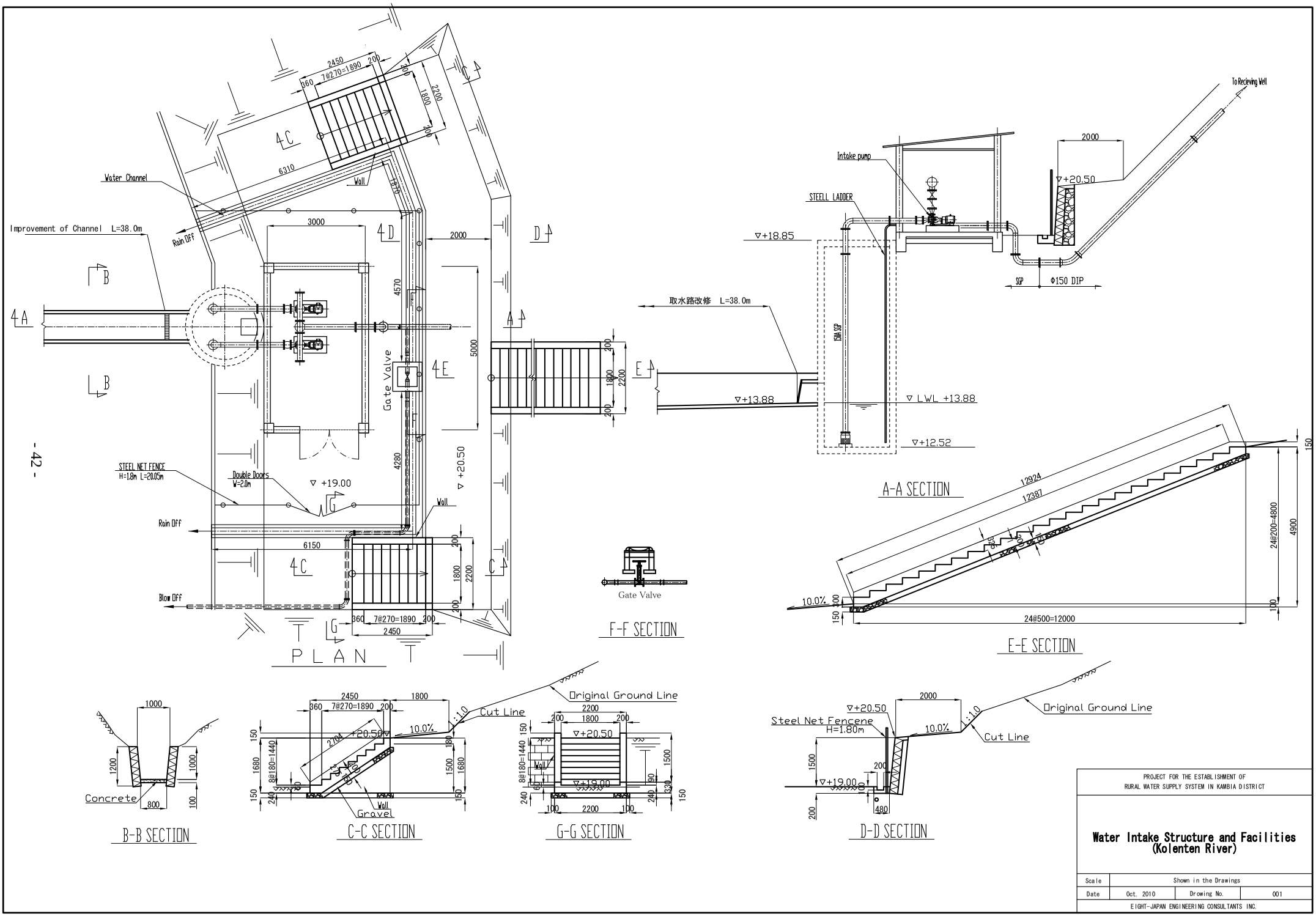
2-2-3 Outline Design Drawing

Outline design drawings of the Project consist of the followings:

Drawing No.	Title
001	Water Intake Structure and Facilities (Kolenten River)
002	Water Intake Structure and Facilities (Swamp)
003	Raw Water Conveyance Pipe Plan (Kolenten River - Water Treatment Plant)
004	Raw Water Conveyance Pipe Plan (Swamp - Water Treatment Plant)
005	Water Treatment Plant General Layout
006	Water Treatment Plant Hydraulic Profile
007	Water Treatment Plant Flow Diagram
008 - 010	Plain Sedimentation Basin Structure
011 - 012	Plain Sedimentation Basin Facilities
013 - 014	Slow Sand Filter Structure
015 - 016	Slow Sand Filter Facilities
017	Clear Water Reservoir Structure
018	Clear Water Reservoir Facilities
019	Sand Wash and Dry Structure and Facilities
020	Sludge and Drainage Basin Structure and Facilities
021	Water Treatment Plant Electric Feeder Plan
022	Control Board
023 - 025	Water Transmission Pipe Plan (Water Treatment Plant - Elevated Tank)
026 - 074	Water Distribution Pipe Plan
075	Water Distribution Pipe Typical Cross Section
076	Water Distribution Pipe Valve Box Details
077	Water Distribution Pipe River Crossing
078	Water Distribution Pipe Existing Structure Crossing
079	Public Tap and Private Connection Structure and Facilities
080	Pump House
081	Generator House
082	Store House
083 - 084	Staff Quarter 1
085 - 086	Staff Quarter 2

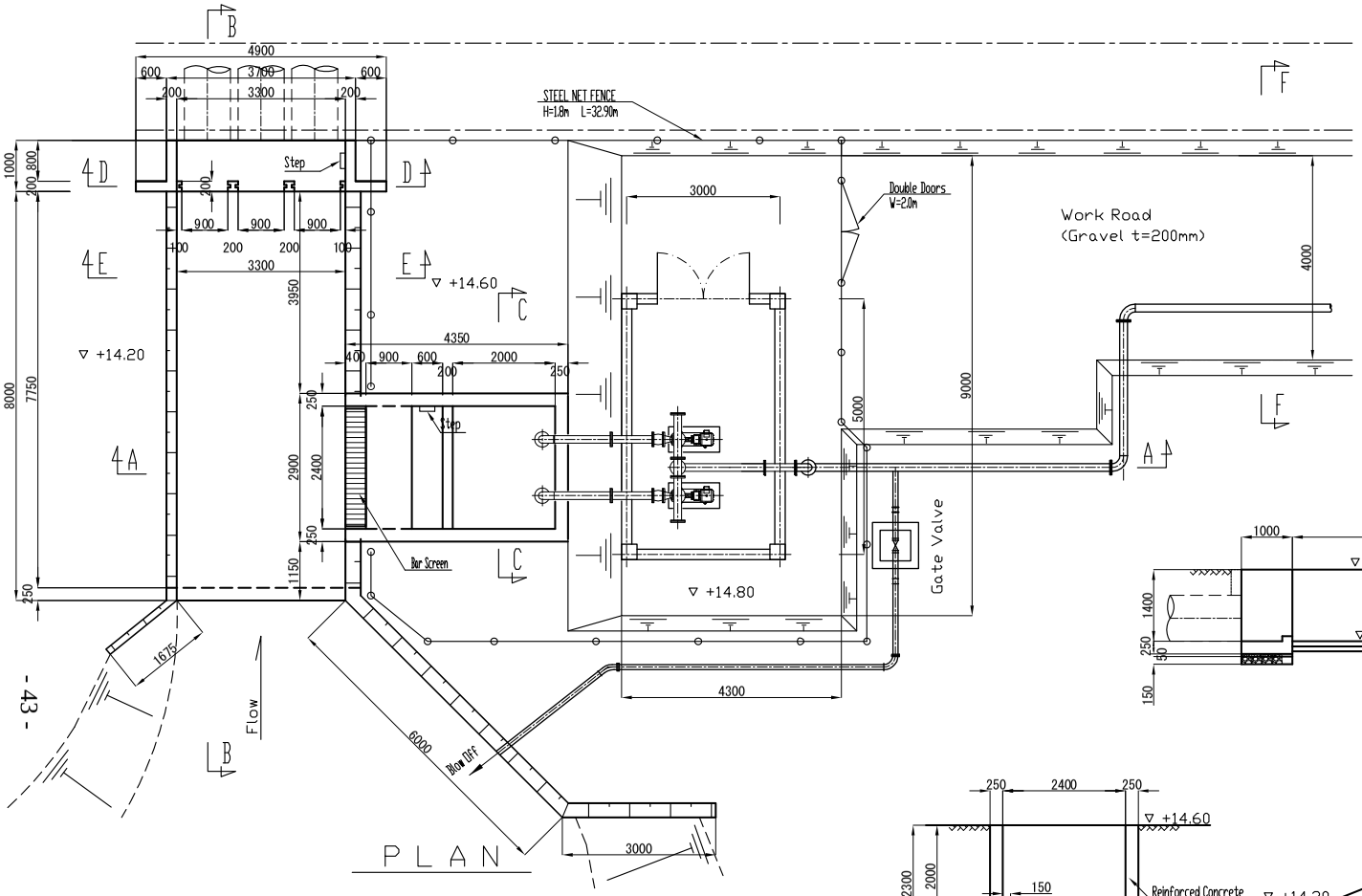


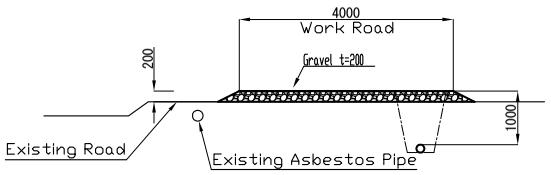
PROJECT FOR THE ESTABLISHMENT OF
RURAL WATER SUPPLY SYSTEM IN KAMBIA DISTRICT

Water Intake Structure and Facilities (Kolenten River)

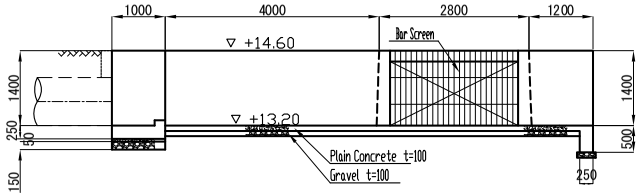
Scale	Shown in the Drawings		
Date	Oct. 2010	Drowing No.	001

EIGHT-JAPAN ENGINEERING CONSULTANTS INC.

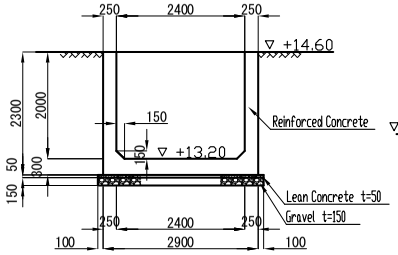




F-F SECTION
Typical Cross Section of Construction Road

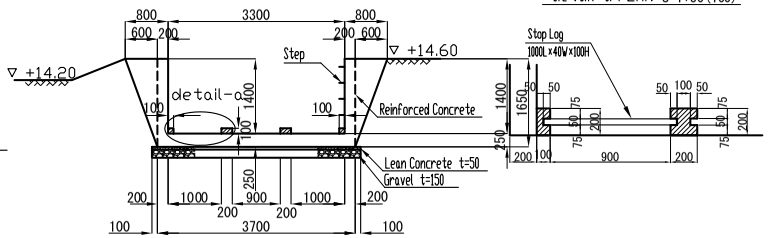


B-B SECTION

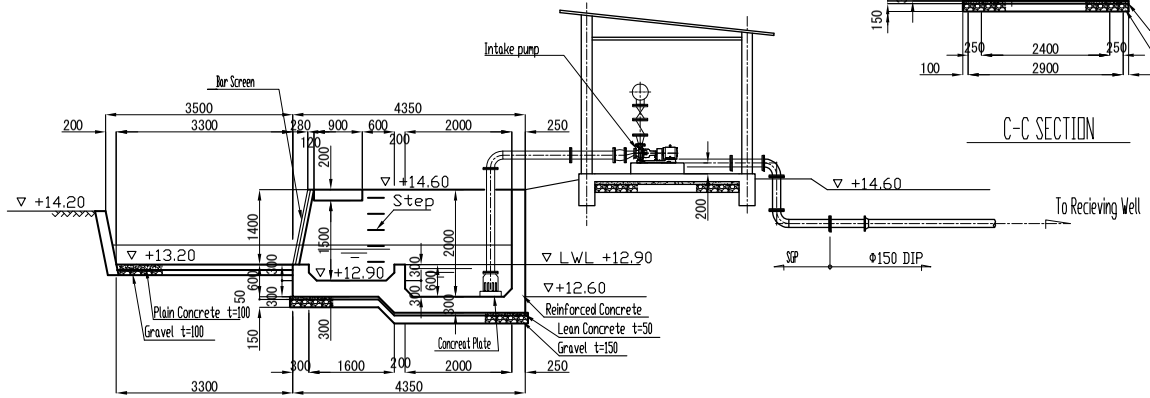


C-C SECTION

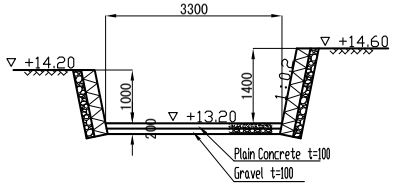
detail-a PLAN S=1:50(100)



D-D SECTION



A-A SECTION



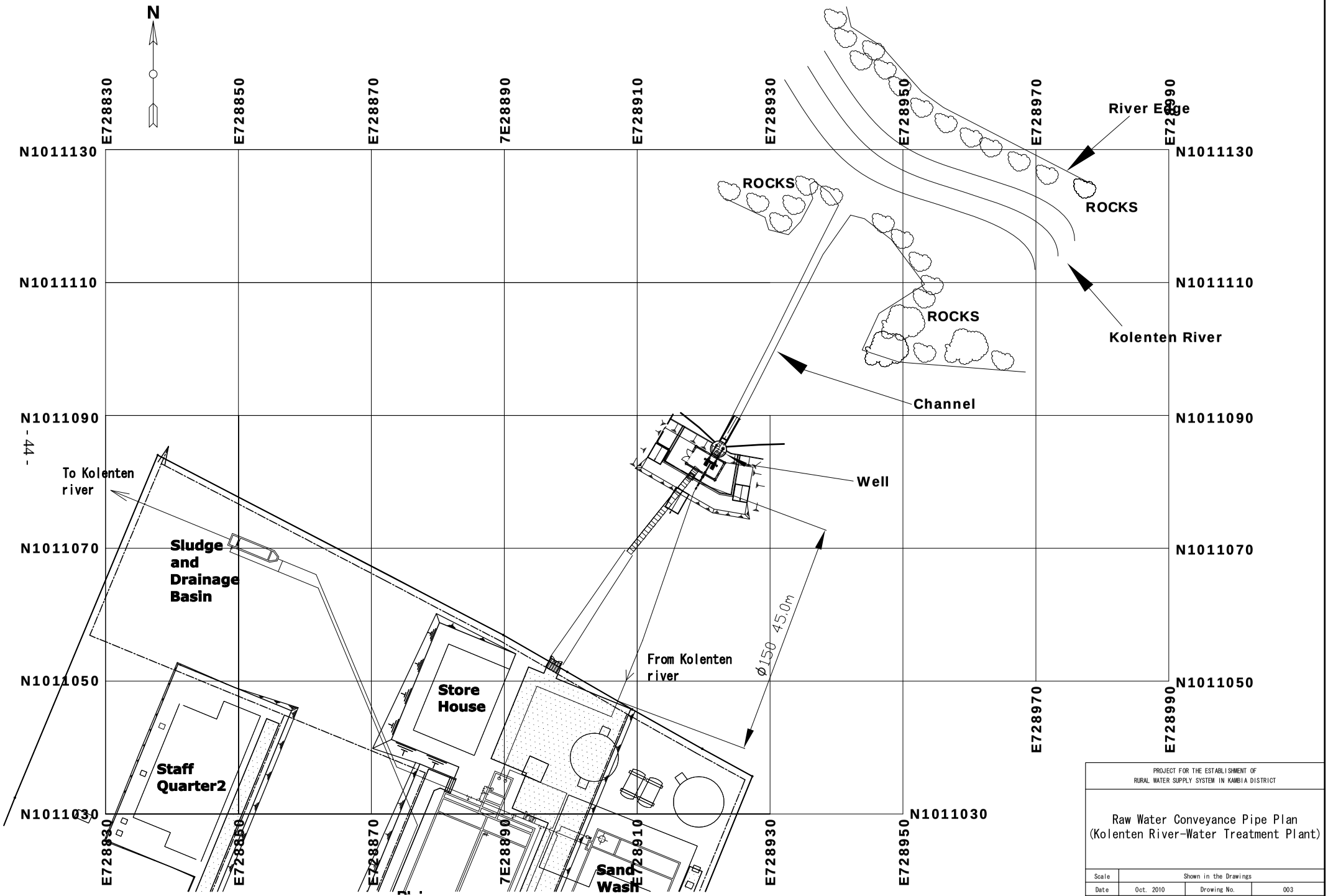
E-E SECTION

PROJECT FOR THE ESTABLISHMENT OF
RURAL WATER SUPPLY SYSTEM IN KAMBIA DISTRICT

Water Intake Structure and Facilities (Swamp)

Scale	Shown in the Drawings		
Date	Oct. 2010	Drowing No.	002

EIGHT-JAPAN ENGINEERING CONSULTANTS INC.



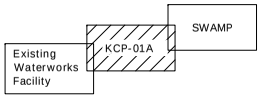
PROJECT FOR THE ESTABLISHMENT OF
RURAL WATER SUPPLY SYSTEM IN KAMBIA DISTRICT

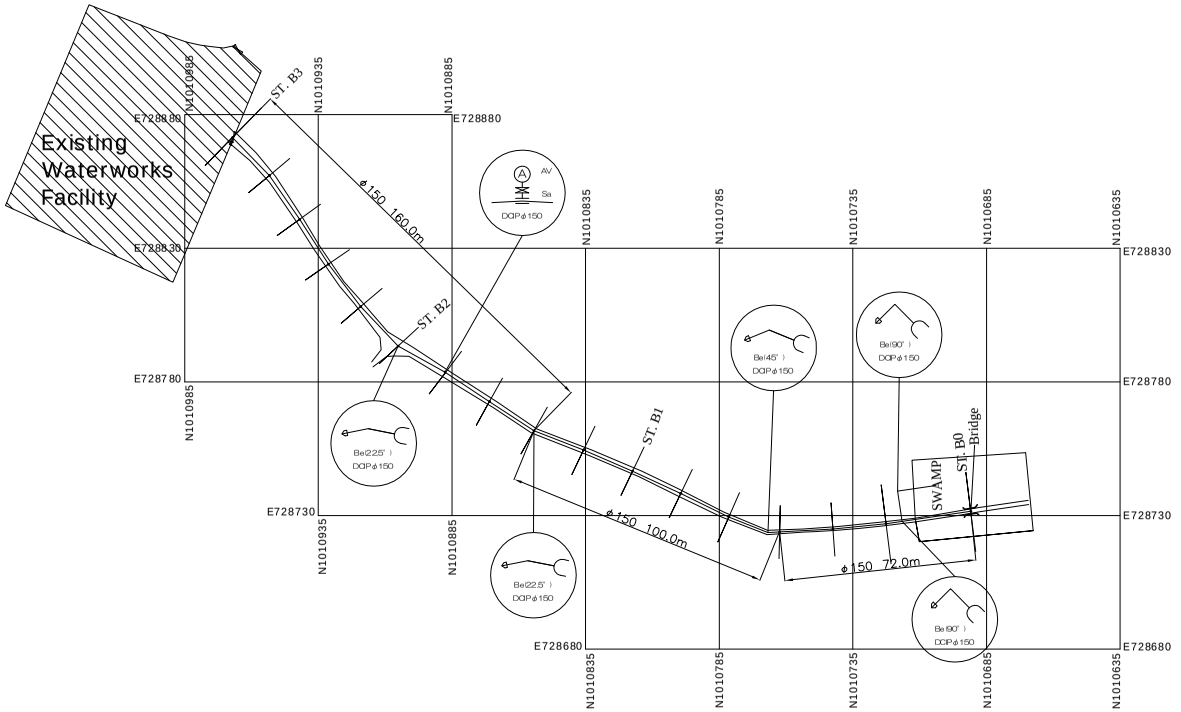
Raw Water Conveyance Pipe Plan
(Kolenten River-Water Treatment Plant)

Scale	Shown in the Drawings		
Date	Oct. 2010	Drowing No.	003

EIGHT-JAPAN ENGINEERING CONSULTANTS INC.

KEY PLAN





LEGEND			
PVC	Vinyl Pipe	Be	Bend
DCIP	ダクタイル鋳鉄管	Re	Reducer
SCP	Steel Connection Peace	Sa	Saddle
		T	Tee
AV	Air Valve		
BOP	Blow Off Pipe	Wt	Water Tank
M	Metar		
MF	MF joint		
GV	Gate Valve		

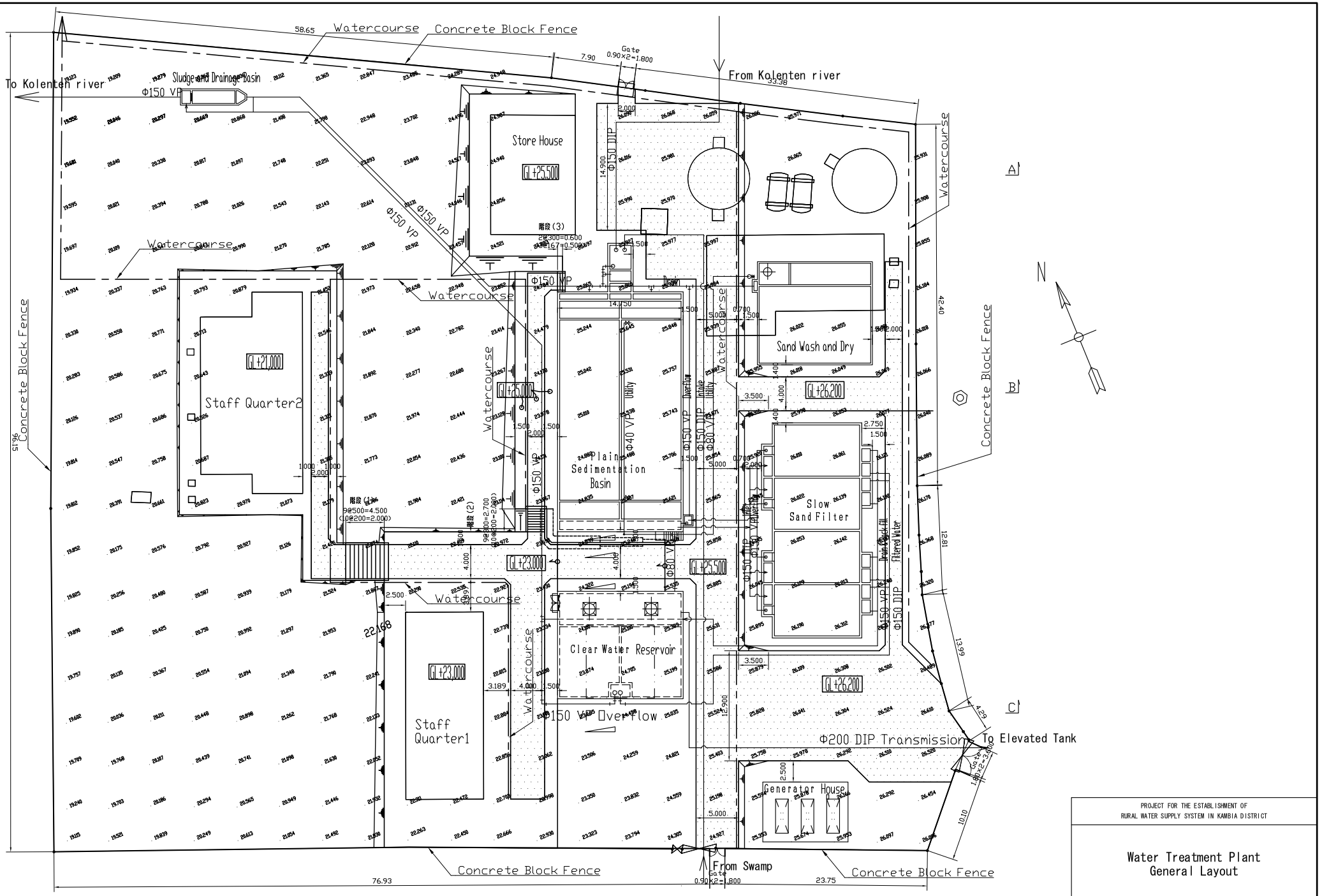
0 10 20 40

PROJECT FOR THE ESTABLISHMENT OF
RURAL WATER SUPPLY SYSTEM IN KAMBIA DISTRICT

Raw Water Conveyance Pipe Plan (Swamp-Water Treatment Plant) KCP-01/A

Scale	Shown in the Drawings		
Date	Oct. 2010	Drowing No.	004

EIGHT-JAPAN ENGINEERING CONSULTANTS INC.

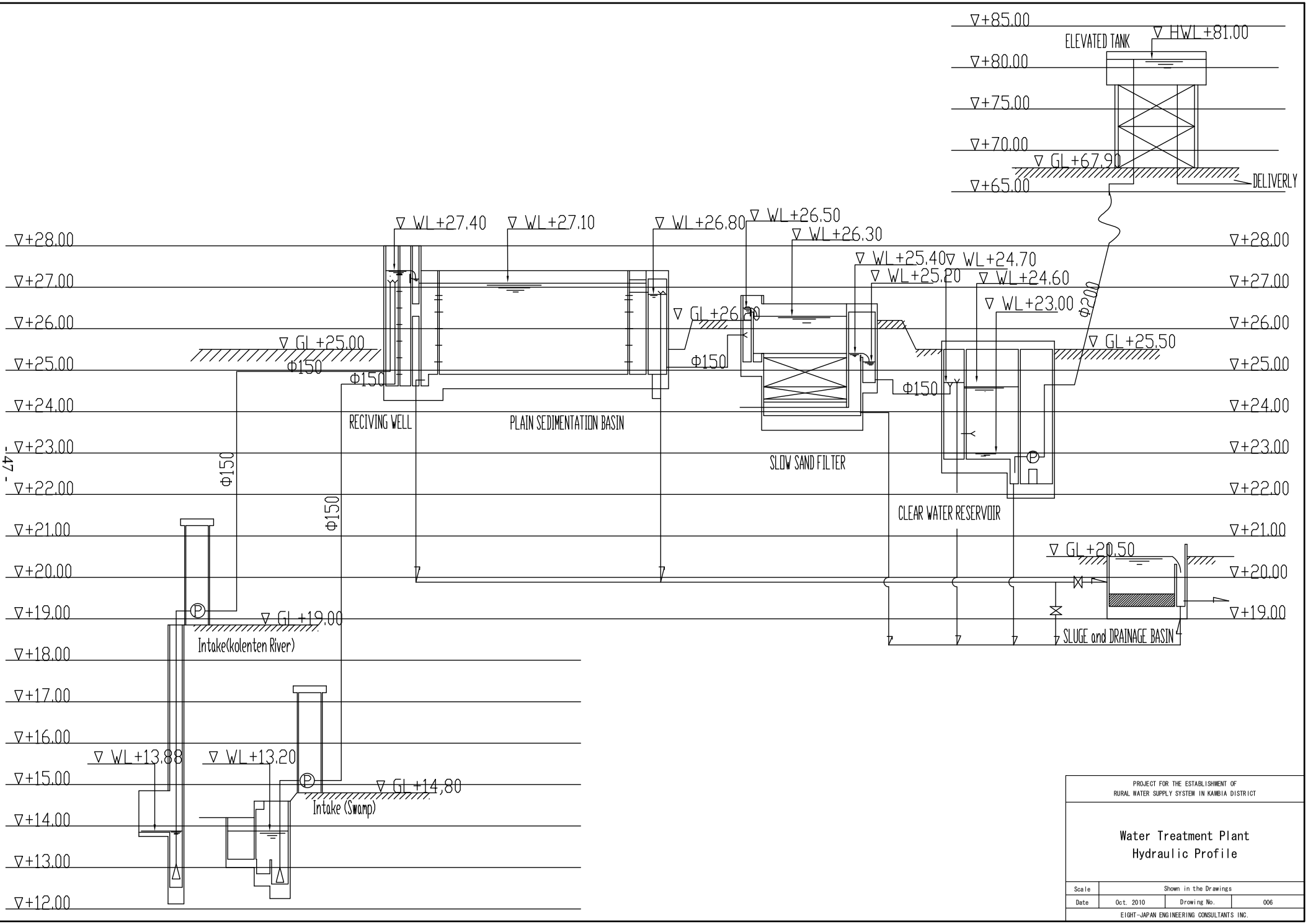


PROJECT FOR THE ESTABLISHMENT OF
RURAL WATER SUPPLY SYSTEM IN KAMBIA DISTRICT

Water Treatment Plant
General Layout

Scale	Shown in the Drawings		
Date	Oct. 2010	Drowing No.	005

EIGHT-JAPAN ENGINEERING CONSULTANTS INC.



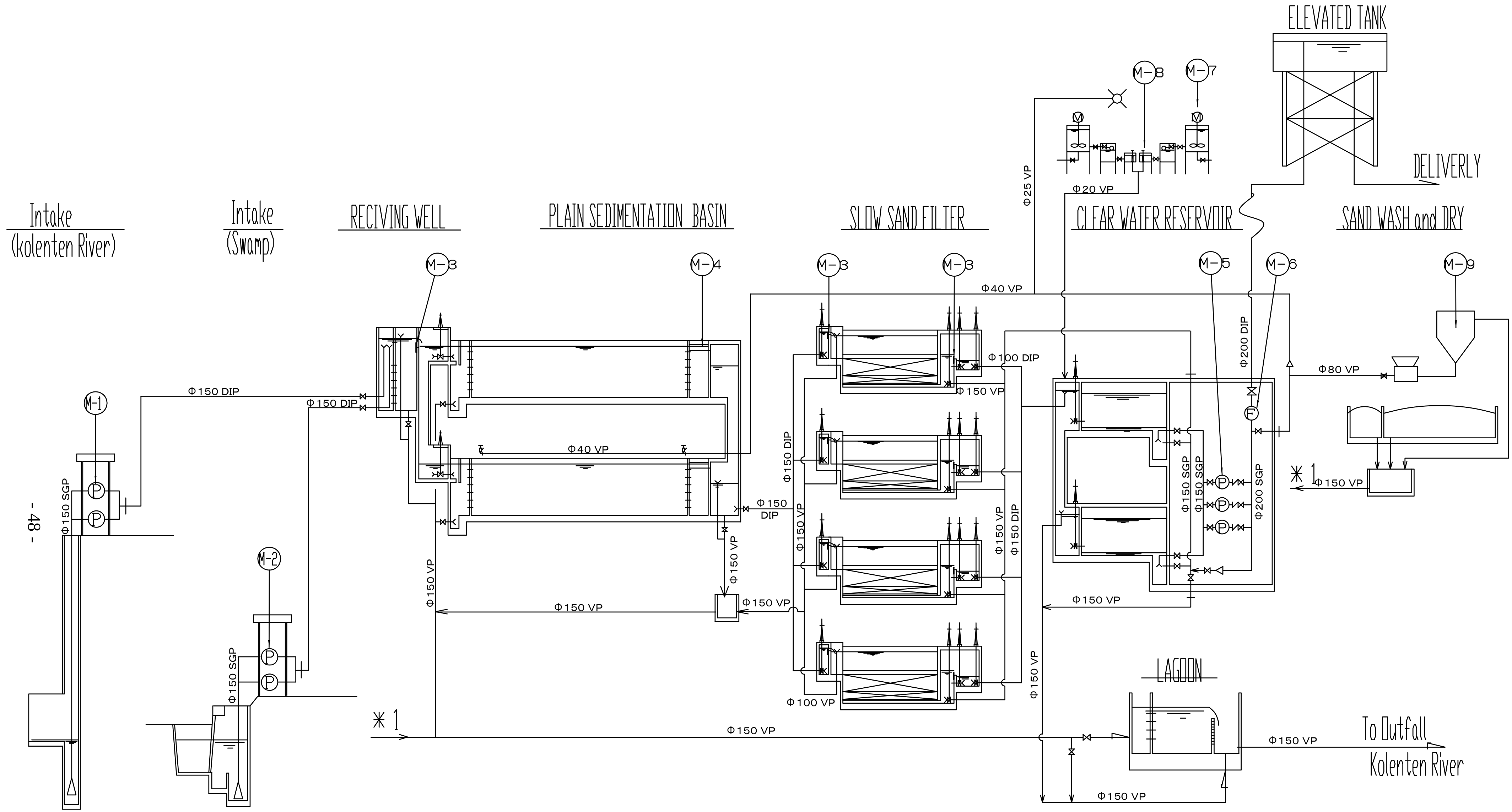
- 47 -

PROJECT FOR THE ESTABLISHMENT OF
RURAL WATER SUPPLY SYSTEM IN KAMBIA DISTRICT

Water Treatment Plant
Hydraulic Profile

Scale	Shown in the Drawings		
Date	Oct. 2010	Drowing No.	006

EIGHT-JAPAN ENGINEERING CONSULTANTS INC.



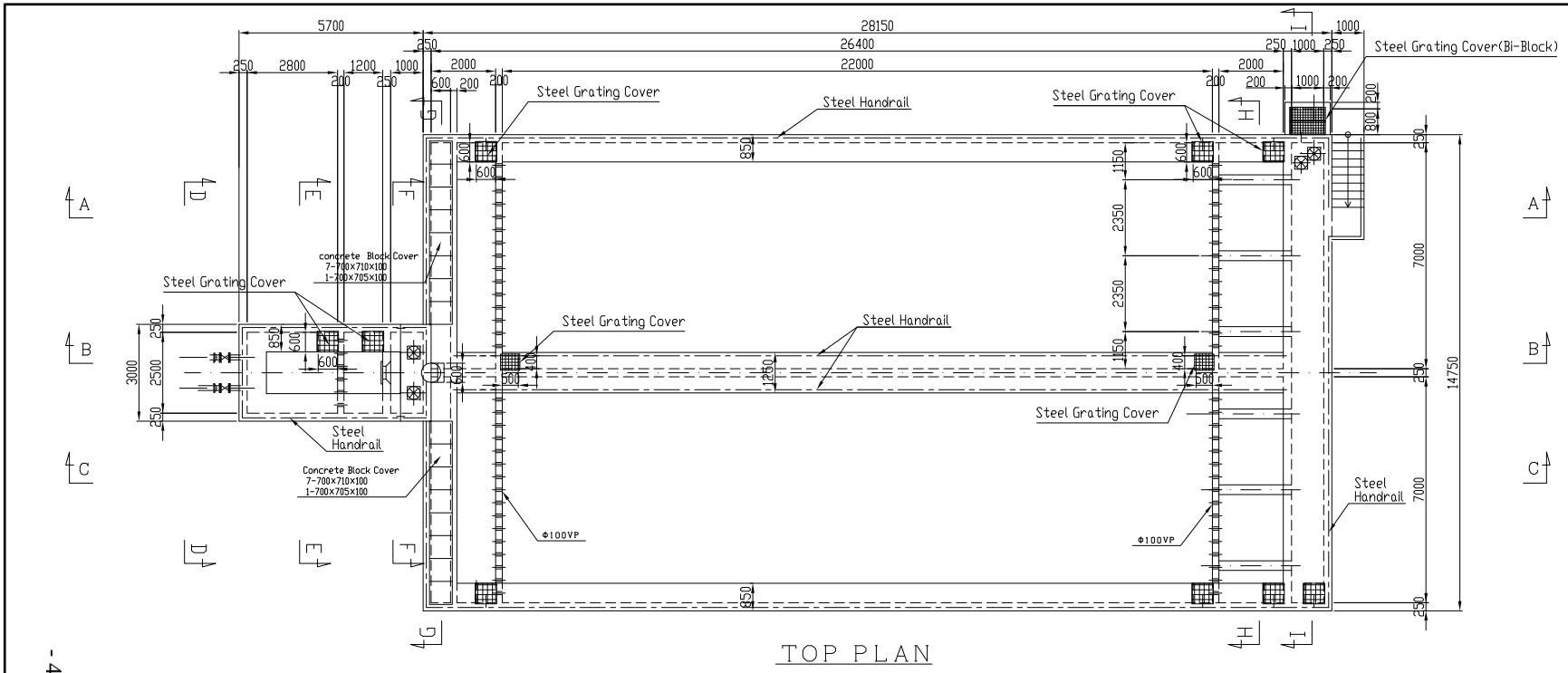
TAG NO	M−1	M−2	M−3	M−4	M−5	M−6	M−7	M−8	M−9
ITEM NAME	INTAKE PUMP	INTAKE PUMP	WEIR PLATE	EFFLUENT TROUGH	TRANSMISSION PUMP	FLOW METER	BLEACHING POWDER MIXER	CHEMICAL DOSING UNIT	SAND WASHER UNIT
TYPE	SELF-PRIMING	SELF-PRIMING	RECTANGULAR TYPE	ORIFICE TYPE	END SUCTION	WALTMAN TYPE	ELECTRIC MOTOR DRIVE	MANUAL DRIP METHOD	HYDRAULIC MIXING
SPEC.	0.84m3/min,14.8m 3.7kw,400v,50Hz	0.84m3/min,17.5m 3.7kw,400v,50Hz	300x300mm 304SS	300x300x2300mm G-FRP/304SS	0.42m3/min,61.1m 11kw,400v,50Hz	DIA.200mm DUCTIL CAST IRON	150 RPM 0.2kw,400v,50Hz	2 to 20 L/hr PVC/CS	0.7 to 1.5 m3/hr
ACCESSORY	FOOT VALVE SLUICE VALVE CHECK VALVE PRESS. GAUGE	FOOT VALVE SLUICE VALVE CHECK VALVE PRESS. GAUGE		SUPPORT	EXPANSION JOINT SLUICE VALVE CHECK VALVE PRESS. GAUGE		DILUTUON TANK 1m3 TANK SUPPORT (CS) STAGE (CS)	STORAGE TANK 0.1m3 SUPPORT (CS)	SAND WASHER SAND CONVEYOR RUBBER HOSE
NUMBER	2 (1)	2 (1)	9	6	3 (1)	1	2 (1)	2 (1)	1

PROJECT FOR THE ESTABLISHMENT OF
RURAL WATER SUPPLY SYSTEM IN KAMBIA DISTRICT

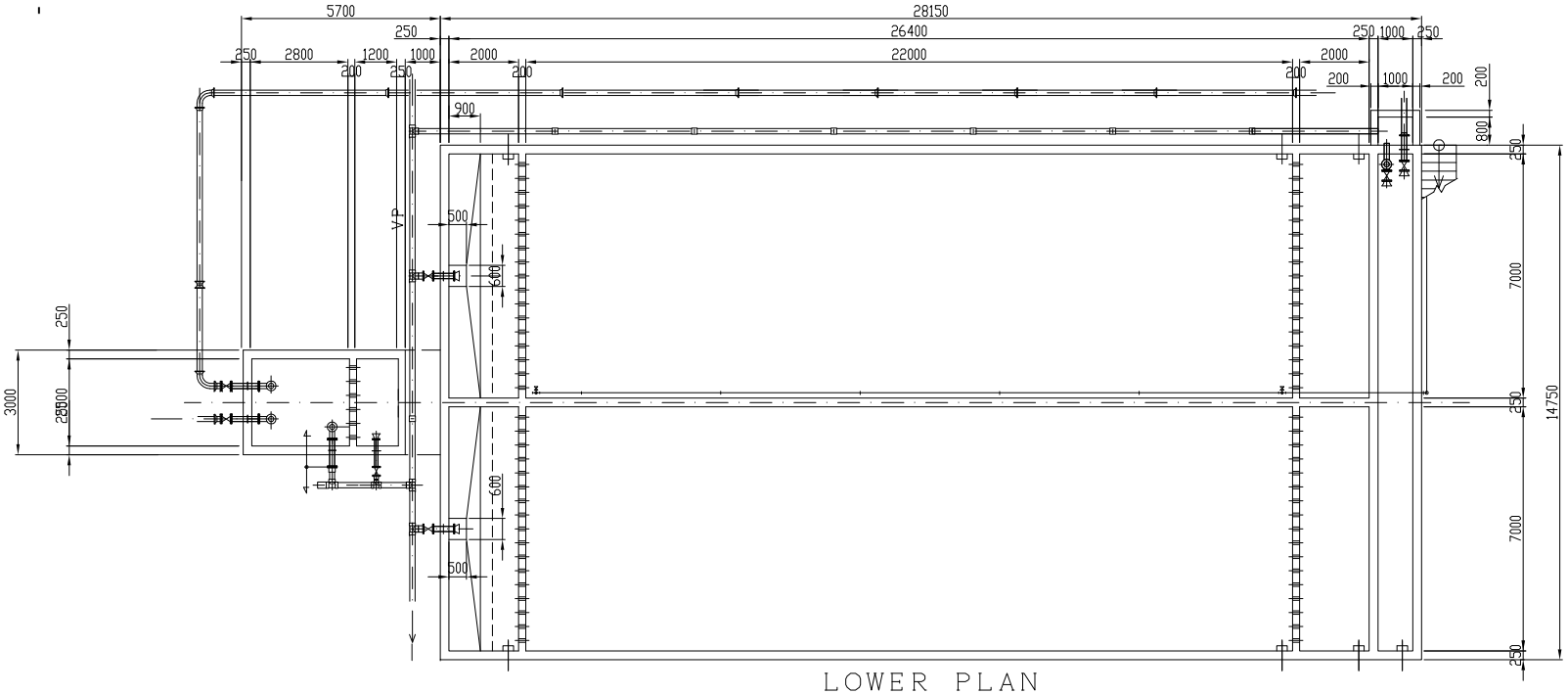
Water Treatment Plant Flow Diagram

Scale	Shown in the Drawings		
Date	Oct. 2010	Drowing No.	007

EIGHT-JAPAN ENGINEERING CONSULTANTS INC.



TOP PLAN



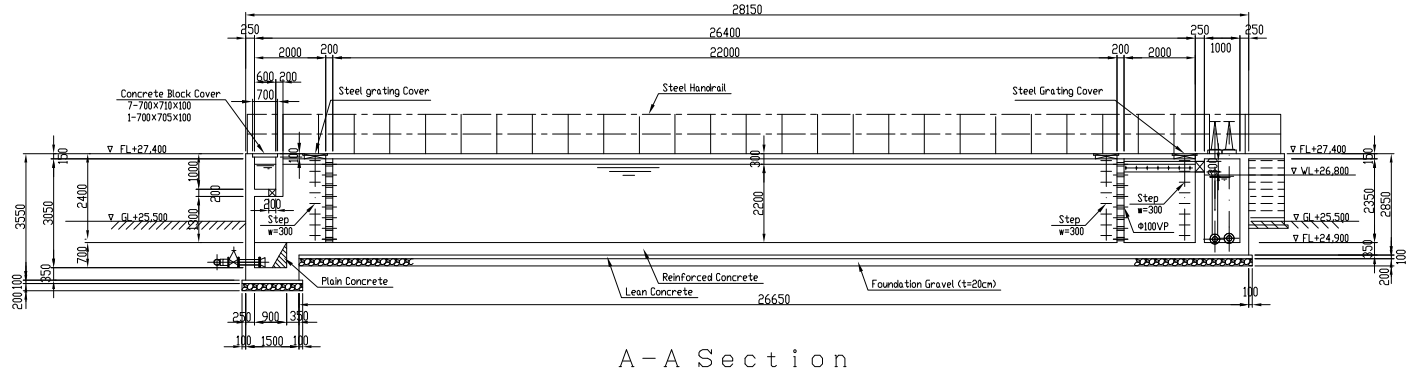
LOWER PLAN

PROJECT FOR THE ESTABLISHMENT OF
RURAL WATER SUPPLY SYSTEM IN KAMBIA DISTRICT

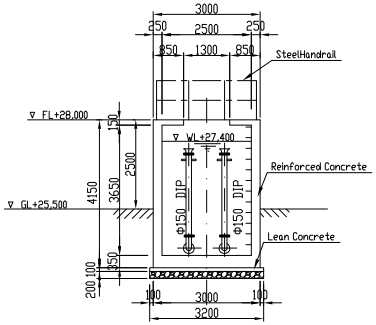
Plain Sedimentation Basin Structure(1/3)

Scale	Shown in the Drawings		
Date	Oct. 2010	Drowing No.	008

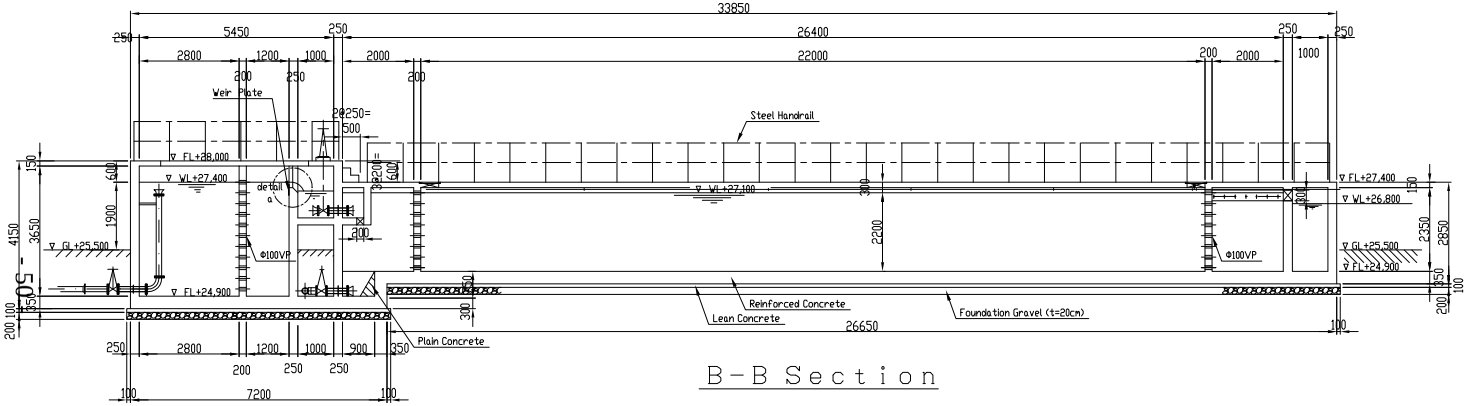
EIGHT-JAPAN ENGINEERING CONSULTANTS INC.



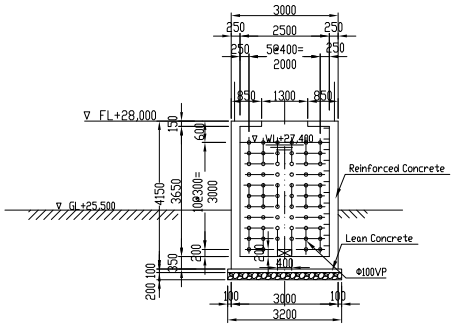
A-A Section



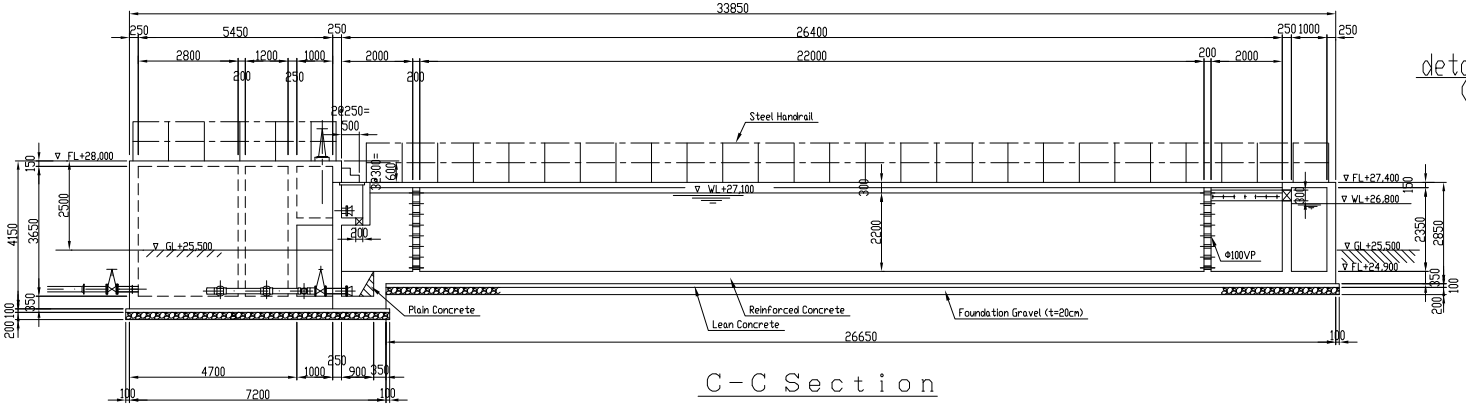
D-D Section



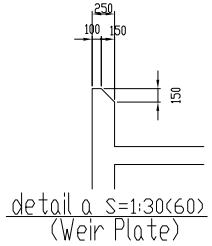
B-B Section

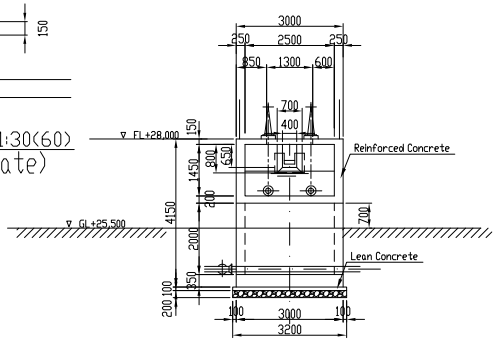


E-E Section



C-C Section





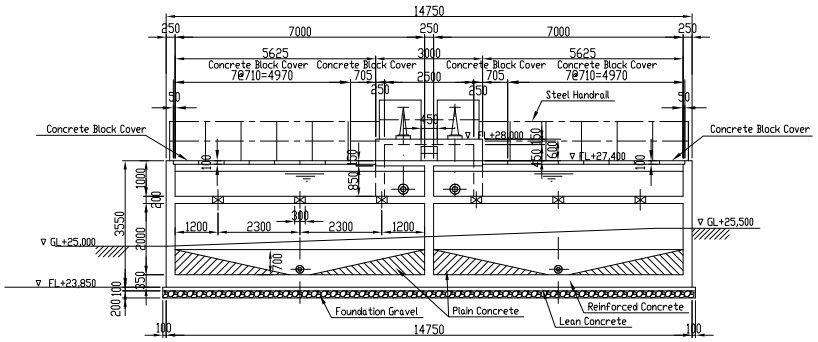
F-F Section

PROJECT FOR THE ESTABLISHMENT OF
RURAL WATER SUPPLY SYSTEM IN KAMBIA DISTRICT

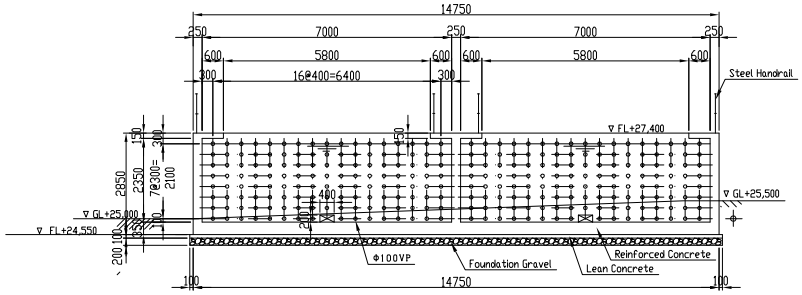
Plain Sedimentation Basin Structure (2/3)

Scale	Shown in the Drawings		
Date	Oct. 2010	Drowing No.	009

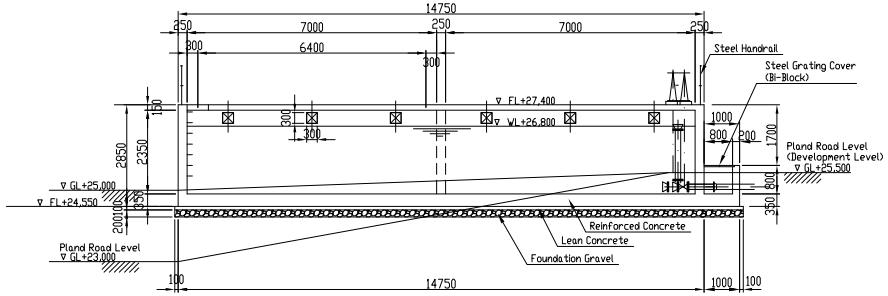
EIGHT-JAPAN ENGINEERING CONSULTANTS INC.



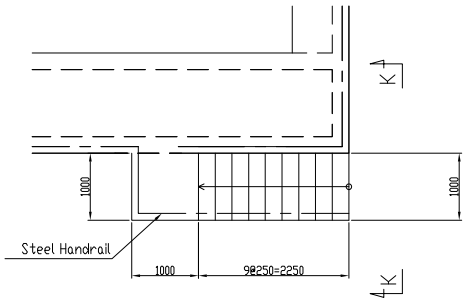
G-G Section



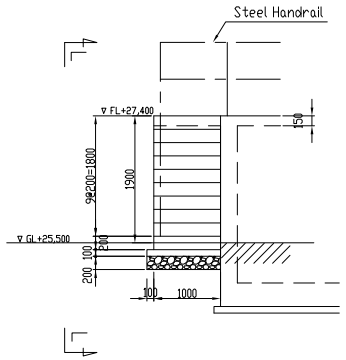
H-H Section



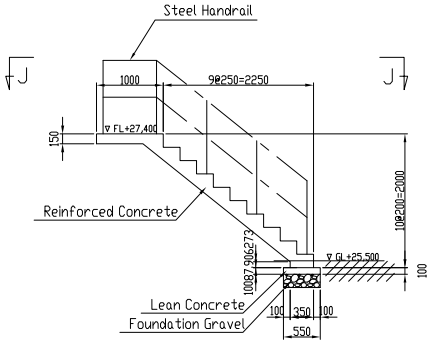
I-I Section



J-J Section

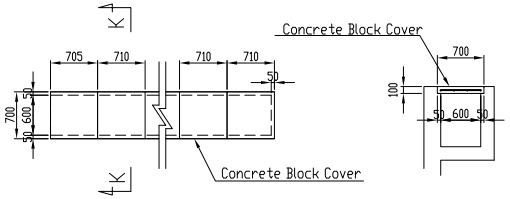


K-K Section



L-L Section

Stairs Detail



PLAN

K-K Section

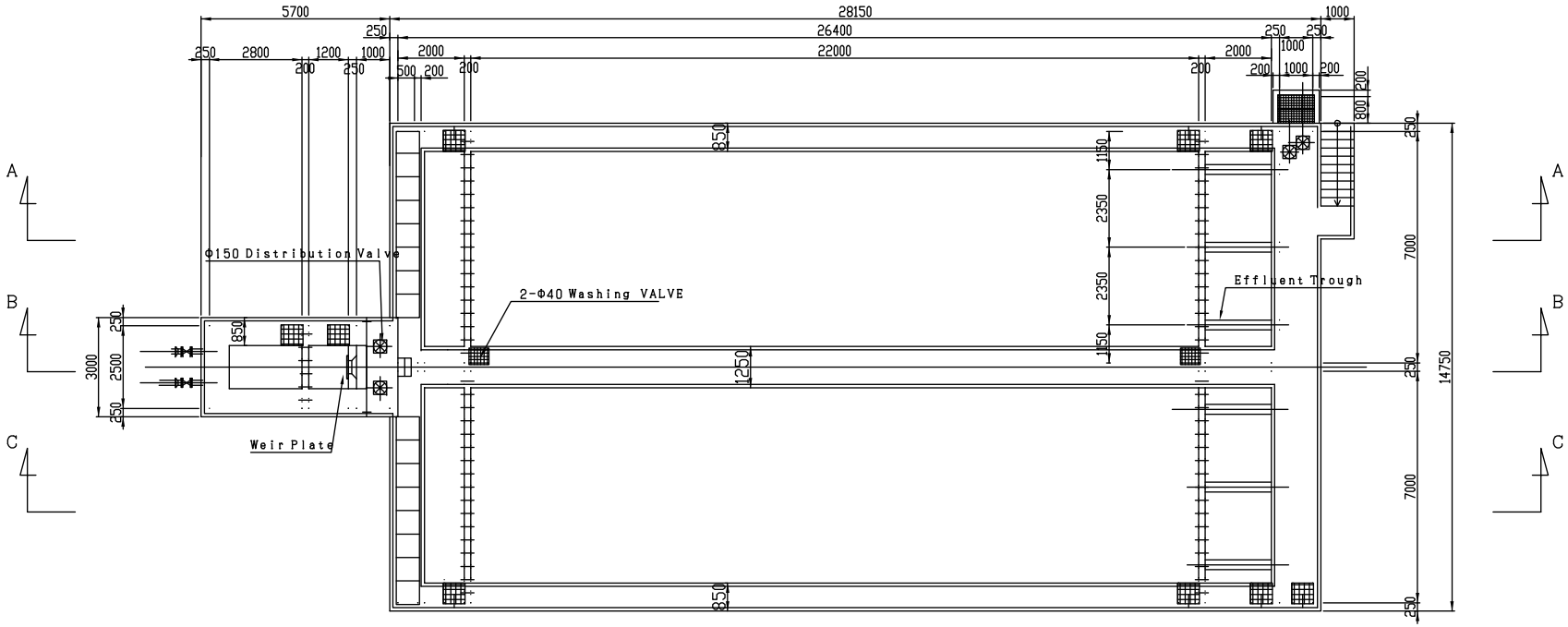
Concrete Cover

PROJECT FOR THE ESTABLISHMENT OF
RURAL WATER SUPPLY SYSTEM IN KAMBIA DISTRICT

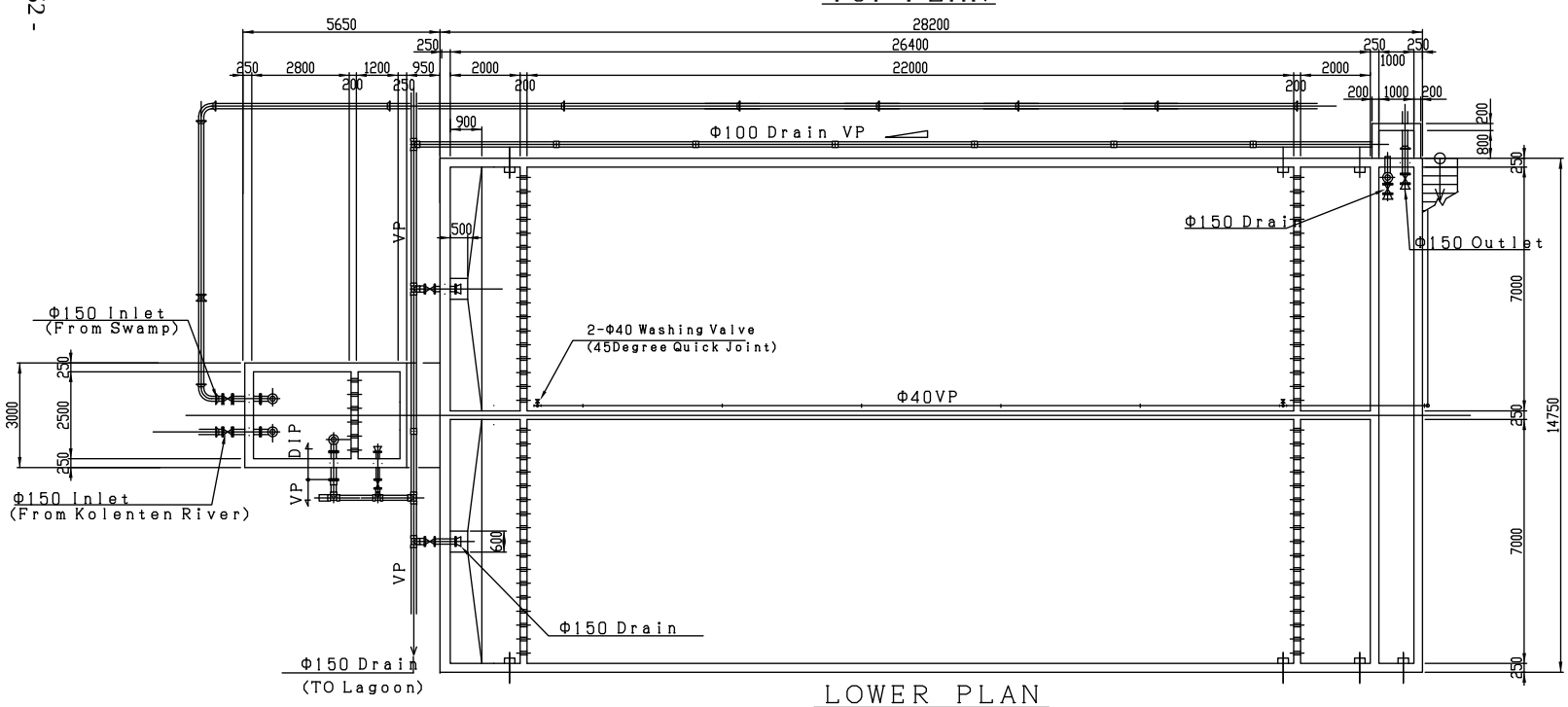
Plain Sedimentation Basin Structure(3/3)

Scale	Shown in the Drawings		
Date	Oct. 2010	Drowing No.	010

EIGHT-JAPAN ENGINEERING CONSULTANTS INC.



TOP PLAN



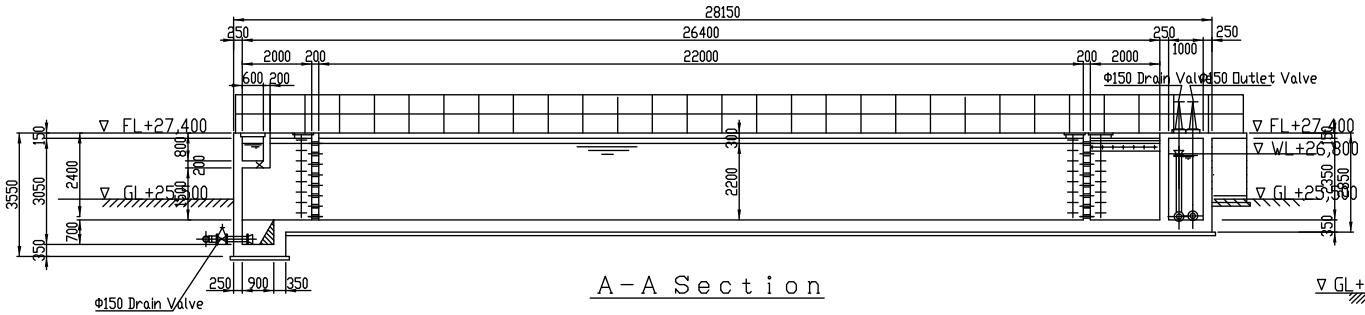
LOWER PLAN

PROJECT FOR THE ESTABLISHMENT OF
RURAL WATER SUPPLY SYSTEM IN KAMBIA DISTRICT

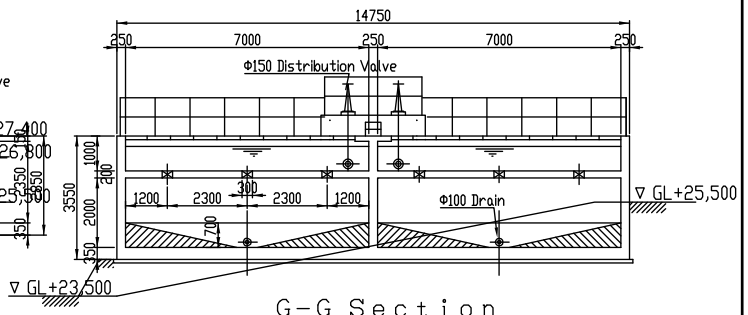
Plain Sedimentation Basin Facilities(1/2)

Scale	1:100		
Date	Oct. 2010	Drowing No.	011

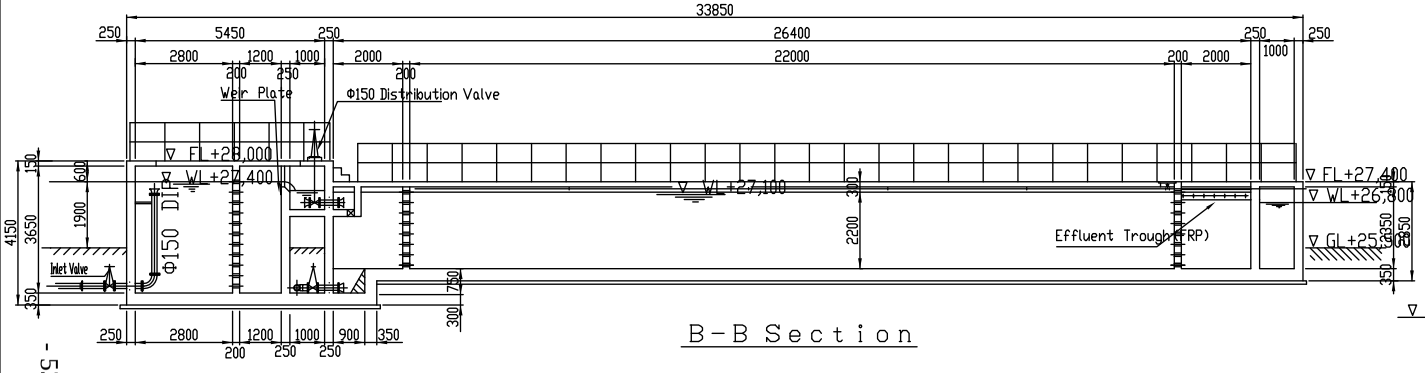
EIGHT-JAPAN ENGINEERING CONSULTANTS INC.



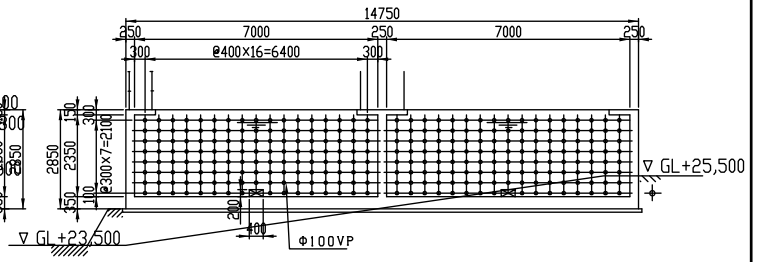
A-A Section



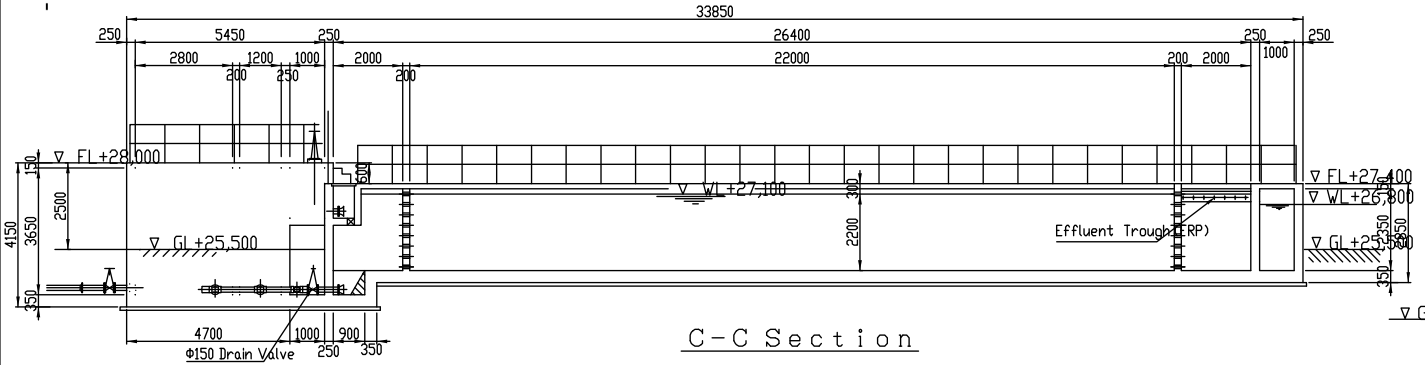
G-G Section



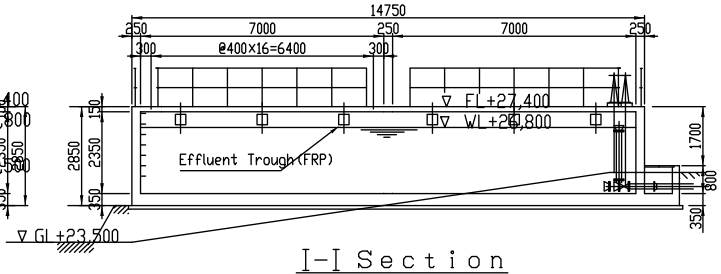
B-B Section



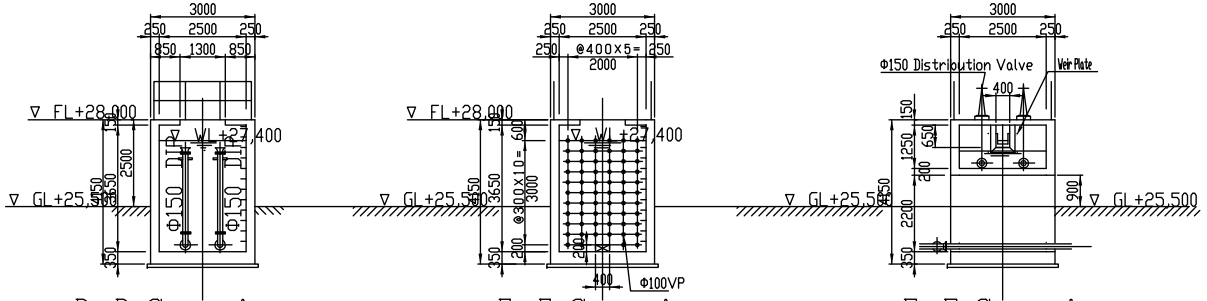
H-H Section



C-C Section



I-I Section



D-D Section

E-E Section

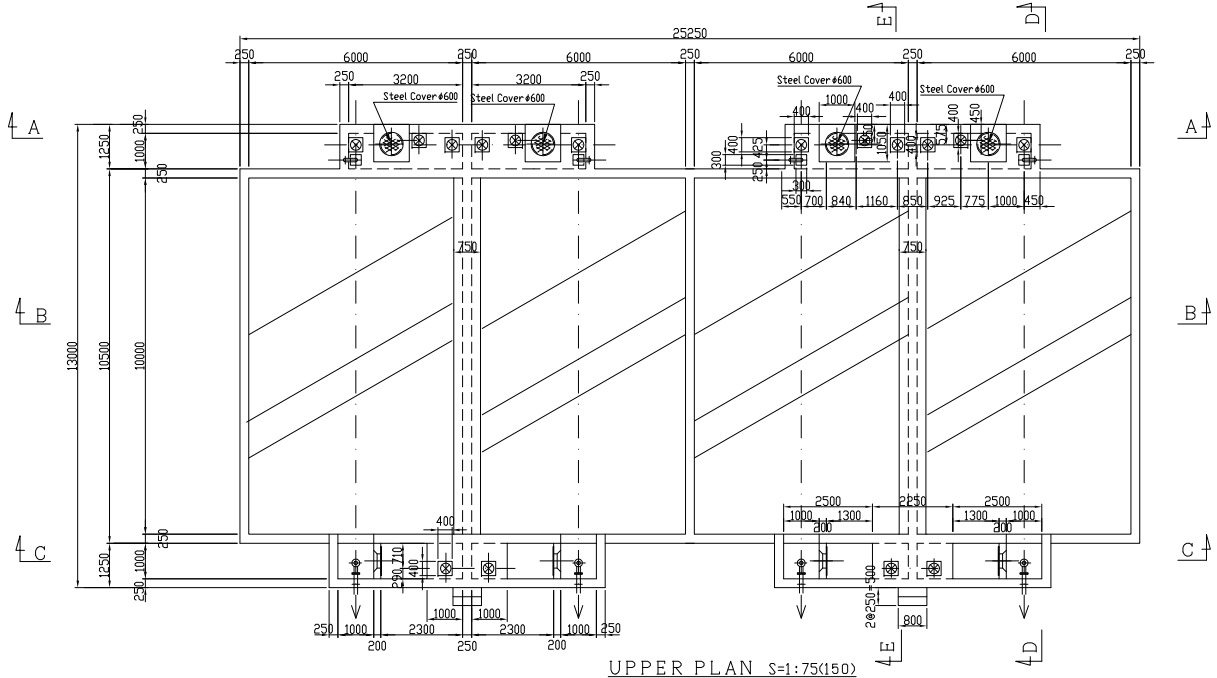
F-F Section

PROJECT FOR THE ESTABLISHMENT OF
RURAL WATER SUPPLY SYSTEM IN KAMBIA DISTRICT

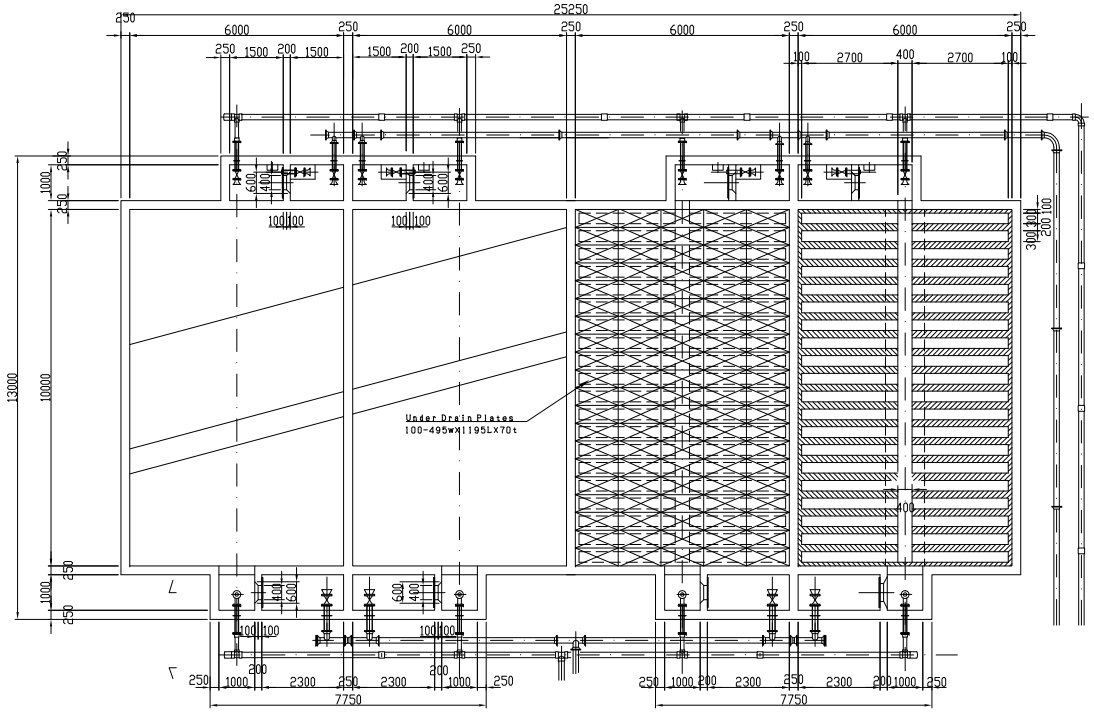
Plain Sedimentation Basin Facilities(2/2)

Scale	1:100		
Date	Oct. 2010	Drowing No.	012

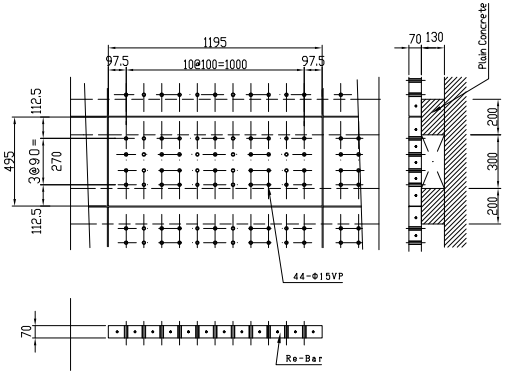
EIGHT-JAPAN ENGINEERING CONSULTANTS INC.



UPPER PLAN S=1:75(150)



LOWER PLAN S=1:75(150)



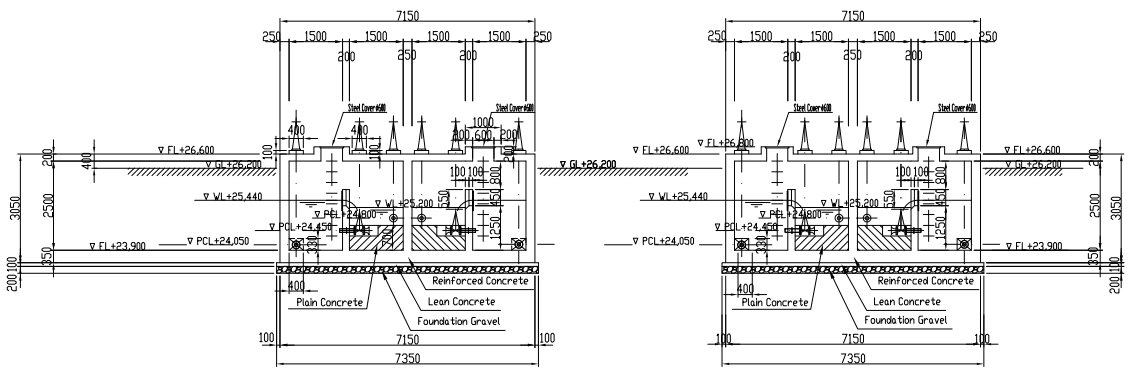
UNDER DRAIN DETAIL S=1:15(30)

PROJECT FOR THE ESTABLISHMENT OF
RURAL WATER SUPPLY SYSTEM IN KAMBIA DISTRICT

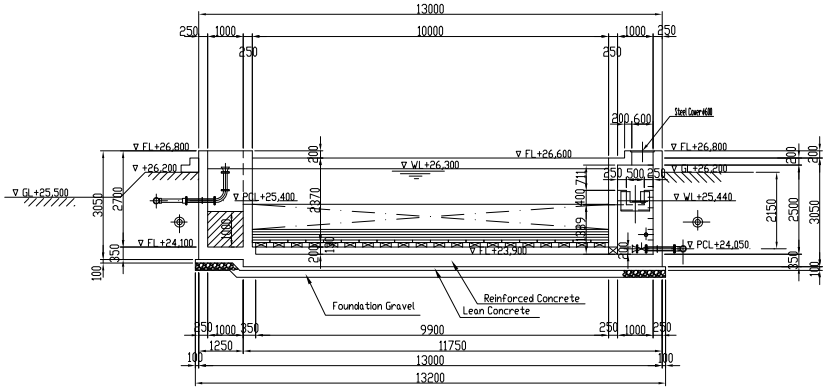
Slow Sand Filter Structure(1/2)

Scale	Shown in the Drawings		
Date	Oct. 2010	Drowing No.	013

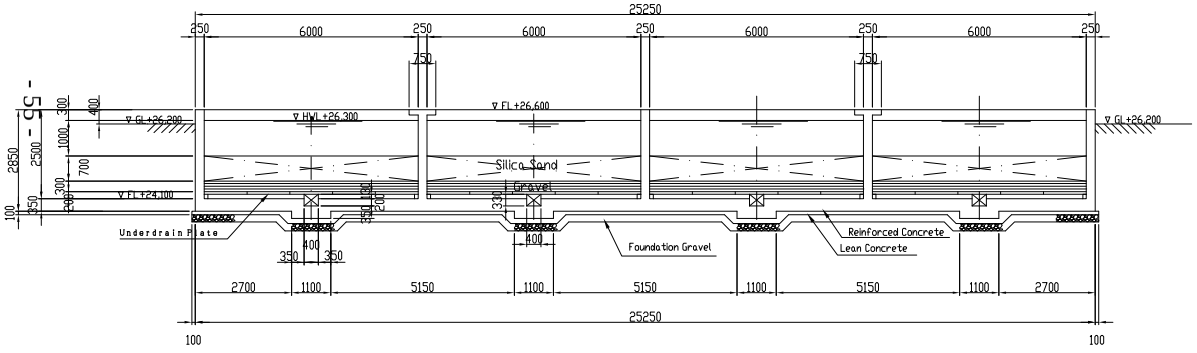
EIGHT-JAPAN ENGINEERING CONSULTANTS INC.



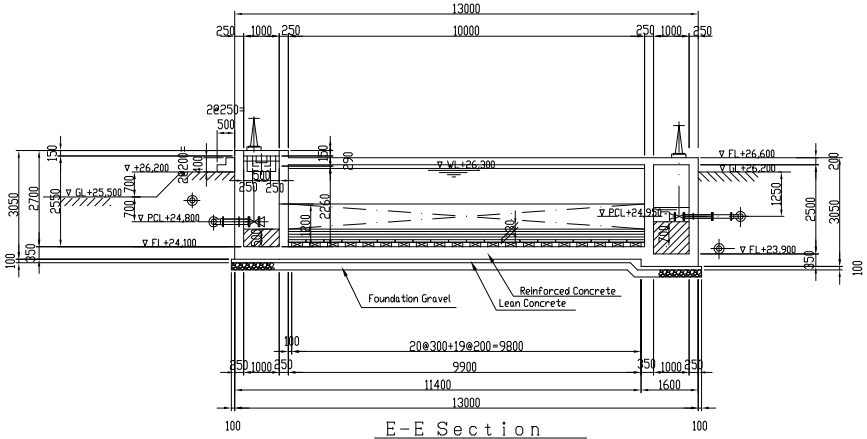
A-A Section



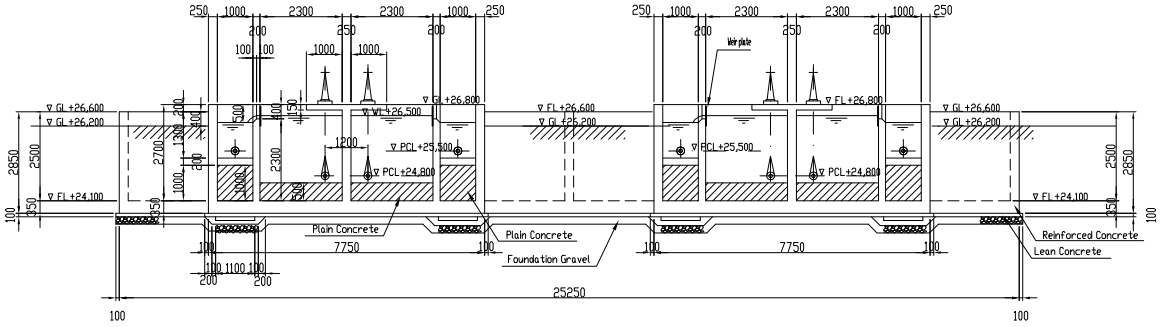
D-D Section



B-B Section



E-E Section



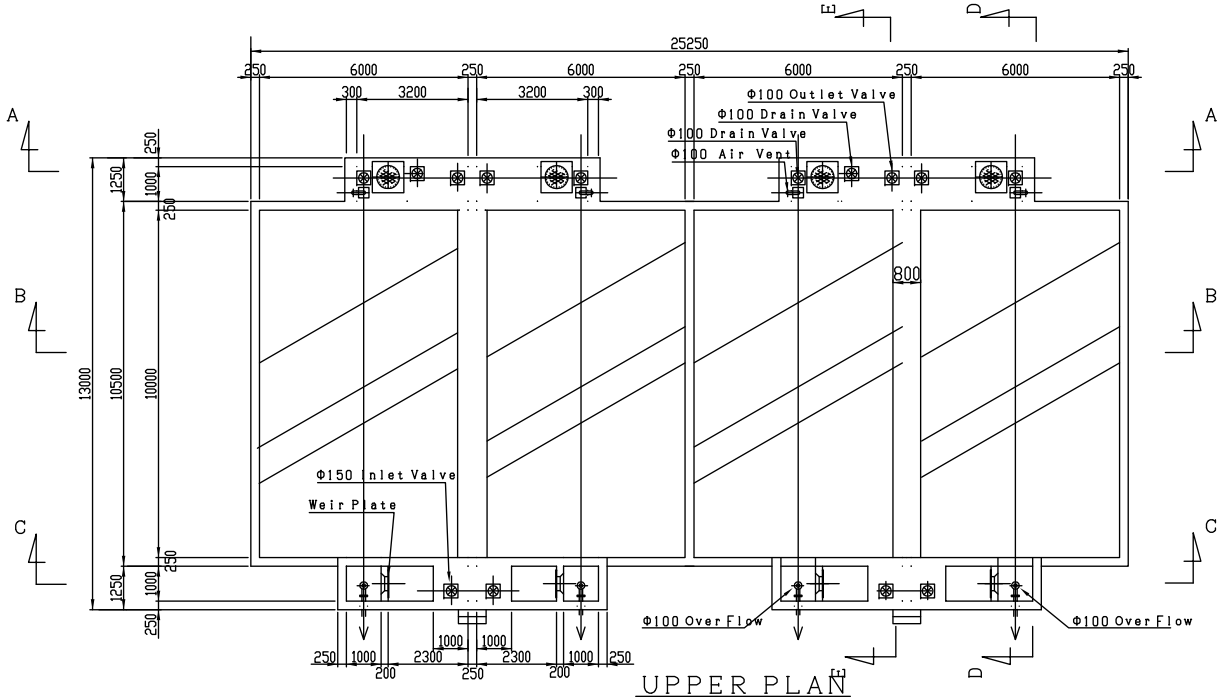
C-C Section

PROJECT FOR THE ESTABLISHMENT OF
RURAL WATER SUPPLY SYSTEM IN KAMBIA DISTRICT

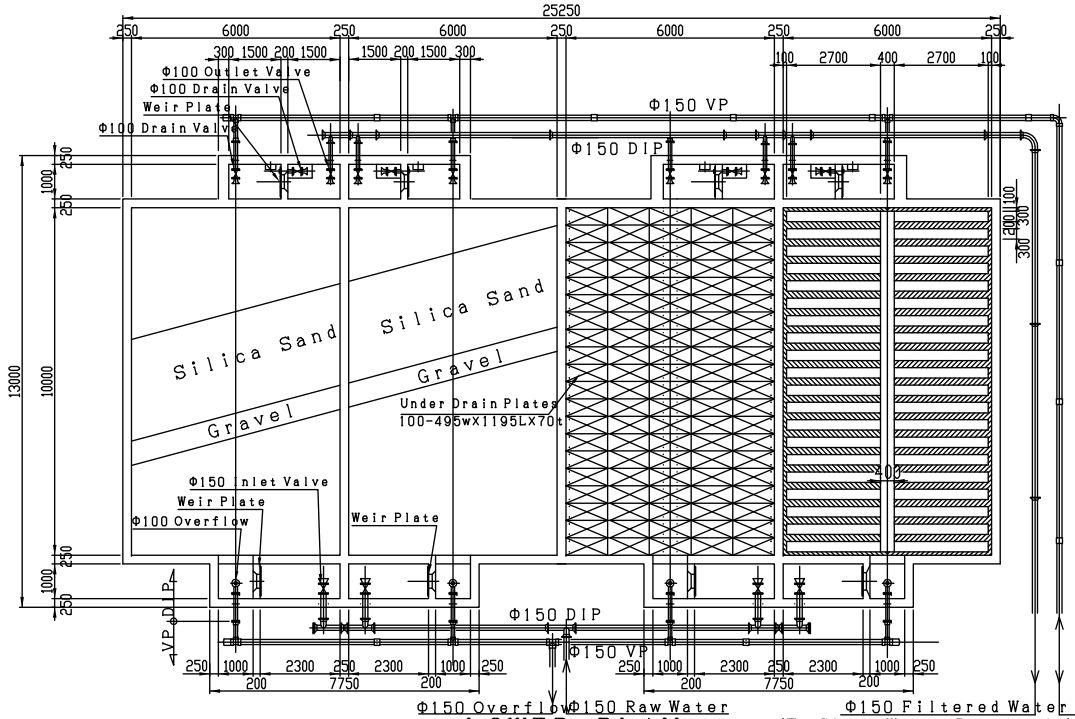
Slow Sand Filter Structure (2/2)

Scale	Shown in the Drawings		
Date	Oct. 2010	Drowing No.	014

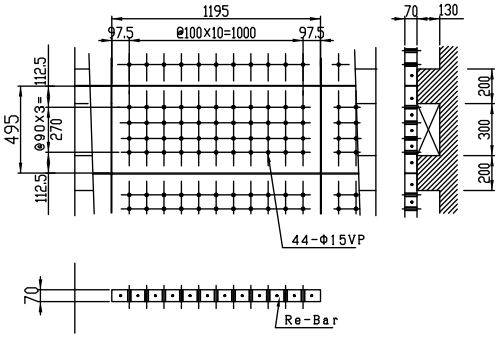
EIGHT-JAPAN ENGINEERING CONSULTANTS INC.



UPPER PLAN



LOWER PLAN



UNDER DRAIN DETAIL 1:50

NOTE:

Silica Sand
- UC :Less Than 2.0
- ES :0.3~0.45mm
- Depth :700mm

Gravel

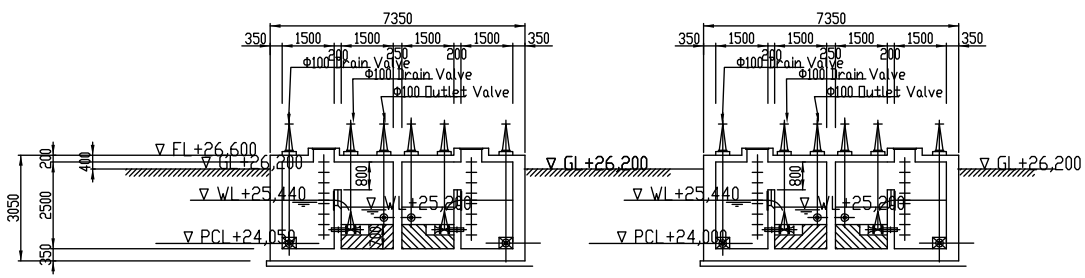
Size 3 to 4 mm	Depth	75mm
Size 10 to 20 mm	Depth	75mm
Size 20 to 30 mm	Depth	75mm
Size 40 to 50 mm	Depth	75mm

PROJECT FOR THE ESTABLISHMENT OF
RURAL WATER SUPPLY SYSTEM IN KAMBIA DISTRICT

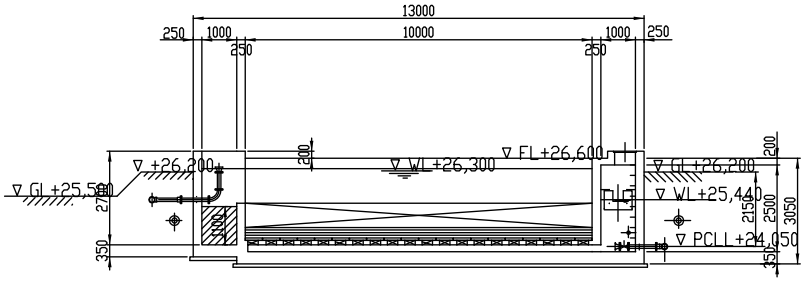
Slow Sand Filter Facilities(1/2)

Scale	1:100		
Date	Oct. 2010	Drowing No.	015

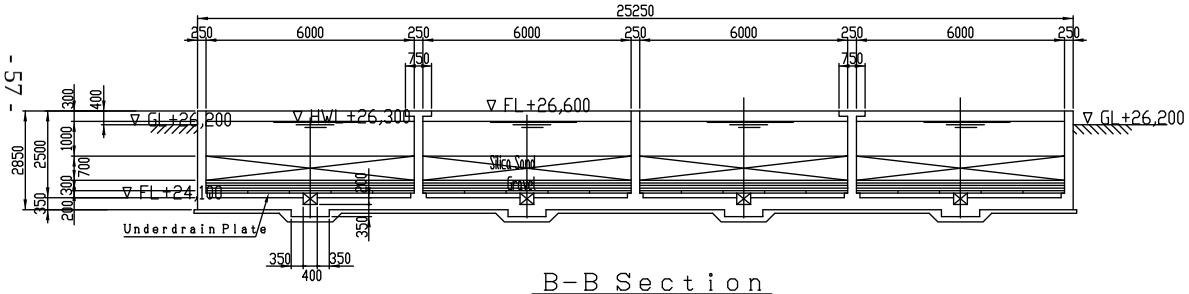
EIGHT-JAPAN ENGINEERING CONSULTANTS INC.



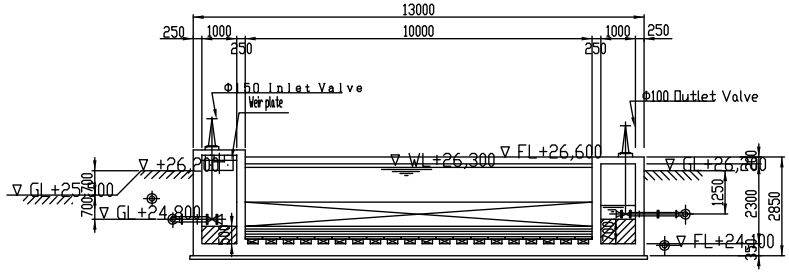
A-A Section



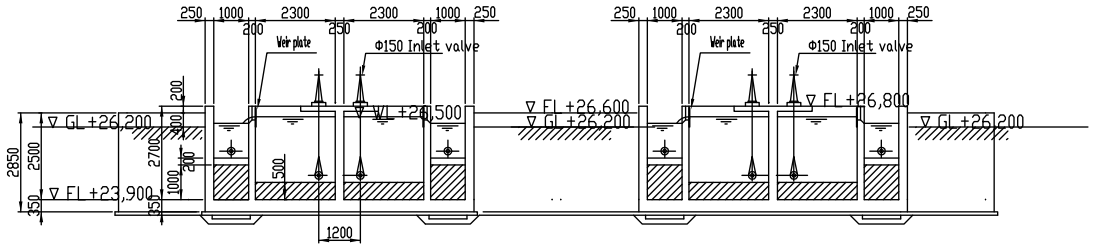
D-D Section



B-B Section

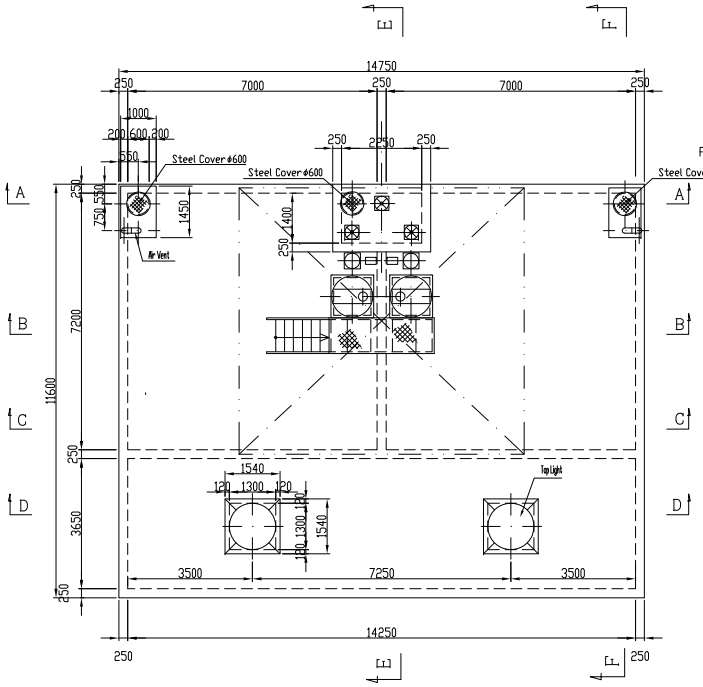


E-E Section

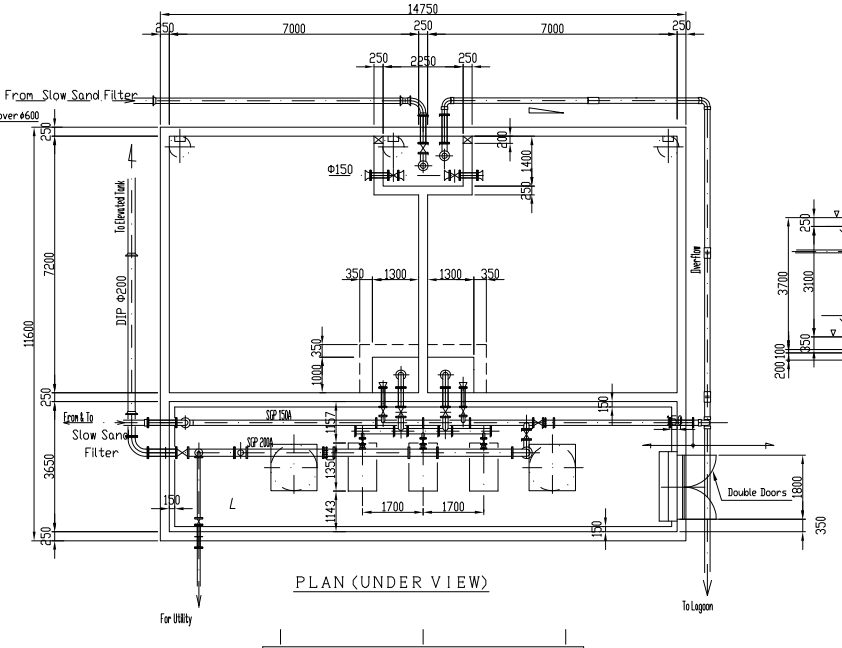


C-C Section

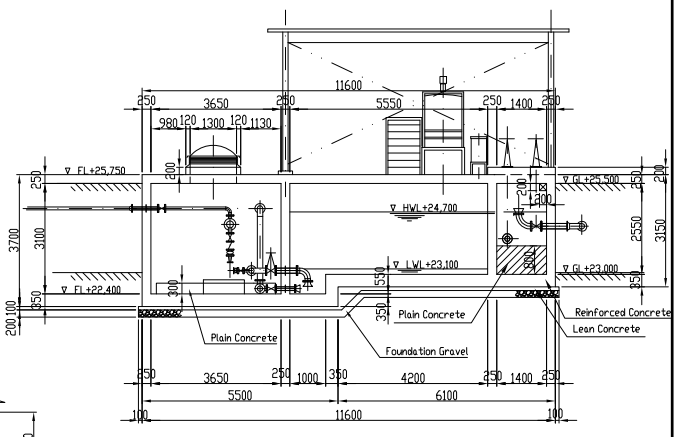
PROJECT FOR THE ESTABLISHMENT OF RURAL WATER SUPPLY SYSTEM IN KAMBIA DISTRICT	
Slow Sand Filter Facilities(2/2)	
Scale	1:100
Date	Oct. 2010
Drowing No.	016
EIGHT-JAPAN ENGINEERING CONSULTANTS INC.	



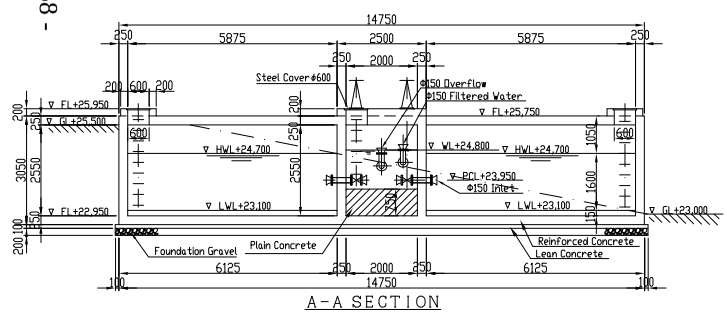
PLAN (TOP VIEW)



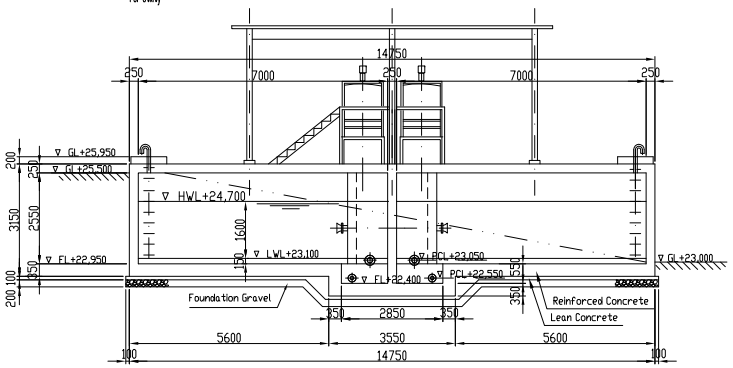
PLAN (UNDER VIEW)



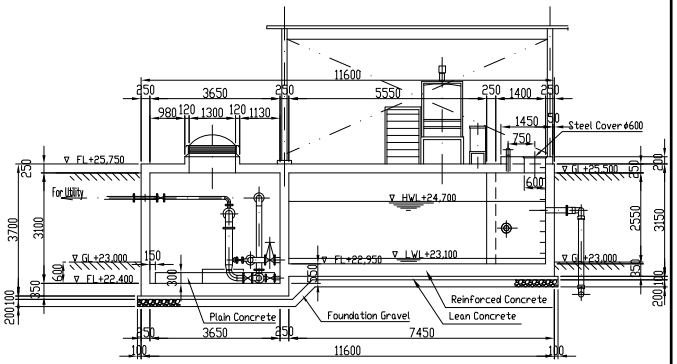
E-E SECTION



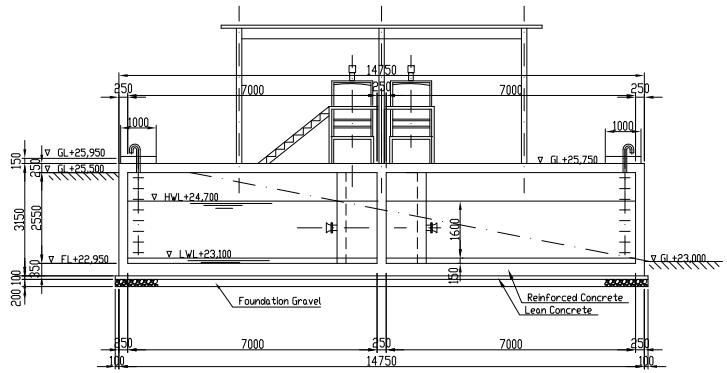
A-A SECTION



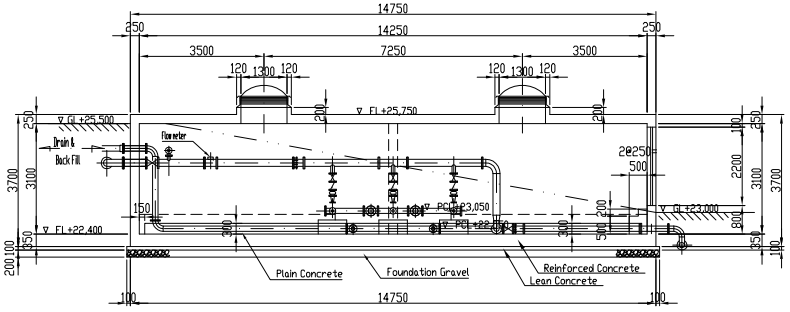
C-C SECTION



F-F SECTION



B-B SECTION



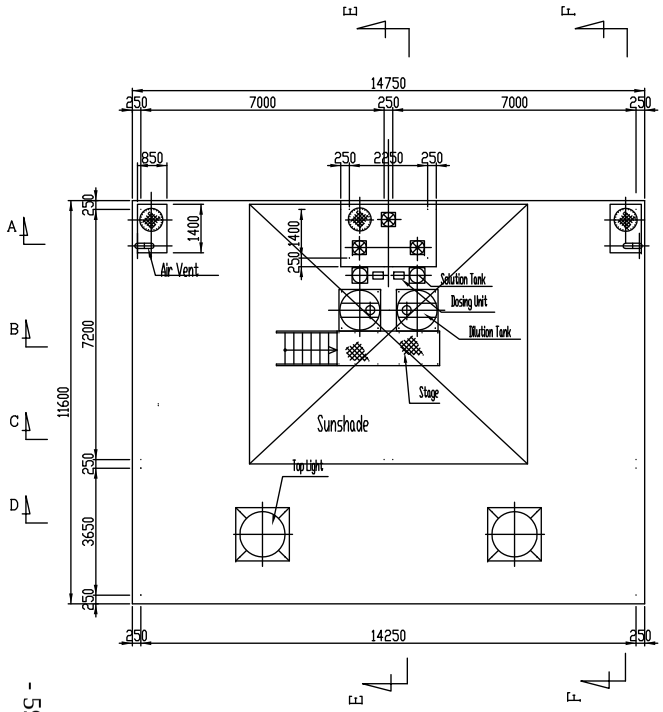
D-D SECTION

PROJECT FOR THE ESTABLISHMENT OF
RURAL WATER SUPPLY SYSTEM IN KAMBIA DISTRICT

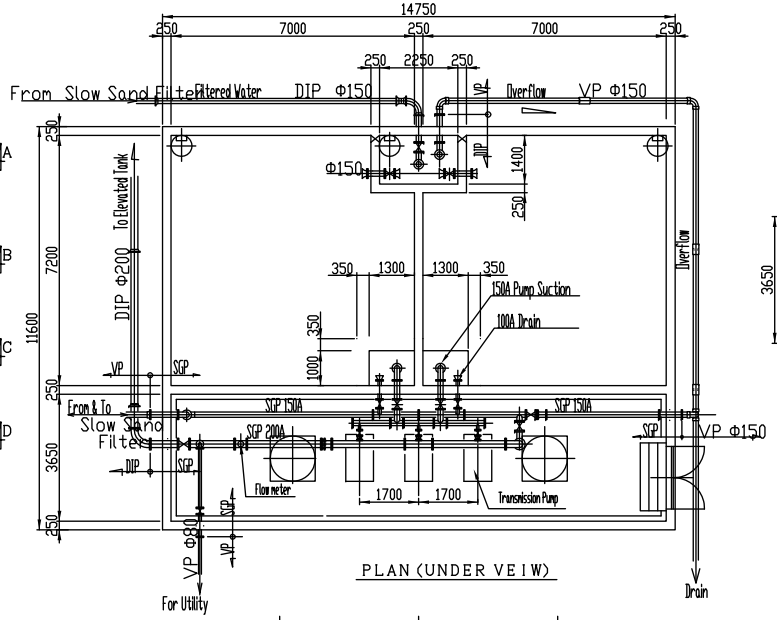
Clear Water Reservoir Structure

Scale	Shown in the Drawings		
Date	Oct. 2010	Drowing No.	017

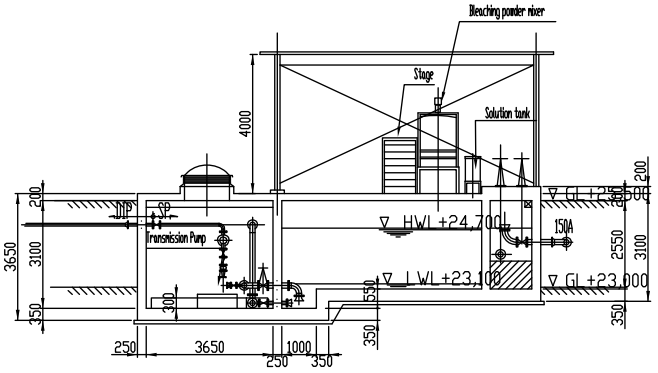
EIGHT-JAPAN ENGINEERING CONSULTANTS INC.



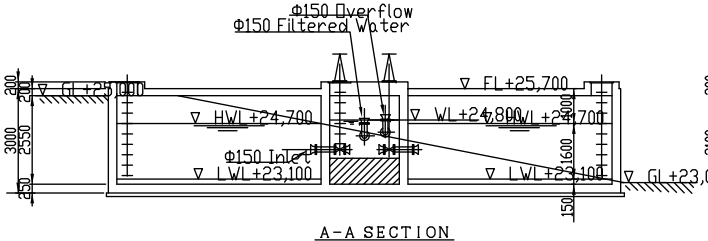
PLAN (TOP VIEW)



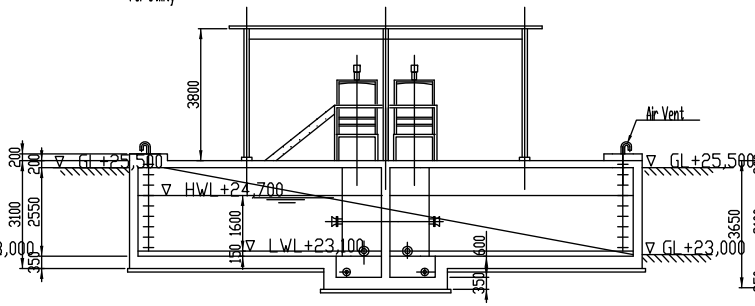
PLAN (UNDER VEIW)



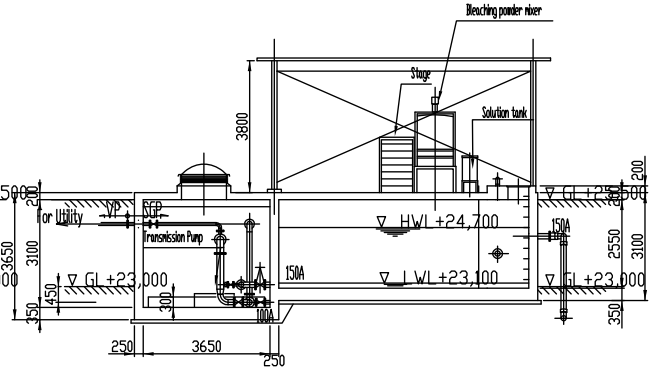
E-E SECTION



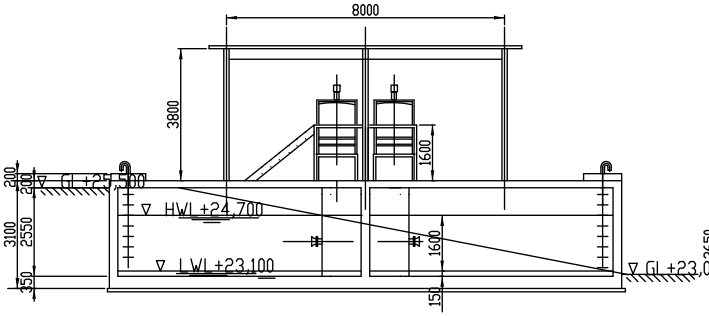
A-A SECTION



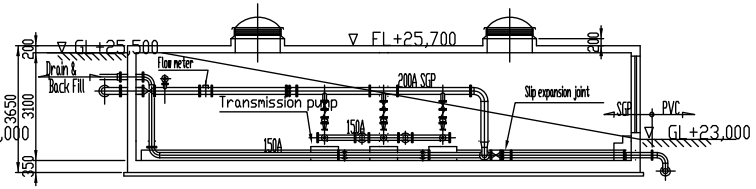
C-C SECTION



F-F SECTION



B-B SECTION



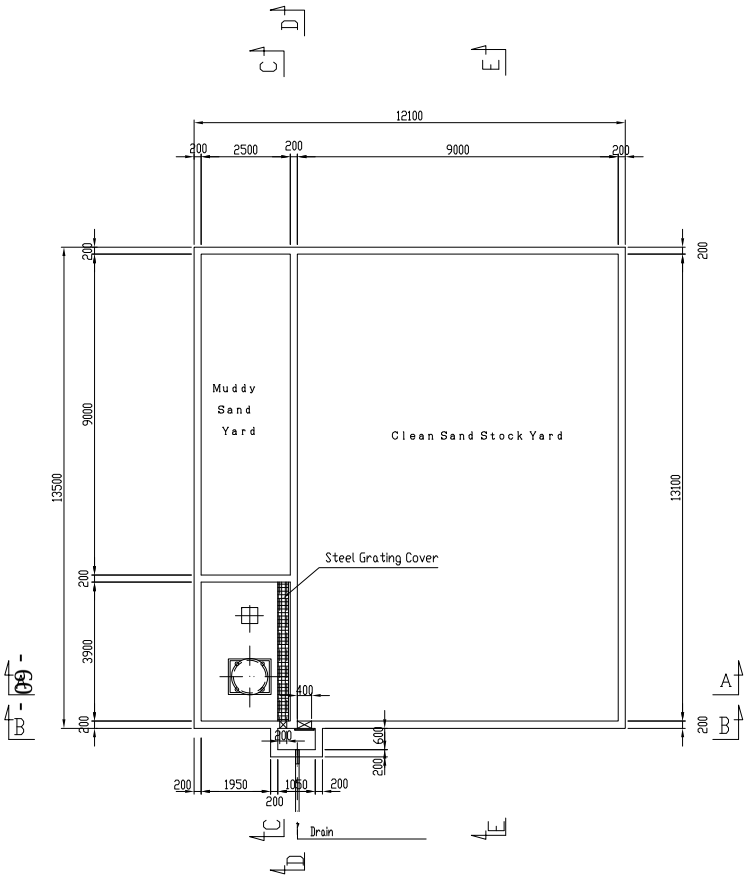
D-D SECTION

PROJECT FOR THE ESTABLISHMENT OF
RURAL WATER SUPPLY SYSTEM IN KAMBIA DISTRICT

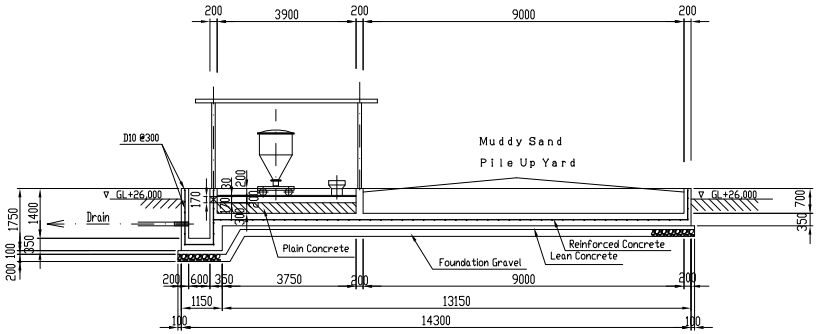
Clear Water Reservoir Facilities

Scale	1:100		
Date	Oct. 2010	Drowing No.	018

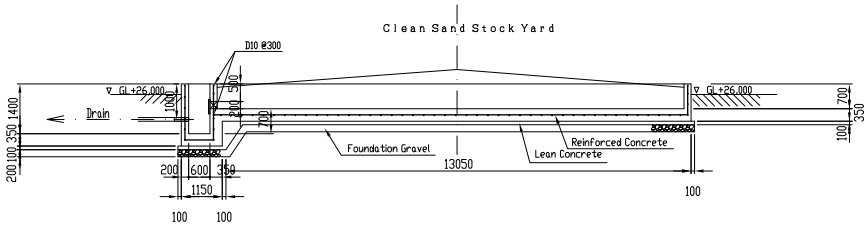
EIGHT-JAPAN ENGINEERING CONSULTANTS INC.



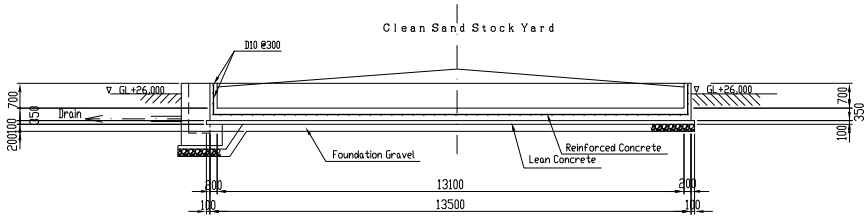
PLAN



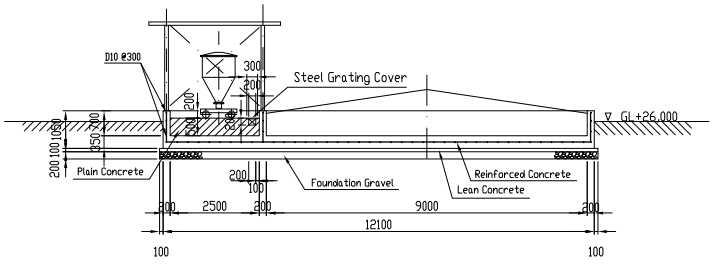
C-C Section



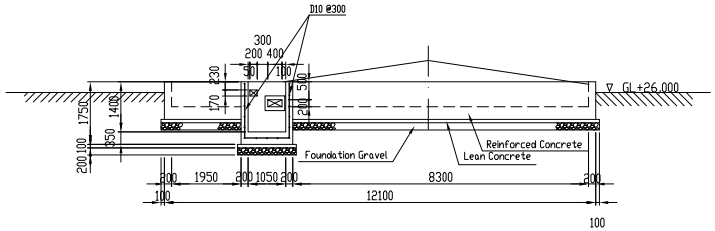
D-D Section



E-E Section



A-A Section



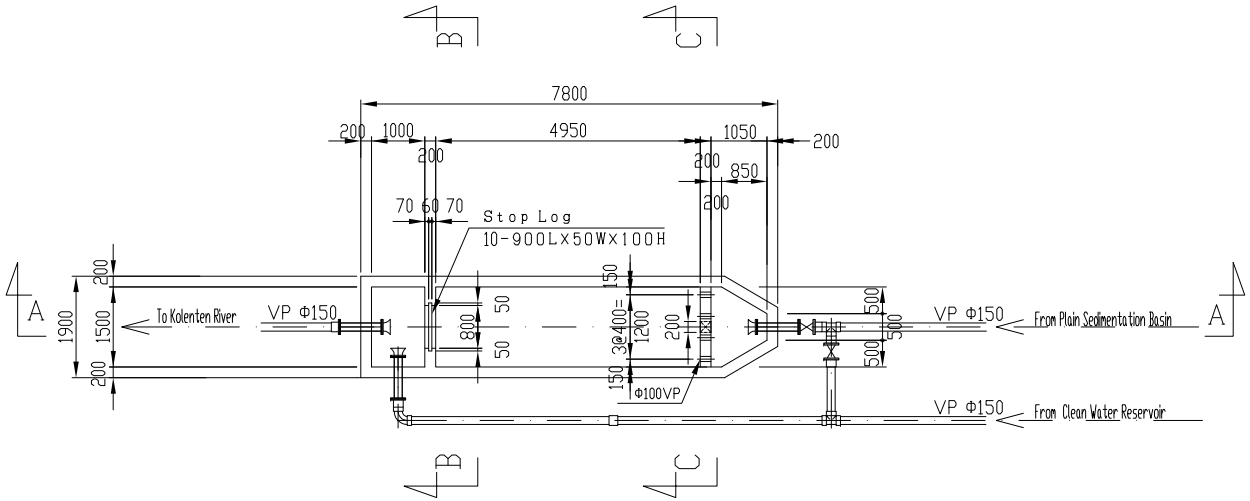
B-B Section

PROJECT FOR THE ESTABLISHMENT OF
RURAL WATER SUPPLY SYSTEM IN KAMBIA DISTRICT

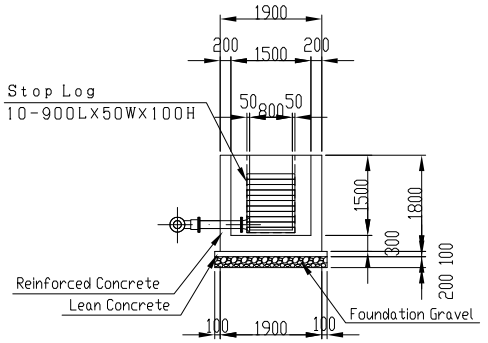
Sand Wash and Dry Structure and Facilities

Scale	Shown in the Drawings		
Date	Oct. 2010	Drowing No.	019

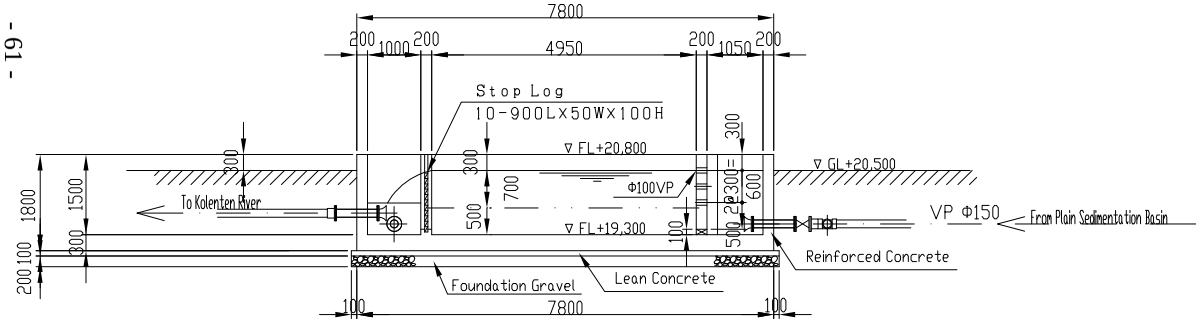
EIGHT-JAPAN ENGINEERING CONSULTANTS INC.



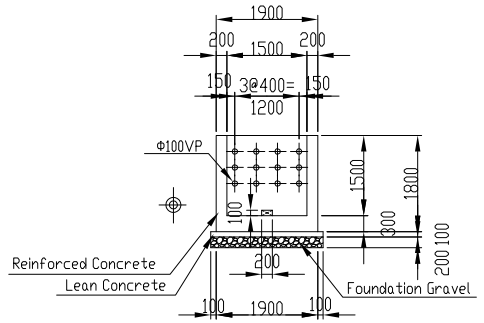
Plan



B-B Section



A-A Section



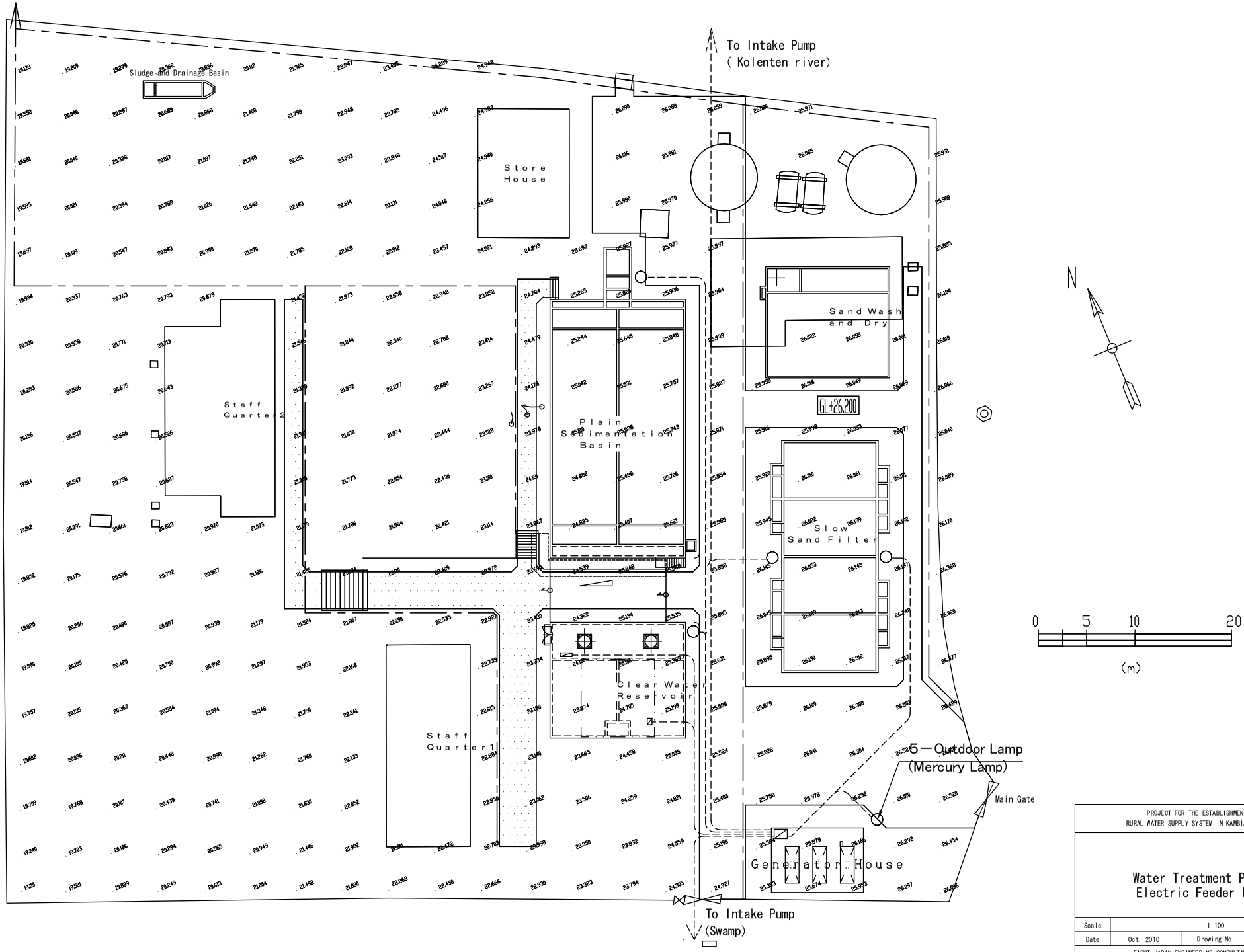
C-C Section

PROJECT FOR THE ESTABLISHMENT OF
RURAL WATER SUPPLY SYSTEM IN KAMBIA DISTRICT

Sludge and Drainage Basin Structure and Facilities

Scale	Shown in the Drawings		
Date	Oct. 2010	Drowing No.	020

EIGHT-JAPAN ENGINEERING CONSULTANTS INC.



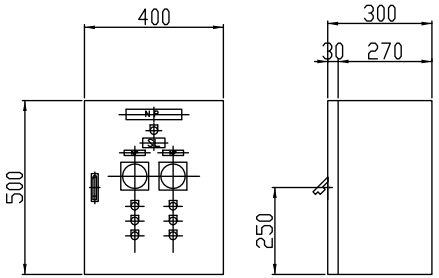
PROJECT FOR THE ESTABLISHMENT OF
RURAL WATER SUPPLY SYSTEM IN KAMBIA DISTRICT

Water Treatment Plant
Electric Feeder Plan

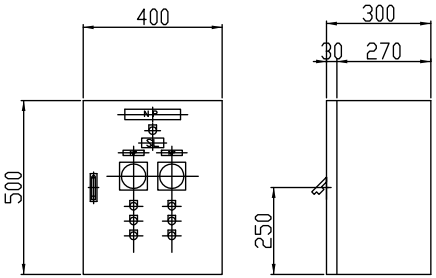
Scale	1:100		
Date	Oct. 2010	Drowing No.	021

EIGHT-JAPAN ENGINEERING CONSULTANTS INC.

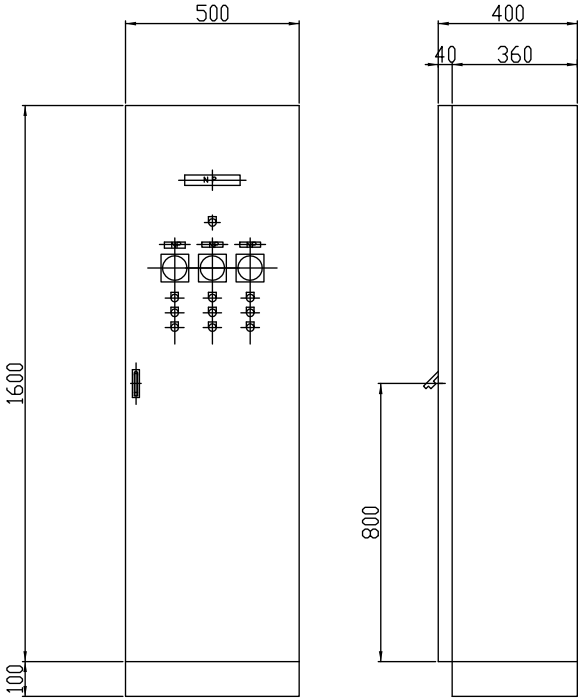
INTAKE PUMP 1 CONTROL BOARD



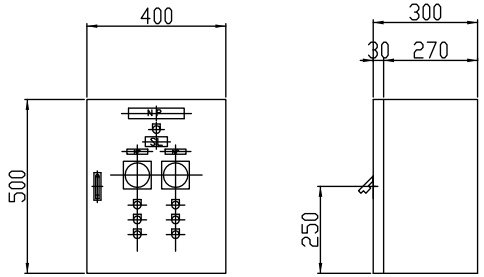
INTAKE PUMP 2 CONTROL BOARD



TRANSMISSION CONTROL BOARD



BLEACHING POWDER MIXER CONTROL BOARD

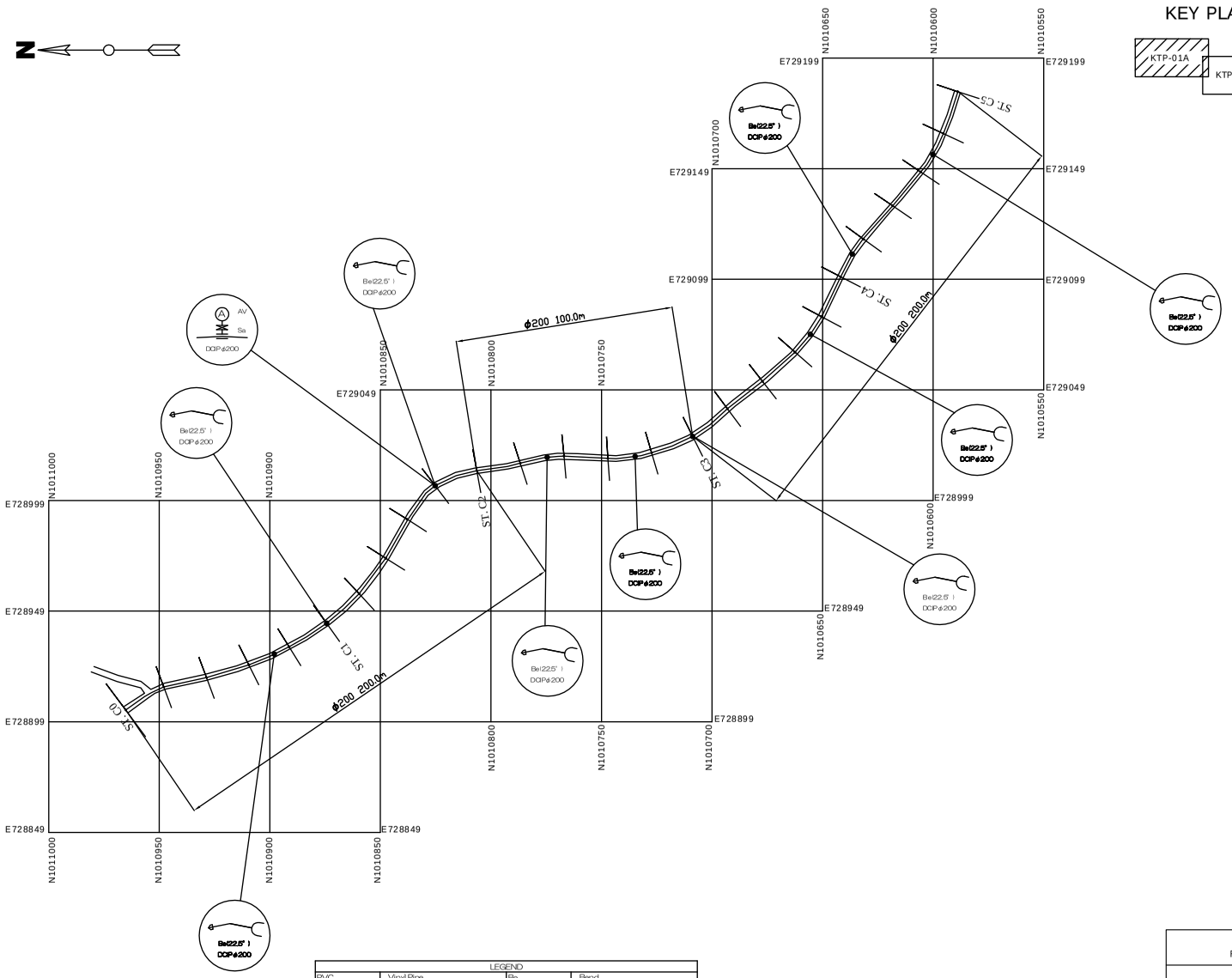


PROJECT FOR THE ESTABLISHMENT OF
RURAL WATER SUPPLY SYSTEM IN KAMBIA DISTRICT

Control Board

Scale	1:100		
Date	Oct. 2010	Drowing No.	022

EIGHT-JAPAN ENGINEERING CONSULTANTS INC.



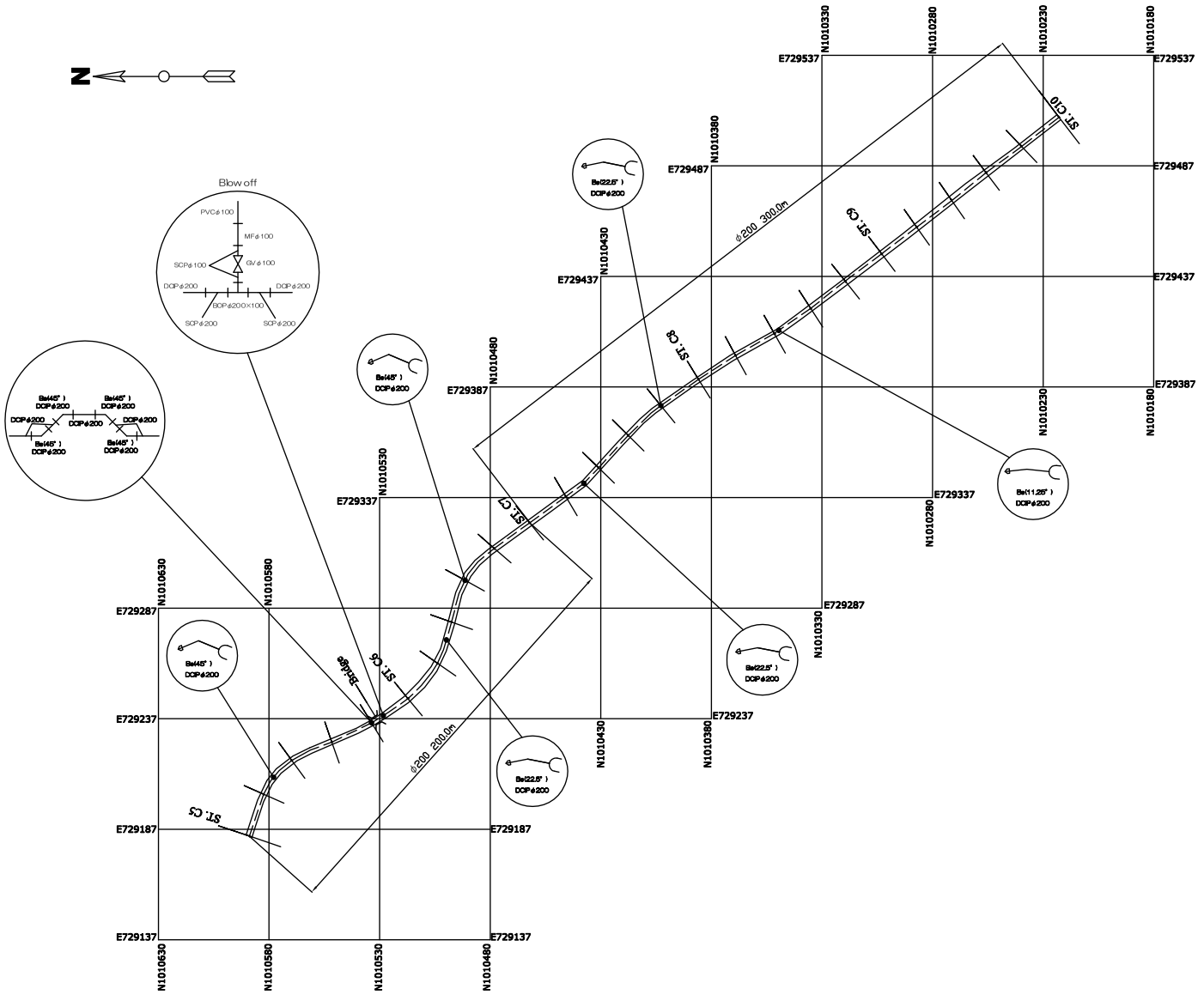
LEGEND			
PVC	Vinyl Pipe	Be	Bend
DCIP	ダクタイル鋳鉄管	Re	Reducer
SCP	Steel Comection Pieace	Sa	Saddle
		T	Tee
AV	Air Valve		
BOP	Blow Off Pipe	Wt	Water Tank
M	Metar		
MF	MF Joint		
GV	Gate Valve		

PROJECT FOR THE ESTABLISHMENT OF
RURAL WATER SUPPLY SYSTEM IN KAMBIA DISTRICT

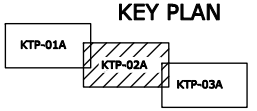
Water Transmission Pipe Plan (Water Treatment Plant-Elevated Tank) KTP-01/A

Scale	Shown in the Drawings		
Date	Oct. 2010	Drowing No.	023

EIGHT-JAPAN ENGINEERING CONSULTANTS INC.



KEY PLAN



LEGEND			
PVC	Vinyl Pipe	Be	Bend
DCIP	ダクタイル鋳鉄管	Re	Reducer
SCP	Steel Comection Pieace	Sa	Saddle
		T	Tee
AV	Air Valve		
BOP	Blow Off Pipe	Wt	Water Tank
M	Meter		
MF	MF Joint		
GV	Gate Valve		

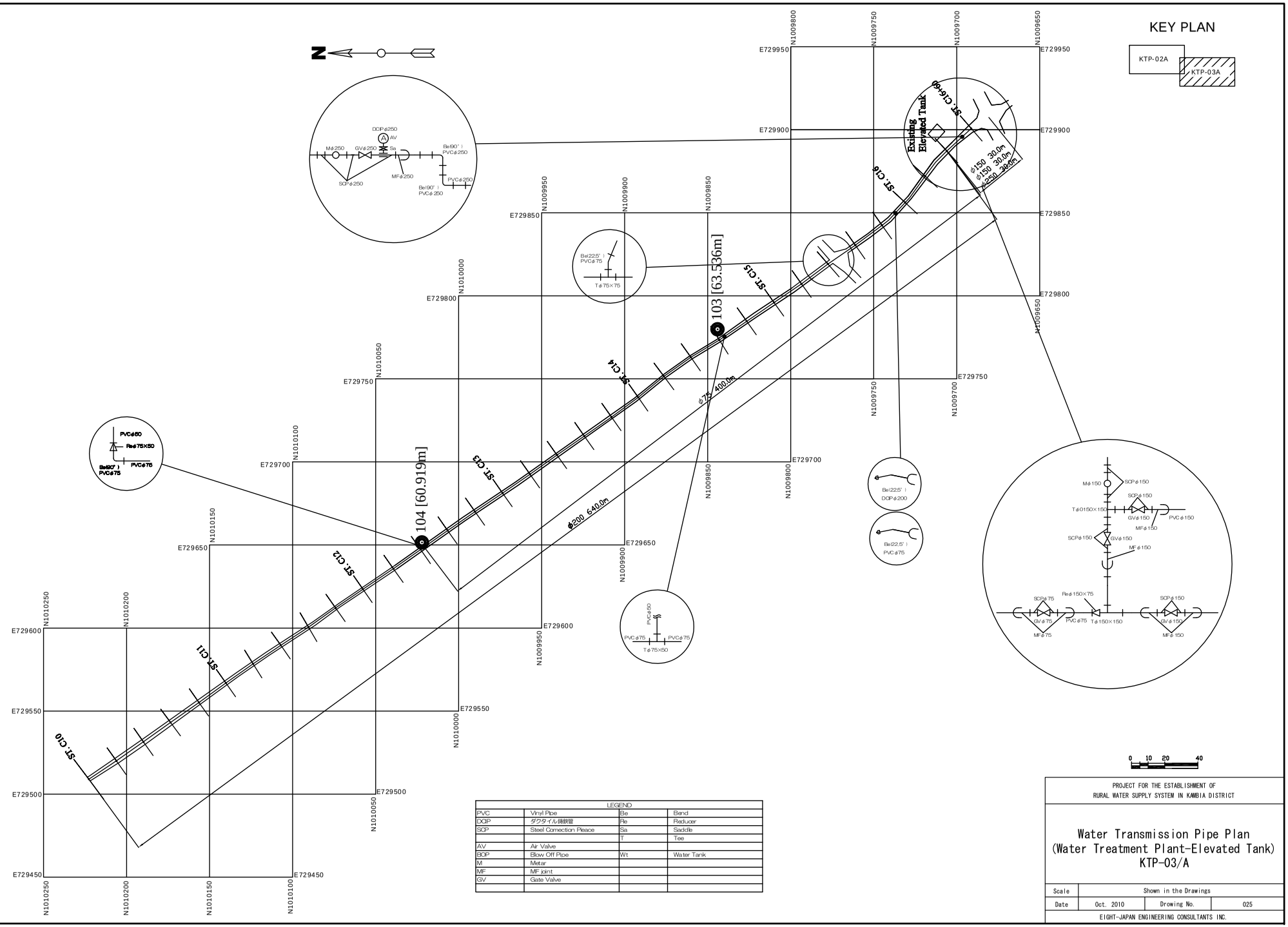
0 10 20 40

PROJECT FOR THE ESTABLISHMENT OF
RURAL WATER SUPPLY SYSTEM IN KAMBIA DISTRICT

Water Transmission Pipe Plan (Water Treatment Plant-Elevated Tank) KTP-02/A

Scale	Shown in the Drawings		
Date	Oct. 2010	Drowing No.	024

EIGHT-JAPAN ENGINEERING CONSULTANTS INC.



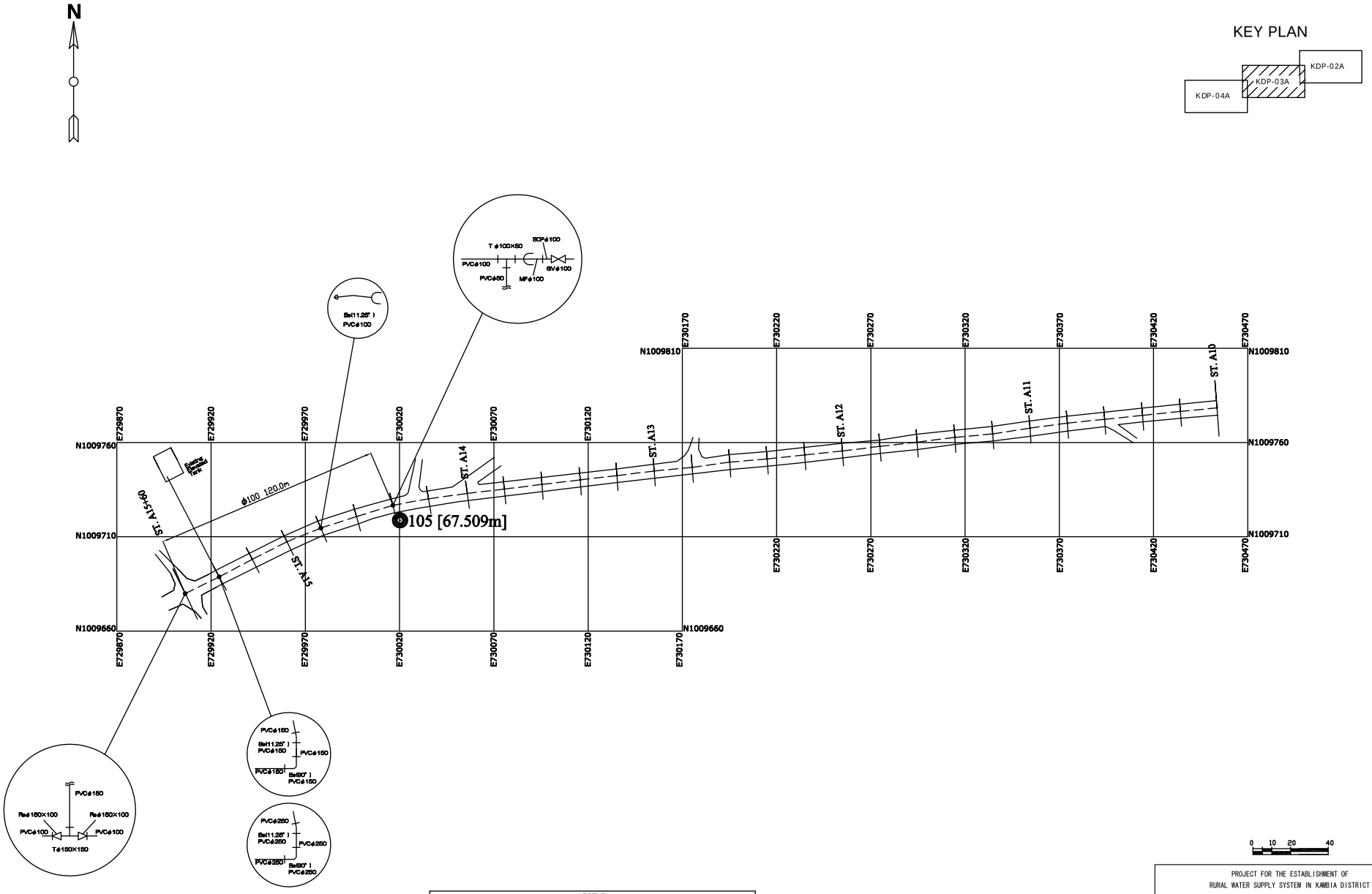
LEGEND			
PVC	Vinyl Pipe	Be	Bend
DCIP	ダクタイル鋳鉄管	Re	Reducer
SCP	Steel Connection Peace	Sa	Saddle
		T	Tee
AV	Air Valve		
BOP	Blow Off Pipe	Wt	Water Tank
M	Metar		
MF	MF joint		
GV	Gate Valve		

PROJECT FOR THE ESTABLISHMENT OF
RURAL WATER SUPPLY SYSTEM IN KAMBIA DISTRICT

Water Transmission Pipe Plan (Water Treatment Plant-Elevated Tank) KTP-03/A

Scale	Shown in the Drawings		
Date	Oct. 2010	Drowing No.	025

EIGHT-JAPAN ENGINEERING CONSULTANTS INC.



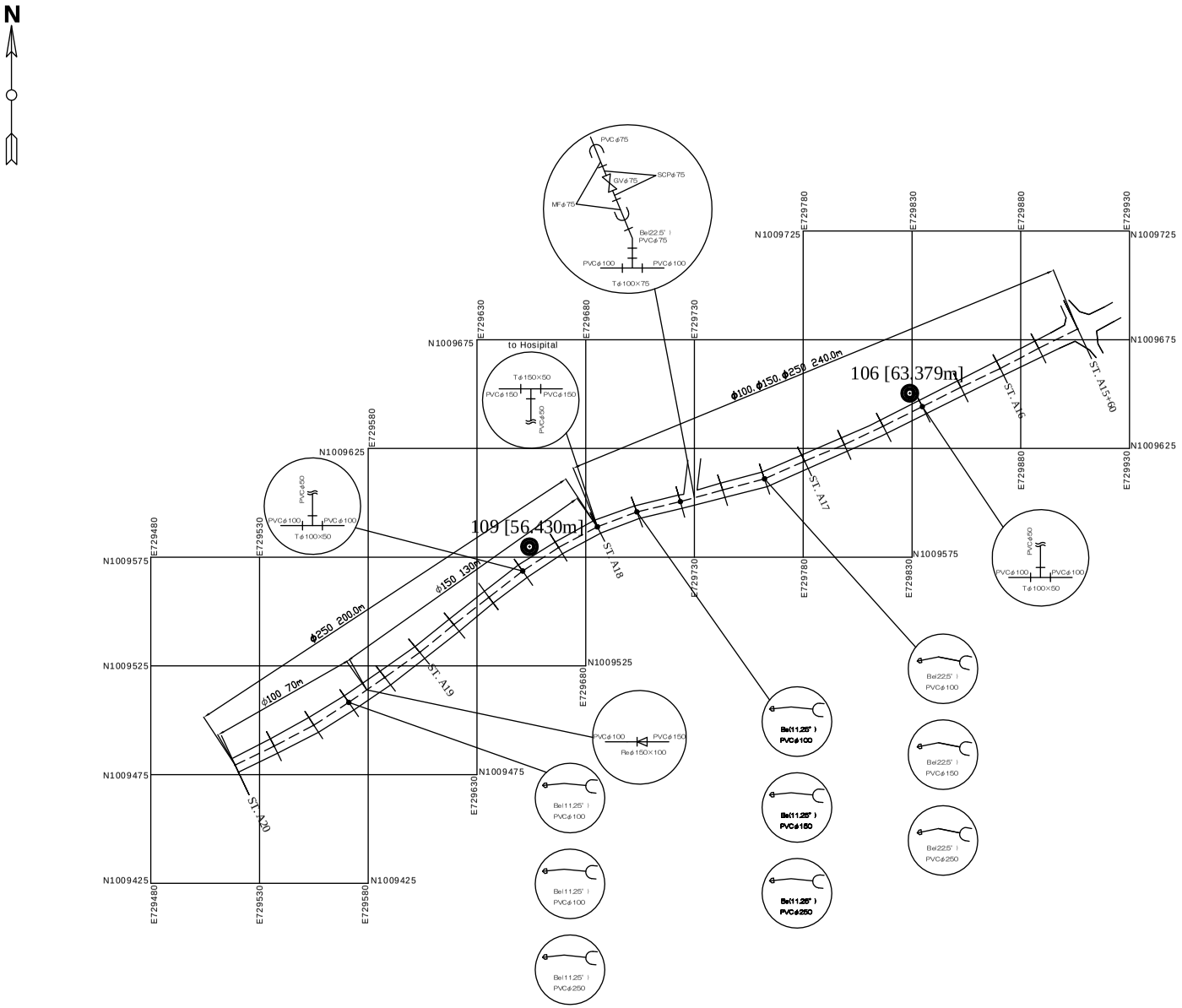
LEGEND			
PVC	Vinyl Pipe	Be	Bend
DCIP	ダクタイル鋳鉄管	Re	Reducer
SCP	Steel Comection Pieace	Sa	Saddle
		T	Tee
AV	Air Valve		
BOP	Blow Off Pipe	Wt	Water Tank
M	Meter		
MF	MF Joint		
GV	Gate Valve		

PROJECT FOR THE ESTABLISHMENT OF
RURAL WATER SUPPLY SYSTEM IN KAMBIA DISTRICT

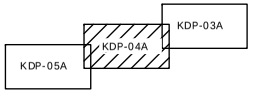
Water Distribution Pipe Plan
KDP-03/A

Scale	Shown in the Drawings		
Date	Oct. 2010	Drowing No.	026

EIGHT-JAPAN ENGINEERING CONSULTANTS INC.



KEY PLAN



LEGEND			
PVC	Vinyl Pipe	Be	Bend
DCIP	ダクタイル鋳鉄管	Re	Reducer
SCP	Steel Comection Pieace	Sa	Saddle
		T	Tee
AV	Air Valve		
BOP	Blow Off Pipe	Wt	Water Tank
M	Metar		
MF	MF Joint		
GV	Gate Valve		

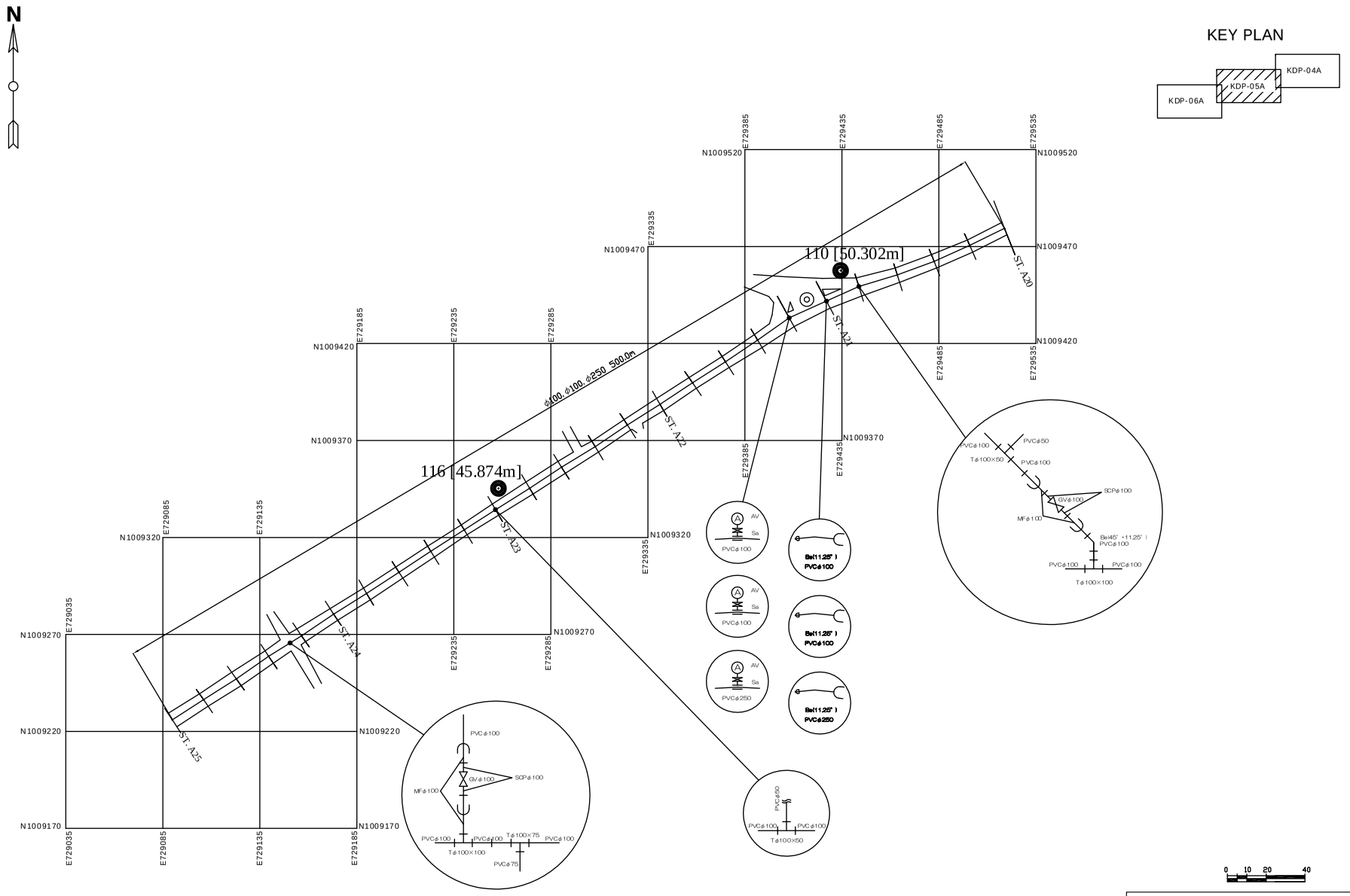
0 10 20 40

PROJECT FOR THE ESTABLISHMENT OF
RURAL WATER SUPPLY SYSTEM IN KAMBIA DISTRICT

Water Distribution Pipe Plan
KDP-04/A

Scale	Shown in the Drawings		
Date	Oct. 2010	Drowing No.	027

EIGHT-JAPAN ENGINEERING CONSULTANTS INC.



LEGEND			
PVC	Vinyl Pipe	Be	Bend
DCIP	ダクタイル鋳鉄管	Re	Reducer
SCP	Steel Comection Pieace	Sa	Saddle
		T	Tee
AV	Air Valve		
BOP	Blow Off Pipe	Wt	Water Tank
M	Metar		
MF	MF Joint		
GV	Gate Valve		

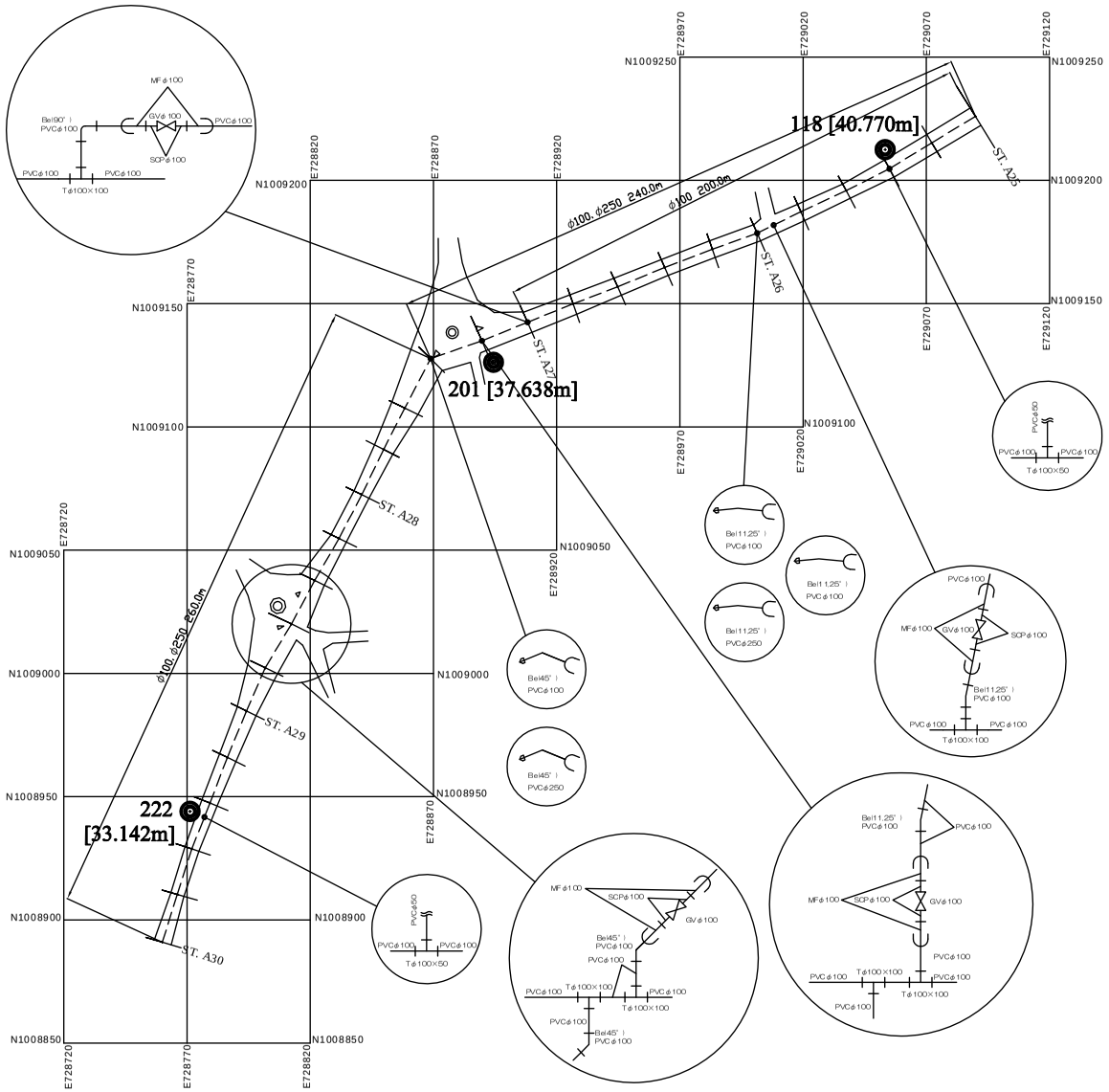
0 10 20 40

PROJECT FOR THE ESTABLISHMENT OF
RURAL WATER SUPPLY SYSTEM IN KAMBIA DISTRICT

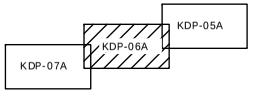
Water Distribution Pipe Plan
KDP-05/A

Scale	Shown in the Drawings		
Date	Oct. 2010	Drowing No.	028

EIGHT-JAPAN ENGINEERING CONSULTANTS INC.



KEY PLAN



LEGEND			
PVC	Vinyl Pipe	Be	Bend
DCIP	ダクタイル鋳鉄管	Re	Reducer
SCP	Steel Comection Pieace	Sa	Saddle
		T	Tee
AV	Air Valve		
BOP	Blow Off Pipe	Wt	Water Tank
M	Metar		
MF	MF Joint		
GV	Gate Valve		

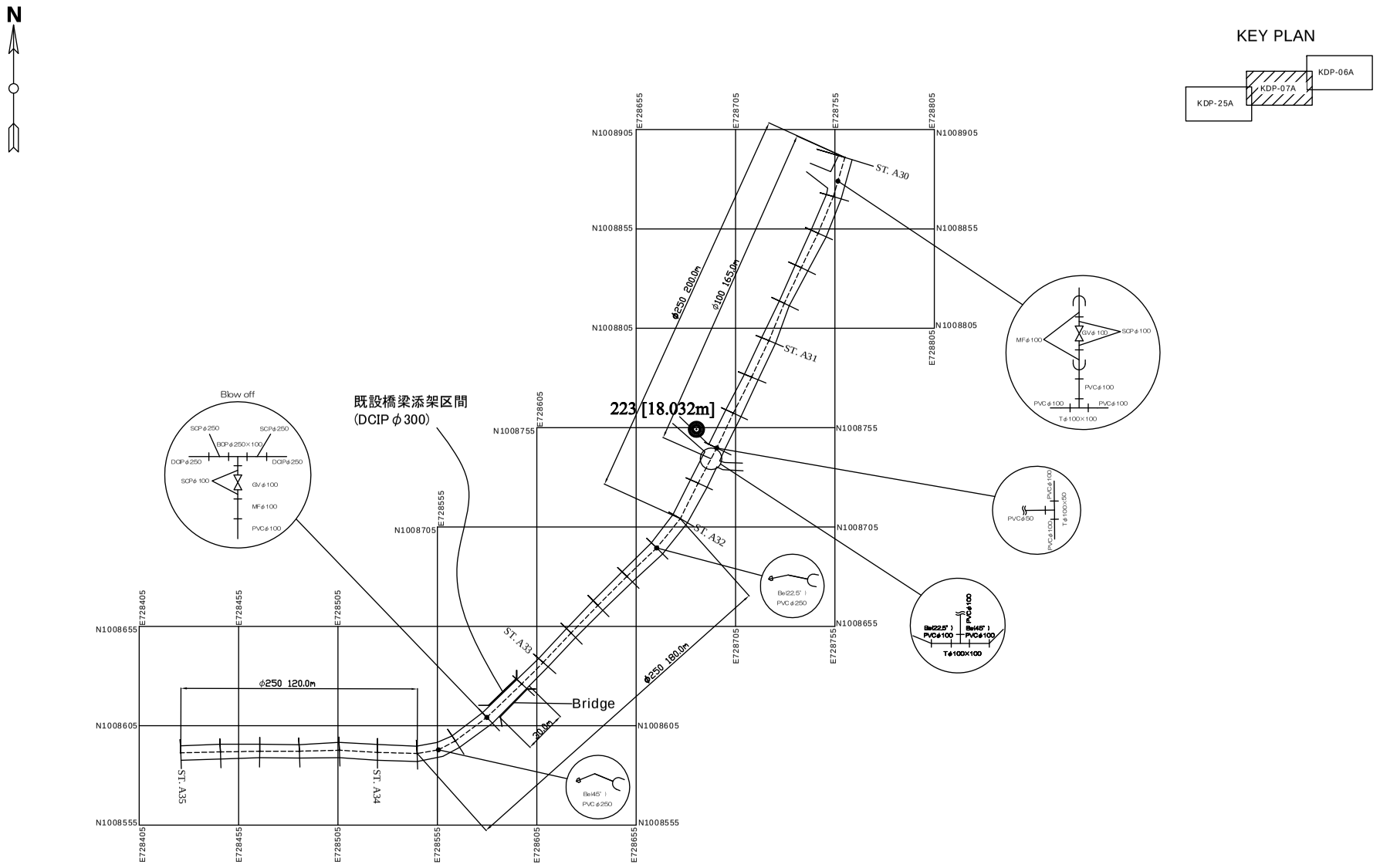
0 10 20 40

PROJECT FOR THE ESTABLISHMENT OF
RURAL WATER SUPPLY SYSTEM IN KAMBIA DISTRICT

Water Distribution Pipe Plan
KDP-06/A

Scale	Shown in the Drawings		
Date	Oct. 2010	Drowing No.	029

EIGHT-JAPAN ENGINEERING CONSULTANTS INC.



LEGEND			
PVC	Vinyl Pipe	Be	Bend
DCIP	ダクタイル鋳鉄管	Re	Reducer
SCP	Steel Comection Pieace	Sa	Saddle
		T	Tee
AV	Air Valve		
BOP	Blow Off Pipe	Wt	Water Tank
M	Metar		
MF	MF Joint		
GV	Gate Valve		

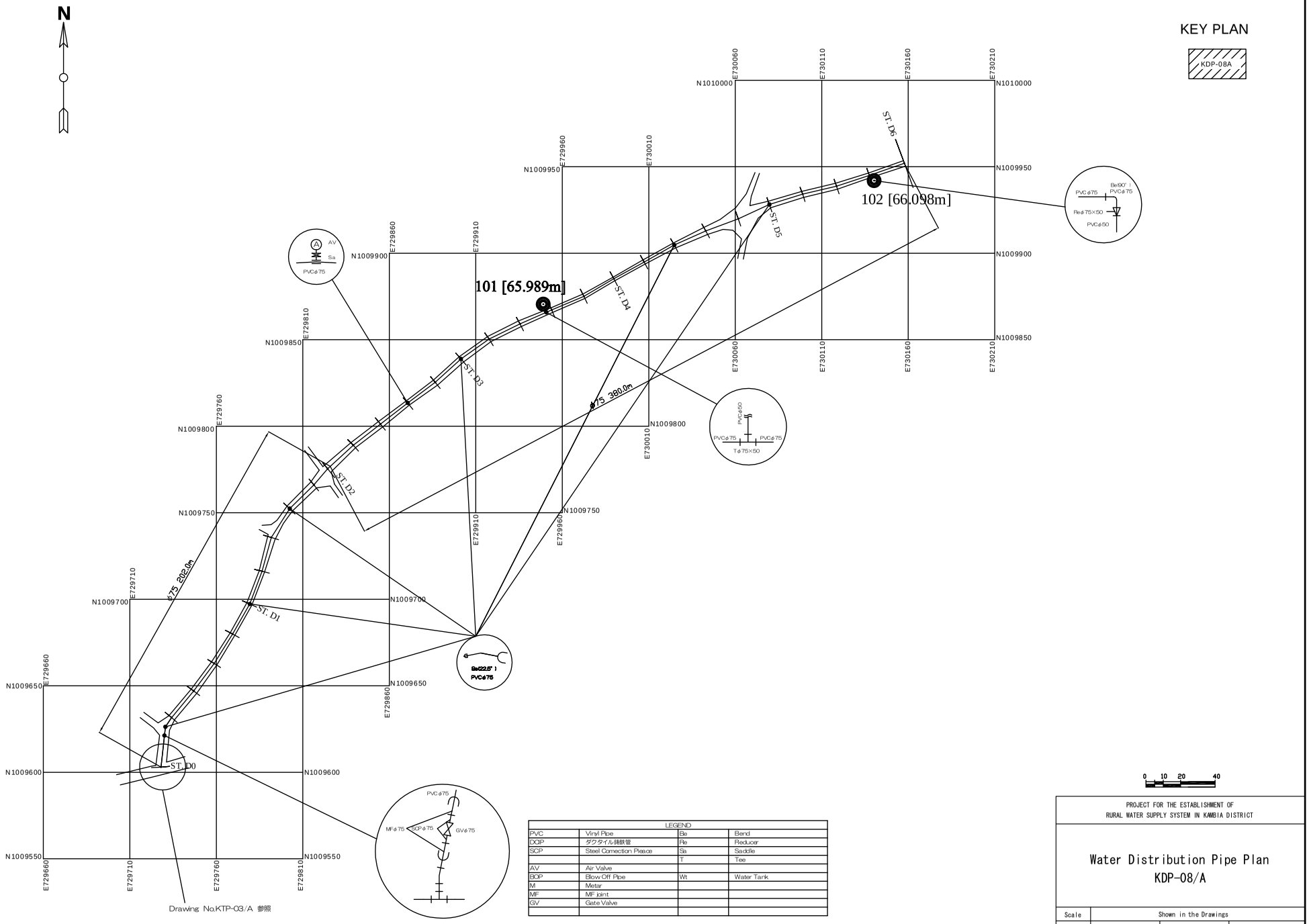
0 10 20 40

PROJECT FOR THE ESTABLISHMENT OF
RURAL WATER SUPPLY SYSTEM IN KAMBIA DISTRICT

Water Distribution Pipe Plan
KDP-07/A

Scale	Shown in the Drawings		
Date	Oct. 2010	Drowing No.	030

EIGHT-JAPAN ENGINEERING CONSULTANTS INC.



LEGEND			
PVC	Vinyl Pipe	Be	Bend
DCIP	ダクタイル鋳鉄管	Re	Reducer
SCP	Steel Connection Piece	Sa	Saddle
		T	Tee
AV	Air Valve		
BOP	Blow Off Pipe	Wt	Water Tank
M	Meter		
MF	MF joint		
GV	Gate Valve		

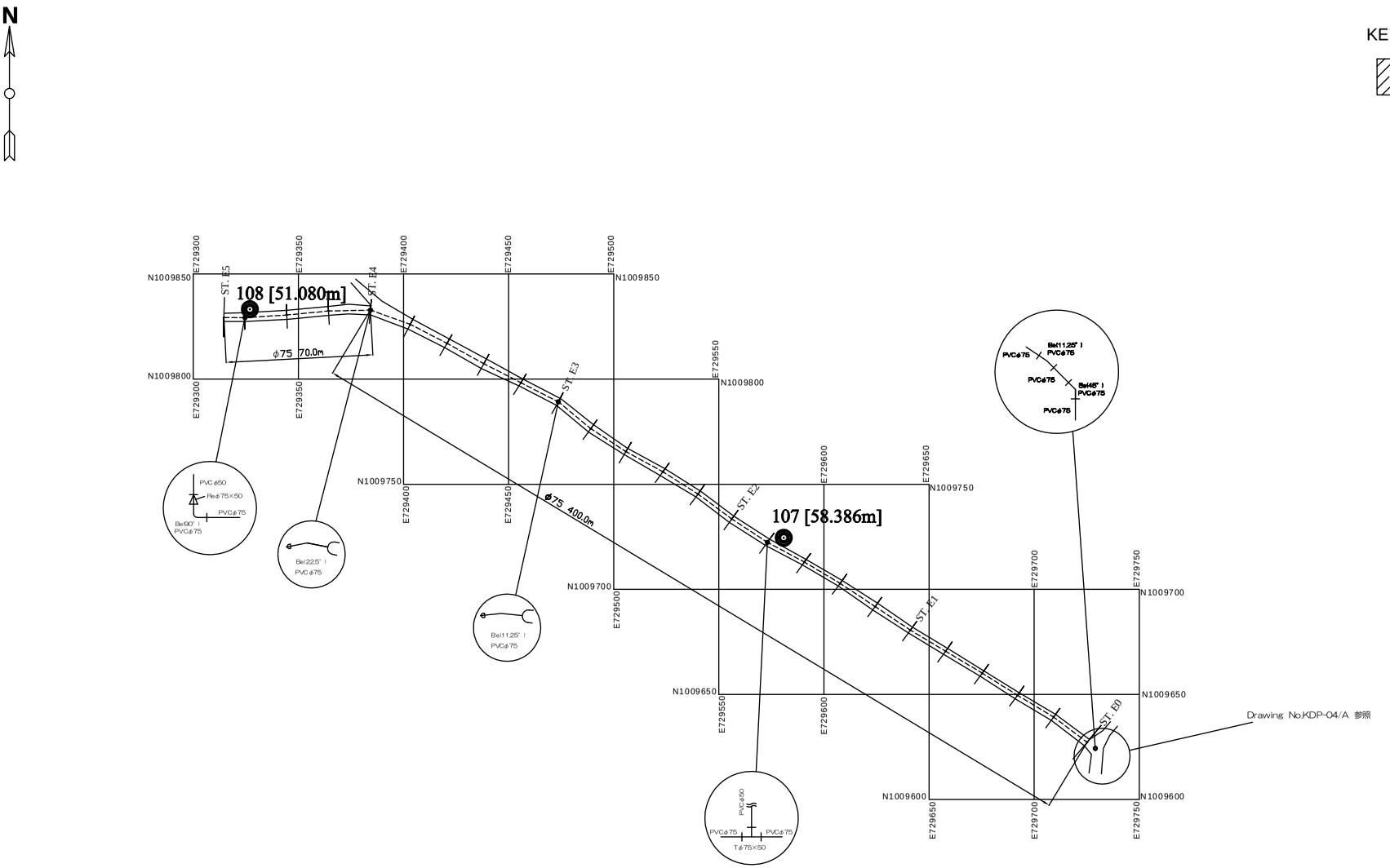
0 10 20 40

PROJECT FOR THE ESTABLISHMENT OF
RURAL WATER SUPPLY SYSTEM IN KAMBIA DISTRICT

Water Distribution Pipe Plan
KDP-08/A

Scale	Shown in the Drawings		
Date	Oct. 2010	Drowing No.	031

EIGHT-JAPAN ENGINEERING CONSULTANTS INC.



LEGEND			
PVC	Vinyl Pipe	Be	Bend
DCIP	ダクタイル鋳鉄管	Re	Reducer
SCP	Steel Comection Pieace	Sa	Saddle
		T	Tee
AV	Air Valve		
BOP	Blow Off Pipe	Wt	Water Tank
M	Metar		
MF	MF Joint		
GV	Gate Valve		

PROJECT FOR THE ESTABLISHMENT OF
RURAL WATER SUPPLY SYSTEM IN KAMBIA DISTRICT

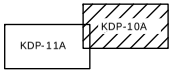
Water Distribution Pipe Plan
KDP-09/A

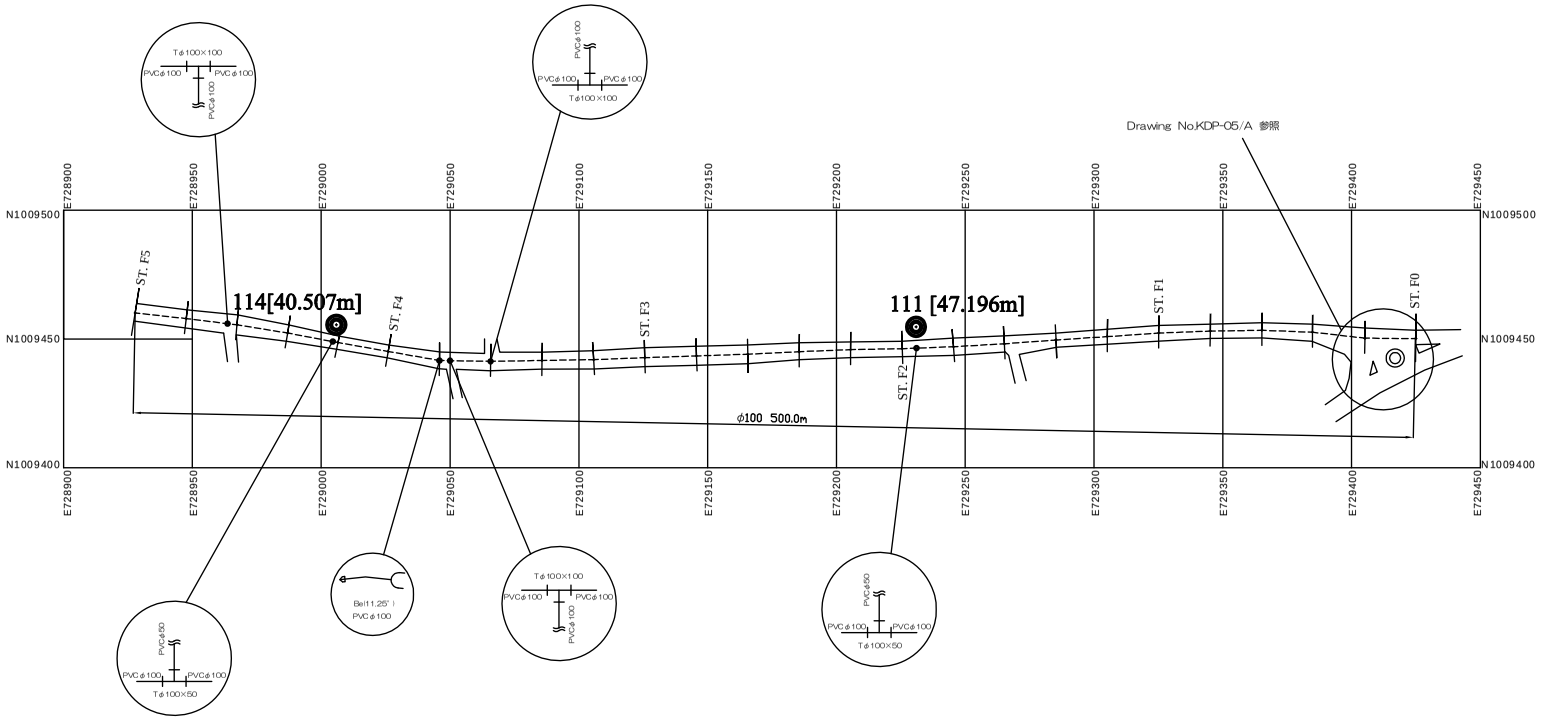
Scale	Shown in the Drawings		
Date	Oct. 2010	Drowing No.	032

EIGHT-JAPAN ENGINEERING CONSULTANTS INC.

N

KEY PLAN





LEGEND			
PVC	Vinyl Pipe	Be	Bend
DCIP	ダクタイル鋳鉄管	Re	Reducer
SCP	Steel Comection Pieace	Sa	Saddle
		T	Tee
AV	Air Valve		
BOP	Blow Off Pipe	Wt	Water Tank
M	Metar		
MF	MF Joint		
GV	Gate Valve		

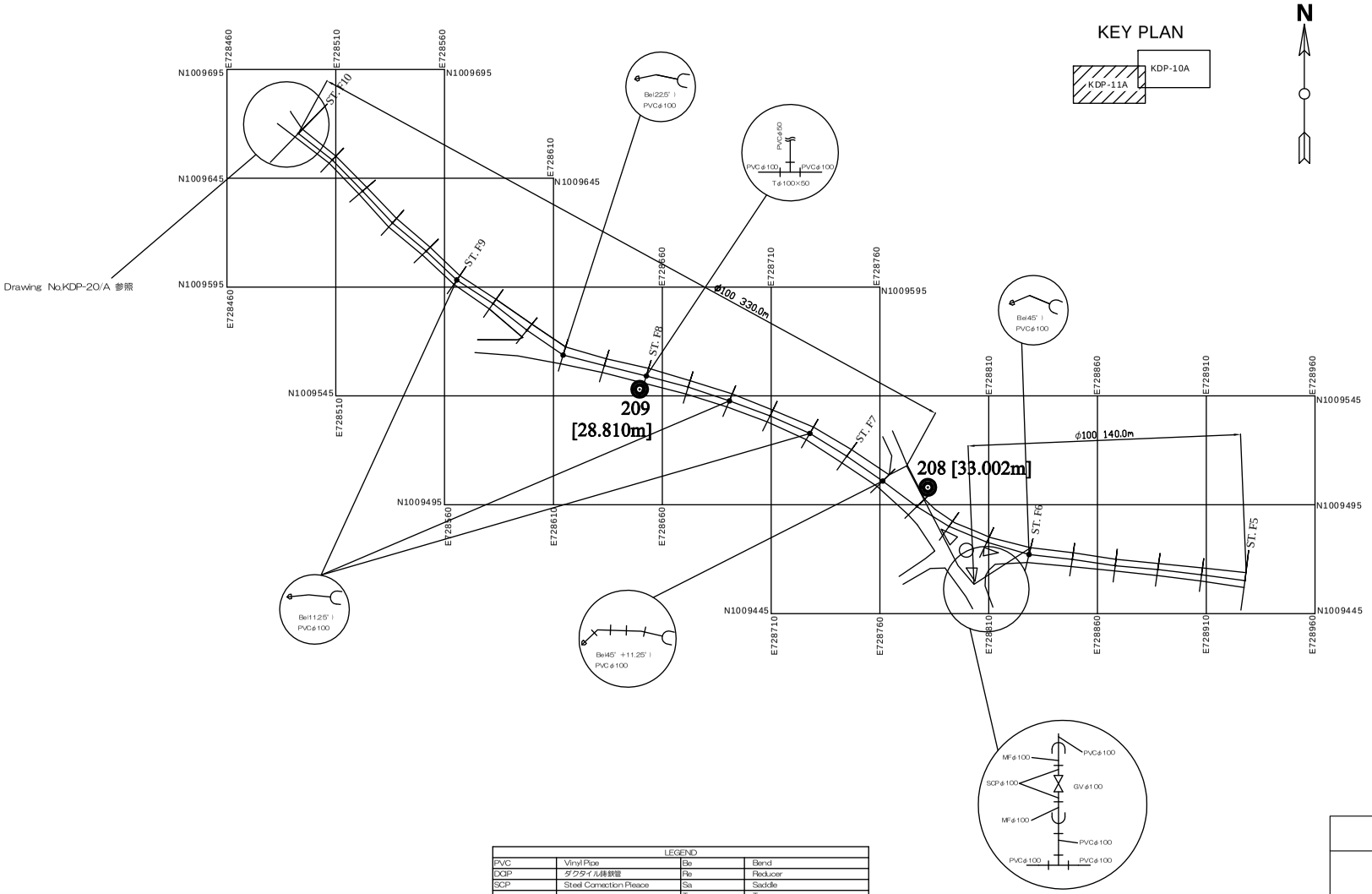
0 10 20 40

PROJECT FOR THE ESTABLISHMENT OF
RURAL WATER SUPPLY SYSTEM IN KAMBIA DISTRICT

Water Distribution Pipe Plan
KDP-10/A

Scale	Shown in the Drawings		
Date	Oct. 2010	Drowing No.	033

EIGHT-JAPAN ENGINEERING CONSULTANTS INC.



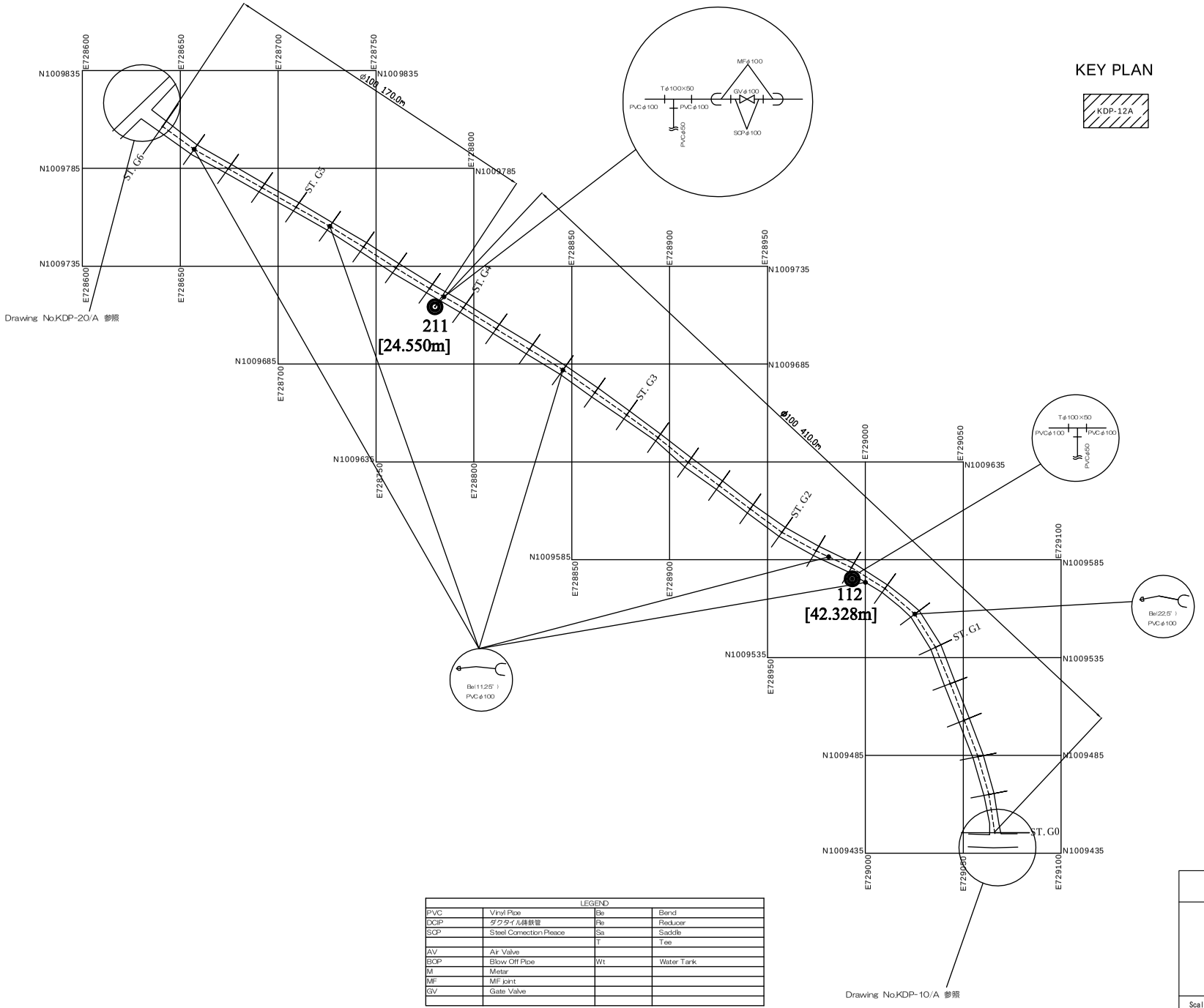
LEGEND			
PVC	Vinyl Pipe	Be	Bend
DCIP	ダクタイル鋳鉄管	Re	Reducer
SCP	Steel Comection Pieace	Sa	Saddle
		T	Tee
AV	Air Valve		
BOP	Blow Off Pipe	Wt	Water Tank
M	Metar		
MF	MF Joint		
GV	Gate Valve		

PROJECT FOR THE ESTABLISHMENT OF
RURAL WATER SUPPLY SYSTEM IN KAMBIA DISTRICT

Water Distribution Pipe Plan
KDP-11/A

Scale	Shown in the Drawings		
Date	Oct. 2010	Drowing No.	034

EIGHT-JAPAN ENGINEERING CONSULTANTS INC.



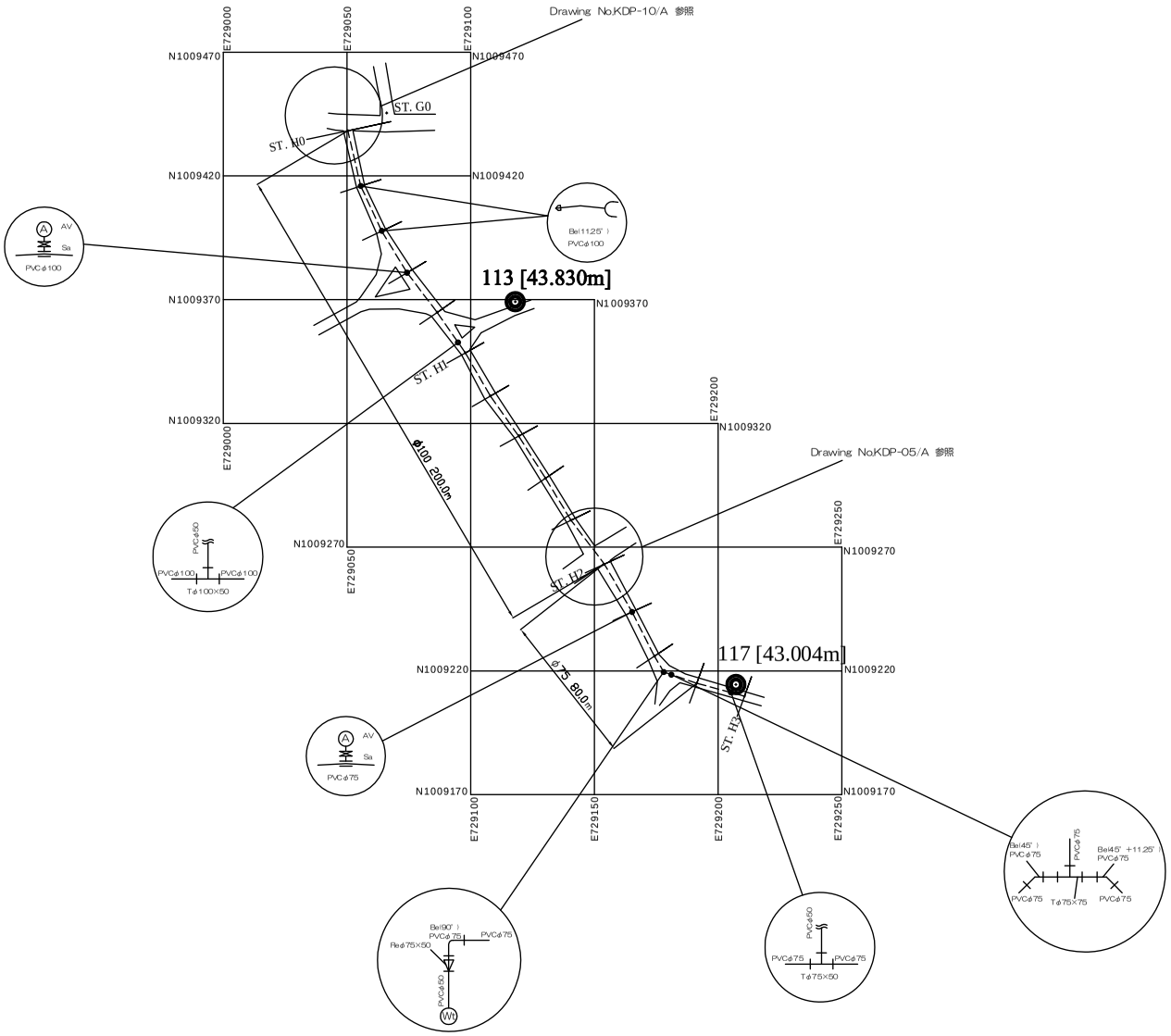
LEGEND			
PVC	Vinyl Pipe	Be	Bend
DCIP	ダクタイル鋳鉄管	Re	Reducer
SCP	Steel Connection Peace	Sa	Saddle
		T	Tee
AV	Air Valve		
BOP	Blow Off Pipe	Wt	Water Tank
M	Metar		
MF	MF joint		
GV	Gate Valve		

PROJECT FOR THE ESTABLISHMENT OF
RURAL WATER SUPPLY SYSTEM IN KAMBIA DISTRICT

Water Distribution Pipe Plan
KDP-12/A

Scale	Shown in the Drawings		
Date	Oct. 2010	Drowing No.	035

EIGHT-JAPAN ENGINEERING CONSULTANTS INC.



KEY PLAN

LEGEND			
PVC	Vinyl Pipe	Be	Bend
DCIP	ダクタイル鋳鉄管	Re	Reducer
SCP	Steel Connection Peace	Sa	Saddle
		T	Tee
AV	Air Valve		
BOP	Blow Off Pipe	Wt	Water Tank
M	Metar		
MF	MF joint		
GV	Gate Valve		

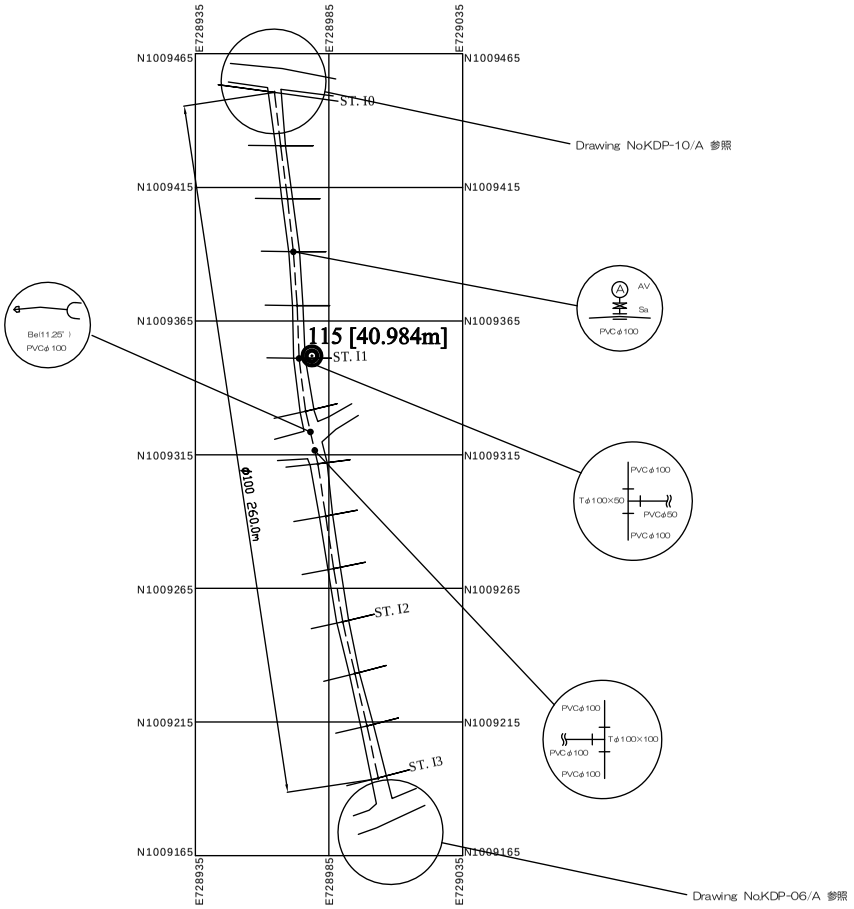
0 10 20 40

PROJECT FOR THE ESTABLISHMENT OF
RURAL WATER SUPPLY SYSTEM IN KAMBIA DISTRICT

Water Distribution Pipe Plan
KDP-13/A

Scale	Shown in the Drawings		
Date	Oct. 2010	Drowing No.	036

EIGHT-JAPAN ENGINEERING CONSULTANTS INC.



KEY PLAN

LEGEND			
PVC	Vinyl Pipe	Be	Bend
DCIP	ダクタイル鋳鉄管	Re	Reducer
SCP	Steel Connection Peace	Sa	Saddle
		T	Tee
AV	Air Valve		
BOP	Blow Off Pipe	Wt	Water Tank
M	Metar		
MF	MF joint		
GV	Gate Valve		

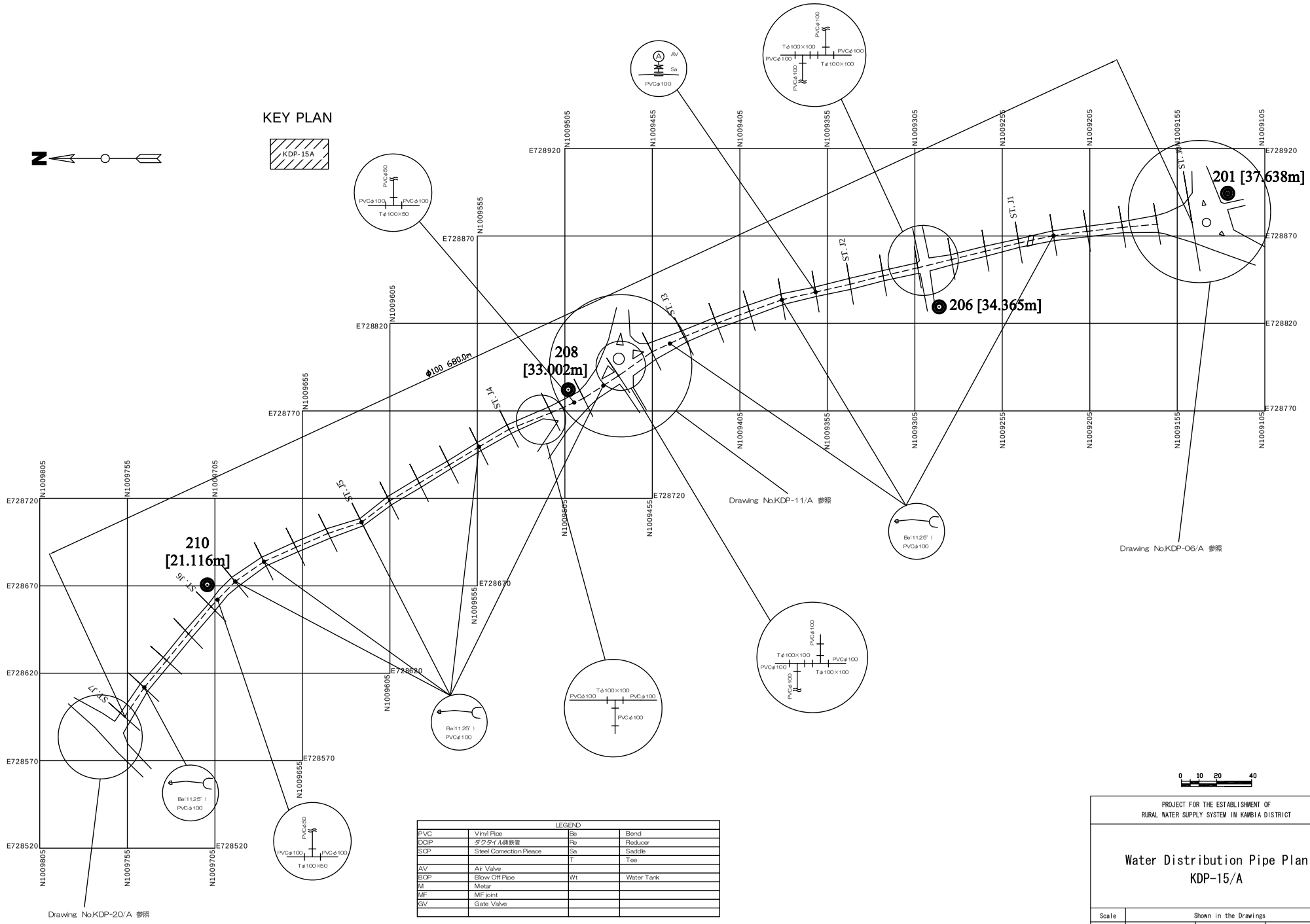
0 10 20 40

PROJECT FOR THE ESTABLISHMENT OF
RURAL WATER SUPPLY SYSTEM IN KAMBIA DISTRICT

Water Distribution Pipe Plan
KDP-14/A

Scale	Shown in the Drawings		
Date	Oct. 2010	Drowing No.	037

EIGHT-JAPAN ENGINEERING CONSULTANTS INC.



LEGEND			
PVC	Vinyl Pipe	Be	Bend
DCIP	ダクタイル鋳鉄管	Re	Reducer
SCP	Steel Correction Peace	Sa	Saddle
		T	Tee
AV	Air Valve		
BOP	Blow Off Pipe	Wt	Water Tank
M	Metar		
MF	MF joint		
GV	Gate Valve		

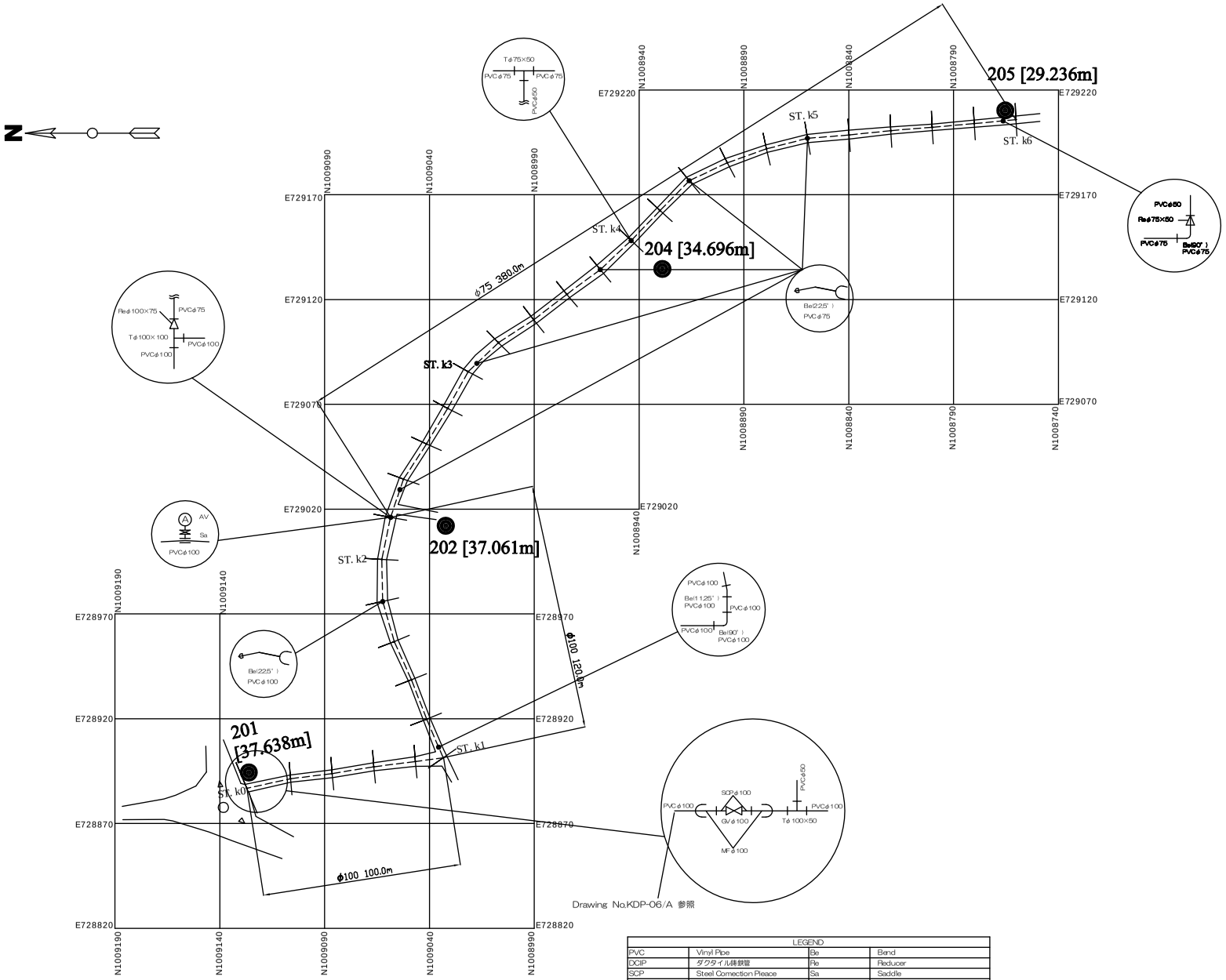
0 10 20 40

PROJECT FOR THE ESTABLISHMENT OF
RURAL WATER SUPPLY SYSTEM IN KAMBIA DISTRICT

Water Distribution Pipe Plan
KDP-15/A

Scale	Shown in the Drawings		
Date	Oct. 2010	Drowing No.	038

EIGHT-JAPAN ENGINEERING CONSULTANTS INC.



KEY PLAN

LEGEND			
PVC	Vinyl Pipe	Be	Bend
DCIP	ダクタイル鋳鉄管	Re	Reducer
SCP	Steel Comection Peace	Sa	Saddle
		T	Tee
AV	Air Valve		
BOP	Blow Off Pipe	Wt	Water Tank
M	Metar		
MF	MF joint		
GV	Gate Valve		

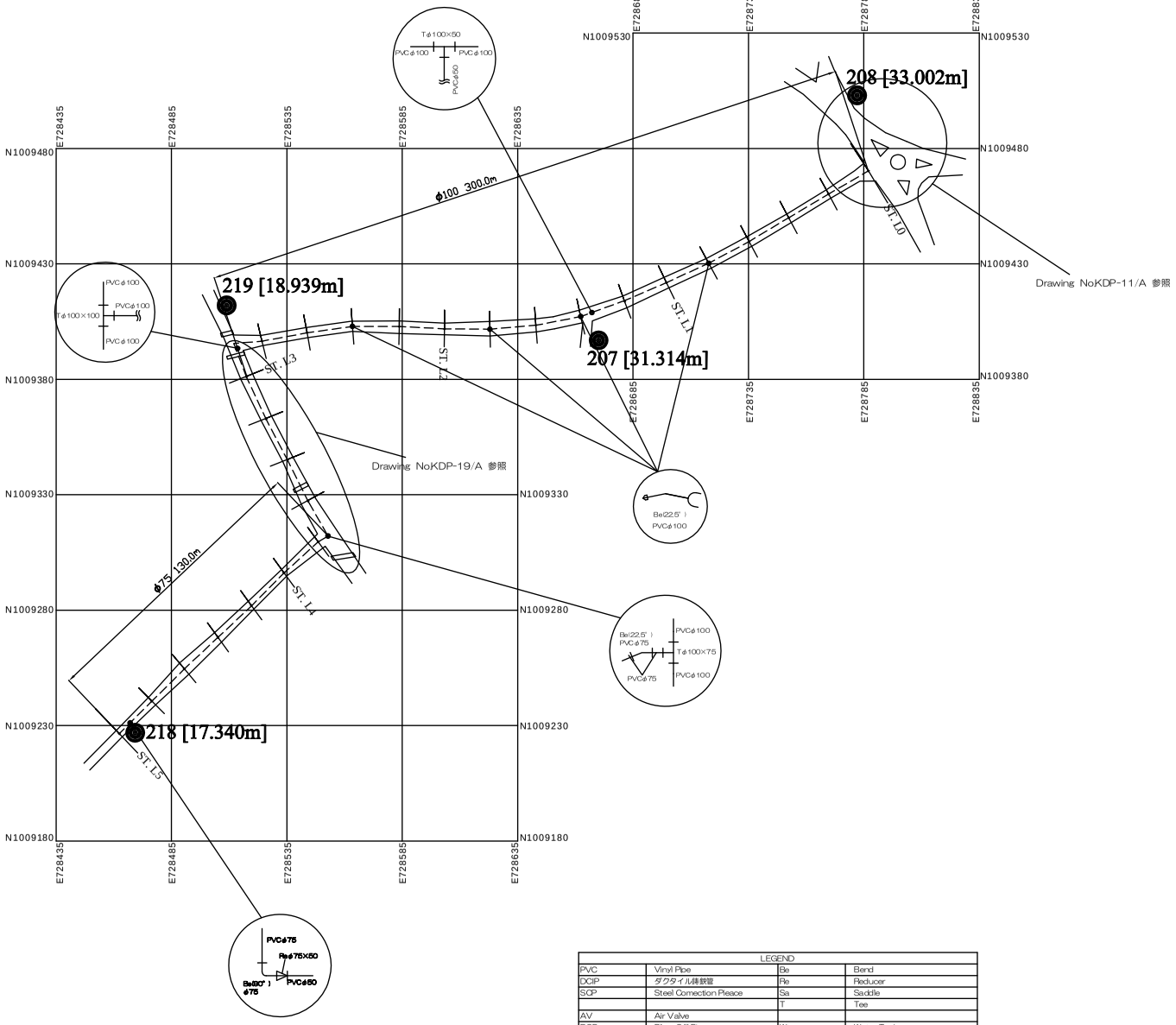
0 10 20 40

PROJECT FOR THE ESTABLISHMENT OF
RURAL WATER SUPPLY SYSTEM IN KAMBIA DISTRICT

Water Distribution Pipe Plan
KDP-16/A

Scale	Shown in the Drawings		
Date	Oct. 2010	Drowing No.	039

EIGHT-JAPAN ENGINEERING CONSULTANTS INC.



KEY PLAN

LEGEND			
PVC	Vinyl Pipe	Be	Bend
DCIP	ダクタイル鋳鉄管	Re	Reducer
SCP	Steel Comection Peace	Sa	Saddle
		T	Tee
AV	Air Valve		
BOP	Blow Off Pipe	Wt	Water Tank
M	Metar		
MF	MF joint		
GV	Gate Valve		

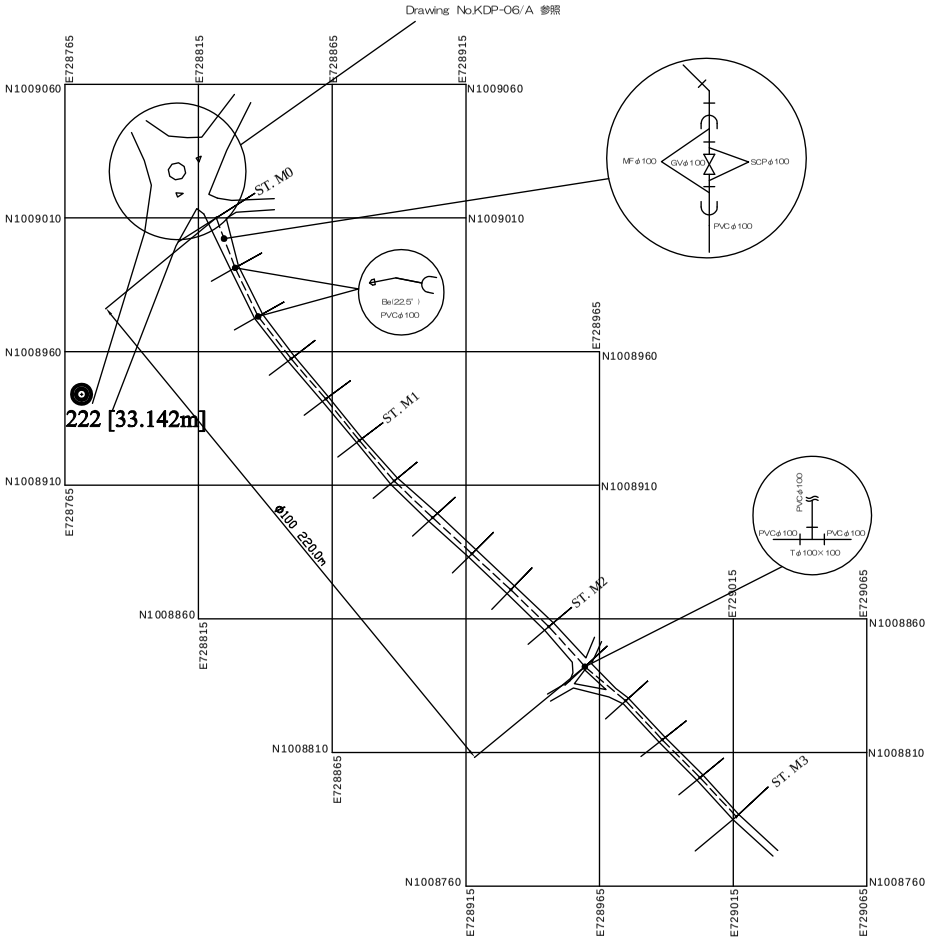
0 10 20 40

PROJECT FOR THE ESTABLISHMENT OF
RURAL WATER SUPPLY SYSTEM IN KAMBIA DISTRICT

Water Distribution Pipe Plan
KDP-17/A

Scale	Shown in the Drawings		
Date	Oct. 2010	Drowing No.	040

EIGHT-JAPAN ENGINEERING CONSULTANTS INC.



KEY PLAN

LEGEND			
PVC	Vinyl Pipe	Be	Bend
DCIP	ダクタイル鋳鉄管	Re	Reducer
SCP	Steel Connection Peace	Sa	Saddle
		T	Tee
AV	Air Valve		
BOP	Blow Off Pipe	Wt	Water Tank
M	Metar		
MF	MF joint		
GV	Gate Valve		

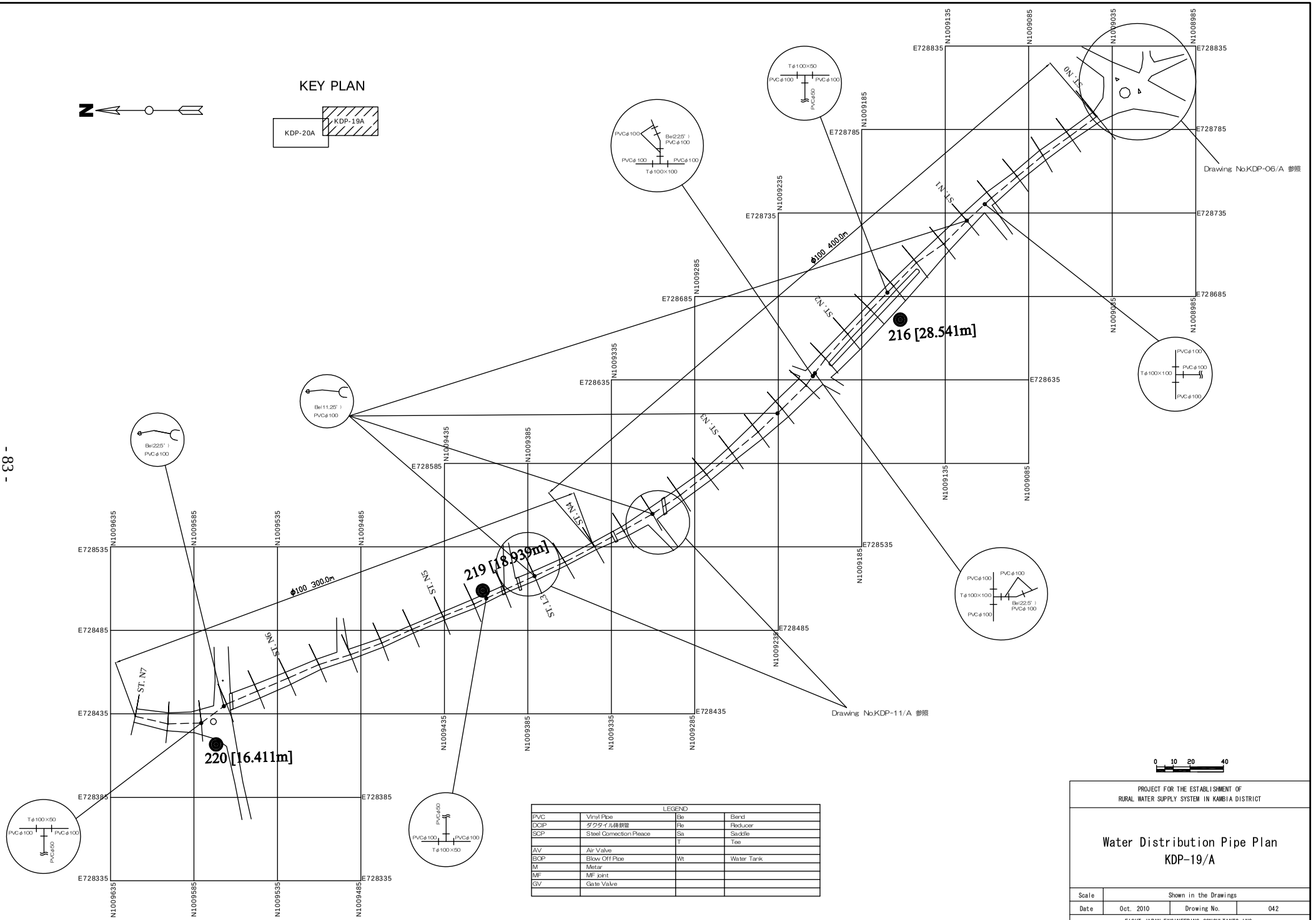
0 10 20 40

PROJECT FOR THE ESTABLISHMENT OF
RURAL WATER SUPPLY SYSTEM IN KAMBIA DISTRICT

Water Distribution Pipe Plan
KDP-18/A

Scale	Shown in the Drawings		
Date	Oct. 2010	Drowing No.	041

EIGHT-JAPAN ENGINEERING CONSULTANTS INC.



LEGEND			
PVC	Vinyl Pipe	Be	Bend
DCIP	ダクタイル鋳鉄管	Re	Reducer
SCP	Steel Comection Peace	Sa	Saddle
		T	Tee
AV	Air Valve		
BOP	Blow Off Pipe	Wt	Water Tank
M	Metar		
MF	MF Joint		
GV	Gate Valve		

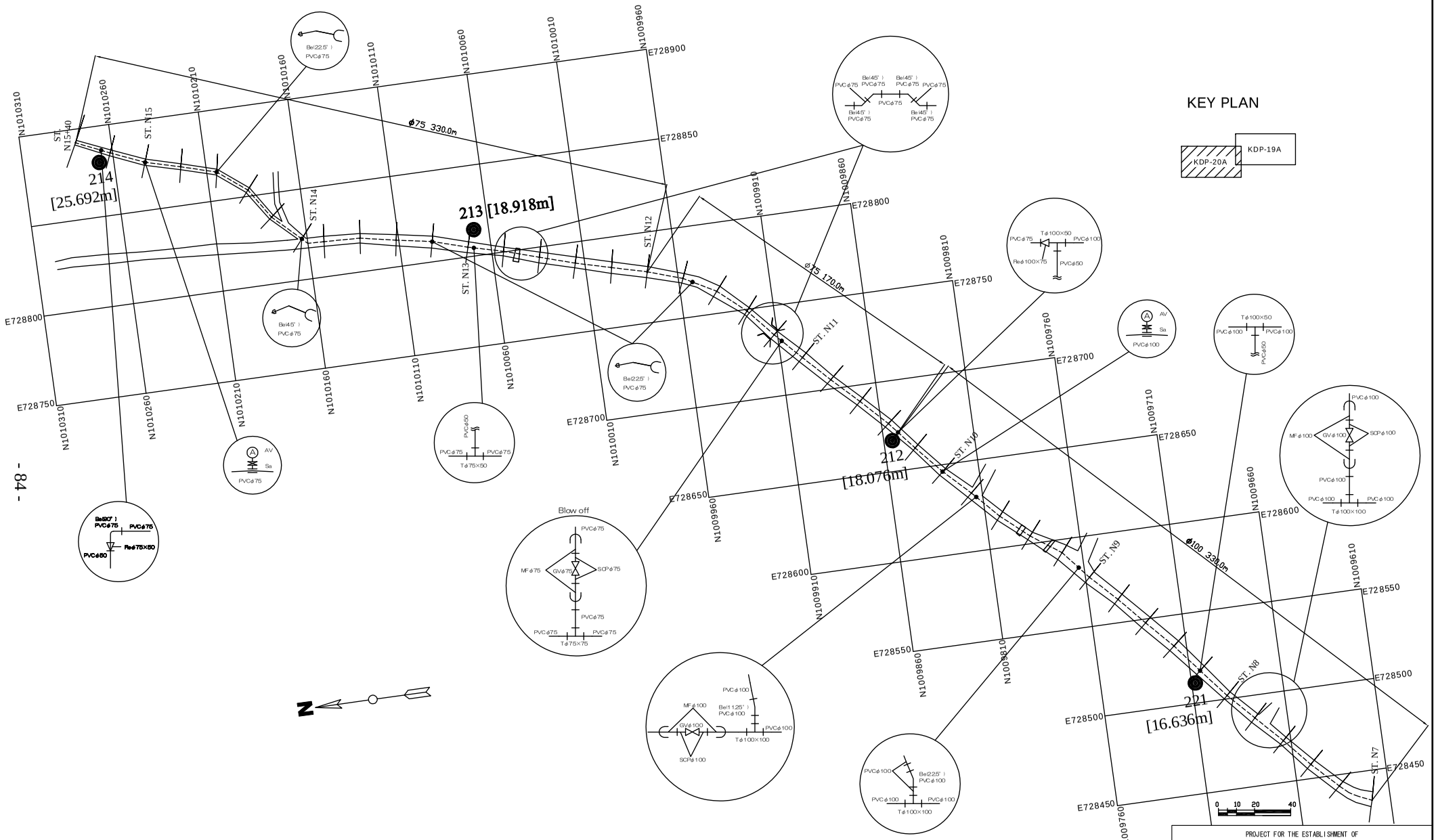
0 10 20 40

PROJECT FOR THE ESTABLISHMENT OF
RURAL WATER SUPPLY SYSTEM IN KAMBIA DISTRICT

Water Distribution Pipe Plan
KDP-19/A

Scale	Shown in the Drawings		
Date	Oct. 2010	Drowing No.	042

EIGHT-JAPAN ENGINEERING CONSULTANTS INC.



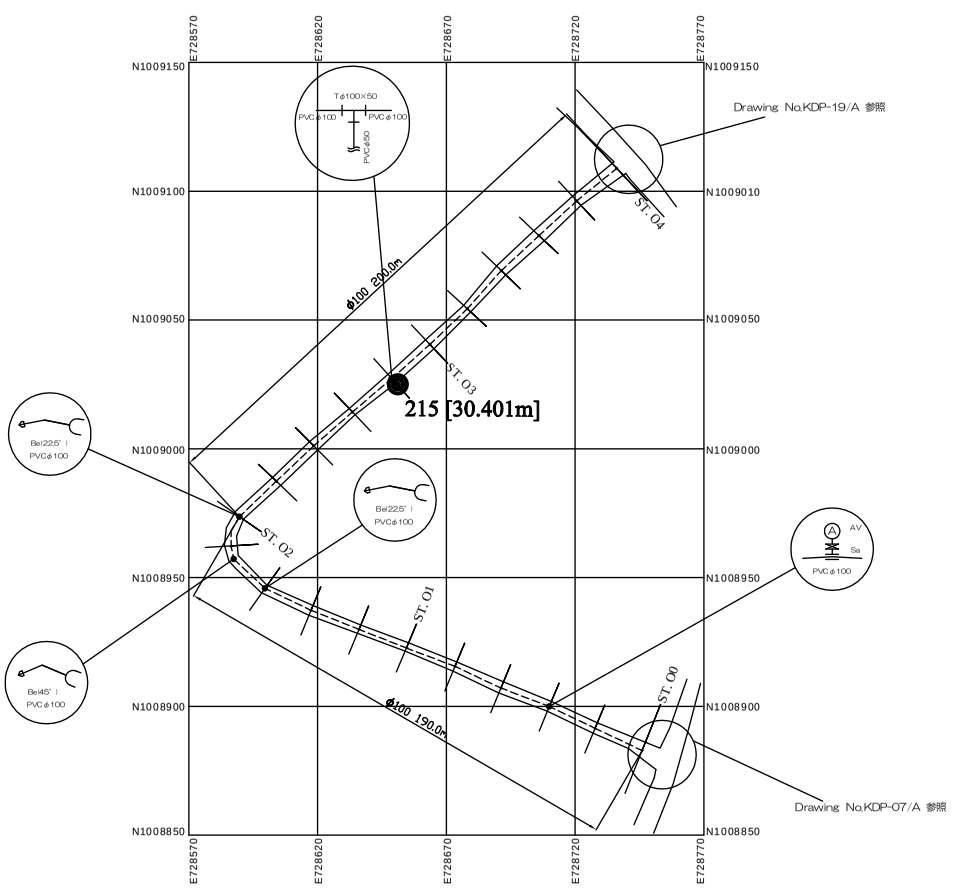
LEGEND			
PVC	Vinyl Pipe	Be	Bend
DCIP	ダクタイル鋳鉄管	Re	Reducer
SCP	Steel Correction Preace	Sa	Saddle
		T	Tee
AV	Air Valve		
BOP	Blow Off Pipe	Wt	Water Tank
M	Metar		
MF	MF joint		
GV	Gate Valve		

PROJECT FOR THE ESTABLISHMENT OF
RURAL WATER SUPPLY SYSTEM IN KAMBIA DISTRICT

Water Distribution Pipe Plan
KDP-20/A

Scale	Shown in the Drawings		
Date	Oct. 2010	Drowing No.	043

EIGHT-JAPAN ENGINEERING CONSULTANTS INC.



KEY PLAN

LEGEND			
PVC	Vinyl Pipe	Be	Bend
DCIP	ダクタイル鋳鉄管	Re	Reducer
SCP	Steel Comection Pieace	Sa	Saddle
		T	Tee
AV	Air Valve		
BOP	Blow Off Pipe	Wt	Water Tank
M	Metar		
MF	MF Joint		
GV	Gate Valve		

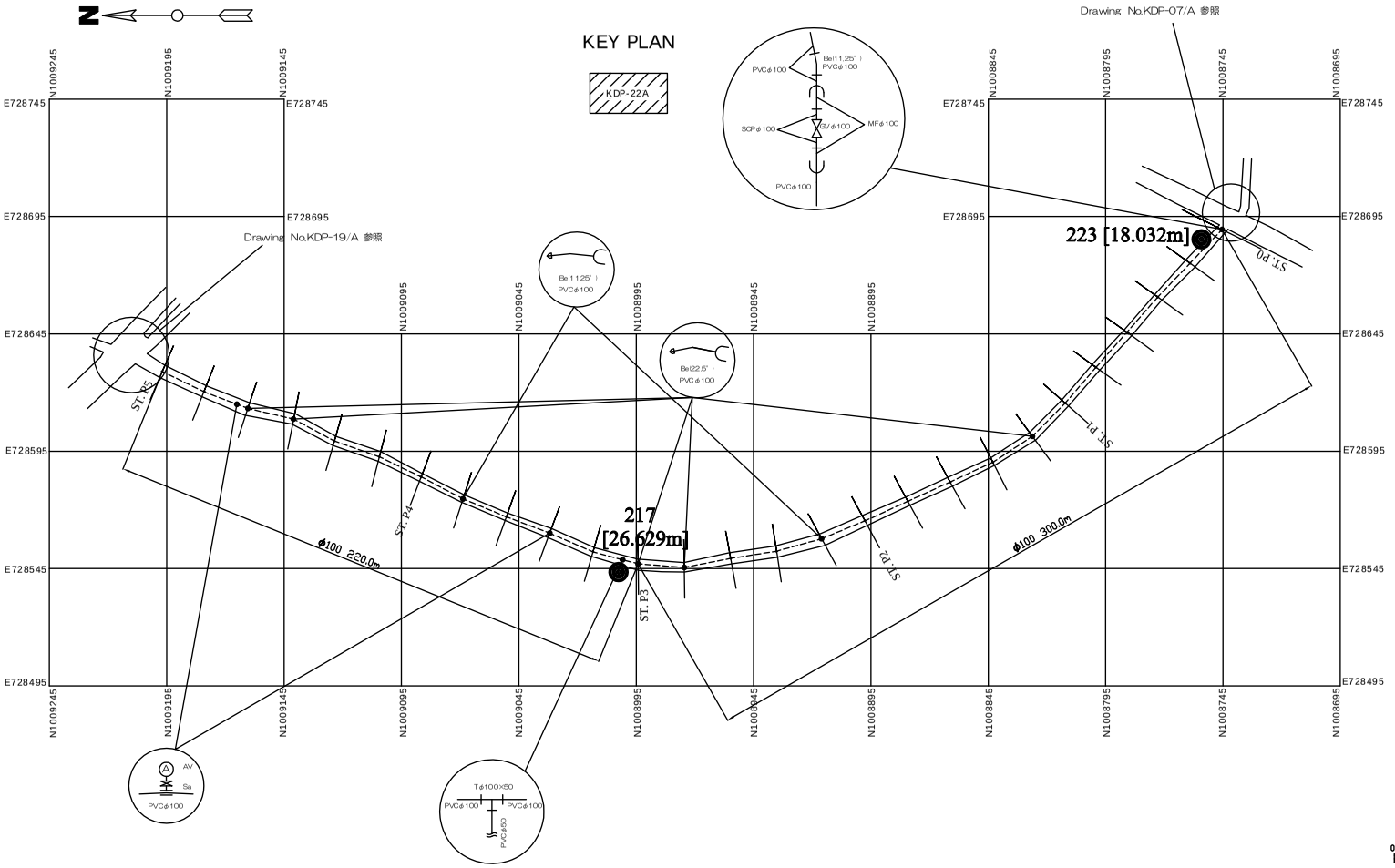
0 10 20 40

PROJECT FOR THE ESTABLISHMENT OF
RURAL WATER SUPPLY SYSTEM IN KAMBIA DISTRICT

Water Distribution Pipe Plan
KDP-21/A

Scale	Shown in the Drawings		
Date	Oct. 2010	Drowing No.	044

EIGHT-JAPAN ENGINEERING CONSULTANTS INC.



LEGEND			
PVC	Vinyl Pipe	Be	Bend
DCIP	ダクタイル鋳鉄管	Re	Reducer
SCP	Steel Comection Pieace	Sa	Saddle
		T	Tee
AV	Air Valve		
BOP	Blow Off Pipe	Wt	Water Tank
M	Metar		
MF	MF Joint		
GV	Gate Valve		

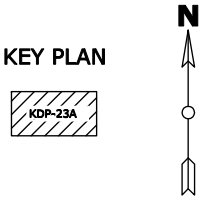
PROJECT FOR THE ESTABLISHMENT OF
RURAL WATER SUPPLY SYSTEM IN KAMBIA DISTRICT

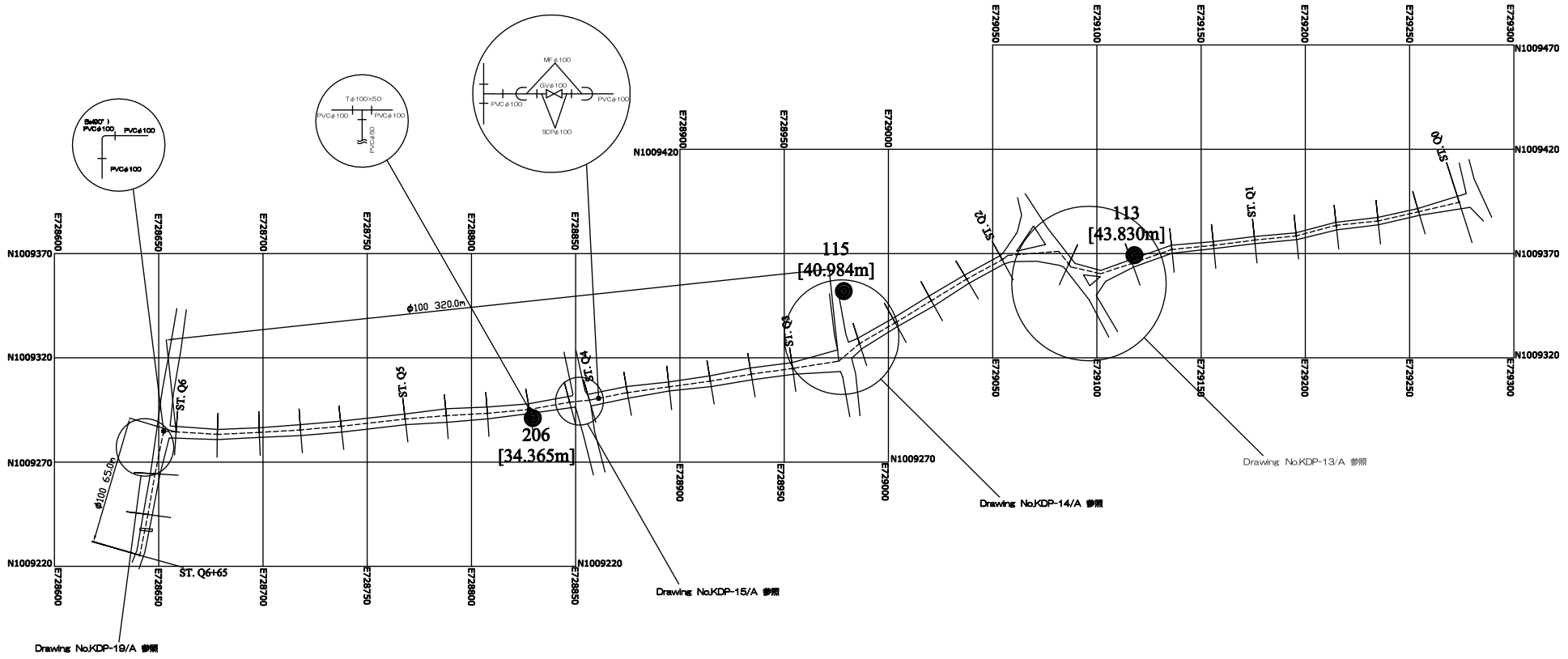
Water Distribution Pipe Plan
KDP-22/A

Scale	Shown in the Drawings		
Date	Oct. 2010	Drowing No.	045

EIGHT-JAPAN ENGINEERING CONSULTANTS INC.

KEY PLAN





LEGEND			
PVC	Vinyl Pipe	Be	Bend
DCIP	ダクタイル鋳鉄管	Re	Reducer
SCP	Steel Comection Pieace	Sa	Saddle
		T	Tee
AV	Air Valve		
BOP	Blow Off Pipe	Wt	Water Tank
M	Metar		
MF	MF Joint		
GV	Gate Valve		

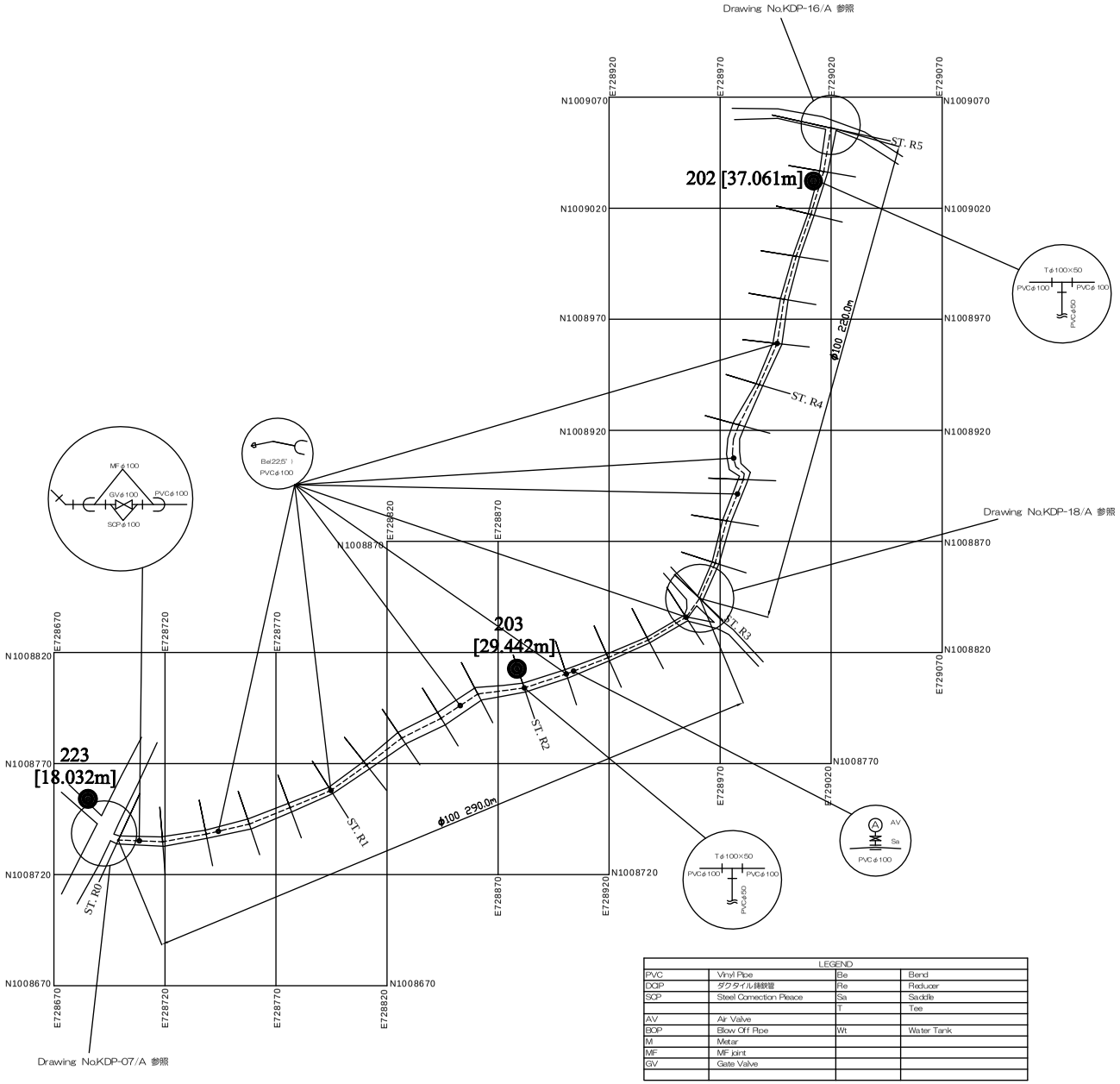
0 10 20 40

PROJECT FOR THE ESTABLISHMENT OF
RURAL WATER SUPPLY SYSTEM IN KAMBIA DISTRICT

Water Distribution Pipe Plan
KDP-23/A

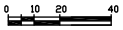
Scale	Shown in the Drawings		
Date	Oct. 2010	Drowing No.	046

EIGHT-JAPAN ENGINEERING CONSULTANTS INC.



KEY PLAN

LEGEND			
PVC	Vinyl Pipe	Be	Bend
DCIP	ダクタイル鋳鉄管	Re	Reducer
SCP	Steel Connection Peace	Sa	Saddle
		T	Tee
AV	Air Valve		
BOP	Blow Off Pipe	Wt	Water Tank
M	Metar		
MF	MF joint		
GV	Gate Valve		

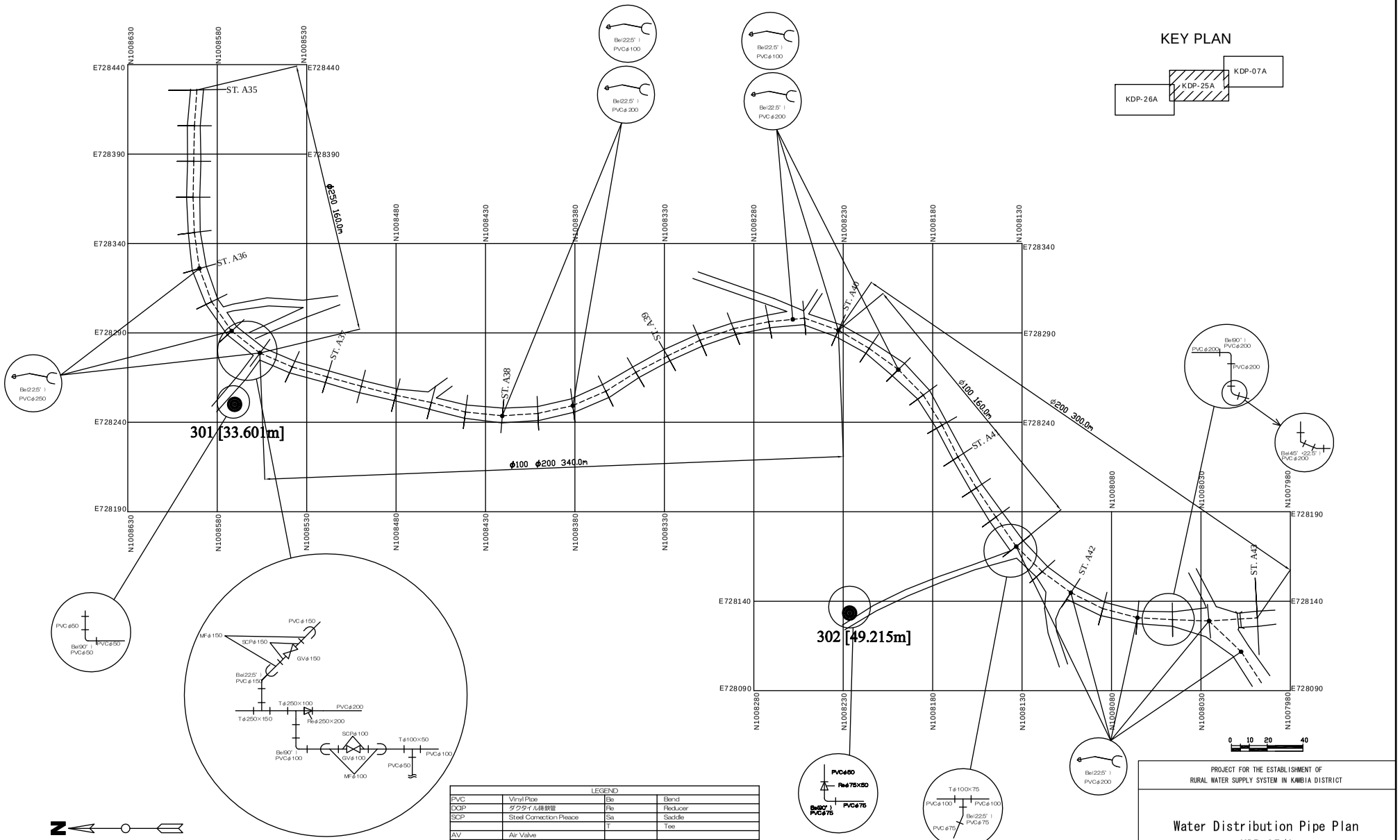


PROJECT FOR THE ESTABLISHMENT OF
RURAL WATER SUPPLY SYSTEM IN KAMBIA DISTRICT

Water Distribution Pipe Plan
KDP-24/A

Scale	Shown in the Drawings		
Date	Oct. 2010	Drowing No.	047

EIGHT-JAPAN ENGINEERING CONSULTANTS INC.



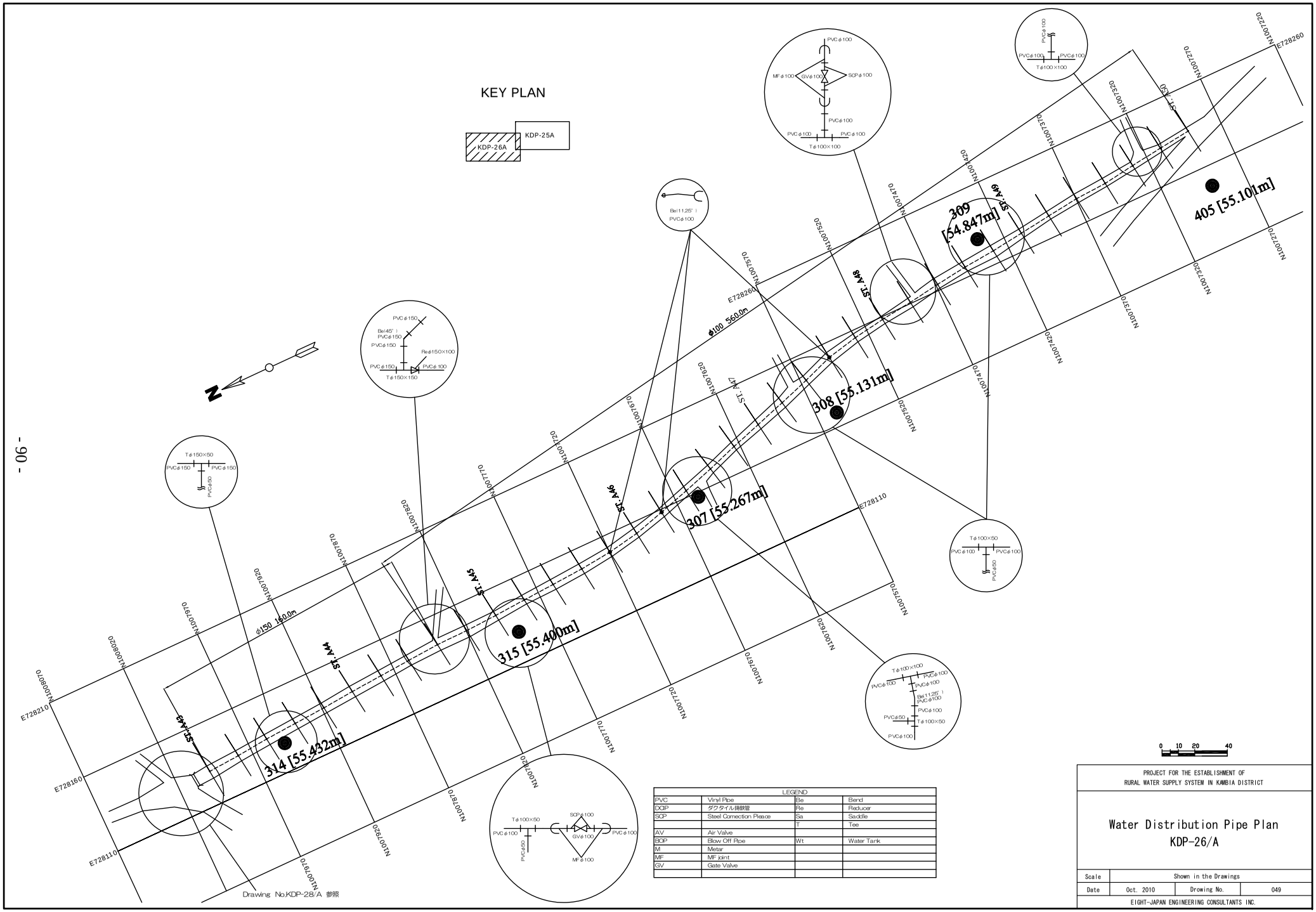
LEGEND			
PVC	Vinyl Pipe	Be	Bend
DCIP	ダクタイル鋳鉄管	Re	Reducer
SCP	Steel Comection Peace	Sa	Saddle
		T	Tee
AV	Air Valve		
BOP	Blow Off Pipe	Wt	Water Tank
M	Metar		
MF	MF Joint		
GV	Gate Valve		

PROJECT FOR THE ESTABLISHMENT OF
RURAL WATER SUPPLY SYSTEM IN KAMBIA DISTRICT

Water Distribution Pipe Plan
KDP-25/A

Scale	Shown in the Drawings		
Date	Oct. 2010	Drowing No.	048

EIGHT-JAPAN ENGINEERING CONSULTANTS INC.



LEGEND			
PVC	Vinyl Pipe	Be	Bend
DCIP	ダクタイル鋳鉄管	Re	Reducer
SCP	Steel Correction Piece	Sa	Saddle
		T	Tee
AV	Air Valve		
BOP	Blow Off Pipe	Wt	Water Tank
M	Metar		
MF	MF joint		
GV	Gate Valve		

PROJECT FOR THE ESTABLISHMENT OF
RURAL WATER SUPPLY SYSTEM IN KAMBIA DISTRICT

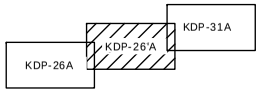
Water Distribution Pipe Plan
KDP-26/A

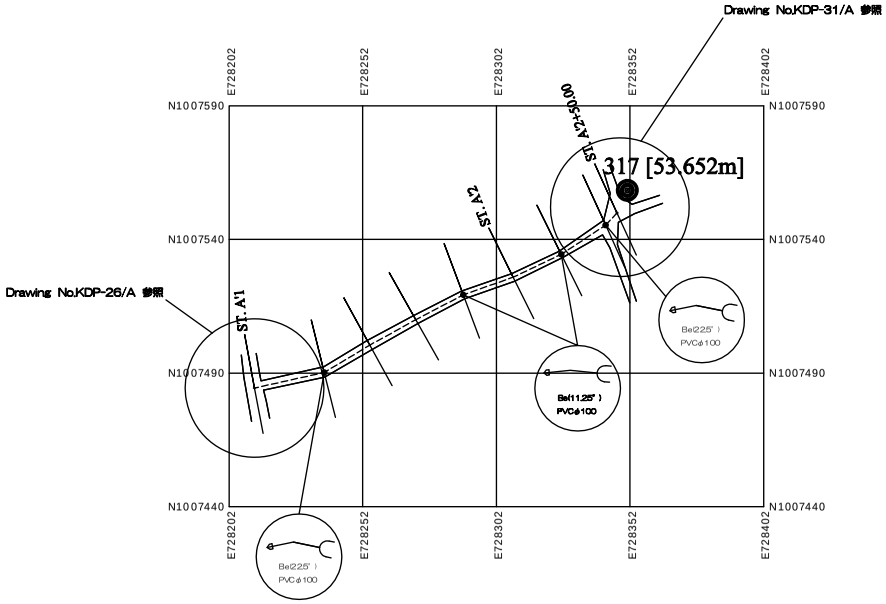
Scale	Shown in the Drawings		
Date	Oct. 2010	Drowing No.	049

EIGHT-JAPAN ENGINEERING CONSULTANTS INC.

N

KEY PLAN





LEGEND			
PVC	Vinyl Pipe	Be	Bend
DCIP	ダクタイル鋳鉄管	Re	Reducer
SCP	Steel Connection Peace	Sa	Saddle
		T	Tee
AV	Air Valve		
BOP	Blow Off Pipe	Wt	Water Tank
M	Metar		
MF	MF joint		
GV	Gate Valve		

0 10 20 40

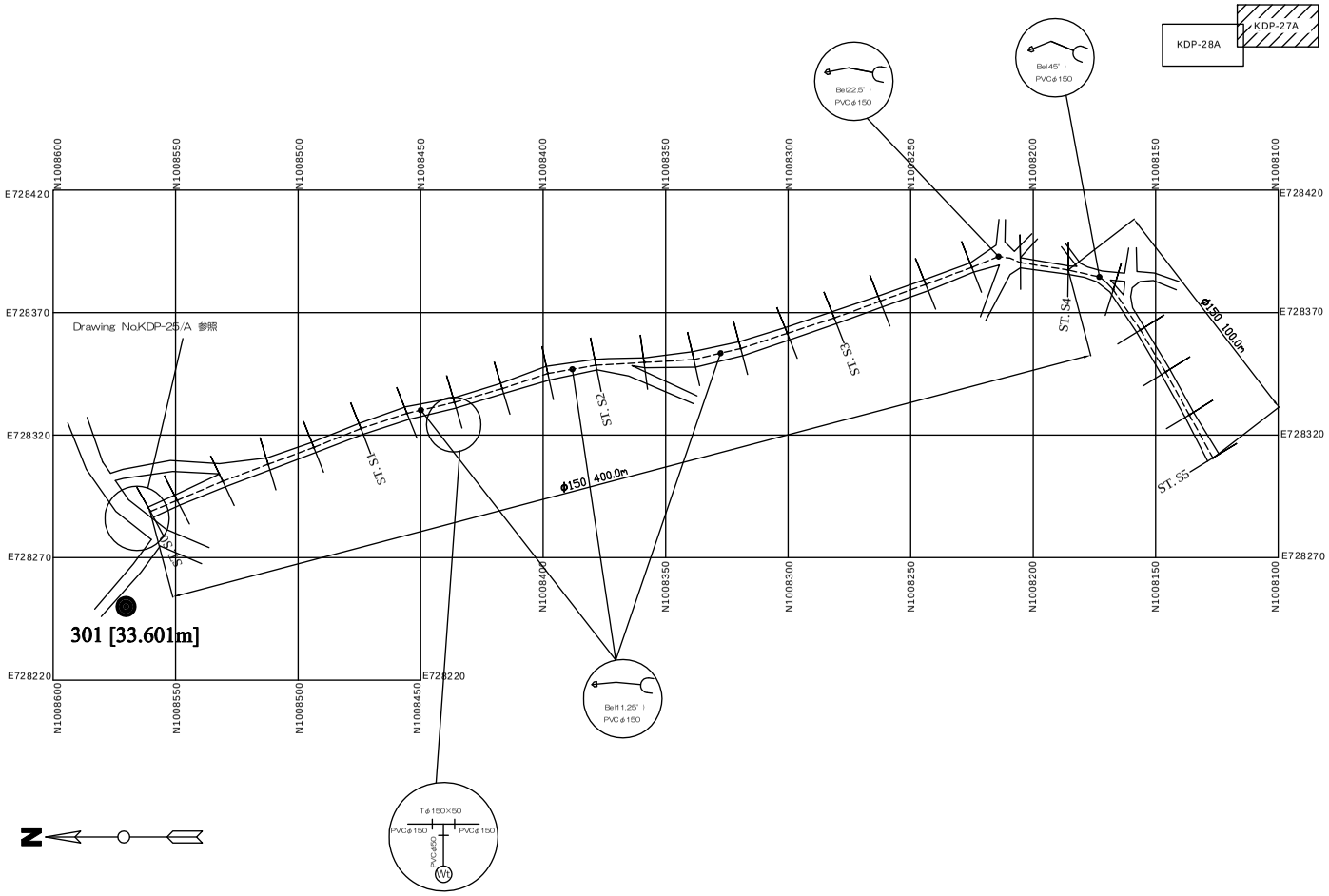
PROJECT FOR THE ESTABLISHMENT OF
RURAL WATER SUPPLY SYSTEM IN KAMBIA DISTRICT

Water Distribution Pipe Plan
KDP-26'/A

Scale	Shown in the Drawings		
Date	Oct. 2010	Drowing No.	050

EIGHT-JAPAN ENGINEERING CONSULTANTS INC.

KEY PLAN



LEGEND			
PVC	Vinyl Pipe	Be	Bend
DCIP	ダクタイル鋳鉄管	Re	Reducer
SCP	Steel Comection Peace	Sa	Saddle
		T	Tee
AV	Air Valve		
BOP	Blow Off Pipe	Wt	Water Tank
M	Metar		
MF	MF Joint		
GV	Gate Valve		

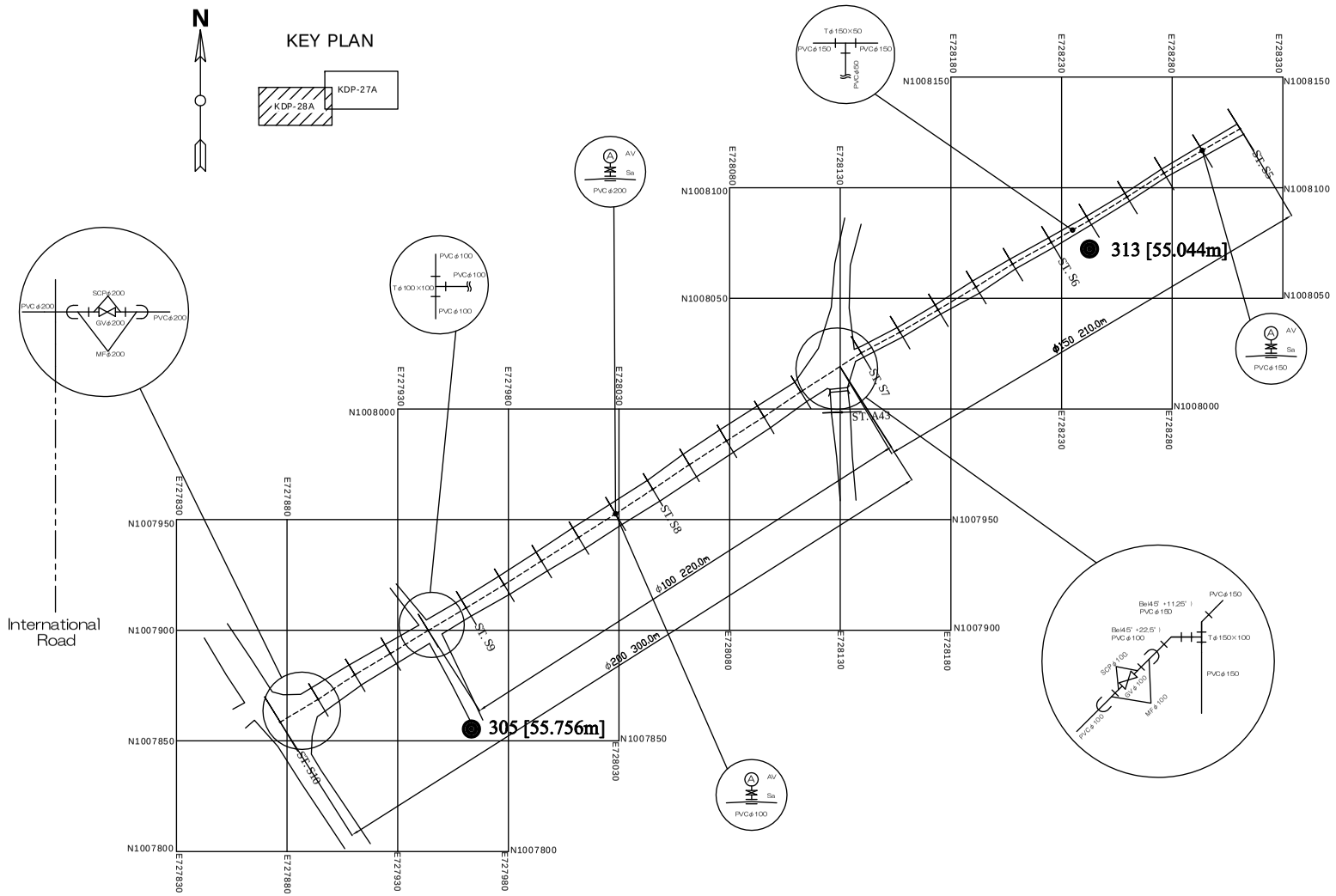
0 10 20 40

PROJECT FOR THE ESTABLISHMENT OF
RURAL WATER SUPPLY SYSTEM IN KAMBIA DISTRICT

Water Distribution Pipe Plan
KDP-27/A

Scale	Shown in the Drawings		
Date	Oct. 2010	Drowing No.	051

EIGHT-JAPAN ENGINEERING CONSULTANTS INC.



LEGEND			
PVC	Vinyl Pipe	Be	Bend
DCIP	ダクタイル鋳鉄管	Re	Reducer
SCP	Steel Comection Peace	Sa	Saddle
		T	Tee
AV	Air Valve		
BOP	Blow Off Pipe	Wt	Water Tank
M	Metar		
MF	MF Joint		
GV	Gate Valve		

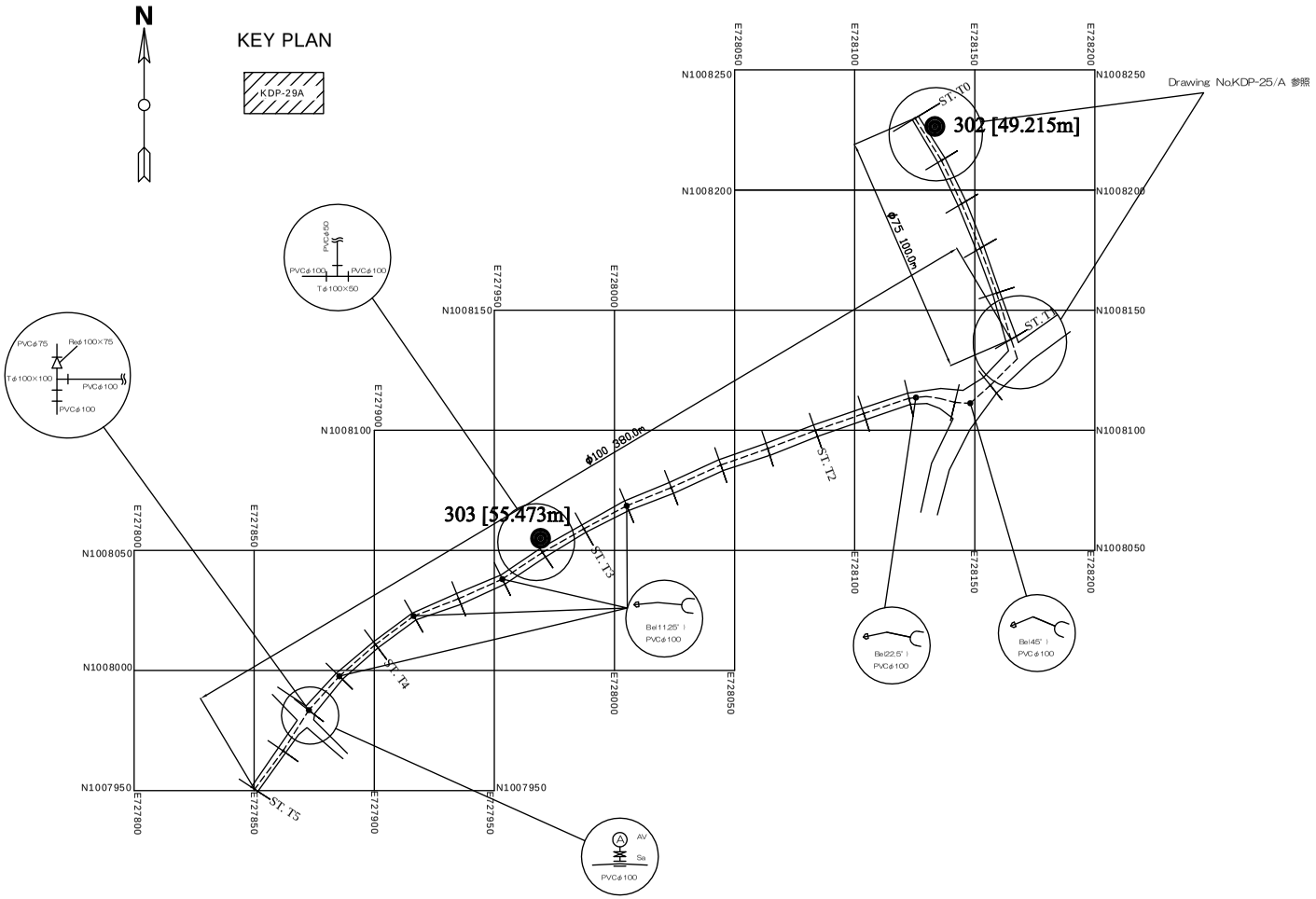
0 10 20 40

PROJECT FOR THE ESTABLISHMENT OF
RURAL WATER SUPPLY SYSTEM IN KAMBIA DISTRICT

Water Distribution Pipe Plan
KDP-28/A

Scale	Shown in the Drawings		
Date	Oct. 2010	Drowing No.	052

EIGHT-JAPAN ENGINEERING CONSULTANTS INC.



LEGEND			
PVC	Vinyl Pipe	Be	Bend
DCIP	ダクタイル鋳鉄管	Re	Reducer
SCP	Steel Comection Pieace	Sa	Saddle
		T	Tee
AV	Air Valve		
BOP	Blow Off Pipe	Wt	Water Tank
M	Metar		
MF	MF Joint		
GV	Gate Valve		

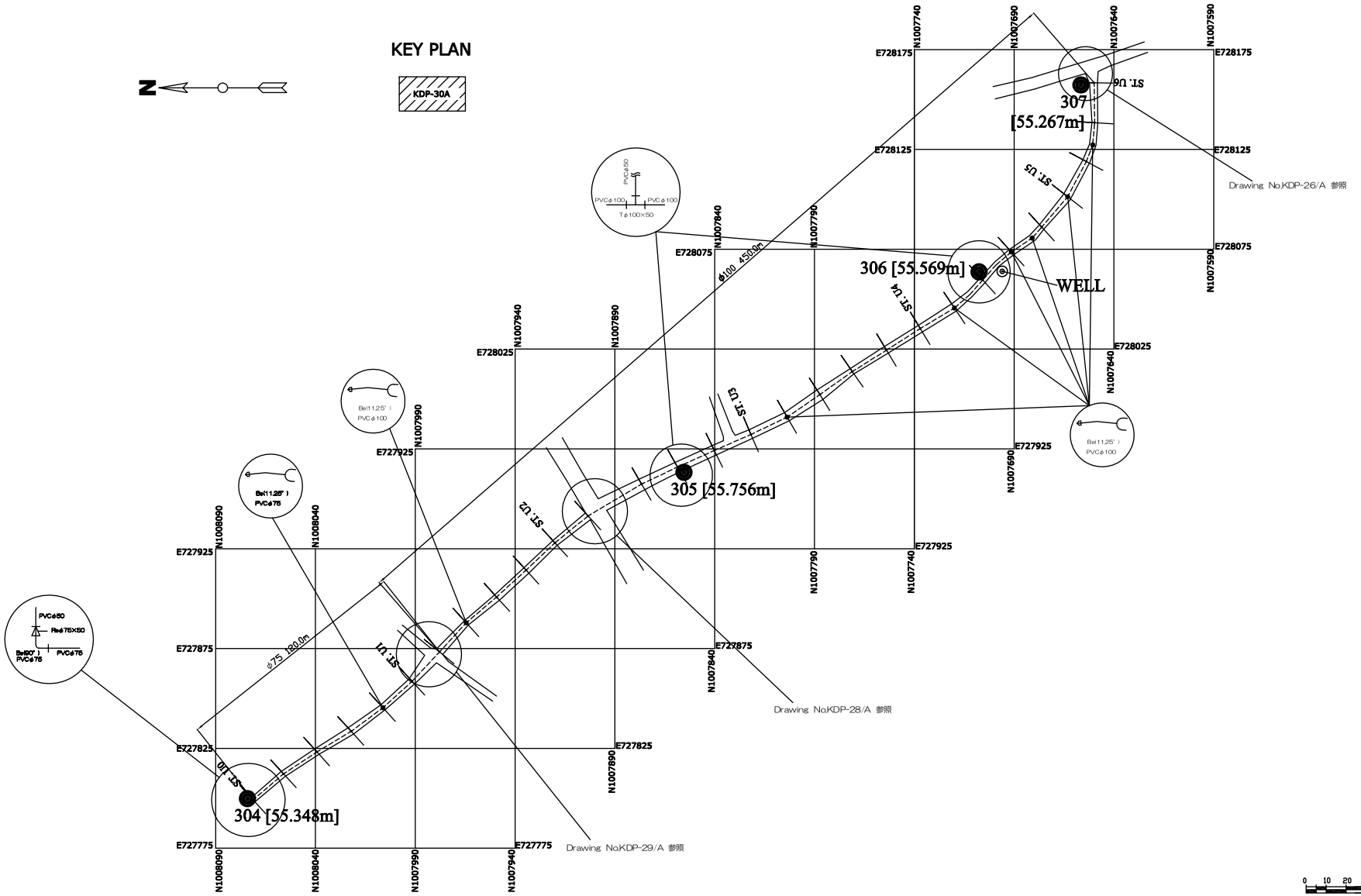
0 10 20 40

PROJECT FOR THE ESTABLISHMENT OF
RURAL WATER SUPPLY SYSTEM IN KAMBIA DISTRICT

Water Distribution Pipe Plan
KDP-29/A

Scale	Shown in the Drawings		
Date	Oct. 2010	Drowing No.	053

EIGHT-JAPAN ENGINEERING CONSULTANTS INC.



LEGEND			
PVC	Vinyl Pipe	Be	Bend
DCIP	ダクタイル鋳鉄管	Re	Reducer
SCP	Steel Comection Pieace	Sa	Saddle
		T	Tee
AV	Air Valve		
BOP	Blow Off Pipe	Wt	Water Tank
M	Metar		
MF	MF Joint		
GV	Gate Valve		

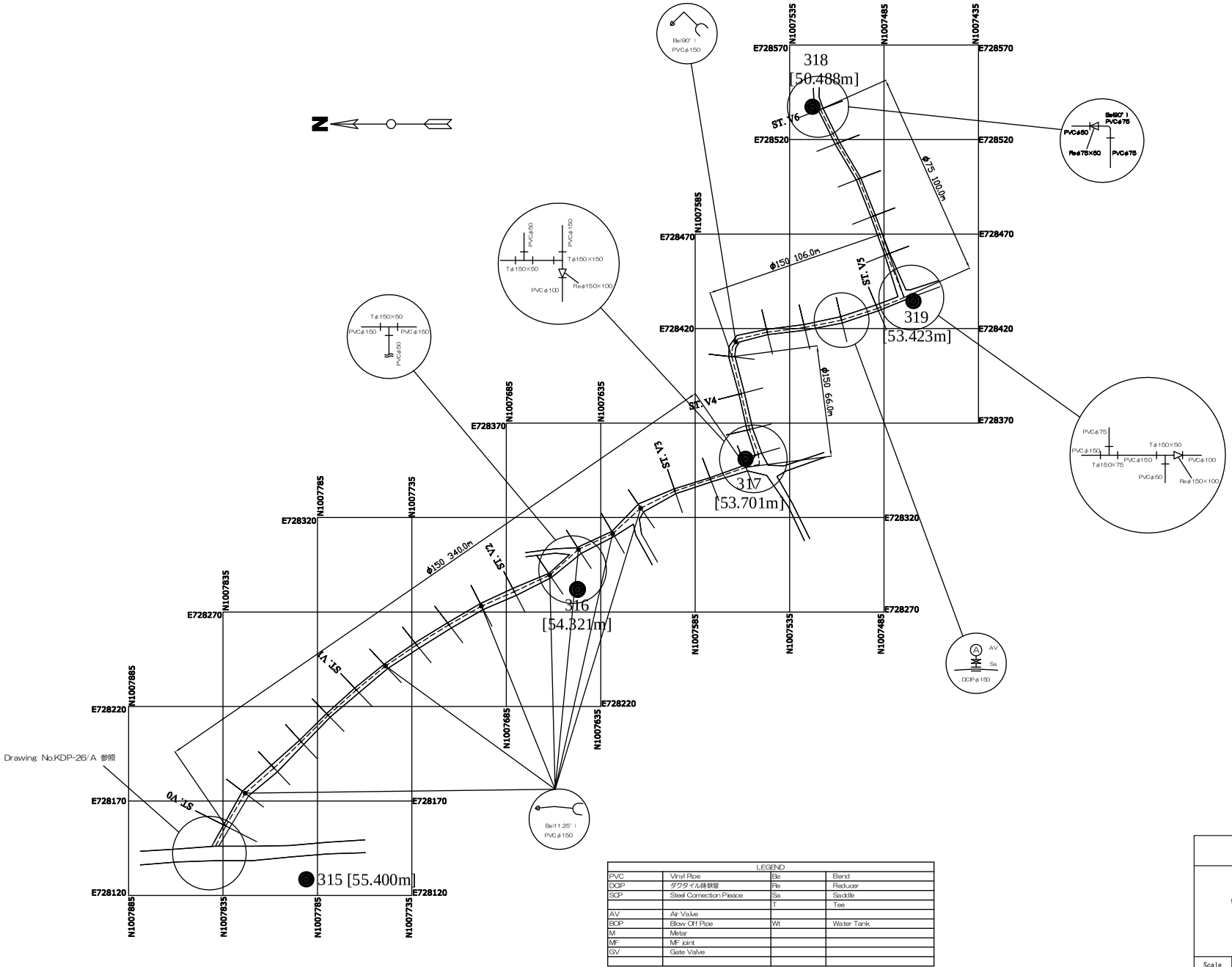
0 10 20 40

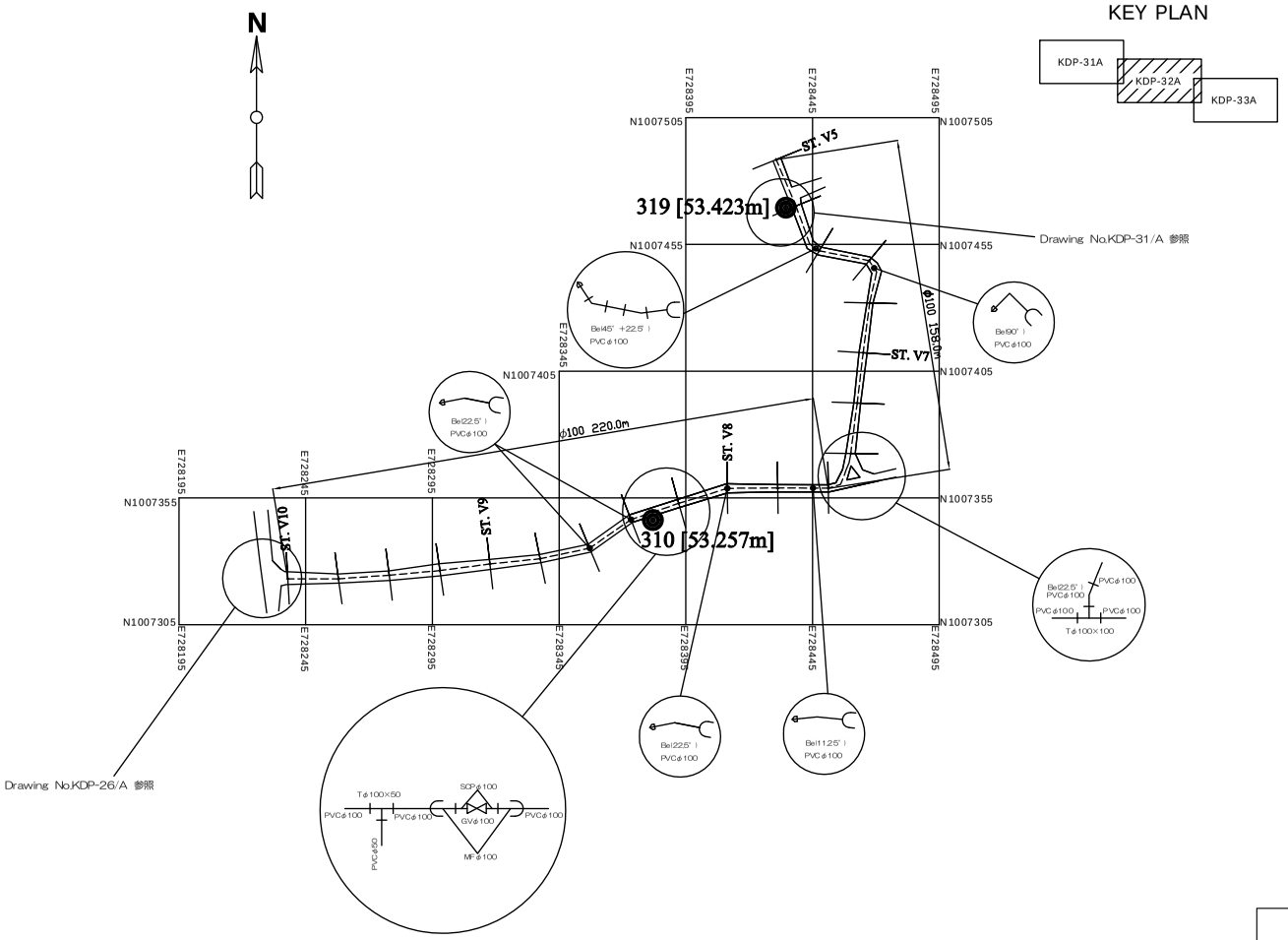
PROJECT FOR THE ESTABLISHMENT OF
RURAL WATER SUPPLY SYSTEM IN KAMBIA DISTRICT

Water Distribution Pipe Plan
KDP-30/A

Scale	Shown in the Drawings		
Date	Oct. 2010	Drowing No.	054

EIGHT-JAPAN ENGINEERING CONSULTANTS INC.


N
318
[50.488m]
ST. T6
φ75 100.0m
319
[53.423m]
ST. V5
φ150 106.0m
317
[53.701m]
ST. V4
φ150 66.0m
316
[54.321m]
ST. V3
φ150 340.0m
ST. V2
ST. V1
ST. V0
315 [55.400m]
Drawing No.KDP-26/A 参照
E728570
E728520
E728470
E728420
E728370
E728320
E728270
E728220
E728170
E728120
N1007535
N1007485
N1007435
N1007585
N1007535
N1007485
N1007685
N1007635
N1007785
N1007735
N1007835
N1007885
KEY PLAN
KDP-31A
KDP-32A
LEGEND
PVC Vinyl Pipe
DCIP ダクタイル鋳鉄管
SCP Steel Connection Pieace
A.V Air Valve
BOP Blow Off Pipe
M Metar
MF MF Joint
GV Gate Valve
Be Bend
Re Reducer
Sa Saddle
T Tee
Wt Water Tank
0 10 20 40
PROJECT FOR THE ESTABLISHMENT OF
RURAL WATER SUPPLY SYSTEM IN KAMBIA DISTRICT
Water Distribution Pipe Plan
KDP-31/A
Scale Shown in the Drawings
Date Oct. 2010
Drowing No. 055
EIGHT-JAPAN ENGINEERING CONSULTANTS INC.



LEGEND			
PVC	Vinyl Pipe	Be	Bend
DCIP	ダクタイル鋳鉄管	Re	Reducer
SCP	Steel Comection Pieace	Sa	Saddle
		T	Tee
AV	Air Valve		
BOP	Blow Off Pipe	Wt	Water Tank
M	Metar		
MF	MF Joint		
GV	Gate Valve		

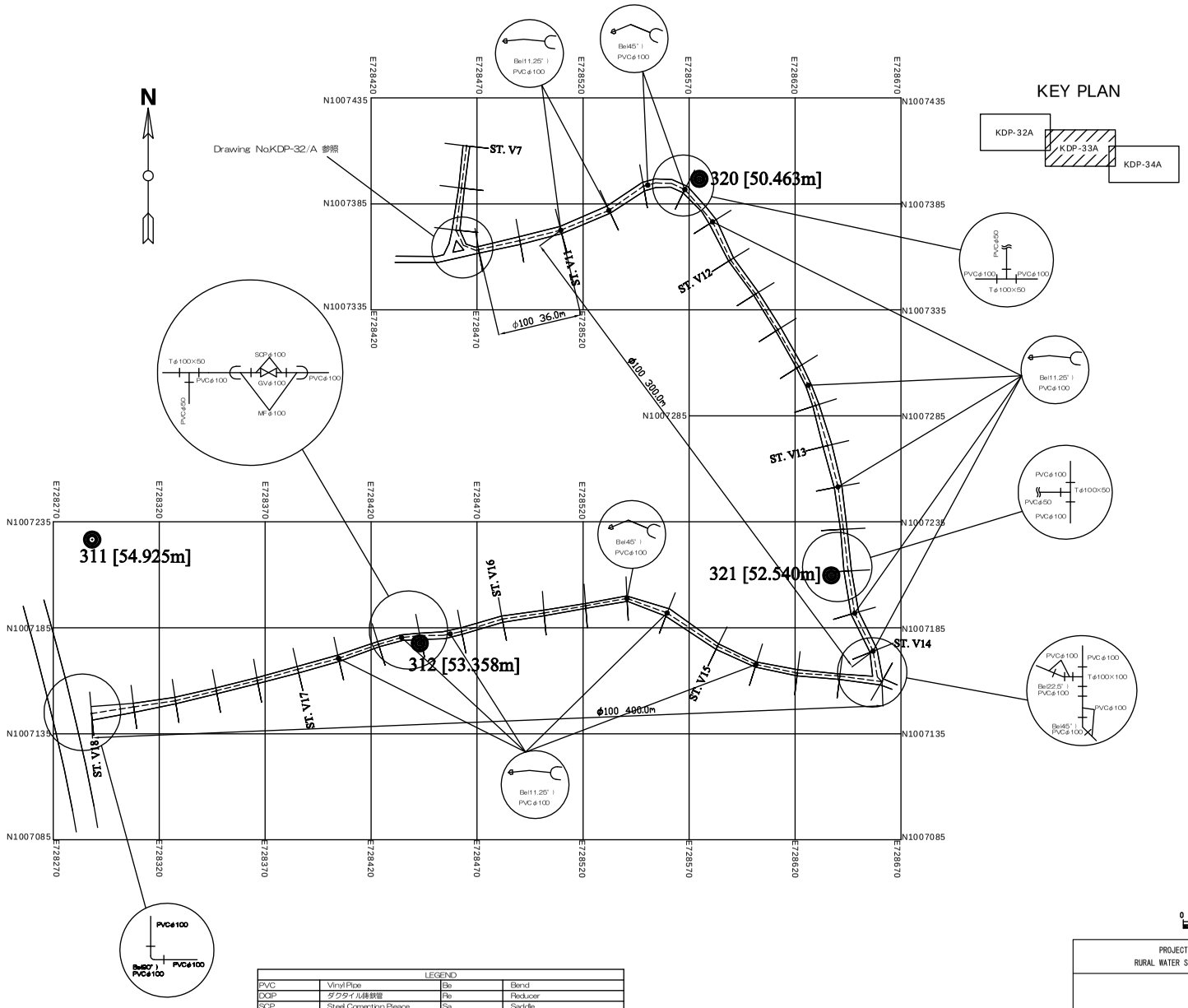
0 10 20 40

PROJECT FOR THE ESTABLISHMENT OF
RURAL WATER SUPPLY SYSTEM IN KAMBIA DISTRICT

Water Distribution Pipe Plan
KDP-32/A

Scale	Shown in the Drawings		
Date	Oct. 2010	Drowing No.	056

EIGHT-JAPAN ENGINEERING CONSULTANTS INC.



LEGEND			
PVC	Vinyl Pipe	Be	Bend
DCIP	ダクタイル鋳鉄管	Re	Reducer
SCP	Steel Comection Pieace	Sa	Saddle
		T	Tee
AV	Air Valve		
BOP	Blow Off Pipe	Wt	Water Tank
M	Metar		
MF	MF Joint		
GV	Gate Valve		

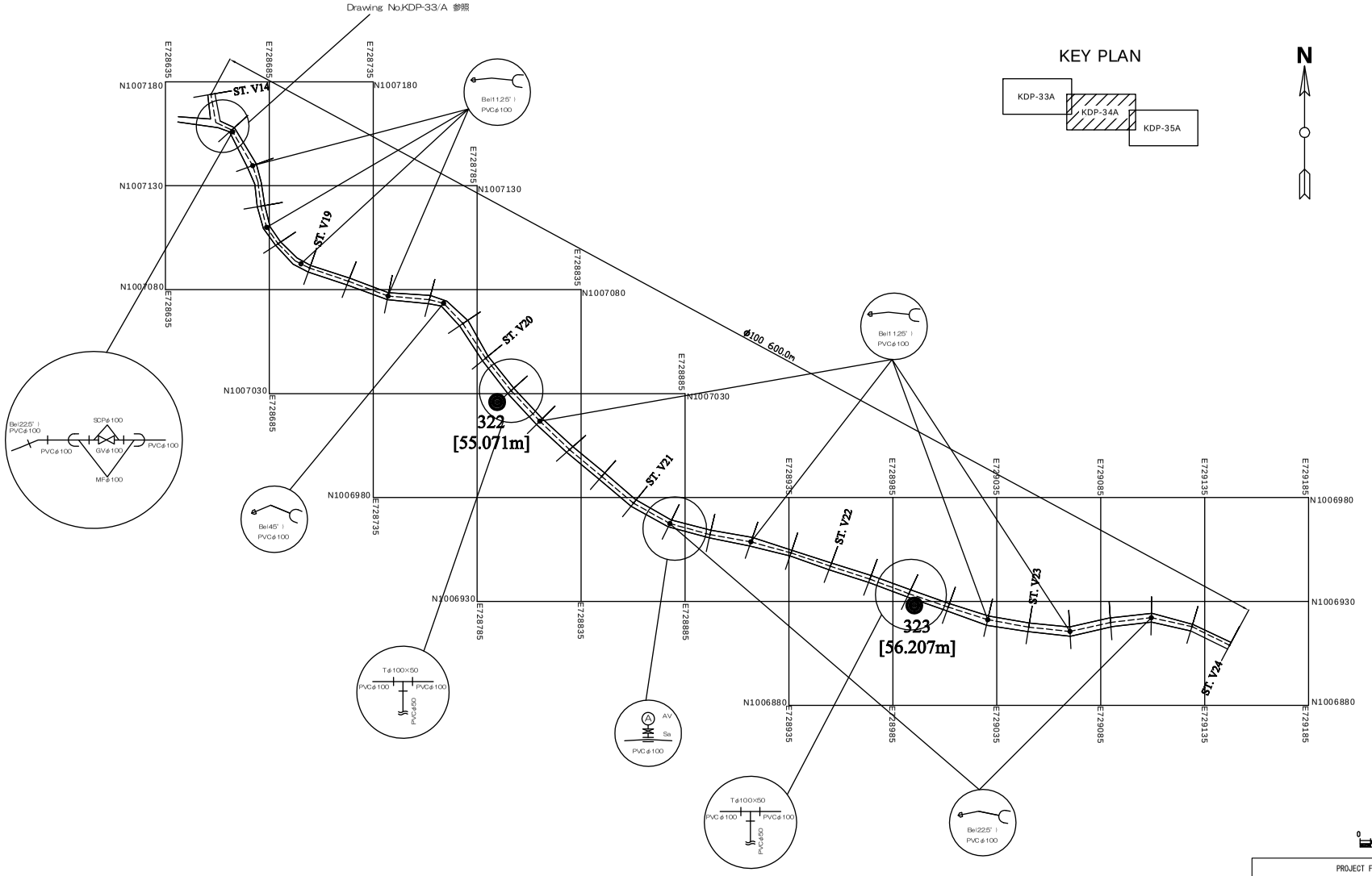
0 10 20 40

PROJECT FOR THE ESTABLISHMENT OF
RURAL WATER SUPPLY SYSTEM IN KAMBIA DISTRICT

Water Distribution Pipe Plan
KDP-33/A

Scale	Shown in the Drawings		
Date	Oct. 2010	Drowing No.	057

EIGHT-JAPAN ENGINEERING CONSULTANTS INC.



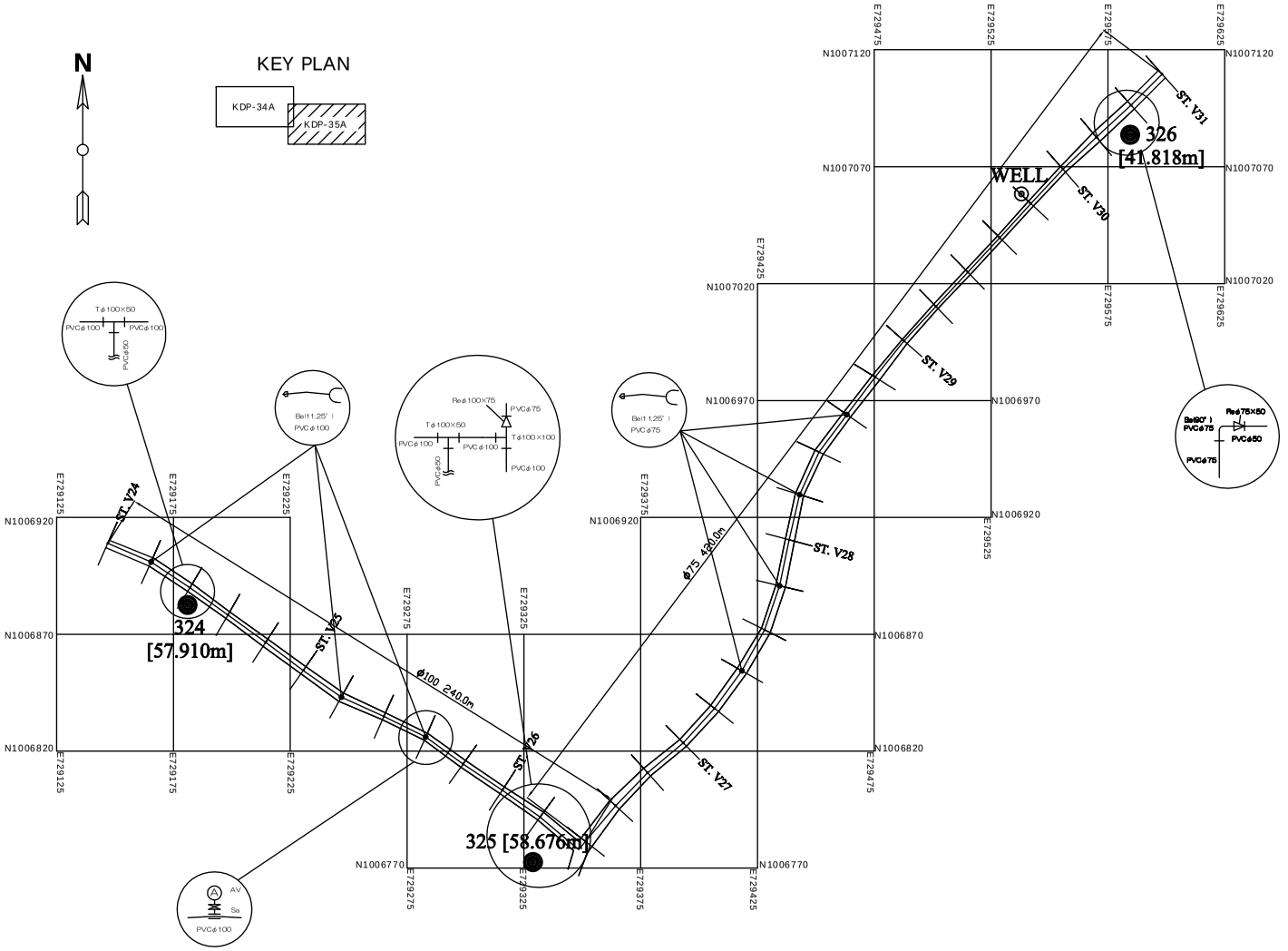
LEGEND			
PVC	Vinyl Pipe	Be	Bend
DCIP	ダクタイル鋳鉄管	Re	Reducer
SCP	Steel Comection Peace	Sa	Saddle
		T	Tee
AV	Air Valve		
BOP	Blow Off Pipe	Wt	Water Tank
M	Metar		
MF	MF Joint		
GV	Gate Valve		

PROJECT FOR THE ESTABLISHMENT OF
RURAL WATER SUPPLY SYSTEM IN KAMBIA DISTRICT

Water Distribution Pipe Plan
KDP-34/A

Scale	Shown in the Drawings		
Date	Oct. 2010	Drowing No.	058

EIGHT-JAPAN ENGINEERING CONSULTANTS INC.



LEGEND			
PVC	Vinyl Pipe	Be	Bend
DCIP	ダクタイル鋳鉄管	Re	Reducer
SCP	Steel Comection Pieace	Sa	Saddle
		T	Tee
AV	Air Valve		
BOP	Blow Off Pipe	Wt	Water Tank
M	Metar		
MF	MF Joint		
GV	Gate Valve		

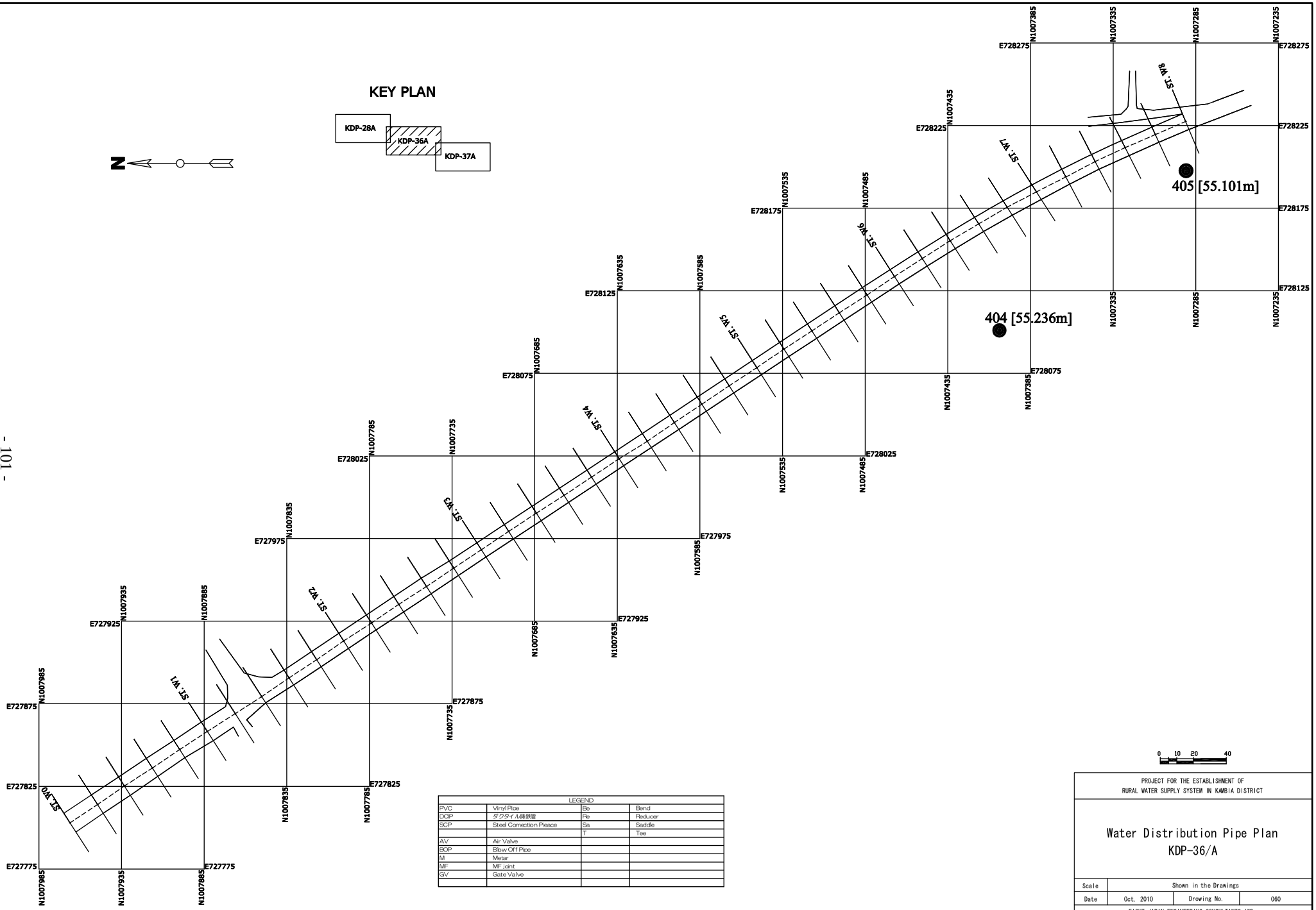
0 10 20 40

PROJECT FOR THE ESTABLISHMENT OF
RURAL WATER SUPPLY SYSTEM IN KAMBIA DISTRICT

Water Distribution Pipe Plan
KDP-35/A

Scale	Shown in the Drawings		
Date	Oct. 2010	Drowing No.	059

EIGHT-JAPAN ENGINEERING CONSULTANTS INC.



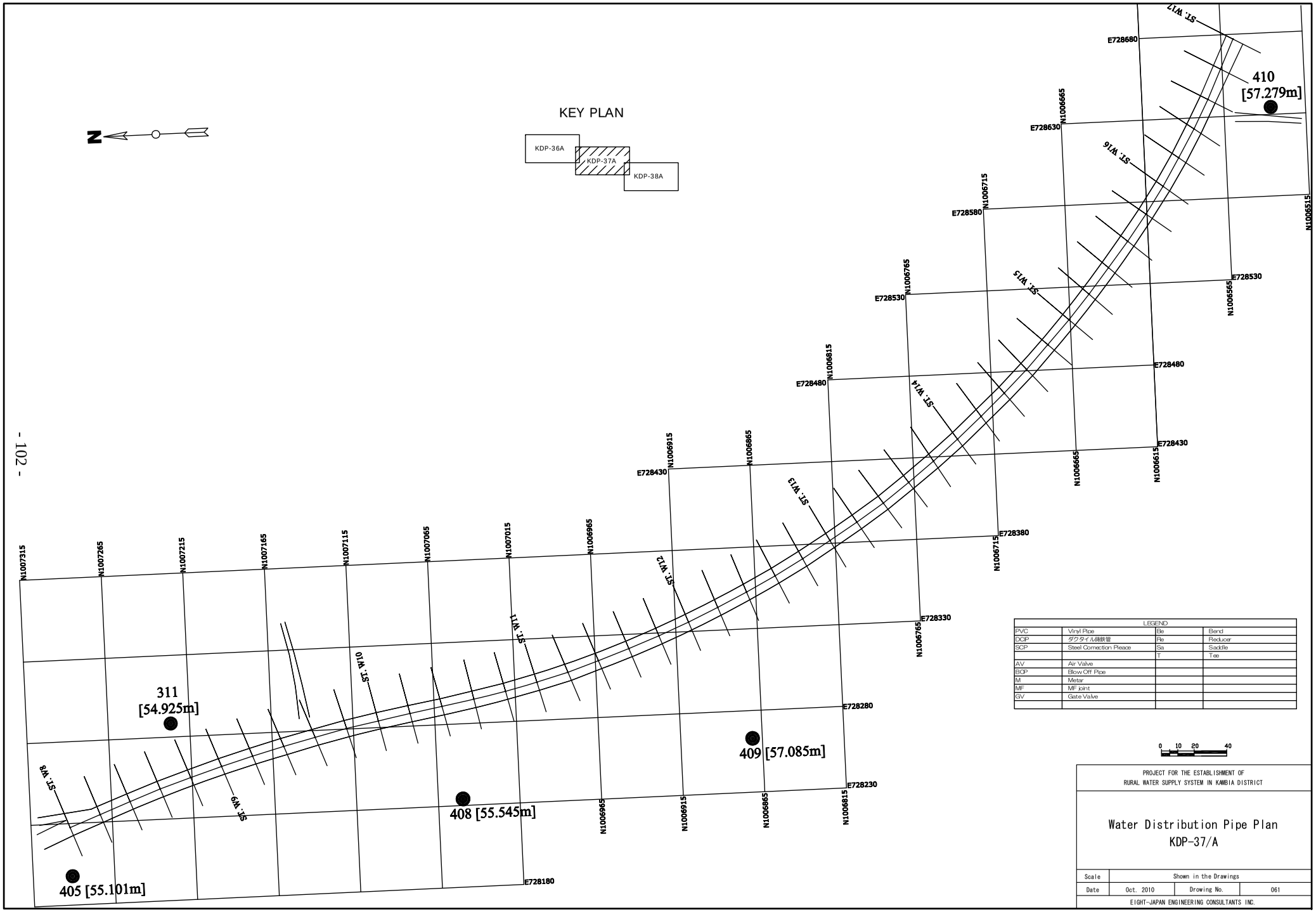
LEGEND			
PVC	Vinyl Pipe	Be	Bend
DCIP	ダクタイル鋳鉄管	Re	Reducer
SCP	Steel Comection Pieace	Sa	Saddle
		T	Tee
AV	Air Valve		
BOP	Blow Off Pipe		
M	Meter		
MF	MF Joint		
GV	Gate Valve		

PROJECT FOR THE ESTABLISHMENT OF
RURAL WATER SUPPLY SYSTEM IN KAMBIA DISTRICT

Water Distribution Pipe Plan
KDP-36/A

Scale	Shown in the Drawings		
Date	Oct. 2010	Drowing No.	060

EIGHT-JAPAN ENGINEERING CONSULTANTS INC.



LEGEND			
PVC	Vinyl Pipe	Be	Bend
DCIP	ダクタイル鋳鉄管	Re	Reducer
SCP	Steel Comection Please	Sa	Saddle
		T	Tee
AV	Air Valve		
BOP	Blow Off Pipe		
M	Meter		
MF	MF Joint		
GV	Gate Valve		

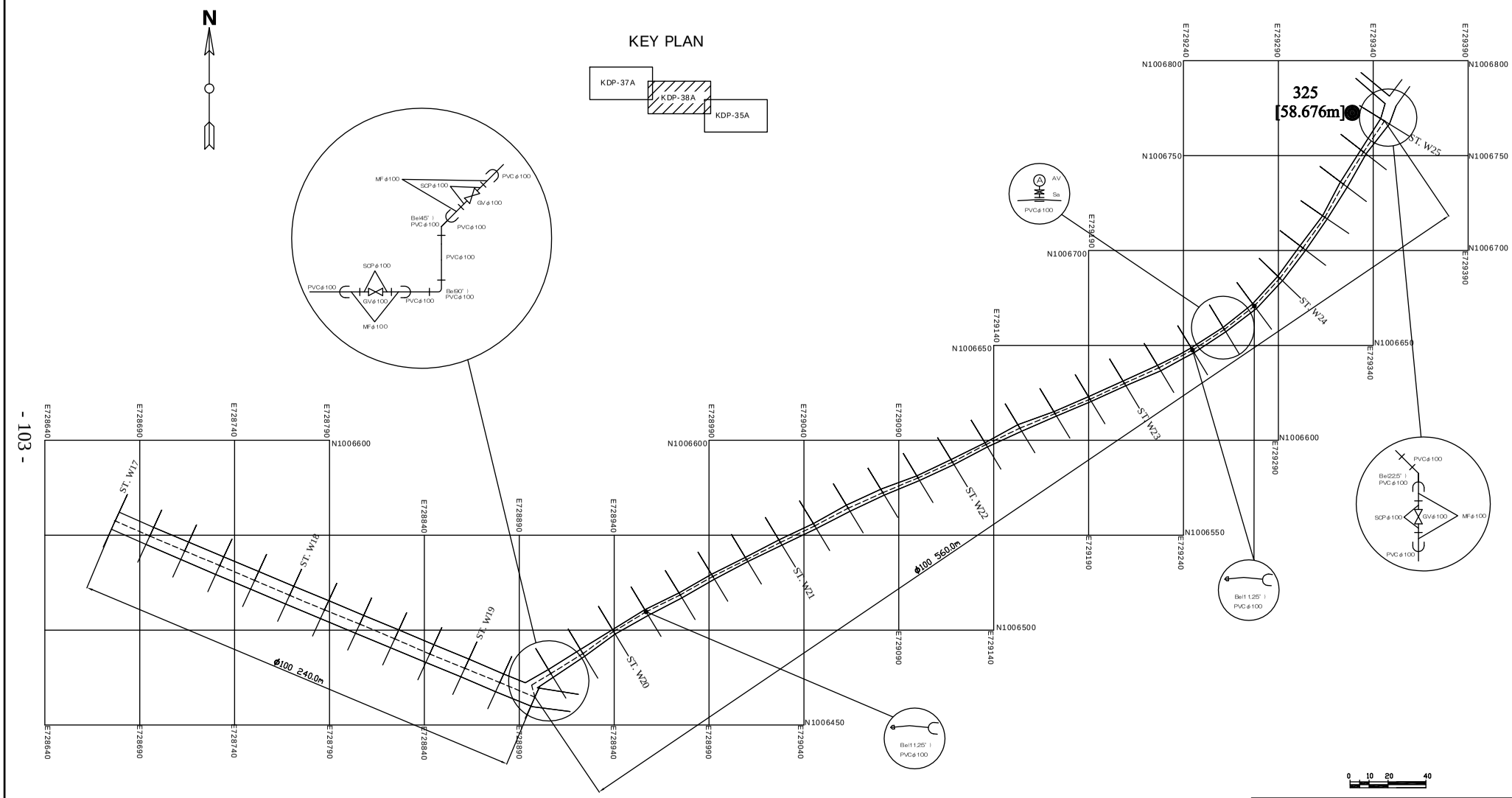
0 10 20 40

PROJECT FOR THE ESTABLISHMENT OF
RURAL WATER SUPPLY SYSTEM IN KAMBIA DISTRICT

Water Distribution Pipe Plan
KDP-37/A

Scale	Shown in the Drawings		
Date	Oct. 2010	Drowing No.	061

EIGHT-JAPAN ENGINEERING CONSULTANTS INC.



LEGEND			
PVC	Vinyl Pipe	Be	Bend
DCIP	ダクタイル鋳鉄管	Re	Reducer
SCP	Steel Comection Pieace	Sa	Saddle
		T	Tee
AV	Air Valve		
BOP	Blow Off Pipe	Wt	Water Tank
M	Metar		
MF	MF Joint		
GV	Gate Valve		

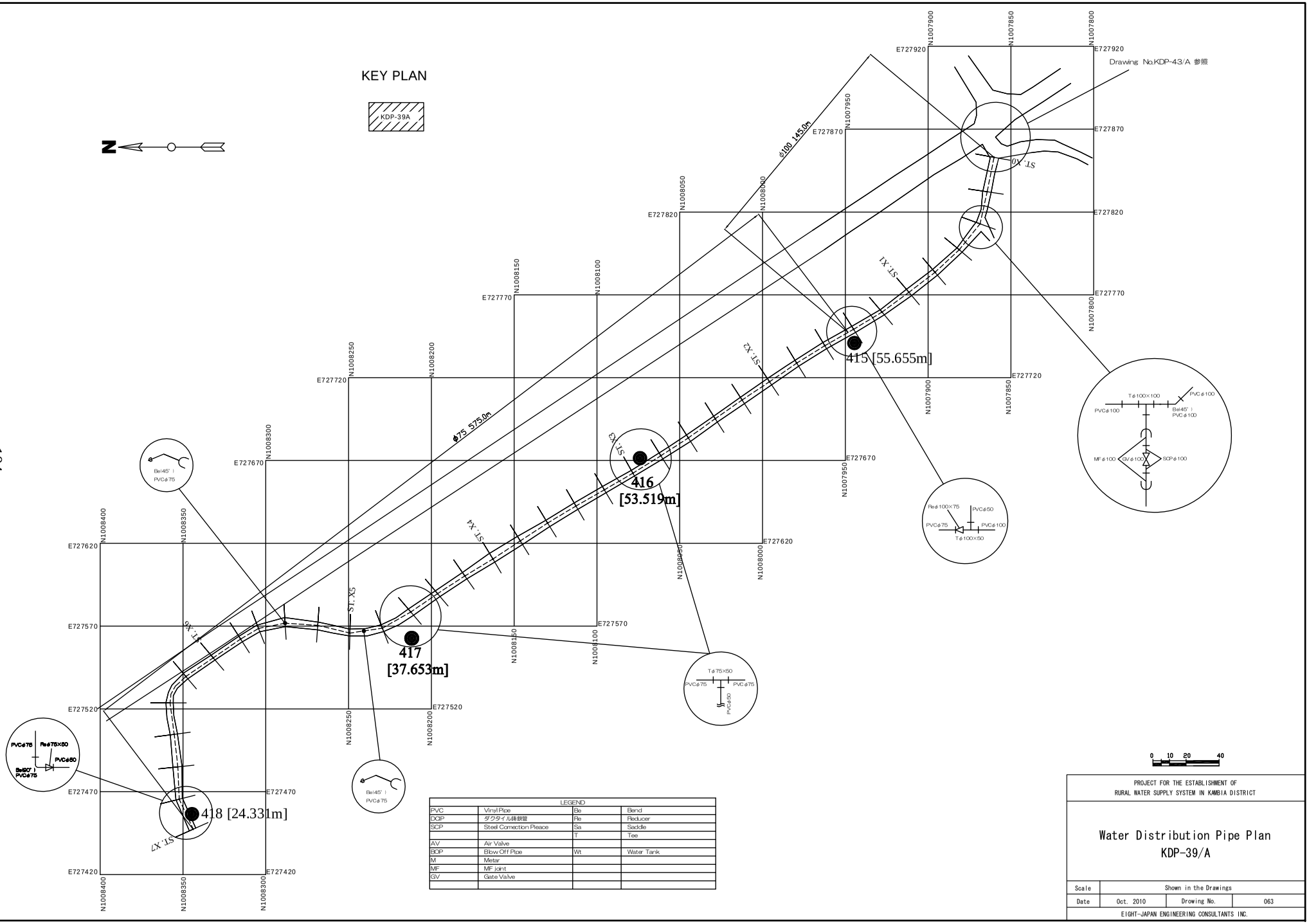
0 10 20 40

PROJECT FOR THE ESTABLISHMENT OF
RURAL WATER SUPPLY SYSTEM IN KAMBIA DISTRICT

Water Distribution Pipe Plan
KDP-38/A

Scale	Shown in the Drawings		
Date	Oct. 2010	Drowing No.	062

EIGHT-JAPAN ENGINEERING CONSULTANTS INC.



LEGEND			
PVC	Vinyl Pipe	Be	Bend
DCIP	ダクタイル鋳鉄管	Re	Reducer
SCP	Steel Comection Pieace	Sa	Saddle
		T	Tee
AV	Air Valve		
BOP	Blow Off Pipe	Wt	Water Tank
M	Metar		
MF	MF Joint		
GV	Gate Valve		

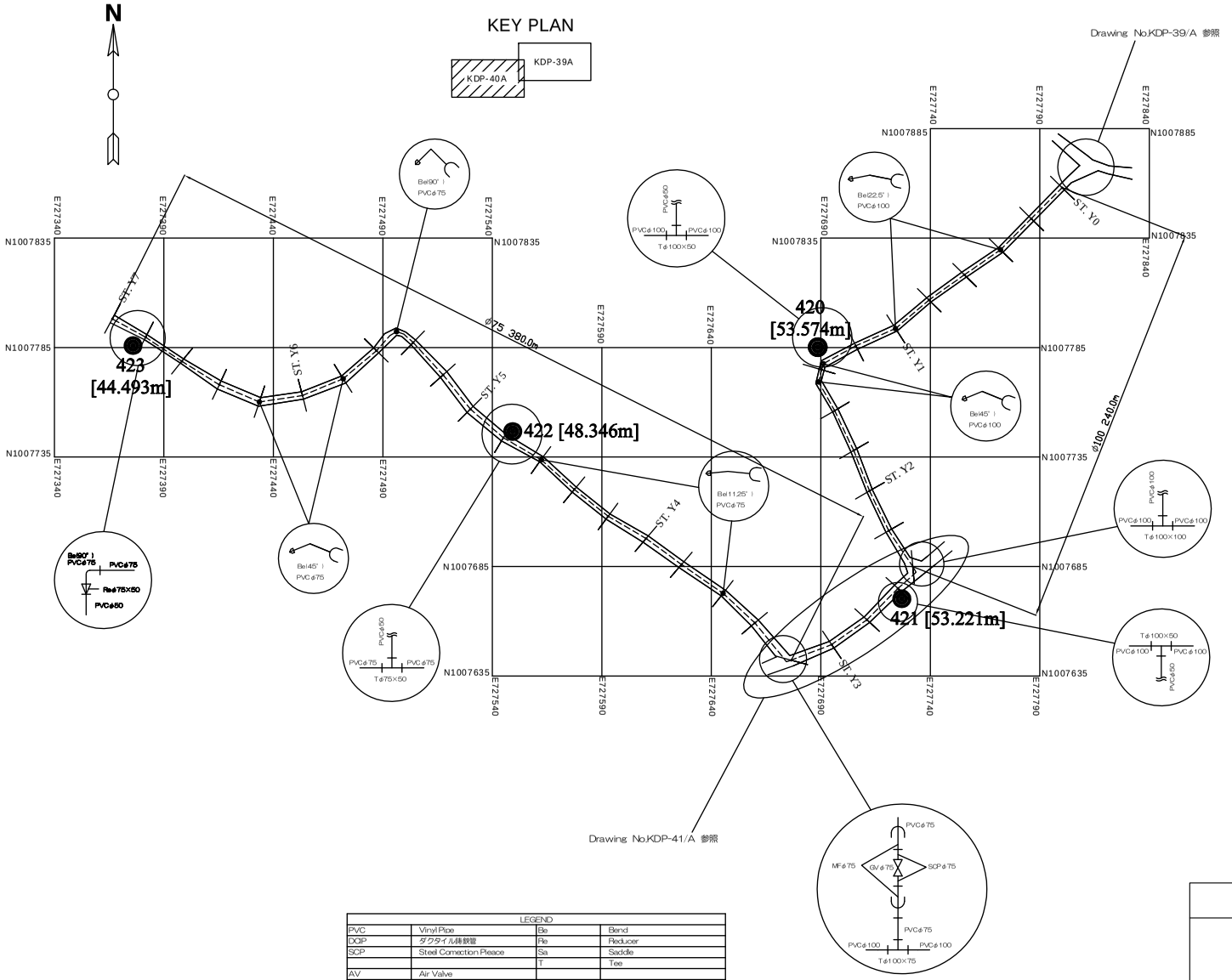
0 10 20 40

PROJECT FOR THE ESTABLISHMENT OF
RURAL WATER SUPPLY SYSTEM IN KAMBIA DISTRICT

Water Distribution Pipe Plan
KDP-39/A

Scale	Shown in the Drawings		
Date	Oct. 2010	Drowing No.	063

EIGHT-JAPAN ENGINEERING CONSULTANTS INC.



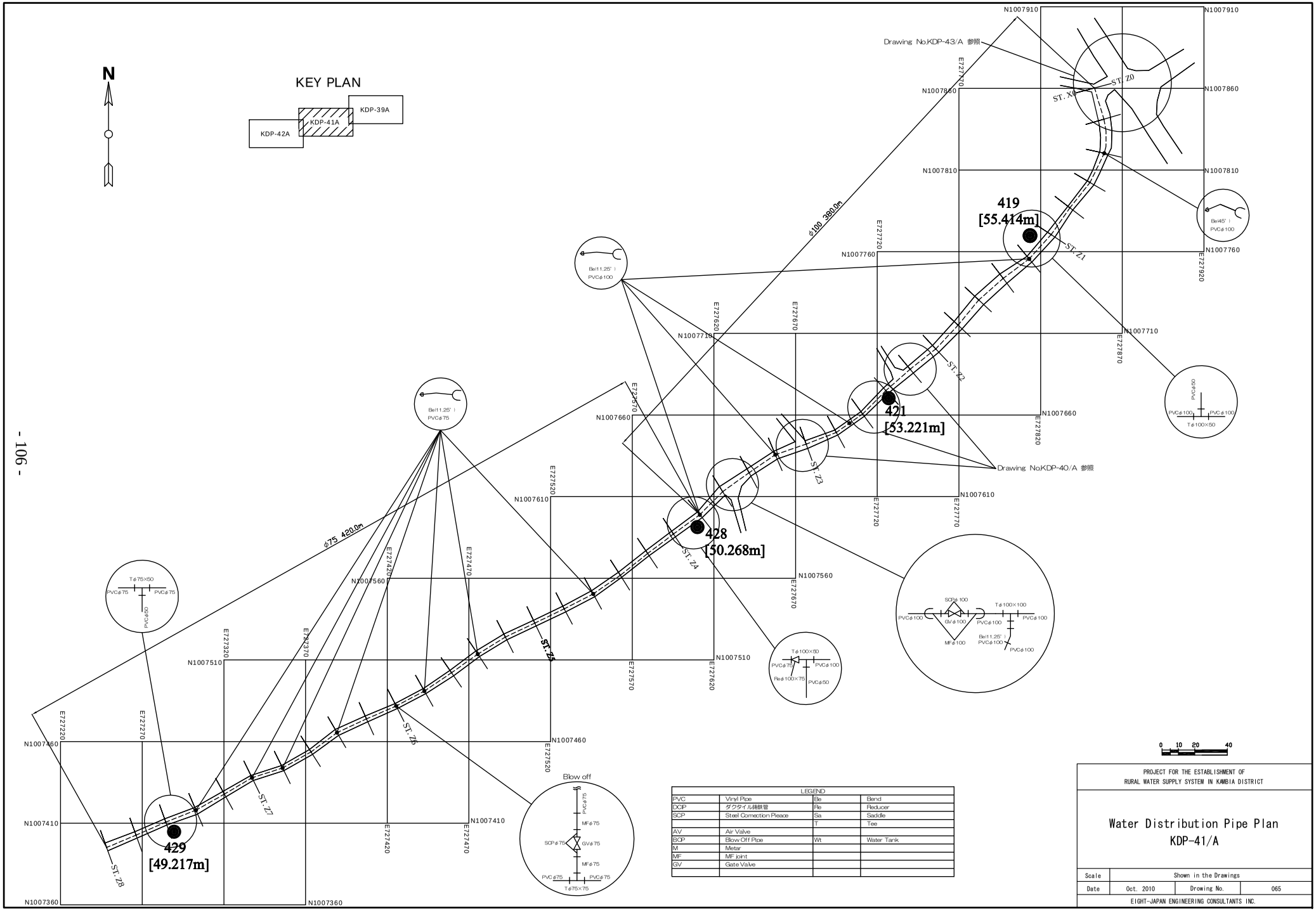
LEGEND			
PVC	Vinyl Pipe	Be	Bend
DCIP	ダクタイル鋳鉄管	Re	Reducer
SCP	Steel Comection Peace	Sa	Saddle
		T	Tee
AV	Air Valve		
BOP	Blow Off Pipe	Wt	Water Tank
M	Metar		
MF	MF Joint		
GV	Gate Valve		

PROJECT FOR THE ESTABLISHMENT OF
RURAL WATER SUPPLY SYSTEM IN KAMBIA DISTRICT

Water Distribution Pipe Plan
KDP-40/A

Scale	Shown in the Drawings		
Date	Oct. 2010	Drowing No.	064

EIGHT-JAPAN ENGINEERING CONSULTANTS INC.



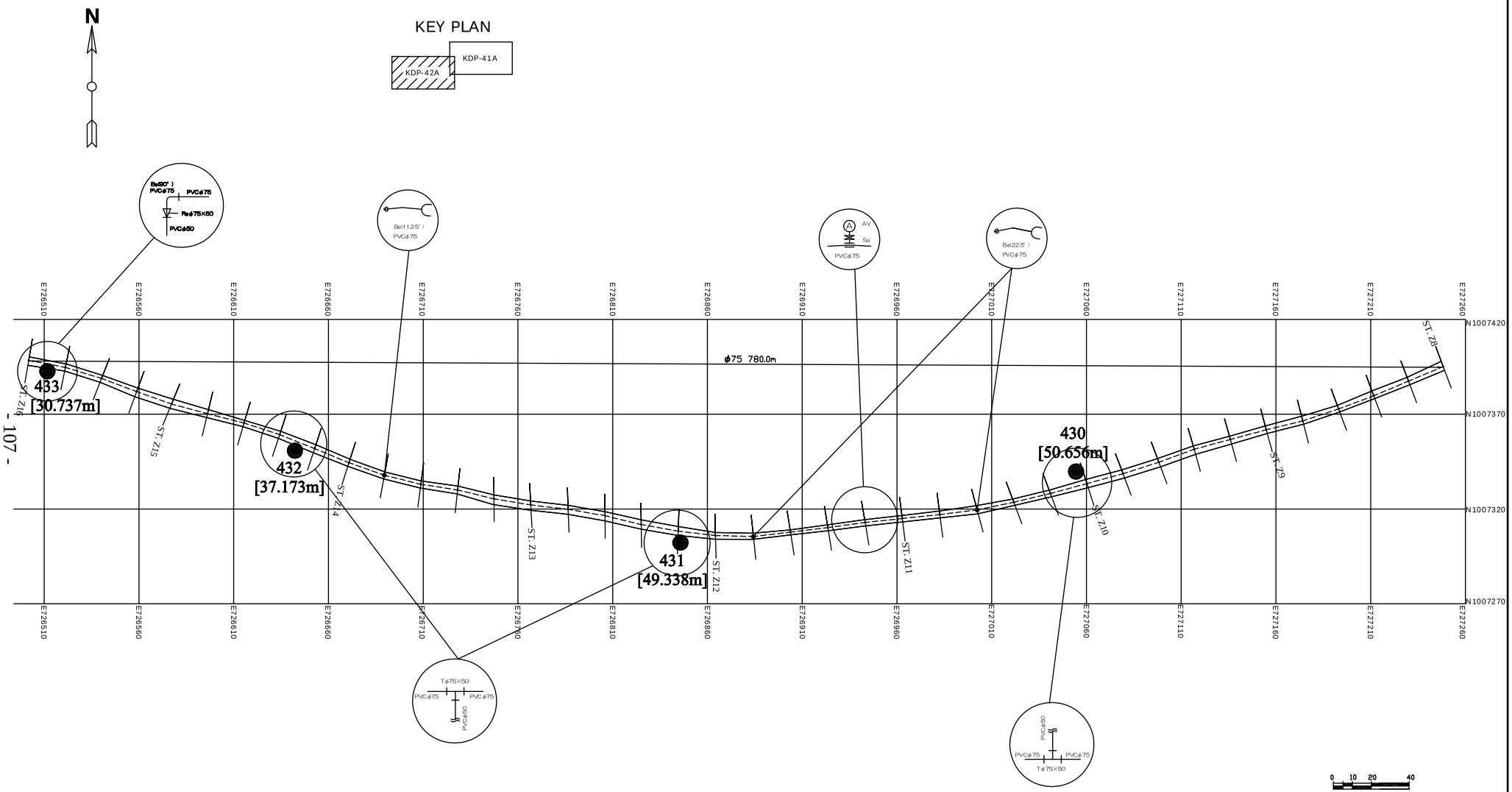
LEGEND			
PVC	Vinyl Pipe	Be	Bend
DCIP	ダクタイル鋳鉄管	Re	Reducer
SCP	Steel Comection Pieace	Sa	Saddle
		T	Tee
AV	Air Valve		
BOP	Blow Off Pipe	Wt	Water Tank
M	Metar		
MF	MF joint		
GV	Gate Valve		

PROJECT FOR THE ESTABLISHMENT OF
RURAL WATER SUPPLY SYSTEM IN KAMBIA DISTRICT

Water Distribution Pipe Plan
KDP-41/A

Scale	Shown in the Drawings		
Date	Oct. 2010	Drowing No.	065

EIGHT-JAPAN ENGINEERING CONSULTANTS INC.



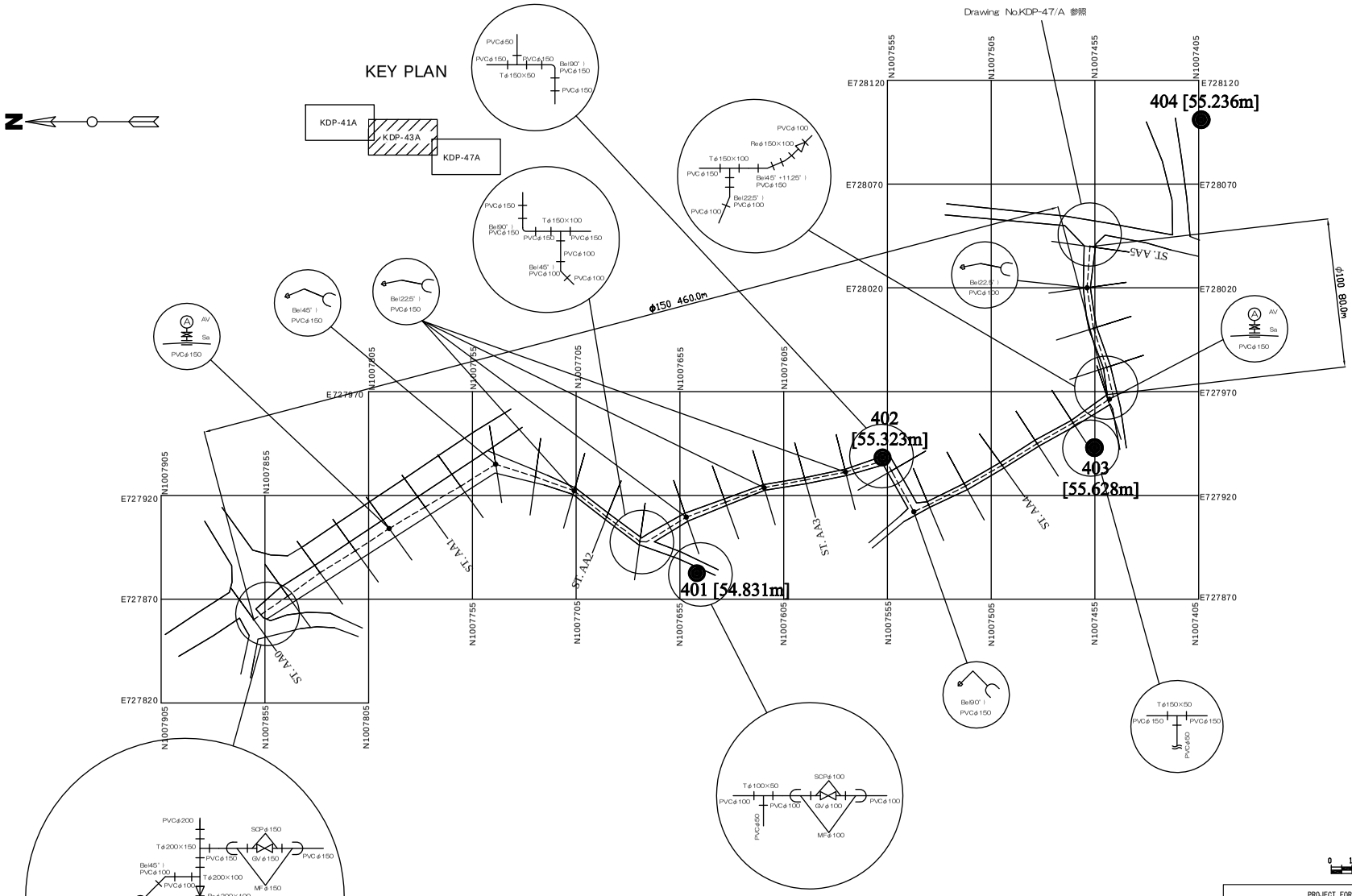
LEGEND			
PVC	Vinyl Pipe	Be	Bend
DCIP	ダクタイル鋳鉄管	Re	Reducer
SCP	Steel Comection Pieace	Sa	Saddle
		T	Tee
AV	Air Valve		
BOP	Blow Off Pipe	Wt	Water Tank
M	Metar		
MF	MF Joint		
GV	Gate Valve		

PROJECT FOR THE ESTABLISHMENT OF
RURAL WATER SUPPLY SYSTEM IN KAMBIA DISTRICT

Water Distribution Pipe Plan
KDP-42/A

Scale	Shown in the Drawings		
Date	Oct. 2010	Drowing No.	066

EIGHT-JAPAN ENGINEERING CONSULTANTS INC.



LEGEND			
PVC	Vinyl Pipe	Be	Bend
DCIP	ダクタイル鋳鉄管	Re	Reducer
SCP	Steel Comection Pieace	Sa	Saddle
		T	Tee
AV	Air Valve		
BOP	Blow Off Pipe	Wt	Water Tank
M	Metar		
MF	MF Joint		
GV	Gate Valve		

0 10 20 40

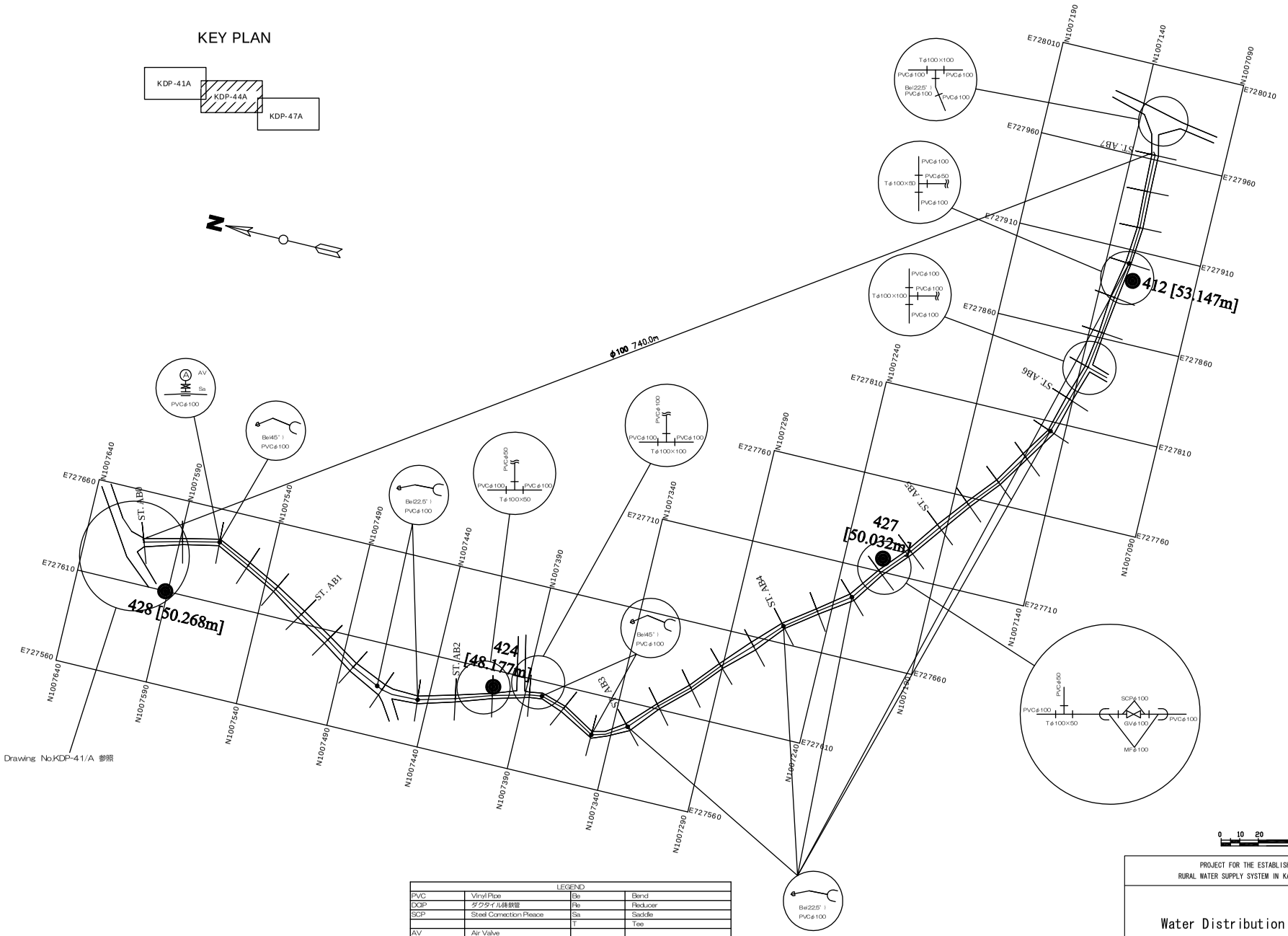
PROJECT FOR THE ESTABLISHMENT OF
RURAL WATER SUPPLY SYSTEM IN KAMBIA DISTRICT

Water Distribution Pipe Plan
KDP-43/A

Scale	Shown in the Drawings		
Date	Oct. 2010	Drowing No.	067

EIGHT-JAPAN ENGINEERING CONSULTANTS INC.

KEY PLAN



LEGEND			
PVC	Vinyl Pipe	Be	Bend
DIP	ダクタイル鋳鉄管	Re	Reducer
SCP	Steel Comection Pieace	Sa	Saddle
		T	Tee
AV	Air Valve		
BOP	Blow Off Pipe	Wt	Water Tank
M	Metar		
MF	MF Joint		
GV	Gate Valve		

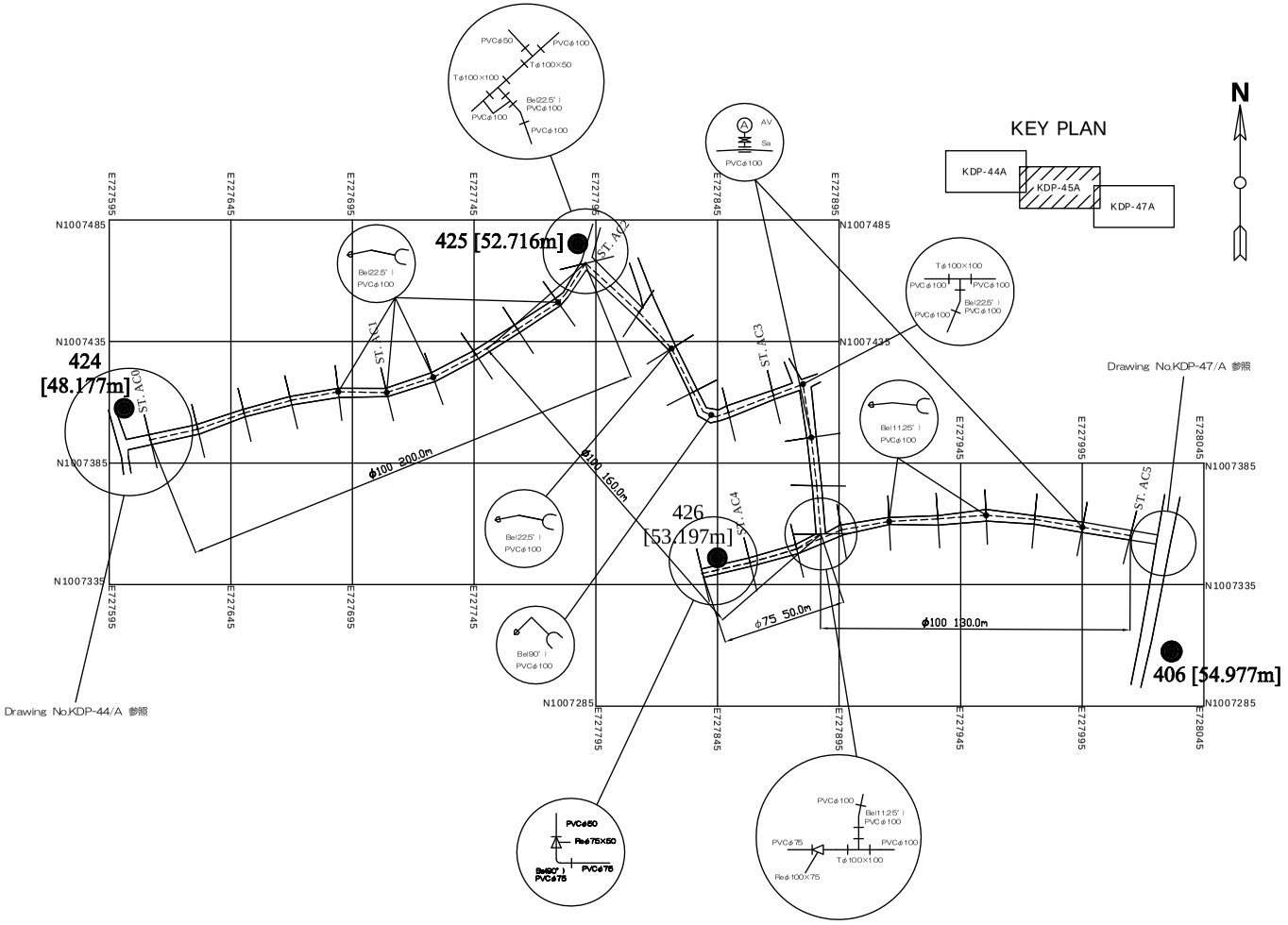
0 10 20 40

PROJECT FOR THE ESTABLISHMENT OF
RURAL WATER SUPPLY SYSTEM IN KAMBIA DISTRICT

Water Distribution Pipe Plan
KDP-44/A

Scale	Shown in the Drawings		
Date	Oct. 2010	Drowing No.	068

EIGHT-JAPAN ENGINEERING CONSULTANTS INC.



LEGEND			
PVC	Vinyl Pipe	Be	Bend
DCIP	ダクタイル鋳鉄管	Re	Reducer
SCP	Steel Comection Pieace	Sa	Saddle
		T	Tee
AV	Air Valve		
BOP	Blow Off Pipe	Wt	Water Tank
M	Metar		
MF	MF Joint		
GV	Gate Valve		

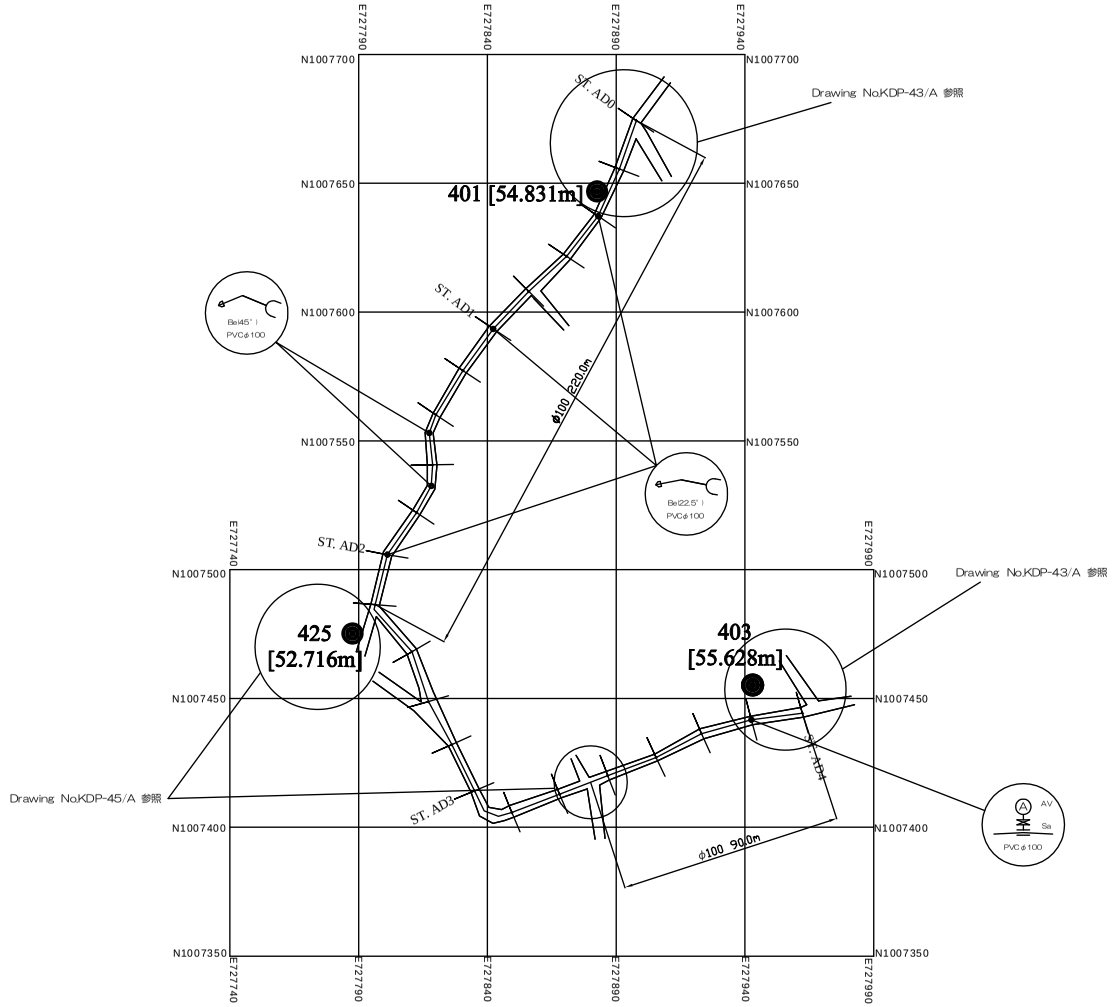
0 10 20 40

PROJECT FOR THE ESTABLISHMENT OF
RURAL WATER SUPPLY SYSTEM IN KAMBIA DISTRICT

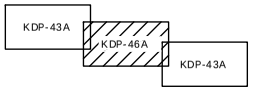
Water Distribution Pipe Plan
KDP-45/A

Scale	Shown in the Drawings		
Date	Oct. 2010	Drowing No.	069

EIGHT-JAPAN ENGINEERING CONSULTANTS INC.



KEY PLAN



LEGEND			
PVC	Vinyl Pipe	Be	Bend
DCIP	ダクタイル鋳鉄管	Re	Reducer
SCP	Steel Comection Pieace	Sa	Saddle
		T	Tee
AV	Air Valve		
BOP	Blow Off Pipe	Wt	Water Tank
M	Metar		
MF	MF Joint		
GV	Gate Valve		

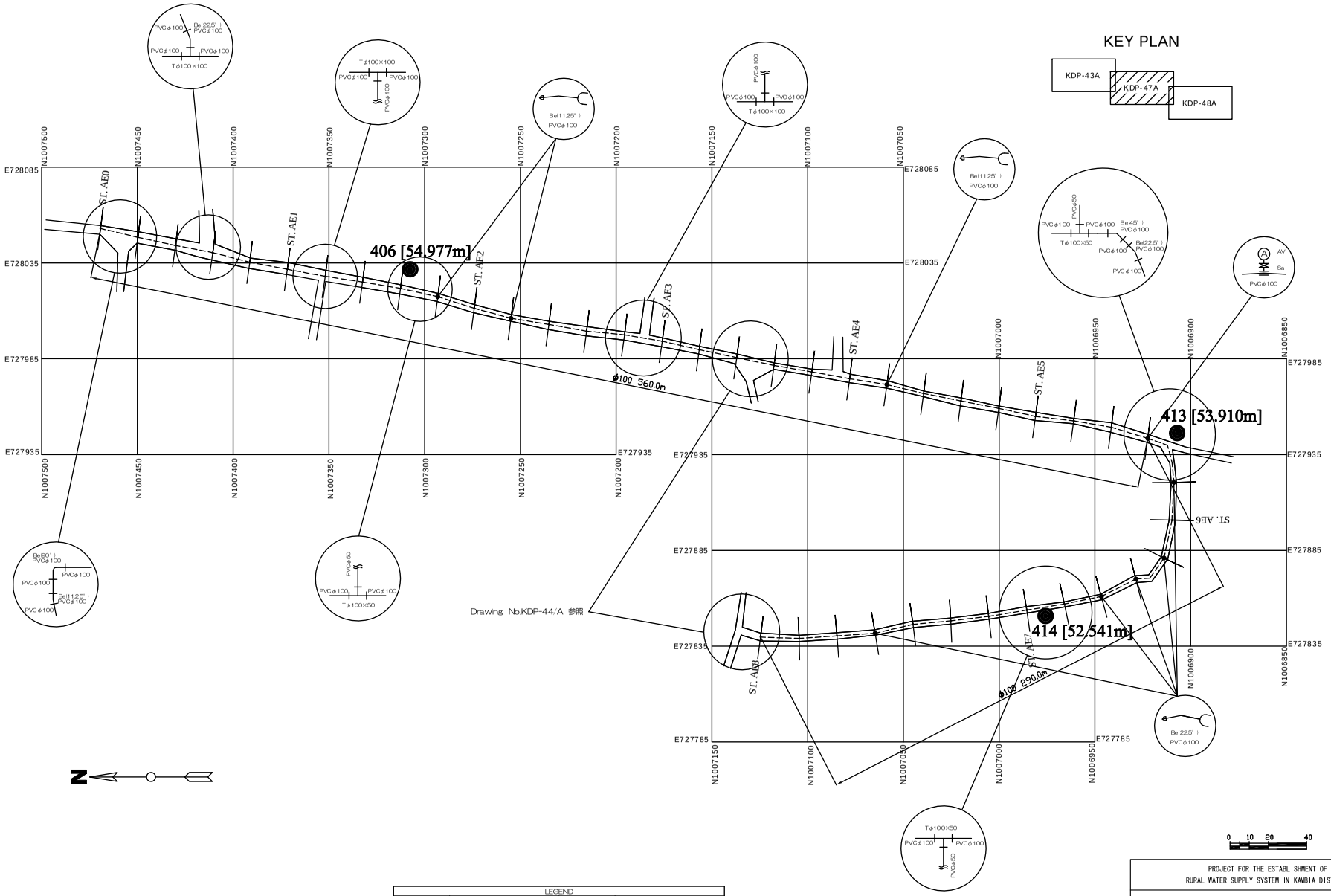
0 10 20 40

PROJECT FOR THE ESTABLISHMENT OF
RURAL WATER SUPPLY SYSTEM IN KAMBIA DISTRICT

Water Distribution Pipe Plan
KDP-46/A

Scale	Shown in the Drawings		
Date	Oct. 2010	Drowing No.	070

EIGHT-JAPAN ENGINEERING CONSULTANTS INC.



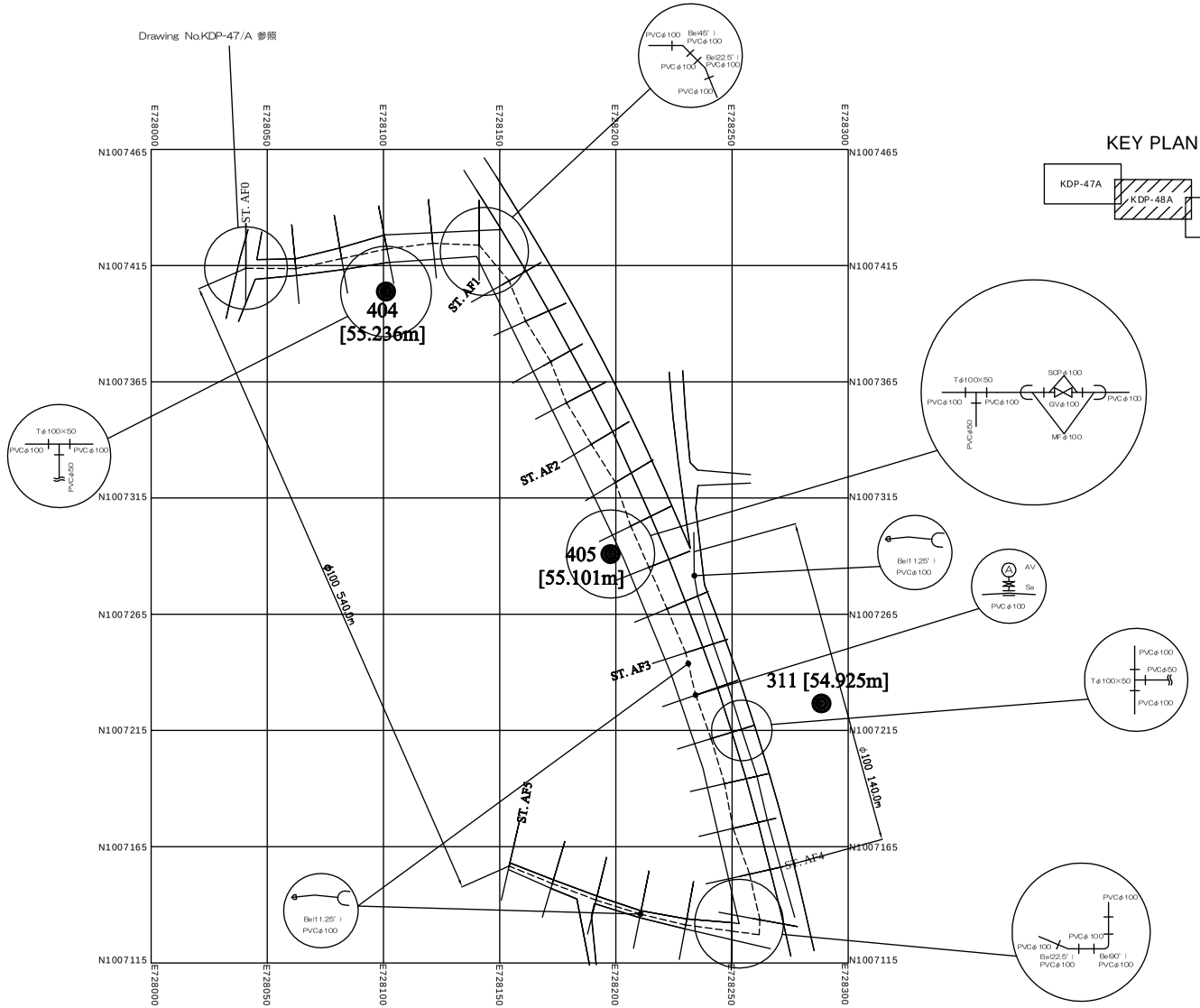
LEGEND			
PVC	Vinyl Pipe	Be	Bend
DCIP	ダクタイル鋳鉄管	Re	Reducer
SCP	Steel Comection Pieace	Sa	Saddle
		T	Tee
AV	Air Valve		
BOP	Blow Off Pipe	Wt	Water Tank
M	Metar		
MF	MF Joint		
GV	Gate Valve		

PROJECT FOR THE ESTABLISHMENT OF
RURAL WATER SUPPLY SYSTEM IN KAMBIA DISTRICT

Water Distribution Pipe Plan
KDP-47/A

Scale	Shown in the Drawings		
Date	Oct. 2010	Drowing No.	071

EIGHT-JAPAN ENGINEERING CONSULTANTS INC.



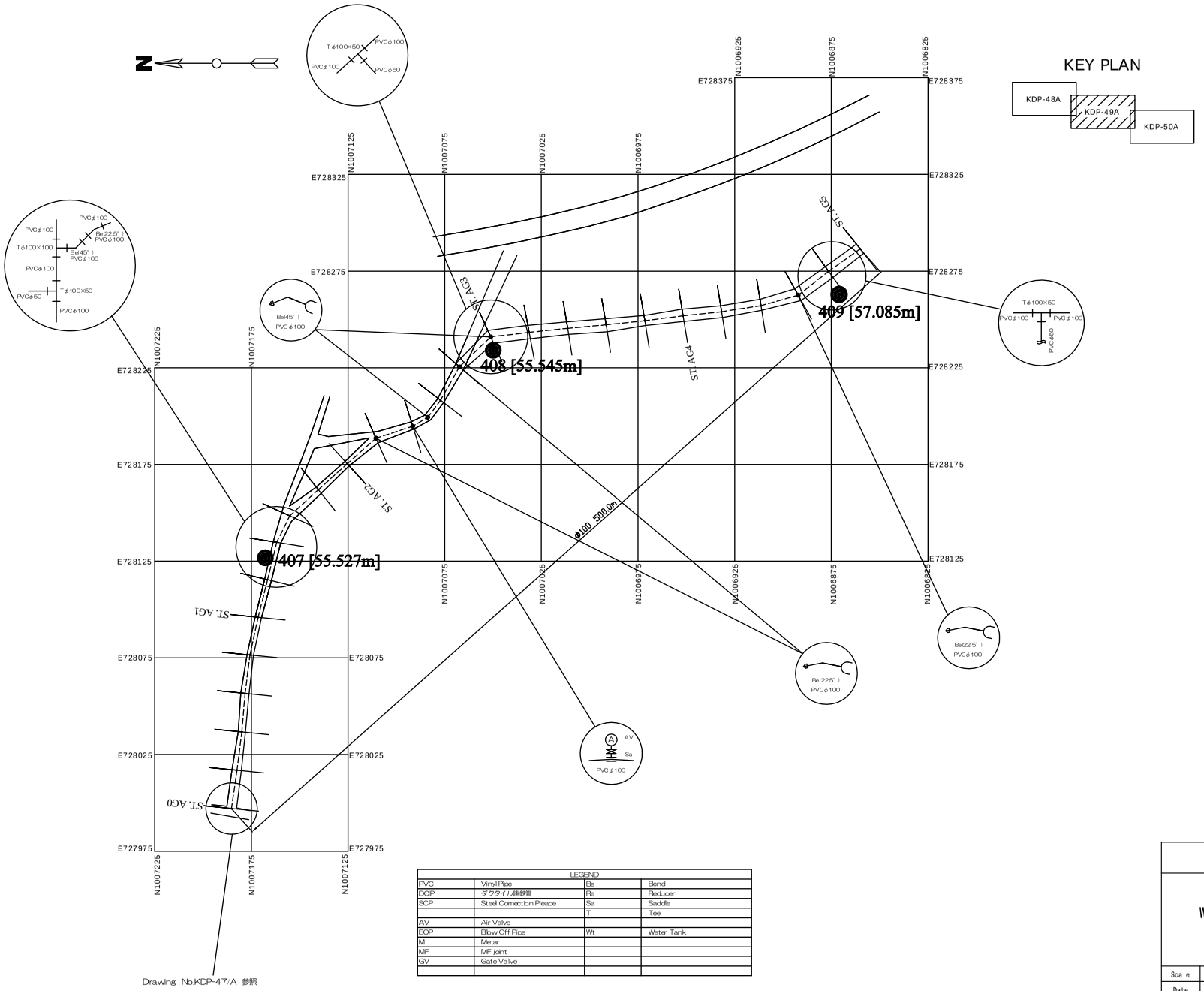
LEGEND			
PVC	Vinyl Pipe	Be	Bend
DCIP	ダクタイル鋳鉄管	Re	Reducer
SCP	Steel Comection Peace	Sa	Saddle
		T	Tee
AV	Air Valve		
BOP	Blow Off Pipe	Wt	Water Tank
M	Metar		
MF	MF Joint		
GV	Gate Valve		

PROJECT FOR THE ESTABLISHMENT OF
RURAL WATER SUPPLY SYSTEM IN KAMBIA DISTRICT

Water Distribution Pipe Plan
KDP-48/A

Scale	Shown in the Drawings		
Date	Oct. 2010	Drowing No.	072

EIGHT-JAPAN ENGINEERING CONSULTANTS INC.

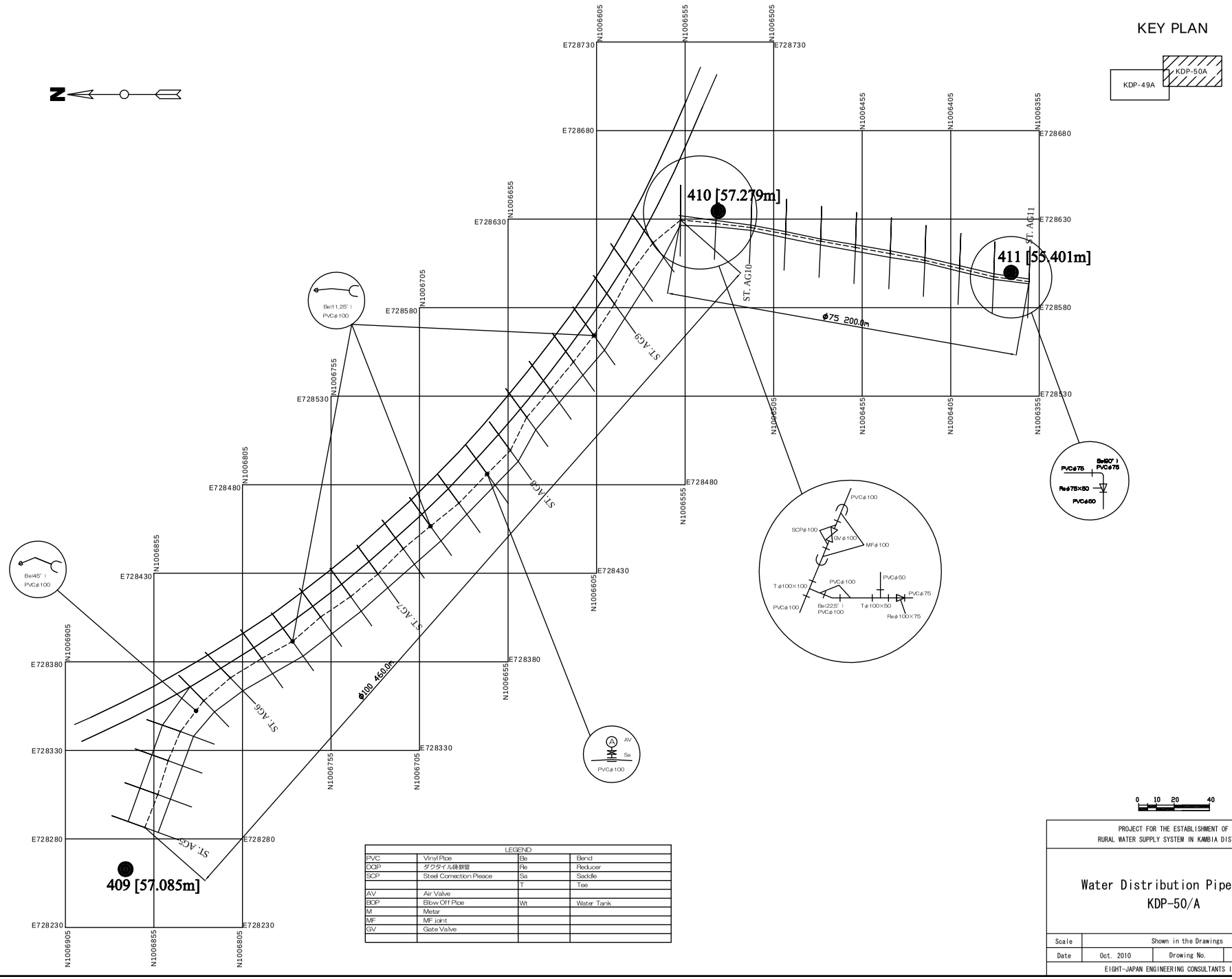


PROJECT FOR THE ESTABLISHMENT OF
RURAL WATER SUPPLY SYSTEM IN KAMBIA DISTRICT

Water Distribution Pipe Plan
KDP-49/A

Scale	Shown in the Drawings		
Date	Oct. 2010	Drowing No.	073

EIGHT-JAPAN ENGINEERING CONSULTANTS INC.



LEGEND			
PVC	Vinyl Pipe	Be	Bend
DCIP	ダクタイル鋳鉄管	Re	Reducer
SCP	Steel Comection Pieace	Sa	Saddle
		T	Tee
AV	Air Valve		
BOP	Blow Off Pipe	Wt	Water Tank
M	Metar		
MF	MF Joint		
GV	Gate Valve		

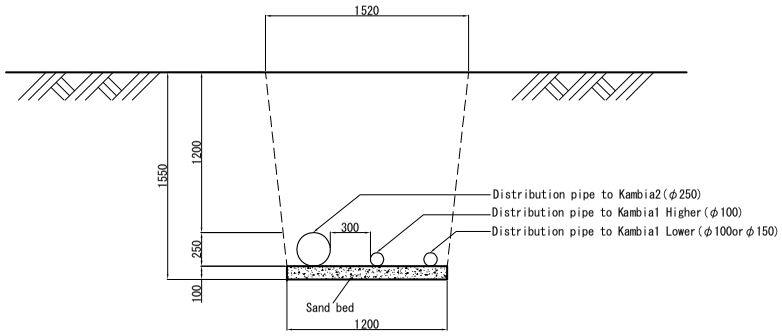
PROJECT FOR THE ESTABLISHMENT OF
RURAL WATER SUPPLY SYSTEM IN KAMBIA DISTRICT

Water Distribution Pipe Plan
KDP-50/A

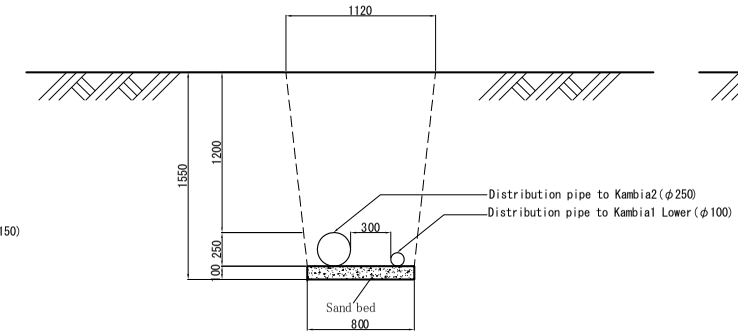
Scale	Shown in the Drawings		
Date	Oct. 2010	Drowing No.	074

EIGHT-JAPAN ENGINEERING CONSULTANTS INC.

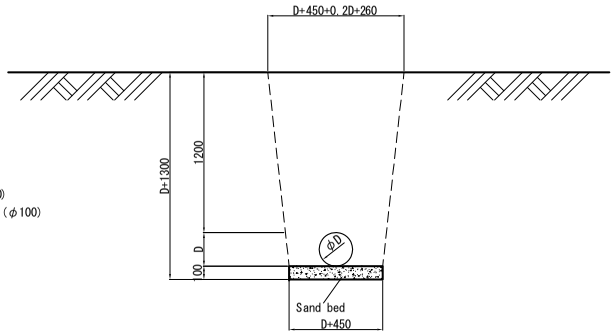
Tripple Line



Dubble Line

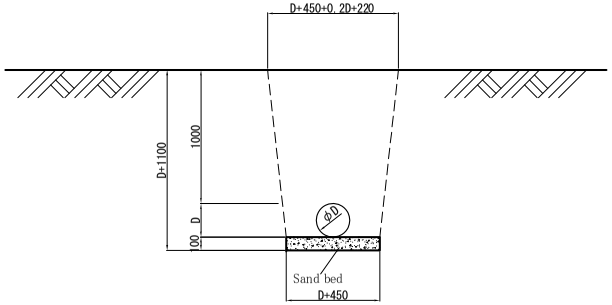


Single Line

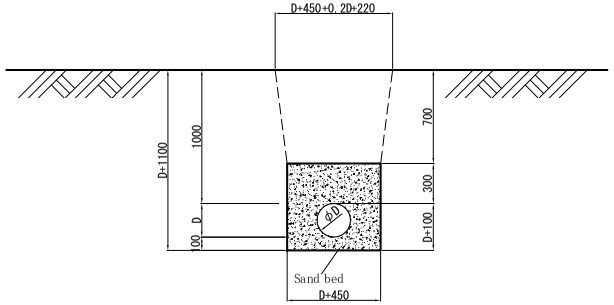


Typical Cross Section under main road

Soil Excavation Section



Rock Excavation Section



Typical Cross Section under feeder road

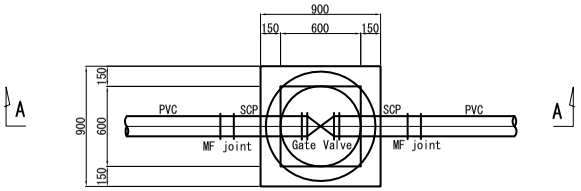
PROJECT FOR THE ESTABLISHMENT OF
RURAL WATER SUPPLY SYSTEM IN KAMBIA DISTRICT

Water Distribution Pipe
Typical Cross Section

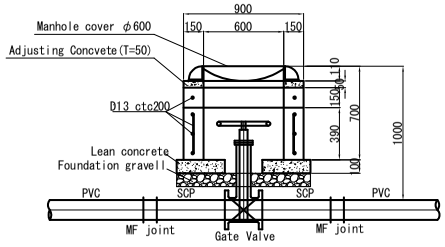
Scale	Shown in the Drawings		
Date	Oct. 2010	Drowing No.	075

EIGHT-JAPAN ENGINEERING CONSULTANTS INC.

Gate Valve Box

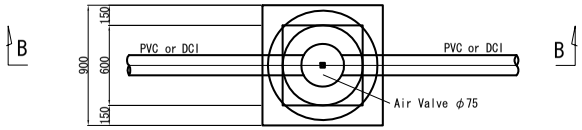


PLAN



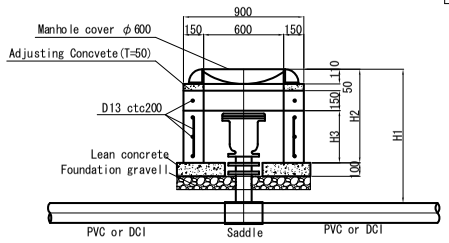
SECTION A—A

Air Valve Box



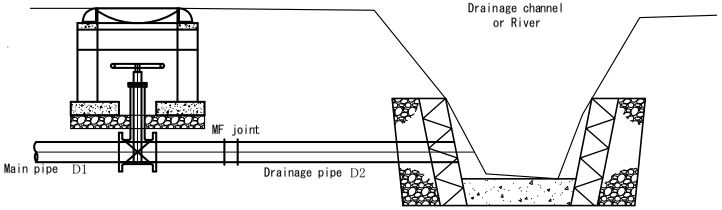
PLAN

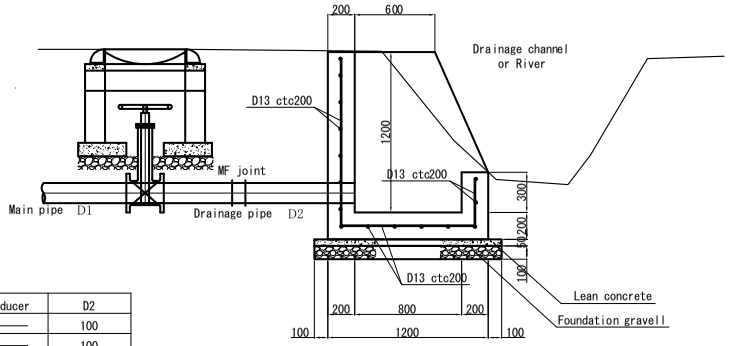
H1	H2
1,000	700
1,200	900



SECTION B—B

Blow off





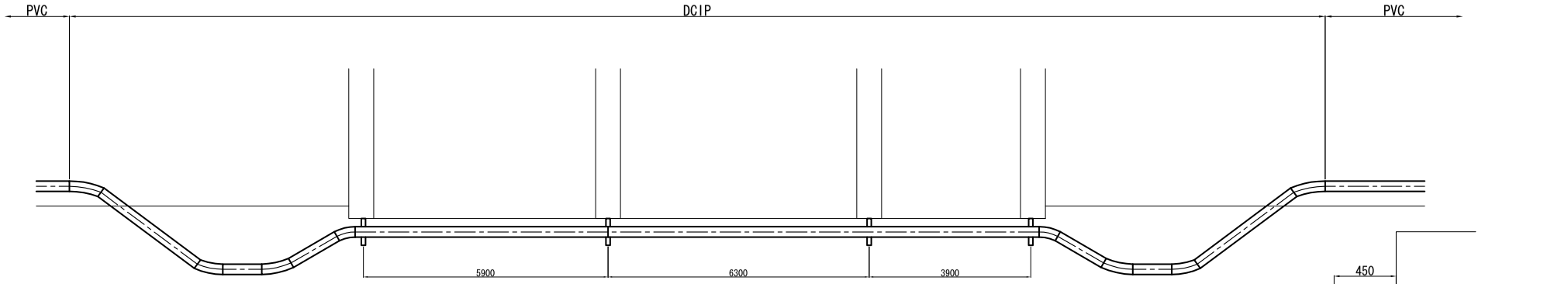
D1	Type of Blow off pipe	Reducer	D2
250	Blow off pipe 250×100	———	100
200	Blow off pipe 200×100	———	100
150	Tee pipe 150×150	150—100	100
100	Tee pipe 100×100	———	100
75	Tee pipe 75 × 75	———	75

PROJECT FOR THE ESTABLISHMENT OF
RURAL WATER SUPPLY SYSTEM IN KAMBIA DISTRICT

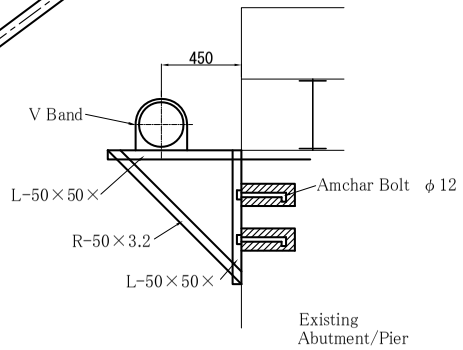
Water Distribution Pipe
Valve Box Details

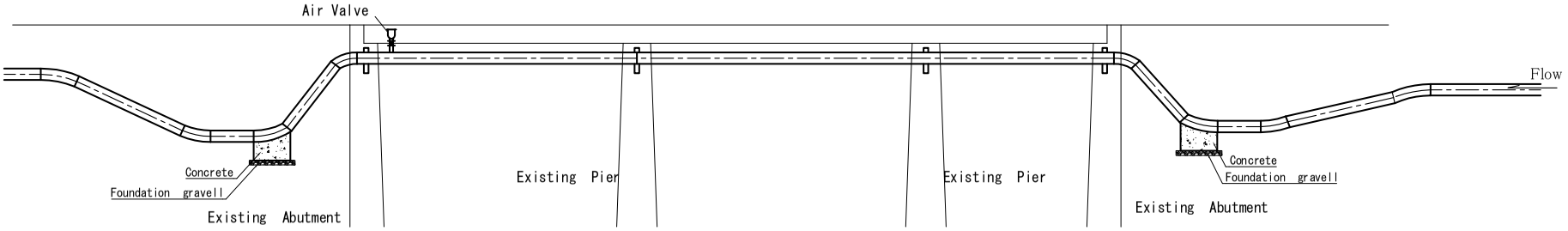
Scale	Shown in the Drawings		
Date	Oct. 2010	Drowing No.	076

EIGHT-JAPAN ENGINEERING CONSULTANTS INC.



PLAN





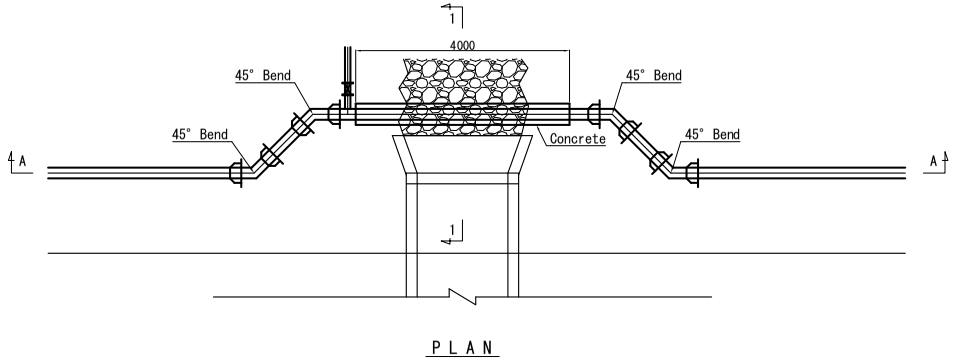
SECTION

PROJECT FOR THE ESTABLISHMENT OF
RURAL WATER SUPPLY SYSTEM IN KAMBIA DISTRICT

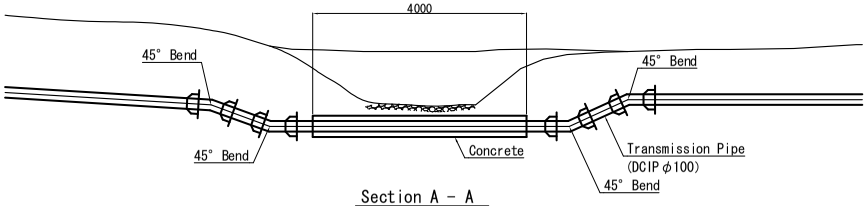
Water Distribution Pipe
River Crossing

Scale	Shown in the Drawings		
Date	Oct. 2010	Drowing No.	077

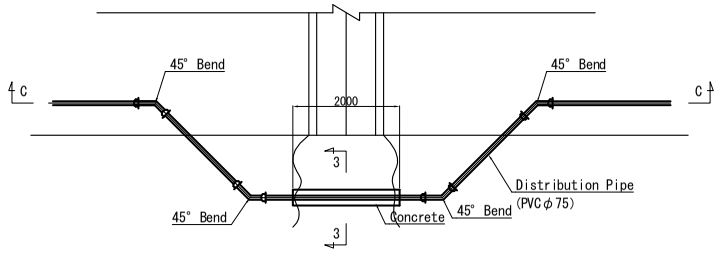
EIGHT-JAPAN ENGINEERING CONSULTANTS INC.



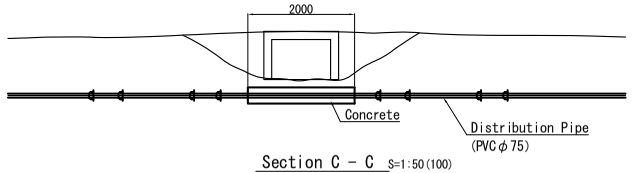
P L A N



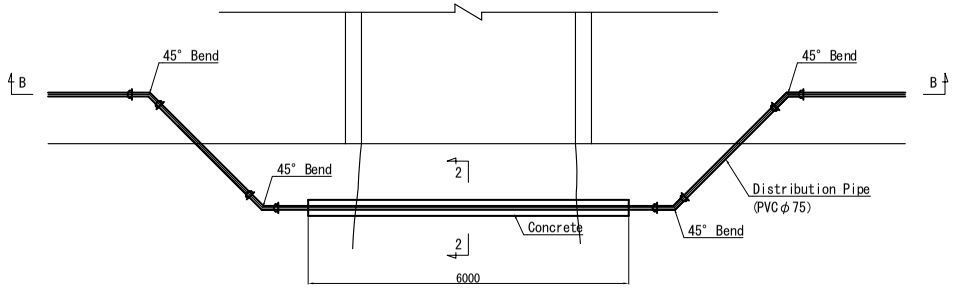
Section A - A



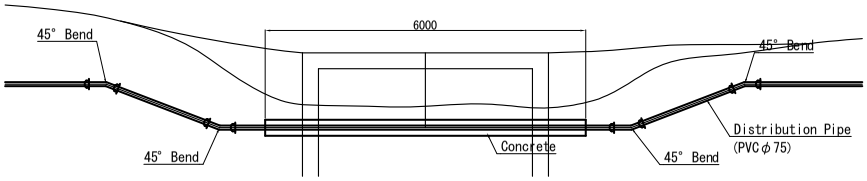
P L A N



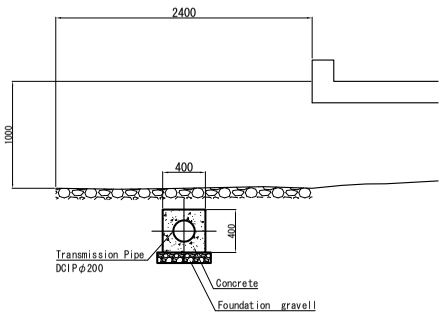
Section C - C S=1:50(100)



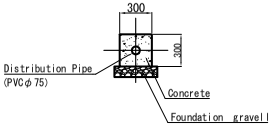
P L A N S=1:100



Section B - B S=1:50(100)



Section 1-1



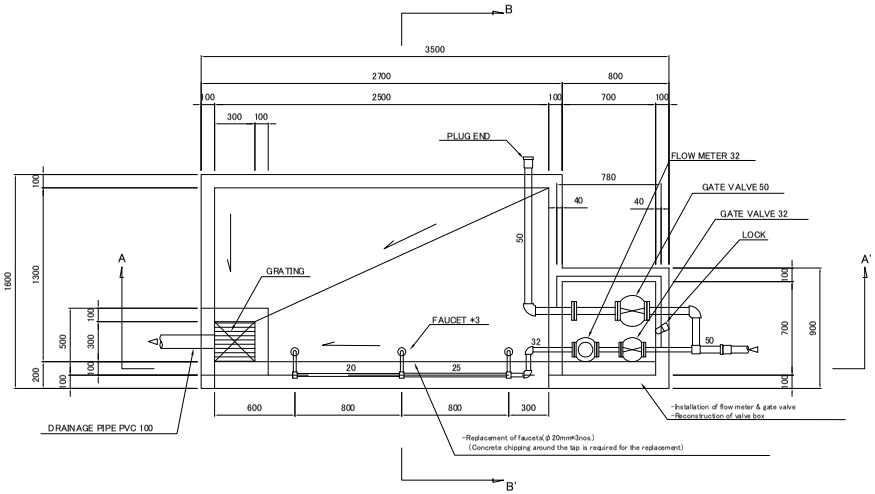
Section 2-2(3-3)

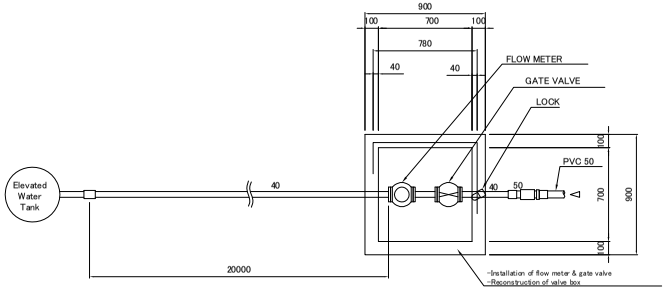
PROJECT FOR THE ESTABLISHMENT OF
RURAL WATER SUPPLY SYSTEM IN KAMBIA DISTRICT

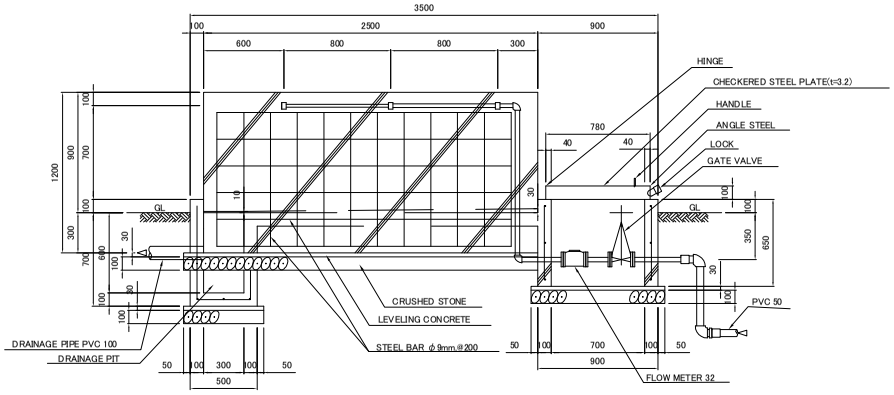
Water Distribution Pipe
Existing Structure Crossing

Scale	Shown in the Drawings		
Date	Oct. 2010	Drowing No.	078

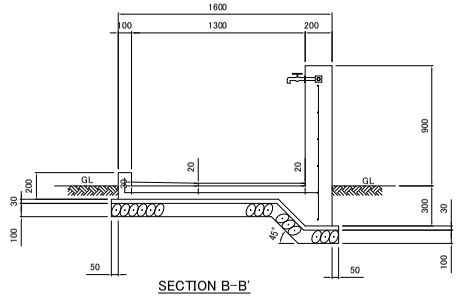
EIGHT-JAPAN ENGINEERING CONSULTANTS INC.



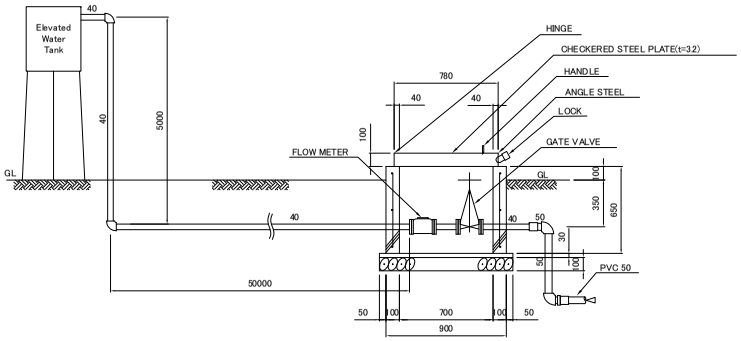




SECTION A-A'



SECTION B-B'

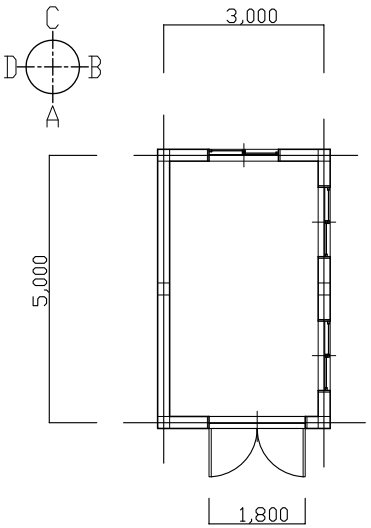


PROJECT FOR THE ESTABLISHMENT OF
RURAL WATER SUPPLY SYSTEM IN KAMBIA DISTRICT

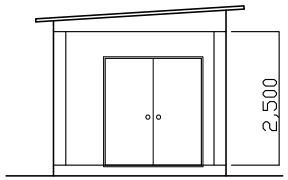
Public Tap(3faucet) & Private Plumbring Structure

Scale	Shown in the Drawings		
Date	Oct. 2010	Drowing No.	079

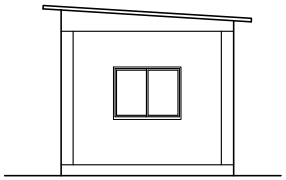
EIGHT-JAPAN ENGINEERING CONSULTANTS INC.



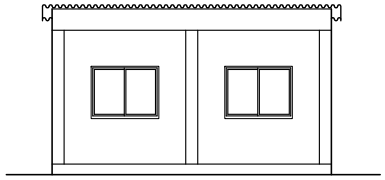
PLAN 1:100



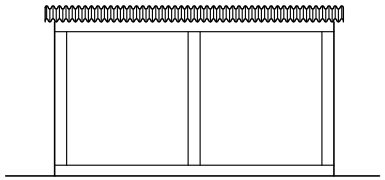
ELEVATION A 1:100



ELEVATION C 1:100



ELEVATION B 1:100



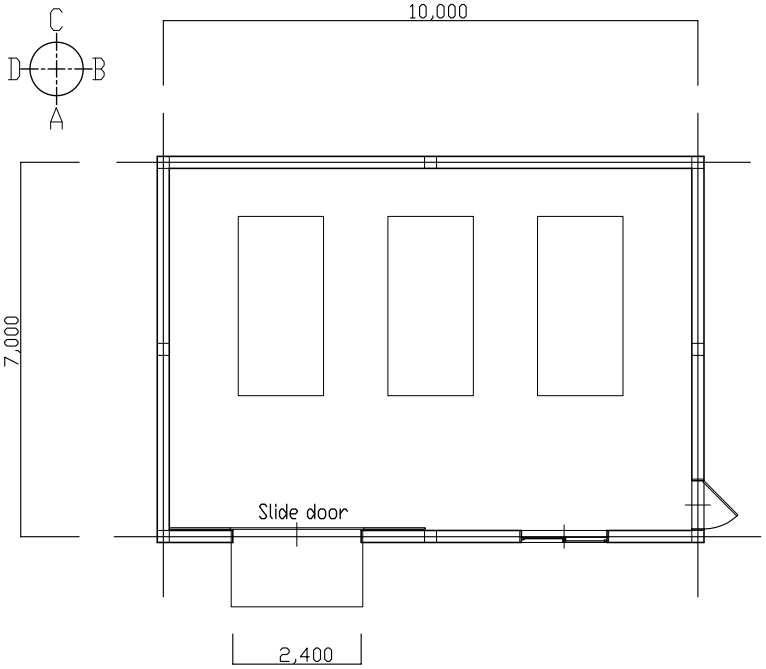
ELEVATION D 1:100

PROJECT FOR THE ESTABLISHMENT OF
RURAL WATER SUPPLY SYSTEM IN KAMBIA DISTRICT

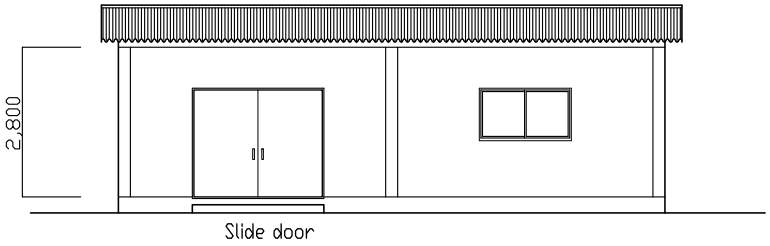
Pump House

Scale	Shown in the Drawings		
Date	Oct. 2010	Drowing No.	080

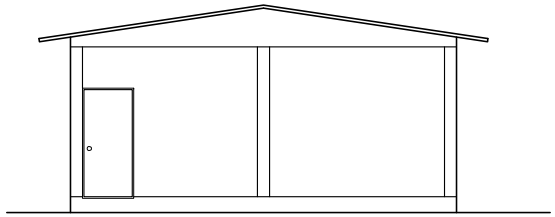
EIGHT-JAPAN ENGINEERING CONSULTANTS INC.



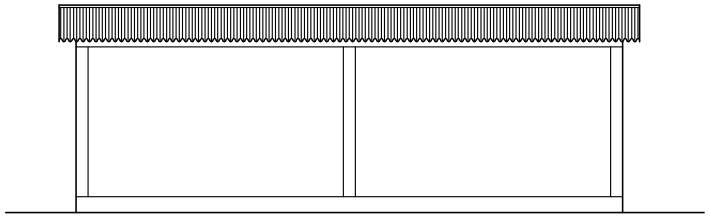
PLAN 1:100



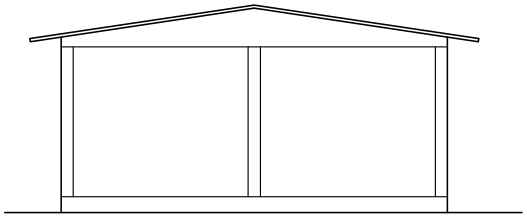
ELEVATION A 1:100



ELEVATION B 1:100



ELEVATION C 1:100



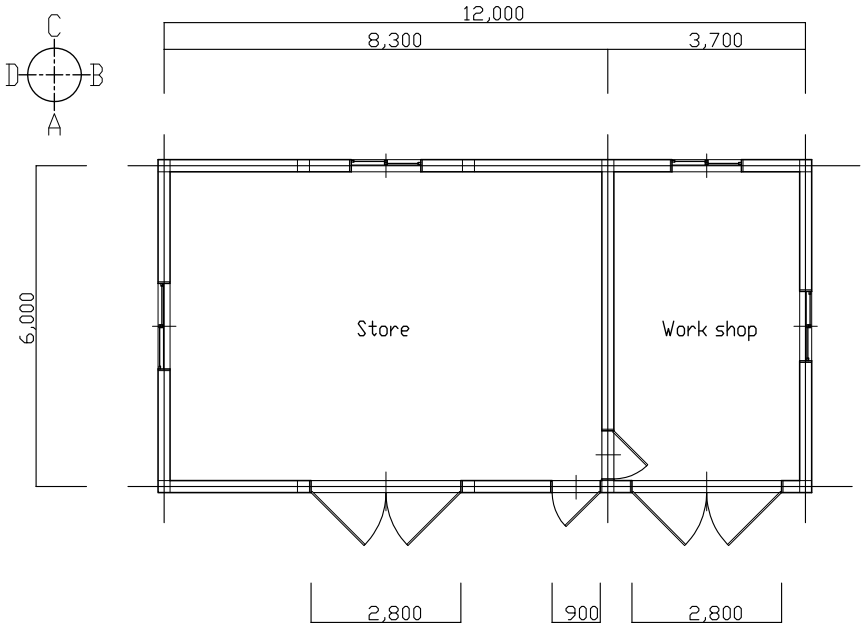
ELEVATION D 1:100

PROJECT FOR THE ESTABLISHMENT OF
RURAL WATER SUPPLY SYSTEM IN KAMBIA DISTRICT

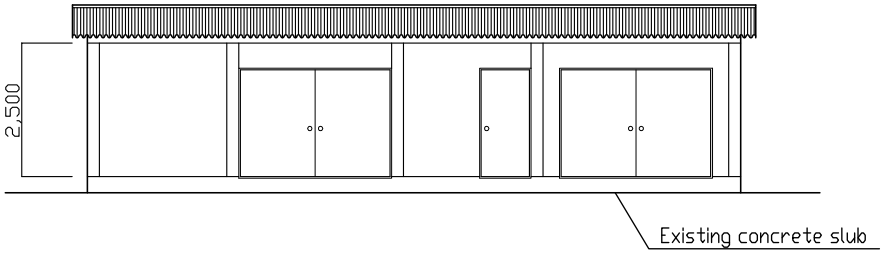
Generator House

Scale	Shown in the Drawings		
Date	Oct. 2010	Drowing No.	081

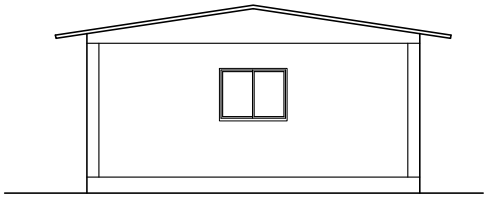
EIGHT-JAPAN ENGINEERING CONSULTANTS INC.



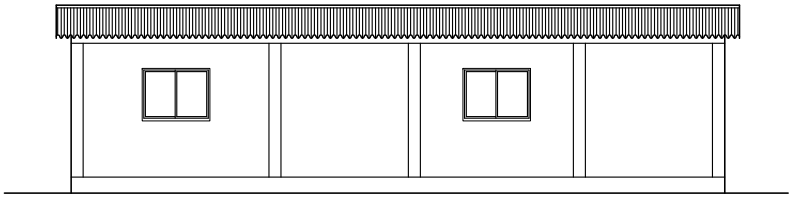
PLAN 1:100



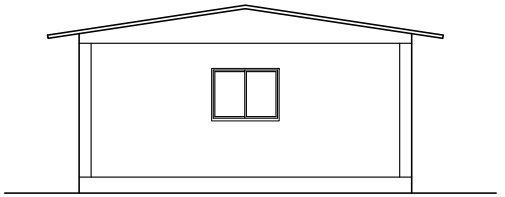
ELEVATION A 1:100



ELEVATION B 1:100



ELEVATION C 1:100



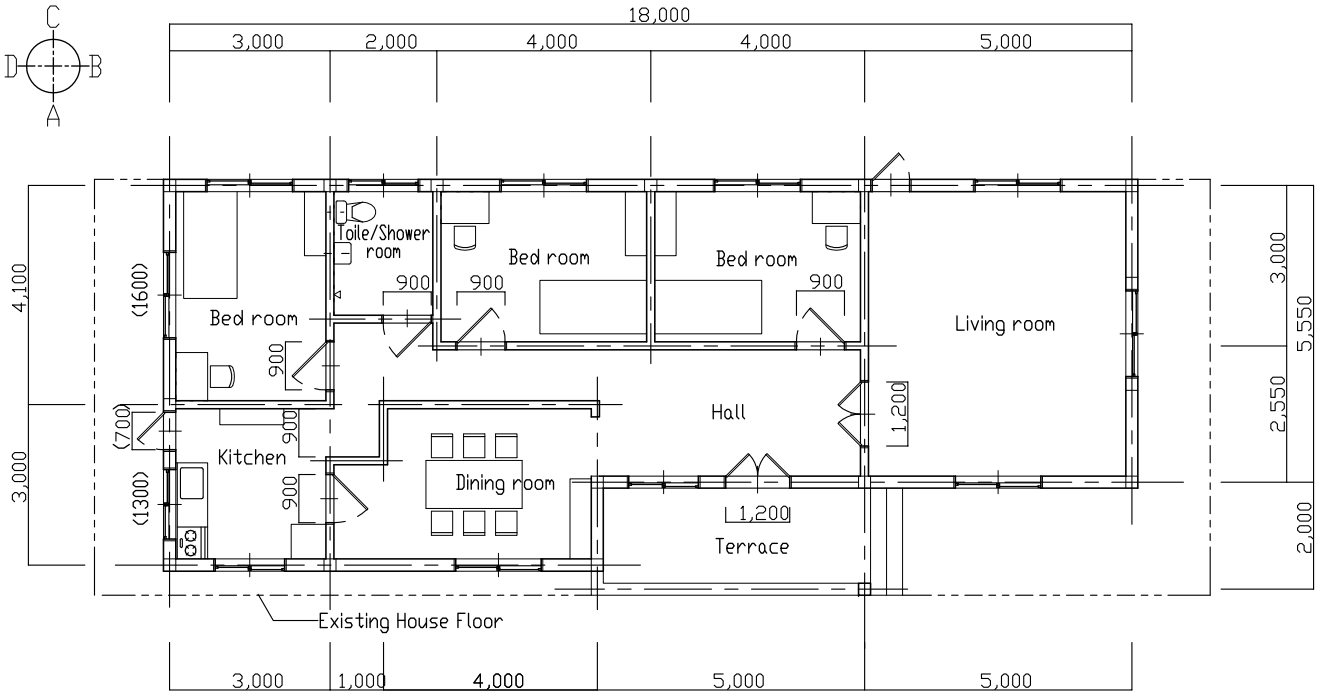
ELEVATION D 1:100

PROJECT FOR THE ESTABLISHMENT OF
RURAL WATER SUPPLY SYSTEM IN KAMBIA DISTRICT

Store House

Scale	Shown in the Drawings		
Date	Oct. 2010	Drowing No.	082

EIGHT-JAPAN ENGINEERING CONSULTANTS INC.



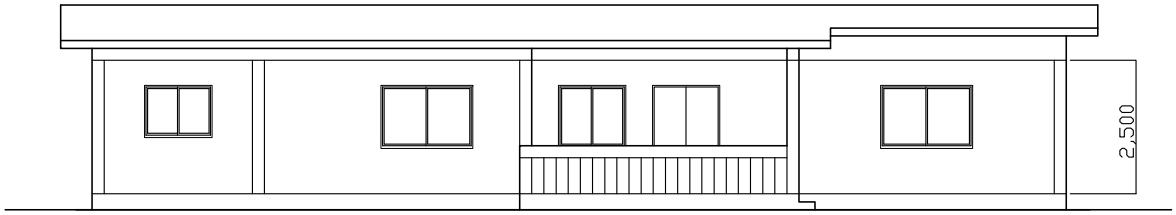
PLAN 1:100

PROJECT FOR THE ESTABLISHMENT OF
RURAL WATER SUPPLY SYSTEM IN KAMBIA DISTRICT

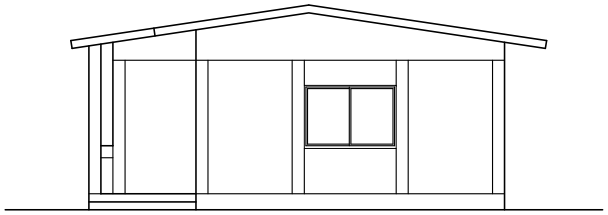
Staff Quarter1 (1/2)

Scale	Shown in the Drawings		
Date	Oct. 2010	Drowing No.	083

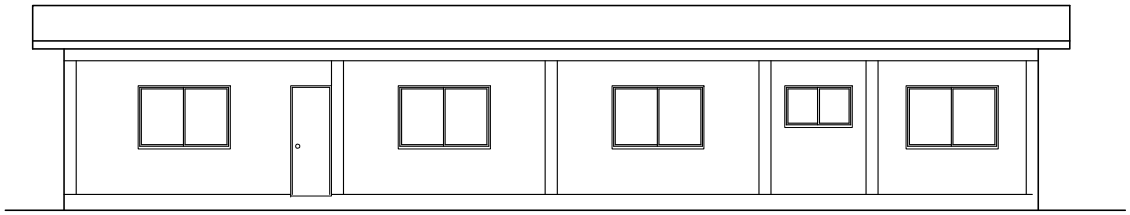
EIGHT-JAPAN ENGINEERING CONSULTANTS INC.



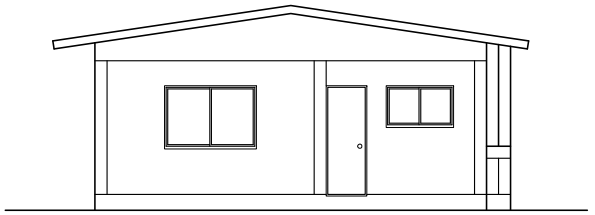
ELEVATION A 1:100



ELEVATION B 1:100



ELEVATION C 1:100



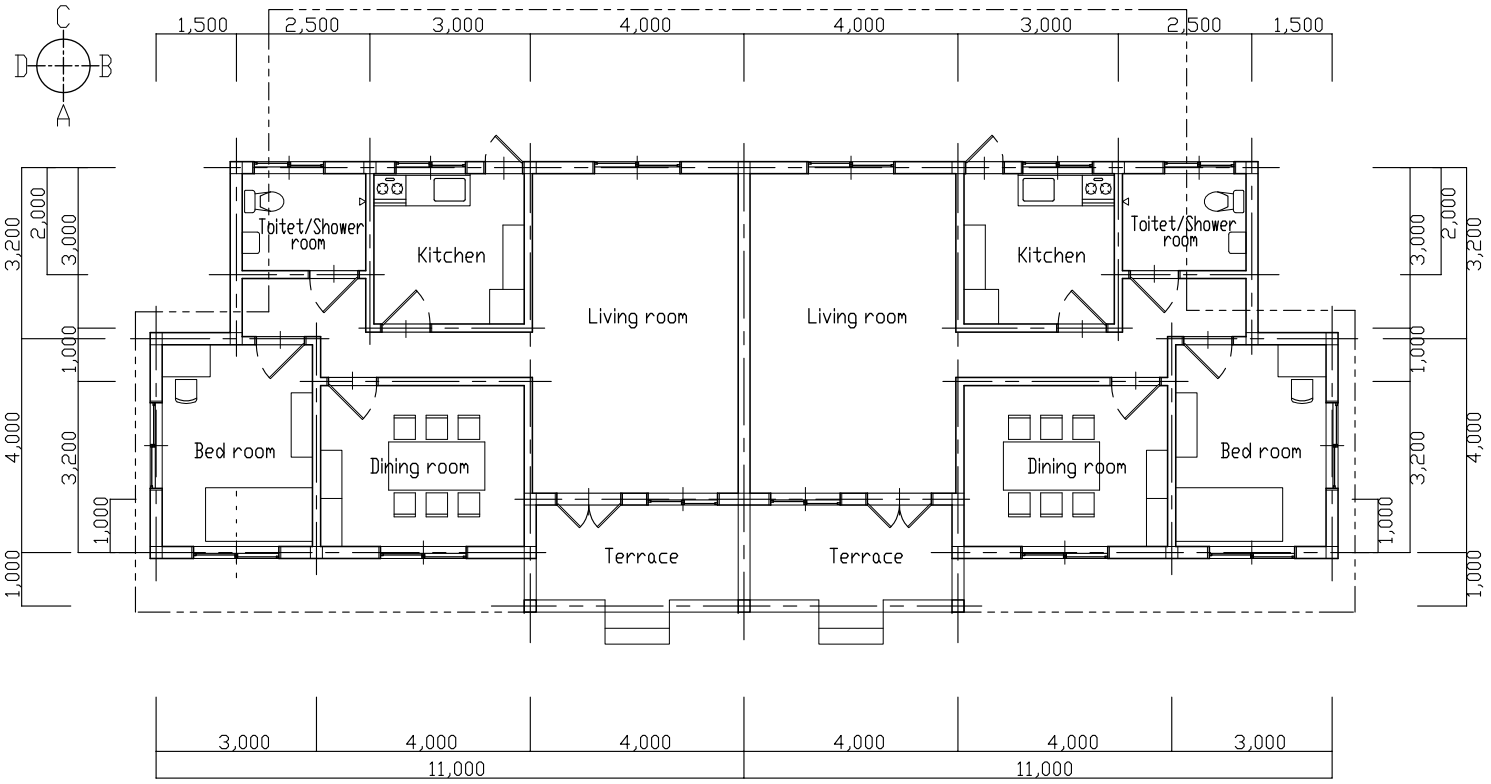
ELEVATION D 1:100

PROJECT FOR THE ESTABLISHMENT OF
RURAL WATER SUPPLY SYSTEM IN KAMBIA DISTRICT

Staff Quarter1 (2/2)

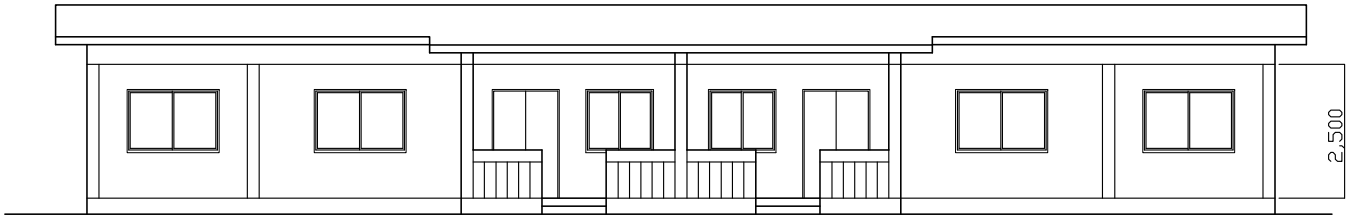
Scale	Shown in the Drawings		
Date	Oct. 2010	Drowing No.	084

EIGHT-JAPAN ENGINEERING CONSULTANTS INC.



PLAN 1:100

PROJECT FOR THE ESTABLISHMENT OF RURAL WATER SUPPLY SYSTEM IN KAMBIA DISTRICT	
Staff Quarter2(1/2)	
Scale	Shown in the Drawings
Date	Oct. 2010 / Drowing No. / 085
EIGHT-JAPAN ENGINEERING CONSULTANTS INC.	



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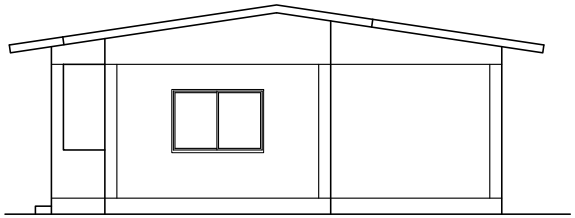

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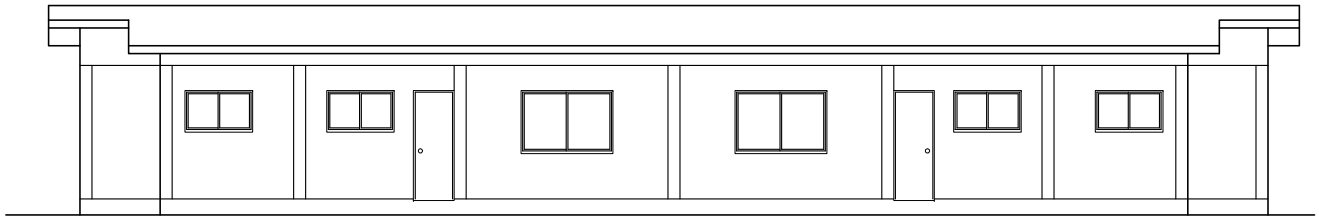

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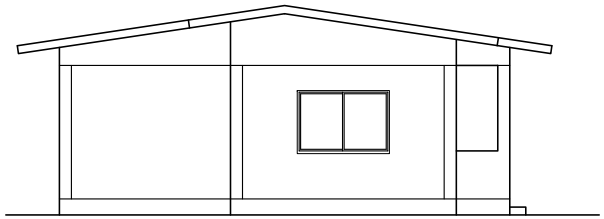

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PROJECT FOR THE ESTABLISHMENT OF
RURAL WATER SUPPLY SYSTEM IN KAMBIA DISTRICT

Staff Quarter2(2/2)

Scale	Shown in the Drawings		
Date	Oct. 2010	Drowing No.	086

EIGHT-JAPAN ENGINEERING CONSULTANTS INC.

2-2-4 Implementation Plan

2-2-4-1 Implementation Policy

(1) Framework of responsibilities

The responsible agency of the Project is the Ministry of Energy and Water Resources (ME&WR). The implementation agency is Water Supply Division (WSD) of ME&WR. The Kambia District Council is also the implementing organization for the operation and maintenance of the facilities to be constructed under the Project. WSD will, therefore, sign the consultancy agreement as well as the construction contract for the Project

Meanwhile, a Japanese consultant will be responsible for the detailed design (preparation of the design documents), assistance in the tender and the supervision of the construction work. Following the signing of the E/N and the G/A for Japan's Grant Aid for the Project, WSD will conclude a consultancy agreement with the consultant in relation to the said consultancy services.

The construction work will be conducted by a Japanese construction company selected by WSD through tender in the presence of the consultant.

(2) Method for Implementation

The method to be employed in the Project will be the one in which the maximum of local workers, equipment and materials might be utilized in creating the employment and in promoting technology transfer, in consideration of the local construction situation and the technical level.

(3) Dispatch of Engineers and Artisans

The water supply facilities to be constructed in the Project are complex facilities involving civil engineering work, building work and electrical/machinery equipment installation work. Towards the successful completion of work by satisfying the specifications required in the design, dispatch of Japanese engineers with the respective expertise would be necessary to provide guidance to local engineers in quality control and others.

The dispatch will concretely include engineers of the Japanese construction company (Site Manager and other three civil engineers) and Japanese artisans in the fields of form work, concrete structure, plumbing, water proofing, mechanic and electricity to instruct local workers.

(4) Use of Local Subcontractors

In a Japan's Grant Aid project, a Japanese construction company concludes a construction contract with the government of the recipient country and acts as the main contractor (the Contractor). However, the participation of local construction companies (acting as subcontractors) will be important for smoothly carrying out the construction work in overseas

where the different legal system, custom and sense of values prevail. Some 20 construction companies are registered as 'Primer' in Sierra Leone; these might have a sufficient capability of construction work under the guidance and supervision of the Japanese Contractor. Local subcontractors shall, therefore, be fully utilized in the Project, partly for the purpose of technology transfer.

2-2-4-2 Implementation Conditions

Construction work in the Project will be carried out, taking note of the site conditions, equipment and material procurement, labour, social conditions and others as delineated below.

(1) Matters to be taken Note in Major Construction Work

1) Temporary Work

The height of facilities to be constructed in the Project will be less than 5m, excluding the elevated tank. The excavation for foundations will require merely 1 to 3m depth. No large-scale temporary work will be required for the facilities of the Project, if considered these structural conditions.

The access road to the proposed construction site of the water treatment plant, approx. 1.7km is steep and narrow with a width of 2m so that it is difficult to get access to the site by a large-sized vehicle. The road is, therefore, improved as gravel paved road in order to secure a smooth access of vehicles of the construction work.

Construction work of the water intakes at the Kolenten River and the swamp will be conducted in the latter half of the dry season when there is little river discharge. By doing so, the work can be done with a simple temporally work by using sand bags and drainage pump for dewatering.

2) Earth Work

Excavation, backfilling and compaction accompanying with the facility construction and installation of pipes will be done with machinery, as a rule. Approx. 1.2km of trench excavation for piping where rock excavation is required will be done by using an excavator together with a giant breaker.

3) Foundation Work

The geological survey results revealed that the spread foundations can be adopted in the Project because of favorable ground condition for most of the planned facilities as well as due to a small facility load of around 50 KN/m^2.

4) Concrete Work

There is no plant of ready-mixed concrete in and around the Project site, and the on-site concrete mixing will be necessary. A proper mixture in weight is essential in maintaining the

appropriateness in concrete quality and a simplified batcher plant is expected to be mobilized in the site, for this reason. However, concrete mixing will be done manually by using mixers because required volume of concreting is not so much as 5 to 20m^3 per day except for base slab concreting of the water treatment facilities

5) Form Work

Water supply facilities have an intricate structure with water channels, partition walls and others. The average thickness of each member is below 30cm. For such a structure, plywood panels for concrete are commonly used. In the Project, plywood panels will also be used, in view of their workability and finish of the concrete surface.

6) Supporting Work

Slab thickness (concrete floor) in the water treatment facilities to be constructed in the Project will be approx. 20cm. The height of supporting will be less than 3m at the maximum, and an appropriate supporting might be provided with pipe support.

7) Scaffolding Work

Prefabricated scaffolding will be erected for re-bar arrangement, form work and concrete placing work, while pipe scaffolding will be used to the works not involving concrete placing. Pipe scaffolding will be erected around the proposed elevated tank for assembling its steel support and segments of the tank and for painting work.

8) Piping Work

Piping work will, in principle, be conducted using machinery. Simple digging without trench timbering would be satisfactory to the trenches where pipes are to be laid at almost all sections, judged from the geological characteristics of the sites.

9) Electrical and Mechanical Equipment Installation

Electrical and mechanical equipment will be installed upon civil engineering and building work drawing to the end, and equipment delivery and installation being possible. Nevertheless, electrical conduit tubes, etc. shall be installed, prior to the concrete placing, with due confirmation of the route.

(2) Measures for Safety

Safety measures vis-à-vis workers will be important equivalently with the quality control. Workers should always wear proper shoes and helmet, as the basic requirement for safety. A safety belt should be used in the construction of elevated tank, because the workers will have to work about 15m above the ground. A safety net will be put up to prevent the scattering of materials by wind.

(3) Construction Schedule

Sierra Leone has the rainy season from May to October, and the dry season from November to April. Annual rainfall is approx. 3,000mm in the Project site. Specially, it rains 500 to 700mm per month in between the middle of July and the middle of September.

During the above-mentioned period, piping work which involves trench excavation work is difficult to do due to heavy rain, and other works are also disrupted and being inefficient. All the construction work will, therefore, be suspended during the period and the construction schedule will be made in consideration of the suspension.

Critical-pass of the construction work of the Project should be piping works. It will take approx. four months to procure and transport the piping materials, and in three-party formation it will take approx. 9.5 months for installing the pipes of 32km in length, valves and valve box and conducting pressure tests after the installation of pipes.

In addition to the above-mentioned period of the procurement, transportation and installation of the pipes (13.5 months), it will take approx. two months for the suspension of the construction work in the rainy season and half a month for the final inspection of the facilities. The required construction period of the Project is, therefore, 16 months in total.

(4) Observance towards Labour Standard

The Contractor shall follow the Labour Law and other relevant laws and regulations in Sierra Leone when employing local workers in the Project. The Labour Law in Sierra Leone has the following provisions:

- Basic working hours: 8 hours/day or 48 hours/week
- Overtime allowance: Overtime: hourly wage×150%
  Public holidays: hourly wage×200%
- Tax obligation: All employees

(5) Observance towards Local Customs

The public holidays based on religion and customs in Sierra Leone shall be taken into consideration in determining working days. There are nine public holidays a year in Sierra Leone.

2-2-4-3 Scope of Works

The division of work between the Japanese and Sierra Leonean sides in the implementation of the Project is as below.

(1) Scope of Work for Japanese Side

(a) Construction of the water supply facilities of the Project described in “2-2 Basic Plan”.

(b) Maritime transportation of the equipment and materials procured in Japan and/or a third country to a port of landing in Sierra Leone.

(c) Inland transportation of the equipment and materials from the port of landing to the construction site.

(d) Consultancy services (detailed design, preparation of tender documents, assistance in the tender and construction supervision).

(2) Scope of Work for Sierra Leonean Side

(a) Provision of stock yard of the construction materials and equipment.

(b) Expropriation of the land required for construction of the planned facilities in the Project and payment of the compensation, if required.

(c) Site clearance at the construction site of water treatment plant (removal of the existing water treatment facilities and buildings except for their foundations).

(d) Site clearance at the construction site of elevated tank (removal of steel shaft and tank of the existing elevated tank).

(e) Prompt customs clearance and tax exemption of the equipment and materials required in the implementation of the Project at the port of landing.

(f) Dispatch of counterparts in charge of the Project and bear the expenses.

2-2-4-4 Consultant Supervision

(1) Consultancy Work

Following the conclusion of the consultancy agreement after signing of the E/N and the G/A, the Consultant will conduct the detailed design, prepare tender documents, provide assistance in the tender, and conduct construction supervision towards the Contractor to be awarded with a construction contract. Major components of the consultancy work are outlined below.

1) Preparation of Detailed Design and Tender Documents

The Consultant will prepare the detailed design documents based on the survey drawings and the boring survey findings compiled under the Preparatory Survey and the findings of the more detailed field survey for the detailed design, and will also prepare the documents required in the tender. The Consultant shall consult with the Government of Sierra Leone with a view to obtaining its approval.

2) Assistance in the Tender

The Consultant will provide assistance to the Government of Sierra Leone in such work as notice of the tender, pre-qualification, distribution of tender documents, acceptance of bids and analysis as well as evaluation of bids, and will also provide advice in contract negotiations between the Government of Sierra Leone and a successful bidder. The Consultant will witness the signing of

the construction contract between the Government of Sierra Leone and the successful bidder (who will then become the Contractor).

3) Construction Supervision

In Japan, the Consultant will examine the documents submitted by the Contractor for their approval by the Consultant. In Sierra Leone, the Consultant will provide assistance to the Government of Sierra Leone in regard to the pre-work consultation meetings and will guide and supervise the Contractor in regard to the transportation of equipment and materials. The Consultant will also conduct schedule and quality control (including the quality inspection to be conducted by the Contractor) and material control. The Consultant will report the progress and other relevant matters to the Government of Sierra Leone and JICA Sierra Leone Field Office for the coordination and consultation required.

(2) Project Implementation Set-up

In order to smoothly carry out the detailed design and subsequent construction supervision, the Consultant will organize a project implementation set-up with those persons, mainly consisting of those who have participated in the Preparatory Survey, having an adequate knowledge of Japan's Grant Aid scheme.

1) Preparation of Detailed Design and Tender Documents

The persons to be involved in the preparation of detailed design and tender documents and for assistance in the tender, with their respective roles, are as below.

(a) Project Manager: Overall supervision of detailed design and the tender.
(b) Water Supply Engineer: Detailed design of water intake facilities, water treatment facilities and water distribution facilities.
(c) Plumbing engineer: Detailed design of raw water conveyance pipes, transmission and distribution pipes and auxiliary equipment to the pipeline.
(d) Cost estimator: Estimation of prospective bidding prices of construction work
(e) Tender coordinator: Pre-qualification, preparation of construction agreement and assistance in the tender

2) Construction Supervision

In consideration of the contents of the construction work and the scale of the Project, the Consultant will dispatch a civil engineer having the precedent experience of Grant Aid projects as a resident engineer. The Consultant will also dispatch a Project Manager and a specialist engineer at crucial stages of project implementation, to coordinate as well as to supervise the work. The engineers to be dispatched at such crucial stages are as below.

(a) Project Manager: Coordination and technical control to ensure the smooth

progress of construction work.

(b) Resident Engineer: Daily project management and schedule control.

(c) Inspection Specialist: Final inspection for the completed water supply facilities before the delivery of the facilities to Sierra Leonean Government.

2-2-4-5 Quality Control Plan

In reference to facilities construction, the Consultant will direct the Contractor to conduct analyses and tests for the following items, the results of which shall be reflected in the quality control:

Table 2-2-6 Analysis and Testing for Quality Control

Classification of Work	Test Item	Test Frequency	Note
1. Concrete Work			
(1) Test Mixing	Grain size analysis of fine aggregates	Once in the mixing	Sieving method
	Grain size analysis of coarse aggregates	- ditto -	Sieving method
	Chlorine ion concentration test	- ditto -	With simplified method
	Compressive stress test	- ditto -	7 days and 28 days stress
(2) Casting at Site	Slump test	Once for 50 m^3	
	Chlorine ion concentration test	Once in 2 weeks	With simplified method
	Compressive stress test	Once for 50 m^3	7days and 28 days stress
2. Re-bar Work	-	In each delivery to the site	With mill sheet
3. Plumbing Work	Water pressure test	After plumbing work completed, once in the section of a stop valve.	
4. Quality Analysis	Water quality items as per WHO Standards	After completion of the treatment facilities, once in the treated water.	To be analyzed by WSD's laboratory.

The Contractor will procure the testing devices for the concrete work and bring them to the site because there is no company or laboratory for conducting the test in Sierra Leone. Towards the major equipment such as pumps and water treatment equipment, to which a special order will be given in the procurement from Japan, an inspection and tests shall be conducted at factories of manufacturers, to confirm the quality and functions in advance.

2-2-4-6 Procurement Plan

The main construction equipment and materials to be used in the Project are cement, reinforcing bars, piping materials (ductile cast iron pipes, PVC pipes and valves), elevated tank (steel panel type), generators and water treatment equipment, etc. The planned procurement of these equipment and materials is outlined below, taking their quality and ease or difficulty of procurement into consideration.

1) Cement

There is a cement factory in Sierra Leone. The quality, stable supply and ease of procurement in the local market is not is not problematic, therefore, the cement made in Sierra Leone will be used.

2) Reinforcing Bars

Although reinforcing bars are being imported, no problematic points are observed in size, quality and quantity and ease of procurement in the local market; the reinforcing bars will, therefore, be procured in Sierra Leone.

3) Piping Materials

Ductile cast iron pipes and PVC pipes are not manufactured in Sierra Leone and procurement of these pipes in the local market is very difficult. These piping materials will, therefore, be imported from other countries. In case that these materials are imported from Japan it will be very costly because not only prices of themselves but transportation cost are also high. These materials are, therefore, imported from Europe, South Africa and other adjacent countries to Sierra Leone which are able to provide required quality of the materials and to deliver them by appointed date. Steel galvanized pipes for water supply can be procured in Sierra Leone, but they are small diameters only.

4) Elevated Tank (Steel Panel Type)

A steel panel type elevated tank of a British manufacturer has come into wide use in Sierra Leone and agency of the manufacturer is in the country. The quality and delivery of the tank are not problematic so that the tank will be procured in the local market through the agency after the confirmation of an advantage over the cost.

5) Generator

Because commercial power supply in Sierra Leone is poor, generators for power supply have become popular and there are some agencies of the manufacturers in the country. Provision of spare parts and maintenance services of the generators is not problematic; therefore, the generators will be procured in the local market.

6) Water Treatment Equipment

Pumps, sand washer, chlorination devices, etc which are to be used in the water treatment plant will be procured from Japan in consideration of their quality and endurance and their factory inspections to be conducted prior to shipping.

Table 2-2-7 Procurement of Materials and Equipment

Materials and Equipment	Sierra Leone	Japan	Third Country
Cement	○		
Aggregate	○		
Reinforcing Bars	○		
Pipes (PVC)			○
Pipes (DCIP)			○
Pipes (SGP)	○		
Valves			○
Elevated Tank (Steel Panel Type)	○		
Generators	○		
Water Treatment Equipment		○	

2-2-4-7 Soft Component (Technical Assistance) Plan

Soft component of the Project will not be conducted under Japan's Grant Aid scheme. The training for building the capacities of the technical and administrative staff of KWSSB who will be engaged in operation and maintenance of the water supply facilities to be constructed in the Project is expected to be done under a technical cooperation scheme that the Government of Sierra Leone has requested assistance to the Government of Japan.

2-2-4-8 Implementation Schedule

(1) Implementation Schedule

The implementation schedule of the Project, after signing of the E/N between the Governments of Sierra Leone and Japan, and the G/A between the Sierra Leonean Government and JICA, is as follows.

After signing of the E/N and the G/A, the Sierra Leonean side (WSD) will immediately conclude a consultancy agreement to prompt the commencement of the detailed design by the Consultant who will then conduct the necessary study, including a field survey, to prepare the detailed design documents. The Consultant will also provide assistance in the tender organized by the Government of Sierra Leone, and will conduct a series of tender-related work, ranging from pre-qualification of construction companies in the bidding to selection of a successful bidder.

When the successful bidder has been selected, a construction agreement will be concluded

between the successful bidder (the Contractor) and WSD, after negotiation. The Contractor will commence the work upon the receipt of a notice to proceed of work issued by the Consultant.

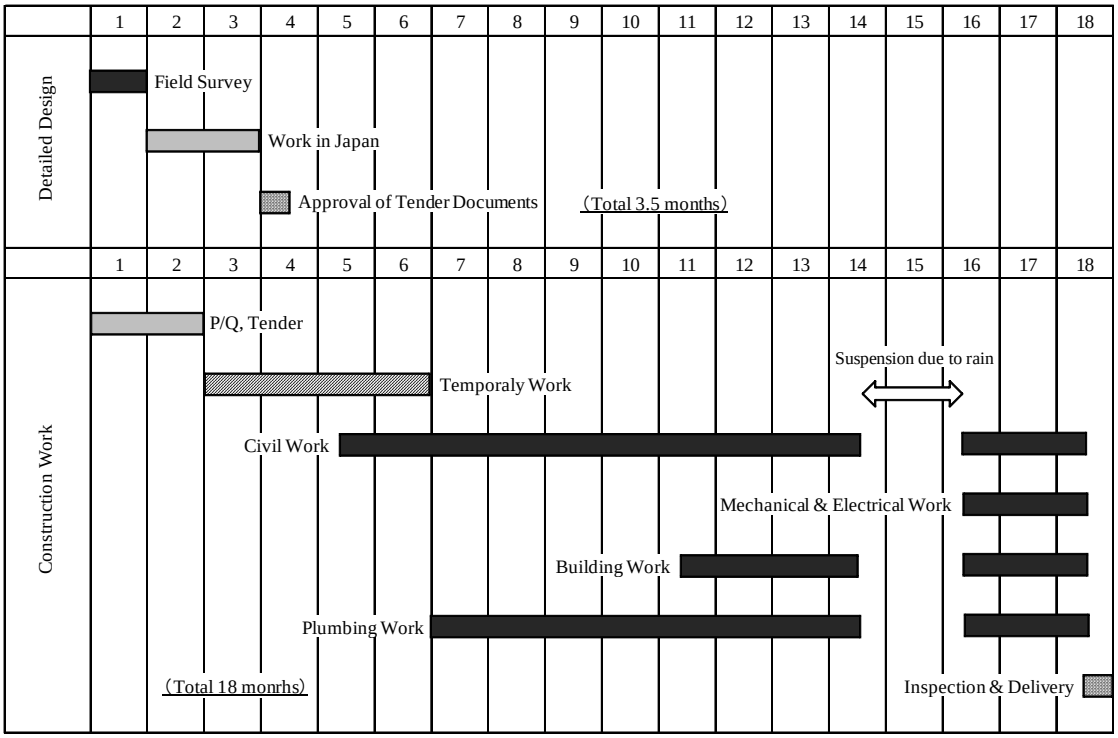
It will take 21.5 months in total for the implementation of the Project, as described below, taking into consideration (i) conditions of work, including the type and scale of the planned facilities, required period for transportation and climate (dry and rainy seasons) and (ii) requirements in the Grant Aid scheme of the Government of Japan.

(a) Detailed design period 3.5 months
(b) Construction period 18.0 months (including 2.0 months for tender)
Total 21.5 months

(2) Project Implementation Schedule

The implementation schedule of the Project, with due consideration of the items above, is shown in Table 2-2-8.

Table 2-2-8 Project Implementation Schedule



2-3 Obligations of Recipient Country

In the implementation of the Project, the Sierra Leonean side will be responsible for the followings:

1) Provision of stock yard (approx. 5,000m^2) of the construction materials and equipment

2) Acquisition of land at the sites for the construction of the following facilities:

(a)	Water Intake		
	- Kolenten River	100m^2	Public land (land use permission has issued)
	- Swamp	100m^2	Public land (-ditto-)
(b)	Water Treatment Plant	10,000m^2	Public land (-ditto-)
(c)	Elevated Tank	500m^2	Public land (-ditto-)
(d)	Public Taps	5m^2×100 places	Public and private land (-ditto-)

3) Site clearance at the construction site of water treatment plant (removal of the existing water treatment facilities and buildings).

4) Site clearance at the construction site of elevated tank (removal of steel shaft and tank of the existing elevated tank).

5) Prompt customs clearance and tax exemption of the equipment and materials required in the implementation of the Project at the port of landing and assistance of internal transportation of the equipment and materials.

6) Payment of all the expenses not including in Japan's Grant Aid scheme but necessary for the implementation of the project:
   (a) Management cost of the Ministry of Energy and Water Resources related to the Project
   (b) Management cost of the Kambia District Council related to the Project
   (c) Initial working capital for the operation and maintenance of KWSSB

7) Exemption of the equipment and materials brought into Sierra Leone and services provided by the Japanese nationals in accordance with the contracts, from customs duty, internal taxes and other levies.

8) Granting of relevant visas and permits of stay in Sierra Leone towards the Japanese nationals involved in the Project in accordance with the contracts.

9) Proper maintenance and use of the facilities and equipment provided with in the Japan's Grant Aid scheme.

10) Payment of banking commission for the Authorization to Pay (A/P) and payment to a Japanese bank based upon the Banking Arrangement (B/A).

2-4 Project Operation Plan

(1) Operation and Maintenance Organizations of the Project

Kambia Water Supply and Sanitation Board (KWSSB) which will be established based on the bye-law of the Kambia District Council will operate and maintain the water supply facilities to be constructed under the Project. KWSSB is comprised of staff of technical and administrative divisions and provides water services to the people under the supervision of the Board members. The operation and maintenance organization of the Project is illustrated in Fig. 2-4-1 below:

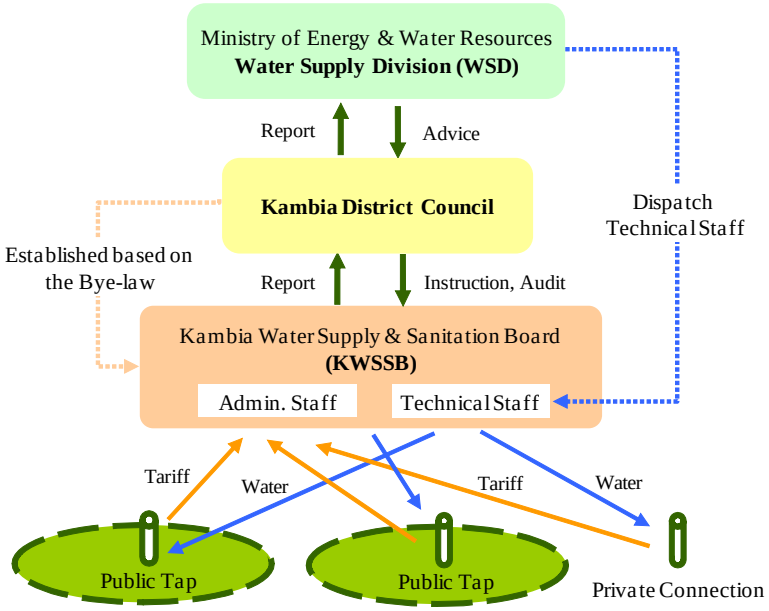


Fig. 2-4-1 Operation and Management Organizations of the Project

(2) Role and Responsibility of the Respective Organization

1) Water Supply Division (WSD)

Before the war, the central government had been providing the water services in rural towns in Sierra Leone and operators of WSD were directory engaged in the operation and maintenance of the water supply facilities. After the war, in accordance with the decentralization policy of the Government, the responsibility of providing water services has been transferred to the local governments and the role of the central government is limited to form a water and sanitation policy and to give necessary advice to the local governments based on a result of monitoring at a national level. Generally, the local governments have, however, no experience and know-how and human resources for achieving the obligation in terms of technical and administrative aspects. WSD will, therefore, dispatch its technical staff to KWSSB in order to conduct the operation and maintenance of the water supply facilities to be constructed under the Project.

After the water services of the Project are commenced, WSD will periodically get a report on the operation and maintenance of the facilities, and if a problem is found WSD will give advice to the Kambia District Council on an immediate solution of the problem.

2) Kambia District Council

The Kambia District Council will legislate for the establishment of KWSSB by its bye-law. The Council will appoint and approve the Board members of KWSSB in accordance with the bye-law and employ the administrative staff of KWSSB including water rate collectors who have knowledge and experience to fulfill their duties through due formalities.

The Council will also conduct training for developing the capacities of the Board members, technical and administrative staff of KWSSB in order to establish the operation and maintenance organization for the water services. After the water services are commenced, the Council will give necessary assistance to KWSSB using its resources such as management, accounting, internal audit, etc.

3) Board of KWSSB

Among stakeholders of the water supply sector in Kambia town, Board members of KWSSB will be appointed by the Kambia District Council or elected by the people (the members will be appointed by the Council for the fist time) and approved by the Council. As a rule, status of the members is an unpaid and honorary post; however, they will make an important decision for the water services.

The Board members usually hold a meeting twice a month and have a discussion on the water services based on a claim and demand of the people and make necessary instructions to the technical and administrative staff of KWSSB.

4) Technical Staff of KWSSB

The technical staffs of KWSSB are operators of WSD who have expertise in the fields of operation of waterworks, distribution of water, maintenance of water supply facilities, etc. and WSD will dispatch them to KWSSB. The staffs consist of a plant manager who will control the operation and maintenance of the water supply facilities, pump operator, plumber, electrician, laborers, etc. and they will engage in daily operation and maintenance works.

5) Administrative Staff of KWSSB

The administrative staffs of KWSSB will be employed by the Kambia District Council. The staffs will procure the materials used for the operation of the facilities (fuel, chlorine, etc) and conduct issuance of water bill and accounting and water rate collectors will be employed temporary basis. They will engage in daily administrative works and also in public relations in order to announce the activities of KWSSB to the people.

(3) Method for Establishing the Organizations

For materializing the sustainable water services in Kambia Town, not only establishing the above-mentioned operation and maintenance organizations but preparatory works such as training of the staff of KWSSB, explanation of the Project and sensitization of the people, preparation of consumer ledger for collecting water rate, etc. are also very important.

According to the experience and know-how obtained in Rokupr Water Supply and Sanitation Board (RWSSB), preparatory works mentioned in the Table 2-4-1 below shall be conducted before and after the commencement of the water services.

Table 2-4-1 Activities and Outputs for Establishing the Organization

Outputs	Activities	Organization in charge
1. KWSSB is established and its staffs are stationed.	1-1 Bye-law for establishing KWSSB is legislated.	KDC
	1-2 Board members of KWSSB are appointed and approved.	KDC
	1-3 Technical staffs are dispatched to KWSSB.	WSD
	1-4 Administrative staffs of KWSSB are employed.	KDC
	1-5 Water rate collectors are employed.	KDC
2. The project is well-known to the people of Kambia town and consensus of the people for paying water rate is formed.	2-1 Community meetings for explaining the water services of the Project to the people are held.	KWSSB
	2-2 Sensitization meetings for paying water rate are held.	KWSSB
	2-3 Leaders for maintaining the public taps are appointed.	KWSSB
3. Tariff that is affordable for the people and enables sustainable water services is prepared.	3-1 Operation and maintenance cost of the water services is estimated.	KWSSB
	3-2 Tariff of the water services is developed.	KWSSB
4. Users registration is completed and consumer ledger is prepared.	4-1 Users of the services are registered and registration plate is set on each house.	KWSSB
	4-2 Consumer ledger (computer data base) is prepared.	KWSSB
5. Staffs of KWSSB are trained and fulfill their respective duties.	5-1 Operation and maintenance plan of the water supply facilities is prepared.	WSD
	5-2 Books for administration and accounting are prepared.	KWSSB
	5-3 Technical staffs of KWSSB are trained.	KDC
	5-4 Administrative staffs of KWSSB are trained.	KDC
	5-5 Water rate collectors of KWSSB are trained.	KDC

Note KDC: Kambia District Council
WSD: Water Supply Division, the Ministry of Energy and Water Resources
KWSSB: Kambia Water Supply and Sanitation Board

The above-mentioned activities for establishing the operation and maintenance organization of the Project shall be carried out in accordance with the road map of the Minutes of Meetings which has been mutually agreed between the Government of Sierra Leone and JICA Preparatory Survey Team.

(4) Capacity Development of the Staff

In order to achieve the purpose of the Project, “Access to safe water in the Project area is improved”, the operation and maintenance organization of the Project shall be established keeping pace with the progress of the construction work of the water supply facilities which will be conducted under Japan’s Grant Aid scheme.

The Kambia District Council that is a responsible organization for establishing the operation and maintenance organization of the Project has experiences of RWSSB; however, it seems to be difficult to establish the organization by their own resources. WSD and other Sierra Leonean Authorities concerned of the Project are, therefore, requested to give necessary assistance to the Council. The Government of Japan is also expected to assist the activities of the Kambia District Council through its technical cooperation scheme.

For the capacity development of the staffs of KWSSB, the training shall be efficient and practical one including training in Rokupr before the completion of the construction work and on-the-job training after the commencement of the water services in Kambia town.

(5) Organization of KWSSB

The organization of KWSSB is set as illustrated in Fig. 2-4-2 below, taking a scale of the facilities of the Project and experiences in Rokupr into consideration. Water rate collectors will be employed as per the number of houses, and in general 200 houses are to be assigned to a water rate collector.

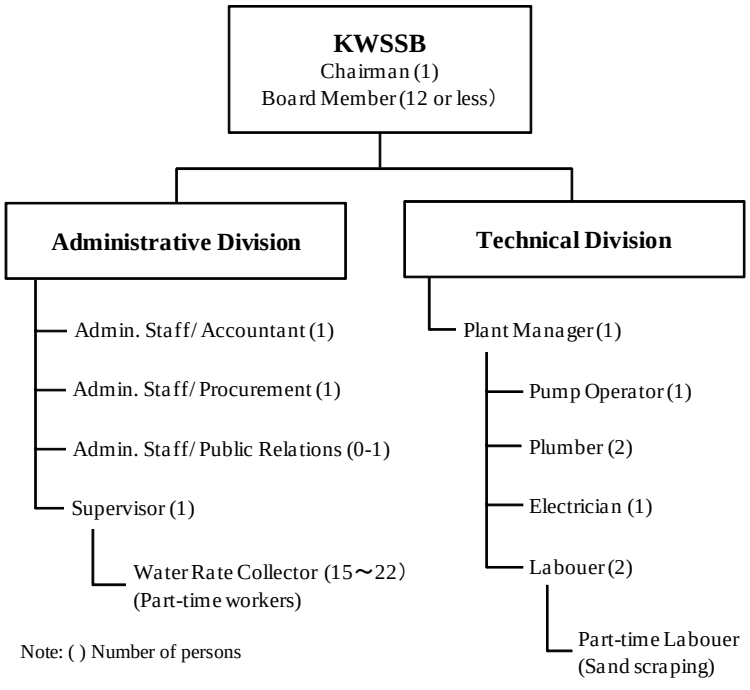


Fig. 2-4-2 Organization Chart of KWSSB

2-5 Project Cost Estimation

2-5-1 Initial Cost Estimation

(1) Sierra Leonean Portion of Project Cost

In accordance with the mutual agreement between the Government of Sierra Leone and JICA Preparatory Survey Team, Sierra Leonean side shall conduct the the following works of the Project and bear the cost.

(a)	Site clearance at the existing waterworks	Le. 504,520,000	
(b)	Site clearance at the existing elevated tank	Le. 131,640,000	
(c)	Provision of initial O/M cost for KWSSB	Le. 39,510,000	
	Total	Le. 675,670,000	(=JYen 16.89 million)

Note: US$1.0 = JYen 92.13, Le. 1.0 = JYen 0.0250 (as of June, 2010)

2-5-2 Operation and Maintenance Cost

The operation and maintenance costs of the year 2013 and 2016 have been estimated below. In the case of the year 2013 that is a year of completion of the Project, the served population is 21,000 and almost of the people will get water through public taps so that per capita consumption and daily water supply amount is 20 lcd and 470m^3/day, respectively. While, in the target year of 2016, the planned served population is 30,000 and the portion of users of public taps and private connections is 60% and 40% so that per capita consumption and daily water supply amount will increase by 36 lcd and 1,200m^3/day, respectively.

(1) O/M Cost of the Completion Year

[Conditions for estimation]

(a)	Operational hour	9.4 hr/day (= 470m^3÷50m^3/hr)
(b)	Fuel consumption	1.7 gal./hr
(c)	Maintenance cost	5% of the fuel cost
(d)	Personnel cost	Technical staff: 7 persons (allowance only, their salary will be paid by WSD), Administrative staff: 2 persons, Water rate collector: 16 persons (total 3,230 houses, 200 houses per person), Part time labouer: 10 man/day (for sand scraping)
(e)	Office cost	10% of the personnel cost
(f)	Sitting fee of Board	Board meeting: 2 times a month, Le.15,000/person/meeting

[Operation and maintenance cost]

(a)	Fuel cost	9.4 hr/day×Le.16,500/gal×1.7 gal/hr×30 days	=	Le. 7,910,100
(b)	Maintenance cost	Le. 7,910,100×5%	=	Le. 395,505

(c)	Personnel cost			
	Technical staff	7 persons×Le.150,000/month	=	Le. 1,050,000
	Administrative staff	2 persons×Le.300,000/month	=	Le. 600,000
	Water rate collector	16 persons×Le.150,000/month	=	Le. 2,400,000
	Part time labouer	10 person/day×Le.10,000/day	=	Le. 100,000
	Sub-total		=	Le. 4,150,000
(d)	Office cost	Le. 4,150,000×10%	=	Le. 415,000
(e)	Sitting fee	Le.15,000×2 time/month×10 persons	=	Le. 300,000
	Total		=	Le. 13,170,605

(2) O/M Cost of the Target Year

[Conditions for estimation]

(a)	Operational hour	24 hr/day (= 1,200m^3÷50m^3/hr)
(b)	Fuel consumption	1.7 gal./hr
(c)	Maintenance cost	5% of the fuel cost
(d)	Personnel cost	Technical staff: 7 persons, Administrative staff: 3 persons, Water rate collector: 23 persons (total 4,615 houses, 200 houses per person), Part time labouer: 30 man/day (for sand scraping)
(e)	Office cost	10% of the personnel cost
(f)	Sitting fee of Board	Board meeting: 2 times a month, Le.15,000/person/meeting

[Operation and maintenance cost]

(a)	Fuel cost	24 hr/day×Le.16,500/gal×1.7 gal/hr×30 days	=	Le. 20,196,000
(b)	Maintenance cost	Le. 20,196,000×5%	=	Le. 1,009,800
(c)	Personnel cost			
	Technical staff	7 persons×Le.450,000/month	=	Le. 3,150,000
	Administrative staff	3 persons×Le.300,000/month	=	Le. 900,000
	Water rate collector	23 persons×Le.150,000/month	=	Le. 3,450,000
	Part time labouer	30 person/day×Le.10,000/day	=	Le. 300,000
	Sub-total		=	Le. 7,800,000
(d)	Office cost	Le. 7,800,000×10%	=	Le. 780,000
(e)	Sitting fee	Le.15,000×2 time/month×10 persons	=	Le. 300,000
	Total		=	Le. 30,085,800

(3) Revenues and Required Collection Ratio

According to the above-mentioned (1) and (2), the monthly operation and maintenance cost of the year 2013 and 2016 is Le.13.17 million and Le.30.09 million, respectively. While, if same water tariff of Rokupr Water Supply and Sanitation Board (RWSSB) is applied to the Project, i.e.

public tap: Le.5,000/month and private connection: Le.20,000 per month, monthly revenues of each year can be estimated as below:

[Revenue of the year 2013]

(a)	Public tap	3,230 houses (100%) × Le.5,000/month	=	Le.16,150,000

[Revenue of the year 2016]

(a)	Public tap	2,769 houses (60%) × Le.5,000/month	=	Le.13,845,000
(b)	Private connection	1,846 houses (40%) × Le.20,000/month	=	Le.36,920,000
	Total		=	Le.50,765,000

As per the above-mentioned O/M costs and revenues, the required minimum ratio of water rate collection in the year of 2013 and 2016 is 82% and 60%, respectively. In the case of the year 2013, because water is supplied through public taps that are charged relatively low water tariff, revenue is also low and higher ratio of water rate collection is therefore required. On the other hand, in the year 2016, private connection users that can be charged relatively high water tariff (per capita consumption of private connection is set at 60 lcd that is three times of the consumption of public tap, however, its water tariff is four times of the tariff of public tap) will increase by 40% so that the minimum ratio of water rate collection becomes lower.

According to the above-mentioned examinations, in order to secure a stable operation and management of KWSSB it is recommendable to increase private connection users at a certain portion. However, in case that water consumption of private connections exceeds its planned water supply amount, it will have a bad influence on the water supply of public taps. It is, therefore, recommended to take a necessary action on controlling the consumption of private connections by imposing a disciplinary high water tariff to full plumbing connection users, etc.

2-6 Other Relevant Issues

In case of the water supply facilities of the Project are to be constructed under Japan's Grant Aid, preparations and procedures mentioned below should be conducted by the Sierra Leonean side as per the schedule designated and be completed without delay:

(1) Provision of Stock Yard

During the construction period, construction materials and equipment will be delivered to Kambia town in large quantities. Because the construction work includes approx. 30km-long pipe installation work, stock yard which is enough to temporarily store a large quantity of the piping materials needs to be prepared. The required area of the stock yard will be approx. 5,000m^2. The stock yard should be prepared by the Kambia District Council prior to the commencement of the construction work and be lent to a Japanese Contractor free of charge on condition that the stock yard is restored as it is and returned to the Council after the completion of the work.

(2) Site Clearance at the Existing Waterworks

The new water treatment plant will be constructed at the site of the existing waterworks. The existing water treatment facilities and buildings such as staff quarters, store, etc. which were destroyed during the war are being left in the site. These facilities and buildings need to be removed by the Sierra Leonean side at its own expense prior to the commencement of the construction work. The foundation of the existing buildings will be used for the new construction so that only the walls of the existing buildings will be removed.

(3) Site Clearance at the Existing Elevated Tank

The new elevated tank will be constructed at the site of the existing elevated tank in Kambia town. The existing tank needs to be removed by the Sierra Leonean side at its own expense prior to the commencement of the construction work of the new elevated tank.

(4) Provision of Initial O/M Cost for KWSSB

Kambia Water Supply and Sanitation Board (KWSSB) which will be established based on the bye-law of the Kambia District Council will operate and maintain the water supply facilities to be constructed under the Project. The staff of KWSSB comprised of the technical staff and the administrative staff needs to be trained before and after the commencement of the water services. The required cost such as salary of the staff, etc. during the training period shall be born by the Sierra Leonean side. The amount of the cost shall be three month O/M cost of the year 2013, equivalent to 39.5 million Leones.

Chapter 3 Project Evaluation

3-1 Recommendations

The purpose of the Project is to improve the access of the people to safe and clean water in Kambia town. To achieve the purpose, it is essential to secure and to develop human resources that have enough skill and expertise for the water services in terms of both technical and administrative aspects.

As for the operation and maintenance of the water supply facilities of the Project, WSD will dispatch its technical staff to the Kambia District Council and support the Council technically. In respect of the management of the Project, the Council is responsible for the employment of the administrative staff and for their training based on the experience and know-how obtained in the previous project conducted in Rokupr. Further, in order to inform the people of the water services to be provided by the Project and to get a consensus of the people for paying water rate, community meetings and sensitization meetings shall be held by the Council.

The process for establishing the operation and maintenance organization of the Project, Kambia Water Supply and Sanitation Board (KWSSB) is going well so far keeping the pace with the road map which has been mutually agreed between the Sierra Leone side and the JICA Survey Team (refer to Appendix 4) and the Kambia District Council has appointed the members of the Working Group and drafted the bye-law for the establishment of KWSSB. The organization is expected to be established as per the schedule.

As mentioned-above, the establishment of KWSSB and the training of the staff will be conducted by the Sierra Leonean side. Nevertheless, now that JICA's technical cooperation be provided for assisting the activities of the Sierra Leonean side, the Project is to be implemented more smoothly and efficiently.

Slow sand filtration system will be introduced as a process of water treatment of the Project. In the system, water is biologically treated by microbes that are grown in and on the surface of the sand layer. The system is, therefore, difficult to treat the raw water that is highly contaminated by chemicals and organic matters. The environment of the basin and the quality of water sources need to be maintained in good condition.

3-2 Project Evaluation

(1) Relevance to the Implementation of the Project

The water supply facilities in rural towns (about 40 towns) in Sierra Leone including Kambia town were destructed during the war and they have not been rehabilitated even now. The people in the rural towns are, therefore, not able to access to safe water. At present, approximately 84%

of the people in Kambia town are fetching insanitary water of unprotected dug wells and of the river or stream. The Project is to improve such inferior situation of water supply and sanitation of the people in Kambia town and the direct-benefitted population of the Project is estimated to be 30,000.

The Project will introduce a slow sand filtration system which enables simple and low cost operation and maintenance. The system has been proven in the JICA's technical cooperation programme in Rokupr as a viable method for a water treatment system in rural towns and can be operated and maintained by using the human resources and skill in Sierra Leone.

The Project will be carried out in accordance with the policies of water supply and sanitation sector of the Government of Sierra Leone and will contribute to achieving the target that is to improve the present coverage of water supply of 37% (2008) by 74% in 2015.

A nonprofit organization, KWSSB will be established based on the bye-law of the Kambia District Council and KWSSB will operate and maintain the water supply facilities of the Project under the supervision of the Council. By doing so, for a small scale and low profitable water business in the rural town it will make water rate affordable for the people and the water services sustainable and self-reliance.

As a result of the examination of a screening format for the Project and a site survey conducted by Sierra Leone Environmental Protection Agency (SLEPA), the Agency has judged that the Project will have no significant and adverse impact on the environment and categorized the Project into "Class C" that is not required to conduct full EIA. Further, it can be judged that the Project has no particular problems for the implementation under Japan's Grant Aid scheme.

As above delineated, considerable effects are expected in the implementation of the Project. At the same time, as the Project will extensively contribute to the improvement of basic human needs as well as stabilization of livelihood of the people, the appropriateness of the implementation of the Project under Japan's Grant Aid scheme can be confirmed.

(2) Effectiveness of the Project

The water supply facilities of the Project that have the capacity of 1,200m^3/day, will be constructed under Japan's Grant Aid. The facilities will have the quantitative effects mentioned in Table 3-2-1 below:

Table 3-2-1 Quantitative Effects of the Japanese Assistance

Indicators	Before implementation (2010)	After implementation (2016)
Population that can access to safe water	3,400*	30,000
Per capita water consumption of the treated water	-	36 liters

Note *: Population that can fetch water from the protected dug well with hand pump.

Under the Japanese assistance, safe and stable water services will be provided to the people and 100 public taps will be constructed in Kambia town so that the following qualitative effects are also expected:

(a) To improve the sanitation of the people and reduce the disease rate of water born diseases.
(b) To ease the burden of the children and women for fetching water.

As for (a) above, according to the result of questionnaire survey conducted during the field survey 30% of the people replied that member(s) of the family got water born diseases in the last one year. The Project is expected to greatly improve such sanitary conditions of the people.

On the other hand, in respect of (b) according to the questionnaire survey the required time for fetching water are as follows:

- Less than 10 min 34%
- 10 to 25 min 33%
- More than 25 min 30%

The public taps will be constructed and arranged in Kambia town in consideration of the convenience of the people and enable the people to fetch water generally at a distance of not exceeding 100m so that the required time for fetching water will greatly be reduced.