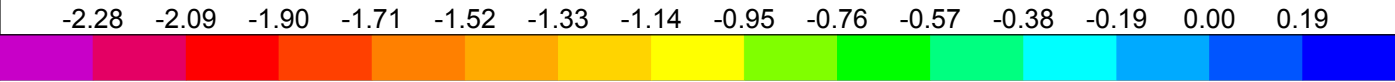
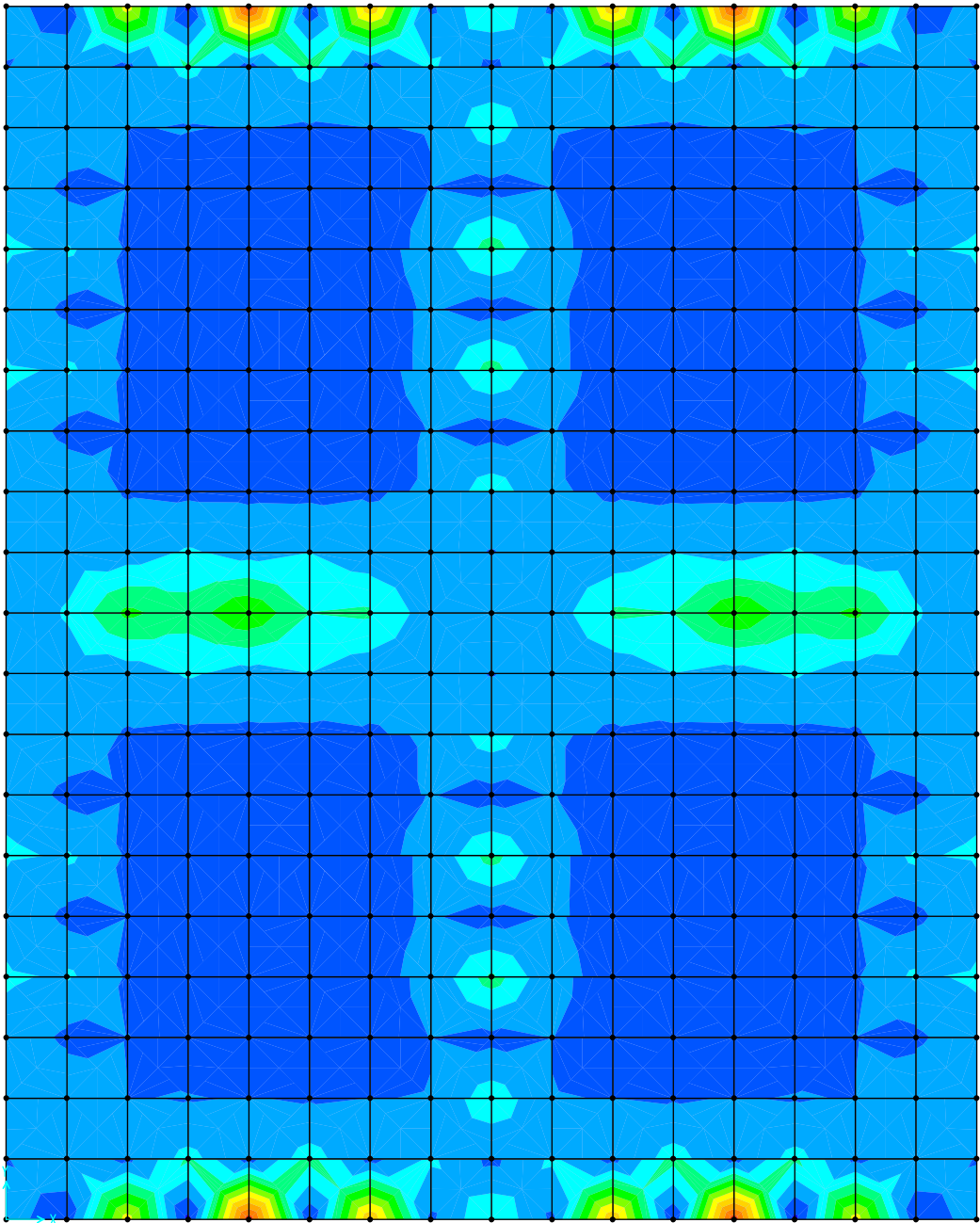


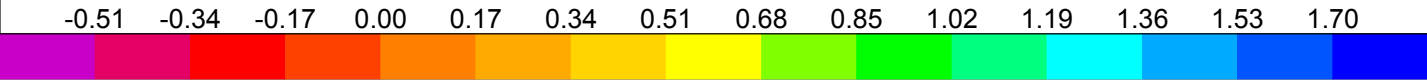
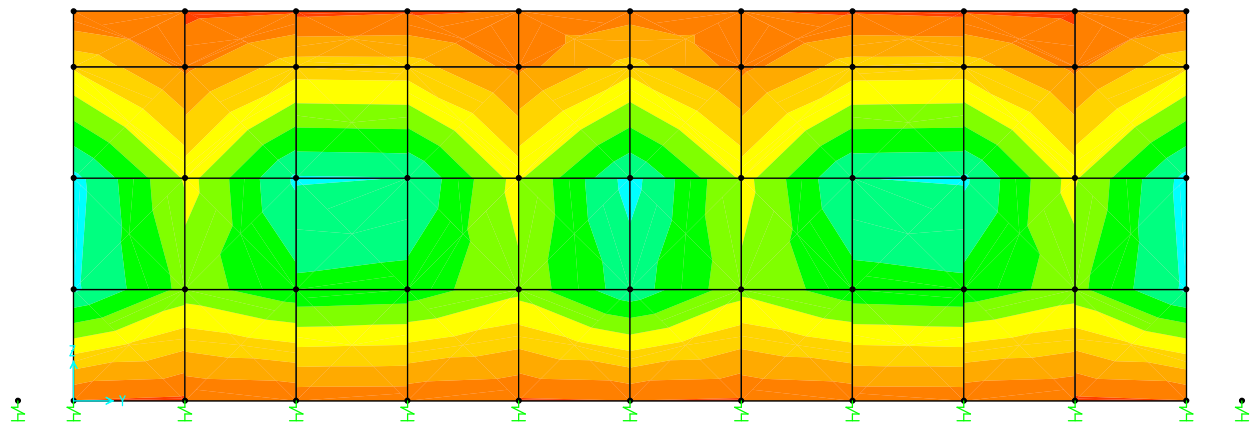


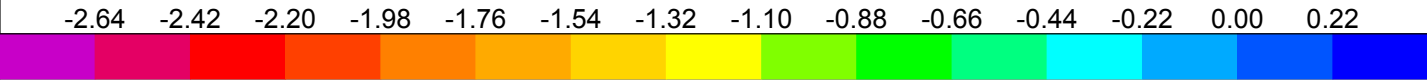
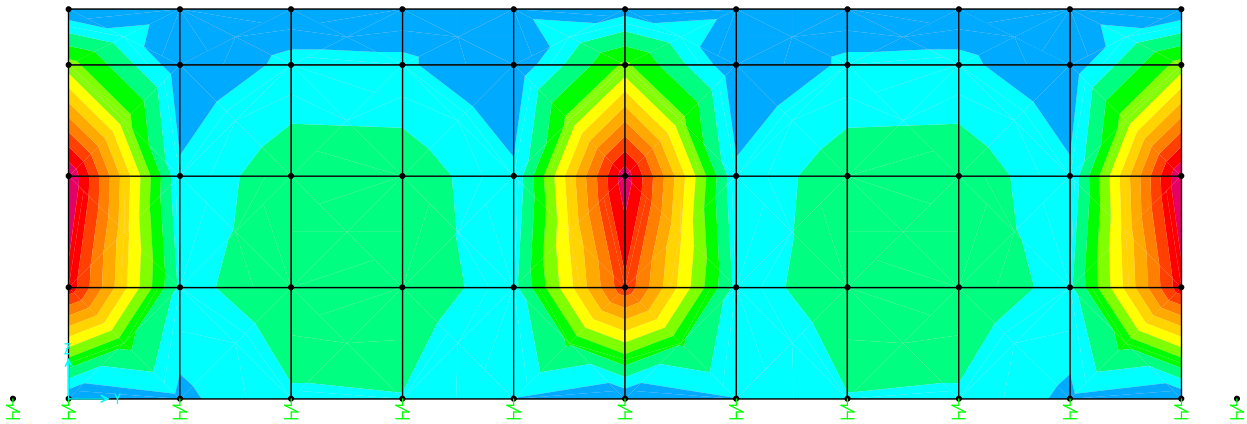


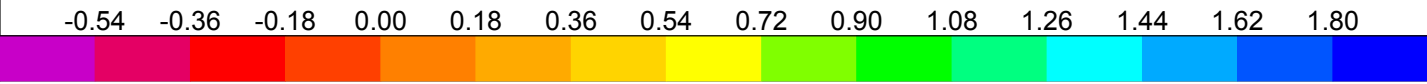
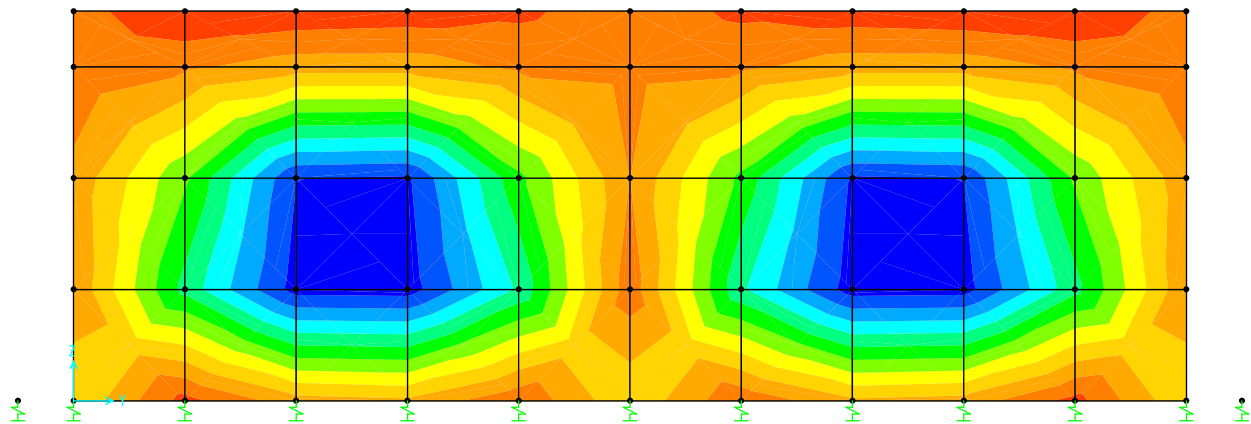
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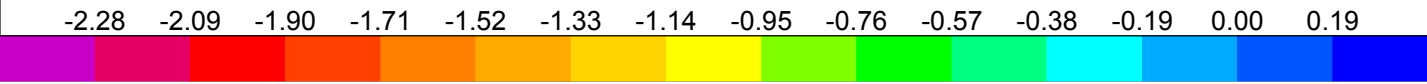
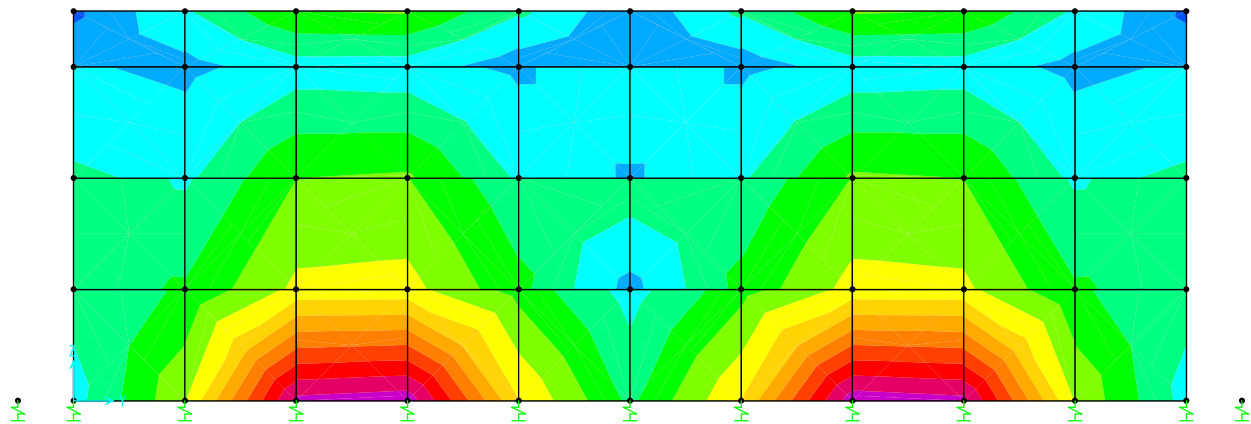




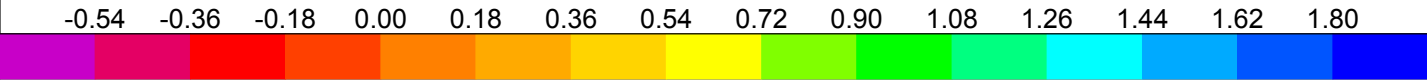
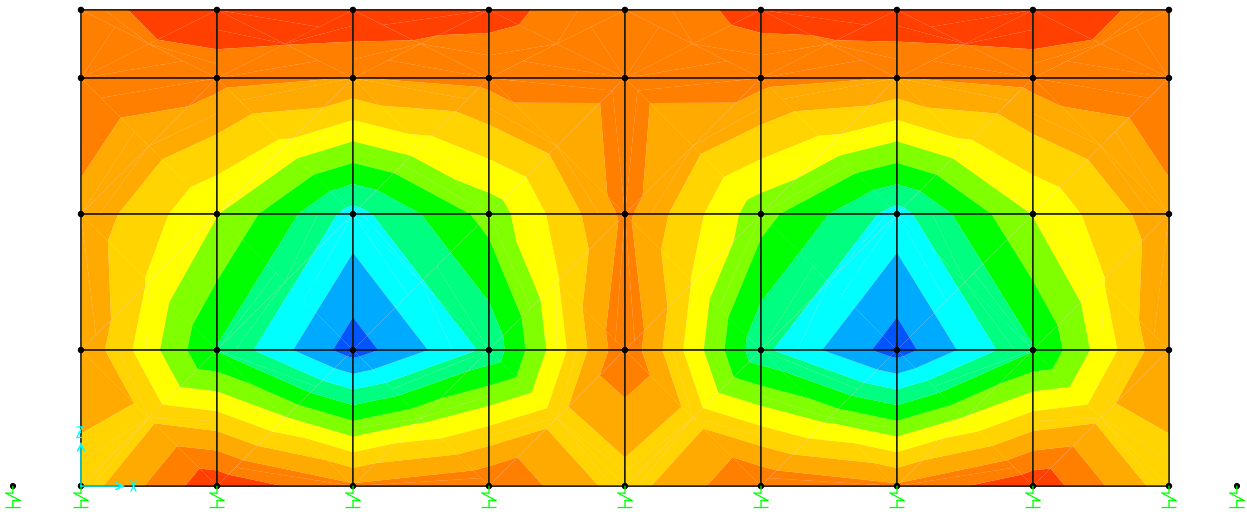


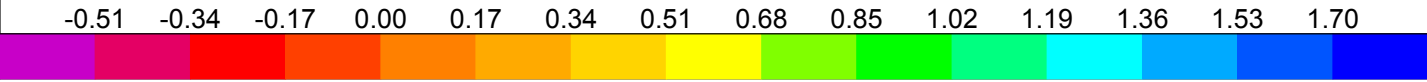
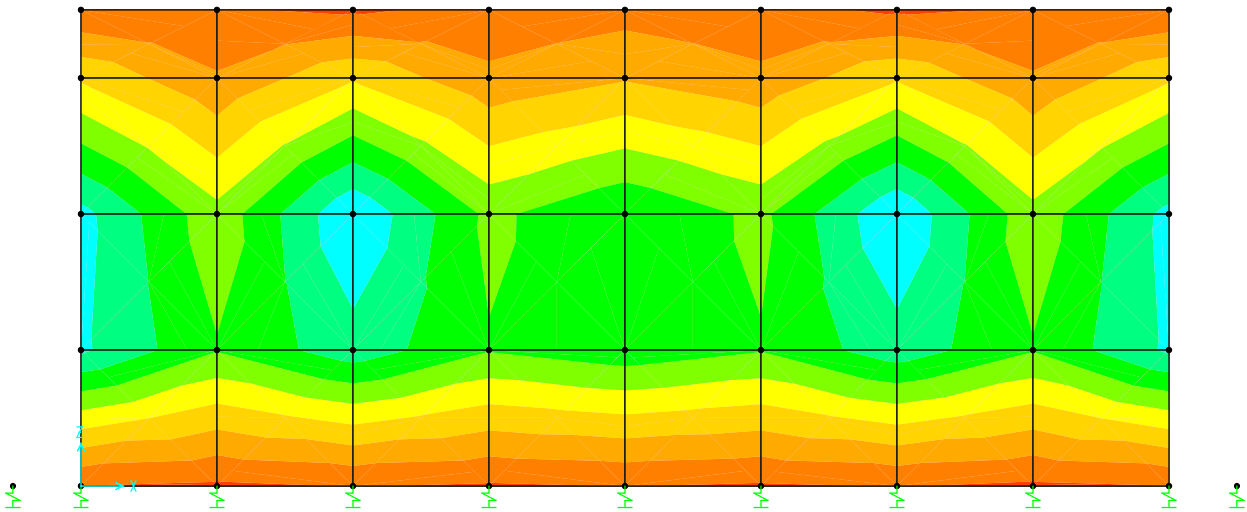


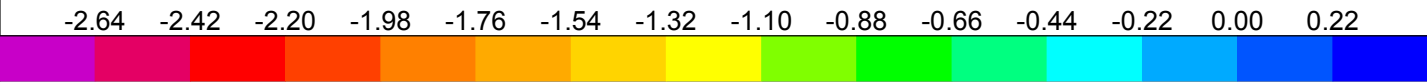
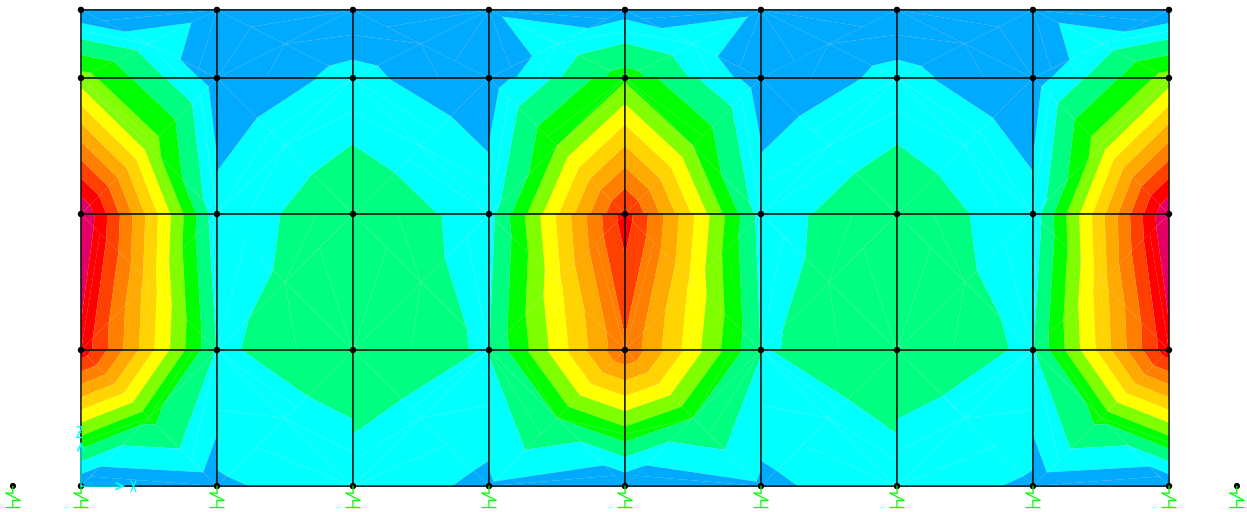


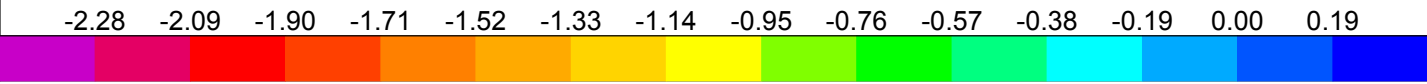
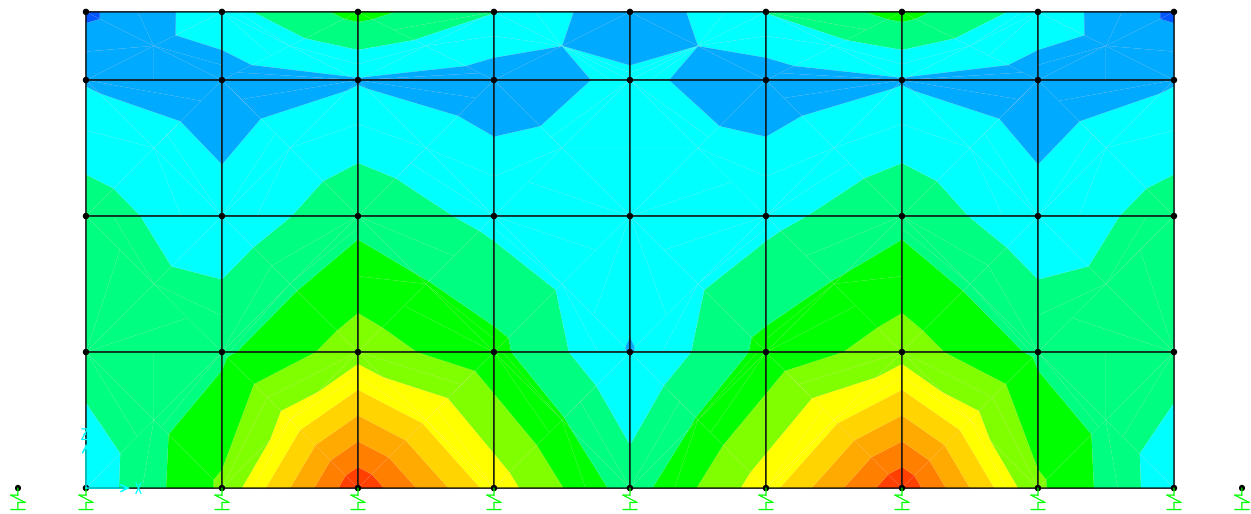












## 6. TÍNH THÉP BÊ

### 6.1 Tính cốt thép vách đứng bê

Chiều dày vách:  $h = 30 \text{ cm}$

Lớp bảo vệ cốt thép  $a = 3 \text{ cm}$

$$\alpha_m = \frac{M}{R_b b_f h_0^2} \quad \xi = 1 - \sqrt{1 - 2\alpha_m} \quad A_s = \frac{M}{R_s \xi h_0} \quad \mu\% = \frac{100A_s}{bh_0}$$

**BẢNG TÍNH THÉP**

Vị trí	M (KN.m)	b (cm)	h (cm)	a (cm)	h <sub>0</sub> (cm)	$\alpha_m$	$\xi$	A <sub>s</sub> <sub>tt</sub> (cm)
Gối đứng	24.17	100	30	3	27	0.03	0.03	3.88
Gối ngang	28.29	100	30	3	27	0.03	0.03	4.55
Nhịp đứng	19.09	100	30	3	27	0.02	0.02	3.05
Nhịp ngang	17.84	100	30	3	27	0.02	0.02	2.85

**BẢNG CHỌN THÉP**

Vị trí	b	h <sub>0</sub>	A <sub>s</sub> <sub>tt</sub>	$\phi$	a	A <sub>s</sub> <sub>c</sub>	$\mu$	K. tra
Gối đứng	100	27.0	3.88	14	200	7.7	0.285	OK
Gối ngang	100	27.0	4.55	14	200	7.7	0.285	OK
Nhịp đứng	100	27.0	3.05	14	200	7.7	0.285	OK
Nhịp ngang	100	27.0	2.85	14	200	7.7	0.285	OK

### 6.2 Tính cốt thép nắp bề

Chiều dày vách:  $h = 20$  cm  
Lớp bảo vệ cốt thép  $a = 3$  cm

**BẢNG TÍNH THÉP**

Vị trí	M (KN.m)	b (cm)	h (cm)	a (cm)	$h_0$ (cm)	$\alpha_m$	$\xi$	$A_{s_{tt}}$ (cm)
Gối M11	25.10	100	20	3	17	0.07	0.07	6.53
Gối M22	18.60	100	20	3	17	0.05	0.05	4.80
Nhịp M11	3.44	100	20	3	17	0.01	0.01	0.87
Nhịp M22	2.30	100	20	3	17	0.01	0.01	0.58

**BẢNG CHỌN THÉP**

Vị trí	b	$h_0$	$A_{s_{tt}}$	$\phi$	a	$A_{s_c}$	$\mu$	K. tra
Gối M11	100	17.0	6.53	14	200	7.7	0.453	OK
Gối M22	100	17.0	4.80	14	200	7.7	0.453	OK
Nhịp M11	100	17.0	0.87	14	200	7.7	0.453	OK
Nhịp M22	100	17.0	0.58	14	200	7.7	0.453	OK

### 6.3 Tính cốt thép đáy bề

Chiều dày vách:  $h = 40$  cm  
Lớp bảo vệ cốt thép  $a = 3$  cm

**BẢNG TÍNH THÉP**

Vị trí	M (KN.m)	b (cm)	h (cm)	a (cm)	$h_0$ (cm)	$\alpha_m$	$\xi$	$A_{s_{tt}}$ (cm)
Gối M11	27.79	100	40	3	37	0.02	0.02	3.24
Gối M22	24.14	100	40	3	37	0.01	0.01	2.81
Nhịp M11	17.78	100	40	3	37	0.01	0.01	2.06
Nhịp M22	13.88	100	40	3	37	0.01	0.01	1.61

**BẢNG CHỌN THÉP**

Vị trí	b	$h_0$	$A_{s_{tt}}$	$\phi$	a	$A_{s_c}$	$\mu$	K. tra
Gối M11	100	37.0	3.24	14	200	7.7	0.208	OK
Gối M22	100	37.0	2.81	14	200	7.7	0.208	OK
Nhịp M11	100	37.0	2.06	14	200	7.7	0.208	OK
Nhịp M22	100	37.0	1.61	14	200	7.7	0.208	OK

## 7. KIỂM TRA MÓNG BÊ

### ĐỊA CHẤT CÁC LỚP ĐẤT

Lớp	Loại	h <sub>i</sub> (m)	g (KN/m <sup>3</sup> )	φ	C	E
Lớp 1B	Á sét	5.2	19.3	13.4	2.17	368.1

- Bản đáy đặt trực tiếp lên nền đất, do đó bản đáy tính như một bản móng đặt trên nền đàn hồi

#### a.Xác định sức chịu tải của nền đất

$$R^{tc} = \frac{m_1 \times m_2}{k_{tc}} (Ab\gamma_{II} + B.Hm.\gamma'_{II} + Dc_{II})$$

Trong đó :

$$m_1 = 1$$

$$m_2 = 1$$

$$k_{tc} = 1$$

$$\varphi^{tc} = 13.4$$

A, B, D : các hệ số phụ thuộc  $\varphi^{tc}$

$$A = 0.275$$

$$B = 2.099$$

$$D = 4.611$$

Bề rộng móng:  $b = 9 \text{ m}$ ,  $l = 11 \text{ m}$ ,  $Hm = 3.5 \text{ m}$

$$\gamma_{II} = 19.300 \text{ (KN/m}^3\text{)}$$

$$\gamma'_{II} = 19.3 \text{ (KN/m}^3\text{)}$$

$$c_{II} = 2.17 \text{ (KPa)}$$

Vậy  $R = 199.48 \text{ (KPa)} = 19.9 \text{ T/m}^2$

### C. Kiểm tra lún cho bể nước:

- Ứng suất bản thân tại đáy bể:

$$\sigma^{BT} = \sum \gamma h = 6.755 \text{ (T/m}^2\text{)}$$

- Ứng suất gây lún tại đáy bể

$$\sigma^{GL} = 1.755 \text{ (T/m}^2\text{)}$$

- Chia nền đất dưới đáy bể thành nhiều lớp có chiều dày

$$h_i = \frac{B}{4} = 2.25 \quad \text{chọn } h = 2 \quad \text{m}$$

### BẢNG TÍNH LÚN

Điểm	Z	$\frac{L_M}{B_M}$	$\frac{2z}{B_M}$	Ko	$\sigma^d \text{ (T/m}^2\text{)}$	$\sigma^g \text{ (T/m}^2\text{)}$	E	Si
0	0	1.222	0.000	1	1.76	6.755	368.1	0.0076
1	2.000	1.222	0.444	0.953	1.67	45.355	368.1	0.0073
2	4.000	1.222	0.889	0.793	1.39	83.955	368.1	0.0060
3	6.000	1.222	1.333	0.604	1.06	122.555	368.1	0.0041
							S=	0.0251

Độ lún nền  $s = \sum_{i=1}^5 \frac{0.8}{E_i} \sigma_{zi}^g h_i = 0.0251 \text{ m} < 0.08\text{m}$  vậy đã thỏa điều kiện lún



# CALCULATION OF THE TANK WALL ACCORDING TO THE CRACK CONDITION ACCORDING TO TCVN 5574-2018

## 1. Materials

Concrete	<b>B25</b>		
	Rb,ser=	18.5	Mpa
	Rbt,ser=	1.6	Mpa
	Eb=	30000	Mpa
Steel	<b>CH</b>		
	Es=	210000	Mpa
	a=Es/Eb=	7.00	



## 2. Section size

b=	100	cm
h floor=	30	cm

Arrangement of tensile reinforcement: **14 a 200**

Yes As = **9.23** cm<sup>2</sup>

Reinforcement protection class a1= **3** cm

Xtb = **twelfth** cm

## 3. Component internal force

The internal force of the structure is obtained from the structural analysis software: Sap

Bending moment due to full load M1= **2.83** Tm

Bending moment due to long-term load M2= **2.83** Tm

## 4. Check for crack formation

Calculation of members subjected to bending, eccentric compression, as well as eccentric tension according to crack formation can be

under the following conditions:

$$M_r < M_{cr,c}$$

In there:

**M<sub>r</sub>**: is the moment due to external forces on one side of the section under consideration with respect to an axis parallel to neutral axis and passes through the core point farther away from the tensile region of this section

**M<sub>cr,c</sub>**: is the anti-cracking moment of the section perpendicular to the longitudinal axis of the member when cracks are formed

$$M_{cr,c} < R_{bt,ser} \cdot W_{pl}$$

**W<sub>pl</sub>**: The bending moment of the converted section for the outermost tensile fiber of the converted section with the fiber

$$W_{pl} = \frac{2 \times (I_{bo} + a I_{so} + a I'_{so})}{h - x} + S_{bo}$$

outermost tensile

Area converted cross-sectional area = **3064.6** cm<sup>2</sup>

x=	0.511	
x=	15.32	cm
I <sub>bo</sub> =	119767.7	cm <sup>4</sup>
I <sub>so</sub> =	1260.2	cm <sup>4</sup>
I' <sub>so</sub> =	0.0	cm <sup>4</sup>
S <sub>bo</sub> =	10780.6	cm <sup>3</sup>
W <sub>pl</sub> =	28295.09	cm <sup>3</sup>
M <sub>cr,c</sub> =	4.53	Tm

**Conclude:** *Floor does not appear cracks*

## 5. Calculation of reinforced concrete members according to crack expansion

Conditions limiting crack expansion

$$a_{arc1} \leq [a_{arc1}]$$

### 5.1 Crack width arc1t due to short-term effect of full load

Width of beam crack according to the formula

$$a_n = \delta \times \varphi_L \times \eta \times \frac{\sigma_s}{E_s} \times 20 \times (3.5 - 100\mu) \times \sqrt[3]{d}$$

d=	first	with flexural members
h=	first	with ribbed bar reinforcement
m=	0.34%	
jl=	1.00	with short acting loads
b=	1.80	With heavy concrete
d=	0.02	
u=	0.45	with short acting loads
jf=	0.00	
l=	0.00	
x=	0.16	
x=	4.21	cm
z=	24.90	cm
ss=	1.23	T/cm2
a <sub>crct</sub> =	0.089	mm

## 5.2 Crack width acrc1d due to short-term effects of long-term loading

Width of beam crack according to the formula

$$a_n = \delta \times \varphi_L \times \eta \times \frac{\sigma_s}{E_s} \times 20 \times (3.5 - 100\mu) \times \sqrt[3]{d}$$

d=	1.00	with flexural members
h=	1.00	with ribbed bar reinforcement
m=	0.34%	
jl=	1.00	with short acting loads
b=	1.80	With heavy concrete
d=	0.02	
u=	0.45	with short acting loads
jf=	0.00	
l=	0.00	
x=	0.156	
x=	4.21	cm
z=	24.90	cm
ss=	1.23	T/cm2
a <sub>crctd</sub> =	0.089	mm

## 5.3 Long-term crack width acrc2 due to long-term effects of long-term loading

Width of beam crack according to the formula

$$a_n = \delta \times \varphi_L \times \eta \times \frac{\sigma_s}{E_s} \times 20 \times (3.5 - 100\mu) \times \sqrt[3]{d}$$

	h=	1.00	with ribbed bar reinforcement
m=		0.34%	
	jl=	1.00	with short acting loads
	b=	1.80	With heavy concrete
	d=	0.02	
	u=	0.1875	with long-term applied load, humidity > 75%
	jf=	0.00	
	l=	0.00	
	x=	0.16	
	x=	4.21	cm
	z=	24.90	cm
	ss=	1.23	T/cm2
	a <sub>crct</sub> =	0.089	mm

Short-term crack width : acrc1= acrc.1t- acrc.1d+ acrc2 = 0.089 [acrc1 ] = 0.3 mm

Conclude:

The steel floor layout ensures the condition to limit cracks

# CALCULATING THE BOTTOM FLOOR OF THE TANK ACCORDING TO THE CRACK CONDITION ACCORDING TO TCVN 5574-2018

## 1. Materials

Concrete	<b>B25</b>		
	Rb,ser=	18.5	Mpa
	Rbt,ser=	1.6	Mpa
	Eb=	30000	Mpa
Steel	<b>CH</b>		
	Es=	210000	Mpa
	a=Es/Eb=	7.00	



## 2. Cross-section

Section size

b=	100	cm
h floor=	40	cm

Arrangement of tensile reinforcement:

Reinforcement protection class  
a1=

14 a 200

Yes As = 9.23 cm2

3 cm

Xtb = 17 cm

## 3. Component internal force

The internal force of the structure is obtained from the structural analysis software: Sap

Bending moment due to full load M1=

2.78 Tm

Bending moment due to long-term load M2=

2.78 Tm

## 4. Check for crack formation

Calculation of members subjected to bending, eccentric compression, as well as eccentric tension according to crack formation can be

under the following conditions:

$$M_r < M_{crc}$$

In there:

Mr: is the moment due to external forces on one side of the section under consideration with respect to an axis parallel to

neutral axis and passes through the core point farther away from the tensile region of this section

Mcrc: is the anti-cracking moment of the section perpendicular to the longitudinal axis of the member when cracks are formed

$$M_{crc} < R_{bt,ser} \cdot W_{pl}$$

Wpl : The bending moment of the converted section for the outermost tensile fiber of the converted section with the fiber outermost tensile

$$W_{pl} = \frac{2 \times (I_{bo} + \alpha I_{so} + \alpha I'_{so})}{h - x} + S_{bo}$$

Ared converted cross-sectional Ared = 4064.6 cm2

x= 0.508

x= 20.32 cm

Ibo= 279588.7 cm4

Iso= 2569.1 cm4

I'so= 0.0 cm4

Sbo= 19369.1 cm3

Wpl= 49607.07 cm3

Mcrc= 7.94 Tm

Conclude: *Floor does not appear cracks*

## 5. Calculation of reinforced concrete members according to crack expansion

Conditions limiting crack expansion

$$a_{arc1} \leq [a_{arc1}]$$

### 5.1 Crack width arc1t due to short-term effect of full load

Width of beam crack according to the formula

$$a_n = \delta \times \varphi_L \times \eta \times \frac{\sigma_s}{E_s} \times 20 \times (3.5 - 100\mu) \times \sqrt[3]{d}$$

d= first with flexural members  
 h= first with ribbed bar reinforcement  
 m= 0.25%  
 jl= 1.00 with short acting loads  
 b= 1.80 With heavy concrete  
 d= 0.01  
 u= 0.45 with short acting loads  
 jf= 0.00  
 l= 0.00  
 x= 0.13  
 x= 4.72 cm  
 z= 34.64 cm  
 ss= 0.87 T/cm2  
 accc1t = 0.065 mm

## 5.2 Crack width acrc1d due to short-term effects of long-term loading

Width of beam crack according to the formula

$$a_n = \delta \times \varphi_L \times \eta \times \frac{\sigma_s}{E_s} \times 20 \times (3.5 - 100\mu) \times \sqrt[3]{d}$$

d= 1.00 with flexural members  
 h= 1.00 with ribbed bar reinforcement  
 m= 0.25%  
 jl= 1.00 with short acting loads  
 b= 1.80 With heavy concrete  
 d= 0.01  
 u= 0.45 with short acting loads  
 jf= 0.00  
 l= 0.00  
 x= 0.128  
 x= 4.72 cm  
 z= 34.64 cm  
 ss= 0.87 T/cm2  
 acrc1d = 0.065 mm

## 5.3 Long-term crack width acrc2 due to long-term effects of long-term loading

Width of beam crack according to the formula

$$a_n = \delta \times \varphi_L \times \eta \times \frac{\sigma_s}{E_s} \times 20 \times (3.5 - 100\mu) \times \sqrt[3]{d}$$

h= 1.00 with ribbed bar reinforcement  
 m= 0.25%  
 jl= 1.00 with short acting loads  
 b= 1.80 With heavy concrete  
 d= 0.01  
 u= 0.1875 with long-term applied load, humidity > 75%  
 jf= 0.00  
 l= 0.00  
 x= 0.13  
 x= 4.72 cm  
 z= 34.64 cm  
 ss= 0.87 T/cm2  
 acrc2 = 0.065 mm

Short-term crack width : acrc1= acrc.1t- acrc.1d+ acrc2 =

0.065 [acrc1 ] = 0.3 mm

Conclude:

The steel floor layout ensures the condition to limit cracks

USAID CIVIL WORKS DIOXIN REMEDIATION AT BIEN HOA AIRBASE AREA  
PROJECT - PHASE 1

ARCHITECT-ENGINEERING SERVICES FOR DIOXIN  
REMEDICATION AT BIEN HOA AIRBASE AREA ACTIVITY  
CONTRACT NO. AID-OAA-I-15-00053  
MAY 2023

CW1 - LTSA FINAL COVER



BIEN HOA



AIRBASE AREA






Trigon Associates, llc  
1515 Poydras St., Ste 930  
New Orleans, LA 70112  
www.trigonassociates.com

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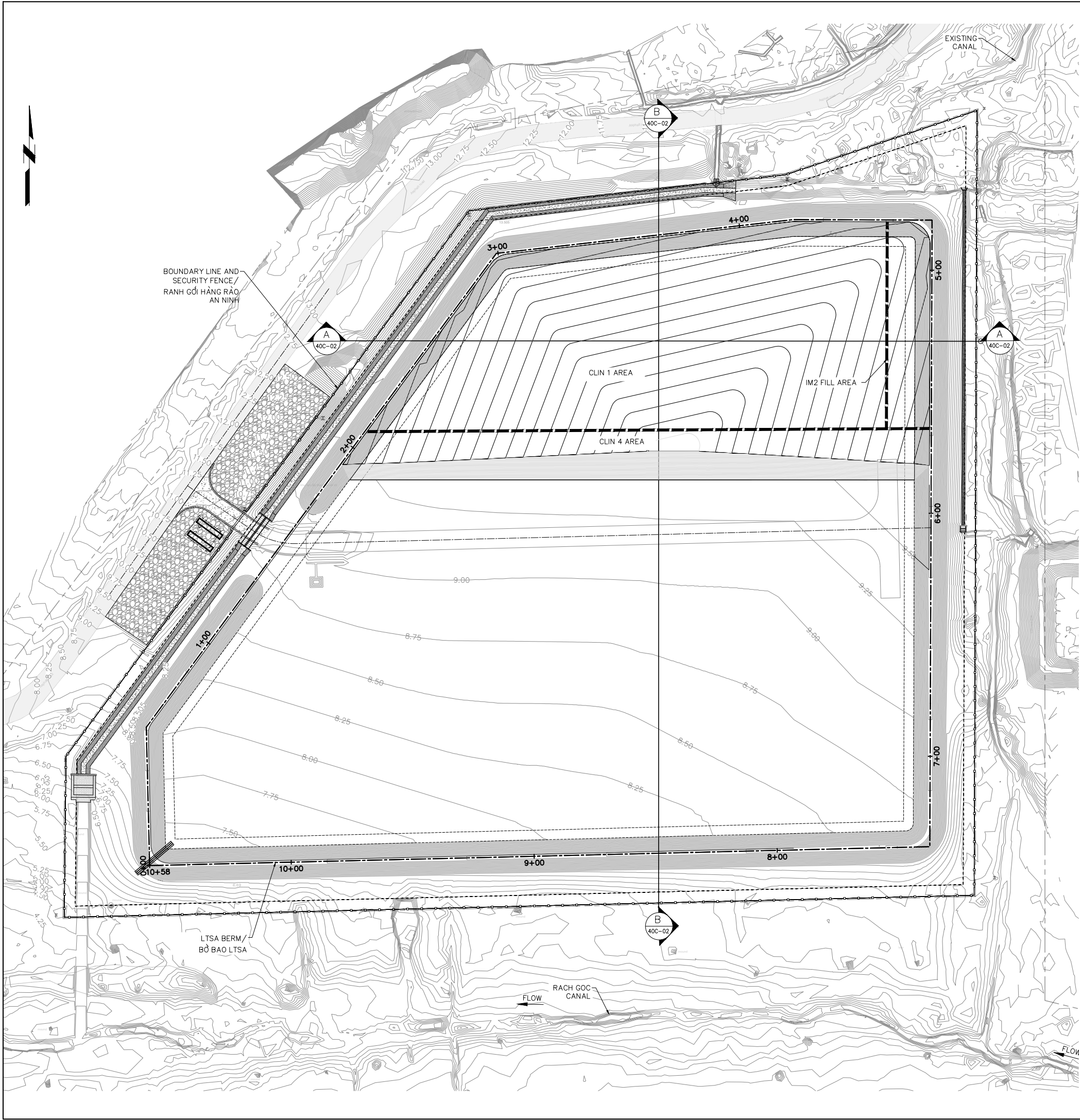
REV BẢN	DESCRIPTION ĐIỀU CHỈNH	DATE NGÀY	BY BỘ
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PREPARED BY NGƯỜI THỰC HIỆN:			
PHAN THANH LUAN			
CHECKED BY NGƯỜI KIỂM TRA:			
BARRY P. BREAUX			
DESIGNER OF RECORD CHỦ NHIỆM THIẾT KẾ:			
GREGORY A. KOLENOVSKY			
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DIOXIN REMEDIATION AT BIEN HOA AIRBASE AREA PROJECT - PHASE 1 DỰ ÁN XỬ LÝ Ô NHIỄM DIOXIN KHU VỰC SÂN BAY BIÊN HÒA - GIAI ĐOẠN 1			
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40G-02	TỜ:	02	43
	CỦA:		



GENERAL NOTES/ GHI CHÚ CHUNG

- ALL ELEVATIONS ARE IN METERS AND RELATIVE TO VIETNAMESE NATIONAL ELEVATION SYSTEM (HONDAU), BASED ON EXISTING ELEVATION BENCHMARK ISSUED BY CLIENT NAMED GPS-1/ TẤT CẢ CAO ĐỘ THỂ HIỆN LÀ M THEO HỆ CAO ĐỘ HỒN DẦU, TỪ GPS-1 DO CHỦ ĐẦU TƯ CẤP.
- ALL COORDINATES ARE IN METERS AND RELATIVE TO VIETNAMESE COORDINATE SYSTEM VN2000, DONGNAI PROVINCE MERIDIAN 107o/45'00" PROJECTION 3o/, BASED ON TEMPORARY BENCHMARKS NAMED TBM-17 AND TBM-18/ TẤT CẢ CÁC TỌA ĐỘ ĐƯỢC GHI LÀ M THEO HỆ TỌA ĐỘ VN2000, KINH TUYẾN ĐÔNG NAI 107o/45'00" , MŨI CHỈ 3°/. VỚI CÁC MỐC TÊN TBM-11 VÀ TBM-12
- ALL DIMENSIONS ARE IN METERS UNLESS NOTED OTHERWISE/ TẤT CẢ CÁC CAO ĐỘ GHI BẰNG M TRỪ KHI CÓ QUY ĐỊNH KHÁC.
- CONTOUR ELEVATIONS SHOW TOP OF LOW CONCENTRATION MATERIAL, EXCLUDING COVER LAYER/ CAO ĐỘ ĐƯỜNG ĐỒNG MỤC ĐÌNH HOÀN THIỆN LÀ LỚP VẬT LIỆU NHIỄM NỒNG ĐỘ THẤP, KHÔNG BAO GỒM LỚP PHỦ

REV	DESCRIPTION	DATE	BY
BẢN	ĐIỀU CHỈNH	NGÀY	BỜ

PREPARED FOR  
CHỦ ĐẦU TƯ:



A&E BIEN HOA CONTRACTOR  
NHÀ THẦU TV&TK BIÊN HÒA



ENGINEERING • CONSULTING • MANAGEMENT  
Trigon Associates, llc1515 Poydras St.,  
Ste 930 New Orleans, LA 70112  
www.trigonassociates.com

PREPARED BY  
NGƯỜI THỰC HIỆN:

PHAN THANH LUAN

CHECKED BY  
NGƯỜI KIỂM TRA:

BARRY P. BREAUX

DESIGNER OF RECORD  
CHỦ NHIỆM THIẾT KẾ:

GREGORY A. KOLENOVSKY

PROJECT NAME/ TÊN DỰ ÁN:  
DIOXIN REMEDIATION AT BIEN HOA  
AIRBASE AREA PROJECT - PHASE 1  
DỰ ÁN XỬ LÝ Ô NHIỄM DIOXIN KHU VỰC  
SÂN BAY BIÊN HÒA - GIAI ĐOẠN 1

FINAL DESIGN

ITEM/ HẠNG MỤC:

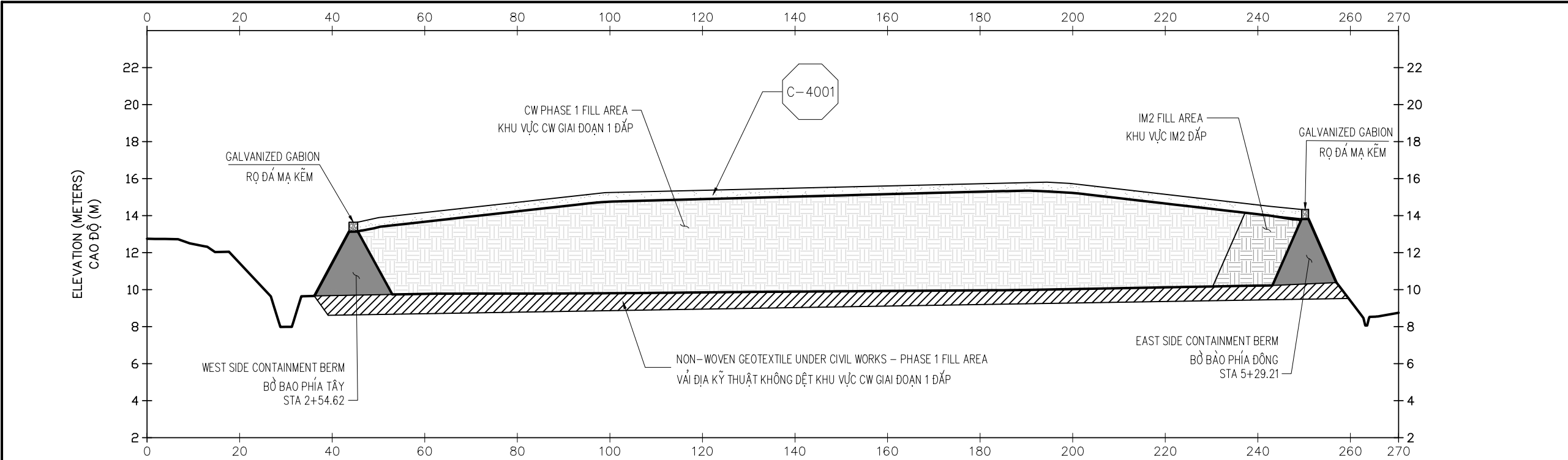
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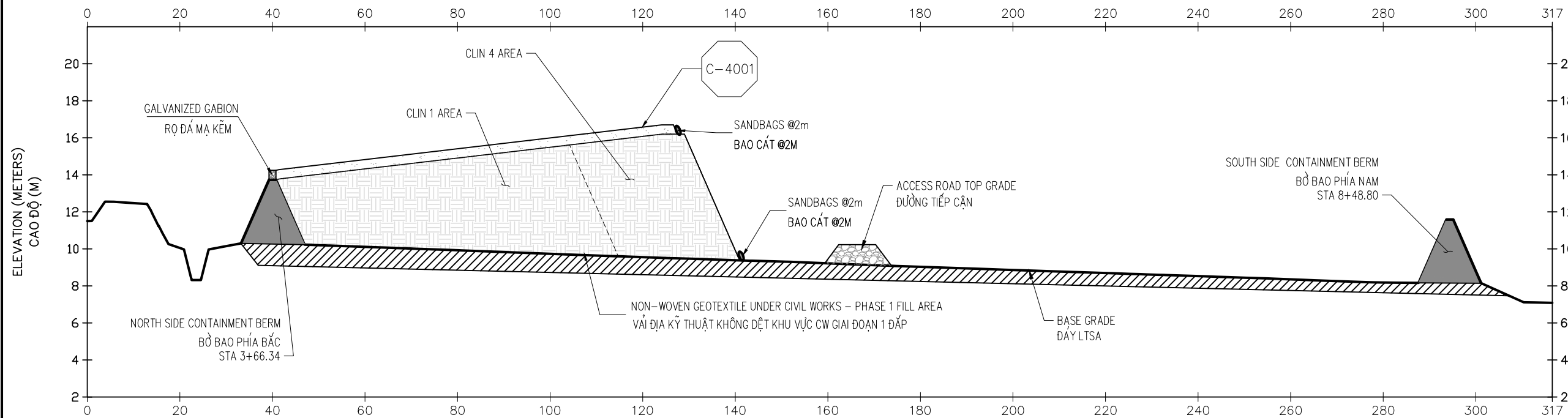
CIVIL WORKS PHASE 1 FILL AREA PLAN  
MẶT BẰNG ĐÁP HOÀN THIỆN CW GIAI  
ĐOẠN 1

DATE/ NGÀY:	SIZE/ KHỔ:	SCALE/ TỈ LỆ:
31-May-2023	A3	NTS
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40C-01	TỜ: 03	CỦA: 43







SECTION A-A/ MẶT CẮT A-A  
HORIZONTAL/ NGANG 1:1000  
VERTICAL/ ĐỨNG 1:250



SECTION B-B/ MẶT CẮT B-B  
HORIZONTAL/ NGANG 1:1000  
VERTICAL/ ĐỨNG 1:250

GENERAL NOTES/ GHI CHÚ CHUNG

- ALL ELEVATIONS ARE IN METERS AND RELATIVE TO VIETNAMESE NATIONAL ELEVATION SYSTEM (HONDAU), BASED ON EXISTING ELEVATION BENCHMARK ISSUED BY CLIENT NAMED GPS-1/ TẤT CẢ CAO ĐỘ THỂ HIỆN LÀ M THEO HỆ CAO ĐỘ HÒN DẦU, TỪ GPS-1 DO CHỦ ĐẦU TƯ CẤP.
- ALL COORDINATES ARE IN METERS AND RELATIVE TO VIETNAMESE COORDINATE SYSTEM VN2000, DONGNAI PROVINCE MERIDIAN 107°/45'00" PROJECTION 3°, BASED ON TEMPORARY BENCHMARKS NAMED TBM-17 AND TBM-18/ TẤT CẢ CÁC TỌA ĐỘ ĐƯỢC GHI LÀ M THEO HỆ TỌA ĐỘ VN2000, KINH TUYẾN ĐÔNG NAI 107°/45'00", MÚI CHIỀU 3°/. VỚI CÁC MỐC TÊN TBM-11 VÀ TBM-12
- ALL DIMENSIONS ARE IN METERS UNLESS NOTED OTHERWISE/ TẤT CẢ CÁC CAO ĐỘ GHI BẰNG M TRỪ KHI CÓ QUY ĐỊNH KHÁC.

REV	DESCRIPTION	DATE	BY
BẢN	ĐIỀU CHỈNH	NGÀY	BỒI
PREPARED FOR CHỦ ĐẦU TƯ:			
<div><div> <b>USAID</b> FROM THE AMERICAN PEOPLE</div></div>			
A&E BIEN HOA CONTRACTOR NHÀ THẦU TV&TK BIÊN HÒA			
<div></div>			
ENGINEERING • CONSULTING • MANAGEMENT Trigon Associates, llc1515 Poydras St., Ste 930 New Orleans, LA 70112 www.trigonassociates.com			
PREPARED BY NGƯỜI THỰC HIỆN:			
PHAN THANH LUAN			
CHECKED BY NGƯỜI KIỂM TRA:			
BARRY P. BREAUX			
DESIGNER OF RECORD CHỦ NHIỆM THIẾT KẾ:			
GREGORY A. KOLENOVSKY			
PROJECT NAME/ TÊN DỰ ÁN:			
DIOXIN REMEDIATION AT BIEN HOA AIRBASE AREA PROJECT - PHASE 1 DỰ ÁN XỬ LÝ Ô NHIỄM DIOXIN KHU VỰC SÂN BAY BIÊN HÒA - GIAI ĐOẠN 1			
FINAL DESIGN			
ITEM/ HANG MỤC:			
CW1 - LTSA FINAL COVER			
DRAWING TITLE/ TÊN BẢN VẼ:			
CIVIL WORKS PHASE 1 FILL AREA CROSS SECTION MẶT CẮT ĐẮP HOAN THIÊN CW GIAI ĐOẠN 1			
DATE/ NGÀY:	SIZE/ KHÖ:	SCALE/ TỈ LỆ:	
31-May-2023	A3	AS NOTED	
DRAWING NO/ BẢN VẼ SỐ:	SHEET	OF	
40C-02	TỜ:	04	CỦA: 43

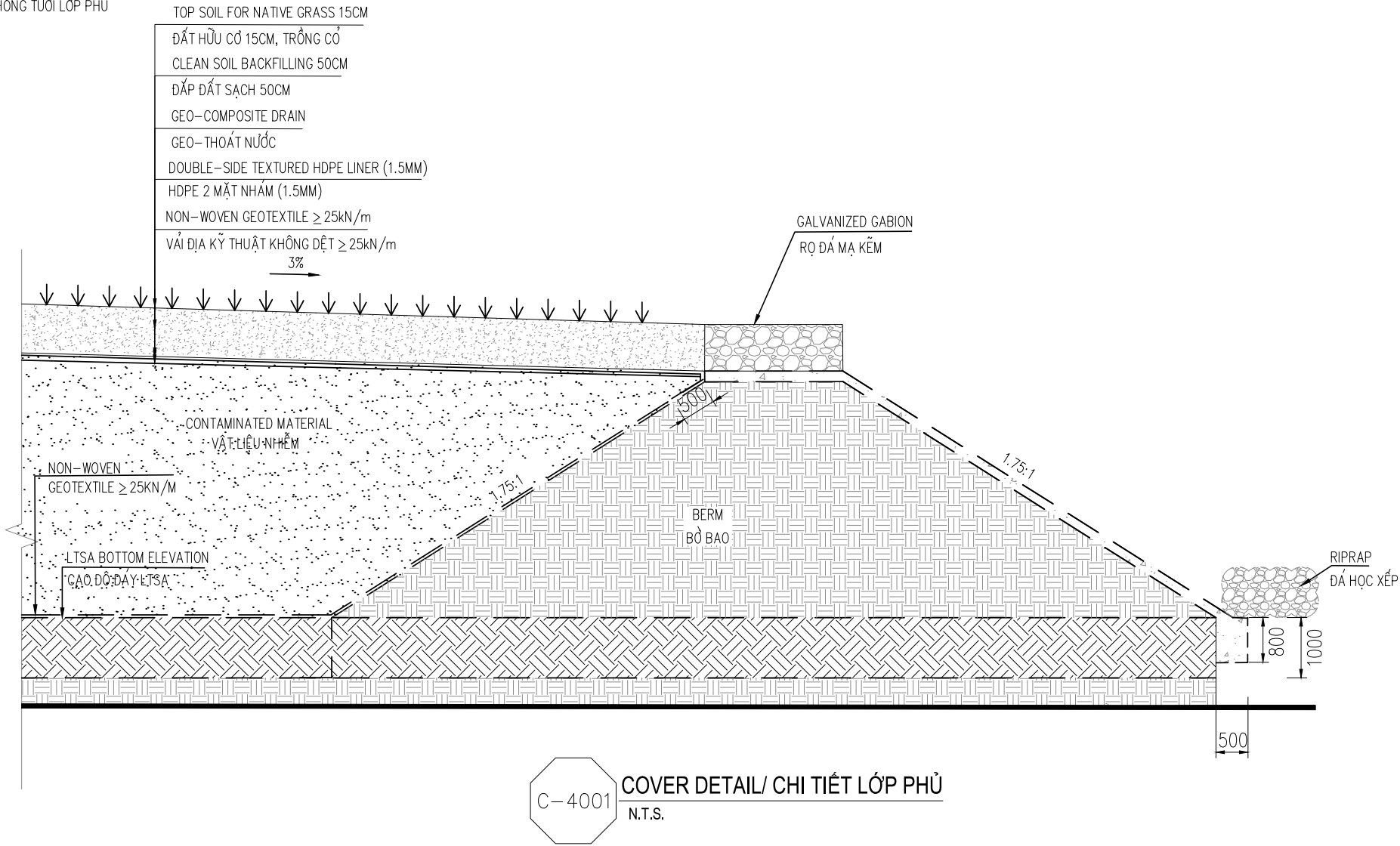


NOTES/ GHI CHÚ

1. CONTRACTOR TO ONLY PROVIDE/ NHÀ THẦU CHỈ CUNG CẤP :
- NON-WOVEN GEOTEXTILE FABRIC AT THE BASE GRADE AND TOP OF CONTAMINATED FILL (CIVIL WORKS PHASE I FILL AREA)/

VẢI ĐỊA KỸ THUẬT Ở ĐÁY VÀ ĐỈNH KHU VỰC ĐẤP ĐẤT NHIỄM (KHU VỰC ĐẤP CỦA NHÀ THẦU XÂY DỰNG 1)
- HDPE LINER TOP OF CONTAMINATED FILL (CIVIL WORKS PHASE I FILL)

TẤM HDPE TRÊN KHU VỰC ĐẤP ĐẤT NHIỄM (KHU VỰC ĐẤP CỦA NHÀ THẦU XÂY DỰNG 1)
2. CONTRACTOR WILL PROVIDE BELOW LAYER ( (CIVIL WORKS PHASE I AND IM2 FILL)/
- NHÀ THẦU THI CÔNG CÁC LỚP DƯỚI ĐÂY( KHU VỰC ĐẤP XÂY DỰNG 1 VÀ IM2).
- TOP SOIL FOR NATIVE GRASS 15CM/ ĐẤT HỮU CƠ 15CM, TRỒNG CỎ
- CLEAN SOIL BACKFILLING 50CM/ ĐẤP ĐẤT SẠCH 50CM
- GEO-COMPOSITE DRAIN/ GEO-THOÁT NƯỚC
- GALVANIZED GABION/ RỌ ĐÁ MẠ KẼM
- COVER IRRIGATION SYSTEM/ HỆ THỐNG TƯỚI LỚP PHỦ



NOTE:  
ALL DIMENSIONS ARE IN MILLIMETERS UNLESS OTHERWISE NOTED.  
TẤT CẢ KÍCH THƯỚC LÀ MILLIMETERS TRỪ CÓ GHI CHÚ KHÁC.

REV	DESCRIPTION	DATE	BY
BẢN	ĐIỀU CHỈNH	NGÀY	BƠI

PREPARED FOR  
CHỦ ĐẦU TƯ:



A&E BIEN HOA CONTRACTOR  
NHÀ THẦU TV&TK BIÊN HÒA



ENGINEERING • CONSULTING • MANAGEMENT  
Trigon Associates, llc1515 Poydras St.,  
Ste 930 New Orleans, LA 70112  
www.trigonassociates.com

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BARRY P. BREAUX

DESIGNER OF RECORD  
CHỦ NHIỆM THIẾT KẾ:

GREGORY A. KOLENOVSKY

PROJECT NAME/ TÊN DỰ ÁN:

DIOXIN REMEDIATION AT BIEN HOA  
AIRBASE AREA PROJECT - PHASE 1  
DỰ ÁN XỬ LÝ Ô NHIỄM DIOXIN KHU VỰC  
SÂN BAY BIÊN HÒA - GIAI ĐOẠN 1

FINAL DESIGN

ITEM/ HANG MỤC:

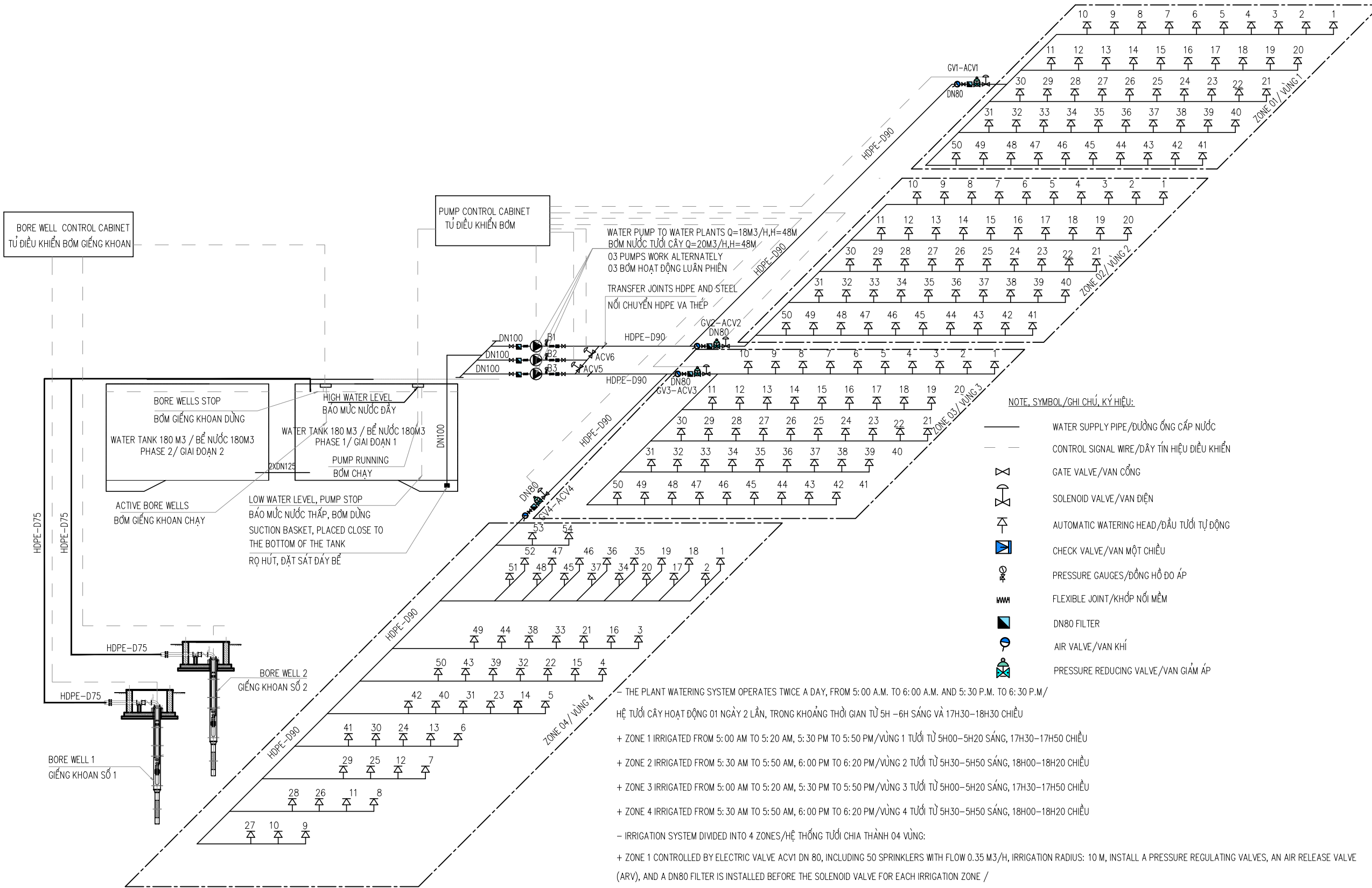
CW1 - LTSA FINAL COVER



DRAWING TITLE/ TÊN BẢN VẼ:

CIVIL DETAILS  
CHI TIẾT XÂY DỰNG

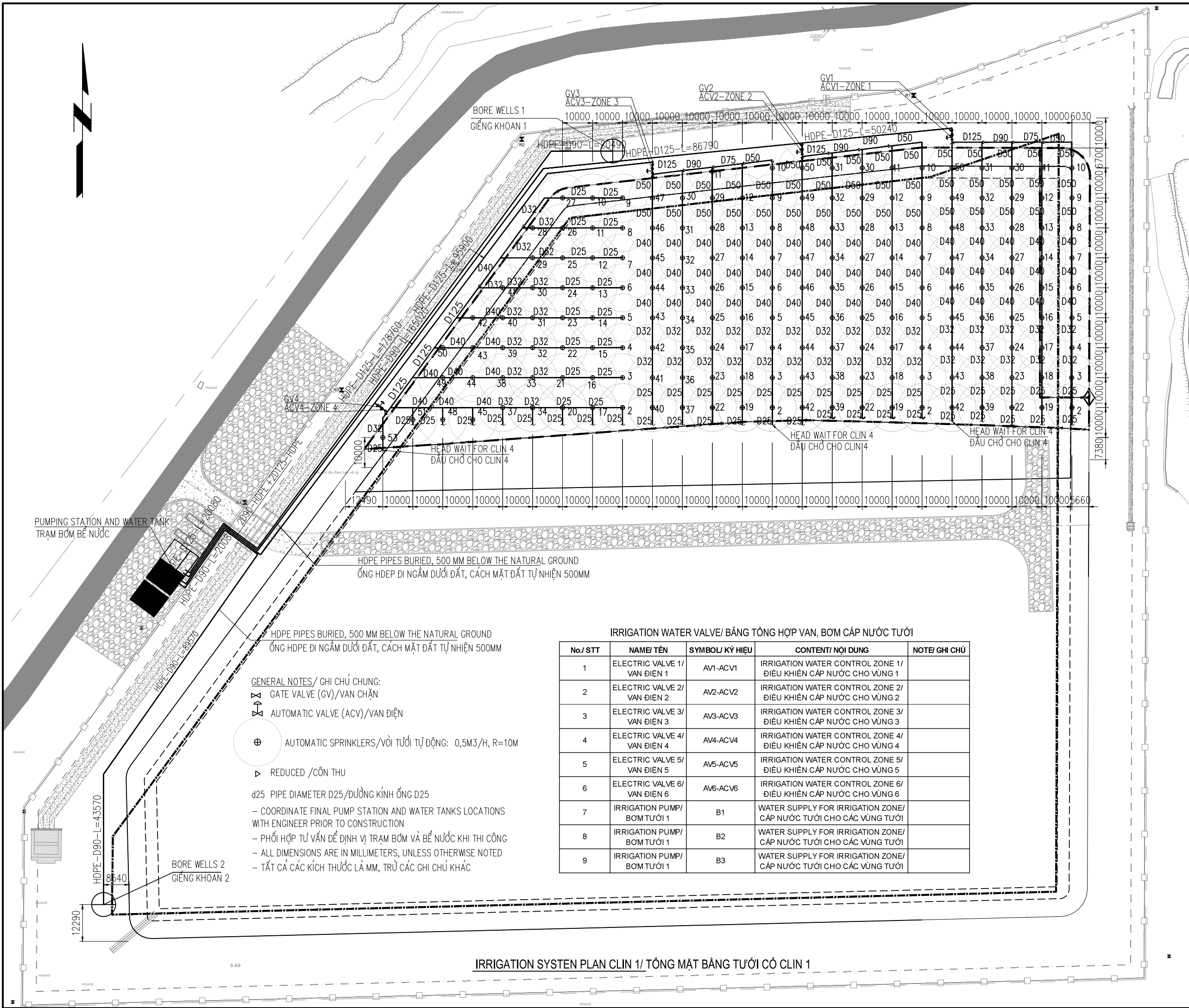
DATE/ NGÀY:	SIZE/ KHỔ:	SCALE/ TỈ LỆ:
31-May-2023	A3	AS NOTED
DRAWING NO/ BẢN VẼ SỐ:	SHEET	OF
40C-03	TỜ:	CỦA: 43



SCHEMATIC DIAGRAM OF IRRIGATION SYSTEM/SƠ ĐỒ NGUYÊN LÝ HỆ THỐNG TƯỚI

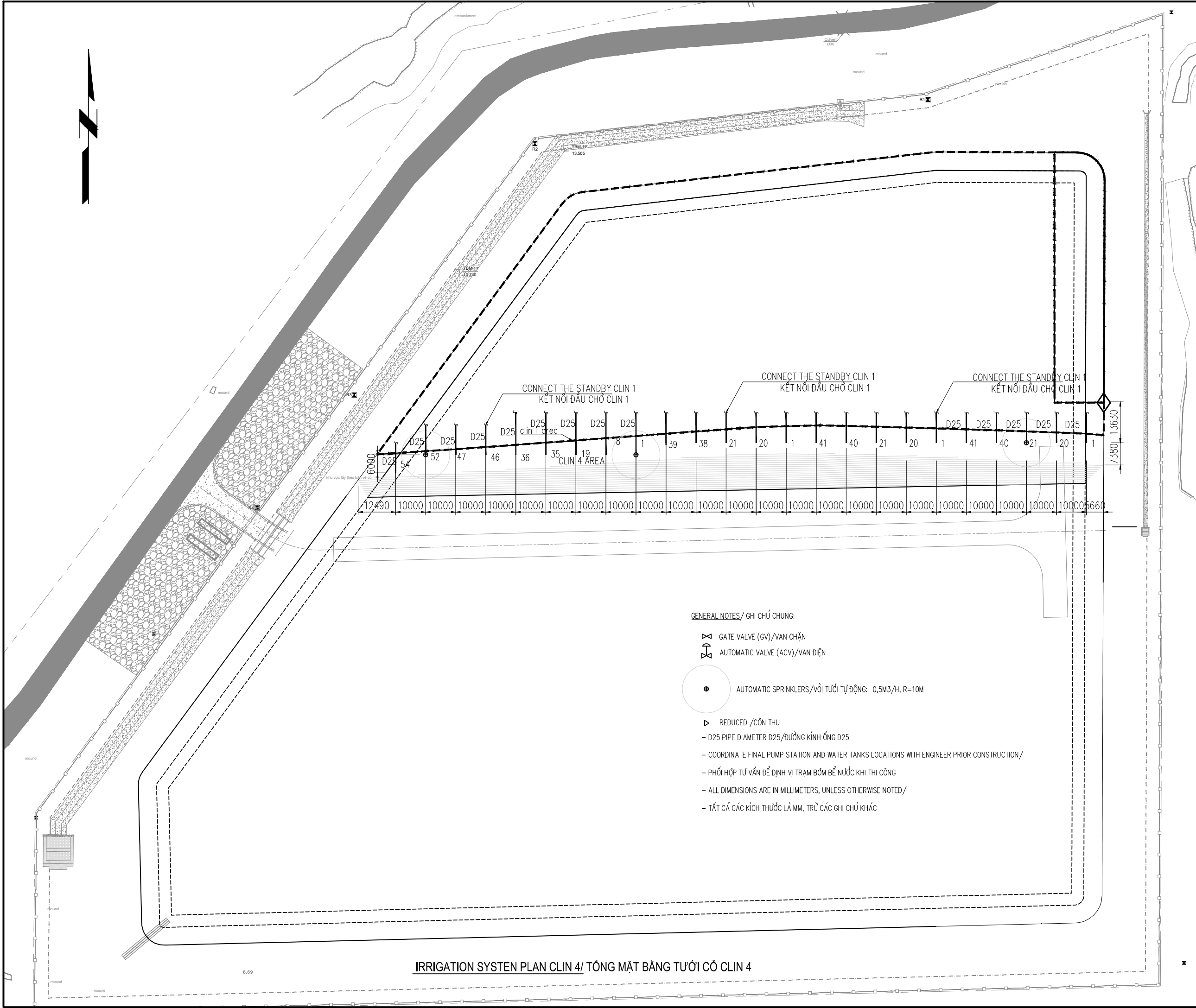


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BẢN	ĐIỀU CHỈNH	NGÀY	BỒI
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A&E BIEN HOA CONTRACTOR NHÀ THẦU TV&TK BIÊN HÒA			
<div></div> <div>ENGINEERING • CONSULTING • MANAGEMENT Trigon Associates, llc1515 Poydras St., Ste 930 New Orleans, LA 70112 www.trigonassociates.com</div>			
DESIGNED IN COLLABORATION WITH ASIA PACIFIC ENGINEERING CONSULTANTS (APECO)			
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TRẦN ĐÌNH TRỌ			
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ITEM/ HẠNG MỤC:			
CW1 - LTSA FINAL COVER			
DRAWING TITLE/ TÊN BẢN VẼ:			
SCHEMATIC DIAGRAM IRRIGATION SYSTEM CLIN1 SƠ ĐỒ NGUYÊN LÝ HỆ THỐNG TƯỚI CLIN1			
DATE/ NGÀY:	SIZE/ KHỔ:	SCALE/ TỈ LỆ:	
31-May-2023	A3	NTS	
DRAWING NO/ BẢN VẼ SỐ:	SHEET	OF	
40M-01	TỜ:	06	CỦA: 43








REV	DESCRIPTION	DATE	BY
BẢN	ĐIỀU CHỈNH	NGÀY	BỒI
PREPARED FOR CHỦ ĐẦU TƯ:			
			
A&E BIEN HOA CONTRACTOR NHÀ THẦU TV&TK BIÊN HÒA			
			
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FINAL DESIGN			
ITEM/ HẠNG MỤC:			
CW1 - LTSA FINAL COVER			
DRAWING TITLE/ TÊN BẢN VẼ:			
IRRIGATION SYSTEM PLAN CLIN 1 TỔNG MẶT BẰNG TƯỚI CỎ CLIN 1			
DATE/ NGÀY:	SIZE/ KHỔ:	SCALE/ TỈ LỆ:	
31-May-2023	A3	NTS	
DRAWING NO/ BẢN VẼ SỐ:	SHEET	OF	
40M-02	TỜ:	07	CỦA: 43



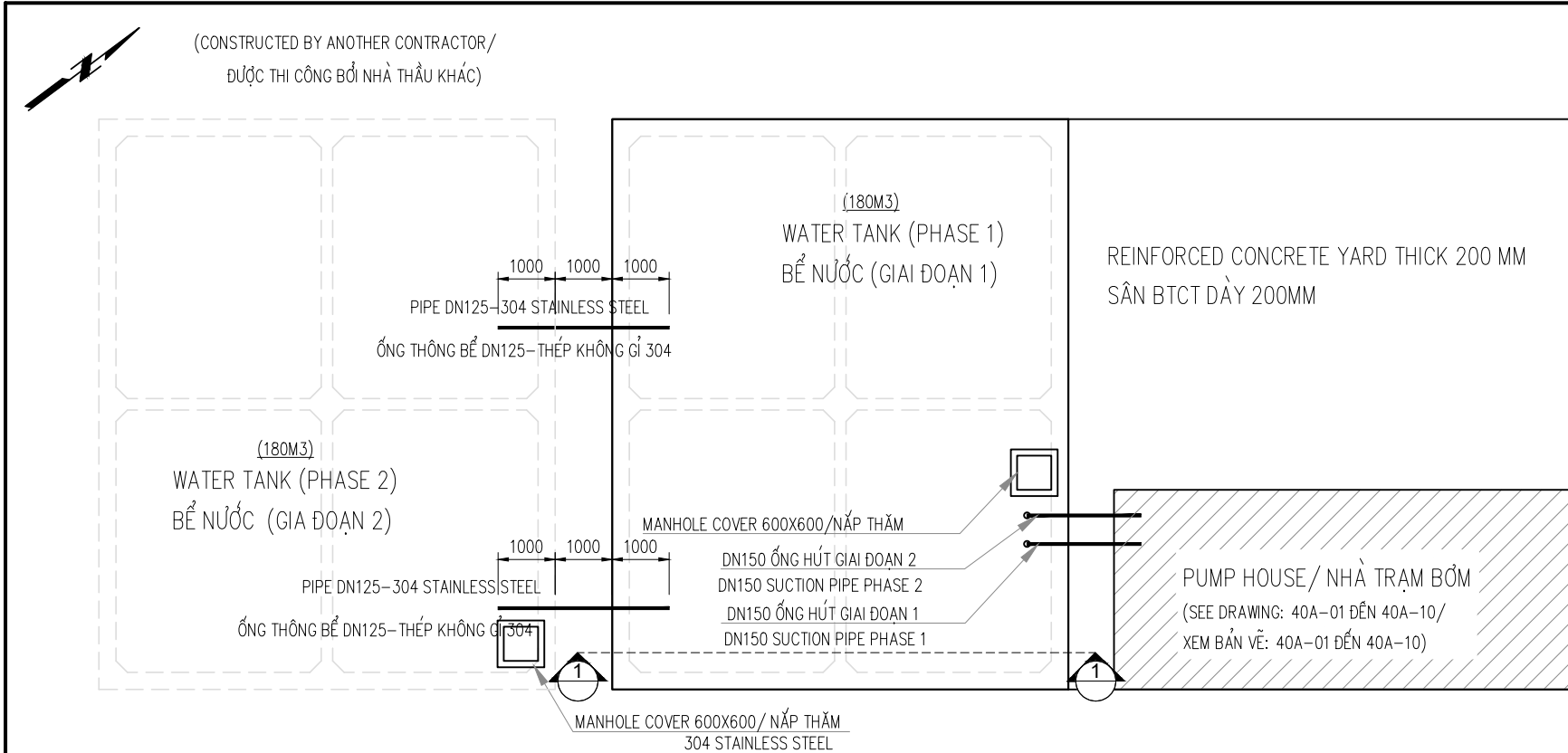
GENERAL NOTES/ GHI CHÚ CHUNG:

- GATE VALVE (GV)/VAN CHẶN
- AUTOMATIC VALVE (ACV)/VAN ĐIỆN
- AUTOMATIC SPRINKLERS/Vòi Tưới Tự Động: 0,5M3/H, R=10M
- REDUCED /CỖN THU
- D25 PIPE DIAMETER D25/ĐƯỜNG KÍNH ống D25
- COORDINATE FINAL PUMP STATION AND WATER TANKS LOCATIONS WITH ENGINEER PRIOR CONSTRUCTION/
- PHỐI HỢP TỪ VẤN ĐỀ ĐỊNH VỊ TRẠM BƠM BỂ NƯỚC KHI THI CÔNG
- ALL DIMENSIONS ARE IN MILLIMETERS, UNLESS OTHERWISE NOTED/
- TẤT CẢ CÁC KÍCH THUỘC LÀ MM, TRỪ CÁC GHI CHÚ KHÁC

IRRIGATION SYSTEM PLAN CLIN 4/ TỔNG MẶT BẰNG TƯỚI CỎ CLIN 4

REV	DESCRIPTION	DATE	BY
BẢN	ĐIỀU CHỈNH	NGÀY	BỒI
PREPARED FOR CHỦ ĐẦU TƯ:			
<div></div>			
A&E BIEN HOA CONTRACTOR NHÀ THẦU TV&TK BIÊN HÒA			
<div></div>			
ENGINEERING • CONSULTING • MANAGEMENT Trigon Associates, llc1515 Poydras St., Ste 930 New Orleans, LA 70112 www.trigonassociates.com			
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TRẦN ĐÌNH TRỢ			
CHECKED BY NGƯỜI KIỂM TRA:			
BARRY P. BREAUX			
DESIGNER OF RECORD CHỦ NHIỆM THIẾT KẾ:			
GREGORY A. KOLENOVSKY			
PROJECT NAME/ TÊN DỰ ÁN:			
DIOXIN REMEDIATION AT BIEN HOA AIRBASE AREA PROJECT - PHASE 1 DỰ ÁN XỬ LÝ Ô NHIỄM DIOXIN KHU VỰC SÂN BAY BIÊN HÒA - GIAI ĐOẠN 1			
FINAL DESIGN			
ITEM/ HẠNG MỤC:			
CW1 - LTSA FINAL COVER			
DRAWING TITLE/ TÊN BẢN VẼ:			
IRRIGATION SYSTEM PLAN CLIN 4 TỔNG MẶT BẰNG TƯỚI CỎ CLIN 4			
DATE/ NGÀY:	SIZE/ KHỔ:	SCALE/ TỈ LỆ:	
31-May-2023	A3	NTS	
DRAWING NO/ BẢN VẼ SỐ:	SHEET	OF	
40M-03	TỜ:	08	43
	CỦA:		

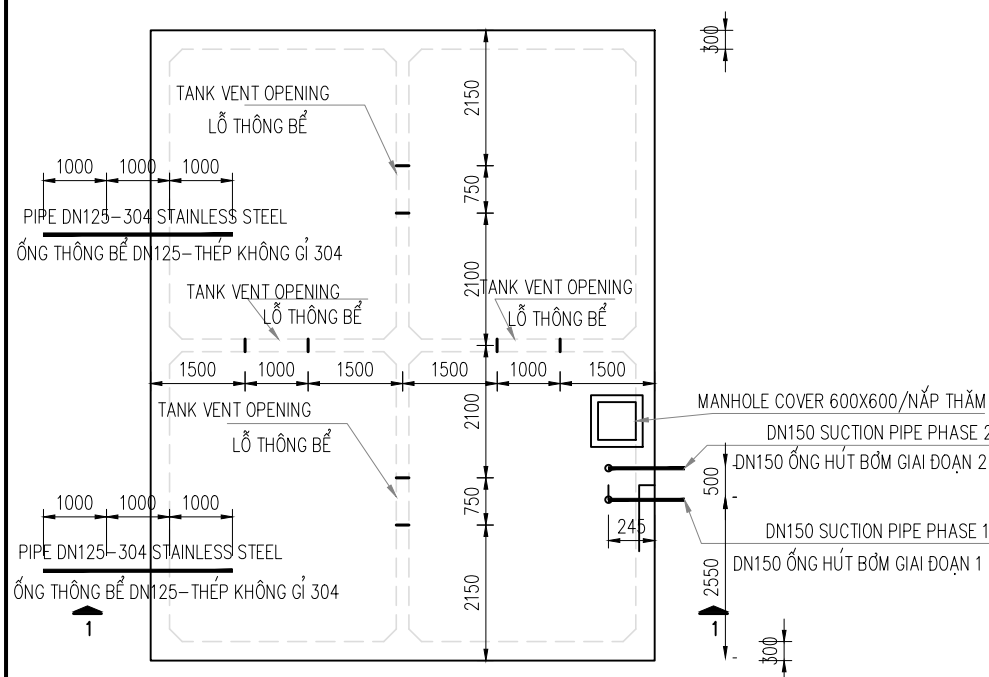




WATER TANKS PLAN, PUMP HOUSE/ MẶT BẰNG ĐỊNH VỊ BỂ NƯỚC, TRẠM BƠM  
SCALE/ TỈ LỆ: 1/120

GENERAL NOTES/ GHI CHÚ CHUNG:

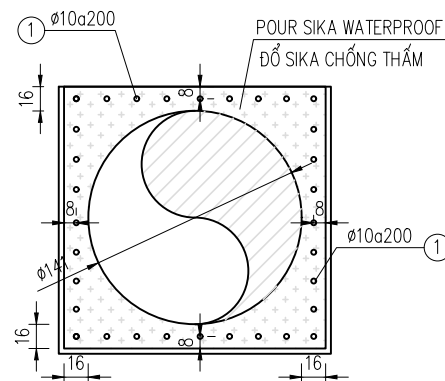
- + ALL DIMENSIONS ARE IN MILLIMETERS, UNLESS OTHERWISE NOTED
- + TẤT CẢ CÁC KÍCH THƯỚC LÀ MM, TRỪ CÁC GHI CHÚ KHÁC
- + ALTITUDE -0.300M ON THE DRAWING IS RELATIVE ALTITUDE, EQUIVALENT TO ELEVATION +10.00M ACCORDING TO THE NATIONAL ELEVATION SYSTEM.
- + CAO ĐỘ -0.300M TRÊN BẢN VẼ LÀ CAO ĐỘ TƯƠNG ĐỐI, TƯƠNG ĐƯƠNG CAO ĐỘ +10.00M THEO HỆ CAO ĐỘ QUỐC GIA.
- + SUCTION PUMP PIPE, TANK VENT USE 304 STAINLESS STEEL MATERIAL, THICKNESS ACCORDING TO SCH10S
- + ĐƯỜNG ống BƠM SỬ DỤNG VẬT LIỆU THÉP KHÔNG GỈ 304, ĐỘ DÀY THEO TIÊU CHUẨN SCH10S.



WATER TANK PLAN / MẶT BẰNG BỂ CHỨA NƯỚC

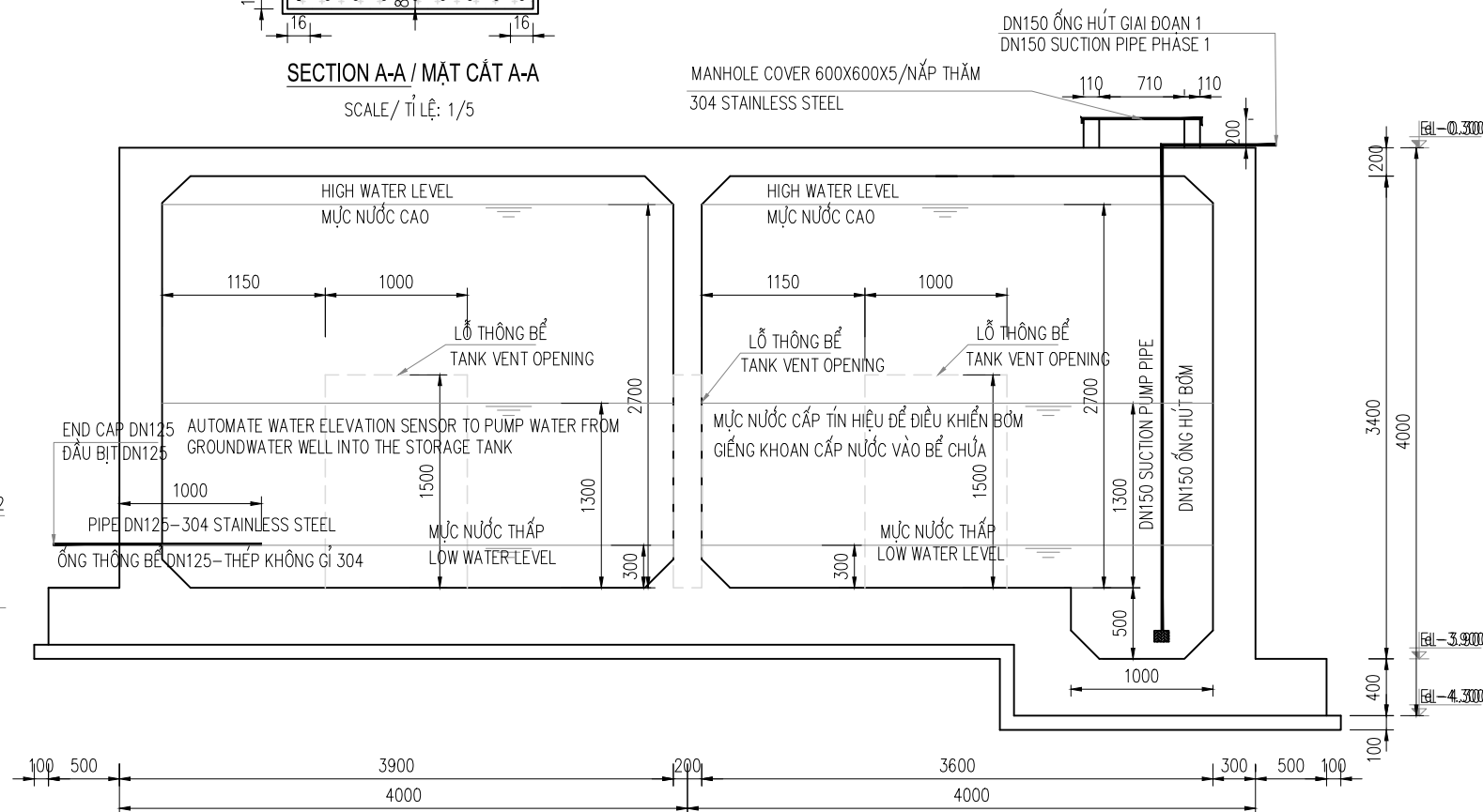
SCALE/ TỈ LỆ: 1/120

(SEE DRAWING: 40S-09, 40S-10, 40S-11/ XEM BẢN VẼ 40S-09, 40S-10, 40S-11)



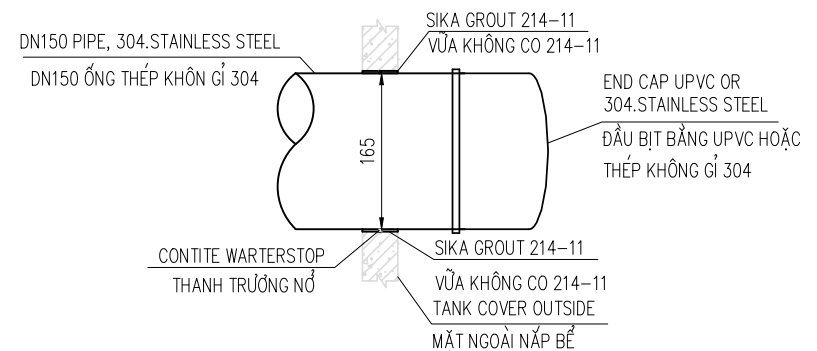
SECTION A-A / MẶT CẮT A-A

SCALE/ TỈ LỆ: 1/5



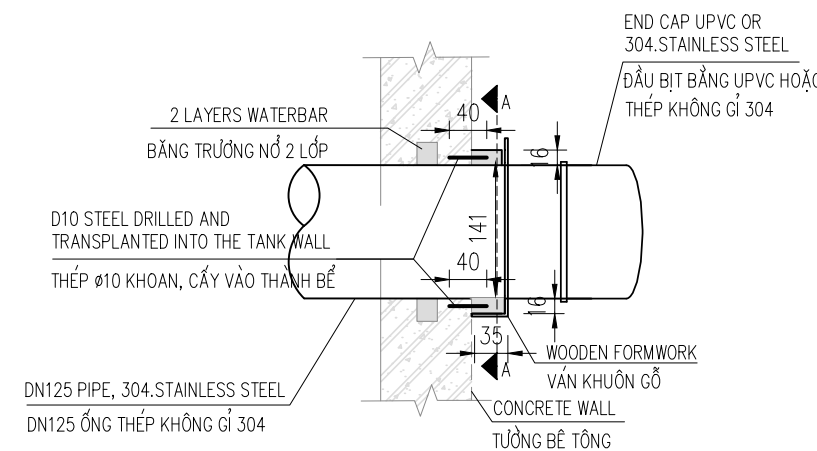
SECTION 1-1 / MẶT CẮT 1-1

SCALE/ TỈ LỆ: 1/50





PIPE DETAILS THROUGH TANK COVER / CHI TIẾT ống QUA NẮP BỂ

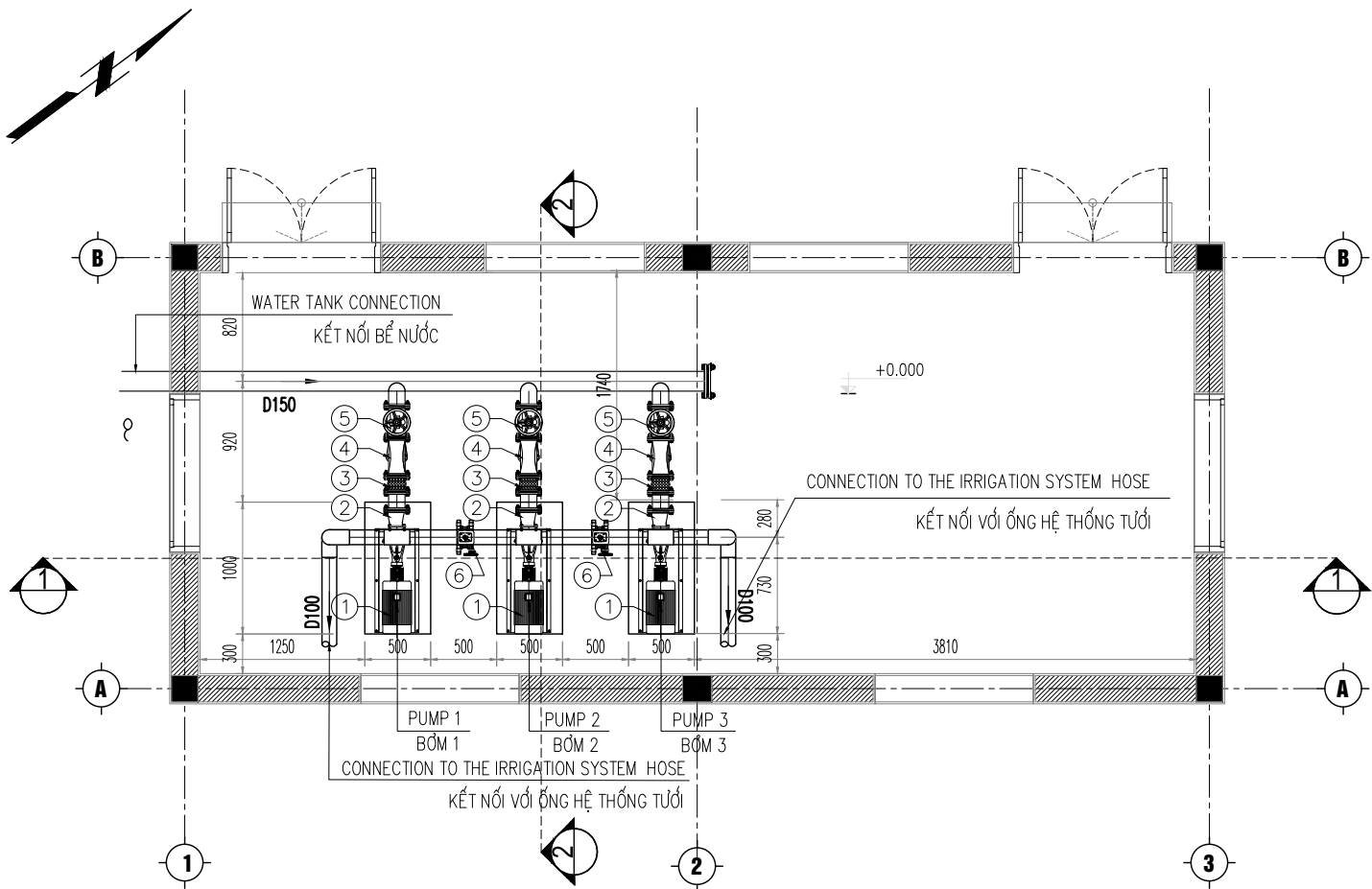
SCALE/ TỈ LỆ: 1/8



DETAILS OF PIPES THROUGH THE TANK WALL / CHI TIẾT ống QUA THÀNH BỂ

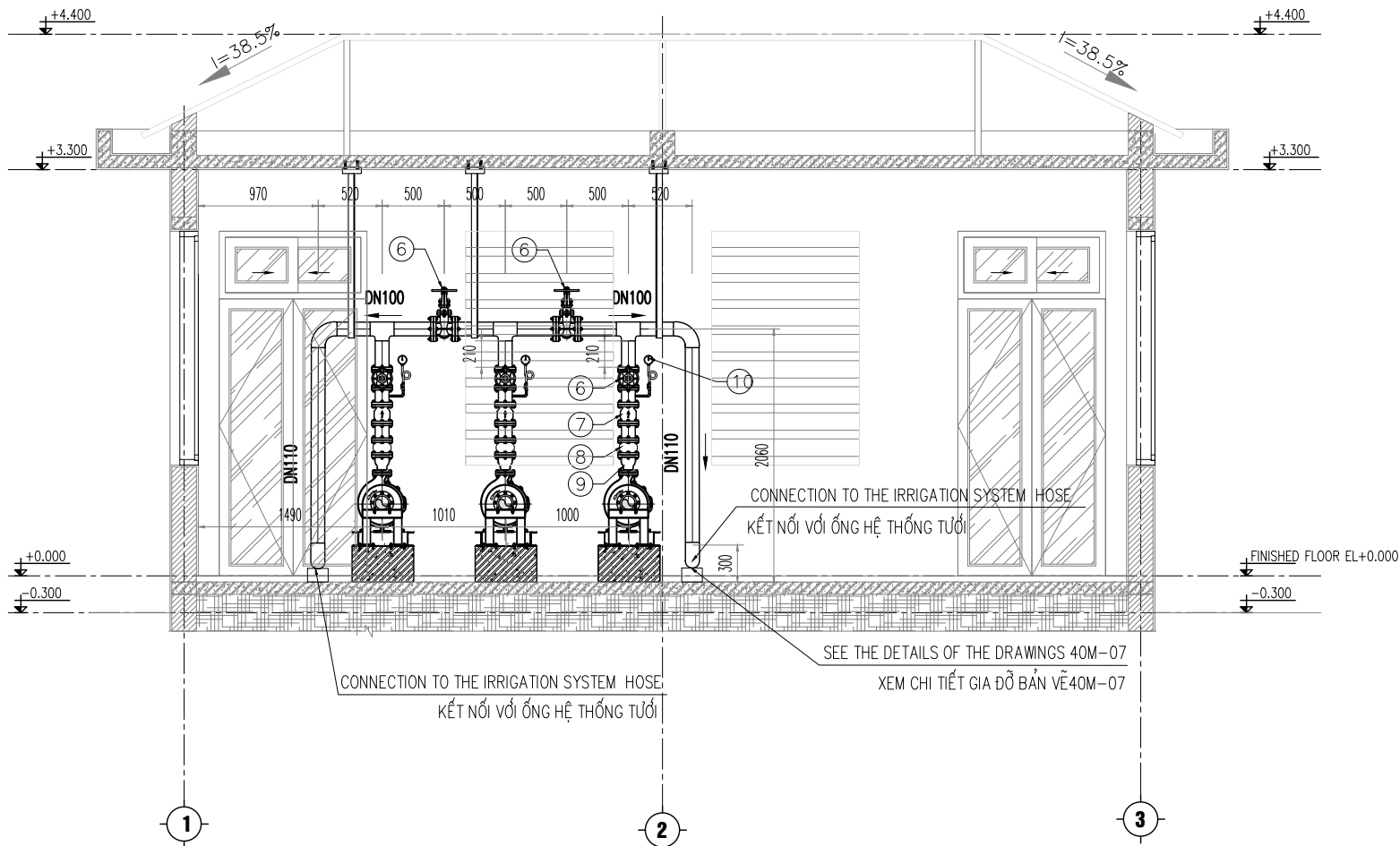
SCALE/ TỈ LỆ: 1/8

REV	DESCRIPTION	DATE	BY
BẢN	ĐIỀU CHỈNH	NGÀY	BỒI
PREPARED FOR CHỦ ĐẦU TƯ:			
 FROM THE AMERICAN PEOPLE			
A&E BIEN HOA CONTRACTOR NHÀ THẦU TV&TK BIÊN HÒA			
			
ENGINEERING • CONSULTING • MANAGEMENT Trigon Associates, Inc 1515 Poydras St., Ste 930 New Orleans, LA 70112 www.trigonassociates.com			
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TRẦN ĐÌNH TRỌ			
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FINAL DESIGN			
ITEM/ HANG MỤC:			
CW1 - LTSA FINAL COVER			
DRAWING TITLE/ TÊN BẢN VẼ:			
PUMPING STATION DETAILS CHI TIẾT TRẠM BƠM			
DATE/ NGÀY:	SIZE/ KHỔ:	SCALE/ TỈ LỆ:	
31-May-2023	A3	AS NOTED	
DRAWING NO/ BẢN VẼ SỐ:	SHEET	OF	
40M-04	TỜ:	09	CỦA: 43

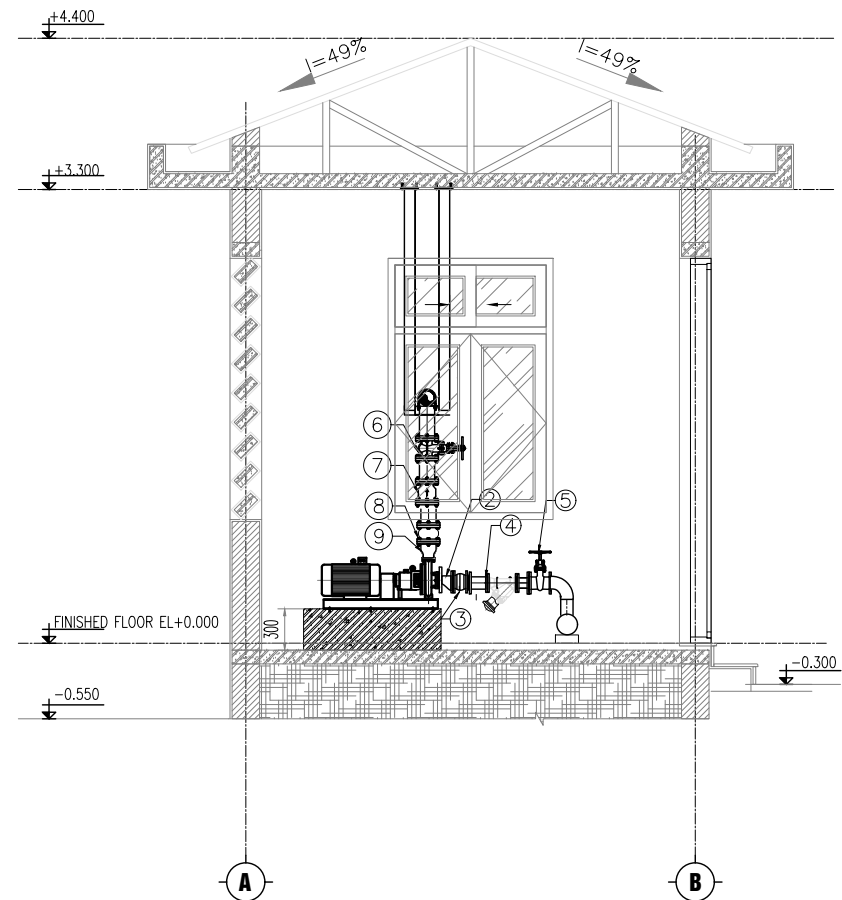


PLAN/ MẶT BẰNG  
SCALE/ TỈ LỆ: 1/55



- NOTES/GHI CHÚ:
- 1 WATER PUMP TO WATER PLANTS Q=18M<sup>3</sup>/H, H=48M/ BƠM TỎI CÂY : Q=18M<sup>3</sup>/H – H=48M
  - 2 ECCENTRIC RECUCER/CÔN LỆCH TÂM D125X100
  - 3 FLEXIBLE JOINT DN125/ KHỚP NỐI MỀM DN125
  - 4 STRAINER DN125/ Y LỌC DN125
  - 5 GATE VALVE DN125/ VAN CỔNG DN125
  - 6 AUTOMATIC VALVE DN100/ VAN ĐIỆN DN100
  - 7 SPRING CHECK VALVE DN100/ VAN MỘT CHIỀU DN100
  - 8 FLEXIBLE JOINT DN100/ KHỚP NỐI MỀM DN100
  - 9 REDUCED DN100X80/ CÔN ĐỒNG TÂM DN100X80
  - 10 PRESSURE GAUGES DN15/ ĐỒNG HỒ ÁP DN15
- + ALL DIMENSIONS ARE IN MILLIMETERS, UNLESS OTHERWISE NOTED/  
+ TẤT CẢ CÁC KÍCH THƯỚC LÀ MM, TRỪ CÁC GHI CHÚ KHÁC  
+ PUMP PIPE, TANK VENT USE 304 STAINLESS STEEL MATERIAL, THICKNESS ACCORDING TO SCH10S  
+ ĐƯỜNG ỐNG BƠM, ỐNG THÔNG BỂ SỬ DỤNG VẬT LIỆU THÉP KHÔNG GỈ 304,  
ĐỘ DÀY THEO TIÊU CHUẨN SCH10S.  
+ PUMP 1 WATER SUPPLY PUMP FOR ZONE 1,2/  
+ BƠM 1 CẤP NƯỚC TỎI CHO KHU VỰC 1,2  
+ PUMP 3 WATER SUPPLY PUMP FOR ZONE 3,4/  
+ BƠM 3 CẤP NƯỚC TỎI CHO KHU VỰC 3,4  
+ PUMP 2 SPRING PUMP FOR PUMP 1 AND 3/  
+ BƠM 2 DỰ PHÒNG CHO BƠM 1 VÀ 3  
+ EL +0.000M IS FLOOR FINISHING 1  
+ EL +0.000M LÀ CAO ĐỘ HOÀN THIỆN SÀN TẦNG 1

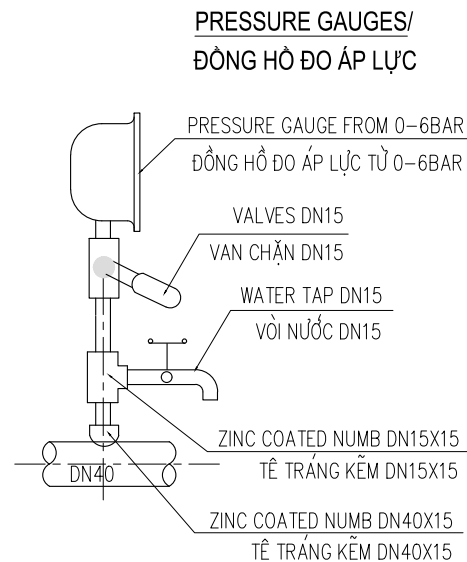
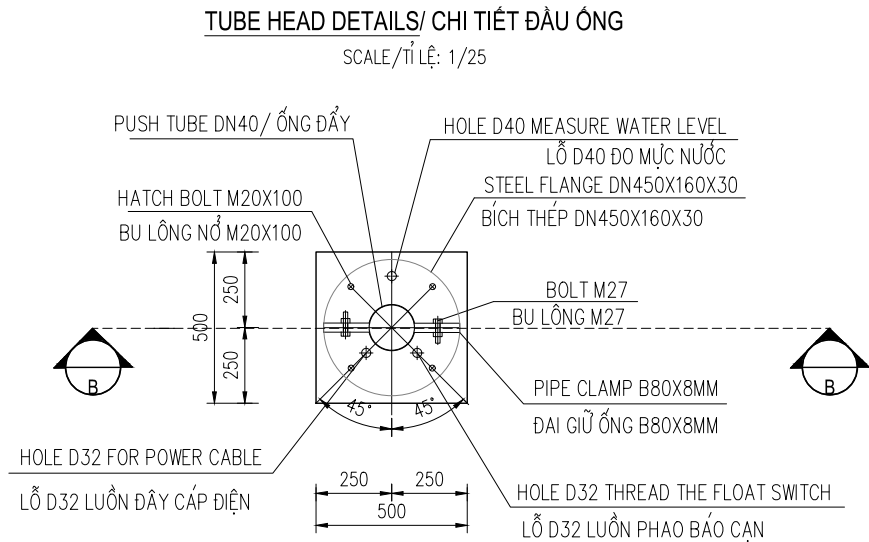
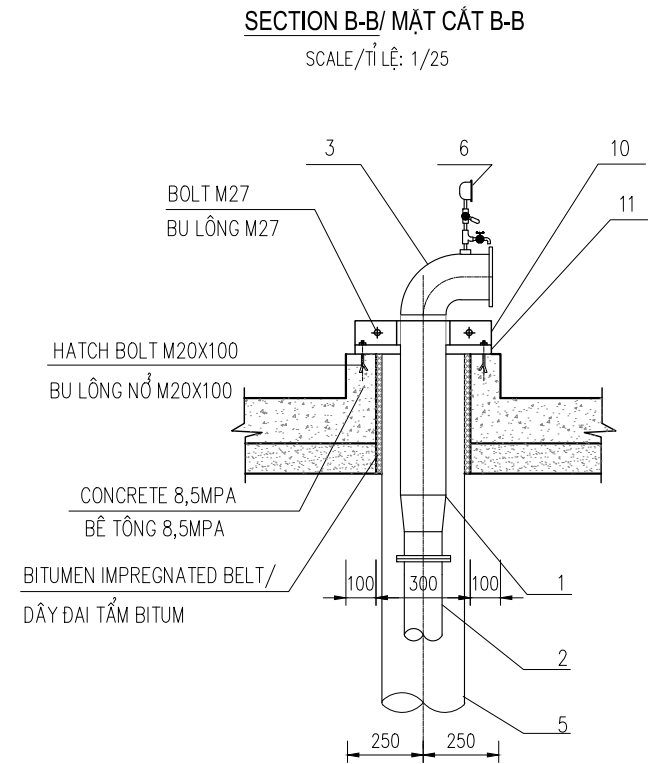
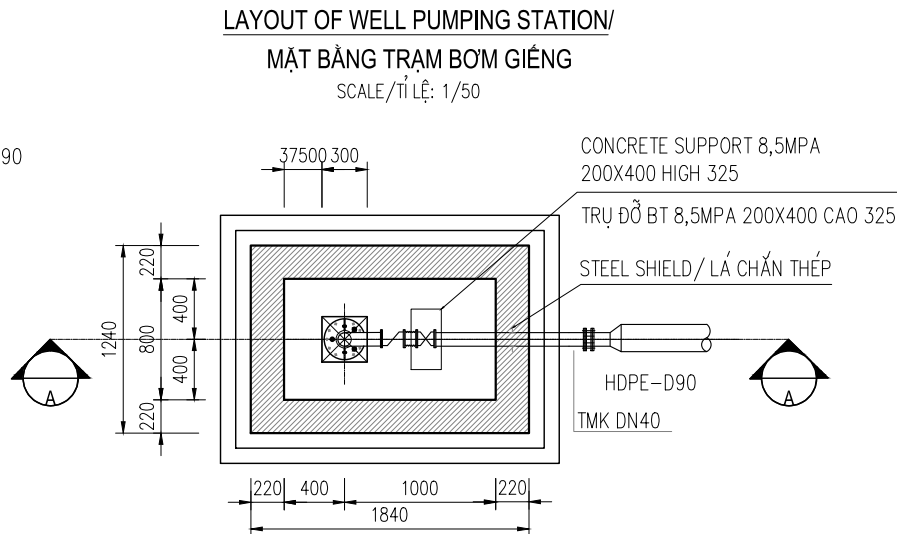
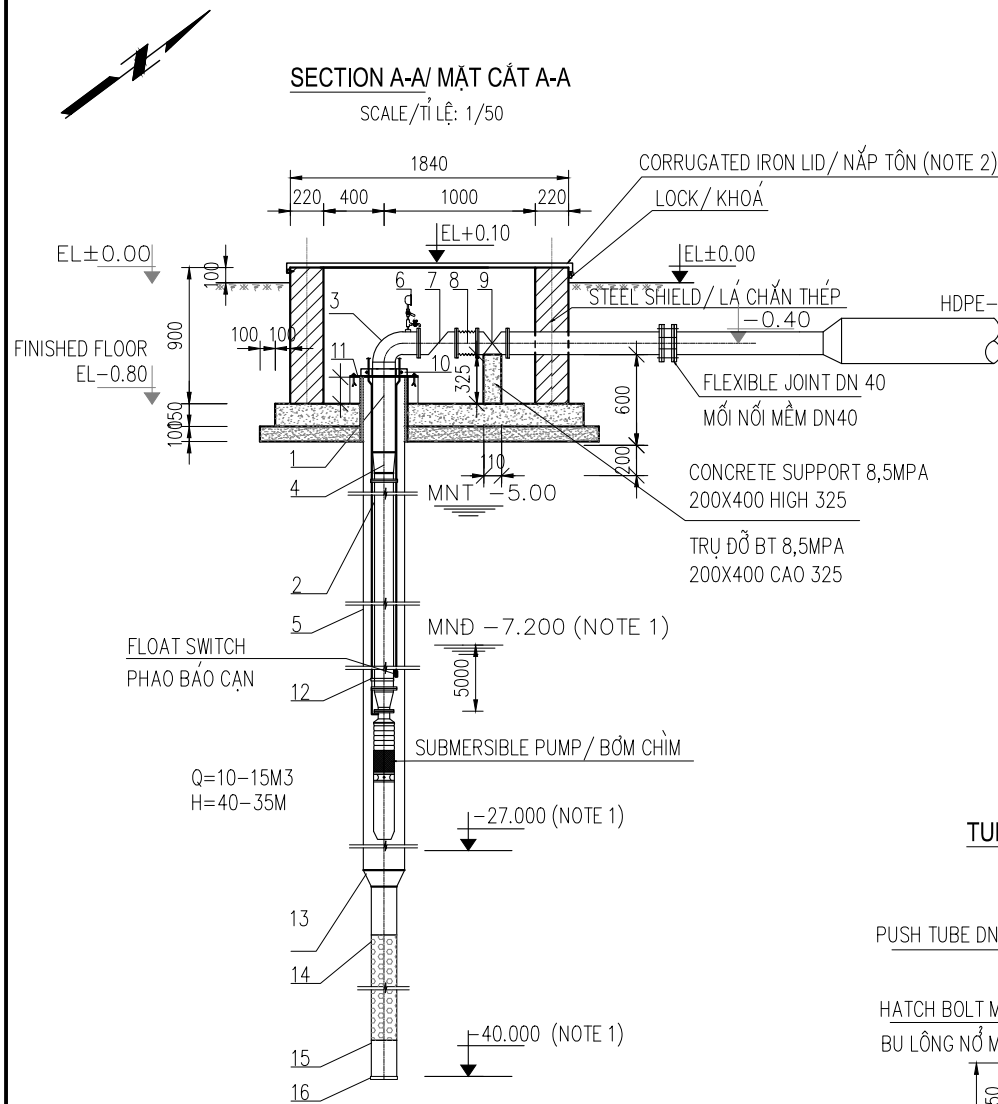


SECTION 1-1/ MẶT CẮT 1-1  
SCALE/ TỈ LỆ: 1/55



SECTION 2-2/ MẶT CẮT 2-2  
SCALE/ TỈ LỆ: 1/55

REV	DESCRIPTION	DATE	BY
BẢN	ĐIỀU CHỈNH	NGÀY	BƠI
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A&E BIEN HOA CONTRACTOR NHÀ THẦU TV&TK BIÊN HÒA			
			
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CHECKED BY NGƯỜI KIỂM TRA:			
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DESIGNER OF RECORD CHỦ NHIỆM THIẾT KẾ:			
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ITEM/ HẠNG MỤC:			
CW1 - LTSA FINAL COVER			
DRAWING TITLE/ TÊN BẢN VẼ:			
PUMPING STATION DETAILS CHI TIẾT TRẠM BƠM			
DATE/ NGÀY:	SIZE/ KHÔ:	SCALE/ TỈ LỆ:	
31-May-2023	A3	AS NOTED	
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40M-05	TỜ:	10	CỦA: 43



**SYMBOL/ KÝ HIỆU:**



- |   |   |    |  |
|---|---|----|--|
| 1 | GALVANIZED STEEL PIPE DN40<br>ỐNG DẰNG TMK DN40         | 9  | VALVES DN40<br>VAN CHẶN DN40   |
| 2 | GALVANIZED STEEL PIPE DN32<br>ỐNG DẰNG TMK DN32         | 10 | PIPE CLAMP B80X8MM, THICK 8MM<br>ĐAI GIỮ ỐNG B=80, DÂY 8MM               |
| 3 | GALVANIZED STEEL ELBOW DN40/90°<br>CÚT TMK DN40/90°     | 11 | HOLLOW STEEL FLANGE D300X160X30<br>BÍCH THÉP RỒNG D300X160X30            |
| 4 | GALVANIZED STEEL CONE DN40/32<br>CÔN TMK DN40/32        | 12 | CONDUCTIVE CABLE/ DÂY CÁP DẪN ĐIỆN                                       |
| 5 | GALVANIZED PIPE DN 80<br>ỐNG VÁCH TMK DN 80             | 13 | WELDED STEEL CONE 80X32<br>CÔN THÉP HÀN 80X32                            |
| 6 | PRESSURE GAUGE FROM 0-6BAR<br>ĐỒNG HỒ ĐO ÁP LỰC 0-6 BAR | 14 | FILTER TUBE DN65/ ỐNG LỌC DN65   |
| 7 | CHECK VALVE DN40<br>VAN MỘT CHIỀU DN40                  | 15 | SETTLING TUBE DN65/ ỐNG LẮNG DN65  |
| 8 | FLEXIBLE JOINT DN40<br>MỐI NỐI CAO SU DN40              | 16 | SOLID STEEL FLANGE, BOTTOM SEALING WELDING/<br>BÍCH THÉP ĐẶC HÀN BỊT ĐÁY |

**NOTE:**

- 1- WHEN INSTALLING THE PUMP, IT IS NECESSARY TO RE-MEASURE THE BOTTOM WATER LEVEL TO ADJUST THE PUMP INSTALLATION DEPTH FOR ACCURACY
- 2- CORRUGATED IRON COVER FOR PUMPING STATION WITH HINGE AND LOCK, MADE OF 2MM THICK CORRUGATED IRON WITH REINFORCING STEEL BARS
- 3- ALL DIMENSIONS ARE IN MILLIMETERS, UNLESS OTHERWISE NOTED
- 4- EL ±0,000M REFERENCES FINISHED FLOOR
- 5- MAXIMUM WATER LEVEL MNT -5.00 AND LOWEST WATER LEVEL MND-7,200 ARE ASSESSMENTS

**GHI CHÚ:**

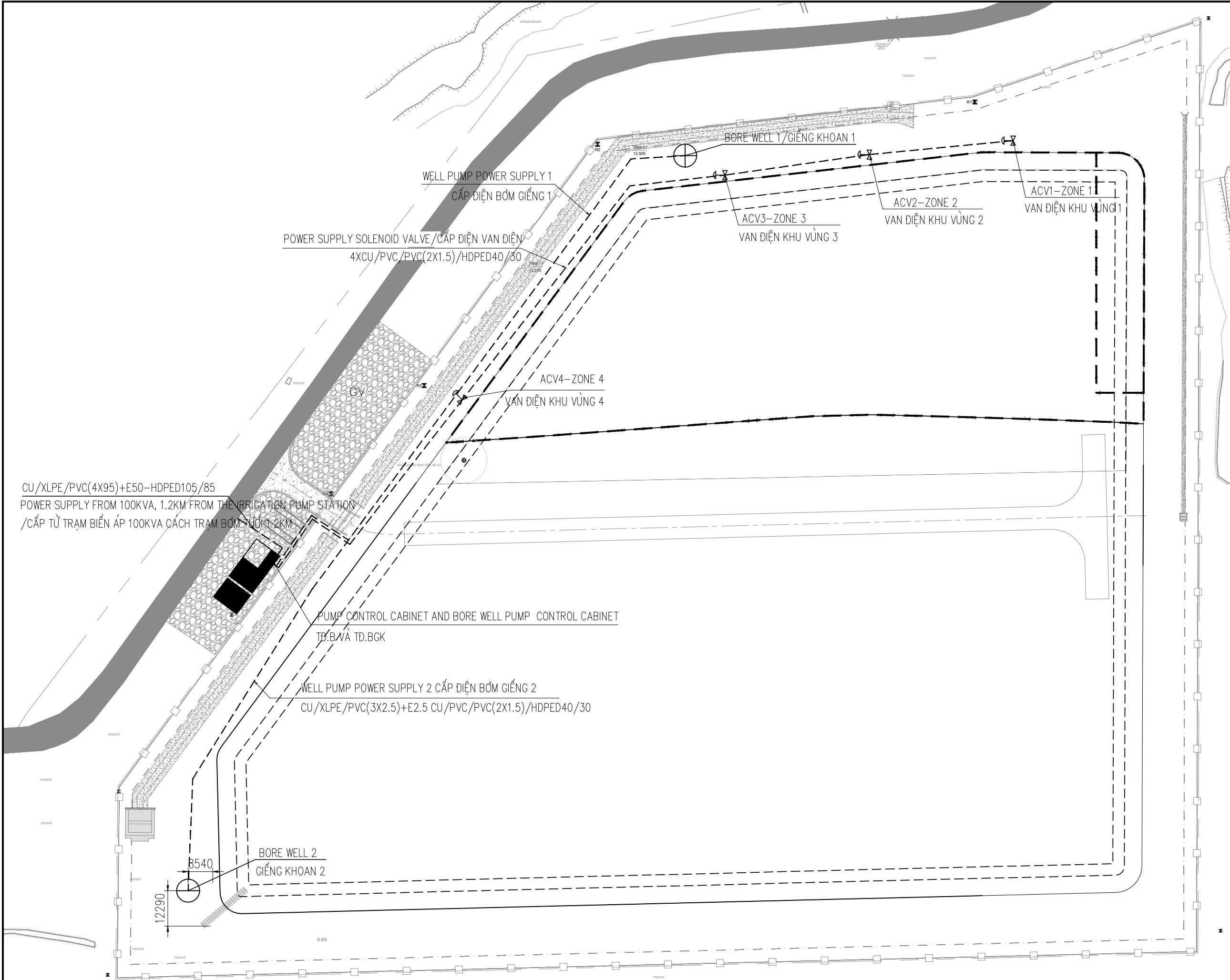
- 1-KHI LẮP BƠM CẦN ĐO LẠI MỨC NƯỚC ĐÁY ĐỂ ĐIỀU CHỈNH ĐỘ SÂU ĐẶT BƠM CHO CHÍNH XÁC
- 2- NẮP TÔN ĐẶT TRẠM BƠM CÓ BẢN LỀ VÀ KHOÁ ĐƯỢC CHẾ TẠO BẰNG TÔN DÀY 2MM CÓ CÁC
- 3- TẤT CẢ CÁC KÍCH THƯỚC LÀ MM, TRỪ CÁC GHI CHÚ KHÁC
- 4- EL ±0,000M CAO ĐỘ HOÀN THIỆN
- 5- MỨC NƯỚC NGẦM CAO NHẤT MNT -5.00 VÀ MỨC NƯỚC NGẦM THẤP NHẤT MND-7.200 LÀ GIÁ ĐỊNH THANH THÉP GIA CƯỜNG

REV	DESCRIPTION	DATE	BY
BẢN	ĐIỀU CHỈNH	NGÀY	BỒI
PREPARED FOR CHỦ ĐẦU TƯ:			
			
A&E BIEN HOA CONTRACTOR NHÀ THẦU TV&TK BIÊN HÒA			
			
ENGINEERING • CONSULTING • MANAGEMENT Trigon Associates, llc1515 Poydras St., Ste 930 New Orleans, LA 70112 www.trigonassociates.com			
DESIGNED IN COLLABORATION WITH ASIA PACIFIC ENGINEERING CONSULTANTS (APECO)			
PREPARED BY NGƯỜI THỰC HIỆN:			
CAO SONG TOÀN			
CHECKED BY NGƯỜI KIỂM TRA:			
BARRY P. BREAUX			
DESIGNER OF RECORD CHỦ NHIỆM THIẾT KẾ:			
GREGORY A. KOLENOVSKY			
PROJECT NAME/ TÊN DỰ ÁN:			
DIOXIN REMEDIATION AT BIEN HOA AIRBASE AREA PROJECT - PHASE 1 DỰ ÁN XỬ LÝ Ô NHIỄM DIOXIN KHU VỰC SÂN BAY BIÊN HÒA - GIAI ĐOẠN 1			
FINAL DESIGN			
ITEM/ HANG MỤC:			
CW1 - LTSA FINAL COVER			
DRAWING TITLE/ TÊN BẢN VẼ:			
WELL PUMPING STATION TRẠM BƠM GIẾNG			
DATE/ NGÀY:	SIZE/ KHỔ:	SCALE/ TỈ LỆ:	
31-May-2023	A3	AS NOTED	
DRAWING NO/ BẢN VẼ SỐ:	SHEET	OF	
40M-06	TỜ:	11	CỦA: 43






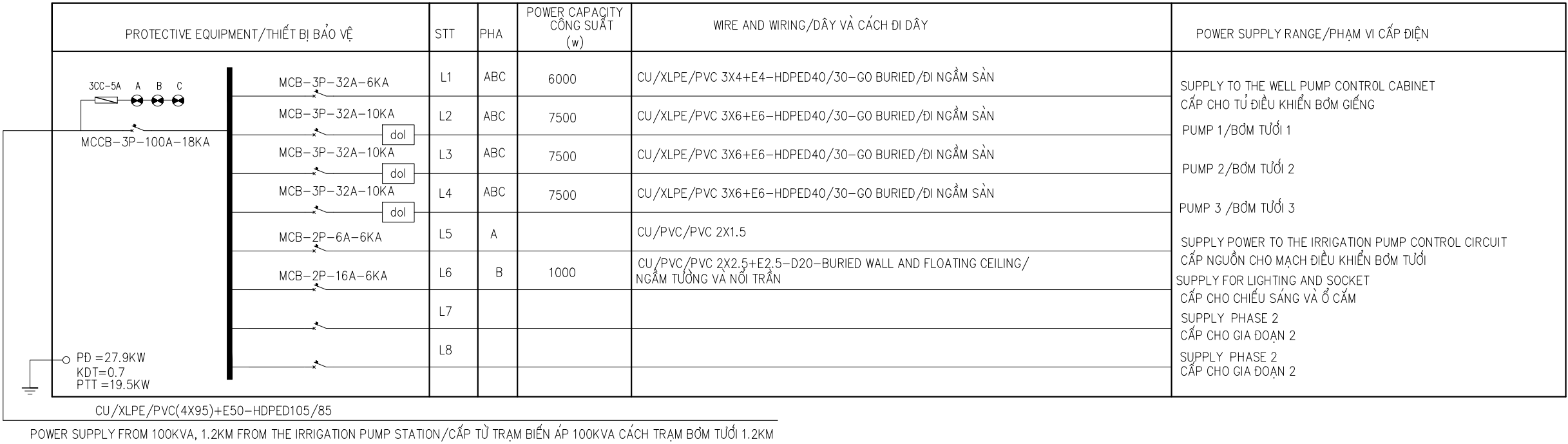




LAYOUT ELECTRICITY SUPPLY/ TỔNG MẶT BẰNG CẤP ĐIỆN

REV	DESCRIPTION	DATE	BY
BẢN	ĐIỀU CHỈNH	NGÀY	BỒI
PREPARED FOR CHỦ ĐẦU TƯ:			
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A&E BIEN HOA CONTRACTOR NHÀ THẦU TV&TK BIÊN HÒA			
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FINAL DESIGN			
ITEM/ HẠNG MỤC:			
CW1 - LTSA FINAL COVER			
DRAWING TITLE/ TÊN BẢN VẼ:			
LAYOUT ELECTRICITY SUPPLY TỔNG MẶT BẰNG CẤP ĐIỆN			
DATE/ NGÀY:	SIZE/ KHỔ:	SCALE/ TỈ LỆ:	
31-May-2023	A3	NTS	
DRAWING NO/ BẢN VẼ SỐ:	SHEET	OF	43
40E-01	TỜ:	13	CỦA:

## POWER SUPPLY PRINCIPLE DIAGRAM/SƠ ĐỒ NGUYÊN LÝ CẤP ĐIỆN - TĐ.B



### PUMP WORKING MODE AND VALVE OPENING SCHEDULE/CHẾ ĐỘ LÀM VIỆC CỦA BƠM VÀ LỊCH MỞ VAN:



	ZONE 1,3 VÙNG TỬỚI 1,3				ZONE 2,4 VÙNG TỬỚI 2,4				ZONE 1,3 VÙNG TỬỚI 1,3				IRRIGATION ZONE 2,4 VÙNG TỬỚI 2,4				ZONE 1,3 VÙNG TỬỚI 1,3				ZONE 2,4 VÙNG TỬỚI 2,4		
	PUMP 1 BƠM 1	PUMP 2 BƠM 2	PUMP 3 BƠM 3		PUMP 1 BƠM 1	PUMP 2 BƠM 2	PUMP 3 BƠM 3		PUMP 1 BƠM 1	PUMP 2 BƠM 2	PUMP 3 BƠM 3		PUMP 1 BƠM 1	PUMP 2 BƠM 2	PUMP 3 BƠM 3		PUMP 1 BƠM 1	PUMP 2 BƠM 2	PUMP 3 BƠM 3		PUMP 1 BƠM 1	PUMP 2 BƠM 2	PUMP 3 BƠM 3
PUMP BƠM VALVE VAN	X	X		PUMP BƠM VALVE VAN		X	X	PUMP BƠM VALVE VAN	X		X	PUMP BƠM VALVE VAN	X	X		PUMP BƠM VALVE VAN		X	X	PUMP BƠM VALVE VAN	X		X
VALVE AC1 VAN AC1	X			VALVE AC1 VAN AC1				VALVE AC1 VAN AC1	X			VALVE AC1 VAN AC1				VALVE AC1 VAN AC1	X			VALVE AC1 VAN AC1			
VALVE AC2 VAN AC2				VALVE AC2 VAN AC2	X			VALVE AC2 VAN AC2				VALVE AC2 VAN AC2	X			VALVE AC2 VAN AC2				VALVE AC2 VAN AC2	X		
VALVE AC3 VAN AC3	X			VALVE AC3 VAN AC3				VALVE AC3 VAN AC3	X			VALVE AC3 VAN AC3				VALVE AC3 VAN AC3	X			VALVE AC3 VAN AC3			
VALVE AC4 VAN AV4				VALVE AC4 VAN AV4	X			VALVE AC4 VAN AV4				VALVE AC4 VAN AV4	X			VALVE AC4 VAN AV4				VALVE AC4 VAN AV4	X		
VALVE AC5 VAN AC5	X			VALVE AC5 VAN AC5				VALVE AC5 VAN AC5				VALVE AC5 VAN AC5	X			VALVE AC5 VAN AC5				VALVE AC5 VAN AC5			
VAN AC6 VAN AV6				VAN AC6 VAN AV6	X			VAN AC6 VAN AV6				VAN AC6 VAN AV6				VAN AC6 VAN AV6	X			VAN AC6 VAN AV6			

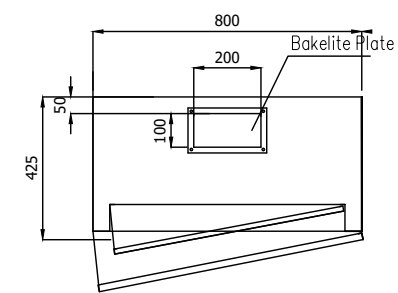
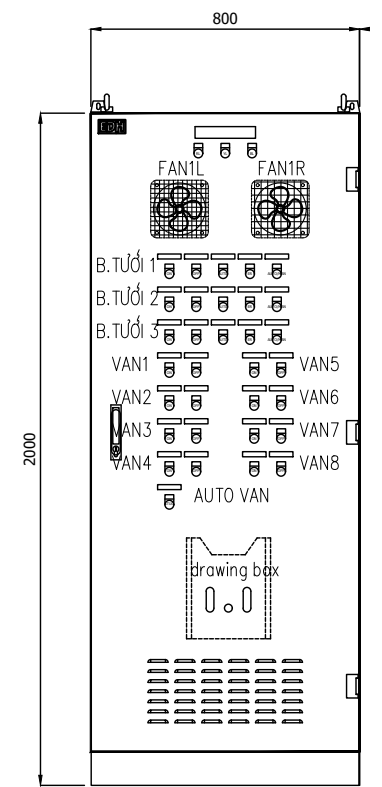
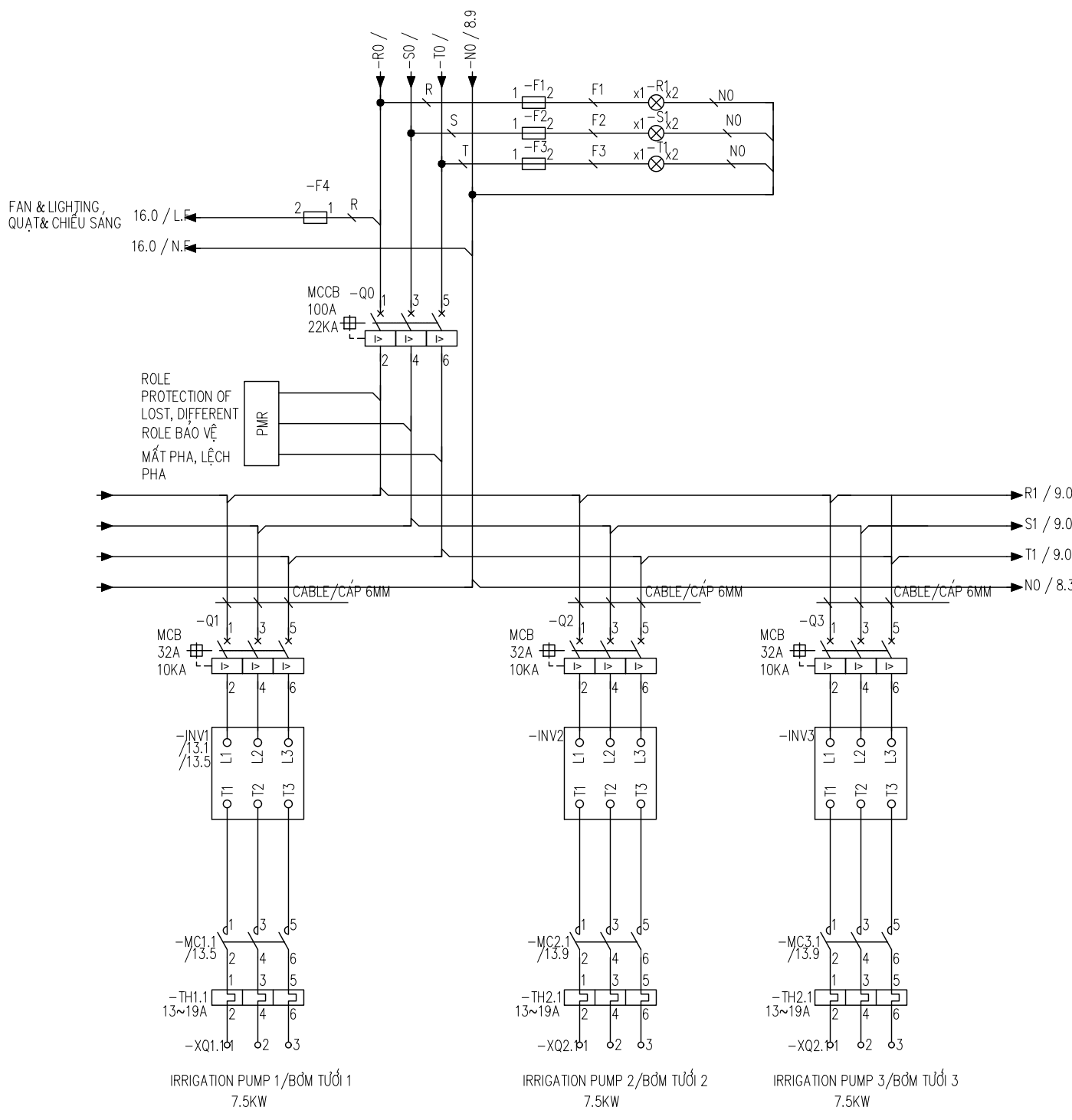
NOTE:

- + WELL WATER PUMP SYSTEM:
- PUMP SYSTEM DIVIDED INTO 2 LEVELS:
- LEVEL 1: FULL LEVEL STOPS PUMPING SYSTEM
- LEVEL 2: 50% LEVEL 01 ACTIVE PUMP, 01 BACKUP PUMP (02 PUMPS RUN ALTERNATELY)
- + IRRIGATION PUMP SYSTEM:
- SPLIT IRRIGATION PUMP SYSTEM USES ELECTRIC VALVE TO OPEN AND CLOSE, DIVIDED INTO 06 VALVES V1..V6
- IRRIGATION PUMP SYSTEM DIVIDED INTO 04 WORKING MODES:
- +ZONE 1 IRRIGATED FROM 5: 00 AM–5: 20 AM, 17: 30–17: 50 PM
- +ZONE 2 IRRIGATED FROM 5: 30 AM–5: 50 AM, 18: 00–18: 20 PM
- +ZONE 3 IRRIGATED FROM 5: 00 AM–5: 20 AM, 17: 30–17: 50 PM
- +ZONE 4 IRRIGATED FROM 5: 30 AM–5: 50 AM, 18: 00–18: 20 PM
- 03 PUMPS RUN ALTERNATELY EACH TIME 02 PUMPS WORK.
- NOTE: WHEN THE TANK WATER LEVEL REACHES DRY, THE IRRIGATION PUMP SYSTEM DOES NOT WORK

GHI CHÚ:

- + HỆ THỐNG BƠM NƯỚC GIẾNG:
- HỆ THỐNG BƠM CHIA LÀM 02 MỨC:
- MỨC 1: MỨC ĐẦY DÙNG HỆ THỐNG BƠM
- MỨC 2: MỨC 50% 01 BƠM HOẠT ĐỘNG 01 BƠM DỰ PHÒNG (02 BƠM CHẠY LUÂN PHIÊN) + HỆ THỐNG BƠM TÚI:
- HỆ THỐNG BƠM TÚI SỬ DỤNG VAN ĐIỆN ĐỂ ĐÓNG MỞ. CHIA LÀM 06 VAN V1..V6
- HỆ THỐNG BƠM TÚI CHIA LÀM 04 CHẾ ĐỘ LÀM VIỆC:
- + VÙNG 1 TÚI TỪ 5H00–5H20 SÁNG, 17H30–17H50 CHIỀU
- + VÙNG 2 TÚI TỪ 5H30–5H50 SÁNG, 18H00–18H20 CHIỀU
- + VÙNG 3 TÚI TỪ 5H00–5H20 SÁNG, 17H30–17H50 CHIỀU
- + VÙNG 4 TÚI TỪ 5H30–5H50 SÁNG, 18H00–18H20 CHIỀU
- 03 BƠM CHẠY LUÂN PHIÊN MỖI LẦN 02 BƠM HOẠT ĐỘNG. GHI CHÚ: KHI MỨC NƯỚC BỂ CHẠM CẬN HỆ THỐNG BƠM TÚI KHÔNG HOẠT ĐỘNG

REV/ BẢN	DESCRIPTION ĐIỀU CHỈNH	DATE NGÀY	BY BỞI
PREPARED FOR CHỦ ĐẦU TƯ:			
<div><div><b>USAID</b> FROM THE AMERICAN PEOPLE</div></div>			
A&E BIEN HOA CONTRACTOR NHÀ THẦU TV&TK BIÊN HÒA			
<div><p>ENGINEERING • CONSULTING • MANAGEMENT</p><p>Trigon Associates, llc1515 Poydras St., Ste 930 New Orleans, LA 70112 <a href="http://www.trigonassociates.com">www.trigonassociates.com</a></p></div>			
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PREPARED BY NGƯỜI THỰC HIỆN:			
CAO SONG TOÀN			
CHECKED BY NGƯỜI KIỂM TRA:			
BARRY P. BREAUX			
DESIGNER OF RECORD CHỦ NHIỆM THIẾT KẾ:			
GREGORY A. KOLENOVSKY			
PROJECT NAME/ TÊN DỰ ÁN:			
DIOXIN REMEDIATION AT BIEN HOA AIRBASE AREA PROJECT - PHASE 1 DỰ ÁN XỬ LÝ Ô NHIỄM DIOXIN KHU VỰC SÂN BAY BIÊN HÒA - GIAI ĐOẠN 1			
FINAL DESIGN			
ITEM/ HẠNG MỤC:			
CW1 - LTSA FINAL COVER			
DRAWING TITLE/ TÊN BẢN VẼ:			
POWER SUPPLY PRINCIPLE DIAGRAM SƠ ĐỒ NGUYÊN LÝ CẤP ĐIỆN			
DATE/ NGÀY: 31-May-2023	SIZE/ KHØ: A3	SCALE/ TỈ LỆ: NTS	
DRAWING NO/ BẢN VẼ SỐ: 40E-02		SHEET TỜ: 14 OF CỦA: 43	



REV BẢN	DESCRIPTION ĐIỀU CHỈNH	DATE NGÀY	BY BỞI

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NHÀ THẦU TV&TK BIÊN HÒA



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Ste 930 New Orleans, LA 70112  
www.trigonassociates.com

DESIGNED IN COLLABORATION WITH  
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CONSULTANTS (APECO)

PREPARED BY  
NGƯỜI THỰC HIỆN:

CAO SONG TOÀN

CHECKED BY  
NGƯỜI KIỂM TRA:

BARRY P. BREAUX

DESIGNER OF RECORD  
CHỦ NHIỆM THIẾT KẾ:

GREGORY A. KOLENOVSKY

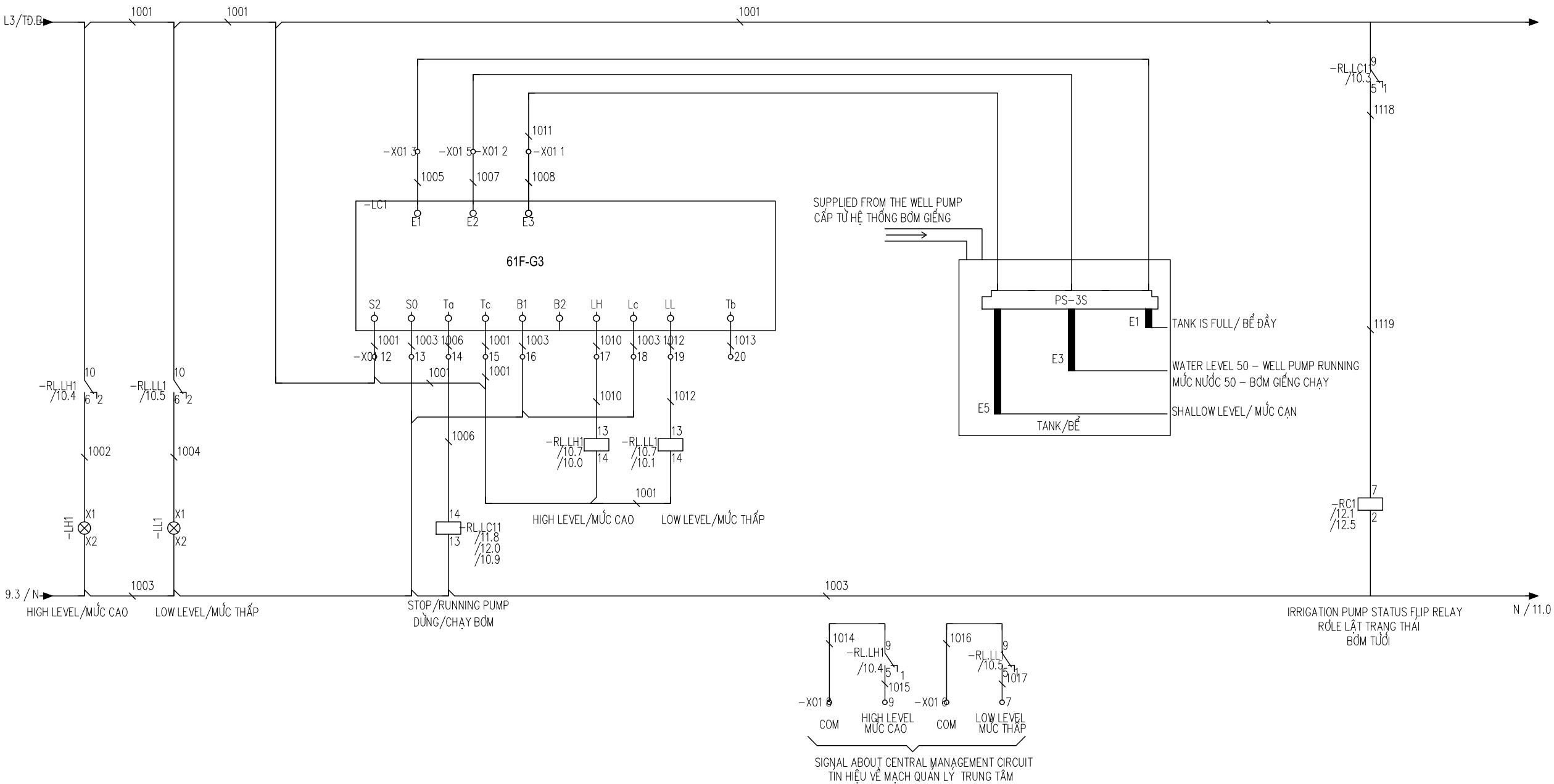
PROJECT NAME/ TÊN DỰ ÁN:  
DIOXIN REMEDIATION AT BIEN HOA  
AIRBASE AREA PROJECT - PHASE 1  
DỰ ÁN XỬ LÝ Ô NHIỄM DIOXIN KHU VỰC  
SÂN BAY BIÊN HÒA - GIAI ĐOẠN 1

FINAL DESIGN

ITEM/ HẠNG MỤC:  
  
CW1 - LTSA FINAL COVER

DRAWING TITLE/ TÊN BẢN VẼ:  
  
CONTROL CIRCUIT DIAGRAM - I  
SƠ ĐỒ MẠCH ĐIỀU KHIỂN - I

DATE/ NGÀY: 31-May-2023	SIZE/ KHØ: A3	SCALE/ TỈ LỆ: NTS
DRAWING NO/ BẢN VẼ SỐ: 40E-03	SHEET TỜ: 15	OF CỦA: 43



REV BẢN	DESCRIPTION ĐIỀU CHỈNH	DATE NGÀY	BY BỘ

PREPARED FOR  
CHỦ ĐẦU TƯ:



A&E BIEN HOA CONTRACTOR  
NHÀ THẦU TV&TK BIÊN HÒA



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Ste 930 New Orleans, LA 70112  
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CONSULTANTS (APECO)

PREPARED BY  
NGƯỜI THỰC HIỆN:

CAO SONG TOÀN

CHECKED BY  
NGƯỜI KIỂM TRA:

BARRY P. BREAUX

DESIGNER OF RECORD  
CHỦ NHIỆM THIẾT KẾ:

GREGORY A. KOLENOVSKY

PROJECT NAME/ TÊN DỰ ÁN:

DIOXIN REMEDIATION AT BIEN HOA  
AIRBASE AREA PROJECT - PHASE 1  
DỰ ÁN XỬ LÝ Ô NHIỄM DIOXIN KHU VỰC  
SÂN BAY BIÊN HÒA - GIAI ĐOẠN 1

FINAL DESIGN

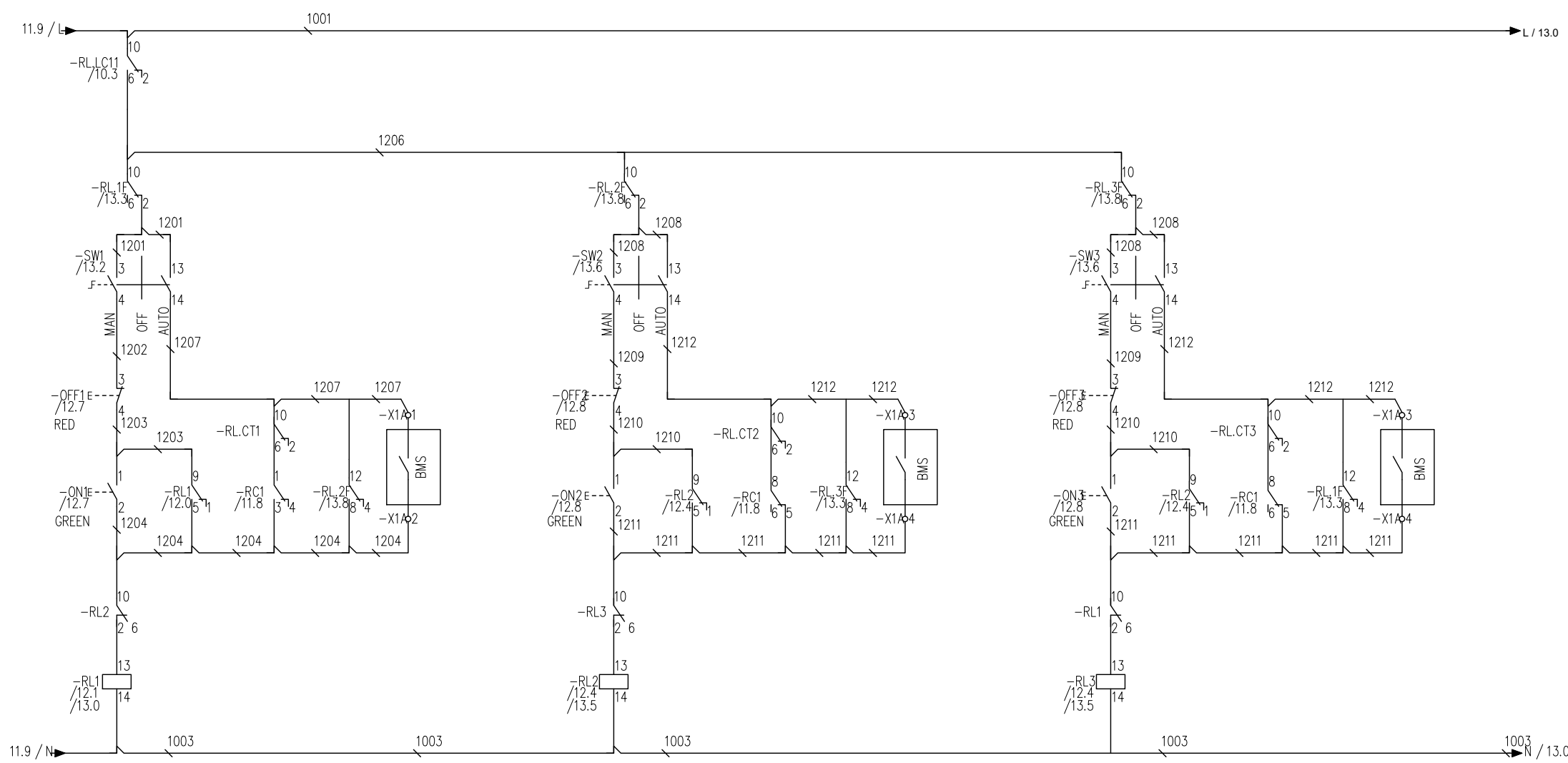
ITEM/ HẠNG MỤC:

CW1 - LTSA FINAL COVER

DRAWING TITLE/ TÊN BẢN VẼ:



CONTROL CIRCUIT DIAGRAM - II  
SƠ ĐỒ MẠCH ĐIỀU KHIỂN -II

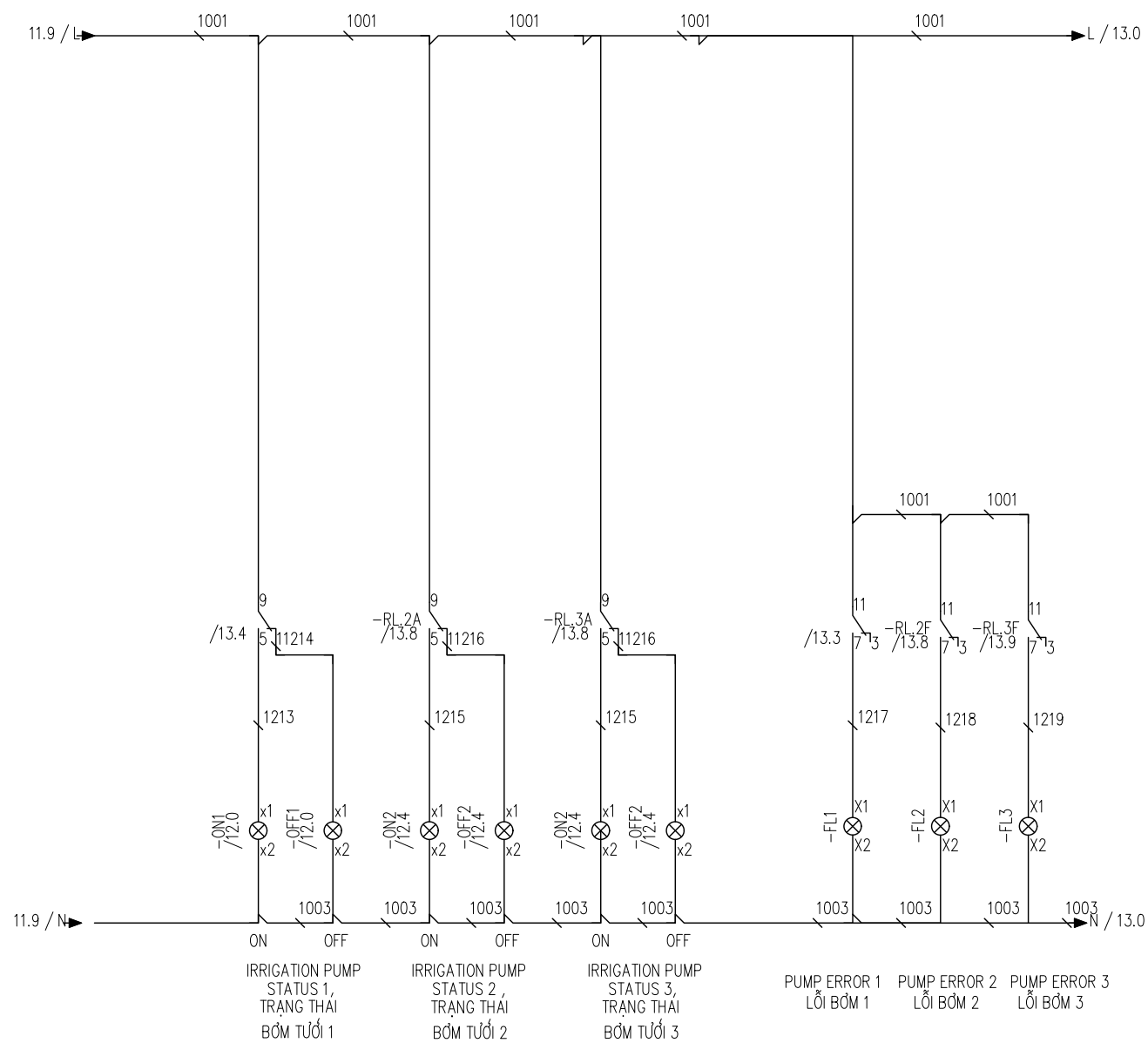
DATE/ NGÀY: 31-May-2023	SIZE/ KHỔ: A3	SCALE/ TỈ LỆ: NTS
DRAWING NO/ BẢN VẼ SỐ: 40E-04	SHEET TỜ: 16	OF CỦA: 43





PRINCIPLE OF PUMP CONTROL:  
+ RUN MODE: MAN/OFF/AUTO  
+ THREE PUMPS RUNING ALTERNATELY  
+ CASE 1 PUMP ERROR THE OTHER PUMP MUST REPLACE  
+ PUMP RUN ONLY WHEN:  
- TANK: WATER LEVEL DOSE NOT DRY UP  
+ STATUS MONITORING CENTRAL MANAGEMENT CIRCUIT:  
- AUTO/ON/TRIP  
- HIGH LEVEL  
- LOW LEVEL  
+ CHẾ ĐỘ CHẠY: MAN/OFF/AUTO  
+ BA BƠM CHẠY LUÂN PHIÊN  
+ TRƯỜNG HỢP 1 BƠM LỖI THÌ BƠM CÒN LẠI PHẢI THAY THẾ  
+ BƠM CHỈ CHẠY KHI:  
- BỂ: MỨC NƯỚC KHÔNG CẠN  
+ MẠCH QUẢN LÝ TRUNG TÂM GIÁM SÁT TRẠNG THÁI:  
- AUTO/ON/TRIP  
- MỨC NƯỚC CAO  
- MỨC NƯỚC THẤP

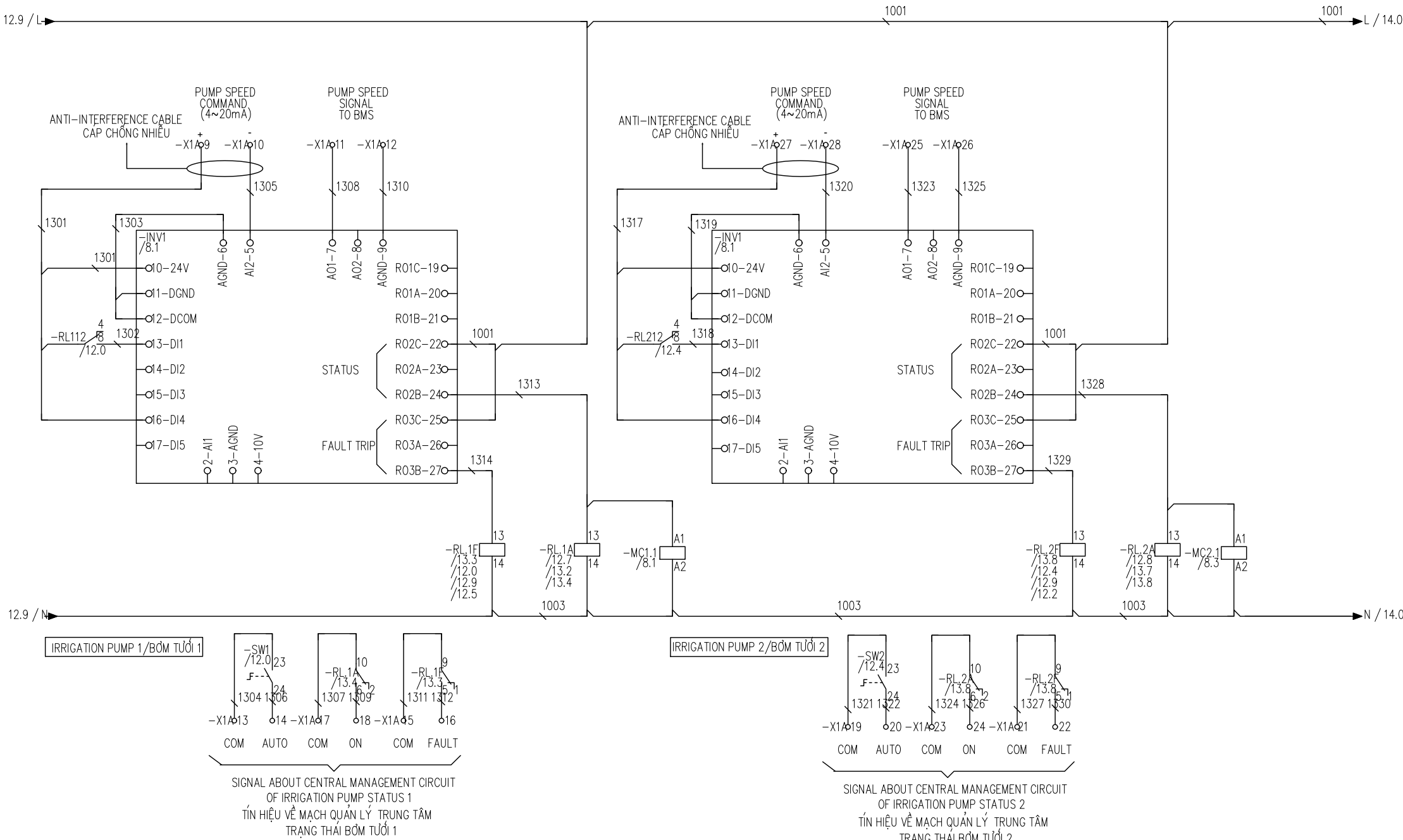
IRRIGATION PUMP 1/BƠM TƯỚI 1      IRRIGATION PUMP 2/BƠM TƯỚI 2      IRRIGATION PUMP 3/BƠM TƯỚI 3



REV BẢN	DESCRIPTION ĐIỀU CHỈNH	DATE NGÀY	BY BỞI
PREPARED FOR CHỦ ĐẦU TƯ:			
<div><div></div><div><b>USAID</b> FROM THE AMERICAN PEOPLE</div></div>			
A&E BIEN HOA CONTRACTOR NHÀ THẦU TV&TK BIÊN HÒA			
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DESIGNER OF RECORD CHỦ NHIỆM THIẾT KẾ:			
GREGORY A. KOLENOVSKY			
PROJECT NAME/ TÊN DỰ ÁN:  DIOXIN REMEDIATION AT BIEN HOA AIRBASE AREA PROJECT - PHASE 1 DỰ ÁN XỬ LÝ Ô NHIỄM DIOXIN KHU VỰC SÂN BAY BIÊN HÒA - GIAI ĐOẠN 1			
FINAL DESIGN			
ITEM/ HẠNG MỤC:  CW1 - LTSA FINAL COVER			
DRAWING TITLE/ TÊN BẢN VẼ:  CONTROL CIRCUIT DIAGRAM - III SƠ ĐỒ MẠCH ĐIỀU KHIỂN - III			
DATE/ NGÀY: 31-May-2023	SIZE/ KHØ: A3	SCALE/ TỈ LỆ: NTS	
DRAWING NO./ BẢN VẼ SỐ: 40E-05	SHEET TỜ:	17 OF CỦA:	43

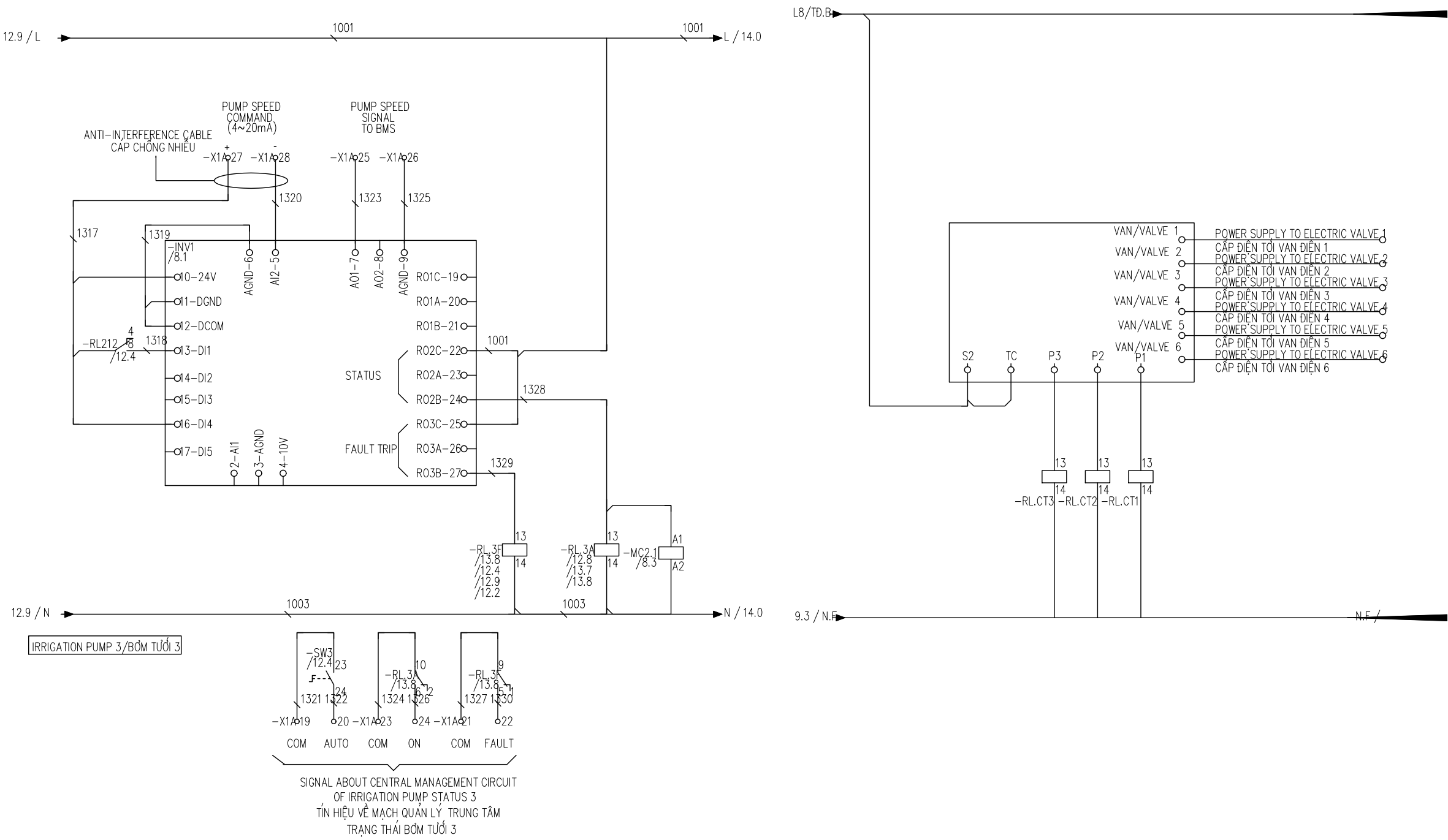


REV BẢN	DESCRIPTION ĐIỀU CHỈNH	DATE NGÀY	BY BỞI
PREPARED FOR CHỦ ĐẦU TƯ:			
<div><div><b>USAID</b> FROM THE AMERICAN PEOPLE</div></div>			
A&E BIEN HOA CONTRACTOR NHÀ THẦU TV&TK BIỂN HÒA			
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CAO SONG TOÀN			
CHECKED BY NGƯỜI KIỂM TRA:			
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DESIGNER OF RECORD CHỦ NHIỆM THIẾT KẾ:			
GREGORY A. KOLENOVSKY			
PROJECT NAME/ TÊN DỰ ÁN:			
DIOXIN REMEDIATION AT BIEN HOA AIRBASE AREA PROJECT - PHASE 1 DỰ ÁN XỬ LÝ Ô NHIỄM DIOXIN KHU VỰC SÂN BAY BIỂN HÒA - GIAI ĐOẠN 1			
FINAL DESIGN			
ITEM/ HẠNG MỤC:			
CW1 - LTSA FINAL COVER			
DRAWING TITLE/ TÊN BẢN VẼ:			
CONTROL CIRCUIT DIAGRAM - IV SƠ ĐỒ MẠCH ĐIỀU KHIỂN - IV			
DATE/ NGÀY: 31-May-2023	SIZE/ KHÖ: A3	SCALE/ TỈ LỆ: NTS	
DRAWING NO/ BẢN VẼ SỐ: 40E-06	SHEET TỜ:	18 OF CỦA:	43





REV BẢN	DESCRIPTION ĐIỀU CHỈNH	DATE NGÀY	BY BỘ
PREPARED FOR CHỦ ĐẦU TƯ:			
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A&E BIEN HOA CONTRACTOR NHÀ THẦU TV&TK BIÊN HÒA			
<div></div> <div>ENGINEERING • CONSULTING • MANAGEMENT Trigon Associates, llc1515 Poydras St., Ste 930 New Orleans, LA 70112 www.trigonassociates.com</div>			
DESIGNED IN COLLABORATION WITH ASIA PACIFIC ENGINEERING CONSULTANTS (APECO)			
PREPARED BY NGƯỜI THỰC HIỆN:			
CAO SONG TOÀN			
CHECKED BY NGƯỜI KIỂM TRA:			
BARRY P. BREAUX			
DESIGNER OF RECORD CHỦ NHIỆM THIẾT KẾ:			
GREGORY A. KOLENOVSKY			
PROJECT NAME/ TÊN DỰ ÁN: DIOXIN REMEDIATION AT BIEN HOA AIRBASE AREA PROJECT - PHASE 1 DỰ ÁN XỬ LÝ Ô NHIỄM DIOXIN KHU VỰC SÂN BAY BIÊN HÒA - GIAI ĐOẠN 1			
FINAL DESIGN			
ITEM/ HẠNG MỤC:			
CW1 - LTSA FINAL COVER			
DRAWING TITLE/ TÊN BẢN VẼ:			
CONTROL CIRCUIT DIAGRAM - V SƠ ĐỒ MẠCH ĐIỀU KHIỂN - V			
DATE/ NGÀY: 31-May-2023	SIZE/ KHØ: A3	SCALE/ TỈ LỆ: NTS	
DRAWING NO/ BẢN VẼ SỐ: 40E-07	SHEET TỜ:	19 OF CỦA:	43



REV BẢN	DESCRIPTION ĐIỀU CHỈNH	DATE NGÀY	BY BỘ

PREPARED FOR  
CHỦ ĐẦU TƯ:



A&E BIEN HOA CONTRACTOR  
NHÀ THẦU TV&TK BIÊN HÒA



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DESIGNER OF RECORD  
CHỦ NHIỆM THIẾT KẾ:

GREGORY A. KOLENOVSKY

PROJECT NAME/ TÊN DỰ ÁN:  
DIOXIN REMEDIATION AT BIEN HOA  
AIRBASE AREA PROJECT - PHASE 1  
DỰ ÁN XỬ LÝ Ô NHIỄM DIOXIN KHU VỰC  
SÂN BAY BIÊN HÒA - GIAI ĐOẠN 1

FINAL DESIGN

ITEM/ HẠNG MỤC:

CW1 - LTSA FINAL COVER

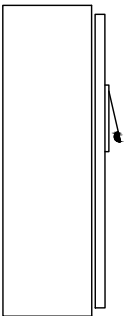
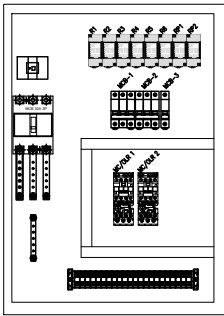
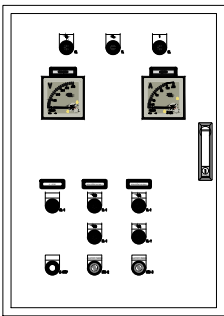
DRAWING TITLE/ TÊN BẢN VẼ:

CONTROL CIRCUIT DIAGRAM - VI  
SƠ ĐỒ MẠCH ĐIỀU KHIỂN - VI

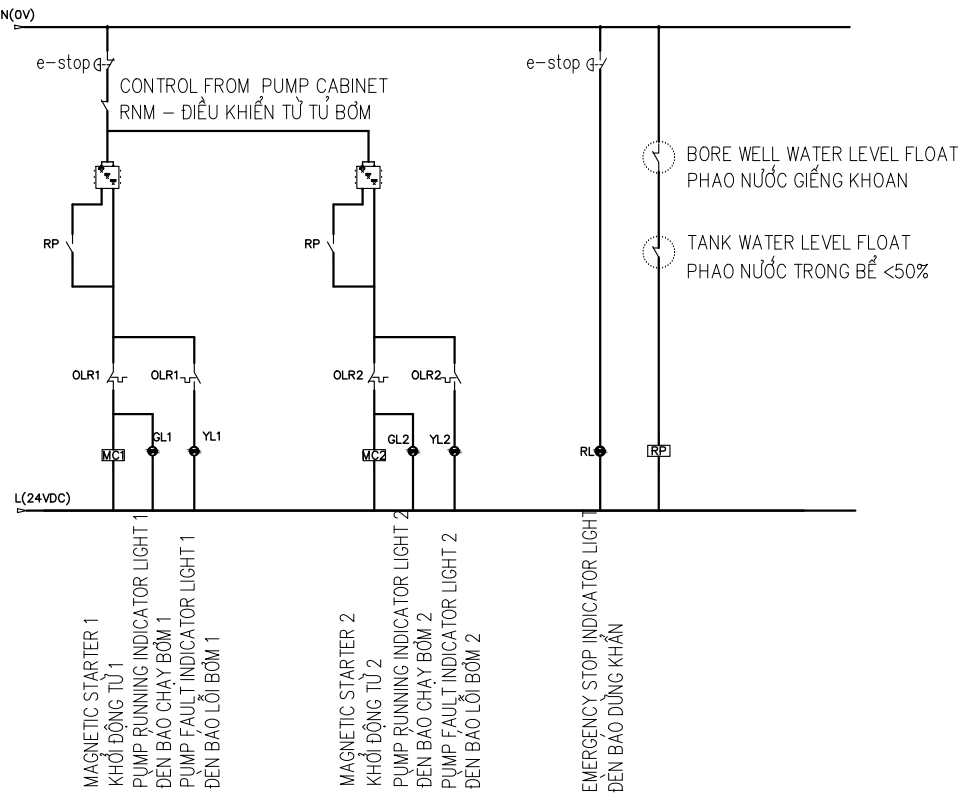
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DRAWING NO/ BẢN VẼ SỐ: 40E-08	SHEET TỜ: 20	OF CỦA: 43



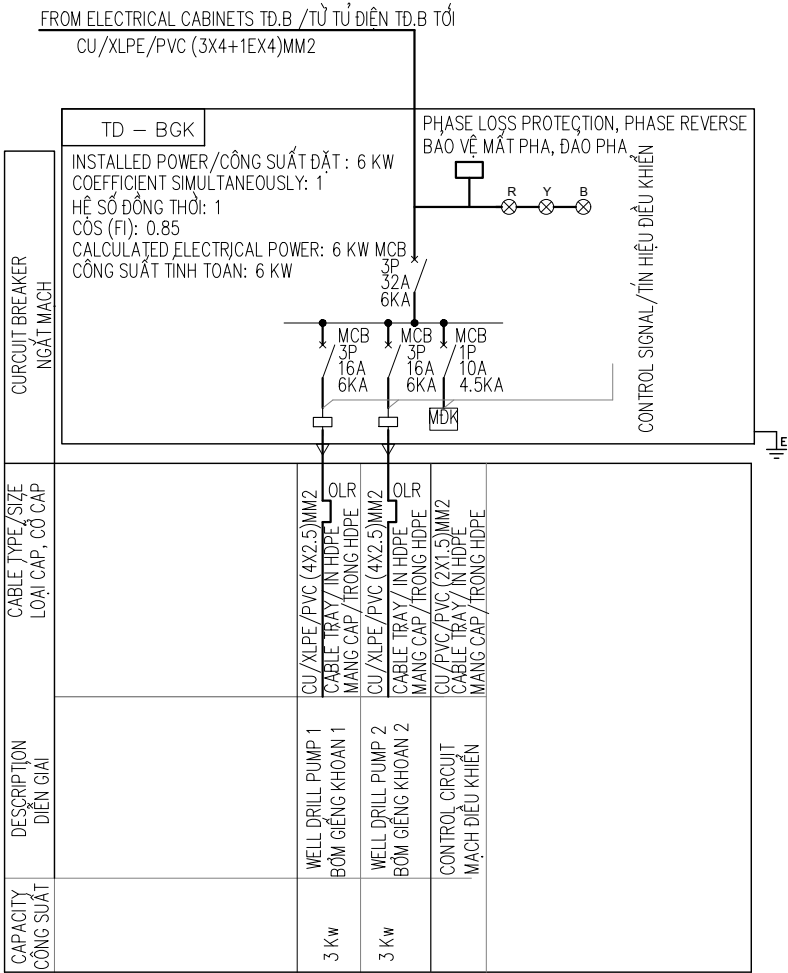
WELL DRILL PUMP CONTROL CABINET/ Tủ điều khiển bơm giếng khoan



WELL PUMP CABINET CONTROL CIRCUIT/MẠCH điều khiển tủ bơm giếng khoan





SCHEMATIC DIAGRAM OF ELECTRICAL CABINET/SƠ ĐỒ NGUYÊN LÝ Tủ Điện

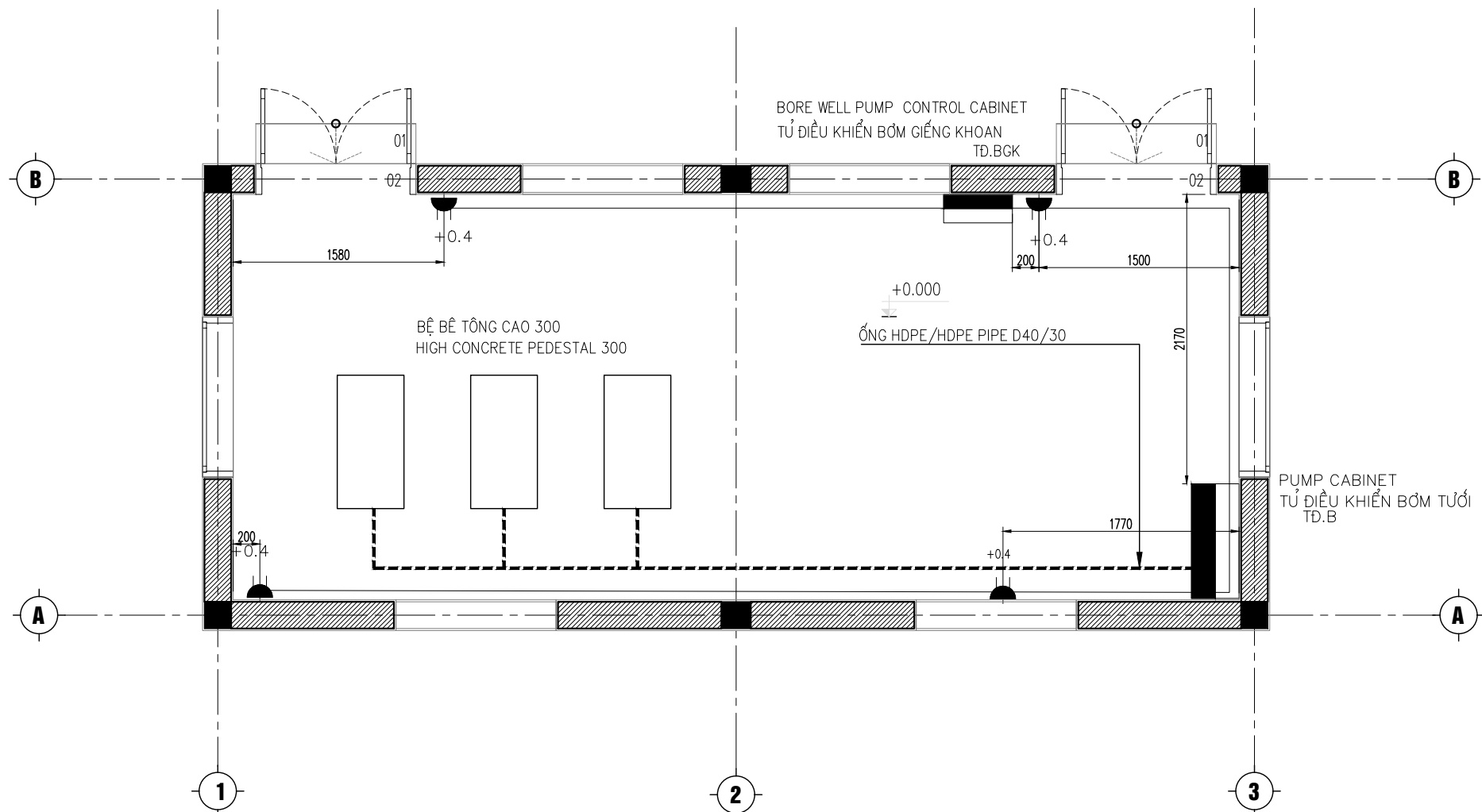
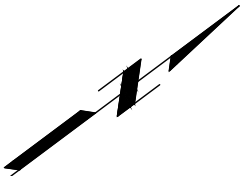


SYMBOL KÝ HIỆU	EXPLAIN/ĐIỂN GIẢI	SYMBOL KÝ HIỆU	EXPLAIN/ ĐIỂN GIẢI
	FUSE/CẦU CHÌ		THERMAL RELAY /RỎ LÊ NHIỆT
	INDICATOR LIGHT ĐÈN BÁO CHỈ THỊ		START THE INVERTER KHỞI ĐỘNG BIẾN TẦN
	CURRENT TRANSFORMER BIẾN DÒNG		CONTROL PART PHẦN ĐIỀU KHIỂN
	VOLTAGE METER (VOLTMETER) ĐỒNG HỒ ĐO ĐIỆN ÁP (VÔN KẾ)		TIME DELAY RELAYS RỎ LÊ THỜI GIAN TRỄ
	CURRENT METER ĐỒNG HỒ ĐO DÒNG ĐIỆN		MAGNETIC STARTER 18A KHỞI ĐỘNG Tủ 18A
	AMMETER / AMMETER SWITCH CHUYỂN MẠCH VÔN KẾ/ AMPE KẾ		NORMALLY OPENED SLOWLY CLOSED CONTACT TIẾP ĐIỂM THƯỜNG MỞ ĐÓNG CHẬM
	STAR BOOT – TRIANGLE KHỞI ĐỘNG SAO – TAM GIÁC		NORMALLY CLOSED SLOWLY OPENED CONTACT TIẾP ĐIỂM THƯỜNG ĐÓNG MỞ CHẬM
	RELAY OF HEAT RELAY TIẾP ĐIỂM CỦA RỎ LÊ NHIỆT		
	NORMALLY CLOSED CONTACT TIẾP ĐIỂM THƯỜNG ĐÓNG		
	NORMALLY OPEN CONTACT TIẾP ĐIỂM THƯỜNG MỞ		
	NORMALLY OPEN PUSH BUTTON NÚT ÁN THƯỜNG MỞ		
	NORMALLY CLOSED PUSH BUTTON NÚT ÁN THƯỜNG ĐÓNG		
	EMERGENCY STOP SWITCH CÔNG TẮC DỪNG KHẨN CẤP		
	3 POSITION SWITCH CÔNG TẮC 3 VỊ TRÍ		
	SIRENS/CỜI BÁO		

GHI CHÚ/ NOTE:

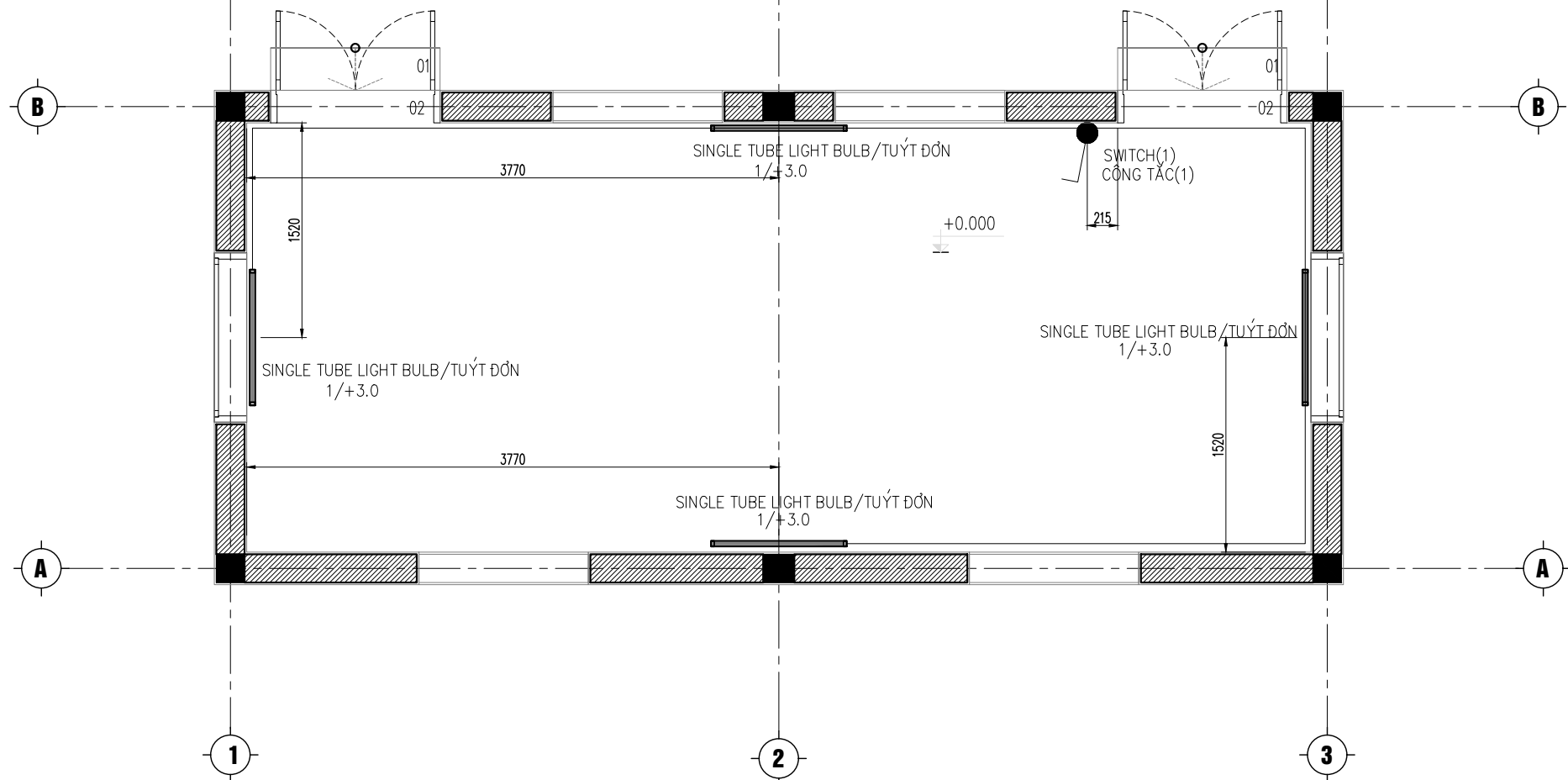
- WHEN MAKING ELECTRICAL CABINETS, IT IS NECESSARY TO SELECT PROTECTIVE DEVICES ACCORDING TO THE ACTUAL CAPACITY OF THE PUMP
  - PUMP IS CONTROLLED IN TWO MODES/BƠM ĐƯỢC ĐIỀU KHIỂN Ở HAI CHẾ ĐỘ:
    - MANUAL MODE: CONTROL START/STOP BY SWITCH
    - AUTOMATIC MODE: CONTROL RUN/STOP ACCORDING TO THE FOLLOWING PRINCIPLE:
      - WHEN THE WATER LEVEL IN THE TANK IS EQUAL TO THE SET HEIGHT: THE PUMPS STOP RUNNING
      - DEPENDING ON THE TIME, THE PUMPS ARE ADJUSTED TO RUN ALTERNATELY
  - THE CONTROL SCHEME CAN BE CHANGED TO SUIT MEASURING DEVICES AND INTERMEDIATE RELAYS
- SƠ ĐỒ ĐIỀU KHIỂN CÓ THỂ ĐƯỢC THAY ĐỔI ĐỂ PHÙ HỢP VỚI CÁC THIẾT BỊ ĐO VÀ RỎ LÊ TRUNG GIAN.

REV BẢN	DESCRIPTION ĐIỀU CHỈNH	DATE NGÀY	BY BỘ
PREPARED FOR CHỦ ĐẦU TƯ:			
			
A&E BIEN HOA CONTRACTOR NHÀ THẦU TV&TK BIÊN HÒA			
			
ENGINEERING • CONSULTING • MANAGEMENT Trigon Associates, llc1515 Poydras St., Ste 930 New Orleans, LA 70112 www.trigonassociates.com			
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CAO SONG TOÀN			
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DESIGNER OF RECORD CHỦ NHIỆM THIẾT KẾ:			
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PROJECT NAME/ TÊN DỰ ÁN:			
DIOXIN REMEDIATION AT BIEN HOA AIRBASE AREA PROJECT - PHASE 1 DỰ ÁN XỬ LÝ Ô NHIỄM DIOXIN KHU VỰC SÂN BAY BIÊN HÒA - GIAI ĐOẠN 1			
FINAL DESIGN			
ITEM/ HẠNG MỤC:			
CW1 - LTSA FINAL COVER			
DRAWING TITLE/ TÊN BẢN VẼ:			
WELL PUMP CONTROL CIRCUIT DIAGRAM SƠ ĐỒ MẠCH ĐIỀU KHIỂN BƠM GIẾNG			
DATE/ NGÀY:	SIZE/ KHØ:	SCALE/ TỈ LỆ:	
31-May-2023	A3	NTS	
DRAWING NO/ BẢN VẼ SỐ:	SHEET	OF	
40E-09	TỜ:	21	CỦA: 43



NOTES /GHI CHÚ:  
+ ALL DIMENSIONS ARE IN MILLIMETERS,ELEVATIONS ARE IN METERS, UNLESS OTHERWISE NOTED/  
+ TẤT CẢ CÁC KÍCH THƯỚC LÀ MM, CAO ĐỘ LÀ M, TRỪ CÁC GHI CHÚ KHÁC

POWER SUPPLY PLAN/ MẶT BẰNG CẤP ĐIỆN SCALE/ TỈ LỆ: 1/45



LIGHTING GROUND PLAN/ MẶT BẰNG CHIẾU SÁNG SCALE/ TỈ LỆ: 1/45

REV	DESCRIPTION	DATE	BY
BẢN	ĐIỀU CHỈNH	NGÀY	BỒI

PREPARED FOR  
CHỦ ĐẦU TƯ:



A&E BIEN HOA CONTRACTOR  
NHÀ THẦU TV&TK BIÊN HÒA



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DESIGNER OF RECORD  
CHỦ NHIỆM THIẾT KẾ:

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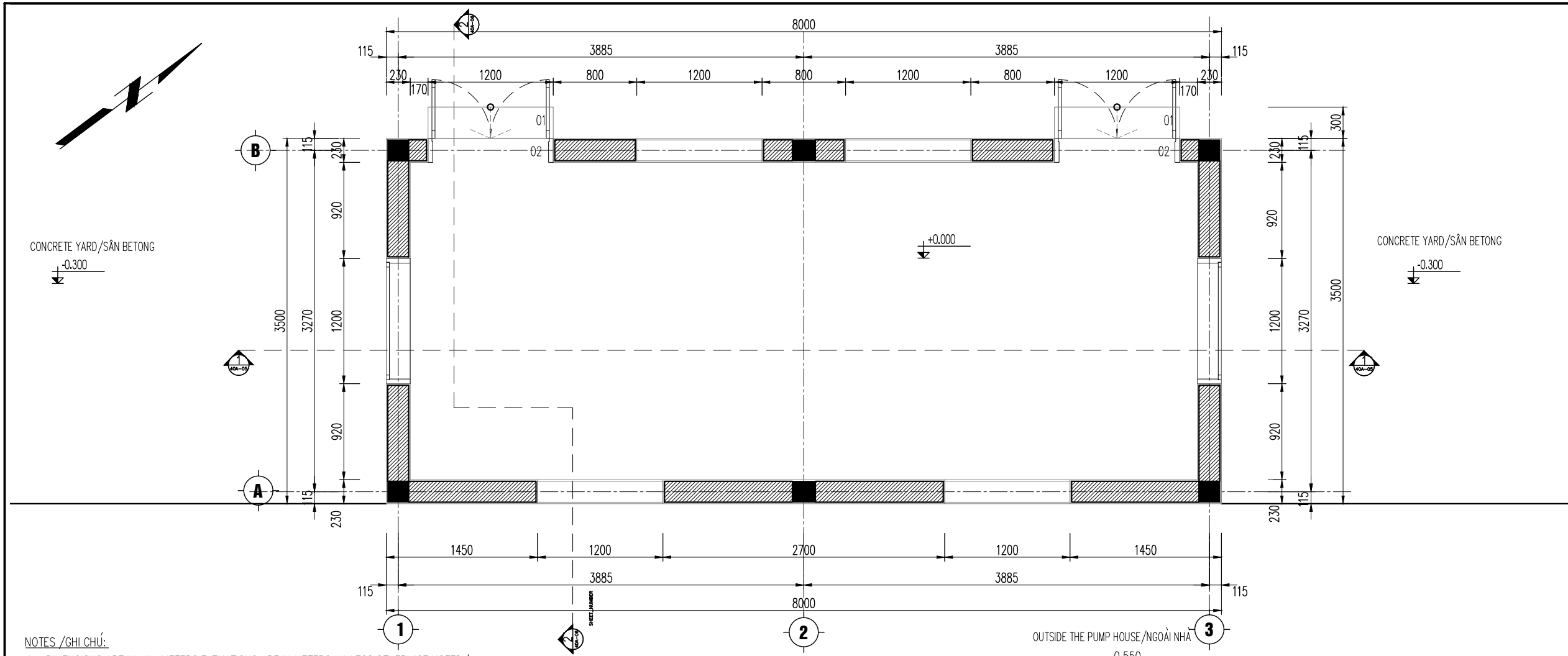
PROJECT NAME/ TÊN DỰ ÁN:  
DIOXIN REMEDIATION AT BIEN HOA  
AIRBASE AREA PROJECT - PHASE 1  
DỰ ÁN XỬ LÝ Ô NHIỄM DIOXIN KHU VỰC  
SÂN BAY BIÊN HÒA - GIAI ĐOẠN 1

FINAL DESIGN

ITEM/ HẠNG MỤC:  
  
CW1 - LTSA FINAL COVER

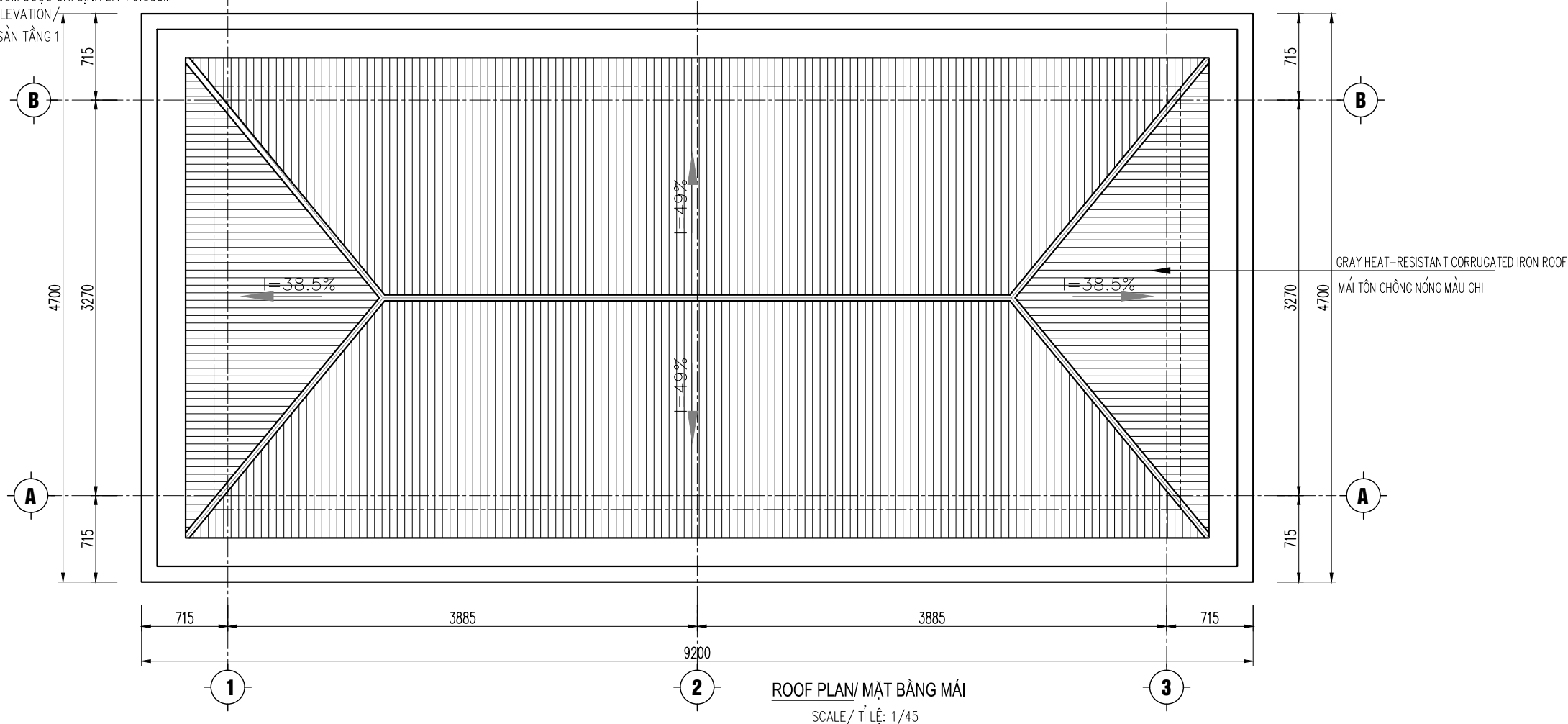
DRAWING TITLE/ TÊN BẢN VẼ:  
  
ELECTRICAL SUPPLY AND ILLUMINATION  
MẶT BẰNG CẤP ĐIỆN VÀ CHIẾU SÁNG

DATE/ NGÀY: 31-May-2023	SIZE/ KHØ: A3	SCALE/ TỈ LỆ: AS NOTED
DRAWING NO/ BẢN VẼ SỐ: 40E-10	SHEET TỜ: 22	OF CỦA: 43





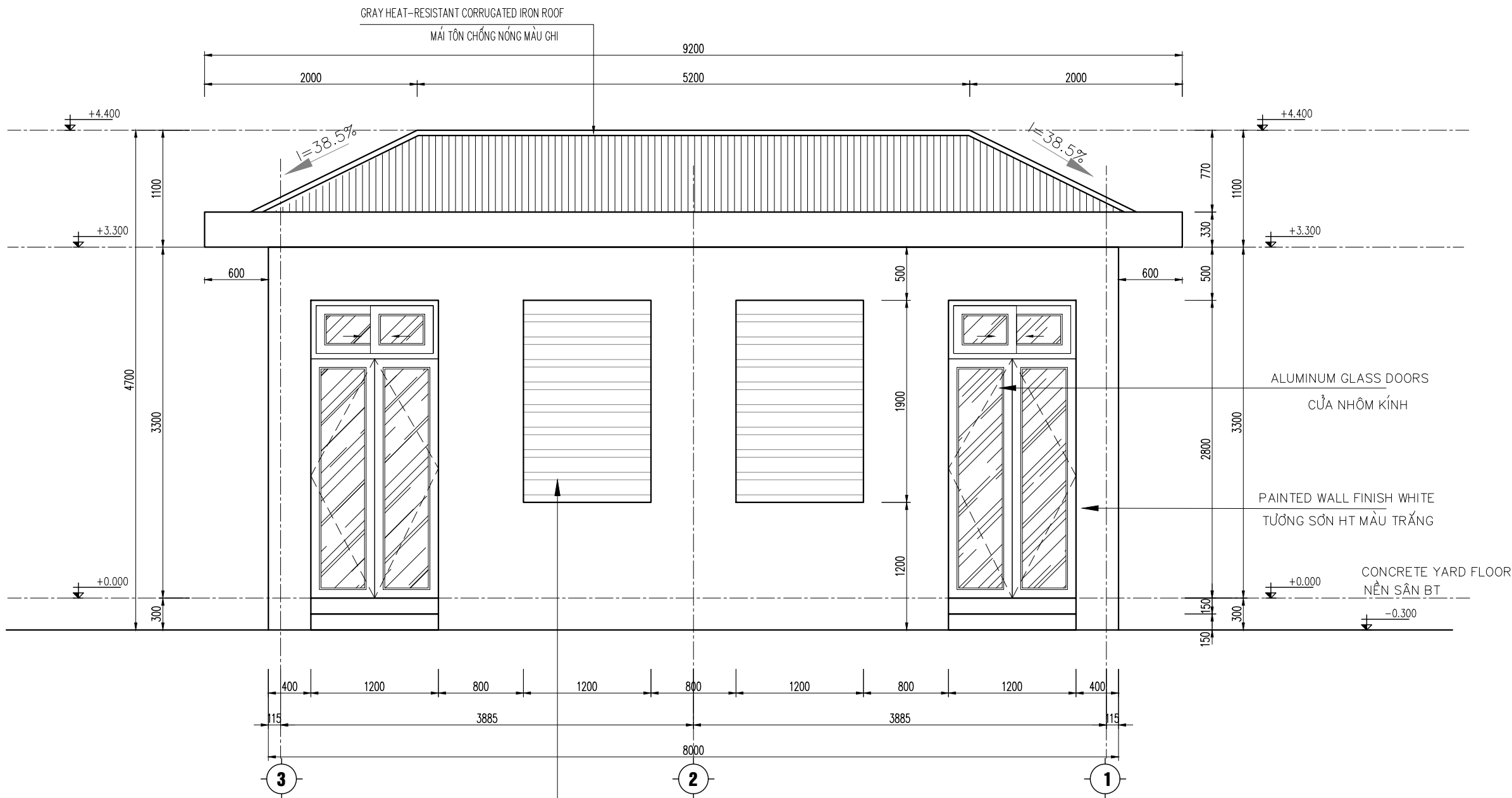
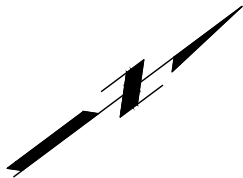
- NOTES /GHI CHÚ:
- + ALL DIMENSIONS ARE IN MILLIMETERS,ELEVATIONS ARE IN METERS, UNLESS OTHERWISE NOTED/
  - + TẤT CẢ CÁC KÍCH THƯỚC LÀ MM, CAO ĐỘ LÀ M, TRỪ CÁC GHI CHÚ KHÁC
  - + ELEVATIONS ARE RELATIVE TO THE PUMP HOUSE FINISHED FLOOR ELEVATION, INDICATED AS +0.000M/
  - + CAO ĐỘ HOÀN THIỆN CỦA NHÀ TRẠM BƠM ĐƯỢC CHỈ ĐỊNH LÀ +0.000M
  - + EL +0.000M IS THE FINISHED FLOOR ELEVATION/
  - + EL +0.000M LÀ CAO ĐỘ HOÀN THIỆN SÀN TẦNG 1

PLAN/ MẶT BẰNG  
SCALE/ TỈ LỆ: 1/45



ROOF PLAN/ MẶT BẰNG MÁI  
SCALE/ TỈ LỆ: 1/45

REV BẢN	DESCRIPTION ĐIỀU CHỈNH	DATE NGÀY	BY BỘ
PREPARED FOR CHỦ ĐẦU TƯ:			
<div><div></div><div><b>USAID</b> FROM THE AMERICAN PEOPLE</div></div>			
A&E BIEN HOA CONTRACTOR NHÀ THẦU TV&TK BIÊN HÒA			
<div><div></div><div>ENGINEERING • CONSULTING • MANAGEMENT Trigon Associates, llc1515 Poydras St., Ste 930 New Orleans, LA 70112 www.trigonassociates.com</div></div>			
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DƯƠNG VĂN PHONG			
CHECKED BY NGƯỜI KIỂM TRA:			
BARRY P. BREAUX			
DESIGNER OF RECORD CHỦ NHIỆM THIẾT KẾ:			
GREGORY A. KOLENOVSKY			
PROJECT NAME/ TÊN DỰ ÁN:			
DIOXIN REMEDIATION AT BIEN HOA AIRBASE AREA PROJECT - PHASE 1 DỰ ÁN XỬ LÝ Ô NHIỄM DIOXIN KHU VỰC SÂN BAY BIÊN HÒA - GIAI ĐOẠN 1			
FINAL DESIGN			
ITEM/ HẠNG MỤC:			
CW1 - LTSA FINAL COVER			
DRAWING TITLE/ TÊN BẢN VẼ:			
LAYOUT PUMPING STATION MẶT BẰNG , MẶT BẰNG MÁI TRẠM BƠM			
DATE/ NGÀY: 31-May-2023	SIZE/ KHØ: A3	SCALE/ TỈ LỆ: AS NOTED	
DRAWING NO/ BẢN VẼ SỐ: 40A-01	SHEET TỜ:	23 OF CỦA:	43



REINFORCED CONCRETE SLAT WINDOWS WITH SIZE 100 X 200 MM, EQUIDISTANT 50MM  
CỬA SỔ NAN CHỚP BTCT KT100x200, CÁCH ĐỀU 50

ELEVATION 3-1/ MẶT ĐỨNG TRỰC 3-1  
SCALE/ TỈ LỆ: 1/45

NOTES /GHI CHÚ:

- + ALL DIMENSIONS ARE IN MILLIMETERS,ELEVATIONS ARE IN METERS, UNLESS OTHERWISE NOTED/
- + TẤT CẢ CÁC KÍCH THƯỚC LÀ MM, CAO ĐỘ LÀ M, TRỪ CÁC GHI CHÚ KHÁC
- + ELEVATIONS ARE RELATIVE TO THE PUMP HOUSE FINISHED FLOOR ELEVATION, INDICATED AS +0.000M/
- + CAO ĐỘ HOÀN THIỆN CỦA NHÀ TRẠM BƠM ĐƯỢC CHỈ ĐỊNH LÀ +0.000M
- + EL +0.000M IS THE FINISHED FLOOR ELEVATION/
- + EL +0.000M LÀ CAO ĐỘ HOÀN THIỆN SÀN TẦNG 1

REV BẢN	DESCRIPTION ĐIỀU CHỈNH	DATE NGÀY	BY BỘ

PREPARED FOR  
CHỦ ĐẦU TƯ:



A&E BIEN HOA CONTRACTOR  
NHÀ THẦU TV&TK BIÊN HÒA

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DƯƠNG VĂN PHONG

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NGƯỜI KIỂM TRA:

BARRY P. BREAUX

DESIGNER OF RECORD  
CHỦ NHIỆM THIẾT KẾ:

GREGORY A. KOLENOVSKY

PROJECT NAME/ TÊN DỰ ÁN:

DIOXIN REMEDIATION AT BIEN HOA  
AIRBASE AREA PROJECT - PHASE 1  
DỰ ÁN XỬ LÝ Ô NHIỄM DIOXIN KHU VỰC  
SÂN BAY BIÊN HÒA - GIAI ĐOẠN 1

FINAL DESIGN

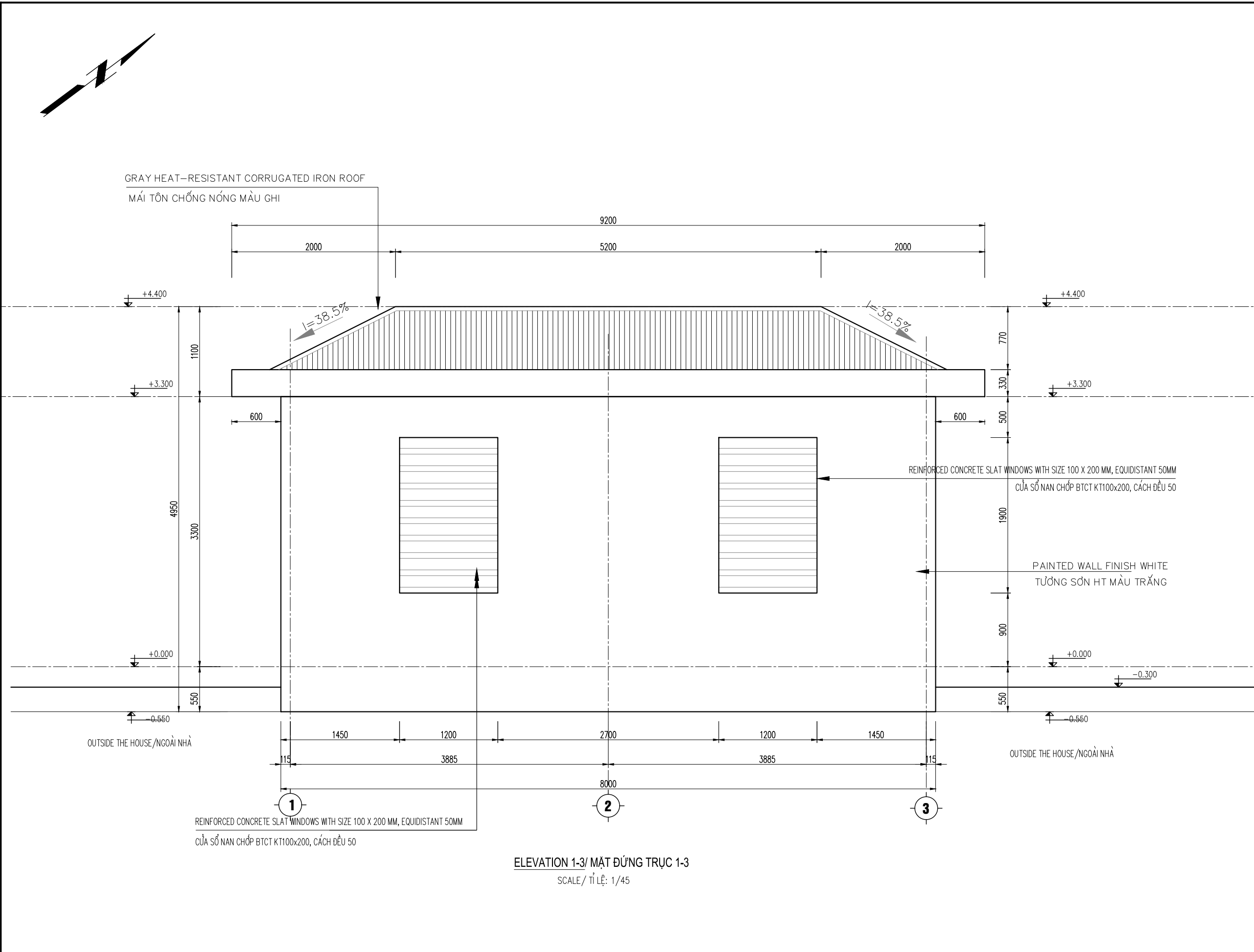
ITEM/ HẠNG MỤC:

CW1 - LTSA FINAL COVER

DRAWING TITLE/ TÊN BẢN VẼ:



ELEVATION 3-1  
MẶT ĐỨNG TRỰC 3-1

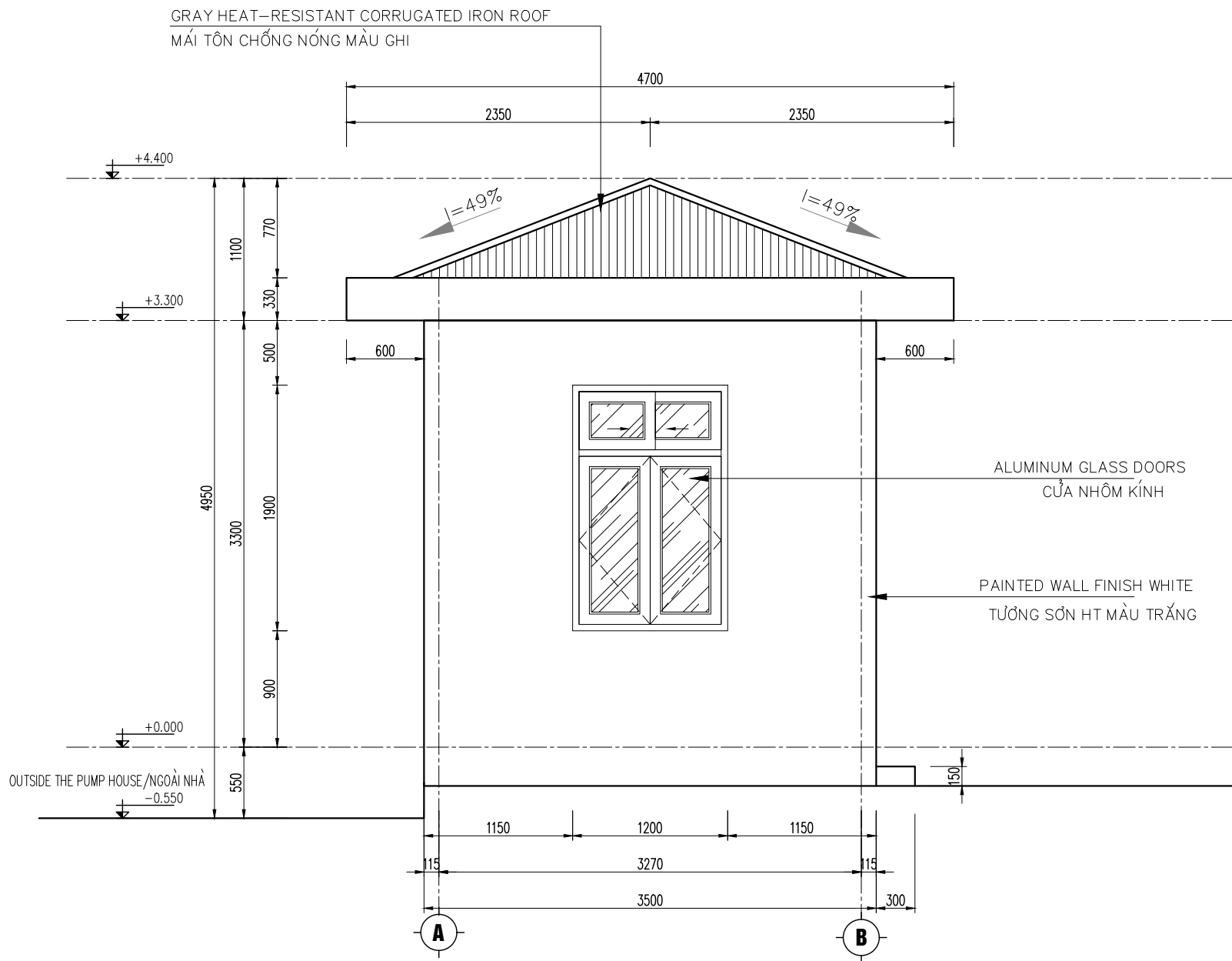
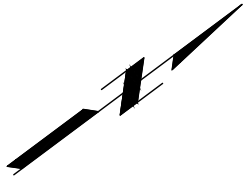
DATE/ NGÀY: 31-May-2023	SIZE/ KHØ: A3	SCALE/ TỈ LỆ: AS NOTED
DRAWING NO/BẢN VẼ SỐ: 40A-02	SHEET TỜ:	OF CỦA: 43



NOTES /GHI CHÚ:



- + ALL DIMENSIONS ARE IN MILLIMETERS,ELEVATIONS ARE IN METERS, UNLESS OTHERWISE NOTED /
- + TẤT CẢ CÁC KÍCH THƯỚC LÀ MM, CAO ĐỘ LÀ M, TRỪ CÁC GHI CHÚ KHÁC
- + ELEVATIONS ARE RELATIVE TO THE PUMP HOUSE FINISHED FLOOR ELEVATION, INDICATED AS +0.000M /
- + CAO ĐỘ HOÀN THIỆN CỦA NHÀ TRẠM BƠM ĐƯỢC CHỈ ĐỊNH LÀ +0.000M
- + EL +0.000M IS THE FINISHED FLOOR ELEVATION /
- + EL +0.000M LÀ CAO ĐỘ HOÀN THIỆN SÀN TẦNG 1

REV BẢN	DESCRIPTION ĐIỀU CHỈNH	DATE NGÀY	BY BỘ
PREPARED FOR CHỦ ĐẦU TƯ:			
<div><div></div><div><b>USAID</b> FROM THE AMERICAN PEOPLE</div></div>			
A&E BIEN HOA CONTRACTOR NHÀ THẦU TV&TK BIÊN HÒA			
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GREGORY A. KOLENOVSKY			
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FINAL DESIGN			
ITEM/ HẠNG MỤC:			
CW1 - LTSA FINAL COVER			
DRAWING TITLE/ TÊN BẢN VẼ:			
ELEVATION 1-3 MẶT ĐỨNG TRỰC 1-3			
DATE/ NGÀY: 31-May-2023	SIZE/ KHÖ: A3	SCALE/ TỈ LỆ: AS NOTED	
DRAWING NO /BẢN VẼ SỐ: 40A-03	SHEET TỜ:	25 OF CỦA:	43

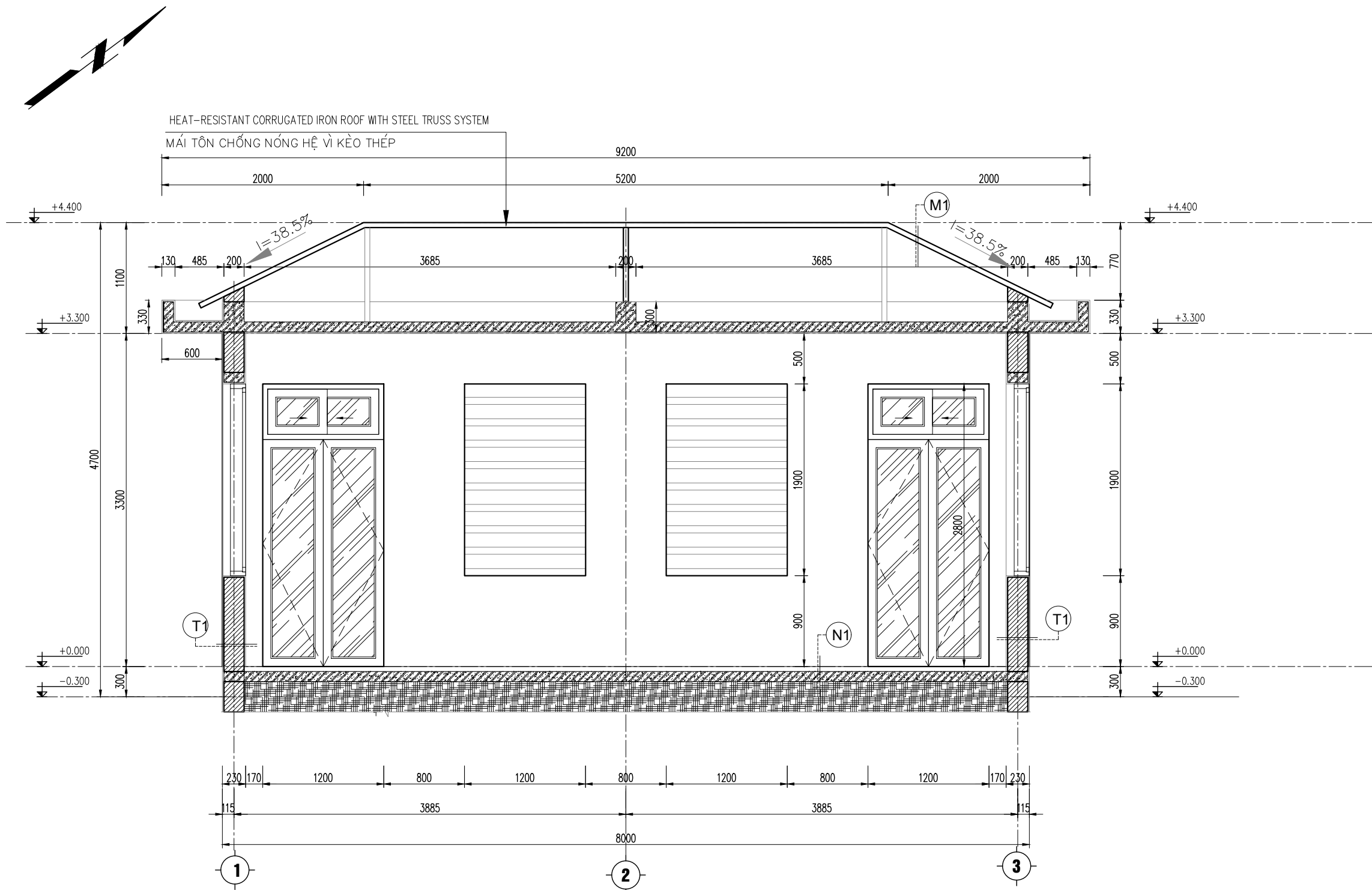


ELEVATION A-B, B-A/ MẶT ĐỨNG TRỤC A-B, B-A  
SCALE/ TỈ LỆ: 1/45

NOTES /GHI CHÚ:  
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+ TẤT CẢ CÁC KÍCH THƯỚC LÀ MM, CAO ĐỘ LÀ M, TRỪ CÁC GHI CHÚ KHÁC  
+ ELEVATIONS ARE RELATIVE TO THE PUMP HOUSE FINISHED FLOOR ELEVATION, INDICATED AS +0.000M/  
+ CAO ĐỘ HOÀN THIÊN CỦA NHÀ TRẠM BƠM ĐƯỢC CHỈ ĐỊNH LÀ +0.000M  
+ EL +0.000M IS THE FINISHED FLOOR ELEVATION/  
+ EL +0.000M LÀ CAO ĐỘ HOÀN THIÊN SÀN TẦNG 1

REV BẢN	DESCRIPTION ĐIỀU CHỈNH	DATE NGÀY	BY BỘ
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<div><div></div><div><b>USAID</b> FROM THE AMERICAN PEOPLE</div></div>			
A&E BIEN HOA CONTRACTOR NHÀ THẦU TV&TK BIÊN HÒA			
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DIOXIN REMEDIATION AT BIEN HOA AIRBASE AREA PROJECT - PHASE 1 DỰ ÁN XỬ LÝ Ô NHIỄM DIOXIN KHU VỰC SÂN BAY BIÊN HÒA - GIAI ĐOẠN 1			
FINAL DESIGN			
ITEM/ HẠNG MỤC:			
CW1 - LTSA FINAL COVER			
DRAWING TITLE/ TÊN BẢN VẼ:			
ELEVATION A-B MẶT ĐỨNG TRỤC A-B			
DATE/ NGÀY:	SIZE/ KHÔ:	SCALE/ TỈ LỆ:	
31-May-2023	A3	AS NOTED	
DRAWING NO/ BẢN VẼ SỐ:	SHEET	TỜ:	OF CỦA:
40A-04	26	43	





SECTION 1-1/ MẶT CẮT TRỰC 1-1  
SCALE/ TỈ LỆ: 1/45

NOTES /GHI CHÚ:  
+ ALL DIMENSIONS ARE IN MILLIMETERS,ELEVATIONS ARE IN METERS, UNLESS OTHERWISE NOTED/  
+ TẤT CẢ CÁC KÍCH THƯỚC LÀ MM, CAO ĐỘ LÀ M, TRỪ CÁC GHI CHÚ KHÁC  
+ ELEVATIONS ARE RELATIVE TO THE PUMP HOUSE FINISHED FLOOR ELEVATION, INDICATED AS +0.000/  
+ CAO ĐỘ HOÀN THIỆN CỦA NHÀ TRẠM BƠM ĐƯỢC CHỈ ĐỊNH LÀ +0.000M  
+ EL +0.000M IS THE FINISHED FLOOR ELEVATION/  
+ EL +0.000M LÀ CAO ĐỘ HOÀN THIỆN SÀN TẦNG 1

- N1** – UNIFORM CERAMIC TILE 600X600, LIGHT COLOR, 8~10MM THICK, GROUT LINE 2MM MAX/  
– GẠCH CERAMIC ĐỒNG CHẤT 600X600 SÁNG MÀU DÀY 8~10MM, MẠCH LÁT TỐI ĐA 2MM  
– CEMENT MORTAR #75, LEVELING AT AVG. 20MM THICK/  
– CÁN Vữa XM#75 DÀY TẠO PHẪNG TRUNG BÌNH 20MM  
– PURE CEMENT SLURRY, TILING AT AVG. 5MM THICK/  
– NƯỚC XI MĂNG NGUYÊN CHẤT(HỖ DẦU) LÁT GẠCH DÀY TB 5MM  
– CONCRETE, STONE 1X2 10 MPA 100MM THICK/  
– BÊ TÔNG DÁ 1X2 10MPA DÀY 100MM  
– WATERED BLACK SAND, 250MM THICK/  
– CÁT ĐEN TƯỚI NƯỚC ĐÁM CHẶT DÀY 250MM  
– REINFORCED NATURAL SOIL/  
– ĐẤT TỰ NHIÊN GIA CỐ

- L1** – PAINT THE INSIDE OF THE WALL 3 LAYERS ( 1 COAT OF PRIMER, 2 COATS OF TOPCOAT)  
SƠN MẶT TRONG TƯỜNG 3 LỚP ( 1 LỚP LÓT, 2 LỚP PHỦ)  
– 15 MM THICK INNER WALL PLASTER, CEMENT MORTAR #75  
LỚP TRÁT TƯỜNG BÊN TRONG DÀY 15 MM, VỮA XI MĂNG #75  
– BRICK WALL TEXTURE, CEMENT MORTAR #75  
KẾT CẤU TƯỜNG GẠCH,VỮA XI MĂNG #75  
– 15 MM THICK EXTERIOR WALL PLASTER, CEMENT MORTAR #75  
LỚP TRÁT TƯỜNG BÊN NGOÀI DÀY 15 MM, VỮA XI MĂNG #75  
– PAINT THE OUTSIDE OF THE WALL 3 LAYERS ( 1 COAT OF PRIMER, 2 COATS OF TOPCOAT)  
SƠN MẶT NGOÀI TƯỜNG 3 LỚP ( 1 LỚP LÓT, 2 LỚP PHỦ)

- M1** –GRAY HEAT-RESISTANT CORRUGATED IRON ROOF  
MÁI TÔN CHỐNG NÓNG MÀU GHI  
–STEEL TRUSS SYSTEM/HỆ VÌ KÈO THÉP  
– REINFORCED CONCRETE CEILING/TRẦN BTCT

REV	DESCRIPTION	DATE	BY
BẢN	ĐIỀU CHỈNH	NGÀY	BỜ

PREPARED FOR  
CHỦ ĐẦU TƯ:



A&E BIEN HOA CONTRACTOR  
NHÀ THẦU TV&TK BIÊN HÒA

Trigon

ENGINEERING • CONSULTING • MANAGEMENT  
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NGƯỜI THỰC HIỆN:

DƯƠNG VĂN PHONG

CHECKED BY  
NGƯỜI KIỂM TRA:

BARRY P. BREAU

DESIGNER OF RECORD  
CHỦ NHIỆM THIẾT KẾ:

GREGORY A. KOLENOVSKY

PROJECT NAME/ TÊN DỰ ÁN:

DIOXIN REMEDIATION AT BIEN HOA  
AIRBASE AREA PROJECT - PHASE 1  
DỰ ÁN XỬ LÝ Ô NHIỄM DIOXIN KHU VỰC  
SÂN BAY BIÊN HÒA - GIAI ĐOẠN 1

FINAL DESIGN

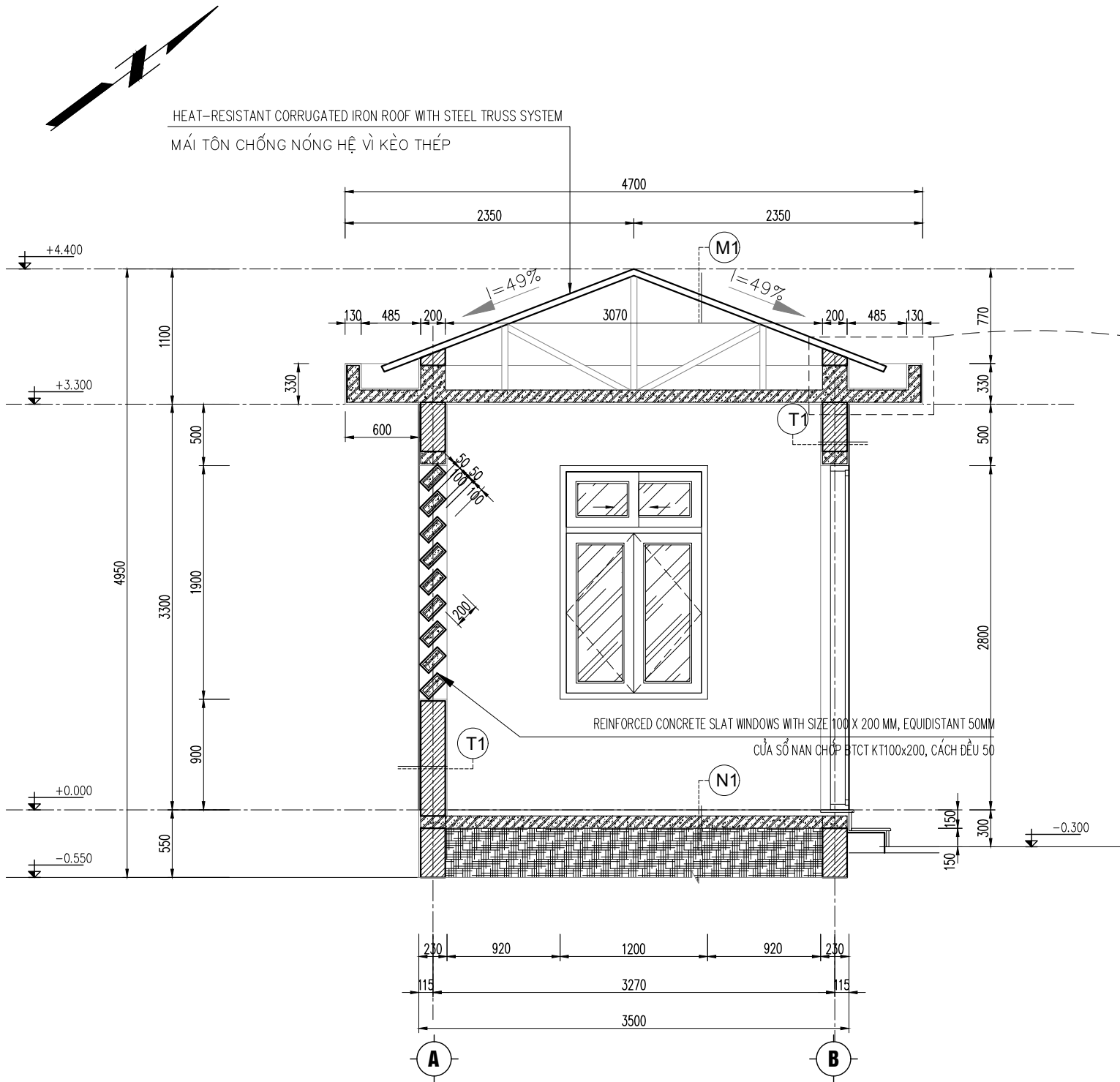
ITEM/ HẠNG MỤC:

CW1 - LTSA FINAL COVER

DRAWING TITLE/ TÊN BẢN VẼ:

SECTION 1-1  
MẶT CẮT 1-1

DATE/ NGÀY:	SIZE/ KHÔ:	SCALE/ TỈ LỆ:
31-May-2023	A3	AS NOTED
DRAWING NO./BẢN VẼ SỐ:	SHEET	OF
40A-05	TỜ:	CỦA: 43

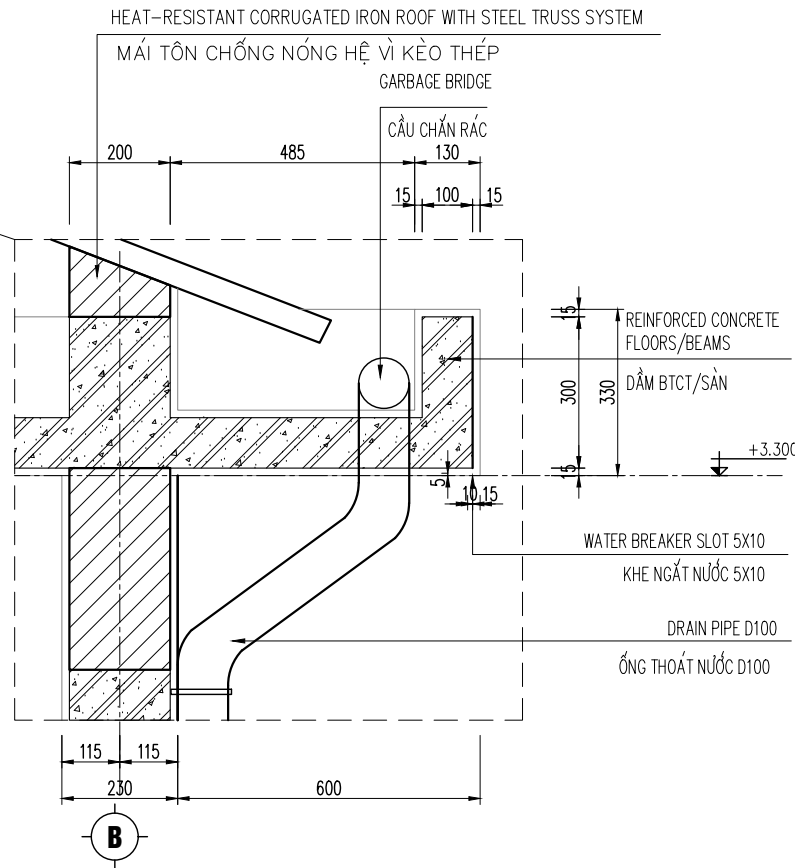


SECTION 2-2/ MẶT CẮT 2-2  
SCALE/ TỈ LỆ: 1/45

NOTES /GHI CHÚ:  
+ ALL DIMENSIONS ARE IN MILLIMETERS, ELEVATIONS ARE IN METERS, UNLESS OTHERWISE NOTED/  
+ TẤT CẢ CÁC KÍCH THUỘC LÀ MM, CAO ĐỘ LÀ M, TRỪ CÁC GHI CHÚ KHÁC  
+ ELEVATIONS ARE RELATIVE TO THE PUMP HOUSE FINISHED FLOOR ELEVATION, INDICATED AS +0.000M/  
+ CAO ĐỘ HOÀN THIỆN CỦA NHÀ TRẠM BƠM ĐƯỢC CHỈ ĐỊNH LÀ +0.000M  
+ EL +0.000M IS THE FINISHED FLOOR ELEVATION/  
+ EL +0.000M LÀ CAO ĐỘ HOÀN THIỆN SÀN TẦNG 1



- N1** – UNIFORM CERAMIC TILE 600X600, LIGHT COLOR, 8~10MM THICK, GROUT LINE 2MM MAX/  
– GẠCH CERAMIC ĐỒNG CHẤT 600X600 SÁNG MÀU DÀY 8~10MM, MẠCH LÁT TỐI ĐA 2MM  
– CEMENT MORTAR #75, LEVELING AT AVG. 20MM THICK/  
– CÁN VỮA XM#75 DÀY TẠO PHẪNG TRUNG BÌNH 20MM  
– PURE CEMENT SLURRY, TILING AT AVG. 5MM THICK/  
– NƯỚC XI MĂNG NGUYÊN CHẤT(HỒ DẦU) LÁT GẠCH DÀY TB 5MM  
– CONCRETE, STONE 1X2 10 MPA 100MM THICK/  
– BÊ TÔNG DÁ 1X2 10MPA DÀY 100MM  
– WATERED BLACK SAND, 250MM THICK/  
– CÁT ĐEN TƯỚI NƯỚC ĐÁM CHẶT DÀY 250MM  
– REINFORCED NATURAL SOIL/  
– ĐẤT TỰ NHIÊN GIA CỐ

- L1** – PAINT THE INSIDE OF THE WALL 3 LAYERS ( 1 COAT OF PRIMER, 2 COATS OF TOPCOAT)  
SƠN MẶT TRONG TƯỜNG 3 LỚP ( 1 LỚP LÓT, 2 LỚP PHỦ)  
– 15 MM THICK INNER WALL PLASTER, CEMENT MORTAR #75  
LỚP TRÁT TƯỜNG BÊN TRONG DÀY 15 MM, VỮA XI MĂNG #75  
– BRICK WALL TEXTURE, CEMENT MORTAR #75  
KẾT CẤU TƯỜNG GẠCH,VỮA XI MĂNG #75  
– 15 MM THICK EXTERIOR WALL PLASTER, CEMENT MORTAR #75  
LỚP TRÁT TƯỜNG BÊN NGOÀI DÀY 15 MM, VỮA XI MĂNG #75  
– PAINT THE OUTSIDE OF THE WALL 3 LAYERS ( 1 COAT OF PRIMER, 2 COATS OF TOPCOAT)  
SƠN MẶT NGOÀI TƯỜNG 3 LỚP ( 1 LỚP LÓT, 2 LỚP PHỦ)

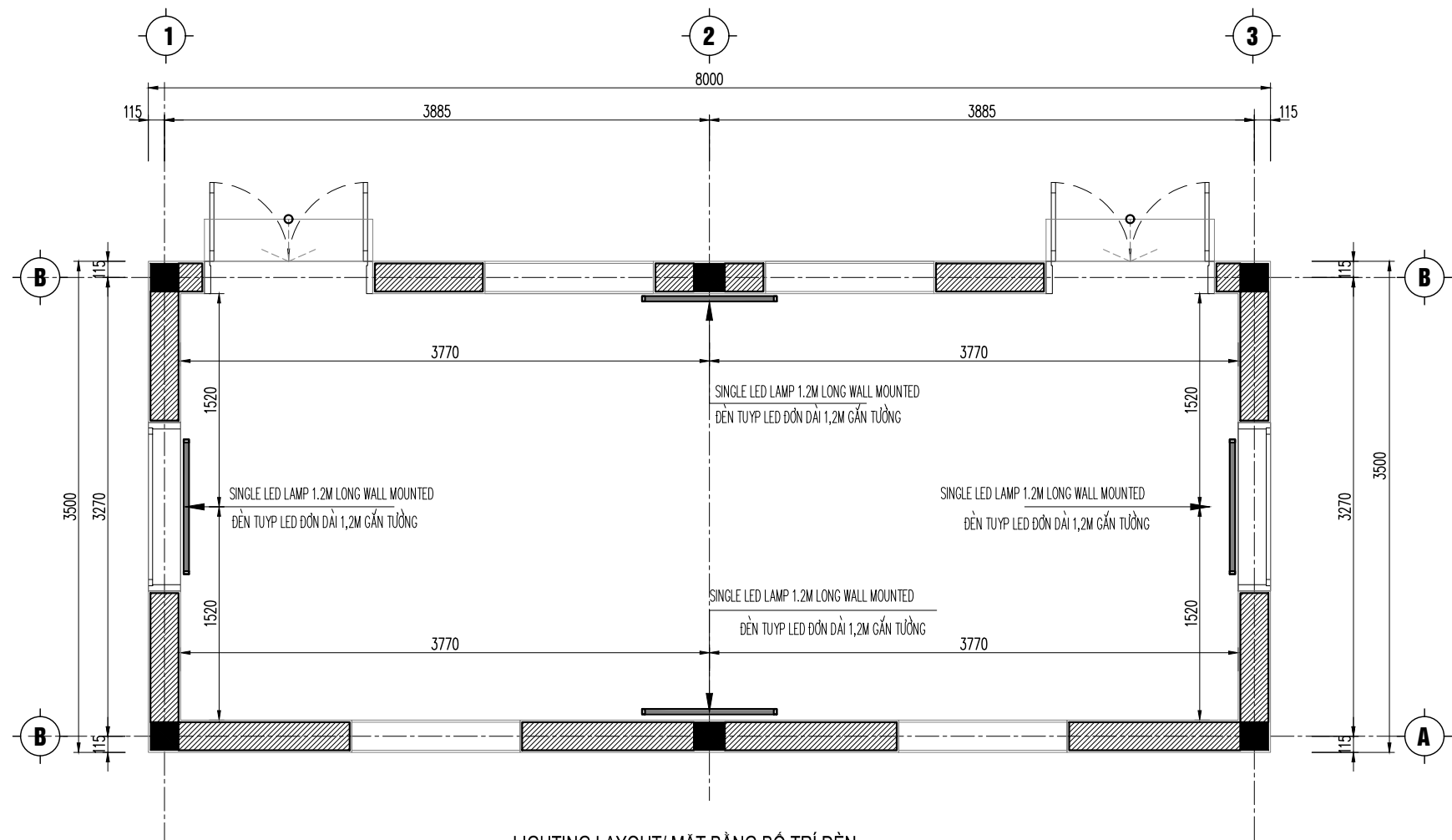
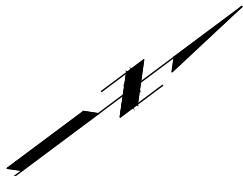


SENO DETAILS/ CHI TIẾT SENO  
SCALE/ TỈ LỆ: 1/15

- M1** – GRAY HEAT-RESISTANT CORRUGATED IRON ROOF  
MÁI TÔN CHỐNG NÓNG MÀU GHI  
– STEEL TRUSS SYSTEM/HỆ VÌ KÈO THÉP  
– REINFORCED CONCRETE CEILING/TRẦN BTCT

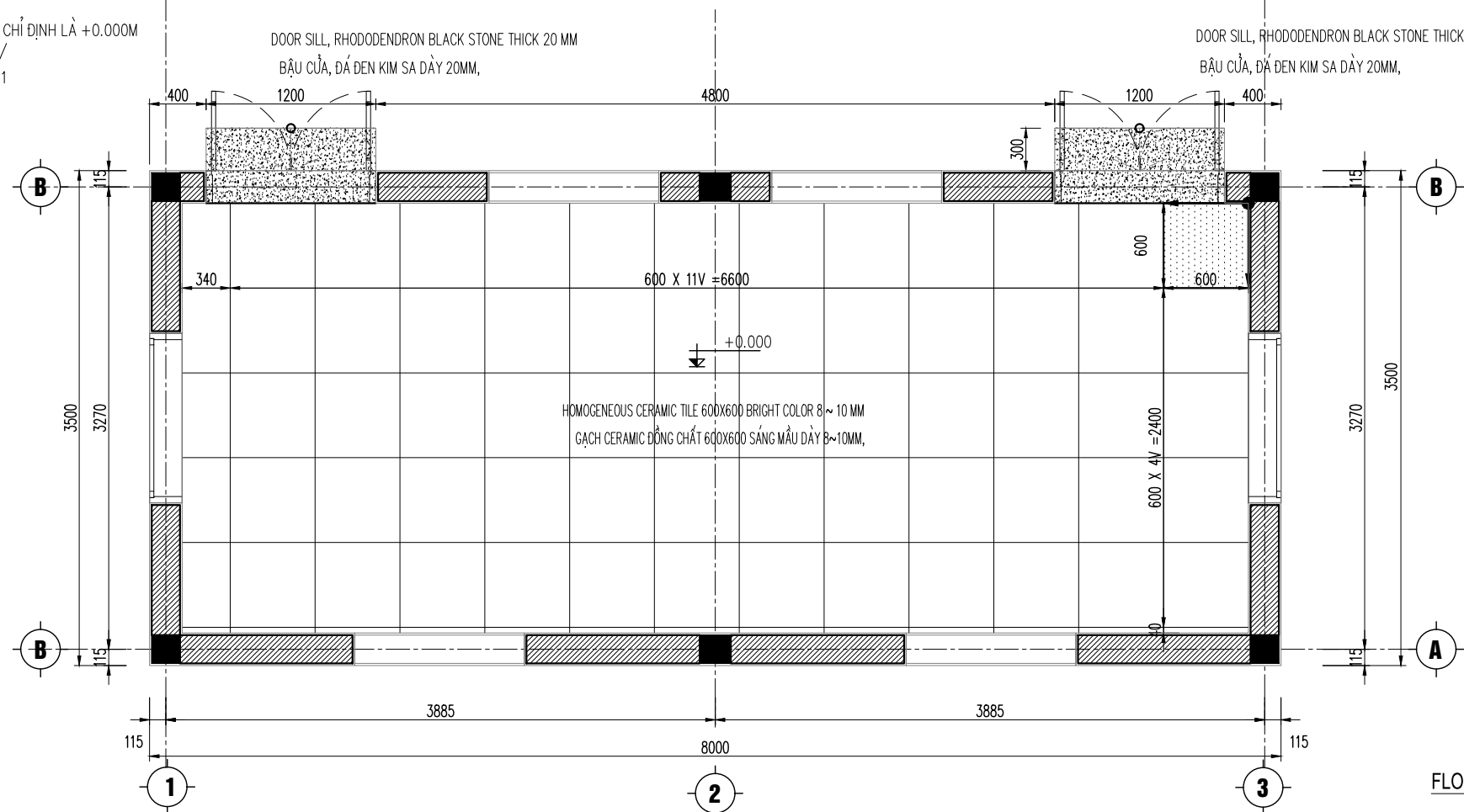
REV BẢN	DESCRIPTION ĐIỀU CHỈNH	DATE NGÀY	BY BỘ
PREPARED FOR CHỦ ĐẦU TƯ:			
<div><div></div><div><b>USAID</b> FROM THE AMERICAN PEOPLE</div></div>			
A&E BIEN HOA CONTRACTOR NHÀ THẦU TV&TK BIÊN HÒA			
<div><div></div><div>ENGINEERING • CONSULTING • MANAGEMENT Trigon Associates, llc1515 Poydras St., Ste 930 New Orleans, LA 70112 www.trigonassociates.com</div></div>			
DESIGNED IN COLLABORATION WITH ASIA PACIFIC ENGINEERING CONSULTANTS (APECO)			
PREPARED BY NGƯỜI THỰC HIỆN:			
DƯƠNG VĂN PHONG			
CHECKED BY NGƯỜI KIỂM TRA:			
BARRY P. BREAUX			
DESIGNER OF RECORD CHỦ NHIỆM THIẾT KẾ:			
GREGORY A. KOLENOVSKY			
PROJECT NAME/ TÊN DỰ ÁN:			
DIOXIN REMEDIATION AT BIEN HOA AIRBASE AREA PROJECT - PHASE 1 DỰ ÁN XỬ LÝ Ô NHIỄM DIOXIN KHU VỰC SÂN BAY BIÊN HÒA - GIAI ĐOẠN 1			
FINAL DESIGN			
ITEM/ HẠNG MỤC:			
CW1 - LTSA FINAL COVER			
DRAWING TITLE/ TÊN BẢN VẼ:			
SECTION 2-2 MẶT CẮT 2-2			
DATE/ NGÀY: 31-May-2023	SIZE/ KHØ: A3	SCALE/ TỈ LỆ: AS NOTED	
DRAWING NO/ BẢN VẼ SỐ: 40A-06	SHEET TỜ:	28 OF CỦA:	43





NOTES /GHI CHÚ:

- + ALL DIMENSIONS ARE IN MILLIMETERS,ELEVATIONS ARE IN METERS, UNLESS OTHERWISE NOTED/
- + TẤT CẢ CÁC KÍCH THƯỚC LÀ MM, CAO ĐỘ LÀ M, TRỪ CÁC GHI CHÚ KHÁC
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- + CAO ĐỘ HOÀN THIỆN CỦA NHÀ TRẠM BƠM ĐƯỢC CHỈ ĐỊNH LÀ +0.000M
- + EL +0.000M IS THE FINISHED FLOOR ELEVATION/
- + EL +0.000M LÀ CAO ĐỘ HOÀN THIỆN SÀN TẦNG 1



NOTE/GHI CHÚ:



POSITIONING BRICKS  
VIÊN GẠCH ĐỊNH VỊ

FLOOR PLAN/ MẶT BẰNG LÁT SÀN

SCALE/ TỈ LỆ: 1/45

REV	DESCRIPTION	DATE	BY
BẢN	ĐIỀU CHỈNH	NGÀY	BỒI

PREPARED FOR  
CHỦ ĐẦU TƯ:



A&E BIEN HOA CONTRACTOR  
NHÀ THẦU TV&TK BIÊN HÒA

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DƯƠNG VĂN PHONG

CHECKED BY  
NGƯỜI KIỂM TRA:

BARRY P. BREAU

DESIGNER OF RECORD  
CHỦ NHIỆM THIẾT KẾ:

GREGORY A. KOLENOVSKY

PROJECT NAME/ TÊN DỰ ÁN:

DIOXIN REMEDIATION AT BIEN HOA  
AIRBASE AREA PROJECT - PHASE 1  
DỰ ÁN XỬ LÝ Ô NHIỄM DIOXIN KHU VỰC  
SÂN BAY BIÊN HÒA - GIAI ĐOẠN 1

FINAL DESIGN

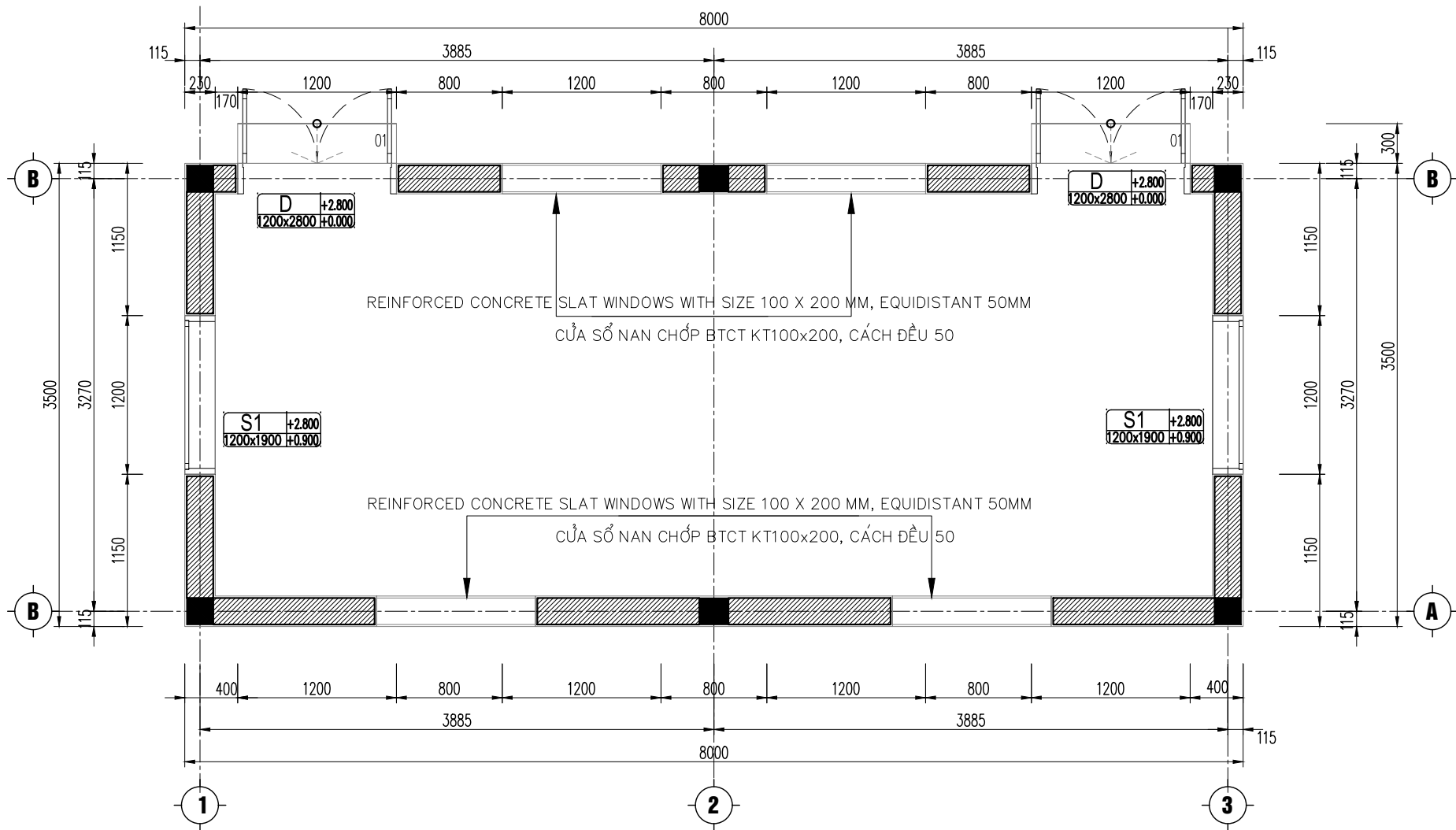
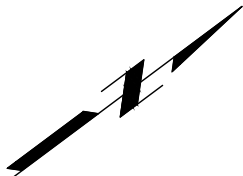
ITEM/ HẠNG MỤC:

CW1 - LTSA FINAL COVER

DRAWING TITLE/ TÊN BẢN VẼ:

CEILING - FLOOR PLAN  
MẶT BẰNG TRẦN - SÀN

DATE/ NGÀY:	SIZE/ KHỔ:	SCALE/ TỈ LỆ:
31-May-2023	A3	AS NOTED
DRAWING NO/ BẢN VẼ SỐ:	SHEET	OF
40A-07	TỜ:	CỦA: 43



DOOR POSITIONING PLAN/ MẶT BẰNG ĐỊNH VỊ CỬA

SCALE/ TỈ LỆ: 1/45

NO. STT	SYMBOL KÍ HIỆU	SIZE/KÍCH THƯỚC		THỐNG KÊ STATISTICAL	SPECIFICATIONS/QUY CÁCH
		WIDTH CHIỀU RỘNG (MM)	HEIGHT CHIỀU CAO (MM)		
1	D	1200	2800	02	XINGFA ALUMINUM DOORS, CLEAR WHITE 8.38 LAMINATED SAFETY GLASS CỬA NHÔM XINGFA, KÍNH DÁN AN TOÀN 8.38 MÀU TRẮNG TRONG
2	S1	1200	1900	02	XINGFA ALUMINUM DOORS, CLEAR WHITE 8.38 LAMINATED SAFETY GLASS CỬA NHÔM XINGFA, KÍNH DÁN AN TOÀN 8.38 MÀU TRẮNG TRONG

NOTE + 0.000M IS THE FINISHED LEVEL OF THE CORRESPONDING DOOR POSITION  
GHI CHÚ: CAO ĐỘ +0.000M TÍNH LÀ CAO ĐỘ HOÀN THIỆN TẠI VỊ TRÍ CỬA TƯƠNG ỨNG

NOTES /GHI CHÚ:  
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+ ELEVATIONS ARE RELATIVE TO THE PUMP HOUSE FINISHED FLOOR ELEVATION,  
INDICATED AS +0.000M /  
+ CAO ĐỘ HOÀN THIỆN CỦA NHÀ TRẠM BƠM ĐƯỢC CHỈ ĐỊNH LÀ +0.000M  
+ EL +0.000M IS THE FINISHED FLOOR ELEVATION /  
+ EL +0.000M LÀ CAO ĐỘ HOÀN THIỆN SÀN TẦNG 1

DOOR NAME TÊN CỬA	D1	+2.700	UPPER PEDESTAL LEVEL CAO ĐỘ BẬC TRÊN
SIZE KÍCH THƯỚC	1200x2700	+0.000	LOWER PEDESTAL LEVEL CAO ĐỘ BẬC DƯỚI

REV BẢN	DESCRIPTION ĐIỀU CHỈNH	DATE NGÀY	BY BỞI

PREPARED FOR  
CHỦ ĐẦU TƯ:



A&E BIEN HOA CONTRACTOR  
NHÀ THẦU TV&TK BIÊN HÒA



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DƯƠNG VĂN PHONG

CHECKED BY  
NGƯỜI KIỂM TRA:

BARRY P. BREAUX

DESIGNER OF RECORD  
CHỦ NHIỆM THIẾT KẾ:

GREGORY A. KOLENOVSKY

PROJECT NAME/ TÊN DỰ ÁN:

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AIRBASE AREA PROJECT - PHASE 1  
DỰ ÁN XỬ LÝ Ô NHIỄM DIOXIN KHU VỰC  
SÂN BAY BIÊN HÒA - GIAI ĐOẠN 1

FINAL DESIGN

ITEM/ HẠNG MỤC:

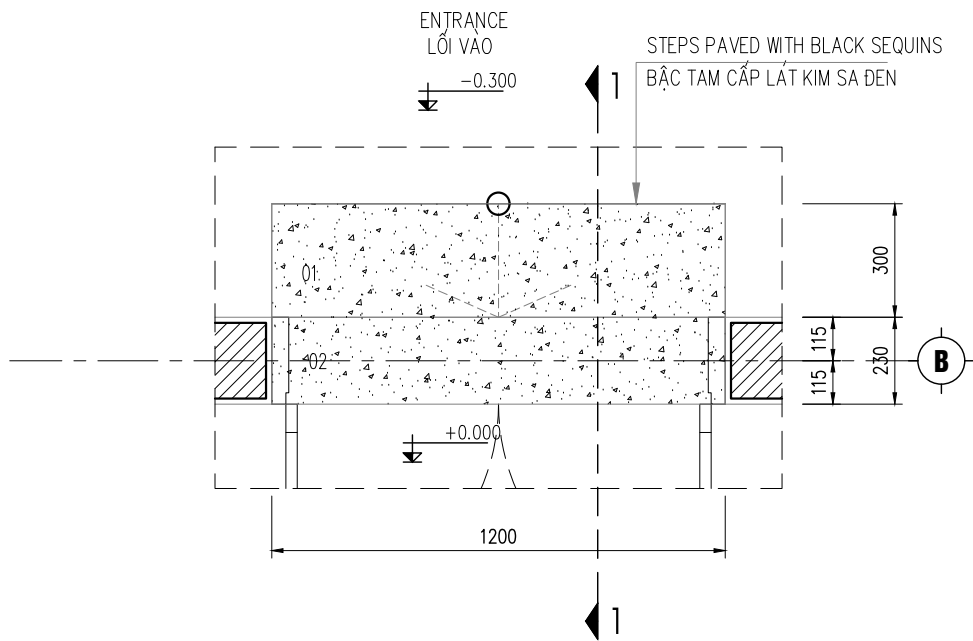
CW1 - LTSA FINAL COVER

DRAWING TITLE/ TÊN BẢN VẼ:

DOOR POSITIONING PLAN  
MẶT BẰNG ĐỊNH VỊ CỬA

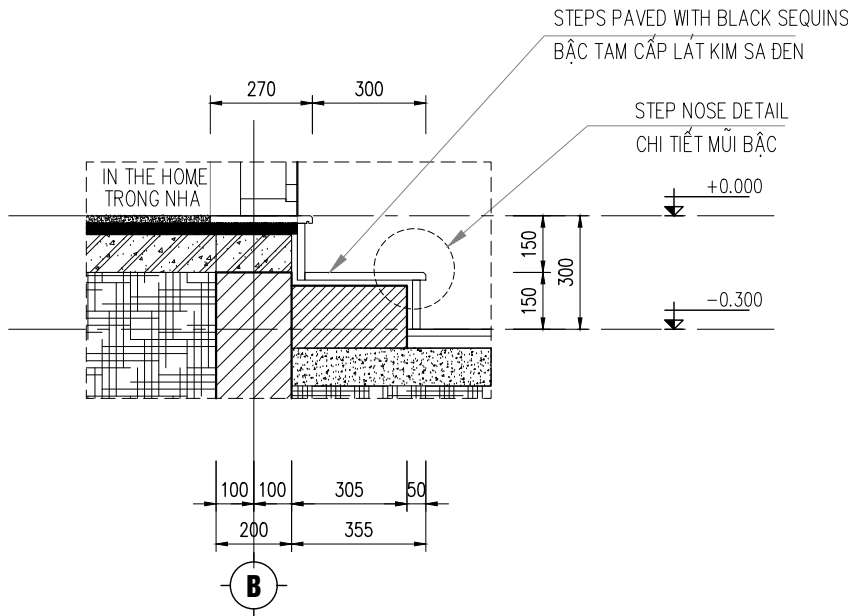
DATE/ NGÀY: 31-May-2023	SIZE/ KHÔ: A3	SCALE/ TỈ LỆ: AS NOTED
DRAWING NO/ BẢN VẼ SỐ: 40A-08	SHEET TỜ: 30	OF CỦA: 43





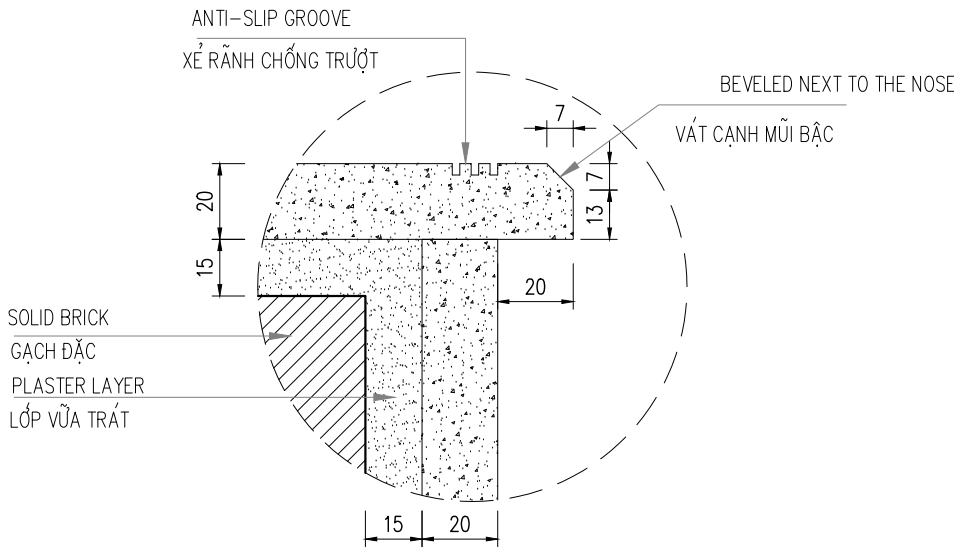
THREE-STEP STAIRCASE PLAN/ MẶT BẰNG TAM CẤP

SCALE/ TỈ LỆ: 1/20



SECTION 1-1/ MẶT CẮT 1-1

SCALE/ TỈ LỆ: 1/20



STEP NOSE DETAIL/ CHI TIẾT MŨI BẬC

SCALE/ TỈ LỆ: 1/20

NOTES /GHI CHÚ:

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- + CAO ĐỘ HOÀN THIỆN CỦA NHÀ TRẠM BƠM ĐƯỢC CHỈ ĐỊNH LÀ +0.000M
- + EL +0.000M IS THE FINISHED FLOOR ELEVATION/
- + EL +0.000M LÀ CAO ĐỘ HOÀN THIỆN SÀN TẦNG 1

THREE-STEP STAIRCASE DETAILS/ CHI TIẾT TAM CẤP

REV BẢN	DESCRIPTION ĐIỀU CHỈNH	DATE NGÀY	BY BỞI

PREPARED FOR  
CHỦ ĐẦU TƯ:



A&E BIEN HOA CONTRACTOR  
NHÀ THẦU TV&TK BIÊN HÒA

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DESIGNER OF RECORD  
CHỦ NHIỆM THIẾT KẾ:

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DIOXIN REMEDIATION AT BIEN HOA  
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DỰ ÁN XỬ LÝ Ô NHIỄM DIOXIN KHU VỰC  
SÂN BAY BIÊN HÒA - GIAI ĐOẠN 1

FINAL DESIGN

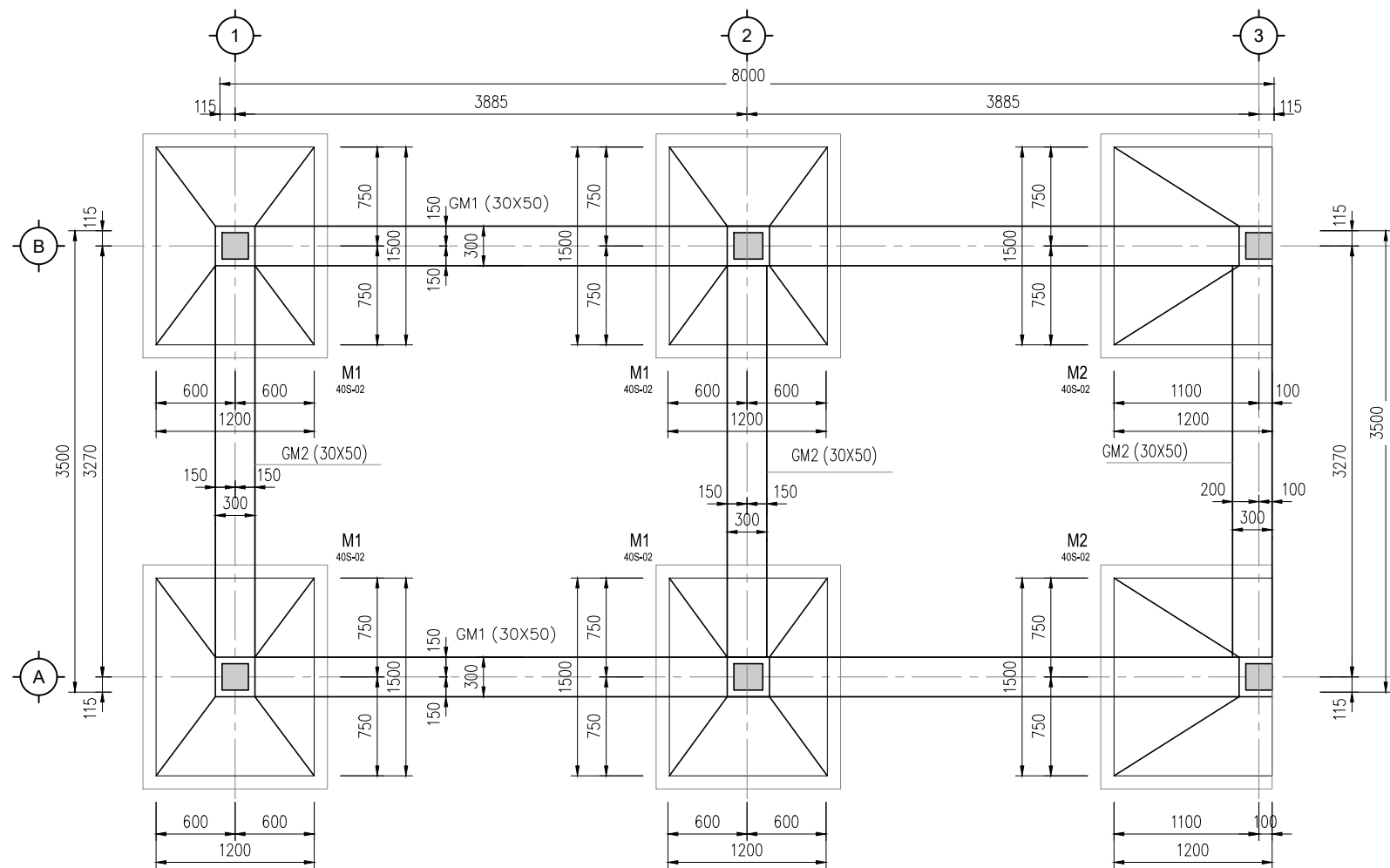
ITEM/ HẠNG MỤC:

CW1 - LTSA FINAL COVER

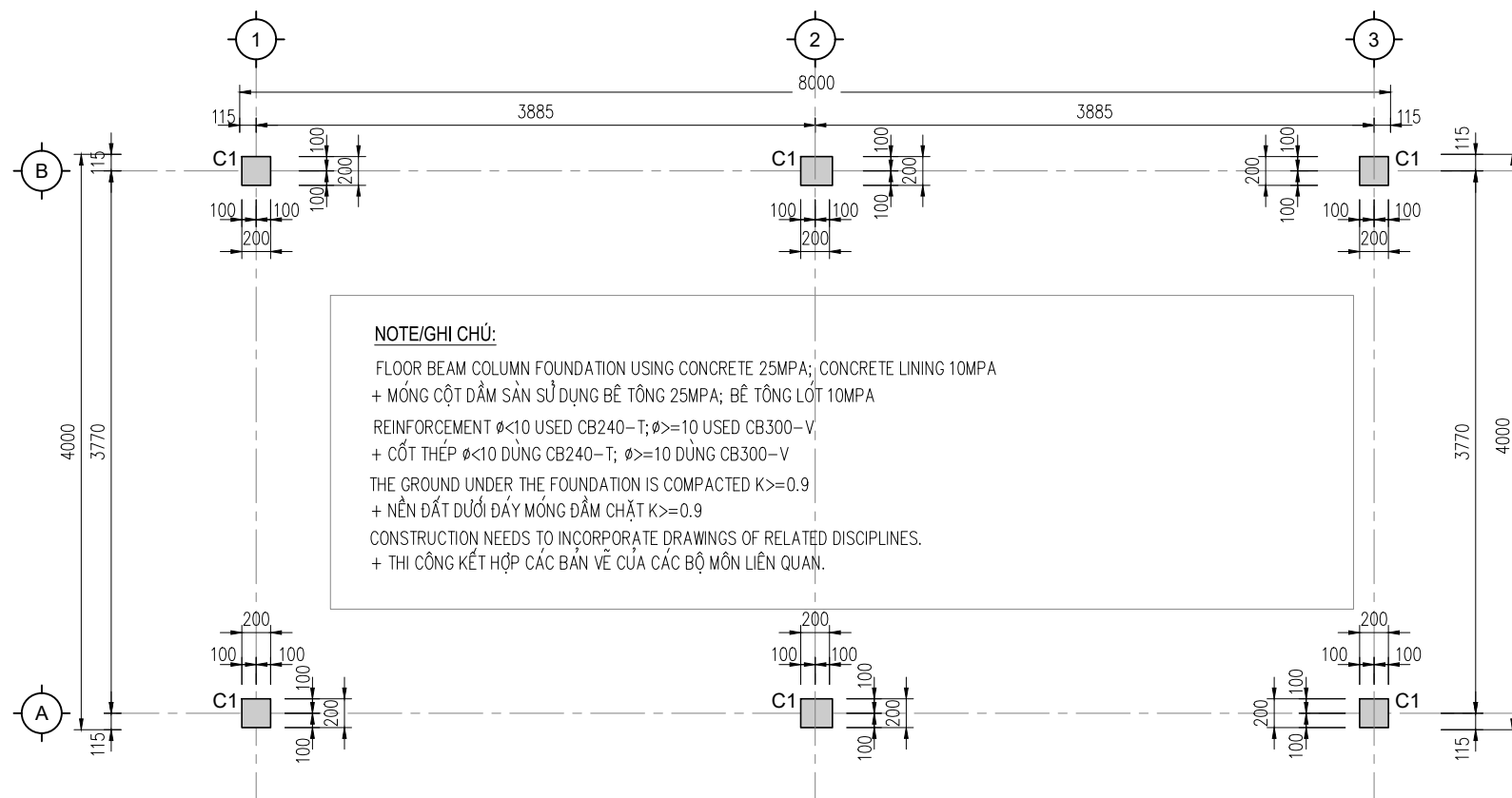
DRAWING TITLE/ TÊN BẢN VẼ:

THREE-STEP STAIRCASE DETAILS  
CHI TIẾT TAM CẤP

DATE/ NGÀY: 31-May-2023	SIZE/ KHÔ: A3	SCALE/ TỈ LỆ: AS NOTED
DRAWING NO/ BẢN VẼ SỐ: 40A-10	SHEET TỜ: 32 OF CỦA: 43	



FOUNDATION PLAN/ MẶT BẰNG MÓNG  
SCALE/TL: 1/50



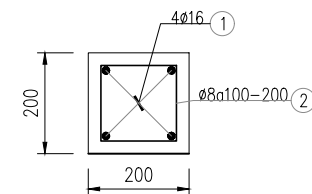
**NOTE/GHI CHÚ:**

FLOOR BEAM COLUMN FOUNDATION USING CONCRETE 25MPA; CONCRETE LINING 10MPA  
+ MÓNG CỘT ĐẮM SÀN SỬ DỤNG BÊ TÔNG 25MPA; BÊ TÔNG LỘT 10MPA  
REINFORCEMENT  $\phi < 10$  USED CB240-T;  $\phi \geq 10$  USED CB300-V  
+ CỐT THÉP  $\phi < 10$  DÙNG CB240-T;  $\phi \geq 10$  DÙNG CB300-V  
THE GROUND UNDER THE FOUNDATION IS COMPACTED  $K \geq 0.9$   
+ NỀN ĐẤT DƯỚI ĐÁY MÓNG ĐẮM CHẶT  $K \geq 0.9$   
CONSTRUCTION NEEDS TO INCORPORATE DRAWINGS OF RELATED DISCIPLINES.  
+ THI CÔNG KẾT HỢP CÁC BẢN VẼ CỦA CÁC BỘ MÔN LIÊN QUAN.

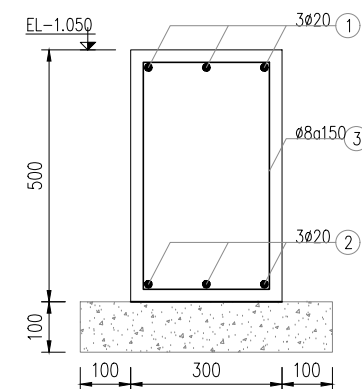
COLUMN POSITIONING PLAN/MẶT BẰNG ĐỊNH VỊ CỘT  
SCALE/TL: 1/50

**NOTE/ GHI CHÚ:**

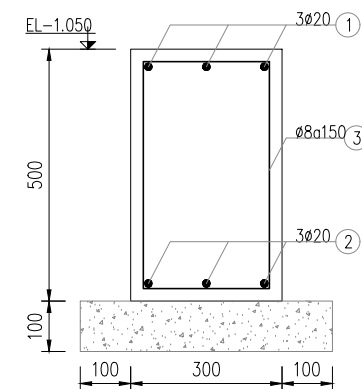
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COLUMN (L=3.715M; QUANTITY: 06)/  
CỘT C1 (L=3.715M; SỐ LƯỢNG: 06)  
(TFROM -0.050 TO CORE +3.665)  
(TỪ CỐT -0.050 ĐẾN CỐT +3.665)  
SCALE/TL: 1/15



GM1 (L=10.02M; QUANLITY: 02)  
SCALE/TL: 1/15



GM2 (L=4.07M; QUANTITY: 03)  
SCALE/TL: 1/15

REV	DESCRIPTION	DATE	BY
BẢN	ĐIỀU CHỈNH	NGÀY	BỒI

PREPARED FOR  
CHỦ ĐẦU TƯ:



A&E BIEN HOA CONTRACTOR  
NHÀ THẦU TV&TK BIÊN HÒA

**Trigon**

ENGINEERING • CONSULTING • MANAGEMENT  
Trigon Associates, llc1515 Poydras St.,  
Ste 930 New Orleans, LA 70112  
www.trigonassociates.com

DESIGNED IN COLLABORATION WITH  
ASIA PACIFIC ENGINEERING  
CONSULTANTS (APECO)

PREPARED BY  
NGƯỜI THỰC HIỆN:

DƯƠNG VĂN PHONG

CHECKED BY  
NGƯỜI KIỂM TRA:

BARRY P. BREAU

DESIGNER OF RECORD  
CHỦ NHIỆM THIẾT KẾ:

GREGORY A. KOLENOVSKY

PROJECT NAME/ TÊN DỰ ÁN:

DIOXIN REMEDIATION AT BIEN HOA  
AIRBASE AREA PROJECT - PHASE 1  
DỰ ÁN XỬ LÝ Ô NHIỄM DIOXIN KHU VỰC  
SÂN BAY BIÊN HÒA - GIAI ĐOẠN 1

FINAL DESIGN

ITEM/ HẠNG MỤC:

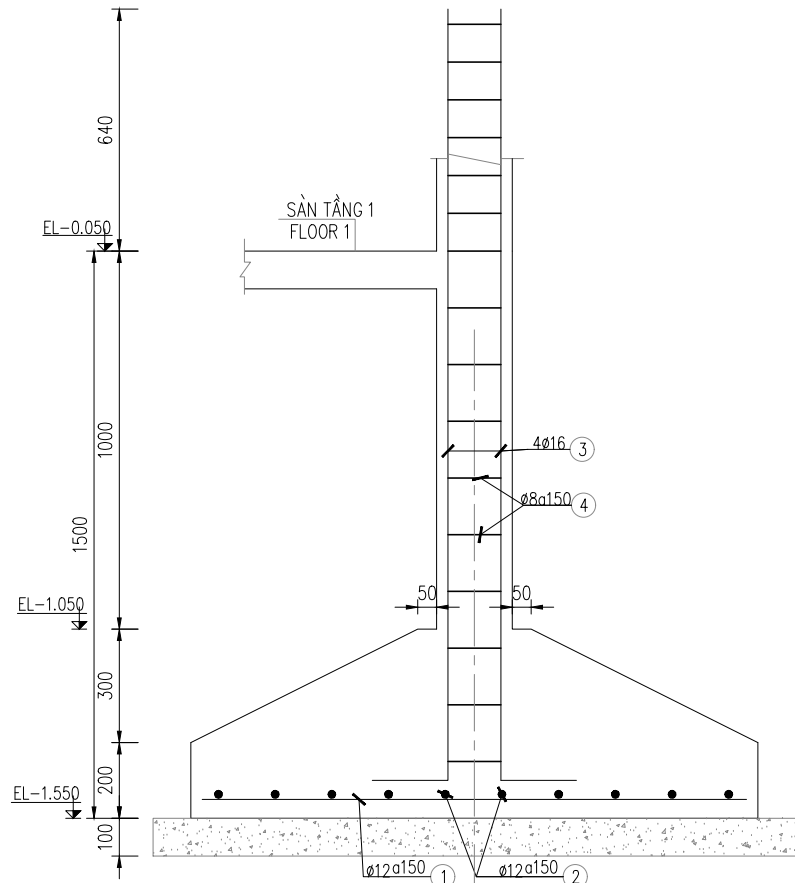
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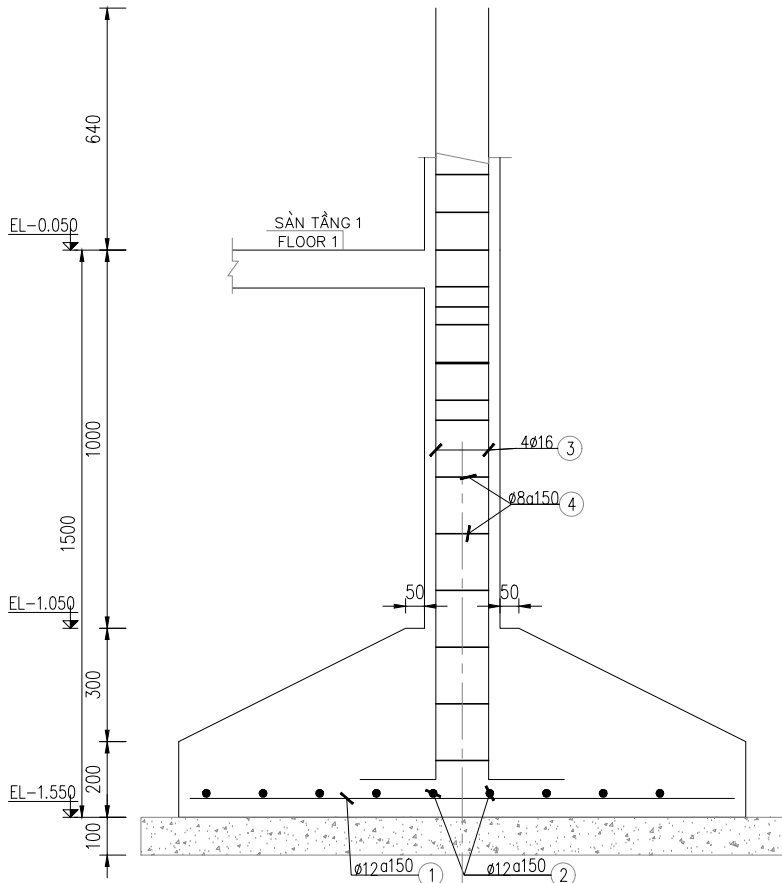
LAYOUT FOUNDATION COLUMN  
MẶT BẰNG MÓNG - CỘT

DATE/ NGÀY:	SIZE/ KHỔ:	SCALE/ TỈ LỆ:
31-May-2023	A3	AS NOTED
DRAWING NO/ BẢN VẼ SỐ:	SHEET	OF
40S-01	TỜ: 33	CỦA: 43

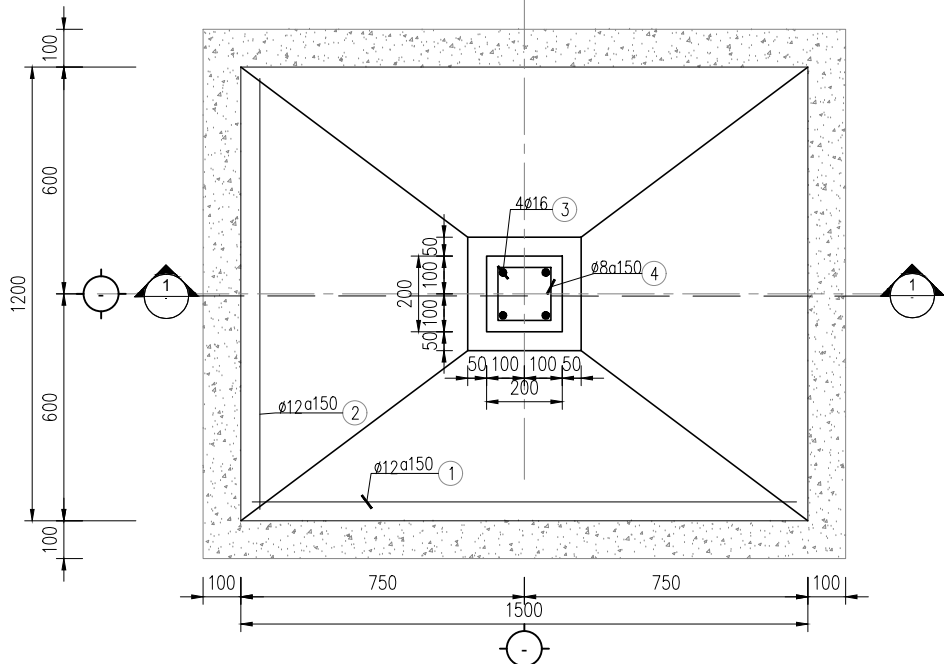




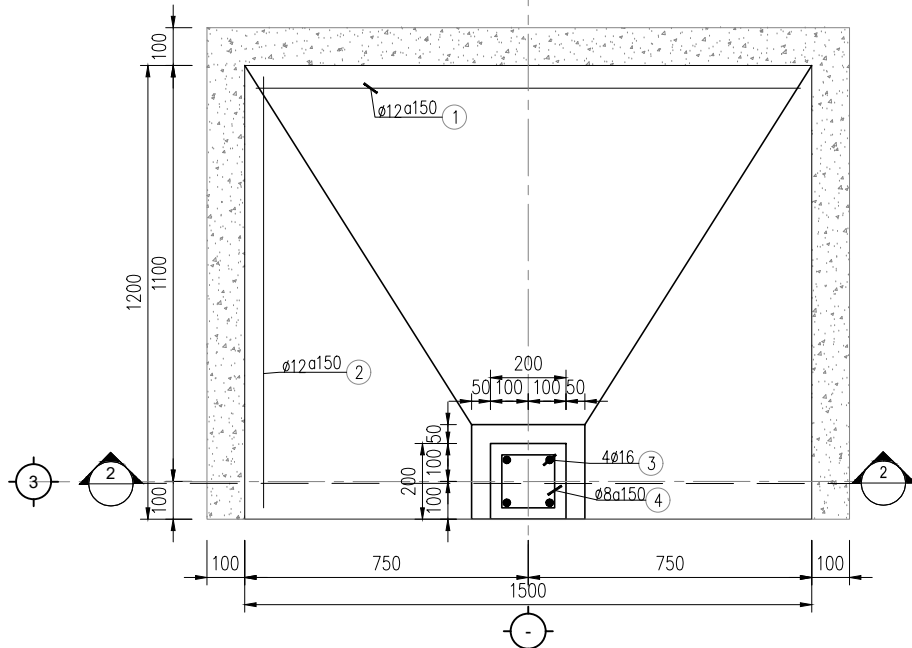
SECTION 1-1/MẶT CẮT 1-1  
SCALE/TL: 1/20



SECTION 2-2/MẶT CẮT 2-2  
SCALE/TL: 1/20





TYPICAL M1 FOUNDATION PILLAR DETAIL(QUANTITY 04)/MÓNG M1 (SỐ LƯỢNG: 04)  
SCALE/TL: 1/20

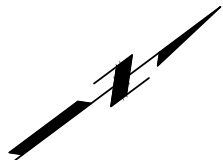


TYPICAL M2 FOUNDATION PILLAR DETAIL(QUANTITY 02)/MÓNG M2 (SỐ LƯỢNG: 02)  
SCALE/TL: 1/20

NOTE/ GHI CHÚ:

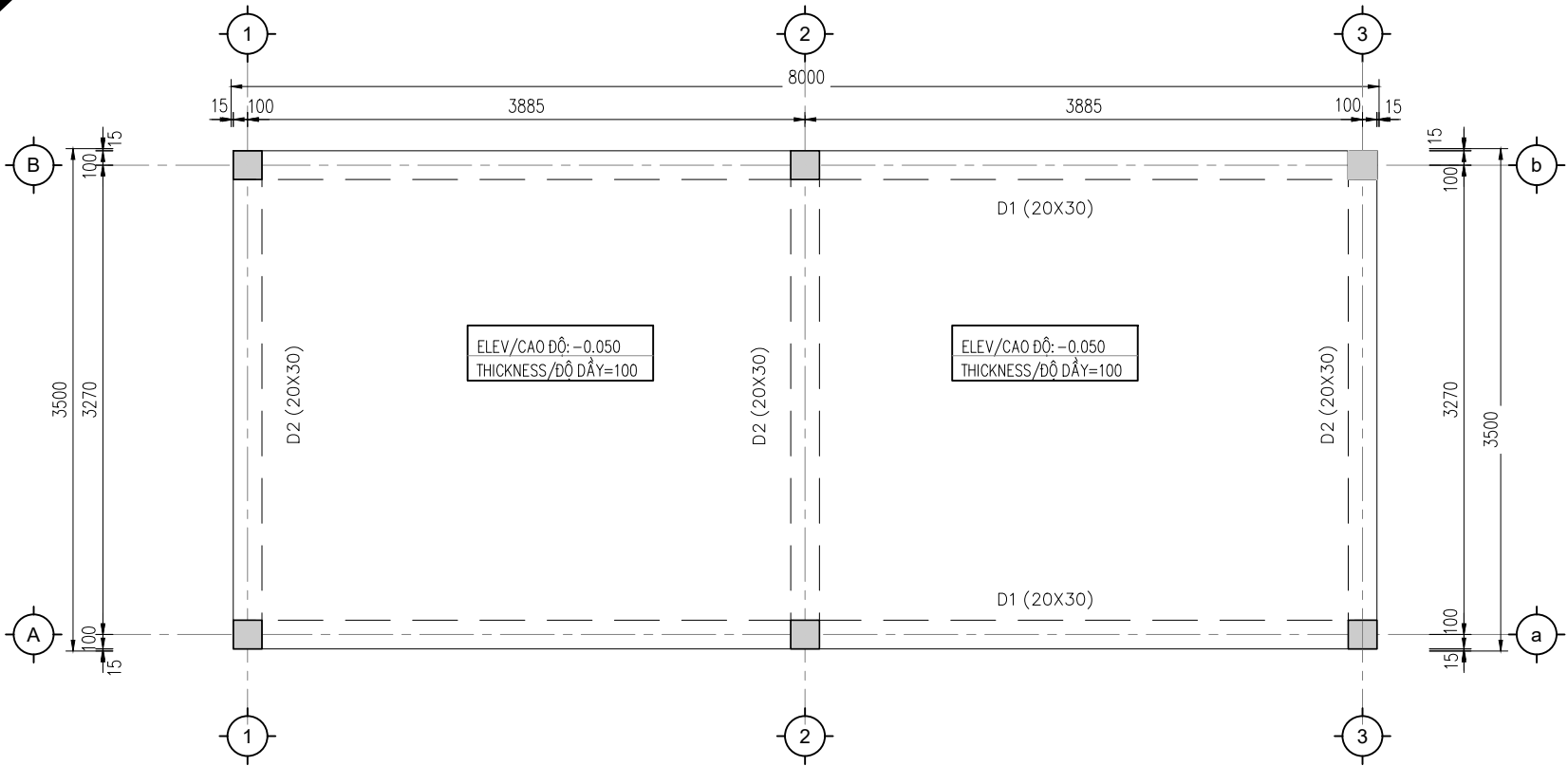
1. ALL DIMENSIONS ARE IN MILLIMETERS, ELEVATIONS ARE IN METERS, UNLESS OTHERWISE NOTED/ TẤT CẢ KÍCH THƯỚC BẰNG MM, CAO ĐỘ BẰNG M, TRỪ KHI CÓ GHI CHÚ KHÁC.

REV BẢN	DESCRIPTION ĐIỀU CHỈNH	DATE NGÀY	BY BỘ
PREPARED FOR CHỦ ĐẦU TƯ:			
			
A&E BIEN HOA CONTRACTOR NHÀ THẦU TV&TK BIÊN HÒA			
			
ENGINEERING • CONSULTING • MANAGEMENT Trigon Associates, llc1515 Poydras St., Ste 930 New Orleans, LA 70112 www.trigonassociates.com			
DESIGNED IN COLLABORATION WITH ASIA PACIFIC ENGINEERING CONSULTANTS (APECO)			
PREPARED BY NGƯỜI THỰC HIỆN:			
DƯƠNG VĂN PHONG			
CHECKED BY NGƯỜI KIỂM TRA:			
BARRY P. BREAUX			
DESIGNER OF RECORD CHỦ NHIỆM THIẾT KẾ:			
GREGORY A. KOLENOVSKY			
PROJECT NAME/ TÊN DỰ ÁN:			
DIOXIN REMEDIATION AT BIEN HOA AIRBASE AREA PROJECT - PHASE 1 DỰ ÁN XỬ LÝ Ô NHIỄM DIOXIN KHU VỰC SÂN BAY BIÊN HÒA - GIAI ĐOẠN 1			
FINAL DESIGN			
ITEM/ HẠNG MỤC:			
CW1 - LTSA FINAL COVER			
DRAWING TITLE/ TÊN BẢN VẼ:			
FOUNDATION-COLUMN DETAILS CHI TIẾT MÓNG - CỘT			
DATE/ NGÀY:	SIZE/ KHỔ:	SCALE/ TỈ LỆ:	
31-May-2023	A3	AS NOTED	
DRAWING NO/ BẢN VẼ SỐ:	SHEET	OF	
40S-02	TỜ:	34	CỦA: 43

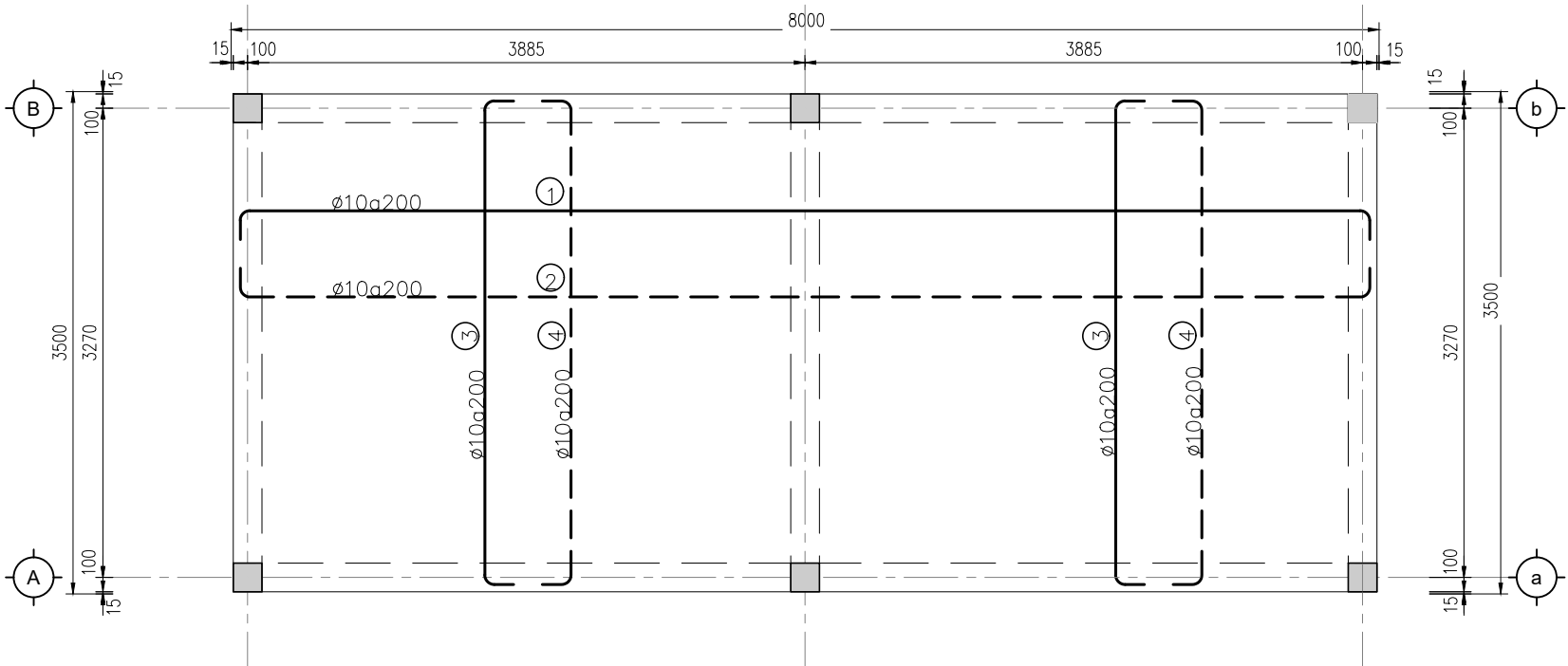


FLOOR STRUCTURAL PLAN 1  
MẶT BẰNG KẾT CẤU TẦNG 1  
SCALE/TL: 1/50

NOTE/GHI CHÚ:  
-DETAIL D1 AND D2 CAN BE FOUND ON 40S-05  
-CÁC CHI TIẾT D1 VÀ D2 CÓ THỂ ĐƯỢC TÌM HIỂU TRÊN BẢN VẼ 40S-05



STEEL FLOOR PLAN 1  
MẶT BẰNG THÉP SÀN TẦNG 1  
SCALE/TL: 1/50



NOTE/ GHI CHÚ:  
1. ALL DIMENSIONS ARE IN MILLIMETERS, ELEVATIONS ARE IN METERS, UNLESS OTHERWISE NOTED/ TẤT CẢ KÍCH THƯỚC BẰNG MM, CAO ĐỘ BẰNG M, TRỪ KHI CÓ GHI CHÚ KHÁC.

REV BẢN	DESCRIPTION ĐIỀU CHỈNH	DATE NGÀY	BY BỘ

PREPARED FOR  
CHỦ ĐẦU TƯ:



A&E BIEN HOA CONTRACTOR  
NHÀ THẦU TV&TK BIÊN HÒA



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DƯƠNG VĂN PHONG

CHECKED BY  
NGƯỜI KIỂM TRA:

BARRY P. BREAUX

DESIGNER OF RECORD  
CHỦ NHIỆM THIẾT KẾ:

GREGORY A. KOLENOVSKY

PROJECT NAME/ TÊN DỰ ÁN:

DIOXIN REMEDIATION AT BIEN HOA  
AIRBASE AREA PROJECT - PHASE 1  
DỰ ÁN XỬ LÝ Ô NHIỄM DIOXIN KHU VỰC  
SÂN BAY BIÊN HÒA - GIAI ĐOẠN 1

FINAL DESIGN

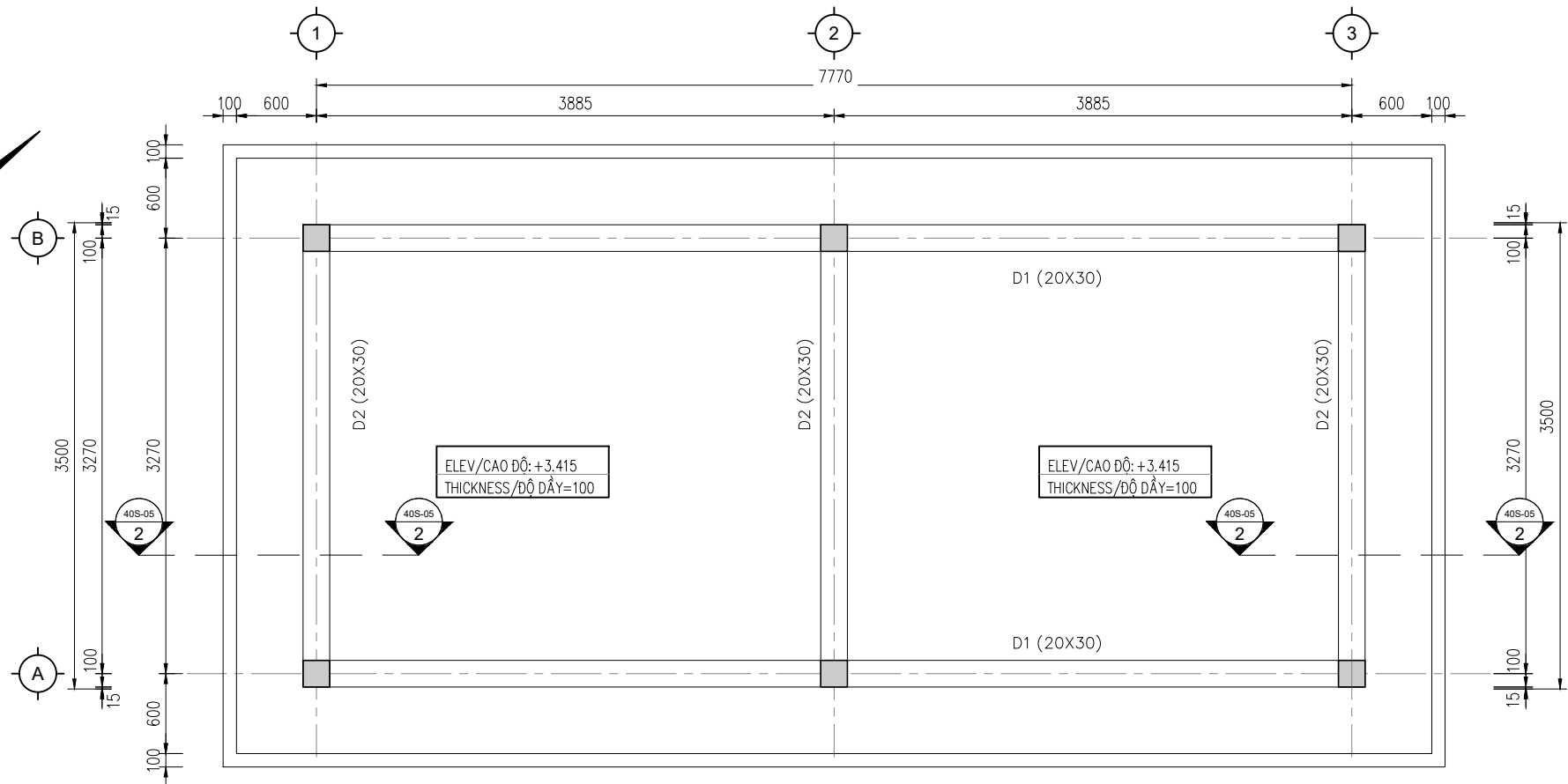
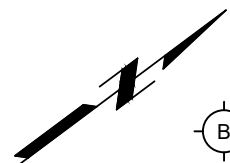
ITEM/ HẠNG MỤC:

CW1 - LTSA FINAL COVER

DRAWING TITLE/ TÊN BẢN VẼ:

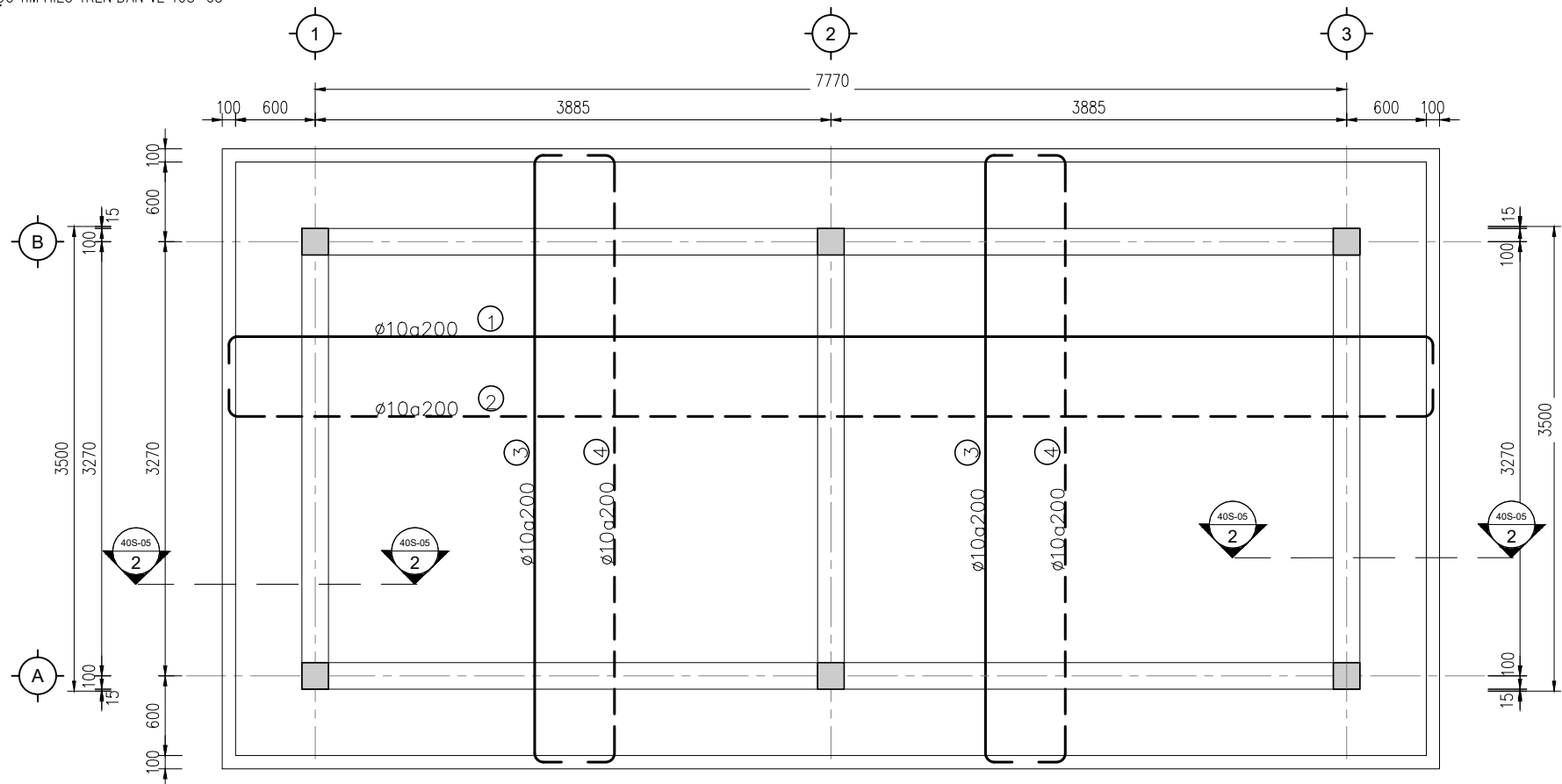
FLOOR STRUCTURAL PLAN 1  
MẶT BẰNG KẾT CẤU SÀN TẦNG 1

DATE/ NGÀY: 31-May-2023	SIZE/ KHØ: A3	SCALE/ TỈ LỆ: AS NOTED
DRAWING NO./BẢN VẼ SỐ: 40S-03	SHEET TỜ: 35	OF CỦA: 43





REINFORCED STRUCTURAL PLAN +3.415M/MẶT BẰNG KẾT CẤU CỘT +3.415M  
SCALE/TL: 1/50

NOTE/GHI CHÚ:  
-DETAIL D1 AND D2 CAN BE FOUND ON SHEET 40S-05  
-CÁC CHI TIẾT D1 VÀ D2 CÓ THỂ ĐƯỢC TÌM HIỂU TRÊN BẢN VẼ 40S-05

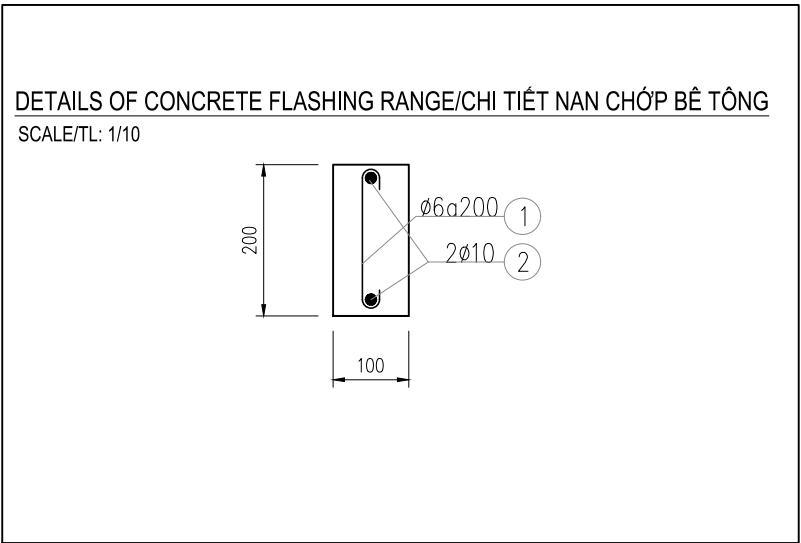
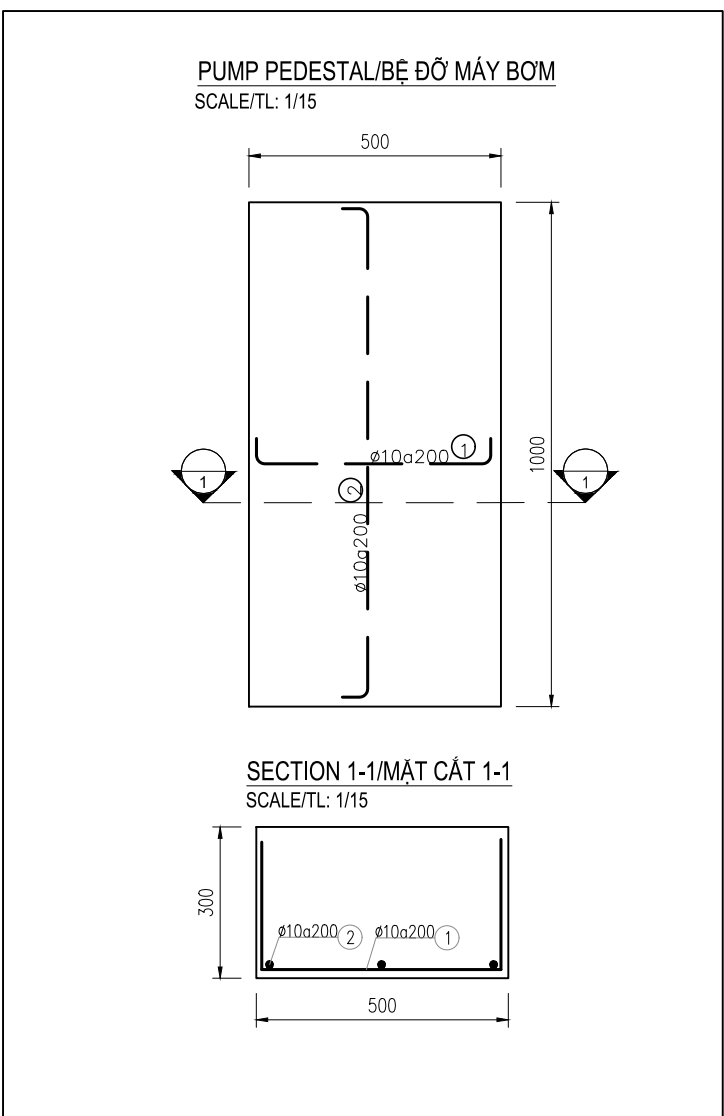
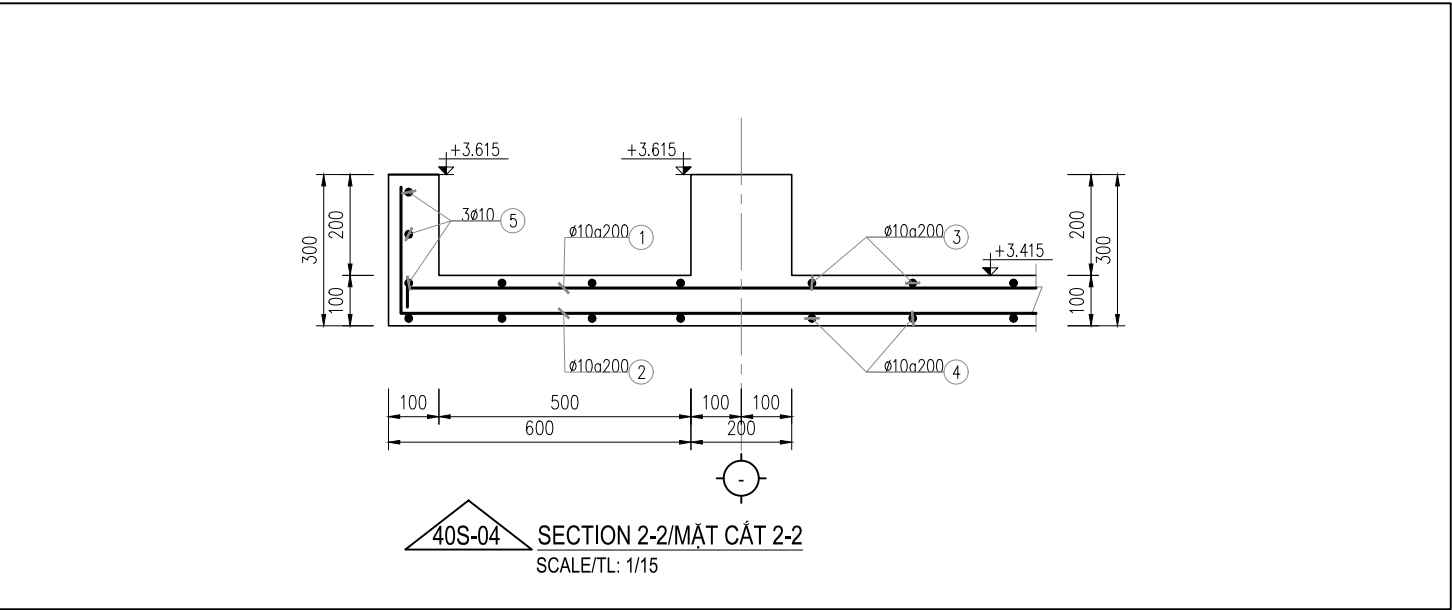
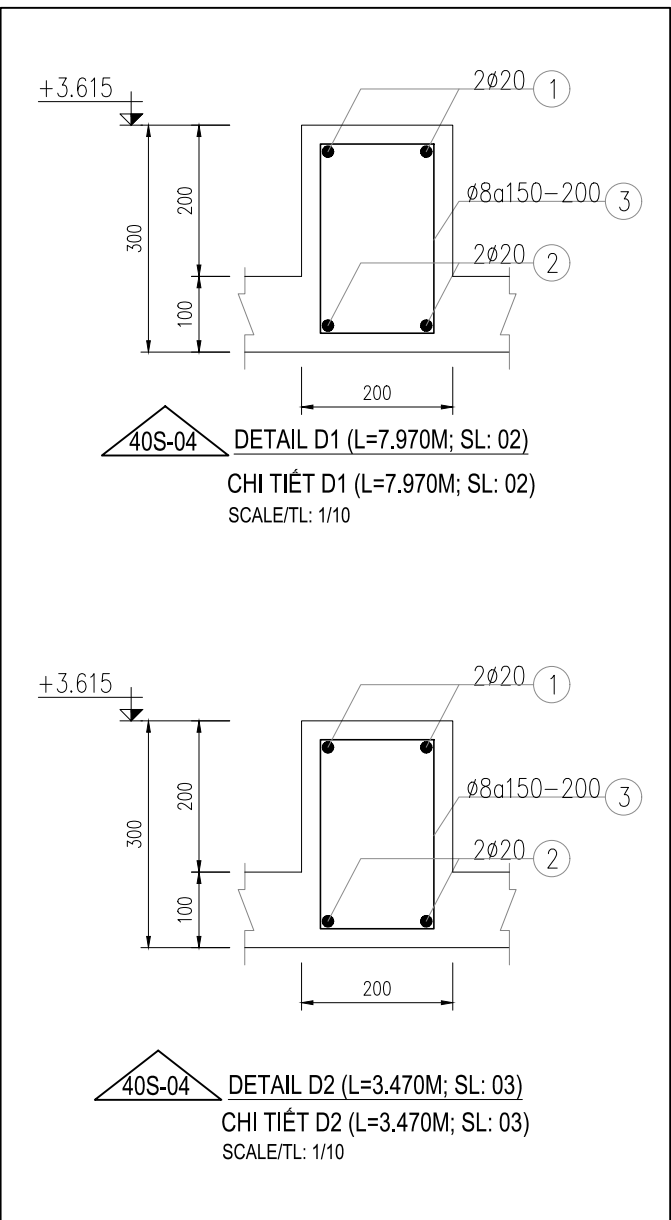
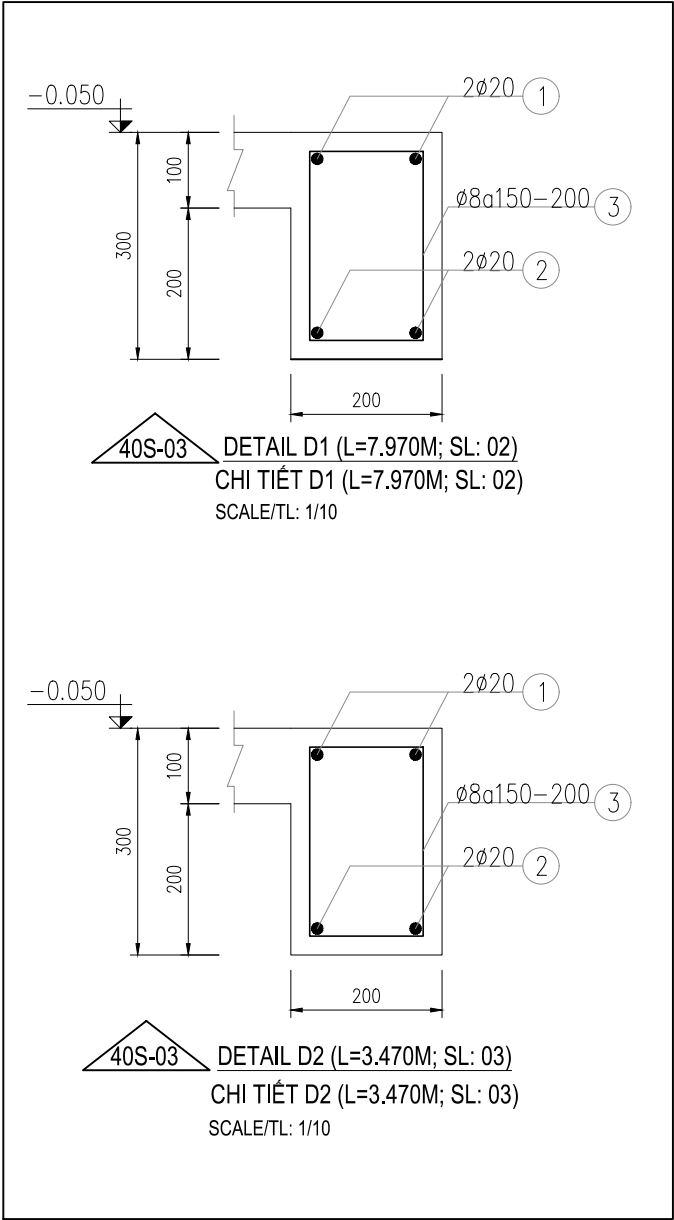


REINFORCED STEEL CEILING PLAN +3.415/MẶT BẰNG THÉP SÀN CỘT +3.415M  
SCALE/TL: 1/50

NOTE/ GHI CHÚ:  
1. ALL DIMENSIONS ARE IN MILLIMETERS, ELEVATIONS ARE IN METERS, UNLESS OTHERWISE NOTED/ TẤT CẢ KÍCH THƯỚC BẰNG MM, CAO ĐỘ BẰNG M, TRỪ KHI CÓ GHI CHÚ KHÁC.



REV BẢN	DESCRIPTION ĐIỀU CHỈNH	DATE NGÀY	BY BỞI
PREPARED FOR CHỦ ĐẦU TƯ:			
<div><div></div><div><b>USAID</b> FROM THE AMERICAN PEOPLE</div></div>			
A&E BIEN HOA CONTRACTOR NHÀ THẦU TV&TK BIÊN HÒA			
<div></div> <div>ENGINEERING • CONSULTING • MANAGEMENT Trigon Associates, llc1515 Poydras St., Ste 930 New Orleans, LA 70112 www.trigonassociates.com</div>			
DESIGNED IN COLLABORATION WITH ASIA PACIFIC ENGINEERING CONSULTANTS (APECO)			
PREPARED BY NGƯỜI THỰC HIỆN:			
DƯƠNG VĂN PHONG			
CHECKED BY NGƯỜI KIỂM TRA:			
BARRY P. BREAUX			
DESIGNER OF RECORD CHỦ NHIỆM THIẾT KẾ:			
GREGORY A. KOLENOVSKY			
PROJECT NAME/ TÊN DỰ ÁN:			
DIOXIN REMEDIATION AT BIEN HOA AIRBASE AREA PROJECT - PHASE 1 DỰ ÁN XỬ LÝ Ô NHIỄM DIOXIN KHU VỰC SÂN BAY BIÊN HÒA - GIAI ĐOẠN 1			
FINAL DESIGN			
ITEM/ HẠNG MỤC:			
CW1 - LTSA FINAL COVER			
DRAWING TITLE/ TÊN BẢN VẼ:			
REINFORCED STRUCTURAL PLAN +3.415 M MẶT BẰNG KẾT CẤU SÀN CỘT +3.415M			
DATE/ NGÀY: 31-May-2023	SIZE/ KHÔ: A3	SCALE/ TỈ LỆ: AS NOTED	
DRAWING NO/ BẢN VẼ SỐ: 40S-04	SHEET TỜ:	36 CỦA:	43

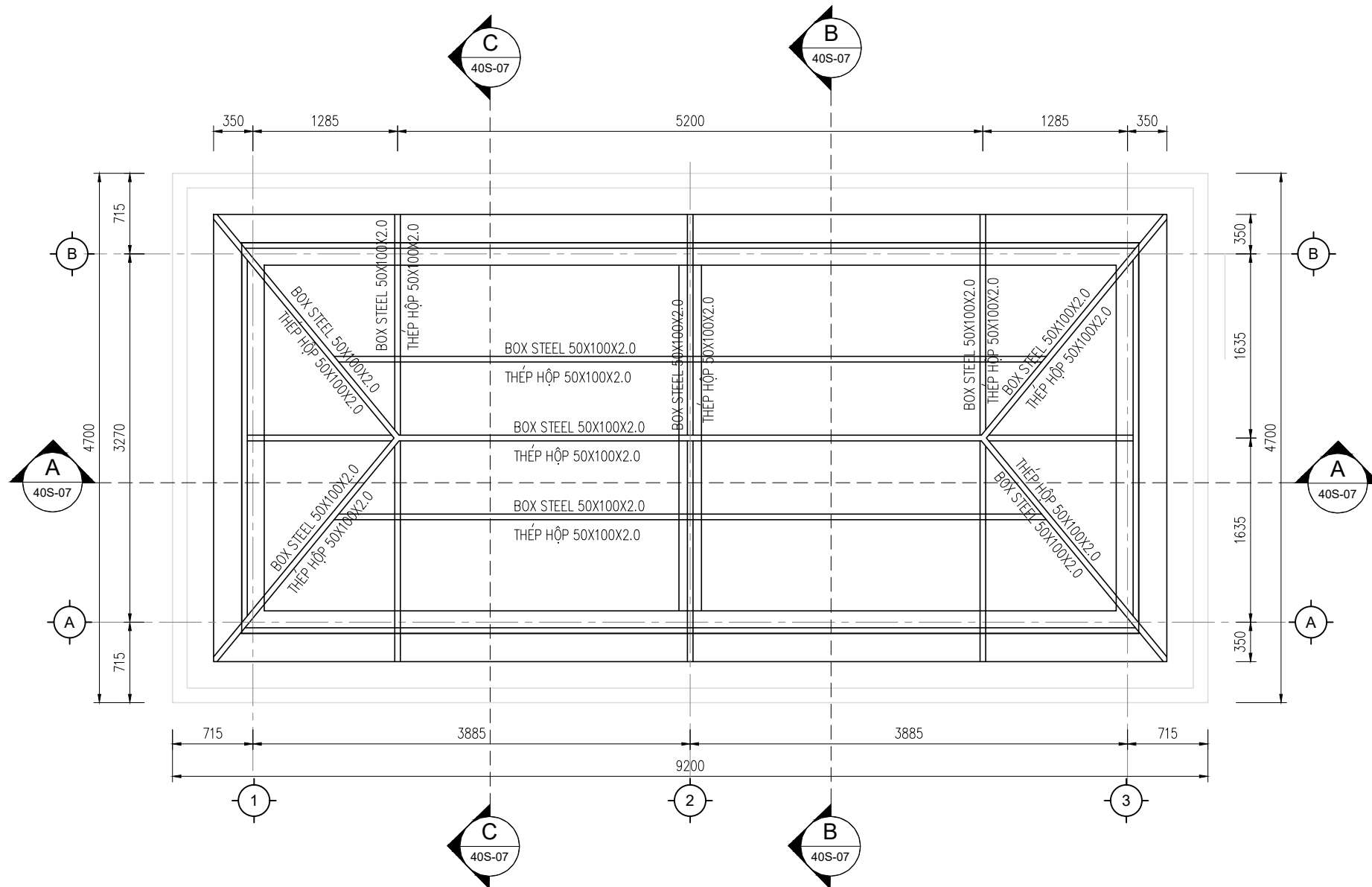
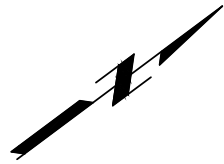




NOTE/ GHI CHÚ:

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REV BẢN	DESCRIPTION ĐIỀU CHỈNH	DATE NGÀY	BY BỘ
PREPARED FOR CHỦ ĐẦU TƯ:			
			
A&E BIEN HOA CONTRACTOR NHÀ THẦU TV&TK BIÊN HÒA			
			
ENGINEERING • CONSULTING • MANAGEMENT Trigon Associates, llc1515 Poydras St., Ste 930 New Orleans, LA 70112 www.trigonassociates.com			
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DƯƠNG VĂN PHONG			
CHECKED BY NGƯỜI KIỂM TRA:			
BARRY P. BREAUX			
DESIGNER OF RECORD CHỦ NHIỆM THIẾT KẾ:			
GREGORY A. KOLENOVSKY			
PROJECT NAME/ TÊN DỰ ÁN:			
DIOXIN REMEDIATION AT BIEN HOA AIRBASE AREA PROJECT - PHASE 1 DỰ ÁN XỬ LÝ Ô NHIỄM DIOXIN KHU VỰC SÂN BAY BIÊN HÒA - GIAI ĐOẠN 1			
FINAL DESIGN			
ITEM/ HẠNG MỤC:			
CW1 - LTSA FINAL COVER			
DRAWING TITLE/ TÊN BẢN VẼ:			
DETAILS BEAM, SENO CHI TIẾT DÀM + SÊ NÔ			
DATE/ NGÀY:	SIZE/ KHỔ:	SCALE/ TỈ LỆ:	
31-May-2023	A3	AS NOTED	
DRAWING NO/ BẢN VẼ SỐ:	SHEET	OF	
40S-05	TỜ:	37	CỦA: 43



ROOF STRUCTURAL PLAN/MẶT BẰNG KẾT CẤU MÁI  
SCALE/TL: 1/50

NOTE/ GHI CHÚ:

1. ALL DIMENSIONS ARE IN MILLIMETERS, ELEVATIONS ARE IN METERS, UNLESS OTHERWISE NOTED/ TẤT CẢ KÍCH THƯỚC BẰNG MM, CAO ĐỘ BẰNG M, TRỪ KHI CÓ GHI CHÚ KHÁC.

REV	DESCRIPTION	DATE	BY
BẢN	ĐIỀU CHỈNH	NGÀY	BỒI

PREPARED FOR  
CHỦ ĐẦU TƯ:



A&E BIEN HOA CONTRACTOR  
NHÀ THẦU TV&TK BIÊN HÒA



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ASIA PACIFIC ENGINEERING  
CONSULTANTS (APECO)

PREPARED BY  
NGƯỜI THỰC HIỆN:

DƯƠNG VĂN PHONG

CHECKED BY  
NGƯỜI KIỂM TRA:

BARRY P. BREAUX

DESIGNER OF RECORD  
CHỦ NHIỆM THIẾT KẾ:

GREGORY A. KOLENOVSKY

PROJECT NAME/ TÊN DỰ ÁN:

DIOXIN REMEDIATION AT BIEN HOA  
AIRBASE AREA PROJECT - PHASE 1  
DỰ ÁN XỬ LÝ Ô NHIỄM DIOXIN KHU VỰC  
SÂN BAY BIÊN HÒA - GIAI ĐOẠN 1

FINAL DESIGN

ITEM/ HẠNG MỤC:

CW1 - LTSA FINAL COVER

DRAWING TITLE/ TÊN BẢN VẼ:

ROOF STRUCTURE PLAN  
MẶT BẰNG KẾT CẤU MÁI

DATE/ NGÀY:	SIZE/ KHỔ:	SCALE/ TỈ LỆ:
31-May-2023	A3	AS NOTED
DRAWING NO/ BẢN VẼ SỐ:	SHEET	OF
40S-06	TỜ: 38	CỦA: 43

PREPARED FOR  
CHỦ ĐẦU TƯ:

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Trigon Associates, llc 1515 Poydras St.,  
 Ste 930 New Orleans, LA 70112  
[www.trigonassociates.com](http://www.trigonassociates.com)

PREPARED BY  
NGƯỜI THỰC HIỆN:  
  
DƯƠNG VĂN PHONG

CHECKED BY  
NGƯỜI KIỂM TRA:

BARRY P. BREAU

DESIGNER OF RECORD  
CHỦ NHIỆM THIẾT KẾ:

GREGORY A. KOLENOVSKY

PROJECT NAME/ TÊN DỰ ÁN:  
DIOXIN REMEDIATION AT BIEN HOA  
AIRBASE AREA PROJECT - PHASE 1  
DỰ ÁN XỬ LÝ Ô NHIỄM DIOXIN KHU VỰC  
SÂN BAY BIÊN HÒA - GIAI ĐOẠN 1

FINAL DESIGN
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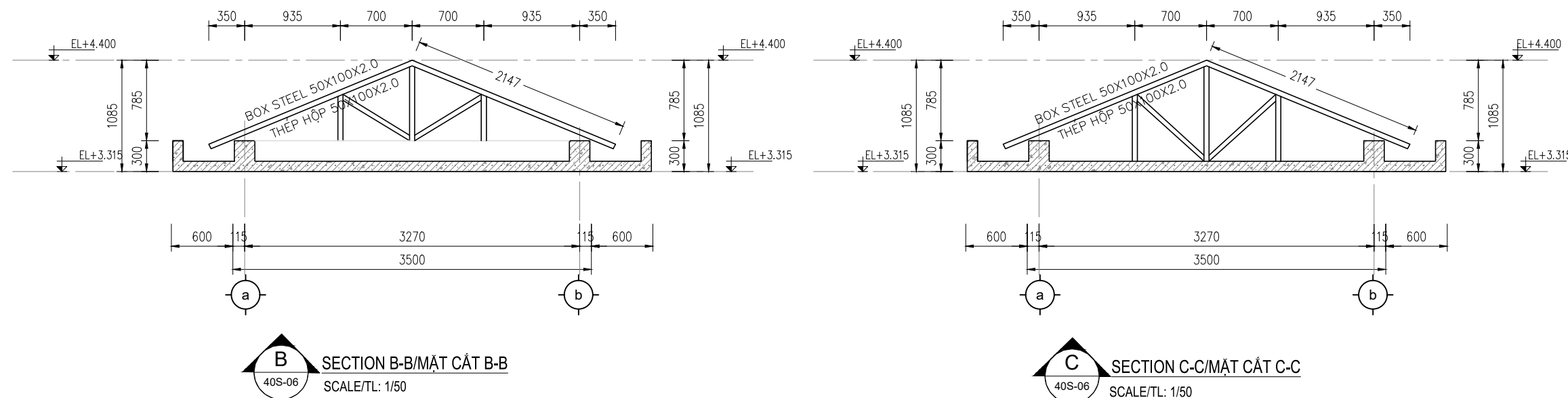
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CW1 - LTSA FINAL COVER

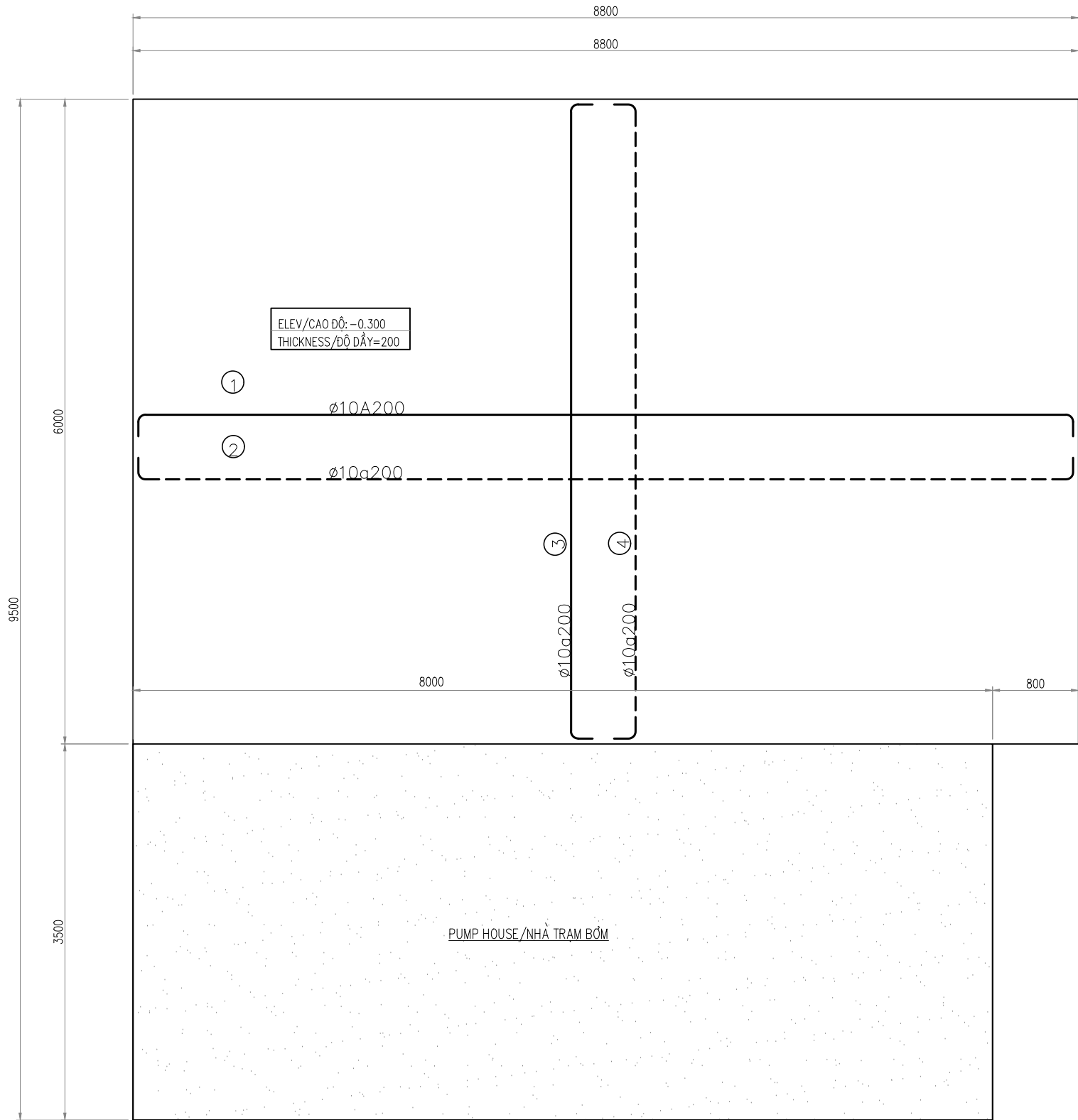
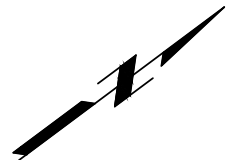
DRAWING TITLE/ TÊN BẢN VẼ:

DETAILS STEEL  
CHI TIẾT KÈO THÉP

DATE/ NGÀY:	SIZE/ KHÖ:	SCALE/ TỈ LỆ:
31-May-2023	A3	AS NOTED
DRAWING NO/ BẢN VẼ SỐ:	SHEET	OF
40S-07	TỜ: 39	CỦA: 43



1. ALL DIMENSIONS ARE IN MILLIMETERS, ELEVATIONS ARE IN METERS, UNLESS OTHERWISE NOTED / TẤT CẢ KÍCH THƯỚC BẰNG MM, CAO ĐỘ BẰNG M, TRỪ KHI CÓ GHI CHÚ KHÁC.



CONCRETE YARD STRUCTURE/KẾT CẤU SÂN BÊ TÔNG  
SCALE/TL: 1/50

**NOTE/GHI CHÚ:**

- + YARD USING CONCRETE 25MPA; CONCRETE LINER 10MPA  
SÂN SỬ DỤNG BÊ TÔNG 25MPA; BÊ TÔNG LỚT 10MPA DÀY 100MM
- + REINFORCEMENT  $\phi < 10$  USED CB240-T;  $\phi \geq 10$  USED CB300-V  
CỐT THÉP  $\phi < 10$  DÙNG CB240-T;  $\phi \geq 10$  DÙNG CB400-V
- + THE GROUND UNDER THE YARD IS COMPACTEDD K $\geq$ 0.9  
NỀN ĐẤT DƯỚI SÂN ĐÃM CHẶT K $\geq$ 0.9

**NOTE/ GHI CHÚ:**

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REV BẢN	DESCRIPTION ĐIỀU CHỈNH	DATE NGÀY	BY BỘ

PREPARED FOR  
CHỦ ĐẦU TƯ:



A&E BIEN HOA CONTRACTOR  
NHÀ THẦU TV&TK BIÊN HÒA



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DƯƠNG VĂN PHONG

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NGƯỜI KIỂM TRA:

BARRY P. BREAUX

DESIGNER OF RECORD  
CHỦ NHIỆM THIẾT KẾ:

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DỰ ÁN XỬ LÝ Ô NHIỄM DIOXIN KHU VỰC  
SÂN BAY BIÊN HÒA - GIAI ĐOẠN 1

FINAL DESIGN

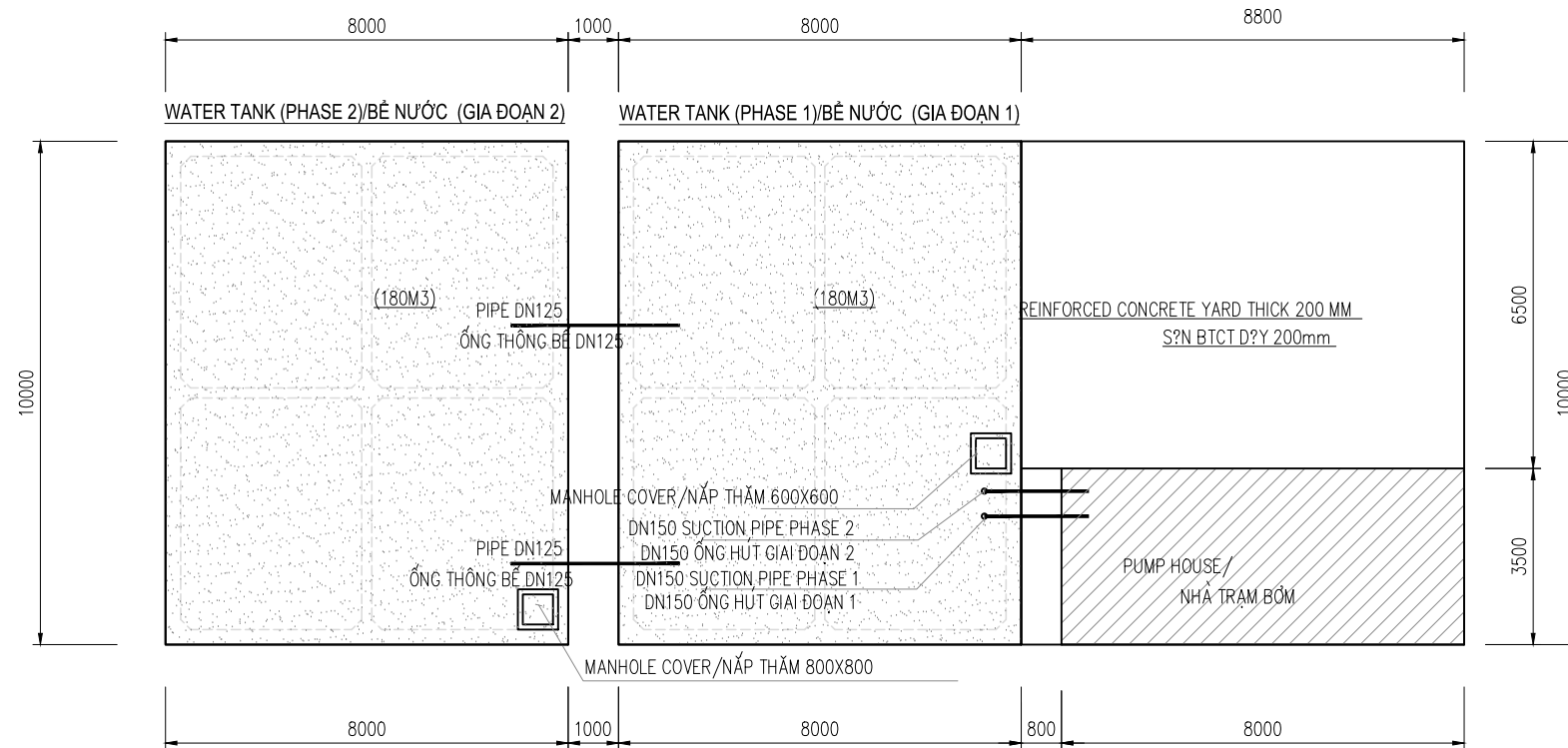
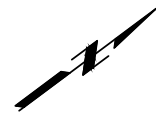
ITEM/ HẠNG MỤC:

CW1 - LTSA FINAL COVER

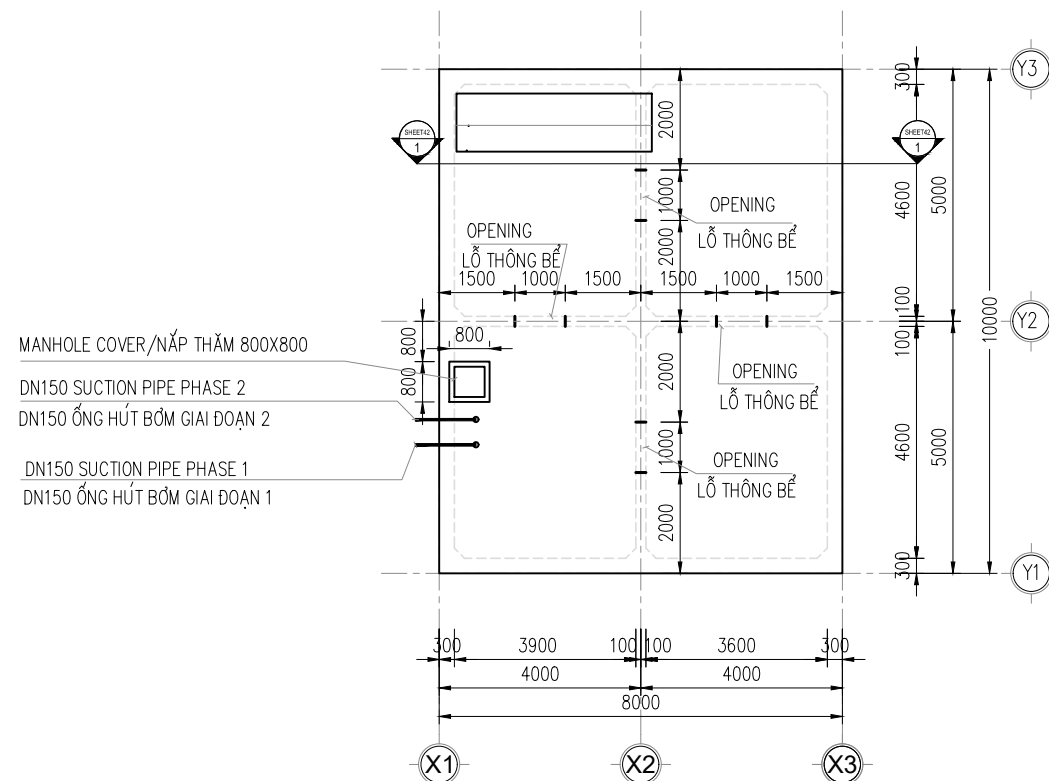
DRAWING TITLE/ TÊN BẢN VẼ:

CONCRETE YARD STRUCTURE  
KẾT CẤU SÂN BÊ TÔNG

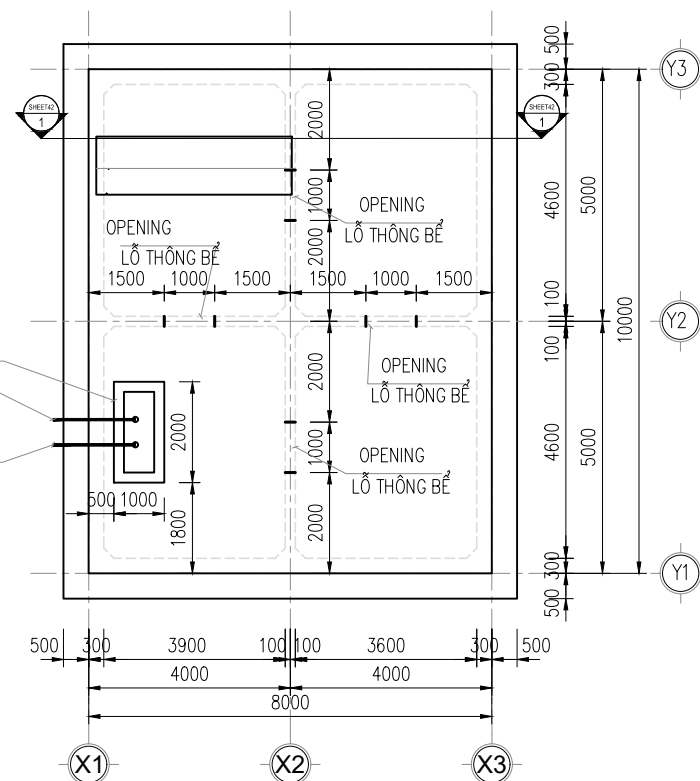
DATE/ NGÀY:	SIZE/ KHÔ:	SCALE/ TỈ LỆ:
31-May-2023	A3	AS NOTED
DRAWING NO/ BẢN VẼ SỐ:	SHEET	OF
40S-08	TỜ:	CỦA: 43



WATER TANK, PUMP HOUSE POSITIONING PLAN/MẶT BẰNG ĐỊNH VỊ BỂ NƯỚC, NHÀ TRẠM BƠM  
SCALE/ TỶ LỆ: 1/150



STRUCTURAL PLAN OF TANK COVER/MẶT BẰNG KẾT CẤU NẮP BỂ  
SCALE/ TỶ LỆ: 1/150



STRUCTURAL PLAN OF THE BOTTOM OF THE TANK/MẶT BẰNG KẾT CẤU ĐÁY BỂ  
SCALE/ TỶ LỆ: 1/150

NOTE/GHI CHÚ:

- + WATER TANK USING CONCRETE 25MPA, WATERPROOF GRADE W8/BỂ NƯỚC SỬ DỤNG BÊ TÔNG 25MPA, CẤP CHỐNG THẤM W8 .
- + REINFORCEMENT  $\phi < 10$  USING CB240,  $\phi > 10$  USING CB300-V/CỐT THÉP  $\phi < 10$  DÙNG CB240-T;  $\phi \geq 10$  DÙNG CB300-V.
- + DURING THE CONSTRUCTION PROCESS, THE BOTTOM OF THE TANK NEEDS TO BE PLACED INTO THE ORIGINAL SOIL LAYER (CLAY, SEMI-SOLID PHASE CLAY). TRONG QUÁ TRÌNH THI CÔNG ĐÁY BỂ CẦN ĐƯỢC ĐẶT VÀO LỚP ĐẤT NGUYÊN THỎ ( SÉT, SÉT PHA TRẠNG THÁI NỬA CỨNG).
- + SOIL LAYER ON THE BOTTOM OF THE TANK SHOULD BE COMPACTED WITH  $K \geq 0.9$ /LỚP ĐẤT DƯỚI ĐÁY BỂ CẦN ĐƯỢC ĐẦM CHẶT VỚI  $K \geq 0.9$ .
- + CONTRACTORS NEED TO HAVE ANTI-FLOATING MEASURES FOR THE TANK (IF ANY) DURING CONSTRUCTION/NHÀ THẦU CẦN CÓ BIỆN PHÁP CHỐNG ĐẨY NỔI CHO BỂ (NẾU CÓ) TRONG QUÁ TRÌNH THI CÔNG.
- + CONSTRUCTION NEEDS TO COMBINE DRAWINGS OF RELATED DISCIPLINES/THI CÔNG CẦN KẾT HỢP CÁC BẢN VẼ CỦA CÁC BỘ MÔN LIÊN QUAN.
- + ALL DIMENSIONS ARE IN MILLIMETERS, ELEVATIONS ARE IN METERS, UNLESS OTHERWISE NOTED/ TẤT CẢ KÍCH THƯỚC BẰNG MM, CAO ĐỘ BẰNG M, TRỪ KHI CÓ GHI CHÚ KHÁC.

REV	DESCRIPTION	DATE	BY
BẢN	ĐIỀU CHỈNH	NGÀY	BỒI

PREPARED FOR  
CHỦ ĐẦU TƯ:



A&E BIEN HOA CONTRACTOR  
NHÀ THẦU TV&TK BIÊN HÒA

Trigon

ENGINEERING • CONSULTING • MANAGEMENT  
Trigon Associates, llc1515 Poydras St.,  
Ste 930 New Orleans, LA 70112  
www.trigonassociates.com

DESIGNED IN COLLABORATION WITH  
ASIA PACIFIC ENGINEERING  
CONSULTANTS (APECO)

PREPARED BY  
NGƯỜI THỰC HIỆN:

DƯƠNG VĂN PHONG

CHECKED BY  
NGƯỜI KIỂM TRA:

BARRY P. BREAUX

DESIGNER OF RECORD  
CHỦ NHIỆM THIẾT KẾ:

GREGORY A. KOLENOVSKY

PROJECT NAME/ TÊN DỰ ÁN:

DIOXIN REMEDIATION AT BIEN HOA  
AIRBASE AREA PROJECT - PHASE 1  
DỰ ÁN XỬ LÝ Ô NHIỄM DIOXIN KHU VỰC  
SÂN BAY BIÊN HÒA - GIAI ĐOẠN 1

FINAL DESIGN

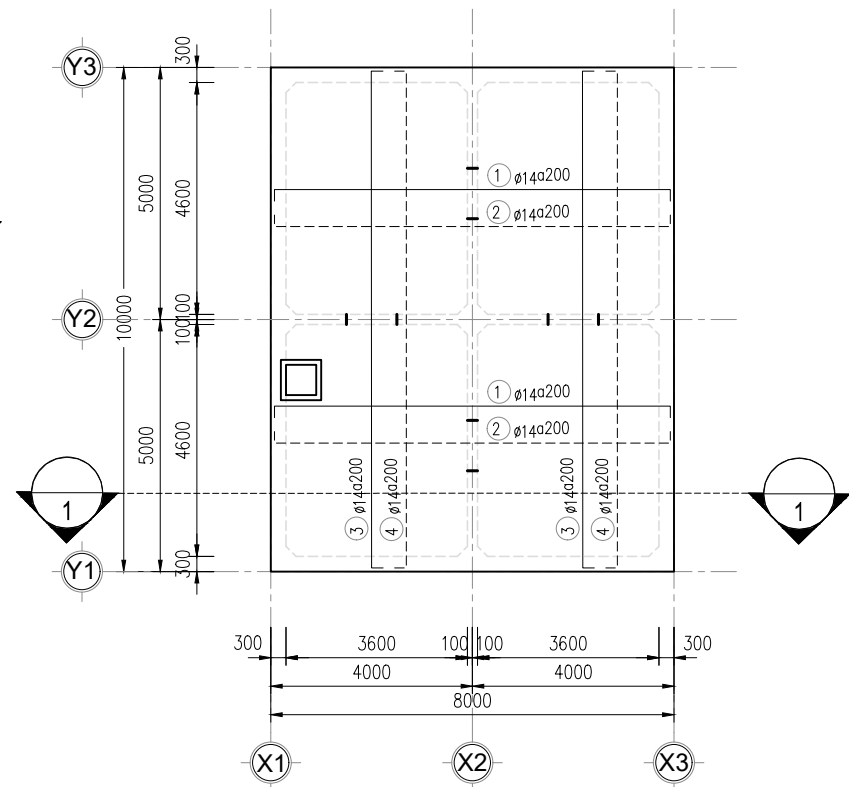
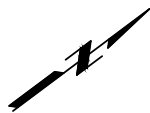
ITEM/ HẠNG MỤC:

CW1 - LTSA FINAL COVER

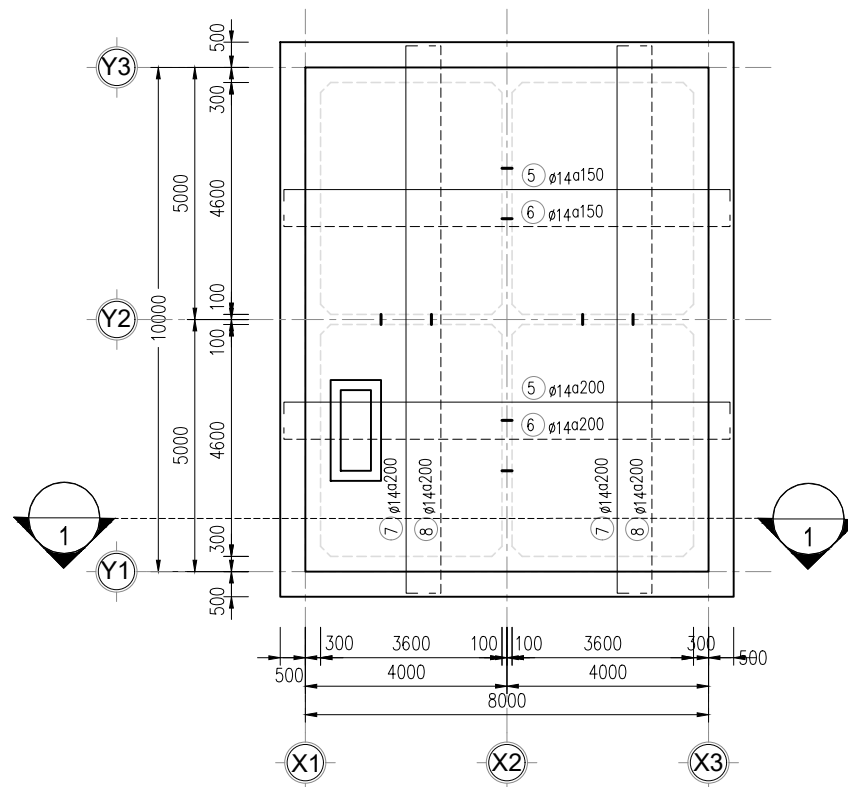
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WATER STRUCTURE - I  
KẾT CẤU BỂ NƯỚC - I

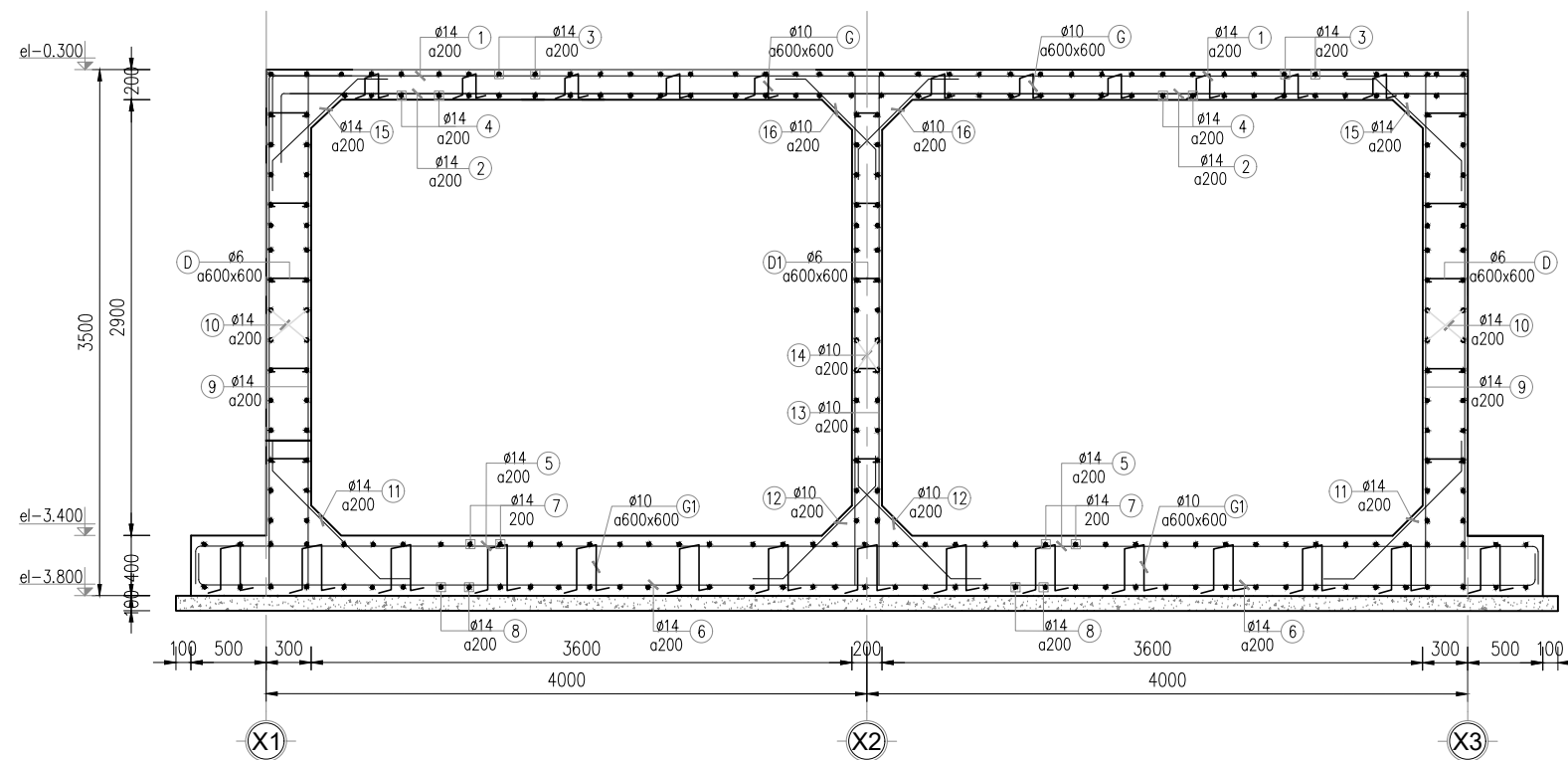
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DRAWING NO/ BẢN VẼ SỐ: 40S-09	SHEET TỜ: 41	OF CỦA: 43



TANK COVER STEEL SURFACE/MẶT BẰNG THÉP NẮP BỂ  
SCALE/ TỶ LỆ: 1/150





TANK BOTTOM STEEL SURFACE/MẶT BẰNG THÉP ĐÁY BỂ  
SCALE/ TỶ LỆ: 1/150



SECTION 1-1/MẶT CẮT 1-1  
SCALE/ TỶ LỆ: 1/50

NOTE/ GHI CHÚ:  
1. ALL DIMENSIONS ARE IN MILLIMETERS, ELEVATIONS ARE IN METERS, UNLESS OTHERWISE NOTED / TẤT CẢ KÍCH THƯỚC BẰNG MM, CAO ĐỘ BẰNG M, TRỪ KHI CÓ GHI CHÚ KHÁC.

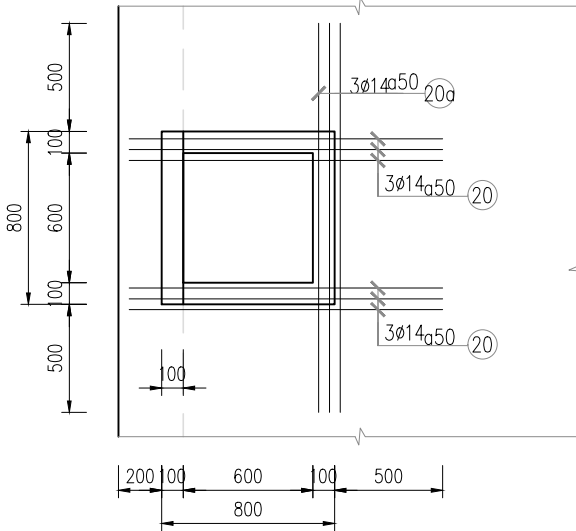
REV BẢN	DESCRIPTION ĐIỀU CHỈNH	DATE NGÀY	BY BỘ
PREPARED FOR CHỦ ĐẦU TƯ:			
<div><div></div><div><b>USAID</b> FROM THE AMERICAN PEOPLE</div></div>			
A&E BIEN HOA CONTRACTOR NHÀ THẦU TV&TK BIÊN HÒA			
<div></div>			
ENGINEERING • CONSULTING • MANAGEMENT Trigon Associates, llc1515 Poydras St., Ste 930 New Orleans, LA 70112 www.trigonassociates.com			
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PREPARED BY NGƯỜI THỰC HIỆN:			
DƯƠNG VĂN PHONG			
CHECKED BY NGƯỜI KIỂM TRA:			
BARRY P. BREAUX			
DESIGNER OF RECORD CHỦ NHIỆM THIẾT KẾ:			
GREGORY A. KOLENOVSKY			
PROJECT NAME/ TÊN DỰ ÁN:			
DIOXIN REMEDIATION AT BIEN HOA AIRBASE AREA PROJECT - PHASE 1 DỰ ÁN XỬ LÝ Ô NHIỄM DIOXIN KHU VỰC SÂN BAY BIÊN HÒA - GIAI ĐOẠN 1			
FINAL DESIGN			
ITEM/ HẠNG MỤC:			
CW1 - LTSA FINAL COVER			
DRAWING TITLE/ TÊN BẢN VẼ:			
WATER STRUCTURE - II KẾT CẤU BỂ NƯỚC - II			
DATE/ NGÀY: 31-May-2023	SIZE/ KHỔ: A3	SCALE/ TỈ LỆ: AS NOTED	
DRAWING NO./ BẢN VẼ SỐ: 40S-10	SHEET TỜ:	42 CỦA:	43



## MANHOLE COVER REINFORCING DETAILS

## CHI TIẾT GIA CƯỜNG NÁP BỂ

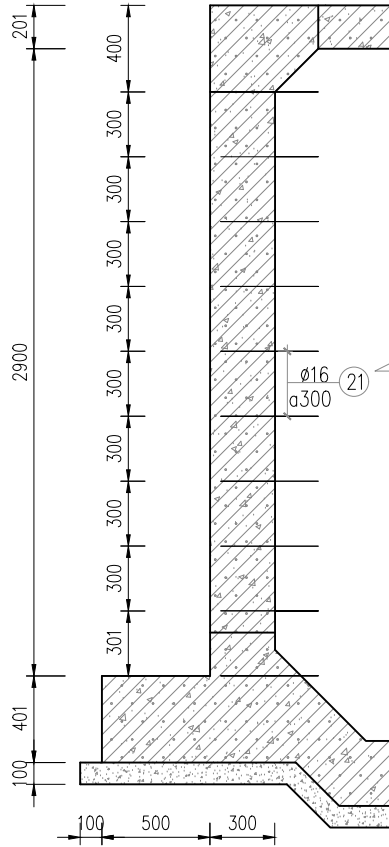
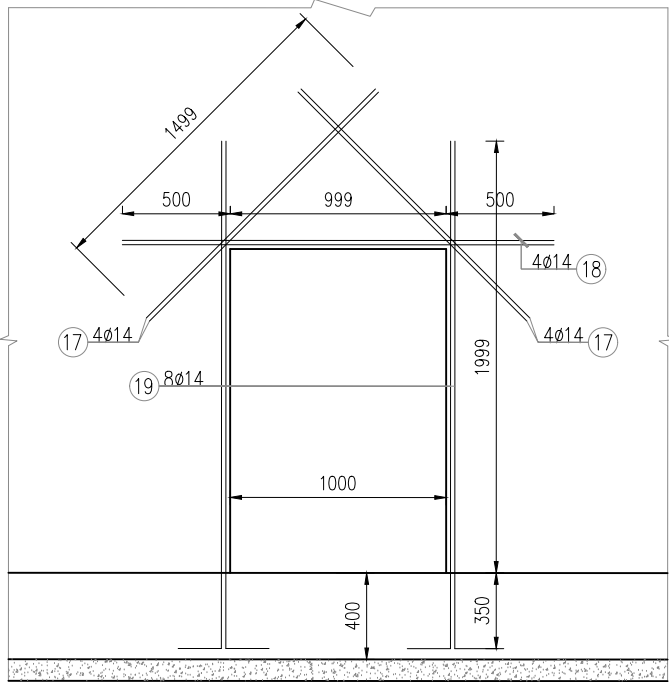
SCALE/ TỶ LỆ: 1/35



## DETAILS OF REINFORCING STEEL HOLES IN THE TANK

## CHI TIẾT GIA CƯỜNG THÉP LỖ THÔNG BỂ

SCALE/ TỶ LỆ: 1/35



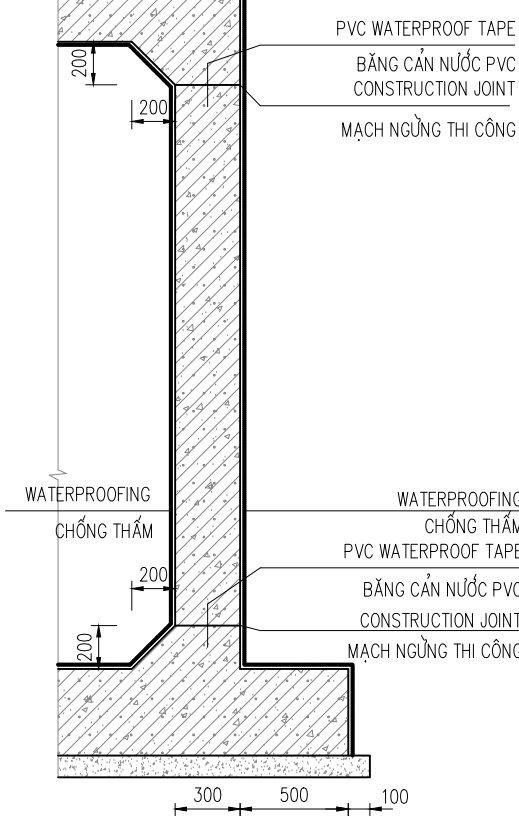
## DETAILS OF LADDER DOWN TO THE TANK

## CHI TIẾT THANG XUỐNG BỂ

SCALE/ TỶ LỆ: 1/35

## WATERPROOFING

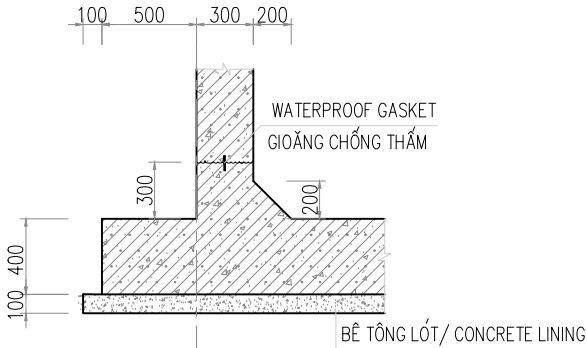
## CHỐNG THẤM



## WATERPROOF DETAILS

## CHI TIẾT CHỐNG THẤM

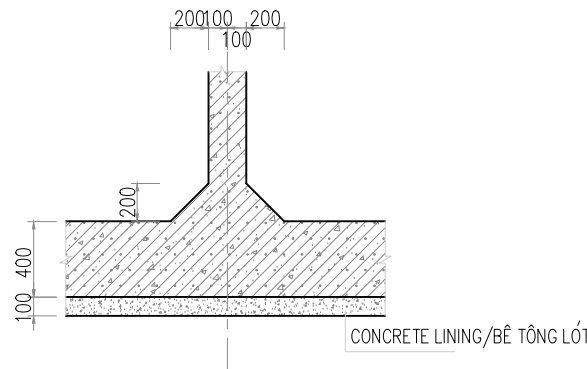
SCALE/ TỶ LỆ: 1/35



## DETAILS OF THE BOTTOM OF THE TANK WALL

## CHI TIẾT CHÂN VÁCH BIÊN BỂ

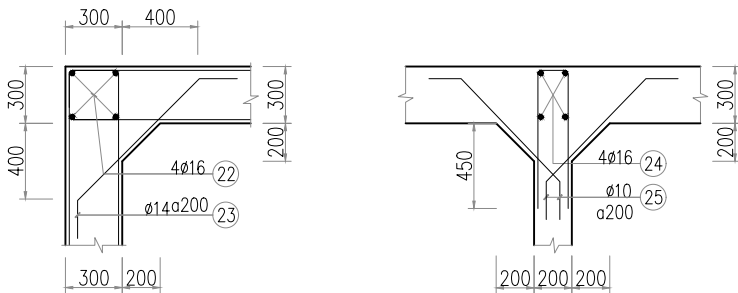
SCALE/ TỶ LỆ: 1/40



## DETAILS OF THE BOTTOM WALL IN THE MIDDLE OF THE TANK

## CHI TIẾT CHÂN VÁCH GIỮA BỂ

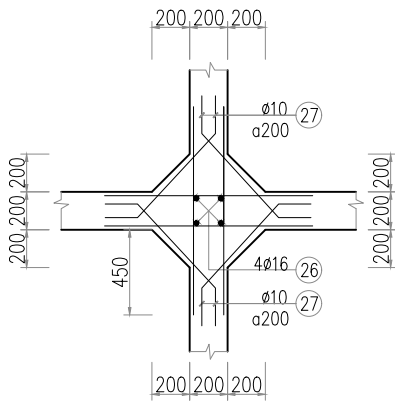
SCALE/ TỶ LỆ: 1/40



## TANK CORNER STEEL REINFORCEMENT DETAILS

## CHI TIẾT GIA CƯỜNG THÉP GÓC BỂ

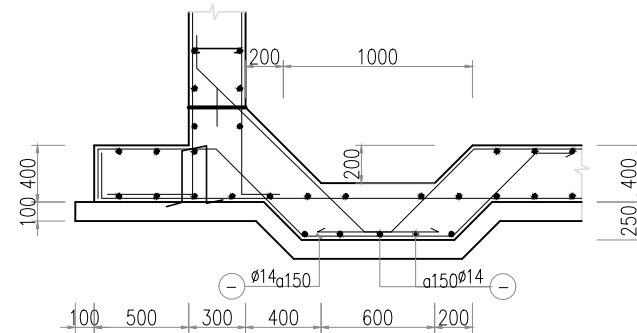
SCALE/ TỶ LỆ: 1/40



## STEEL REINFORCEMENT DETAILS IN THE MIDDLE OF THE TANK

## CHI TIẾT GIA CƯỜNG THÉP GIỮA BỂ

SCALE/ TỶ LỆ: 1/40



## DETAIL OF CATCH BASIN

## CHI TIẾT HỒ THU NƯỚC

SCALE/ TỶ LỆ: 1/40

## NOTE/ GHI CHÚ:

- ALL DIMENSIONS ARE IN MILLIMETERS, ELEVATIONS ARE IN METERS, UNLESS OTHERWISE NOTED/ TẤT CẢ KÍCH THƯỚC BẰNG MM, CAO ĐỘ BẰNG M, TRỪ KHI CÓ GHI CHÚ KHÁC.
- TECHNICAL PROCESS OF WATERPROOFING CONSTRUCTION ACCORDING TO THE REGULATIONS OF THE MANUFACTURER OF WATERPROOFING MATERIALS/ QUY TRÌNH KỸ THUẬT THI CÔNG CHỐNG THẤM THEO QUY ĐỊNH CỦA NHÀ SẢN XUẤT VẬT LIỆU CHỐNG THẤM

REV	DESCRIPTION	DATE	BY
BẢN	ĐIỀU CHỈNH	NGÀY	BỘ

PREPARED FOR  
CHỦ ĐẦU TƯ:A&E BIEN HOA CONTRACTOR  
NHÀ THẦU TV&TK BIÊN HÒA**Trigon**ENGINEERING • CONSULTING • MANAGEMENT  
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SÂN BAY BIÊN HÒA - GIAI ĐOẠN 1

FINAL DESIGN

ITEM/ HẠNG MỤC:

CW1 - LTSA FINAL COVER

DRAWING TITLE/ TÊN BẢN VẼ:

WATER STRUCTURE - III  
KẾT CẤU BỂ NƯỚC - III

DATE/ NGÀY:	SIZE/ KHỔ:	SCALE/ TỶ LỆ:
31-May-2023	A3	AS NOTED
DRAWING NO./ BẢN VẼ SỐ:	SHEET	OF
40S-11	TỜ:	CỦA: