Ministry of Transport

Project Management Unit Thang Long

Japan International Cooperation Agency

Loan No. : VN13-P2
Contract No. 127/HD-PUMTL

Hanoi City Ring Road No.3 Construction Project
Mai Dich – South Thang Long Section

Package 3: Technical Design, Cost Estimation and Tender Assistance

Work Plan for Geological Survey

Investigation for current road base, Geological, and material mine

August 2015

The Joint Venture of

NIPPON KOEI CO.,LTD.

NIPPON ENGINEERING CONSULTANTS CO.,LTD.

NIPPON KOEI VIETNAM INTERNATIONAL CO., LTD.

CONTENTS

MINISTRY OF TRANSPORT
PMU THANG LONG

SOCIALIST REPUBLIC OF VIETNAM
Independence - Freedom - Happiness

Hanoi, date..... month 08 year 2015

WORKING PLAN FOR
GEOLOGICAL INVESTIGATION

Project	:	Hanoi City Ring Road No. 3 Construction Project, Mai Dich - South Thang Long Section
Location	:	North Tu Liem district and Cau Giay district, Hanoi City
Stage	:	Detailed Design

1. BASE OF ESTABLISHED WORKING PLAND

1.1. Introduction

The Hanoi City Ring road No3 construction Project is a part of Ring road No3 route with a viaduct above the middle medial of Pham Van Dong road. Now, City Ring road No3 construction Project, Thanh Tri- Mai Dich section is built and opened to traffic. The Mai Dich- South Thang Long has not yet finished. During peak hours, the traffic flow exceeds through Pham Van Dong road causing traffic congestion. Therefore, it is necessary to research on plan for building a Viaduct on The Ring road No3 to meet traffic demand.

The profile report stepped up Investment projects of Viaduct construction Mai Dich- South Thang Long section, The Hanoi City Ring road No3 has been established by Transport Engineering Design Incorporated (TEDI) in 2012

The working plan established for the geological investigation for the Hanoi city Ring road No3, Mai Dich- South Thang Long section in the detailed design stage.

1.2. Legal Bases

- Law on Construction promulgated by the National Assembly of the Socialist Republic of Vietnam on 26th, November 2003 and Law No. 38/2009/QH12 dated 19th, June 2009 amending and supplementing a number of articles of the laws concerning capital construction investment;
- The Government's Decree No. 12/2009/ND-CP dated 12nd February, 2009 of the Government on management of investment projects on the construction of works and

the Government's Decree No. 83/2009/ND-CP dated 15th October, 2009 amending and supplementing a number of articles of Decree No. 12/2009/ND-CP;

- Decree No.15/2013/NĐ-CP, dated February 6th 2013, issued by Government for quality management of construction work;
- The Decree No.209/2004/NĐ-CP dated 16th December, 2004 by the Government on the Management of Building Works Quality and the Decree No.49/2008/NĐ-CP dated 18th April, 2008 on additional adjustment of some articles in the Decree No.209/2004/NĐ-CP;
- The Decree No. 112/2009/NĐ-CP dated 14th December, 2009 by the Government on the Management of Construction Investment Expenditure;
- The Circular No. 12/2005/TT-BXD dated 15th July, 2005 by the Ministry of Construction on guiding a number of provisions on quality management of construction works and capacity condition of organization and individuals in construction activity;
- The Circular No. 06/2006/TT-BXD dated 10th November, 2006 on guiding geotechnical surveys in service of selection of construction locations and designing of works;
- Contract for consulting services of technical design, cost estimation and tender assistance for Hanoi Ring Road No.3 construction project, Mai Dich – South Thang Long section, Contact No 1725/HD-PMUTL, dated June 19th 2015;
- The Report on Geological investigation for Hanoi City Ring Road No.3 Construction Project, Mai Dich - South Thang Long Section in the Basic Design Stage have been established by Transport Engineering Design Incorporated (TEDI) in 2012

1.3. Study Scope

The study scope of Hanoi City Ring Road No.3 Construction Project, Mai Dich - South Thang Long Section in the detailed design stage includes:

- Beginning point: Km 0+130, the North of The Mai Dich bridge;
- Ending point: Km 5+493.7, the South of the Thang Long bridge
- Length: 5.364 km along the Project road

1.4. Investigation Objectives

1.4.1. Investigation Items

- Geological investigation for bridge:

- Geological investigation for pile;
- Geological investigation for abutments;

- Geological investigation for road:
  - Geological investigation for approach roadbase
  - Geological investigation for extent roadbase
- Geological investigation for retaining wall.
  - Geological investigation for retaining wall at the beginning of route
  - Geological investigation for retaining wall at the end of route

1.4.2. Investigation Objectives

To assess the current status of road pavement and identify modulus of elasticity of Pham Van Dong road pavement to design stage in the project scope.

The geological investigation to provide the necessary documents on geotechnical conditions for the designing and construction of Hanoi City Ring Road No. 3 Construction Project, Mai Dich - South Thang Long Section:

- Indentify strata, boundary and mechanical-physical properties of soil layers in the construction area;
- Determining underground water level, corrosion of water to concrete and reinforce concrete structures.

2. QUANTITY OF WORKS

According to the Contact No 1725/HD-PMUTL, dated June 19th 2015, quantities of the geological investigation for the project are shown on following table:

No.	Item	Unit	Quantity
1	**Geological investigation for bridge**		
1.1	Number of boreholes	Hole	115
1.2	Drilling depth	m	45.0
1.3	Drilling meters total	m	5.175
1.4	Sampling	Sample	2.588
1.5	Laboratory testing		1.812
	- Undisturbed samples	Sample	1.268
	- Disturbed samples	Sample	543
	- Unconfined compression test	Sample	190
	-Testing on water sample	Sample	04
1.6	SPT testing	Point	2.588
1.7	Determining underground water level	Hole	115
2	**Geological investigation for retaining wall**		

No.	Item	Unit	Quantity
2.1	Number of boreholes	Hole	02
2.2	Drilling depth	m	30
2.3	Drilling meters total	m	60
2.4	Sampling	Sample	30
2.5	Laboratory testing		21
	- Undisturbed samples	Sample	15
	- Disturbed samples	Sample	06
	- Unconfined compression test	Sample	08
	- Triaxial compression test (CU)	Sample	02
	- Triaxial compression test (UU)	Sample	02
	- Consolidation test	Sample	02
2.6	Determining underground water level	Hole	02
2.7	SPT testing	Point	30
3	**Investigation for material construction mine**		
3.1	Filling soil mine	Mine/sample	1/3
3.2	Filling sand mine	Mine/sample	1/3
3.3	Construction sand mine	Mine/sample	2/5
3.4	Construction rock mine	Mine/sample	1/8
3.5	Investigation for waste yard	Location	02
4	**Investigation for current road pavement**		
4.1	Investigation for current status of road pavement	Km	5.5
4.2	Measurements Pavement strength by Benkelman	Point	20

3. EXCUTIVE METHOD AND EQUIPMENT

3.1. Preparation works

To obtain and prepare for relating document, including:

- Hanoi geological map with scale of 1/200.000;
- Document of geological investigation obtained while Hanoi City Ring Road No. 3 Construction Project, Mai Ditch - South Thing Long Section in the Investment projects stage.

3.2. Locating borehole location

3.2.1. Objectives

Locating boreholes from the drawing to the field according to the co-ordinate of borehole conforming to the approved topography surveying co-ordinate VN2000.

3.2.2. Equipment

Using Total Stations NIVO3M and GTS -235N (Produc of ToPcom Japan) or Equivalence.

3.2.3. Executive method

- Using intersection method, levelling by Total Stations base on GPS benchmarks, secondary control point of the project;
- After determining, borehole locations are marked by wood stakes;
- All boreholes have acceptance record of location between The Investigation Contractor, Consulant and Employer.

3.2.4. Technical requirement

- Borehole locations are determined on relief map by national coordinate system;
- In case borehole location is stuck by private house or other project that must to shift, Investigation Contractor must send report document include shifting outline location to the design manager. Drilling mission is carried out only after approved by the Consultants and PMU Thang Long.

3.3. Drilling

3.3.1. Objectives

- Determining stratum and geological feature in the surveying area;
- Implementing tests at the field (according to Standard Penetration Test - SPT...);
- Getting the samples of soil and water for testing;
- Install standpipe, determination and monitor of groundwater level in drilling hole.

3.3.2. Objectives

- Using China XY-1 or XY-1A with following technical features:
- Maximum depth: 150m;
- Maximum diameter: 152mm;
- Rod diameter: 42mm;
- Weight (no diesel engine): 550kg.

3.3.3. Executive method

- Equipment should be upright installed and avoid any shifting in whole drilling process;
- Used method is rotary drilling by using the sample barrel enclosed alloy drill twist, pumping and cleaning with Bentonit solution. The open hole diameter is 127mm, terminate diameter is 76-91mm;
- Drilling mission will accompany with installing temporary casing when the bore hole doesn't stabilize because of soft soil stratum, quick sand phenomenon;
- The boring process is done to the required depth of sampling, then it will be stopped to perform the sampling and SPT standard follow technical requirements of the TOR for Survey and Design;

- Before carrying out SPT test or taking sample, bore hole bottom should be cleaned then determined the depth again;
- The follow-up process at the field must be recorded in the works journal including elaboration of boring log. Borehole must be named in a boring log, it should mention in the depth, completed part and thickness of the soil layer, depth of sampling, the state, the colours of the soil, SPT testing indicator; elevation, coordinates of the borehole, the supervisor's name, beginning and ending date of the borehole. Each borehole must be recorded in the acceptance certificate as regulated;
- Colour photograph should be taken for boring at site, including borehole location, SPT testing, FVST testing, collected samples, total of drilling rod.
- After check and take over, boreholes should be filled in according to the standards of geology exploratory drilling process TCVN 9437-2012. All boreholes must have acceptance minutes for filling of boreholes.

3.3.4. Technical requirement and Termination of boring

- The boring carry out according to the standards of geology exploratory drilling process TCVN 9437-2012;
- For road: Boring shall be drilled to the estimated depth when drilling without soft soil. In case of soft soil, boring shall be terminated when drilling penetrated into bearing stratum 4m thickness of from and over stiff clayey soil or medium dense sandy soil;
- For bridge: Boring shall be terminated when drilling penetrated into bearing stratum such as 10-12m thickness of clayey soil (N>30) or sandy soil (N>50); 6-8m thickness of gravel soil (N>50).
- For retaining wall: Boring shall be terminated when drilling penetrated into bearing stratum 6-8m thickness of clayey soil (N>15) or sandy soil (N>30);
- *Notes: For all boreholes, when boring penetrated in to the estimated depth but not meet technical requirements, it shall be continued drilling into load-resistant layer as assigned after having approval from the Consultants and PMU Thang Long.*

3.4. Sampling

3.4.1. Objectives

- Taking samples for determining physical/ mechanical properties of soil layers;
- Taking water sample in borehole for analysis and calculation for determining water's erosion indicators for concrete reinforce concrete structures;
- Taking sample for later referencs.

3.4.2. Equipment

- Thin wall tube sampler 91mm;
- Open-tube type 91mm;
- Opened sampler (SPT sampler);
- Water sapling tool.

3.4.3. Executive method

- Using thin wall tube sampler, outer diameter of 76mm taking undisturbed sample in the soft soil . Sampler is pushed into the soil by static load. Length of tube sampler is 80cm;
- Using Open-tube type, outer diameter of 91mm taking undisturbed sample in the from and over medium stiff soil. It is often driven into ground with a slide hammer or a bob. Length of sampler 20cm;
- Disturbed samples is collectsd from split barrel when SPT test or using Open-tube type to take;
- Before taking sample must clean the borehole bottom and guarantee unaffected to the intended taking sample layer, avoid losing undisturbed property of sample;
- All undisturbed sample should be sealed to keep humidity. End of sample tube should be jacketed and adhesive tape hold;
- The labels with signal, name of the project, name of borehole, date of sampling, person in charge, the depth, status, color of the soil must be sticked on the boxes.
- Sample for later referencs is selected during drilling process, the over of undisturbed sample, disturbed sample or SPT core. The sample for later referencs after taken shall be keep in a plastic box with eteketto (same as UD, D sample).
- Under ground water taking in borehole. After having bored, using the pump to clean boring so that waiting underground coming into the borehole. Taking water will be implemented when the water becomes clear, but not over 12 hours after cleaning the borehole. Water sample will be taken in 2 glass bottles with volume of 1 litter. In which, 1 bottle should contain 6g badigeon to determine CO2 erosion content. After having sampled, the cord must be closed carefully, sealed paraphin, and sticked label with following information: Name of water sample, borehole and the depth for sampling, taking date, person in charge, volume of additional chemical.

3.4.4. Technical requirement

- Undisturbed and disturbed carry out according to the standards of geology exploratory drilling TCVN 9437-2012;

- Undisturbed and disturbed will be conducted with 2.0m/ 1sample;
- Sample for later referencs will be conducted with 1.0m/ 1sample
- All samples have to be taken photograph for serving preservation and inspection.

3.5. Standard penetration test (SPT)

3.5.1. Objectives

- Determining the soil state, soil resistance in SPT;
- Sampling disturbed sample for the sandy soil.

3.5.2. Equipment

- Using Vietnamese/China equipment with following technical features:
- SPT hammer weight: 63.5kg;
- Free fall height: 760mm;
- Penetration tip (bifurcated sampler) outside diameter 50.8mm;
- Cone solid penetration tip 600 diameter 50.8mm.

3.5.3. Executive method

- Drill to the SPT estimate depth;
- Pumping clean the borehole bottom then determine the depth again;
- Take the rod fitting SPT tip down the bore hole;
- SPT sampler is driven 45cm from the bottom of borehole by the hammer 63.5kg, falling height 760mm. SPT value is total of blows of the second 15cm and the thirst 15cm. The SPT graph will be present on the boring logs;
- When penetrate in gravel or strong cracked and weathered stone, bifurcated sampler can be replaced by cone solid penetration tip 600.

3.5.4. Technical requirement

- Standard penetration test (SPT) is executed in boreholes for bridge and retaining wall according to TCXD 226-1999 standard;
- Standard Penetration tests (SPT) will be conducted at bridge boreholes and retaining wall boreholes with 2.0m intervals.
- All SPT sample after taken should be put into plastic box, careful protected avoid nature moisture variation and transfer to the laboratory.

3.6. Determination of underground water level

Determination of underground water level will be carried out in all on shore boreholes. The underground water level shall be defined as follows:

- After having bored, using the pump to clean boring;

- The underground water level will be checked 48h after the drilling process (waiting underground level in borehole is stable);
- The results observable undeground water are presented in the report on geological investigation

3.7. Transporting preservation samples

- All samples must be keep in cool area and good condition, protected from crashing and other outside factors;
- In order to avoid damage, all samples must be keep carefully in containing box;
- After finishing drilling for each borehole, samples will be transported to the laboratory that Investigation Contractor assigns and Employer approves. During transporting process, the samples must be protected from crashing;
- Method of take, package, transportation and maintenance for sample should be obeyed strictly TCVN 2683-1991 standards.

3.8. Filling borehole

After check and take over, boreholes should be filled back in according to the standards of geology exploratory drilling process TCVN 9437-2012.

3.9. Investigation for material mine

3.9.1. Objectives

- Determining location, mine management levels, material supply, the estimated quantity, the quality of material, the distance from source to construction, price.
- Taking sample material at source to test in the laboratory.

3.9.2. Equipment

- Topography of status mines.
- Transportation map, distance measuring equipment from source to construction.

3.9.3. Executive method

- Determining sand, soil, rock mine can exploit or are exploited;
- Discussion with local administrations / Management mine agency for contract agreement and located up on diagrams;
- Collecting the document about quantity, quality, exploiting and providing ability, condition transportation to construction, material costs ...;
- Additional investigation for sand yard: sand source managing unit, ability to provide from the mine, the unit price in the mine;
- Taking sample for the laboratory test to assess the quality of the material.

3.9.4. Technical requirement

- Before investigation, it is necessary to have agreement with Head of the Geotechnical Investigation on the location of material mine. Principles of surveying borrow pits have evenly distributed in the route, rock and sand construction near the project area;
- Showing the location and information of each mine on the construction material mine diagram. Besides, showing and describing the existing roads used to transport materials to the project.

3.10. Investigation for waste yard

- Conduction a survey of possible locations poured waste materials during construction, locating on the diagram; distance to projects; area and volume of waste material obtain written agreement with the local.

3.11 Investigation for current road base

3.11.1 Assess the situation of the current road surface

- Inspection along existing roads;
- Study on topography, longitudinal section, cross section of current road
- Observation, classifying failure situation of current road coat;
- Topographic conditions and geometric factors of route;
- Type road base, type of ground base;
- Type hydrologic of base;
- Status and failure scope of road.

3.11.2 Measurement of overall elastic modulus of pavement by Benkelman

3.11.2.1 Equipment

Loaded vehicles with rear axle load of 10T

- Benkelman beam with technical parameters mainly follows

+ Scale of beam: 1:2;
+ Vibration system eliminated residual deformation of beam;
+ Dial Gauges with readable value to 0.01mm
+ 32T hydraulic jack to identify the rear axle of the vehicle weight;
+ Digital thermometer with a range of approximately 0°C to 100°C;

3.11.2.2 Executive method

a) Arranging measurement points

- Alternate Arranging;
- Distance measuring 50m / point.

b) Executive method

Check the specifications of vehicles:

+ Check axle load by hydraulic jack, check area of outer wheel path by oiling up the wheel and place on cell paper and measuring exposure area;

+ Set up the Benkelman Beams and check sensitivity of deformation equipment;

+ Locate the truck at the test site, adjust beam in the equilibrium position, and set the vibrating parts stable, read and record the reading;

+ Move truck very slowly forward until the rear axle is just over the 5.00 metre marking; wait for deformation recovered completely and vibration operations. Read and record the dial gauge reading as before.

+ Continue on to next test point and allow the same process as above.

c) **Data processing**

- Eliminating the error terms during measurement;
- Graphed the relationship between elastic deflection and the point of measurement;
- Establishing and divided into by the equivalent strength segment;
- Determination of featured elastic deflection to calculate the elastic modulus of the route;
- Charting featured elastic deflection calculations along route.

d) Technical requirement

Testing conducted obey standard: TCXDVN 8867: 2011 – Flexible pavement-standard test method for determination of elastic modulus of pavement structure using Benkelman beam.

3.12. Laboratory testing

- All samples are tested in accordance with Vietnamese standards; those not falling into any Vietnamese standard will be tested under international ones;
- Soil classification according to the standards TCVN 5747:1993;
- Testing properties shall be selected to ensure design requirements. Test criteria shall be proposed by the Geological manager and approved by Design manager.

  For the undisturbed sample:
- Properties shall be tested as follows: grain size (P %), moisture content (W %), specific gravity (Δ), unit weight (γ), liquid limit (WL), plastic limit (Wp), and compression test (compressibility coefficient a), direct shear test (cohesive power - C; internal friction angle -φ), organic content (if any); consolidation test (Cv), triaxial compression test (UU, CU) for the soft soil.

- For bridge boreholes and retaining wall boreholes, unconfined compression test for cohesive soil layer with stiff state and over (SPT≥8) shall be carried out.

For the disturbed sample:

- For the cohesive soil shall be tested as follows: grain size (P %), moisture content (W %), specific gravity (Δ), liquid limit (WL), plastic limit (WP).
- For the in cohesive soil shall be tested as follows: grain size (P %), specific gravity (Δ), dry and wet angle of repose, maximum void ratio (e_{max}), minimum void ratio (e_{min}).

For the water samples:

- For water sample following testing: pH, total mineralized level M, temperature, free content of C02, CO2 corrosion, HCO3-, SO42-, Cl-, Ca2+ , Mg2+, (Na+K)+, Mg2+, water naming conformable to the formula Cuoc-lop.

For filling soil samples

- Determining the parameters: P(%),Δ, W, WL, WP, compaction standard (γ_{cmax}, Wo), CBR.

For filling sand samples

- Determining the parameters: P(%),Δ, W, compaction standard (γ_{cmax}, Wo), Angle of repose Dry(αd), Angle of repose Saturated (αw), Void ratio of sand max (e_{max}), Void ratio of sand min (e_{min}), CBR.

For construction sand samples

- Determining the parameters: P(%),Δ, Clay dust content, organic content, Size Modulus (Mk).
- *For rock material source*
- Determining the parameters: name of rock,Δ, strength and softening coefficient of the original stone, Los Angles abrasion.

3.13. Reporting

The content and form of Geotechnical investigation reports, Surveying construction and stockpiled material report, Investigation for pavement and ground road have to comply with decree 15/2013 / ND-CP.

3.14. Submitted report

Number of documents will be submitted: 10 Vietnamese versions + 10 English versions + 01 CD (file).

3.15. Language

All letters and reports submitted to the Consultants must be in English versions. The Final report will be submitted in both Vietnamese and English.

3.16. Others regulations

Color photograph should be taken for each investigation article to store and insert to geological engineering investigation document, detailed as follow:

- Each borehole take 01 panorama picture with a board include project name, borehole name, start date, 01 picture snap SPT test, 01 picture snap FVST test, and 01 picture snap when finish the bore hole;
- Laboratory testing: snap when open sample and keeping sample after test.

4. APPLIED STANDARDS

The geological investigation will be carried out/ referent in accordance with the standards is shown on following table:

No	Description of Specification	Code of standard
1	Construction survey - Basic principles	TCVN 4419:1987
2	Standards of engineering geological exploratory drilling	TCVN 9437-2012
4	Procedure of Roadway Investigation	22TCN 263-2000
5	Geotechnical investigation for design and construction of pile foundation	TCXDVN 160:1987
6	Guiding collection, transportation, and preservation of soil sample	TCVN 5960:1995
7	Method of wrapping, transporting and saving sample	TCVN 2683:2012
8	Construction soil - Method of field testing - Standard Penetration Test (SPT)	TCVN 9351:2012
9	Construction soil-Method to determine Gravity in Laboratory	TCVN 4195: 2012
10	Construction soil-Method to determine Moisture content and desiccate in Laboratory	TCVN 4196: 2012
11	Construction soil-Method to determine Plastic limit and Liquid limit in Laboratory	TCVN 4197: 2012
12	Construction soil-Method to determine Particle (grain) size in Laboratory	TCVN 4198: 2012
13	Construction soil for hydrology geological project -Method to determine Repose angles (Dry & Saturated) and Voids Radio (Max and Min) for Sand in Laboratory	TCVN 8724:2012 TCVN8721:2012
14	Construction soil-Method to determine Direct shear strength in Laboratory	TCVN 4199:1995
15	+ Construction soil-Method to determine Compression in Laboratory	TCVN 4200: 2012
16	+ Consolidation test	
17	Construction soil for -Method to determine Bulk density in	TCVN 4202: 2012

No	Description of Specification	Code of standard
	Laboratory	
18	Standard Test Method for Unconfined Compressive Strength of Cohesive Soil (qu)	TCVN 9438:2012
19	Standard Test Method for Unconsolidated-Undrained Triaxial Compression Test for Cohesive Soils (UU)	TCVN 8868 - 2011
20	Standard Test Method for Consolidated Undrained Triaxial Compression Test for Cohesive Soils (CU)	TCVN 8868 - 2011
21	Construction soil - Classification	TCVN 5747-1993
22	Testing of defining physical, chemical criteria of overall water sample	TCVN 3994:1985
23	Determination of elastic modulus of pavement structure using Benkelman beam.	TCVN 8867:2011
24	Test methods of aggregates for concrete and mortar	TCVN 7572-1:2006 TCVN 7275-20:2006
25	Compaction standard test	22TCN 333:06
26	CBR test	22TCN 332:06
27	Specifications of Aggregates for concrete and mortar	TCVN 7570:2006

5. ARRANGEMENT AND RATE OF PROGRESS

5.1. Arrangement

The geological investigation is expected to be mobilized 16 boring staff 2laboratories working separately, under the guidance of geological manager.

List of main person for geological investigation is shown on following table:

No.	Name	Title	Telephone
1	Tran Dung Thang	Project manager	-
2	Le Tien Dung	Geological manager	
3	Nguyen The Anh	Vice Geological manager	
4	Hoang Trung Hieu	Leader of laboratory LASXD910	
5	Pham Thi Thu Ha	Vice leader of Laboratory LASXD910	
6	Pham Tuan Anh	Leader of laboratory LASXD-69	

Detailed list of person for the project is shown in Appendix 6.

5.2. Machine and equipment mobilization

Mobilized investigation equipment should guarantee ability executive project technical requirements. Machines, equipment are listed as following table:

No.	Equipment / Inv. Team	Drilling & Sampling (set)	SPT test (set)	Total Stasion (set)	Water sampling (set)
1	T&C	16	16	3	4
Total		**16**	**16**	**3**	**4**

5.3. Name of Laboratory

The laboratory testing should be carried out at 2 laboratories. The list of laboratory (including laboratory name, LAS number and address) are shown on following table:

No.	Laboratory	LAS No.	Address
1	Geotechnical and Material Laboratory Department	LAS-XD 910	16/28, lane 210, Hoan Quoc Viet, Cau Giay, Ha Noi
2	Geotechnical &Inspection Testing Center	LAS-XD 69	237 Luong The Vinh, Trung Van, Tu Liem, Ha Noi

6. RATE OF PROGRESS

6.1. Rate of Geotechnical Investigation progress

- Transportation the machines and equipment to site (03 days);
- Surveying site (45 days);
- Laboratory testing (65 days);
- Reporting(15 days);
- Back up progress (05 days);
- Total time: 90 days

6.2. Rate of material mine investigation progress

- Preparation (01 day);
- Surveying site (20 days);
- Laboratory testing (20 days);
- Reporting (05 days)
- Total time: 46 days

(The detailed plan of investigation works is shown in Appendix 1)

7. PROTECTION OF TECHNICAL INFASTURAL

Before implementation, the Investigation Contractor must be checked the around survey area to find out obstacles such as water drainage and supply pipeline, underground electric cables, telephone cable, fibber optics ... If there are any problems, it should report to Consultants and contact the management agencies to protect the above mentioned infrastructures so as to not happen damage and unsafely when boring or moving borehole location.

8. ENVIRONMENTAL SANITATION

- Environmental sanitation is carried out in all investigation time. The guaranteed environmental sanitation at the investigation areas will be restored as the beginning;
- Drill cuttings, wastes (oil, grease), soil core... shall be revoked, transported to shore and treated according to regulations, not let out directly to surround environment.

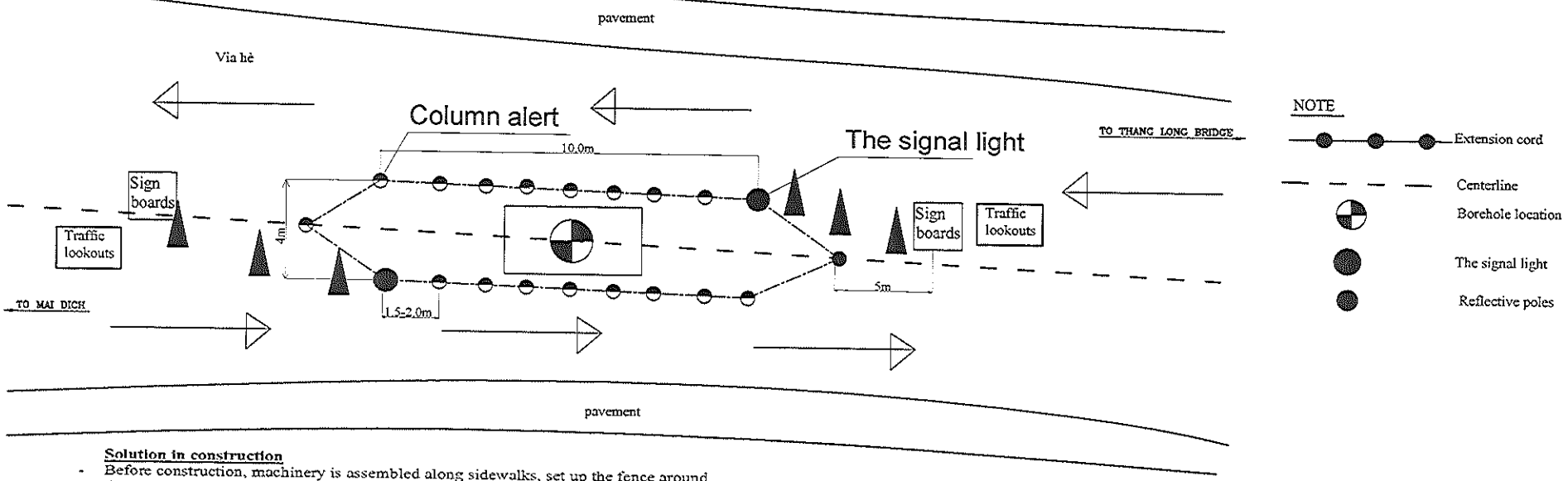
9. WORKING SEFETY GUARANTEE

The Contractor must be guaranteed working safety, traffic safety in all investigation time. Safety methods guarantee as follow:

- Equip for investigation staff enough equipment, working safety devices such as safety shoes, safety helmet, safety vest...;
- Supervise and speed up located drilling equipment and operating process. When carrying out the work should not cause traffic jammed;
- If survey is carried out at day, it needs to have speed limit board and survey is carried out at night, it needs to have flashing;
- With the borehole located in the traffic security corridor, railway, Investigation Contractor should apply to the appropriate authorities to get construction permission and traffic flow control regulated.

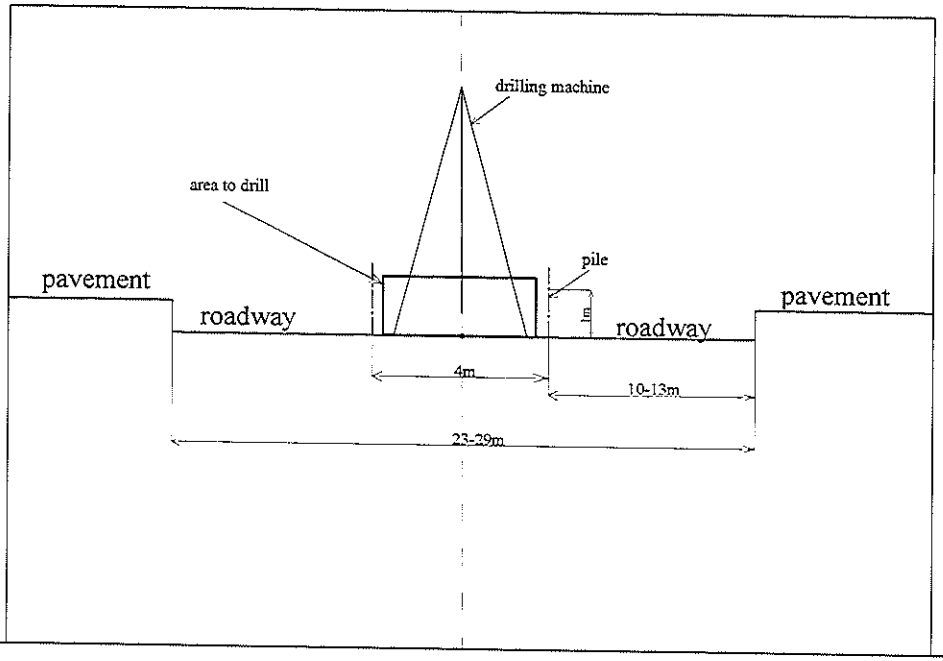
Details of construction solutions can be seen in the drawing (next page)

Drill holes located on the centerline

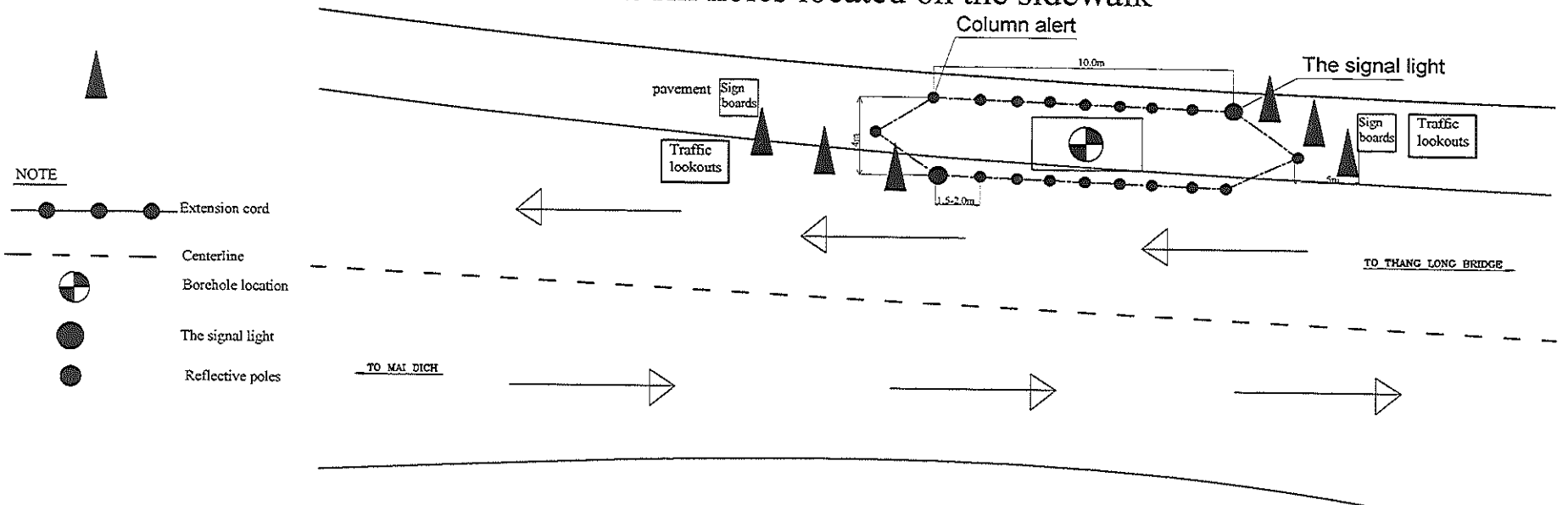


Solution in construction

- Before construction, machinery is assembled along sidewalks, set up the fence around the machine and signboards;
- After sorting machinery stably, we can carry out thepreparation of work site:
  + The sites of drill holesurfaceare arranged 4m x 10m
  + Set up piles in order to protected corridor on both sides of the machine, positioned parallel to the roadway. Piles are designed 1.5m in length, the distance between the poles is 1.5-2m, connected with wire stakes are reflective rope. Each corridor is estimated at 10m.
  + Traffic signal lightsshould be settled at the first pile and the last pile and necessary to appoint staff to guide and manage the traffic
  + Put up warning signboards (alert direction warning signboard, narrow roadssignboard, constructionsiteboards) at two sides of the construction area. Placement of billboards should be about 5m farfrom marker fence.
  + After finishing the preparation work, it is necessary to appoint staff to guide and manage the traffic to transport the driller to the drilling position.Arranging machine floor neatly, not exceed the scope of construction. When excuting, the occupied area by the driller should be about 3-4m; after finished drilling date, put machine's leg(reduced to about 1 meter), supplies and piles neatly in orderto return road for traffic participants.
- Because of location of construction includes roadway and sidewalk so construction time should be arranged throughout the day and night:
  + With line heart boreholes, because of high traffic density, conducted time should be at night from 8 pm(previous day) to 4 am (next day)
  + With side walk boreholes, there is a litle effect on the circulation of vehicles, so the conducted time should be during the day, starting from 7am to 6 pm.
- On implementing the construction works, all drilling teams must obey all the regulations on labor safety in the construction and regulations during the construction on roads where being exploited. People on the construction sitemust be fully equipped with protective clothing, shoes, hard hat as prescribed.
- After finished all the construction, original status of road should be returned.
- After construction, original status of road should be returned.
- Construction work is divided into 4 section:
  + Section 1: Km 0+00 – Km 0+910
  + Section 2: Km 0+910 – Km 1+940
  + Section 3: Km 1+940 – Km 3+200
  + Section 4: Km 3+200 – Km 5+500
- Construction time starting on 08.10.2015 until 30.10.2015

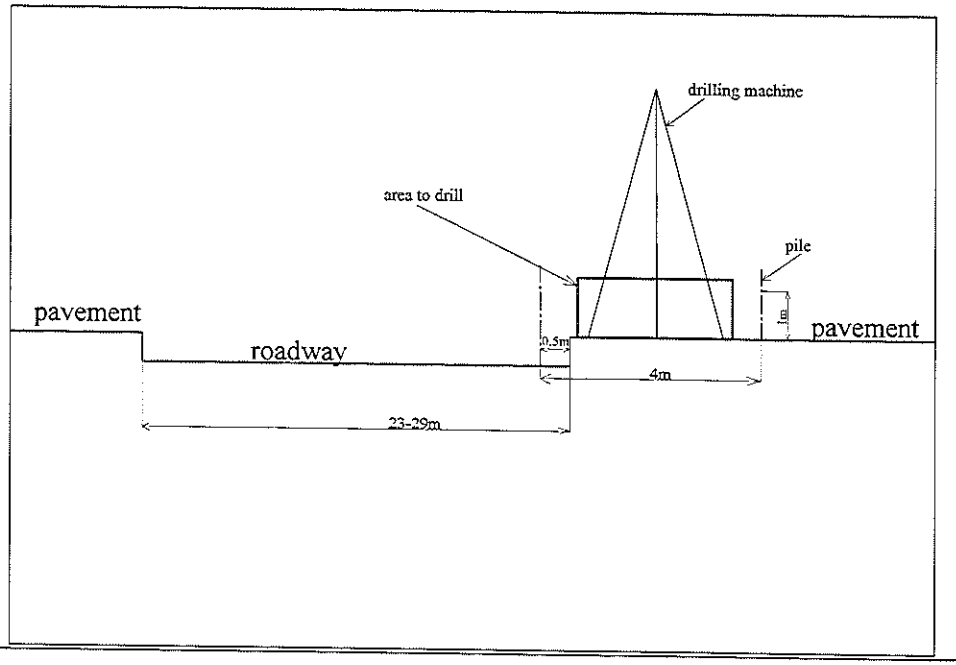


Drill holes located on the sidewalk



Solution in construction

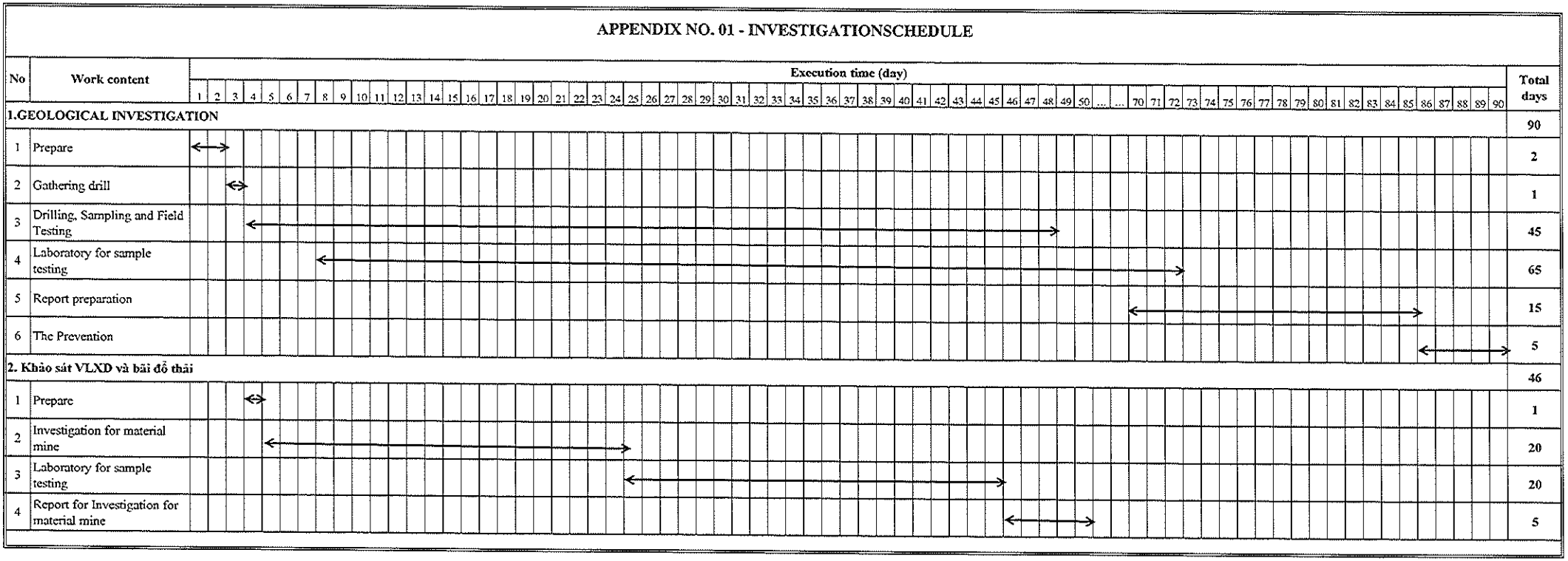
- Before construction, machinery is assembled along sidewalks, set up the fence around the machine and signboards;
- After sorting machinery stably, we can carry out thepreparation of work site:
  + The sites of drill holesurfaceare arranged 4m x 10m
  + Set up piles in order to protected corridor on both sides of the machine, positioned parallel to the roadway. Piles are designed 1.5m in length, the distance between the poles is 1.5-2m, connected with wire stakes are reflective rope. Each corridor is estimated at 10m.
  + Traffic signal lightsshould be settled at the first pile and the last pile and necessary to appoint staff to guide and manage the traffic
  + Put up warning signboards (alert direction warning signboard, narrow roadssignboard, constructionsiteboards) at two sides of the construction area. Placement of billboards should be about 5m farfrom marker fence.
  + After finishing the preparation work, it is necessary to appoint staff to guide and manage the traffic to transport the driller to the drilling position.Arranging machine floor neatly, not exceed the scope of construction. When executing, the occupied area by the driller should be about 3-4m: after finished drilling date, put machine's leg(reduced to about 1 meter), supplies and piles neatly in orderto return road for traffic participants.
- Because of location of construction includes roadway and sidewalk so construction time should be arranged throughout the day and night:
  + With line heart boreholes, because of high traffic density, conducted time should be at night from 8 pm(previous day) to 4 am (next day)
  + With side walk boreholes, there is a litle effect on the circulation of vehicles, so the conducted time should be during the day, starting from 7am to 6 pm.
- On implementing the construction works, all drilling teams must obey all the regulations on labor safety in the construction and regulations during the construction on roads where being exploited. People on the construction sitemust be fully equipped with protective clothing, shoes, hard hat as prescribed.
- After finished all the construction, original status of road should be returned.
- After construction, original status of road should be returned.
- Construction work is divided into 4 section:
  + Section 1: Km 0+00 – Km 0+910
  + Section 2: Km 0+910 – Km 1+940
  + Section 3: Km 1+940 – Km 3+200
  + Section 4: Km 3+200 – Km 5+500
- Construction time starting on 08.10.2015 until 30.10.2015



Appendix 1: Schedule on geological investigation

APPENDIX NO. 01 - INVESTIGATIONSCHEDULE

No	Work content	Execution time (day)	Total days
1.GEOLOGICAL INVESTIGATION			**90**
1	Prepare		**2**
2	Gathering drill		**1**
3	Drilling, Sampling and Field Testing		**45**
4	Laboratory for sample testing		**65**
5	Report preparation		**15**
6	The Prevention		**5**
2. Khảo sát VLXD và bãi đổ thải			**46**
1	Prepare		**1**
2	Investigation for material mine		**20**
3	Laboratory for sample testing		**20**
4	Report for Investigation for material mine		**5**



NOTE:

The drilling geotechnical investigation is expected in 90 days include the following items:

The preparation of machinery, equipment and supplies: 2 days

Transporting machinery from the warehouse to the construction gathered: 1 day

Drilling, Sampling and Field Testing: 45 day (we will supply on the working day following completion of the bore)

Experiment activity in Experiment activity in laboratory is implemented promptly after when drilling activity for the first borehole is finished. This activity is expected to start on the 4th day after the first drilling and shall last during entire drilling process. Total expected day for experiment implementation is 65 days

Report preparation (final report): 15 days

Prevention: 5 days

-Investigation for material mine is expected in 46 days include the following items:

Prepare: 1 day

Investigation for material mine: 20 days

Laboratory for sample testing 20 days

Report for Investigation for material mine: 5 days

Appendix 2: Co-ordinate of boreholes and Quantity of investigation.

PHỤ LỤC 02: BẢNG TỔNG HỢP KHỐI LƯỢNG KHẢO SÁT GIAI ĐOẠN THIẾT KẾ KỸ THUẬT

APPENDIX NO. 02: TABLE OF SUMARIZED SURVEY QUANTITY IN THE DETAILED DESIGN PHASE

TT No	Lý trình Station	Tên lỗ khoan/ Name of borehole	Toạ độ hố khoan/ Coordinates of the borehole		Vị trí + chiều sâu lỗ khoan địa chất / Position and depth of drill hole		Số mẫu / No sample		Số SPT/ No SPT		Xác định mực nước trong hố khoan/ Determination of water level in borehole	Số mẫu thí nghiệm/ Test samples (70%)		Thí nghiệm nén nở hông/ Unconfined compression test	Thí nghiệm nén 3 trục/ Triaxial Compression test		Thí nghiệm nén cố kết/ Consolidation test	Thí nghiệm mẫu nước/ Water samples in boreholes and testing	Ghi chú / Note
			X	Y	Vị trí / Position at exting road	Chiều sâu / Depth (m)	Mẫu nguyên dạng/ Undisturbed Sample	Mẫu xáo động/ Disturbed Sample	Điểm cấp đất I-III/ Soil levels I-III point	Điểm cấp đất IV-VI/ Soil levels IV-VI point	Lỗ/ sample	Mẫu nguyên dạng/ Undisturbed Sample	Mẫu xáo động/ Disturbed Sample	mẫu/ sample	CU	UU	mẫu /sample	mẫu /sample	
1	Km 0+248.9	LK1	2327442.276	580957.584	Tim tuyến / Centre line	45	16	7	16	7	1	11	5	1					
2	Km 0+288	LK2	2327481.695	580959.578	Tim tuyến / Centre line	45	16	7	16	7	1	11	5	2				1	
3	Km 0+328	LK3	2327522.126	580962.444	Tim tuyến / Centre line	45	16	7	16	7	1	11	5	2					
4	Km 0+368	LK4	2327561.490	580964.072	Tim tuyến / Centre line	45	16	7	16	7	1	11	5	2					
5	Km 0+408	LK5	2327601.176	580965.189	Tim tuyến / Centre line	45	16	7	16	7	1	11	5	1					
6	Km 0+448	LK6	2327641.169	580965.924	Tim tuyến / Centre line	45	16	7	16	7	1	11	5	2					
7	Km 0+488	LK7	2327681.162	580966.664	Tim tuyến / Centre line	45	16	7	16	7	1	11	5	2					
8	Km 0+568	LK8	2327761.117	580969.495	Tim tuyến / Centre line	45	16	7	16	7	1	11	5	2					
9	Km 0+608	LK9	2327801.055	580971.670	Tim tuyến / Centre line	45	16	7	16	7	1	11	5	1					
10	Km0+648	LK10	2327840.958	580974.389	Tim tuyến / Centre line	45	16	7	16	7	1	11	5	2					
11	Km 0+488	LK11	2327880.868	580977.073	Tim tuyến / Centre line	45	16	7	16	7	1	11	5	1					
12	Km 0+728	LK12	2327920.795	580979.496	Tim tuyến / Centre line	45	16	7	16	7	1	11	5	2					
13	Km 0+768	LK13	2327960.702	580982.233	Tim tuyến / Centre line	45	16	7	16	7	1	11	5	1					
14	Km 0+808	LK14	2328000.606	580985.000	Tim tuyến / Centre line	45	16	7	16	7	1	11	5	2					
15	Km 0+848	LK15	2328040.578	580988.248	Tim tuyến / Centre line	45	16	7	16	7	1	11	5	1					
16	Km 0+888	LK16	2328080.443	580990.114	Tim tuyến / Centre line	45	16	7	16	7	1	11	5	2					
17	Km 0+928	LK17	2328120.357	580992.728	Tim tuyến / Centre line	45	16	7	16	7	1	11	5	1					
18	Km 0+967.1	LK18	2328159.367	580995.388	Tim tuyến / Centre line	45	16	7	16	7	1	11	5	2					
19	Km 1+030	LK19	2328222.141	580999.407	Tim tuyến / Centre line	45	16	7	16	7	1	11	5	1					
20	Km 1+108	LK20	2328299.978	581004.412	Tim tuyến / Centre line	45	16	7	16	7	1	11	5	2					
21	Km 1+170.9	LK21	2328362.695	581008.461	Tim tuyến / Centre line	45	16	7	16	7	1	11	5	1					
22	Km1+210	LK22	2328401.766	581010.975	Tim tuyến / Centre line	45	16	7	16	7	1	11	5	2					
23	Km+1+250	LK23	2328441.684	581013.538	Tim tuyến / Centre line	45	16	7	16	7	1	11	5	1					
24	Km1+290	LK24	2328481.602	581016.094	Tim tuyến / Centre line	45	16	7	16	7	1	11	5	2					
25	Km1+330	LK25	2328521.521	581018.644	Tim tuyến / Centre line	45	16	7	16	7	1	11	5	1					
26	Km1+370	LK26	2328561.440	581021.187	Tim tuyến / Centre line	45	16	7	16	7	1	11	5	2					
27	Km1+410	LK27	2328601.359	581023.728	Tim tuyến / Centre line	45	16	7	16	7	1	11	5	1					
28	Km1+450	LK28	2328641.278	581026.268	Tim tuyến / Centre line	45	16	7	16	7	1	11	5	2					
29	Km1+490	LK29	2328681.198	581028.808	Tim tuyến / Centre line	45	16	7	16	7	1	11	5	1					
30	Km1+530	LK30	2328721.117	581031.348	Tim tuyến / Centre line	45	16	7	16	7	1	11	5	2					
31	Km1+570	LK31	2328761.036	581033.888	Tim tuyến / Centre line	45	16	7	16	7	1	11	5	1				1	
32	Km1+610	LK32	2328800.956	581036.428	Tim tuyến / Centre line	45	16	7	16	7	1	11	5	2					
33	Km1+650	LK33	2328840.875	581038.968	Tim tuyến / Centre line	45	16	7	16	7	1	11	5	1					
34	Km1+690	LK34	2328880.793	581041.508	Tim tuyến / Centre line	45	16	7	16	7	1	11	5	2					
35	Km1+730	LK35	2328920.713	581044.048	Tim tuyến / Centre line	45	16	7	16	7	1	11	5	1					
36	Km1+770	LK36	2328960.632	581046.592	Tim tuyến / Centre line	45	16	7	16	7	1	11	5	2					
37	Km1+810	LK37	2329000.492	581049.995	Tim tuyến / Centre line	45	16	7	16	7	1	11	5	1					
38	Km1+850	LK38	2329040.433	581052.227	Lòng đường/ Roadway	45	16	7	16	7	1	11	5	2					
39	Km1+890	LK39	2329080.349	581055.009	Lòng đường/ Roadway	45	16	7	16	7	1	11	5	2					
40	Km1+930	LK40	2329120.044	581060.052	Lòng đường/ Roadway	45	16	7	16	7	1	11	5	2					
41	Km2+10	LK41	2329199.945	581071.666	Lòng đường/ Roadway	45	16	7	16	7	1	11	5	1					

PHỤ LỤC 02: BẢNG TỔNG HỢP KHỐI LƯỢNG KHẢO SÁT GIAI ĐOẠN THIẾT KẾ KỸ THUẬT

APPENDIX NO. 02: TABLE OF SUMARIZED SURVEY QUANTITY IN THE DETAILED DESIGN PHASE

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			X	Y	Vị trí / Position at exting road	Chiều sâu / Depth (m)	Mẫu nguyên dạng/ Undisturbed Sample	Mẫu xáo động/ Disturbed Sample	Điểm cấp đất I-III/ Soil levels I-III point	Điểm cấp đất IV-VI/ Soil levels IV-VI point	Lỗ/ sample	Mẫu nguyên dạng/ Undisturbed Sample	Mẫu xáo động/ Disturbed Sample	mẫu/ sample	CU	UU	mẫu /sample	mẫu /sample	
42	Km2+45.5	LK42	2329233.830	581077.069	Lòng đường/ Roadway	45	16	7	16	7	1	11	5	2					
43	Km2+81.5	LK43	2329269.264	581085.733	Tim tuyến / Centre line	45	16	7	16	7	1	11	5	2					
44	Km2+117.5	LK44	2329304.607	581092.622	Tim tuyến / Centre line	45	16	7	16	7	1	11	5	2					
45	Km2+158	LK45	2329344.080	581101.686	Tim tuyến / Centre line	45	16	7	16	7	1	11	5	2					
46	Km2+193	LK46	2329378.352	581108.839	Tim tuyến / Centre line	45	16	7	16	7	1	11	5	2					
47	Km2+228	LK47	2329412.004	581118.633	Tim tuyến / Centre line	45	16	7	16	7	1	11	5	2					
48	Km2+263	LK48	2329446.331	581125.554	Tim tuyến / Centre line	45	16	7	16	7	1	11	5	2					
49	Km2+298	LK49	2329480.406	581133.547	Tim tuyến / Centre line	45	16	7	16	7	1	11	5	1					
50	Km2+325.125	LK50	2329515.018	581141.439	Tim tuyến / Centre line	45	16	7	16	7	1	11	5	2					
51	Km2+358.375	LK51	2329550.017	581149.875	Tim tuyến / Centre line	45	16	7	16	7	1	11	5	1					
52	Km2+398.625	LK52	2329589.426	581159.210	Tim tuyến / Centre line	45	16	7	16	7	1	11	5	2					
53	Km2+438.875	LK53	2329628.390	581168.258	Tim tuyến / Centre line	45	16	7	16	7	1	11	5	1					
54	Km2+480	LK54	2329667.333	581177.393	Tim tuyến / Centre line	45	16	7	16	7	1	11	5	2					
55	Km2+522	LK55	2329706.276	581186.527	Tim tuyến / Centre line	45	16	7	16	7	1	11	5	1					
56	Km2+564	LK56	2329745.219	581195.662	Tim tuyến / Centre line	45	16	7	16	7	1	11	5	2					
57	Km2+606	LK57	2329784.162	581204.796	Tim tuyến / Centre line	45	16	7	16	7	1	11	5	1					
58	Km2+648	LK58	2329823.592	581214.045	Tim tuyến / Centre line	45	16	7	16	7	1	11	5	2					
59	Km2+690	LK59	2329863.508	581223.408	Tim tuyến / Centre line	45	16	7	16	7	1	11	5	1					
60	Km2+732	LK60	2329903.425	581232.771	Tim tuyến / Centre line	45	16	7	16	7	1	11	5	2					
61	Km2+773	LK61	2329942.855	581242.019	Tim tuyến / Centre line	45	16	7	16	7	1	11	5	1				1	
62	Km2+812.1	LK62	2329981.052	581250.979	Tim tuyến / Centre line	45	16	7	16	7	1	11	5	2					
63	Km2+875	LK63	2330042.185	581265.318	Tim tuyến / Centre line	45	16	7	16	7	1	11	5	2					
64	Km2+953	LK64	2330118.154	581283.137	Tim tuyến / Centre line	45	16	7	16	7	1	11	5	2					
65	Km3+15.9	LK65	2330179.336	581297.489	Tim tuyến / Centre line	45	16	7	16	7	1	11	5	1					
66	Km3+55	LK66	2330217.404	581306.418	Tim tuyến / Centre line	45	16	7	16	7	1	11	5	2					
67	Km3+95	LK67	2330256.347	581315.552	Tim tuyến / Centre line	45	16	7	16	7	1	11	5	2					
68	Km3+135	LK68	2330295.290	581324.687	Tim tuyến / Centre line	45	16	7	16	7	1	11	5	1					
69	Km3+175	LK69	2330334.232	581333.821	Tim tuyến / Centre line	45	16	7	16	7	1	11	5	2					
70	Km3+215	LK70	2330374.052	581343.161	Tim tuyến / Centre line	45	16	7	16	7	1	11	5	1					
71	Km3+255	LK71	2330412.756	581352.476	Tim tuyến / Centre line	45	16	7	16	7	1	11	5	2					
72	Km3+295	LK72	2330452.105	581360.699	Tim tuyến / Centre line	45	16	7	16	7	1	11	5	1					
73	Km3+335	LK73	2330490.015	581370.312	Tim tuyến / Centre line	45	16	7	16	7	1	11	5	2					
74	Km3+375	LK74	2330529.071	581378.952	Tim tuyến / Centre line	45	16	7	16	7	1	11	5	1					
75	Km3+415	LK75	2330568.336	581386.572	Tim tuyến / Centre line	45	16	7	16	7	1	11	5	2					
76	Km3+495	LK76	2330647.594	581397.297	Lòng đường/ Roadway	45	16	7	16	7	1	11	5	1					
77	Km3+535	LK77	2330687.441	581400.777	Lòng đường/ Roadway	45	16	7	16	7	1	11	5	2					
78	Km3+575	LK78	2330727.392	581403.720	Lòng đường/ Roadway	45	16	7	16	7	1	11	5	1					
79	Km3+615	LK79	2330767.231	581406.577	Vỉa hè/Side walk	45	16	7	16	7	1	11	5	2					
80	Km3+655	LK80	2330807.129	581409.438	Vỉa hè/Side walk	45	16	7	16	7	1	11	5	2					
81	Km3+695	LK81	2330847.026	581412.299	Vỉa hè/Side walk	45	16	7	16	7	1	11	5	2					
82	Km3+735	LK82	2330886.924	581415.161	Vỉa hè/Side walk	45	16	7	16	7	1	11	5	1					

PHỤ LỤC 02: BẢNG TỔNG HỢP KHỐI LƯỢNG KHẢO SÁT GIAI ĐOẠN THIẾT KẾ KỸ THUẬT

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			X	Y	Vị trí / Position at exting road	Chiều sâu / Depth (m)	Mẫu nguyên dạng/ Undisturbed Sample	Mẫu xáo động/ Disturbed Sample	Điểm cấp đất I-III/ Soil levels I-III point	Điểm cấp đất IV-VI/ Soil levels IV-VI point	Lỗ/ sample	Mẫu nguyên dạng/ Undisturbed Sample	Mẫu xáo động/ Disturbed Sample	mẫu/ sample	CU	UU	mẫu /sample	mẫu /sample	
83	Km3+775	LK83	2330926.862	581418.025	Vỉa hè/Side walk	45	16	7	16	7	1	11	5	2					
84	Km3+815	LK84	2330966.719	581420.883	Vỉa hè/Side walk	45	16	7	16	7	1	11	5	2					
85	Km3+855	LK85	2331006.616	581423.744	Vỉa hè/Side walk	45	16	7	16	7	1	11	5	2					
86	Km3+895	LK86	2331046.514	581426.605	Vỉa hè/Side walk	45	16	7	16	7	1	11	5	2					
87	Km3+935	LK87	2331086.411	581429.466	Vỉa hè/Side walk	45	16	7	16	7	1	11	5	2					
88	Km3+975	LK88	2331126.309	581432.327	Vỉa hè/Side walk	45	16	7	16	7	1	11	5	2					
89	Km4+15	LK89	2331166.207	581435.189	Vỉa hè/Side walk	45	16	7	16	7	1	11	5	2					
90	Km4+55	LK90	2331206.104	581438.050	Vỉa hè/Side walk	45	16	7	16	7	1	11	5	1					
91	Km4+95	LK91	2331246.002	581440.911	Vỉa hè/Side walk	45	16	7	16	7	1	11	5	2					
92	Km4+135	LK92	2331285.151	581443.718	Vỉa hè/Side walk	45	16	7	16	7	1	11	5	1					
93	Km4+175	LK93	2331325.797	581446.633	Vỉa hè/Side walk	45	16	7	16	7	1	11	5	2					
94	Km4+215	LK94	2331365.694	581449.503	Vỉa hè/Side walk	45	16	7	16	7	1	11	5	2					
95	Km4+255	LK95	2331405.569	581452.653	Vỉa hè/Side walk	45	16	7	16	7	1	11	5	2					
96	Km4+295	LK96	2331445.360	581456.718	Lòng đường/ Roadway	45	16	7	16	7	1	11	5	1				1	
97	Km4+335	LK97	2331484.959	581462.344	Lòng đường/ Roadway	45	16	7	16	7	1	11	5	2					
98	Km4+375	LK98	2331524.179	581470.167	Lòng đường/ Roadway	45	16	7	16	7	1	11	5	2					
99	Km4+415	LK99	2331562.922	581480.054	Lòng đường/ Roadway	45	16	7	16	7	1	11	5	1					
100	Km4+450	LK100	2331595.687	581492.555	Lòng đường/ Roadway	45	16	7	16	7	1	11	5	2					
101	Km4+485	LK101	2331627.814	581506.432	Lòng đường/ Roadway	45	16	7	16	7	1	11	5	2					
102	Km4+525.675	LK102	2331664.193	581524.615	Lòng đường/ Roadway	45	16	7	16	7	1	11	5	1					
103	Km4+557.050	LK103	2331691.673	581539.754	Lòng đường/ Roadway	45	16	7	16	7	1	11	5	2					
104	Km4+588.450	LK104	2331718.809	581555.552	Lòng đường/ Roadway	45	16	7	16	7	1	11	5	2					
105	Km4+625.5	LK105	2331750.559	581574.647	Lòng đường/ Roadway	45	16	7	16	7	1	11	5	2					
106	Km4+668.2	LK106	2331787.074	581596.781	Lòng đường/ Roadway	45	16	7	16	7	1	11	5	2					
107	Km4+708.2	LK107	2331821.283	581617.512	Lòng đường/ Roadway	45	16	7	16	7	1	11	5	2					
108	Km4+748.2	LK108	2331855.604	581638.054	Lòng đường/ Roadway	45	16	7	16	7	1	11	5	2					
109	Km4+788.2	LK109	2331890.359	581657.854	Tim tuyến / Centre line	45	16	7	16	7	1	11	5	2					
110	Km4+828.2	LK110	2331925.845	581676.305	Tim tuyến / Centre line	45	16	7	16	7	1	11	5	1					
111	Km4+868.2	LK111	2331962.361	581692.603	Tim tuyến / Centre line	45	16	7	16	7	1	11	5	2					
112	Km4+948.2	LK112	2332038.415	581717.052	Lòng đường/ Roadway	45	16	7	16	7	1	11	5	2					
113	Km4+983.2	LK113	2332072.826	581723.400	Lòng đường/ Roadway	45	16	7	16	7	1	11	5	2					
114	Km5+18.2	LK114	2332107.625	581727.055	Lòng đường/ Roadway	45	16	7	16	7	1	11	5	1					
115	Km5+52.3	LK115	2332141.704	581728.005	Lòng đường/ Roadway	45	16	7	16	7	1	11	5	2					
116	Km0+219.6	LK116	2327410.327	580989.189	Phải tuyến +33.8m/ Right side +33.8m	30	12	3	15	0	1	8	2	4	1	1	1		
117	Km5+78.70	LK117	2332168.539	581742.253	Phải tuyến +15.9m/ Right side +15.9m	30	12	3	15	0	1	8	3	4	1	1	1		
Tổng cộng / Total			117	117		5235	1864	811	1870	805	117	1304	569	198	2	2	2	4	

Appendix 3: Plan of borehole locations

CẦU THĂNG LONG
THANH XUÂN
LK8
LK1
LK116
X = 2327410.327
Y = 580989.189
7720
5000
Cáp quang ngầm 48 fo
8 Sợi cáp quang chôn 24 fo
3 Sợi cáp đồng chôn
Đường Phạm Văn Đồng
Đường Xuân Thủy
D=150
D=100
D=90
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CẦU THĂNG LONG
THANH XUÂN
LK11
LK10
LK9
LK8
LK7
LK6
LK5
LK4
LK3
Cáp quang ngầm 48 fo
Cáp trục QR540 ngầm
8 Sợi cáp quang chôn 24 fo
Đường Trần Quốc Hoàn
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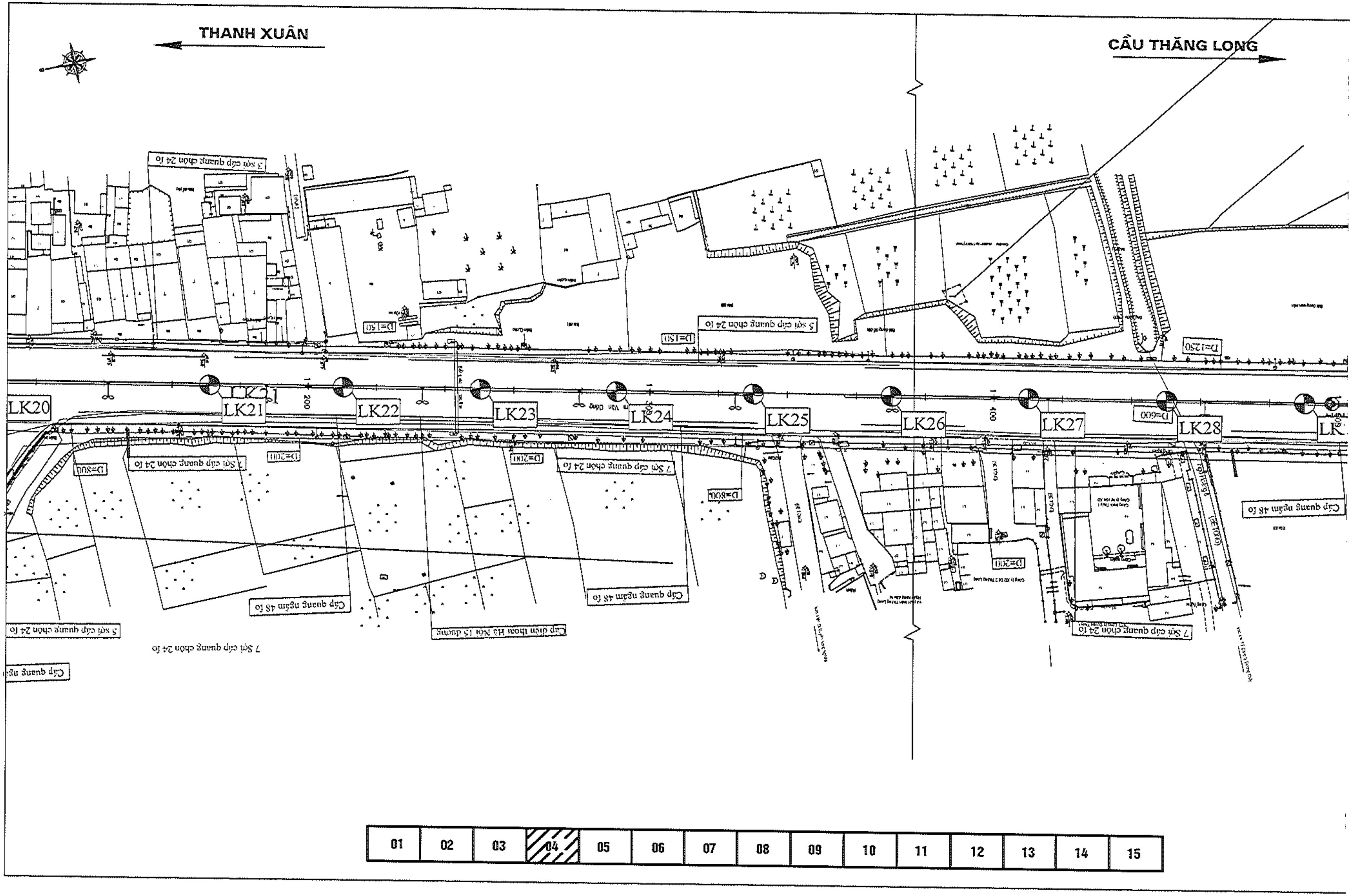
CẦU THĂNG LONG
THANH XUÂN
Đường Hoàng Quốc Việt
Đường Phạm Văn Đồng
LK19
LK18
LK17
LK16
LK15
LK14
LK13
LK12
Cáp quang ngầm 48 fo
Cáp quang ngầm 24 fo
Cáp trục QR540 ngầm
03 tuyến ống nhựa PVC phi 110
09 sợi cáp 100x2
4 sợi cáp 50x2 30x2
8 Sợi cáp quang chôn 24 fo
01 Sợi 30x2
02 sợi 100x2
01 2 03 04 05 06 07 08 09 10 11 12 13 14 15


THANH XUÂN
CẦU THĂNG LONG
LK20
LK21
LK22
LK23
LK24
LK25
LK26
LK27
LK28
D=150
D=150
D=1250
D=600
D=800
D=200
D=200
D=800
D=200
3 sợi cáp quang chôn 24 fo
5 sợi cáp quang chôn 24 fo
7 Sợi cáp quang chôn 24 fo
7 Sợi cáp quang chôn 24 fo
7 Sợi cáp quang chôn 24 fo
7 Sợi cáp quang chôn 24 fo
5 sợi cáp quang chôn 24 fo
Cáp quang ngầm 48 fo
Cáp quang ngầm 48 fo
Cáp quang ngầm 48 fo
Cáp điện thoại Hà Nội 15 đường
01
02
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14
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CẦU THĂNG LONG
THANH XUÂN
LK38
LK37
LK36
LK35
LK34
LK33
LK32
LK31
LK30
D=1250
D=600
D=800
Cáp quang ngầm 48 fo
Cáp trục QR540 ngầm
Sợi cáp quang chôn 24 fo
5 sợi cáp quang chôn 24 fo
7 Sợi cáp quang chôn 24 fo
01
02
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CẦU THĂNG LONG
THANH XUÂN
LK39
LK40
LK41
LK42
LK43
LK44
LK45
LK46
LK47
LK48
V2
Đường Phạm Văn Đồng
Cáp thông tin HN 15 tuyến
Cáp quang ngầm 48 fo
Cáp trục QR540 ngầm
Sợi cáp quang chôn 24 fo
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14
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CẦU THĂNG LONG
THANH XUÂN
LK57
LK56
LK55
LK54
LK53
LK52
LK51
LK50
LK49
LK48
Cáp treo QR540 ngầm
5 sợi cáp quang chôn 24 lõ
1 sợi 20x2x0.4
1 sợi 30x2x0.4
3 sợi 5x2x0.5
7 Sợi cáp quang chôn 24 lõ
Cáp quang ngầm 48 lõ
Dường Phạm Văn Đồng
01
02
03
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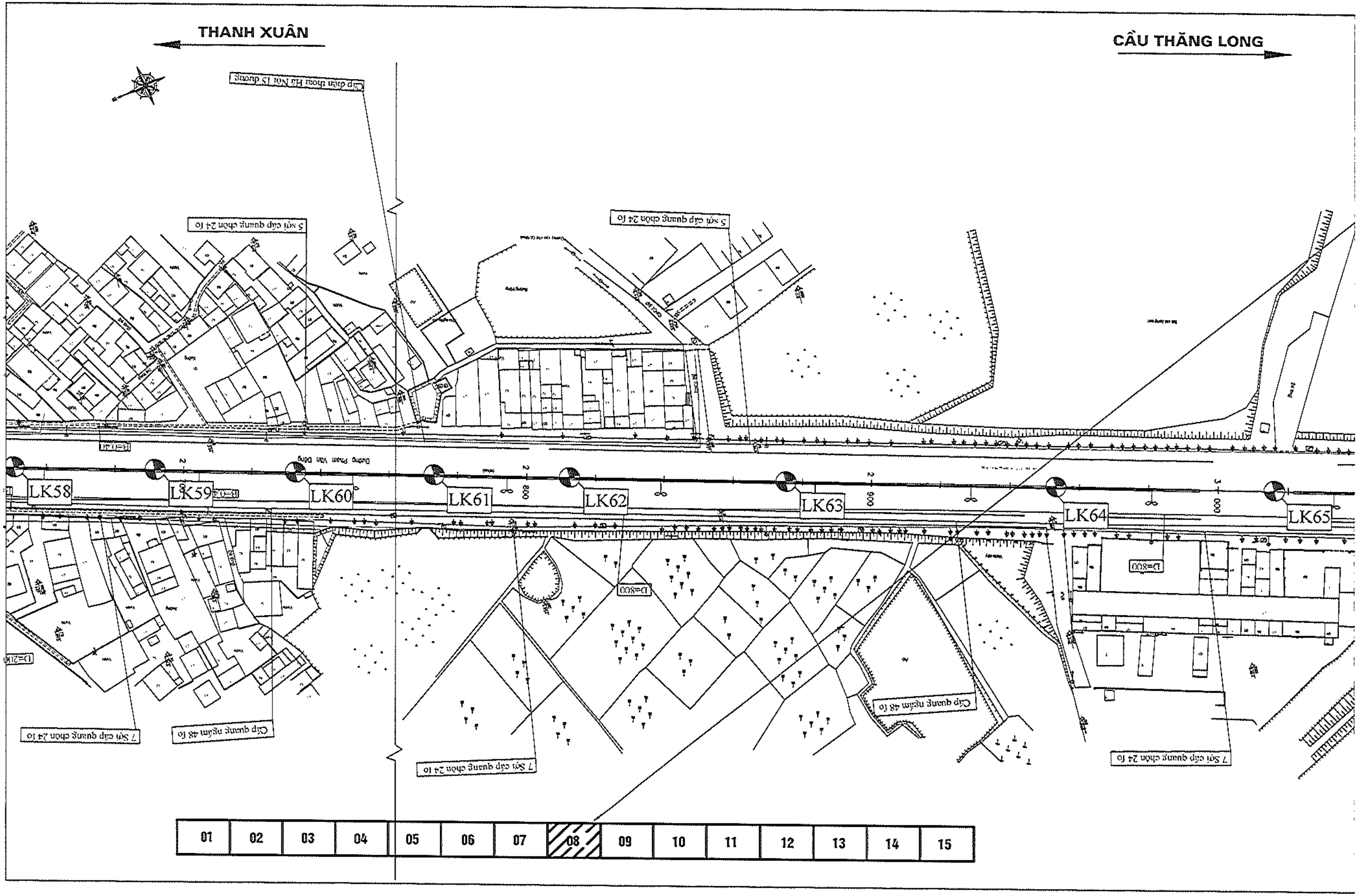
THANH XUÂN
CẦU THĂNG LONG
Cáp điện thoại Hà Nội 15 đường
5 sợi cáp quang chôn 24 fo
5 sợi cáp quang chôn 24 fo
Đường Phạm Văn Đồng
LK58
LK59
LK60
LK61
LK62
LK63
LK64
LK65
2 + 800
2 + 900
3 + 000
D=800
D=800
7 Sợi cáp quang chôn 24 fo
Cáp quang ngầm 48 fo
7 Sợi cáp quang chôn 24 fo
Cáp quang ngầm 48 fo
7 Sợi cáp quang chôn 24 fo
01
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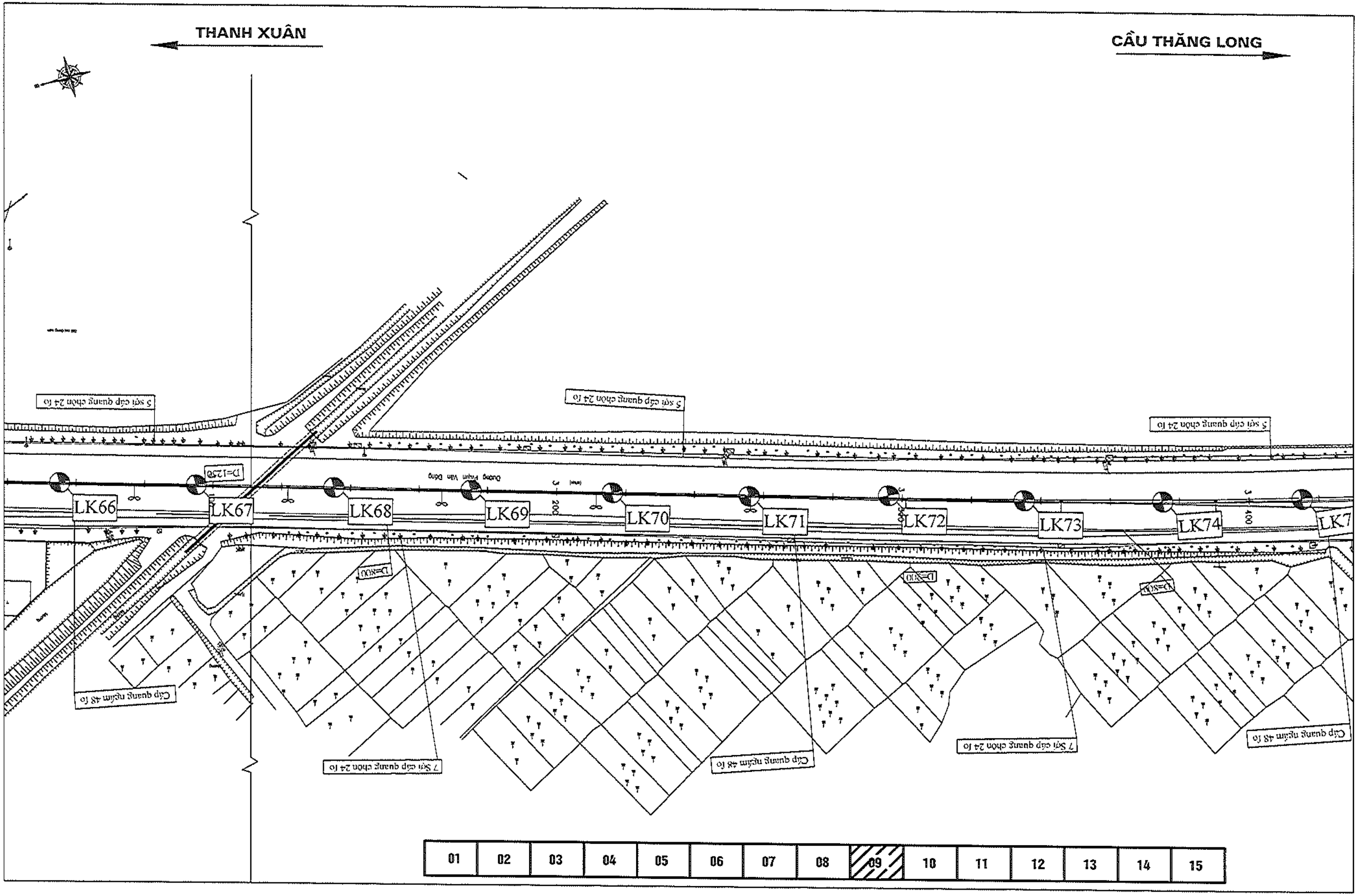
THANH XUÂN
CẦU THĂNG LONG
5 sợi cáp quang chôn 24 fo
5 sợi cáp quang chôn 24 fo
5 sợi cáp quang chôn 24 fo
D=1250
Đường Phạm Văn Đồng
LK66
LK67
LK68
LK69
LK70
LK71
LK72
LK73
LK74
LK7
D=800
D=800
D=800
Cáp quang ngầm 48 fo
7 Sợi cáp quang chôn 24 fo
Cáp quang ngầm 48 fo
7 Sợi cáp quang chôn 24 fo
Cáp quang ngầm 48 fo
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CẦU THĂNG LONG
THANH XUÂN
LK83
LK82
LK81
LK80
LK79
LK78
LK77
LK76
V-3
Cáp quang tuyến 48 sợi
Cáp quang tuyến 24 sợi
D=1000
D=800
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CẦU THĂNG LONG
THANH XUÂN
LK92
LK91
LK90
LK89
LK88
LK87
LK86
LK85
LK84
Đường Phạm Văn Đồng
Cáp quang ngầm 48 fo
Cáp quang ngầm 48 fo
5 Sợi cáp quang chôn 24 fo
5 Sợi cáp quang chôn 24 fo
5 Sợi cáp quang chôn 24 fo
7 Sợi cáp quang chôn 24 fo
7 Sợi cáp quang chôn 24 fo
7 Sợi cáp quang chôn 24 fo
D=100
D=100
D=100
D=100
01
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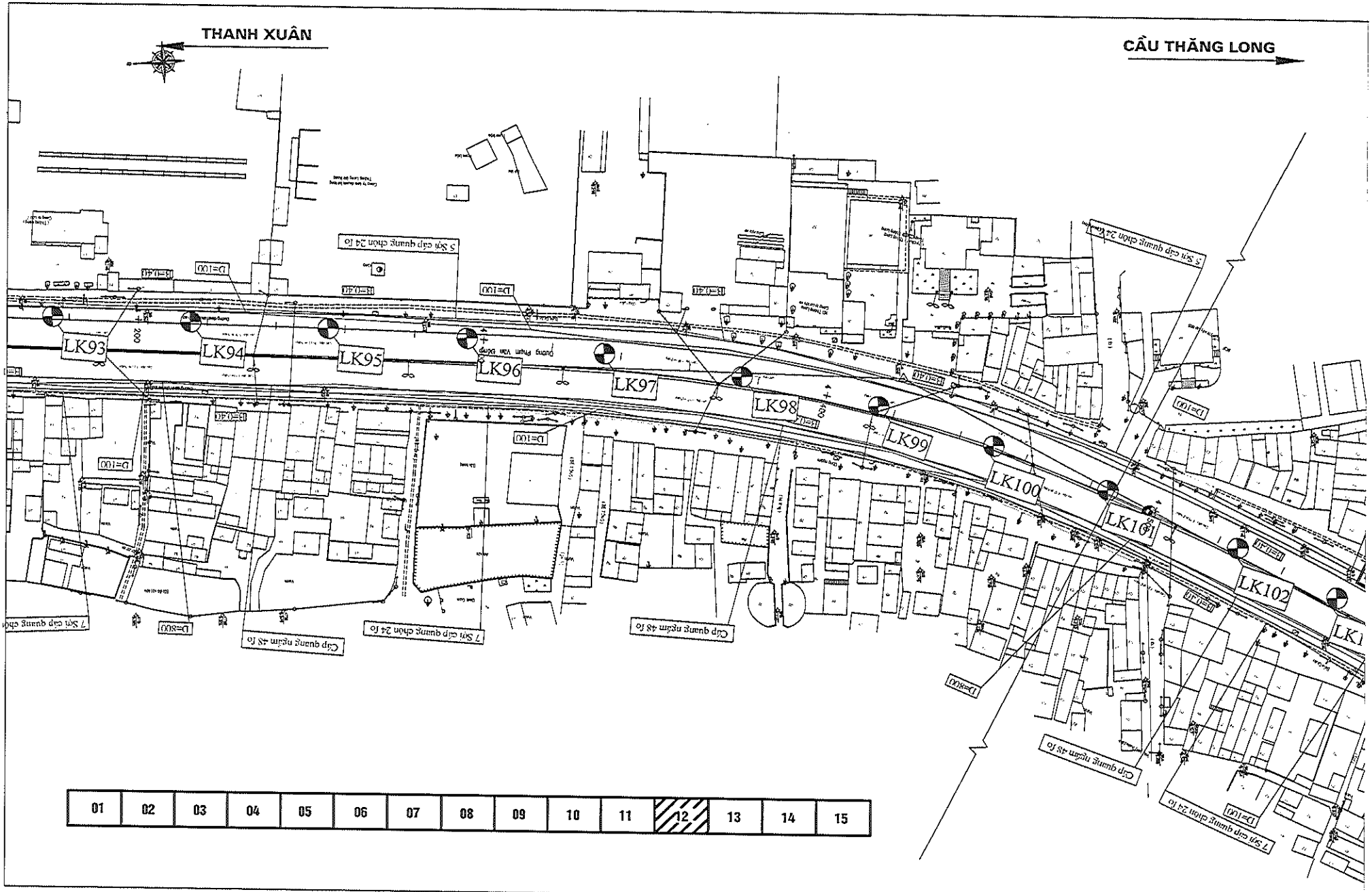
THANH XUÂN
CẦU THĂNG LONG
LK93
LK94
LK95
LK96
LK97
LK98
LK99
LK100
LK101
LK102
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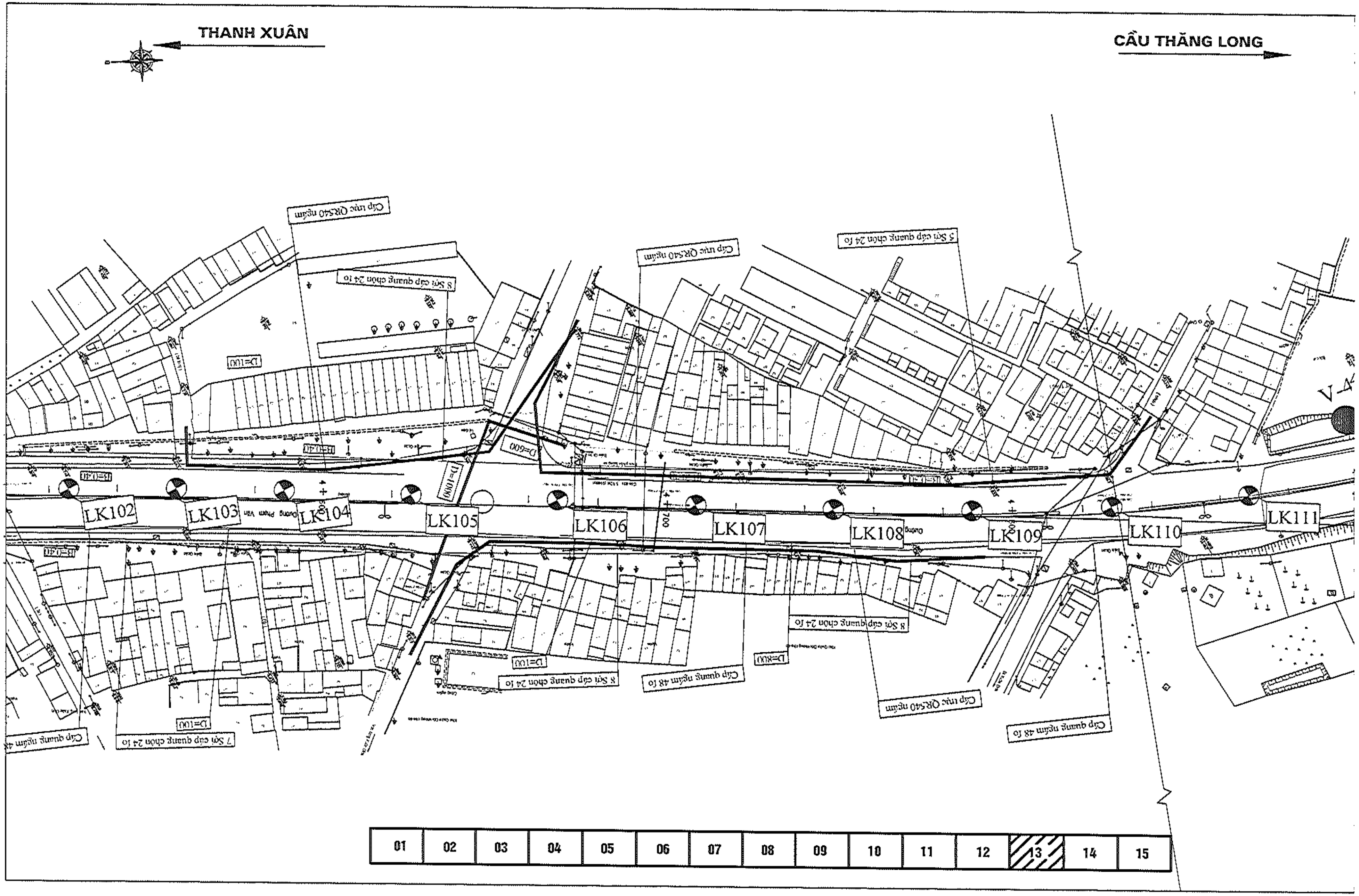

THANH XUÂN
CẦU THĂNG LONG
LK102
LK103
LK104
LK105
LK106
LK107
LK108
LK109
LK110
LK111
Cáp trục QR540 ngầm
8 Sợi cáp quang chôn 24 fo
Cáp trục QR540 ngầm
5 Sợi cáp quang chôn 24 fo
D=100
D=600
D=1000
700
D=100
D=800
8 Sợi cáp quang chôn 24 fo
Cáp quang ngầm 48 fo
8 Sợi cáp quang chôn 24 fo
Cáp trục QR540 ngầm
Cáp quang ngầm 48 fo
D=100
7 Sợi cáp quang chôn 24 fo
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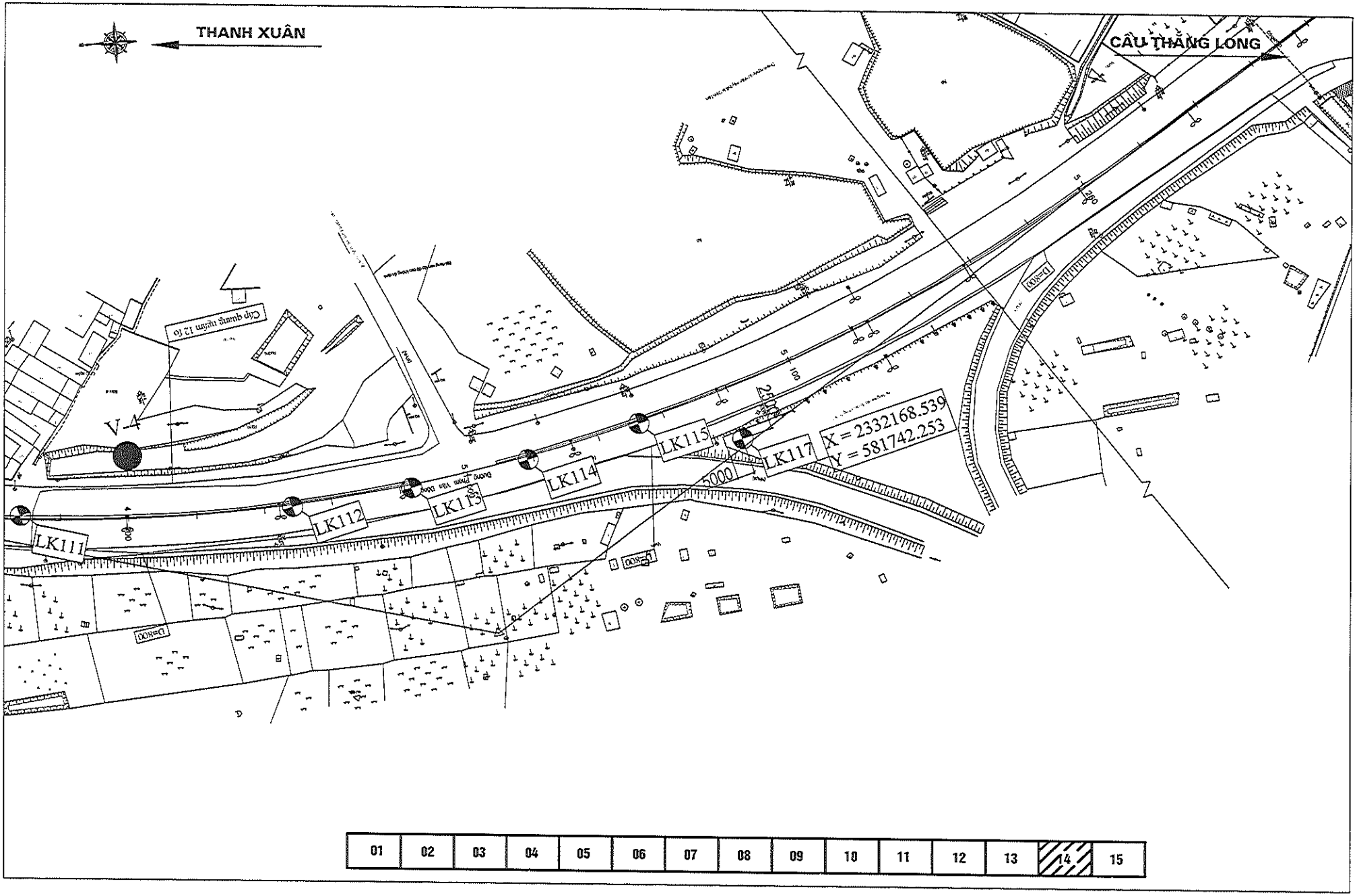
THANH XUÂN
CẦU THĂNG LONG
LK111
LK112
LK113
LK114
LK115
LK117
X = 2332168.539
Y = 581742.253
V-4
5000
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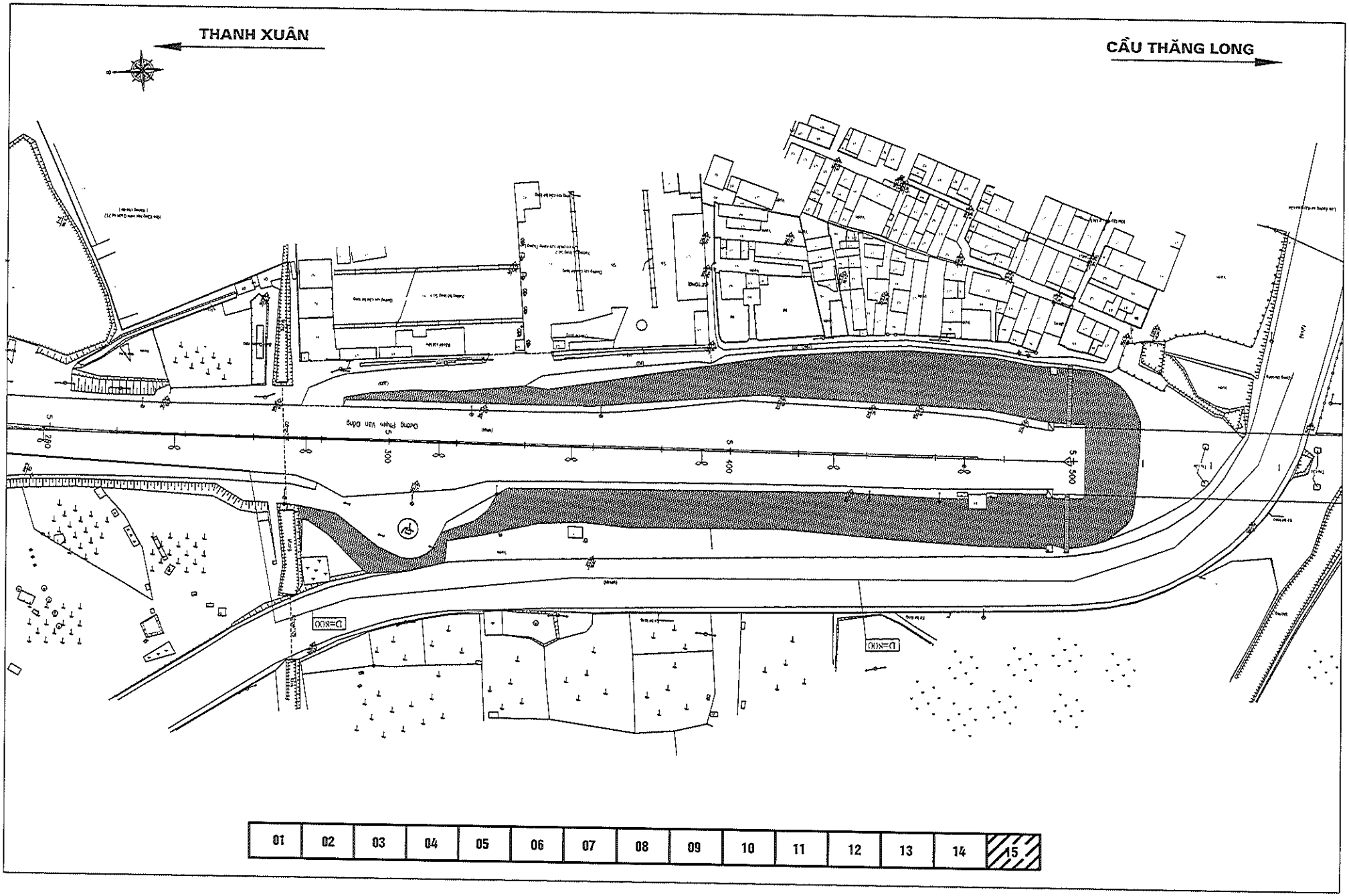
THANH XUÂN
CẦU THĂNG LONG
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Appendix 4: Form of site documents

BAN QUẢN LÝ DỰ ÁN THĂNG LONG - PROJECTS MANAGEMENT UNIT THANG LONG

Project: Hanoi City Ring Road No.3 Construction Project, Mai Dich – South Thang Long Section
Dự án: Dự án đầu tư xây dựng cầu cạn đoạn Mai Dịch - Nam Thăng Long thuộc đường vành đai III thành phố Hà Nội
Jont Venture Consultants (LD Tư vấn): NK-KE-NKV JV

Sub-Project/ hạng mục:
Ramp/ Nhánh:
Contractor/ Nhà thầu khảo sát: T&C

CHECKING RECORD OF EQUIPMENT AT SITE

(Biên bản kiểm tra máy móc thiết bị tại hiện trường)

Form/ Mẫu số:T&C-01/10

Works Item (Hạng mục KS): Drilling & Site testing / Khoan và TN hiện trường

Based on (Căn cứ): Working Plan for Geo. investigation/ Phương án kỹ thuật khảo sát địa chất

Location (Vị trí): At the site/ Tại hiện trường

Equipment/ Máy móc, thiết bị								
Mobilization Equipment/ Máy móc, thiết bị huy động				Actually Mobilized at Site/ thực tế huy động tại công trường				
No. STT	Equipment Type/ chủng loại máy	Unit Đơn vị	Quantity Số lượng	Correct type and Capacity Đúng chủng loại và công suất	Quantity Số lượng	Condition Tình trạng	Trial operation Chạy thử	Certificated Chứng nhận
1	Boring machine XY-1A/ Máy khoan XY-1A	Set/ bộ		Yes		Good	Good	x
2	Rod diameter 42mm/ Cần khoan Φ42	m		Yes		Good	Good	
3	Casing pipe Φ130/ Ống vách Φ 130	Pipe/ ống		Yes		Good		
4	Casing pipe Φ110/ Ống vách Φ 110	Pipe/ ống		Yes		Good		
5	Casing pipe Φ91/ Ống vách Φ 91	Pipe/ ống		Yes		Good		
6	SPT equipment/ Bộ thí nghiệm SPT	Set/ bộ		Yes		Good		
7	Sampling equipment/ Dụng cụ lấy mẫu	Set/ bộ		Yes		Good		
8	Thin walled samp. tupe/ Ống mẫu TM	Pipe/ ống		Yes				
9	Sampling tray/ Khay đựng mẫu	box		Yes		Good		
10	Camera/ Máy ảnh	machine		Yes		Good	Good	
11	Other tool/ Dụng cụ khác	LS		Yes		Good		

Remark (Nhận xét):.....

Acceptance (Nghiệm thu):.....

The Contractor (T&C)	*The Consultants (NK-KE-NKV JV)*	*The Employer (PMU THANG LONG)*
Date:.....	Date:.....	Date:.....

BAN QUẢN LÝ DỰ ÁN THĂNG LONG - PROJECTS MANAGEMENT UNIT THANG LONG

Project: Hanoi City Ring Road No.3 Construction Project, Mai Dich – South Thang Long Section
Dự án: Dự án đầu tư xây dựng cầu cạn đoạn Mai Dịch - Nam Thăng Long thuộc đường vành đai III thành phố Hà Nội
Jont Venture Consultants (LD Tư vấn): NK-KE-NKV JV

Sub-Project/ hạng mục:
Ramp/ Nhánh:
Contractor/ Nhà thầu khảo sát: T&C

CHECKING RECORD OF LABOUR AT SITE

(Biên bản kiểm tra nhân lực tại hiện trường)

Form/Mẫu số:T&C-02/10

Works Item (Hạng mục KS): Drilling & Site testing / Khoan và TN hiện trường
Location (Vị trí): At the site/ Tại hiện trường

Based on (Căn cứ): Working Plan for Geo. investigation/
Phương án kỹ thuật khảo sát địa chất

Labour (Nhân lực)							
Method Statements (Biện pháp thi công)			Actually Mobilized at Site (thực tế huy động tại công trường)				
No.	Position/ Labour trade (Chức vụ/ Nghề)	Quantity Số lượng	Full Name Họ và tên	Training Đào tạo	Employer Đơn vị sử dụng LĐ	Experiment (year) Kinh nghiệm (năm)	Note Ghi chú
I	Geological Manager			University	T&C		
II	Geo. engineer – Leader of Technical on ste			University	T&C		
III	Geo. engineer – Technical on site			University	T&C		
1				University	T&C		
2				University	T&C		
3				University	T&C		
4				University	T&C		
5				University	T&C		
6				University	T&C		
7				University	T&C		
8				University	T&C		
9				University	T&C		
10				University	T&C		
IV	Drilling worker			Worker	T&C		

Remark (Nhận xét):.....

Acceptance (Nghiệm thu):.....

The Contractor (T&C)	*The Consultants (NK-KE-NKV JV)*	*The Employer (PMU THANG LONG)*
Date:	Date:	Date: .....

Project: Hanoi City Ring Road No.3 Construction Project, Mai Dich – South Thang Long Section Dự án: Dự án đầu tư xây dựng cầu cạn đoạn Mai Dịch - Nam Thăng Long thuộc đường vành đai III thành phố Hà Nội Jont Venture Consultants (LD Tư vấn): NK-KE-NKV JV	Sub-Project/ hạng mục: Ramp/ Nhánh: Contractor/ Nhà thầu khảo sát: T&C

Form/Mẫu số: T&C-03/10

CHECKING ON LABORATORY TESTING LAS-XD910
(KIỂM TRA PHÒNG THÍ NGHIỆM LAS-XD910)

Checked object/ Đối tượng kiểm tra: Checking on Laboratory testing LAS-XD 910/ Kiểm tra phòng thí nghiệm LAS-XD 910

I. Theoretical points/ Cơ sở kiểm tra: Based on the Working Plan have been approved/ Căn cứ Phương án khảo sát địa chất được phê duyệt.

II. Participants/ Thành phần tham gia

1. **The Employer/ Chủ đầu tư: PMU Thang Long/ Ban QLDA Thăng Long**
   Mr./ Ông: ..... Position/ Chức vụ: .....
   Mr./ Ông: ..... Position/ Chức vụ: .....
2. **The Consultants/ Tư vấn: Joint Venture of NK-KE-NKV JV/ Liên danh tư vấn NK-KE-NKV JV**
   Mr./ Ông: ..... Position/ Chức vụ: .....
   Mr./ Ông: ..... Position/ Chức vụ: .....
3. **The Contractor/ Nhà thầu khảo sát: T&C**
   Mr./ Ông: ..... Position/ Chức vụ: .....
   Mr./ Ông: ..... Position/ Chức vụ: .....

III. Time and Place/ Thời gian và địa điểm

Start time/ Thời gian bắt đầu: Date (ngày):..... month (tháng)..... year (năm) 2015
End time/ Thời gian kết thúc: Date (ngày):..... month (tháng)..... year (năm) 2015
Location/ Địa điểm: LAS-XD 910 No. 16/28, lane 210-Hoang Quoc Viet-Cau Giay- Ha Noi/ Phòng thí nghiệm LAS-XD 910 số 16/28, ngõ 210, Hoàng Quốc Việt, Cầu Giấy, Hà Nội.

IV. Content/ Nội dung

- Establishment Decision of Laboratory No. 01/QĐ-STGC date 01/03/2010 of Trading Technology Construction JCS (T&C)/ Quyết định thành lập phòng thí nghiệm số 01/QĐ-STGC ngày 01/03/2010 của Công ty CP Dịch Vụ Thương Mại Công Nghệ và Xây Dựng (T&C).

- Approving Decision of execution capaty for the soil test and testing method No.161/QD-BXD date 21/04/2010 and No. 632/QD-BXD date 27/12/2010 of Ministry of Contruction/ Quyết định công nhận năng lực thực hiện các phép thử và phương pháp thử số 161/QD-BXD ngày 21/04/2010 và số 632/QD-BXD ngày 27/12/2010 của Bộ Xây Dựng.

- Decision of Laboratory testing Chief No. 02 /QĐ-STGC date 02/04/2010 of Director of Trading Technology Construction JCS (T&C)/ Quyết định bổ nhiệm Trưởng phòng Thí nghiệm số 01/QĐ-STGC ngày 02/04/2010 của Công ty CP Dịch Vụ Thương Mại Công Nghệ và Xây Dựng (T&C).

- Testing certificate of testing personal No. 6449/2010/VKH –TNXD 35/CN –TTĐT&TT, 03/2010/TTNCĐKT-MĐC 0083/2012/HVCBQLXD&ĐT, 6426/2010/VKH-TNXD, QĐ 14/2014/TNV, QĐ 14/2014/TNV, QĐ 14/2014/TNV, QĐ 14/2014/TNV, 1496/2006/VKH-TNXD, 38/09 TT NC ĐKT- ĐHMĐC, 20/09 TT NCĐKT- ĐHMĐC, 15/09 TT NCĐKT-ĐHMĐC, 329/2003/VKH-TNXD, 6425/2010/VKH –TNXD Chứng chỉ nghề của các thí nghiệm viên số 6449/2010/VKH –TNXD 35/CN –TTĐT&TT, 03/2010/TTNCĐKT-MĐC

0083/2012/HVCBQLXD&ĐT, 6426/2010/VKH-TNXD, QĐ 14/2014/TNV, QĐ 14/2014/TNV, QĐ 14/2014/TNV, QĐ 14/2014/TNV, 1496/2006/VKH-TNXD, 38/09 TT NC ĐKT- ĐHMĐC, 20/09 TT NCĐKT- ĐHMĐC, 15/09 TT NCĐKT- ĐHMĐC, 329/2003/VKH-TNXD, 6425/2010/VKH –TNXD

- Testing equipments/ Thiết bị thí nghiệm:

Name of Equipments/ ***Tên thiết bị***	**Unit** ***Đơn vị***	**Quantity** ***Số lượng***
+ Practicle size & Hydrometer/ Bộ rây và tỷ trọng kế	Set/ bộ	3
+ Moisure content equipment/ Bộ thí nghiệm độ ẩm	Set/ bộ	L.S
+ Atterberg limits Cassagrande/ Bộ thí nghiệm chảy dẻo Cassgrande	Set/ bộ	3
+ Direct shear test/ Máy cắt phẳng	Set/ bộ	2
+ Consolidation test / Máy nén cố kết	Set/ bộ	24
+ Oedometer test/ Máy nén nhanh	Set/ bộ	24
+ Triaxial compression test (ELE)/ Máy nén 3 trục (ELE)	Set/ bộ	1
+ Unconfined compression test / Máy thí nghiệm nén nở hông	Set/ bộ	1
+ Permeability meter for clayey soil/ Bộ thí nghiệm thấm cho đất	Set/ bộ	1
+ Standard and Modified compaction test apparatus (rammer and mould)/ Bộ thí nghiệm đầm nén tiêu chuẩn	Set/ bộ	2
+ And other equipment / Một số thiết bị khác:	L.S	-

V. Conclusion/ Kết luận:

- Personnel, laboratory equipments and testing guarantee exactly to the decision and certificated/ Nhân sự, thiết bị thí nghiệm và các phương pháp thử đảm bảo đầy đủ, chính xác theo các quyết định và giấy chứng nhận kiểm định.

- Approving laboratory LAS-XD 910 for testing experiment samples for the Project/ Chấp thuận phòng thí nghiệm LAS-XD 910 thí nghiệm mẫu cho dự án.

This report is made in ... originals and each party keeps one with the same meaning and valid/ Biên bản đã được lập thành.... bản, mỗi bên giữ 01 bản có giá trị như nhau.

The Contractor (T&C)	**The Consultants (NK-KE-NKV JV)**	**The Employer (PMU THANG LONG)**
Date (Ngày):	Date (Ngày):	Date (Ngày):.....

BAN QUẢN LÝ DỰ ÁN THĂNG LONG-PROJECT MANAGEMENT UNIT`

Project: Hanoi City Ring Road No.3 Construction Project, Mai Dich – South Thang Long Section Dự án: Dự án đầu tư xây dựng cầu cạn đoạn Mai Dịch - Nam Thăng Long thuộc đường vành đai III thành phố Hà Nội Jont Venture Consultants (LD Tư vấn): NK-KE-NKV JV	Sub-Project/ hạng mục: Ramp/ Nhánh: Contractor/ Nhà thầu khảo sát: T&C

Form/Mẫu số: T&C-04/10

LOCATING CO-ORDINATE OF BOREHOLES (TOẠ ĐỘ VỊ TRÍ LỖ KHOAN)

Checked object/ Đối tượng kiểm tra: Co-ordinate of boreholes/ Tọa độ các lỗ khoan:

.....

I. Theoretical points/ Cơ sở kiểm tra: Based on the co-ordinate of boreholes as Working Plan have been approved/ Căn cứ tọa độ lỗ khoan theo Phương án khảo sát địa chất được phê duyệt.

II. Participants/ Thành phần tham gia

1. **The Employer/ Chủ đầu tư: PMU Thang Long/ Ban QLDA Thăng Long**
   Mr./ Ông: ..... Position/ Chức vụ: .....
   Mr./ Ông: ..... Position/ Chức vụ: .....
2. **The Consultants/ Tư vấn: Joint Venture of NK-KE-NKV JV / Liên danh tư vấn NK-KE-NKV JV**
   Mr./ Ông: ..... Position/ Chức vụ: .....
   Mr./ Ông: ..... Position/ Chức vụ: .....
3. **The Contractor/ Nhà thầu khảo sát: T&C**
   Mr./ Ông: ..... Position/ Chức vụ: .....
   Mr./ Ông: ..... Position/ Chức vụ: .....

III. Time and Place/ Thời gian và địa điểm

Start time/ Thời gian bắt đầu: Date (ngày):..... month (tháng)..... year (năm) 2015
End time/ Thời gian kết thúc: Date (ngày):..... month (tháng)..... year (năm) 2015
At location/ Tại vị trí: .....

IV. Content/ Nội dung

Checking the co-ordinate of boreholes/ Kiểm tra tọa độ các lỗ khoan.

V. Result/ Kết quả

No STT	*Bore No. Lỗ khoan*	*Coordinate/ Tọa độ*			
			Design/ Thiết kế	*Actual/ Thực tế*	*Tolerance/ Dung sai*
01		X			
		Y			
		Z			
02		X			
		Y			
		Z			

VI. Conclusions: This document agreed by above participants, made ..... editions which has the same value and each participant takes one copy/ Biên bản được thống nhất giữa các bên tham gia và được lập thành ..... bản có giá trị như nhau, mỗi bên giữ 1 bản.

The Contractor (T&C)	The Consultants (NK-KE-NKV JV)	The Employer (PMU THANG LONG)
Date (Ngày):	Date (Ngày):	Date (Ngày):.....

PLAN LOCATION OF BOREHOLE

SƠ HỌA VỊ TRÍ LỖ KHOAN

(BOREHOLE - LỖ KHOAN .....)

INSPECTION SHEET FOR BORING LOG - PHIẾU KIỂM TRA LỖ KHOAN

Hanoi City Ring Road No.3 Construction Project, Mai Dich – South Thang Long Section

Dự án đầu tư xây dựng cầu cạn đoạn Mai Dịch - Nam Thăng Long thuộc đường vành đai III thành phố Hà Nội

STAGE : DETAILED DESIGN - GIAI ĐOẠN : THIẾT KẾ KỸ THUẬT

NAME BOREHOLE - TÊN LỖ KHOAN :.....

HA NOI/ 2015

BAN QUẢN LÝ DỰ ÁN THĂNG LONG - PROJECTS MANAGEMENT UNIT THANG LONG

Project: Hanoi City Ring Road No.3 Construction Project, Mai Dich – South Thang Long Section
Dự án: Dự án đầu tư xây dựng cầu cạn đoạn Mai Dịch - Nam Thăng Long thuộc đường vành đai III thành phố Hà Nội
Jont Venture Consultants (LD Tư vấn): NK-KE-NKV JV

Sub-Project/ hạng mục:
Ramp/ Nhánh:
Contractor/ Nhà thầu khảo sát: T&C

BOREHOLE RECORD (NHẬT KÝ HÓ KHOAN ĐỊA CHẤT CÔNG TRÌNH)

Works Item (Hạng mục KS): Drilling & Site testing / Khoan và TN hiện trường
Bore-hole (Lỗ khoan): .....
Coordinate (Tọa độ): X = ... Y = ...
Elevation (Cao độ): .....
Terminated depth (Chiều sâu kết thúc lỗ khoan): .....

Started date (Ngày bắt đầu): .....
Finished date (Ngày kết thúc): .....
Underground Water (Mức nước ngầm): .....
Technician (Cán bộ kỹ thuật hiện trường): .....
Sheet: ...../..... Form/Mẫu số:T&C-05/10

Time (Thời gian làm việc)		Description Tên công việc, đặc điểm trong các hiệp khoan (Tốc độ khoan, dung dịch, mùn khoan)	Chiều dài hiệp khoan		Layer (Thứ tự lớp)	Depth of bottom layer (Độ sâu đáy lớp)	Thicknes s layer (bề dày lớp)	Borehole (hình trụ lỗ khoan)	Description (Mô tả địa tầng)	SPT					Sample (Mẫu thí nghiệm)	
From	To		From	To						Depth	N1	N2	N3	N	Symbol (K.hiệu)	Depth Độ sâu (m)

The Contractor (T&C)	*The Consultants (NK-KE-NKV JV)*	*The Employer (PMU THANG LONG)*
Date/ ngày:	Date/ ngày:	Date/ ngày: .....

BAN QUẢN LÝ DỰ ÁN THĂNG LONG-PROJECT MANAGEMENT UNIT

Project: Hanoi City Ring Road No.3 Construction Project, Mai Dich – South Thang Long Section Dự án: Dự án đầu tư xây dựng cầu cạn đoạn Mai Dịch - Nam Thăng Long thuộc đường vành đai III thành phố Hà Nội Jont Venture Consultants (LD Tư vấn): NK-KE-NKV JV	Sub-Project/ hạng mục: Ramp/ Nhánh: Contractor/ Nhà thầu khảo sát: T&C

Mẫu số: T&C-06/10

TAKING SAMPLES AND TRANSPORT TO LABORATORY
(BIÊN BẢN NGHIỆM THU MẪU VÀ CHUYỂN TỚI PHÒNG THÍ NGHIỆM)

Checked object/ Đối tượng kiểm tra: Soil samples of borehole/ Mẫu đất của lỗ khoan:.....

I. Theoretical points/ Cơ sở kiểm tra: Based on the co-ordinate of boreholes as Working Plan have been approved/ Căn cứ tọa độ lỗ khoan theo Phương án khảo sát địa chất được phê duyệt.

II. Participants/ Thành phần tham gia

1. **The Employer/ Chủ đầu tư: PMU Thang Long/ Ban QLDA Thăng Long**
   Mr./ Ông: ..... Position/ Chức vụ: .....
   Mr./ Ông: ..... Position/ Chức vụ: .....
2. **The Consultants/ Tư vấn: Joint Venture of NK-KE-NKV JV / Liên danh tư vấn NK-KE-NKV JV**
   Mr./ Ông: ..... Position/ Chức vụ: .....
   Mr./ Ông: ..... Position/ Chức vụ: .....
3. **The Contractor/ Nhà thầu khảo sát: T&C**
   Mr./ Ông: ..... Position/ Chức vụ: .....
   Mr./ Ông: ..... Position/ Chức vụ: .....

III. Time and Place/ Thời gian và địa điểm

Start time/ Thời gian bắt đầu: Date (ngày):..... month (tháng)..... year (năm) 2015
End time/ Thời gian kết thúc: Date (ngày):..... month (tháng)..... year (năm) 2015
At location/ Tại vị trí: .....

IV. Content/ Nội dung

Checking the quality and quantity of soil samples from the boreholes, taking to the Laboratory/ Kiểm tra số lượng, chất lượng mẫu đất lấy tại lỗ khoan để làm thí nghiệm trong phòng.

V. Result/ Kết quả

No. STT	Borehole No./ Lỗ khoan	Quantity/ Khối lượng		
		Undisturbed Sample/ Mẫu nguyên dạng	Disturbed Sample/ Mẫu phá hủy	Total/ Tổng cộng

VI. Conclusions/ Kết luận:

Taking sample, packaging, maintaining and moving to Laboratory were accomplished in the right way in according to the Working plan/ Công tác lấy mẫu, bao gói, bảo quản và vận chuyển mẫu tới phòng thí nghiệmtuân thủ theo đúng Phương án kỹ thuật khảo sát địa chất.

This document agreed by above participants, made ..... editions which has the same value and each participant takes one copy/ Biên bản được thống nhất giữa các bên tham gia và được lập thành ..... bản có giá trị như nhau, mỗi bên giữ 1 bản.

The Contractor (T&C)	The Consultants (NK-KE-NKV JV)	The Employer (PMU THANG LONG)
Date (Ngày):	Date (Ngày):	Date (Ngày):.....

Project: Hanoi City Ring Road No.3 Construction Project, Mai Dich – South Thang Long Section Dự án: Dự án Dự án đầu tư xây dựng cầu cạn đoạn Mai Dịch - Nam Thăng Long thuộc đường vành đai III thành phố Hà Nội Jont Venture Consultants (LD Tư vấn): NK-KE-NKV JV	Sub-Project/ hạng mục: Ramp/ Nhánh: Contractor/ Nhà thầu khảo sát: T&C

Form/Mẫu số: T&C-07/10

CHECKING AND FILLING UP THE BOREHOLES
(BIÊN BẢN NGHIỆM THU LẤP LỖ KHOAN)

Checked object/ Đối tượng kiểm tra: Filling up the boreholes/ Lấp lỗ khoan số: .....

I. Theoretical points/ Cơ sở kiểm tra: Based on the co-ordinate of boreholes as Working Plan have been approved/ Căn cứ tọa độ lỗ khoan theo Phương án khảo sát địa chất được phê duyệt.

II. Participants/ Thành phần tham gia

1. **The Employer/ Chủ đầu tư: PMU Thang Long/ Ban QLDA Thăng Long**
   Mr./ Ông: ..... Position/ Chức vụ: .....
   Mr./ Ông: ..... Position/ Chức vụ: .....
2. **The Consultants/ Tư vấn: Joint Venture of NK-KE-NKV JV / Liên danh tư vấn NK-KE-NKV JV**
   Mr./ Ông: ..... Position/ Chức vụ: .....
   Mr./ Ông: ..... Position/ Chức vụ: .....
3. **The Contractor/ Nhà thầu khảo sát: T&C**
   Mr./ Ông: ..... Position/ Chức vụ: .....
   Mr./ Ông: ..... Position/ Chức vụ: .....

III. Time and Place/ Thời gian và địa điểm

Start time/ Thời gian bắt đầu: Date (ngày):..... month (tháng)..... year (năm) 2015
End time/ Thời gian kết thúc: Date (ngày):..... month (tháng)..... year (năm) 2015
At location/ Tại vị trí:.....

IV. Content/ Nội dung

Checking and Filling up boreholes number/ Kiểm tra và lấp lỗ khoan số:.....

V. Conclusions/ Kết luận:

Filling up the boreholes was accomplished in the right way in according to Working plan/ Công tác lấp lỗ khoan tuân thủ theo đúng yêu cầu quy định trong Phương án kỹ thuật khảo sát.

This This document agreed by above participants, made ..... editions which has the same value and each participant takes one copy/ Biên bản được thống nhất giữa các bên tham gia và được lập thành ..... bản có giá trị như nhau, mỗi bên giữ 1 bản.

The Contractor (T&C)	The Consultants (NK-KE-NKV JV)	The Employer (PMU THANG LONG)
Date (Ngày):	Date (Ngày):	Date (Ngày):.....

BAN QUẢN LÝ DỰ ÁN THĂNG LONG-PROJECT MANAGEMENT UNIT

Project: Hanoi City Ring Road No.3 Construction Project, Mai Dich – South Thang Long Section Dự án: Dự án đầu tư xây dựng cầu cạn đoạn Mai Dịch - Nam Thăng Long thuộc đường vành đai III thành phố Hà Nội Jont Venture Consultants (LD Tư vấn): NK-KE-NKV JV	Sub-Project/ hạng mục: Ramp/ Nhánh: Contractor/ Nhà thầu khảo sát: T&C

COMPLETED WORK QUANTITY CONFIRMATION RECORD
(BIÊN BẢN XÁC NHẬN KHỐI LƯỢNG)

Form/Mẫu số: T&C-08/10

I. Theoretical points/ Cơ sở kiểm tra: Based on the Working Plan have been approved/ Căn cứ Phương án khảo sát địa chất được phê duyệt.

II. Participants/ Thành phần tham gia

1. **The Employer/ Chủ đầu tư: PMU Thang Long/ Ban QLDA Thăng Long**
   Mr./ Ông: ..... Position/ Chức vụ: .....
   Mr./ Ông: ..... Position/ Chức vụ: .....
2. **The Consultants/ Tư vấn: Joint Venture of NK-KE-NKV JV / Liên danh tư vấn NK-KE-NKV JV**
   Mr./ Ông: ..... Position/ Chức vụ: .....
   Mr./ Ông: ..... Position/ Chức vụ: .....
3. **The Contractor/ Nhà thầu khảo sát: T&C**
   Mr./ Ông: ..... Position/ Chức vụ: .....
   Mr./ Ông: ..... Position/ Chức vụ: .....

III. Time and Place/ Thời gian và địa điểm

Start time/ Thời gian bắt đầu: Date (ngày):..... month (tháng)..... year (năm) 2015
End time/ Thời gian kết thúc: Date (ngày):..... month (tháng)..... year (năm) 2015
At location/ Tại vị trí:.....

IV. Content/ Nội dung

We have entirely agreed on the following completed work quantity/ Đã cùng nhau thống nhất khối lượng công việc hoàn thành như sau:

1/ Technical scope/Nhận xét về kỹ thuật:

.....
.....

2/ Completed work quantity/ Về khối lượng

Total drilling length/ Tổng chiều dài: *m*
On Shore/ Trên cạn ☐ *Off Shorer/ Dưới nước* ☐

+/ Drilling work/Khoan :
- Soil/ Đất (I-III) *m*
- Gravel/ Cuội (IV-VI): *m*

+/ Standard Penetration Test (SPT)/Thí nghiệm xuyên tiêu chuẩn
- Soil/ Đất (I-III) *times/Lần*
- Gravel/ Cuội (IV-VI): *times/Lần*

+/ Samples/Mẫu
- Undisturbed Sample / Mẫu nguyên dạng: samples/ *mẫu*
- Disturbed Sample / Mẫu không nguyên dạng: samples/ *mẫu*
- Water/Nước: samples/*mẫu*

This report is made in ... originals and each party keeps one with the same meaning and valid/ Biên bản đã được lập thành.... bản, mỗi bên giữ 01 bản có giá trị như nhau.

The Contractor (T&C)	The Consultants (NK-KE-NKV JV)	The Employer (PMU THANG LONG)
Date (Ngày):	Date (Ngày):	Date (Ngày): .....

Jont Venture Consultants (LD Tư vấn): NK-KE-NKV JV

Contractor/ Nhà thầu khảo sát: T&C

REQUEST TESTING AT LABORATORY/ YÊU CẦU THÍ NGHIỆM TRONG PHÒNG

Works Item (Hạng mục KS): Drilling & Site testing / Khoan và TN hiện trường

Form/Mẫu số: T&C-09/10

Request date/ Ngày yêu cầu: .....

Completion date/ Ngày kết thúc: .....

No	Borehole No. Lỗ khoan	Sample No. Ký hiệu mẫu	Depth of sample Độ sâu lấy mẫu (m)	Grain size Thành phần hạt	Natural Moiture content Độ ẩm tự nhiên	Natural density Khối lượng thể tích	Specific gravity Khối lượng riêng	Liquid limit Giới hạn chảy	Plastic limit Giới hạn dẻo	Compression test Thí nghiệm nén (a)	Direc shear test Cắt phẳng	Uncofined comp. test Nén 1 trục nở hông (qu)	Triaxial Comp. Test Nén ba trục (CU)	Triaxial Comp. Test Nén ba trục (UU)	Angle of repose for sand Góc nghỉ cho cát	Void ratio for sand Hệ số rỗng cho cát	Organic content Hàm lượng hữu cơ	Classification of Phân loại đất theo TCVN5747-1993	Note Ghi chú
1																			
2																			
3																			
4																			
5																			
6																			
7																			
8																			
9																			
10																			
11																			
12																			
13																			
14																			
15																			
16																			

The Contractor (T&C)	*The Consultants (NK-KE-NKV JV)*	*The Employer (PMU THANG LONG)*
Date (ngày):.....	Date (ngày):.....	Date (ngày):.....

BAN QUẢN LÝ DỰ ÁN THĂNG LONG-PROJECT MANAGEMENT UNIT

Project: Hanoi City Ring Road No.3 Construction Project, Mai Dich – South Thang Long Section Dự án: Dự án đầu tư xây dựng cầu cạn đoạn Mai Dịch - Nam Thăng Long thuộc đường vành đai III thành phố Hà Nội Jont Venture Consultants (LD Tư vấn): NK-KE-NKV JV	Sub-Project/ hạng mục: Ramp/ Nhánh: Contractor/ Nhà thầu khảo sát: T&C

ACCEPTANCE FOR COMPONENT QUANTITIES OF SOIL INVESTIGATION AT THE SITE
(NGHIỆM THU KHỐI LƯỢNG HOÀN THÀNH CÔNG TÁC KHẢO SÁT NGOÀI HIỆN TRƯỜNG)

Form/Mẫu số: T&C-10/10

Đối tượng nghiệm thu/ Acceptance Subjects: Drilling, sampling and field test/ Khoan, lấy mẫu và thí nghiệm hiện trường
Item/ Hạng mục: Bridge on the Intersection/ Cầu nút giao
Giai đoạn: Thiết kế kỹ thuật/ Stage: Detailed design

I. Theoretical points/ Cơ sở kiểm tra: Based on the Working Plan have been approved/ Căn cứ Phương án khảo sát địa chất được phê duyệt.

II. Participants/ Thành phần tham gia

1. **The Employer/ Chủ đầu tư: PMU Thang Long/ Ban QLDA Thăng Long**
   Mr./ Ông: ..... Position/ Chức vụ: .....
   Mr./ Ông: ..... Position/ Chức vụ: .....
2. **The Consultants/ Tư vấn:** Joint Venture of NK-KE-NKV JV / Liên danh tư vấn NK-KE-NKV JV
   Mr./ Ông: ..... Position/ Chức vụ: .....
   Mr./ Ông: ..... Position/ Chức vụ: .....
3. **The Contractor/ Nhà thầu khảo sát: T&C**
   Mr./ Ông: ..... Position/ Chức vụ: .....
   Mr./ Ông: ..... Position/ Chức vụ: .....

III. Time and Place/ Thời gian và địa điểm

Start time/ Thời gian bắt đầu: Date (ngày):..... month (tháng)..... year (năm) 2015
End time/ Thời gian kết thúc: Date (ngày):..... month (tháng)..... year (năm) 2015
At location/ Tại vị trí:.....

IV. Content/ Nội dung

We have entirely agreed on the following completed work quantity for Bridge Item/ Đã cùng nhau thống nhất khối lượng công việc hoàn thành cho Hạng mục cầu trong nút giao như sau:

1/ Technical scope/Nhận xét về kỹ thuật:

.....
.....

2/ Completed work quantity/ Về khối lượng

Total drilling length/ Tổng chiều dài: *m*
On Shore/ Trên cạn ☐ *Off Shorer/ Dưới nước* ☐

+/ Drilling work/Khoan :
- Soil/ Đất (I-III) *m*
- Gravel/ Cuội (IV-VI): *m*

+/ Standard Penetration Test (SPT)/Thí nghiệm xuyên tiêu chuẩn
- Soil/ Đất (I-III) *times/Lần*
- Gravel/ Cuội (IV-VI): *times/Lần*

+/ Samples/Mẫu
- Undisturbed Sample / Mẫu nguyên dạng: samples/ *mẫu*
- Disturbed Sample / Mẫu không nguyên dạng: samples/ *mẫu*
- Water/Nước: samples/*mẫu*

This report is made in ... originals and each party keeps one with the same meaning and valid/ Biên bản đã được lập thành.... bản, mỗi bên giữ 01 bản có giá trị như nhau.

The Contractor (T&C)	The Consultants (NK-KE-NKV JV)	The Employer (PMU THANG LONG)
Date (Ngày):	Date (Ngày):	Date (Ngày):.....

PHIẾU MẪU

Dự án đầu tư xây dựng cầu cạn đoạn Mai Dịch - Nam Thăng Long thuộc đường vành đai III TP. Hà Nội

Lỗ khoan:.................... Tên mẫu: .... Độ sâu (m):..................
Mô tả:...
....
Ngày:........................ Người lấy mẫu: ....

SAMPLE TICKET

Hanoi City Ring Road No.3 Construction Project
Mai Dich – South Thang Long Section

Borehole:.................... Sample No.: .... Depth (m):..................
Description:...
....
Date:........................ Sampling by: ....

PHIẾU MẪU

Dự án đầu tư xây dựng cầu cạn đoạn Mai Dịch - Nam Thăng Long thuộc đường vành đai III TP. Hà Nội

Lỗ khoan:.................... Tên mẫu: .... Độ sâu (m):..................
Mô tả:...
....
Ngày:........................ Người lấy mẫu: ....

SAMPLE TICKET

Hanoi City Ring Road No.3 Construction Project
Mai Dich – South Thang Long Section

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Description:...
....
Date:........................ Sampling by: ....

PHIẾU MẪU

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Mô tả:...
....
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Hanoi City Ring Road No.3 Construction Project
Mai Dich – South Thang Long Section

Borehole:.................... Sample No.: .... Depth (m):..................
Description:...
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PHIẾU MẪU

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PHIẾU MẪU

Dự án đầu tư xây dựng cầu cạn đoạn Mai Dịch - Nam Thăng Long thuộc đường vành đai III TP. Hà Nội

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