

5. Cost Estimation Borne by the Recipient Country

5. Breakdown of the Cost Borne by the Recipient Country

1. Crop compensation for land acquisition

1.1 Area for land acquisition

Item	Area (ha)	Occupation period	Remark
(1)Area for new canal			
①inside the system	9.9	permanent (compensation period is 18 month because of land reallocation)	width 30m x length 3.3km
②outside the system	7.5	permanent (compensation period is 18 month because of land reallocation)	wiidth 30m x length 2.5km
(2)Temporary yard			
①Camp yard	0.8	18 month	150m x 50m
②Yard around headworks	4	10 month	50m x 400m x 2
Total	22.2		

1.2 Cost for crop compensation per ha

Item	Amount	Unit
①Maize		
Maize (rainfed)	1.0	t/ha
Selling price	8	MK/kg
Selling price per ha	7,970	MK
②Paddy (inside the system)		
Paddy	2	t/ha
Selling price	15	MK/kg
Selling price per ha	30,000	MK

1.3 Cost for compensation

Item	Area (ha)	Crop	Number of harvesting	Cost for compensation (MK/ha)	Total (MK)
(1)Area for new canal	9.9	paddy	2	30,000	594,000
	7.5	maize	2	7,970	119,550
(2)Temporary yard					
①Camp yard	0.8	maize	2	7,970	12,752
②Yard around headworks	4	maize	1	7,970	31,880
Total	22.2				758,182

2. Bank handling charge

Item	Quantity	Unit	Unit Cost (MK)	Amount (MK)
(1)0.2% of total project cost	0.2	%	982,828,283	2,120,943
Total				2,120,943

3. Implementation of land reallocation

Item	Quantity	Unit	Unit Cost (MK)	Amount (MK)	Remark
(1)Per diem and accomodation					
Staff of Lilongwe ADD	42	person day	6,300	264,600	1person x 2days/month x 21months (3months+ 18months)
(2)Transportation					
Fuel for cars(including lubricant)	2,590	lit	100	259,000	185km / 3km/lit x 2(round trip) x 21times
Total				523,600	

4. Repair work of the existing main canal

Item	Quantity	Unit	Unit Cost (MK)	Amount (MK)	Remark
(1)Per diem and accomodation					
Staff of Lilongwe ADD	120	person day	5,300	636,000	1person x 30 days x 4 months
Staff of DOI	120	person day	5,300	636,000	1person x 30 days x 4 months
(2)Transportation					
Fuel for cars(including lubricant)	4,000	lit	100	400,000	100km/day / 3km/lit x 30 days x 4months
Total				1,672,000	

6. Environment-Related Plans

6-1 Environmental Management Plan

Environmental Management Plan

THE PROJECT FOR REHABILITATION OF THE BWANJE VALLEY IRRIGATION SYSTEM

September 2005

**DEPARTMENT OF IRRIGATION
LILONGWE ADD**

Environmental Management Plans for the Project for Rehabilitation of the Bwanje Valley Irrigation System (1/6)

Environmental Impact Items	Potential Environmental Impacts	Mitigation Plans	Institutional Responsibilities	Cost Estimate(MK)	Comments
Before Construction (In Basic Design • Detailed Design)					
Traffic accidents and Security situation	Increase risk of traffic accidents due to increased traffic volume	Plan and design considering smooth traffic of vehicles, bicycles and pedestrians. Safety and preventive measure of accident - Safety alignment of road (Vertical and horizontal grade, horizontal curve radius etc.) - Installation of traffic safety facilities (traffic board, road marking, railing • guardrail etc.) - Proper drainage plan (horizontal • vertical grade, drain ditch, side ditch, etc.) - Secure the safety side walk (required width, mount-up type)	JICA study team (checked by MOA and DOI)	0	All mitigation plans are considered in the Design
Water quality • Water Usage	- Risk of water pollution in the Namikokwe rivers - Inconvenience to use the existing water supplies	Plan, design and construction plan to protect deterioration of water and maintaining water usage - Secure the access to water usage points such as washing place (installation of stairs) - Selection of foundation type to minimize deterioration of water by waste material due to construction works - Construction in dry season or low water level	JICA study team (checked by MOA and DOI)	0	
Biodiversity	Increased risk of negative impacts to biodiversity	Plan and design in consideration with preservation of precious biodiversity - Inspection and confirmation of area growing precious plants from topographic survey - Selection of new main canal alignment avoiding the area growing precious plants - Plan of detour road and temporary road for construction avoiding the area growing precious plants	JICA study team (checked by MOA and DOI)	0	

Environmental Management Plans for the Project for Rehabilitation of the Bwanje Valley Irrigation System (2/6)

Environmental Impact Items	Potential Environmental Impacts	Mitigation Plans	Institutional Responsibilities	Cost Estimate(MK)	Comments
Removal of Inhabitation (in principle, there is no house in the area related to the project)	Relocation of the existing houses and facilities	Plan and design not to relocate the existing houses and facilities - Inspection and confirmation of scale and location of houses - Selection of new main canal alignment avoiding the removal of inhabitant - Plan of detour road and temporary road for construction avoiding the removal of inhabitant - Plan of temporary facilities yards avoiding the removal of inhabitant	JICA study team (checked by MOA and DOI)	0	All mitigation plans are considered in the Design
Social Infrastructures (in principle, there is no social infrastructure in the area related to the project)	Relocation of the existing religious facilities, meeting places, electric and telephone lines	Plan and design considering the existing social infrastructures - Confirmation of location and scale of the facilities from topographic map data - Selection of new main canal alignment not to relocation and removal - Plan of detour road and temporary roads to avoid environmental impact - Plan of temporary facilities such as camp yard, store area of materials to avoid environmental impact	JICA study team (checked by MOA and DOI)	0	
Disposal of construction waste	Increased construction waste due to demolition of existing structures	Disposal plan of construction waste (waste soil, concrete, asphalt boulder etc.) - Control of construction waste to minimize - Reuse of construction waste to other rehabilitation works - Selection of proper disposal area (utilization of borrow pit, quarry site, soil disposal site etc.)	JICA study team (checked by MOA and DOI)	0	

Environmental Management Plans for the Project for Rehabilitation of the Bwanje Valley Irrigation System (3/6)

Environmental Impact Items	Potential Environmental Impacts	Mitigation Plans	Institutional Responsibilities	Cost Estimate(MK)	Comments
Natural · Flood Disasters	Risk of damage to structures by natural/flood disaster	Plan and design of counter measures of river bed change, local scouring around piers, bank erosion to prevent from disaster - Secure of flow capacity at headwork - Stability of river bank and river bed (drop structure, spur dike, bank and river bed protection) - Protection of erosion on the slope of the existing main canal	JICA study team (checked by MOA and DOI)	0	All mitigation plans are considered in the Design
During Construction					
Noise and Vibration	Noise and vibration during the construction period	Construction plan to minimize environmental impact against habitants near site due to noise and vibration - Reconfirm the surrounding condition near sites (density of habitant, presences of public facilities) - Explanation and advertise to local habitants (construction object, period, scale etc.) - Selection of low noise and vibration machine. - Proper operation and maintenance of heavy equipment. - Minimize to use heavy equipment at night. -Counter measures to reduce noise and vibration(anti-noise wall, etc, if necessary)	-Contractor (MOA and DOI supports if necessary)	Costs are included in Contract Amount of Contractor	Primary impacts that are mitigatable
Air Pollution	Increased dust and air pollution due to construction works.	Preventive measures of air pollution due to construction works - Periodical water sprinkling and dust measure due to construction equipment and dump tracks - Cover to prevent dropping mud, stones from dump tracks - Instruction and training to operators and drivers of heavy equipment and dump trucks (speed limitation, minimum idling, washing facilities, etc.)	-Contractor		

Environmental Management Plans for the Project for Rehabilitation of the Bwanje Valley Irrigation System (4/6)

Environmental Impact Items	Potential Environmental Impacts	Mitigation Plans	Institutional Responsibilities	Cost Estimate(MK)	Comments
Water quality · Water Usage	Increased waste water and mud due to construction works	Execution of construction avoiding environmental impact to local inhabitant due to waste water an mud from construction works <ul style="list-style-type: none"> - Inspection and reconfirmation of water usage - Constriction plans reducing deterioration of water and mud and proper measures (if necessary) - Protect to leaking oil from heavy equipment with proper instruction and training 	-Contractor		Primary impacts that are mitigatable
Traffic Congestion due to vehicles for construction and traffic security	Increase risk of traffic accidents due to increased traffic volume for construction works	Secure of smooth traffic operation and safety on the existing roads, detour roads and temporary road for construction <ul style="list-style-type: none"> - Explanation and advertise to local habitants (construction object, period, scale etc.) - Installation of barricade, traffic control boards - Arrange traffic management polices - Safety instruction to operator of equipment and driver of dump tracks 	-Contractor (MOA and DOI supports if necessary)		
Disposal of construction waste	Increased construction waste from construction works	Proper disposal of waste (mud and concrete fragments) during construction <ul style="list-style-type: none"> - Classify and volume (quantity) of waste - Reduce waste produced from construction - Recycle of waste (river bank protection, spur dike, part of embankment etc.) - Proper disposal plan of waste 	-Contractor		
Temporary facilities for construction	Risk of negative environmental impacts to surrounding area	Plan of temporary facilities to minimize environmental impact to surrounding area <ul style="list-style-type: none"> - Explanation and advertise to local habitants (construction object, period, scale etc.) - Installation of a fence for security if necessary 	-Contractor (MOA and DOI supports if necessary)		

Environmental Management Plans for the Project for Rehabilitation of the Bwanje Valley Irrigation System (5/6)

Environmental Impact Items	Potential Environmental Impacts	Mitigation Plans	Institutional Responsibilities	Cost Estimate(MK)	Comments
Instruction and training for social environment	Risk of negative environmental impacts from bad behavior of employee	Instruction and training about environmental impact to relating all staffs - Disposal of garbage and waste from construction sites, camp yard, accommodation - Health control, prevention of an epidemic disease (Malaria, HIV/AIDS)	-Contractor		Primary impacts that are mitigatable
Land Reallocation	Dispute among farmers	Implementation of the Land Reallocation Plan as follows; 1.Registration of farmers for the land re-allocation 2.Training of personnel concerned for the land re-allocation 3.Acquisition of agreement from farmers on the land re-allocation 4.Preparation of the detailed implementation plan and standard for the land re-allocation a.Review and examination of the detailed land re-allocation plan and standard b.Meetings and interviews with relevant stakeholders to obtain their opinions, and finalization of the detailed land re-allocation plan and its criteria based on the results of the meetings and interviews 5.Implementation of the land re-allocation a.Preparation of re-allocated land list to qualified member farmers (draft) and new land registration list (draft) b.Acquisition of farmers' agreement on the re-allocated land list to qualified member farmers (draft) c.In-site land re-allocation with witnesses of farmers' representatives d.Preparation of cadastral maps e.Progress monitoring and supervision of the land	-MOA(LADD) -Traditional Authority and District Commissioner -Farmers' Cooperative -Consultant	524,000	

Environmental Management Plans for the Project for Rehabilitation of the Bwanje Valley Irrigation System (6/6)

Environmental Impact Items	Potential Environmental Impacts	Mitigation Plans	Institutional Responsibilities	Cost Estimate(MK)	Comments
		re-allocation in the field f. Consulting services if any (such as occurrence of dispute among farmers and necessity of coordination with TA, Dedza district commissioner)			
After Construction					
Demolish of temporary facilities · Clearing	Risk of negative environmental impacts due to demolish of temporary facilities and clearing sites	Demolish plan of temporary facilities after construction to minimize environmental impact to surrounding area - After demolish of Camp yard, store houses for materials, the land should be cleared at original condition. -Waste (wood, concrete, steel, re-bar etc.) from demolish of temporary facilities should be recycled or disposed properly.	-Contractor	Costs are included in Contract Amount of Contractor	
Demolish of detour road · temporary roads for construction	Risk of negative environmental impacts due to demolish of detour road and construction road	Demolish plan of detour and temporary road after construction to minimize environmental impact to surrounding area - After demolish of detour roads, temporary roads for construction, the land should be cleared at original condition. - Waste (disposal soil, boulder etc.) from demolish of detour roads and temporary roads for construction should be recycled or disposed properly.	-Contractor		

6-2 *Environmental Monitoring Plan*

Environmental Monitoring Plan

**THE PROJECT FOR REHABILITATION OF
THE BWANJE VALLEY IRRIGATION SYSTEM**

September 2005

**DEPARTMENT OF IRRIGATION
LILONGWE ADD**

Environmental Monitoring Plans for the Project for Rehabilitation of the Bwanje Valley Irrigation System (1/4)

Environmental Impact Items	Parameters to be Monitored	Measurements (Incl. method & equipment)	Location	Frequency of Measurement	Institutional Responsibilities	Cost Estimate(MK)
Pre-Construction						
Removal of Inhabitation for permanent and temporary structures (in principle, there is no house in the area related to the project)	Location, number, and size of house relocated and compensated	Inspection and survey of relocated and demolished property	New alignment of relocated main canal and temporary yard, and tentative flood diversion channel and others	Prior to commencement of construction works	- MOA (LADD) and DOI -Traditional Authority and District commissioner -Contractor	758,000
Land taken for permanent and temporary structures	Location and area of land taken and compensated	Inspection and survey of relocated and demolished property	New alignment of relocated main canal and temporary yard, and tentative flood diversion channel and others	Prior to commencement of construction works	- MOA (LADD) and DOI - Traditional Authority and District commissioner -Contractor	
Relocation and reconstruction of social infrastructures (in principle, there is no social infrastructure in the area related to the project)	Location, number, and scale of social infrastructures for permanent and temporary structures	Inspection and survey of relocated and rebuild social infrastructures	New alignment of relocated main canal and temporary yard, and tentative flood diversion channel and others	Prior to commencement of construction works	- MOA (LADD) and DOI -Traditional Authority and District commissioner -Contractor	

Environmental Monitoring Plans for the Project for Rehabilitation of the Bwanje Valley Irrigation System (2/4)

Environmental Impact Items	Parameters to be Monitored	Measurements (Incl. method & equipment)	Location	Frequency of Measurement	Institutional Responsibilities	Cost Estimate(MK)
During Construction						
Noise and Vibration (if required or unacceptable level)	Noise and vibration levels based on environmental standard	Measuring and investigation of noise and vibration levels at center and boundary of the work site based on the environmental standard	The project area	Once or when required	MOA(LADD) and DOI (supported by contractor if necessary)	250,000
Air pollution (if required or unacceptable level)	Dust level based on environmental standard	Observation and investigation of dust levels in the areas where there are sensitive receivers and precious floras	The project area	Once or when required	MOA(LADD) and DOI (supported by contractor if necessary)	
Water quality (if required or unacceptable level)	Taking samples and water quality level based on environmental standard (e.g., pH, electrical conductivity, dissolved oxygen)	Measuring and investigation of water quality level in the river and at water usage places	Namikokwe river	Once or when required	MOA(LADD) and DOI (supported by contractor if necessary)	
Biodiversity	Healthy and damaged to biodiversity (e.g., precious flora, vegetation, tree)	-Monitoring and inspection of state of biodiversity	The project area	Once or when required	MOA(LADD) and DOI (supported by contractor if necessary)	
Traffic safety	Condition of traffic congestion and safety operation	Monitoring and inspection of traffic management and safety facilities	The project area	Once a month	- Contractor - MOA(LADD) and DOI	
Construction waste	Condition of disposal and recycle of construction waste	Monitoring and inspection of management for disposal and recycle of construction waste	The project area	Once a month	Contractor	

Environmental Monitoring Plans for the Project for Rehabilitation of the Bwanje Valley Irrigation System (3/4)

Environmental Impact Items	Parameters to be Monitored	Measurements (Incl. method & equipment)	Location	Frequency of Measurement	Institutional Responsibilities	Cost Estimate(MK)
Security of temporary facilities	Security situation of temporary facilities (e.g., camp yard, guard fence, stock place)	Monitoring and inspection of management for temporary facilities	Temporary yard and tentative flood diversion channel and others	Once a month	Contractor	
Employee education	Contents of lecture and training for social environment (e.g., staff health control, disposal of garbage and waste)	Monitoring and inspection of lecture and training	All staff	Once a month	Contractor	
Civil appeal (if required)	Number and content of complaint made by local resident	Monitoring and inspection of the action taken quickly and the amicable settlement	The project area	When appeal arise	-Contractor - Traditional Authority and District commissioner - MOA(LADD) and DOI	
Land Reallocation	Number of meetings, preparation of cadastral map and land registration list	Monitoring and inspection of land reallocation activities	Bwanje Valley Irrigation System	Once a month	- MOA(LADD) - Traditional Authority and District Commissioner - Farmers' Cooperative - Consultant	524,000

Environmental Monitoring Plans for the Project for Rehabilitation of the Bwanje Valley Irrigation System (4/4)

Environmental Impact Items	Parameters to be Monitored	Measurements (Incl. method & equipment)	Location	Frequency of Measurement	Institutional Responsibilities	Cost Estimate(MK)
After Construction						
Demolish and demobilization of temporary facilities including detour and construction roads	<ul style="list-style-type: none"> - Circumstances of the used land - Condition of disposal of waste 	Monitoring and inspection of the demolish and cleaning plan to minimize environmental impact to surrounding area	Temporary yard and tentative flood diversion channel and others	After demolish and transfer	Contractor	50,000

7. Result of Collection of Farmers' Opinions

7. Result of Collection of Farmers' Opinions

1. Workshop (Qualitative Data)

1.1 Schedule

From the afternoon of Dec.16, workshops were held for the areas of BC-1, -2 and 3 as shown in the following table:

Date	Time	Location	Organizations of Attendants
Dec. 16	13:30-17:00	Project O&M Office	Farmers in BC-1, Cooperative, Project O&M Office, Embassy of Japan, and JICA Study Team
Dec. 17	09:30-12:00	Meeting Place in Mthembanji	Farmers in BC-3, Cooperative, Project O&M Office, Embassy of Japan, JICA Malawi Office, and JICA Study Team
Dec. 17	13:30-17:00	Meeting Place in Mchanja	Farmers in BC-2, Cooperative, Project O&M Office, Embassy of Japan, JICA Malawi Office, and JICA Study Team

1.2 Method

Collection of opinions was made by Rapid Rural Appraisal (Ranking). Following numbers of farmers participated.

BC-1	BC-2	BC-3
88 farmers	66 farmers	63 farmers

Total 217 farmers (11 % of the total farmers 1,926 in the scheme)

Agenda was as follows.

- Pray
- Introduction of each other
- Explanation of purpose
- Explanation of present situation
- Discussion / Ranking
 - a)opinions on present situation about Bwanje Valley Irrigation System
 - b)opinions on alternative plans currently under examination
- Collected opinions through discussion were prioritized together with farmers.
- Summarizing of workshop and explanation of future schedule
- Closing

1.3 Result

Result of workshop was summarized in the next page.

Summary of Farmers' Opinions in Workshops

	BC1 Date: 16th December Participants: 88 farmers Location: Project O&M Office	BC2 Date: 17th December Participants: 66 farmers Location: Primary School in Mchanja village	BC3 Date: 17th December Participants: 63 farmers Location: Primary School in Mthembanji village
Opinions on Present Situation of Bwanje Valley Irrigation Scheme (the Order of Priority)	<p>1 Main Canal is close to the river. As countermeasure, river course should be shifted.</p> <p>2 Main Canal is damaged.</p> <p>3 Land is unlevelled.</p> <p>4 Plot is small (land reallocation issue)</p> <p>5 Main Canal is small.</p> <p>6 Road is not fully maintained.</p> <p>7 There is no market.</p>	<p>1 Main Canal is damaged because Main Canal is close to the river. As countermeasure, (1) Main Canal should be shifted (2) River course should be shifted.</p> <p>2 Land is unlevelled.</p> <p>3 Tertiary Canal is not cemented.</p> <p>4 There is lack of bridge for access to the land in the scheme</p> <p>5 Main Canal is small.</p> <p>6 There are no dam and reservoir.</p> <p>7 Sand is in the canal.</p>	<p>1 Main Canal is damaged. As countermeasure, (1) Main Canal should be shifted (2) River course should be shifted.</p> <p>2 Present facilities is not enough to secure adequate water. (each branch canal should have each headwork, main canal is too small, no reservoir, water would be pumped up from the lake to dam, and the scheme is small considering size of main canal)</p> <p>3 Land is unlevelled.</p> <p>4 Tertiary Canal is not cemented.</p> <p>5 Farmers want water to their land by pipe. <Same priorities after the fifth ></p> <ul style="list-style-type: none"> • Sand is in the canal. • There is lack of water in winter (dry) season. • Cooperative is immature.
Opinions on Future Plan of Bwanje Valley Irrigation Scheme (Not in the Order of Priority)	<ul style="list-style-type: none"> • River course should be shifted (refer to above opinions). • Existing Main Canal should be rehabilitated and utilized. 	<ul style="list-style-type: none"> • First priority is Main Canal should be shifted, second priority is River course should be shifted (refer to above opinions). 	<ul style="list-style-type: none"> • First priority is Main Canal should be shifted, second priority is River course should be shifted (refer to above opinions).
Opinions on Canal Shifting Plan	<ul style="list-style-type: none"> • If main canal were shifted, some farmers would lose their land inside the Scheme (outside irrigable area). • Former owner who had the land before establish this Scheme might bring back the land if main canal were shifted and the land became outside the scheme. • Land reallocation is difficult (farmers from the land outside future scheme to the land inside the future scheme). • Farmers want to cultivate their lands which can receive water. They don't want to cultivate outside the scheme (not irrigable area). • Even if main canal will be shifted, present main canal is requested to be utilized. • If possible, new branch canal is requested to be constructed from shifted main canal so that present land could receive water. 	<ul style="list-style-type: none"> • Farmers may cultivate their land which will be outside the future scheme, under rainfed condition. • Land reallocation can be done (farmers from the land outside future scheme to the land inside the future scheme). 	<ul style="list-style-type: none"> • Farmers may cultivate their land which will be outside the future scheme, under rainfed condition. • Land reallocation seems difficult (farmers from the land outside future scheme to the land inside the future scheme). • Land reallocation can be assisted (farmers from the land outside future scheme to the land inside the future scheme). • Land reallocation will be discussed in land allocation committee in the cooperative.(farmers from the land outside future scheme to the land inside the future scheme).
Summary of opinions (majority)	River course should be shifted and the existing main canal should be rehabilitated and utilized. Land reallocation is difficult if the main canal is shifted.	Shifting of the main canal is acceptable. Land reallocation can be done if the main canal is shifted.	Shifting of the main canal is acceptable. Regarding land reallocation, both opinions (difficult and possible) were observed if main canal is shifted.

2. Questionnaire Survey (Quantitative Data)

2.1 Schedule

The survey was conducted right after completion of workshop in each Branch Canal, held on 16th, 17th of December 2004, mentioned in 1.1.

2.2 Method

The survey was made by use of questionnaire. Questionnaires were distributed to farmers who mainly participated in workshop and each farmer filled up one form of questionnaire. AEDO assisted to fill up the form in case farmers were illiterate.

Following numbers of questionnaire were collected.

BC-1	BC-2	BC-3
84	71	62

Total 217 numbers (11 % of the total farmers 1,926 in the scheme)

2.3 Result

Result of workshop was summarized in the next page.

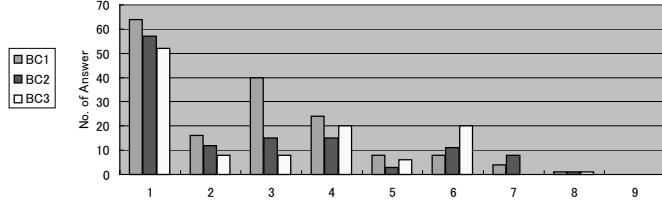
Result of Questionnaire Survey for The Project for Rehabilitation of The Bwanje Valley Irrigation System

A lot of formulating queries that only the person who did a specific answer by the pre-question answered the question were included in this questionnaire. Though there were farmers who had answered without understanding the queries of the questions mentioned above, this results include such answers in order to pick up maximum needs of farmers. Figure in pie chart is number of answers and figure under bracket in same chart is the proportion in the whole answers in parentheses.

A. Present situation of Bwanje Valley Irrigation System

A-1 What are your most unsatisfactory issues under present situation of Bwanje Valley Irrigation System?
Please select 2 (two) choices.

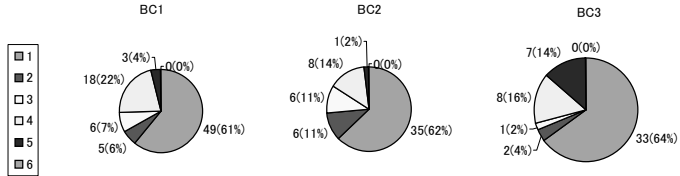
1. Adequate water doesn't come to your land
2. Water management committee doesn't function well
3. Situation of land tenure is not fair in Bwanje Valley Irrigation System
4. Crop yield is low.
5. Farming information and input can not be obtained.
6. Product of crop can not be sold at satisfactory price or there is no access to sell the product
7. Distance between your house and your land in Bwanje Valley Irrigation System is long due to the lack of bridge
8. There are no particular unsatisfactory issues.
9. Others



It is the most unsatisfactory issue that adequate water doesn't come to the land in BC1, 2 and 3. In BC1, the second unsatisfactory issue is unfair land tenure and numbers of its answer are much more than those in other branch canals. In BC2, the second unsatisfactory issues are unfair land tenure and low crop yield. Numbers of answer of these two issues are not much difference among other issues. In BC3, the second unsatisfactory issues are relating to farming practice, low crop yield and marketing matters.

A-1-1 If you select 1 in Question A-1, what is the first reason that water doesn't reach to your land?

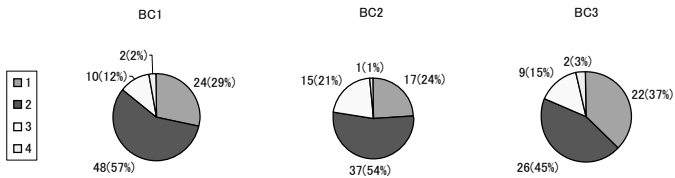
1. There are no adequate water in the canal because the main canal was damaged by heavy flood
2. Water doesn't flow smoothly because there is a lot of silt in the canal
3. Too much water is withdrawn to the land in upper stream area in Bwanje Valley Irrigation System.
4. Water can not cover the land because level of the land is higher than water level.
5. Water can not be withdrawn from headwork and/or Branch canal to because control of the gate is not appropriate.
6. Others



More than 60% of the farmers in BC1,2 and 3 recognize the reason is there is no adequate water in the canal because of damage of the main canal. The second reason in BC1,2 and 3 is that the land is not leveled. In BC3, the proportion of numbers of answer "unappropriate gate control" to total answers is higher than that in other BCs.

A-2 Main canal has suffered from heavy flood. How did it influence on your land?

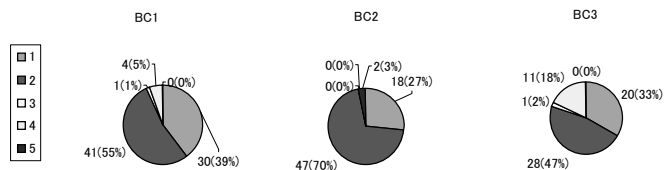
1. Water didn't come to your land totally.
2. Amount of water decreased compared with amount of water before flood.
3. Threat to suffer your land from flood increased.
4. No particular change.



In each BC, as an influence by the damage of main canal, farmers think firstly "amount of water decreased", secondly "water didn't come to their land totally", thirdly "threat to suffer their land from flood increased". Same tendency is observed in all three BCs.

A-3 Currently Government of Malawi conducts the construction work to change the course of Namikokwe river. What do you expect for this work?

1. Present main canal could be utilized without any threat of damage for future.
2. Threat of suffering your land might decrease because river course would be apart from your land and stabilized.
3. No expectation
4. On the contrary there is unsatisfaction or concern
5. Others

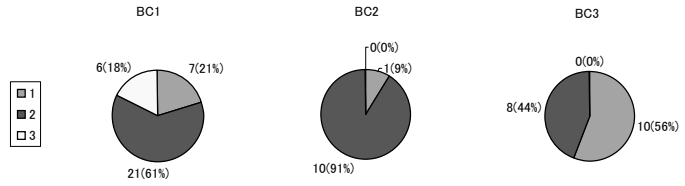


As for present river course changing work, farmers in each BC expect firstly "Threat of suffering your land might decrease because river course would be apart from your land and stabilized" and secondly "Present main canal could be utilized without any threat of damage for future". Around 20 % of farmers in BC3 have unsatisfaction or concern, this proportion is bigger than that in other BCs.

Result of Questionnaire Survey (2/6)

A-3-1 If you select 4 in Question A-3, what is the content about unsatisfaction or concern?

1. River course might be changed again to previous channel due to future flood.
2. Flood might occur in the new river course
3. Others

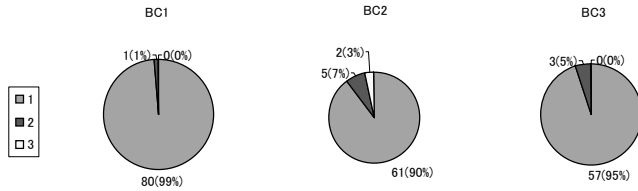


In BC1, about 60 % of the farmers are worried about flood which might occur in the new river course, on the other hand, around 20 % of them think river course might be changed again to previous channel. In BC2, almost 90 % of the farmers are worried about flood which might occur in the new river course. In BC3, the concern "river course might be changed again to previous course", which around 60 % of the farmers answered, following "river course might be changed again to previous channel due to future flood"(around 40%).

Farmers organization

A-4 Are you a member of farmers organization?

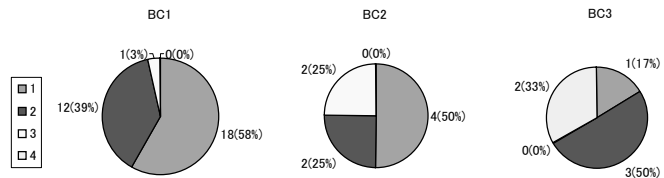
1. Yes
2. No
3. I do not know



More than 90% of the farmers recognize that they are members of farmers cooperative (Here "cooperative" is used instead of "organization" because of registration completed) in every BC.

A-4-1 If you select 2 in Question A-4, what is the reason?

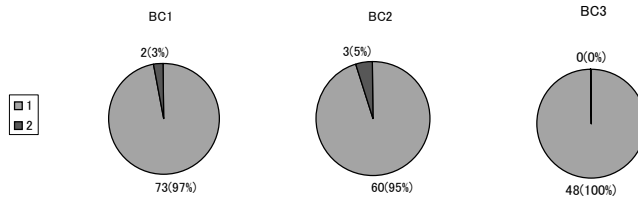
1. Water doesn't reach to your land from canal
2. You do not want to do obligation which member has to do
3. You do not know farmers organization itself
4. Others



In BC1 and 2, the first reason to prevent farmers to be a member of cooperative is "water doesn't reach to their land from canal". In BC3 around 50 % of the farmers think they do not want to do the obligation which member has to do. (It has to be noted that numbers of answer are less than 10 in BC2,3.)

A-4-2 If you select 1 in Question A-4, do you participate in activities of farmers organization?

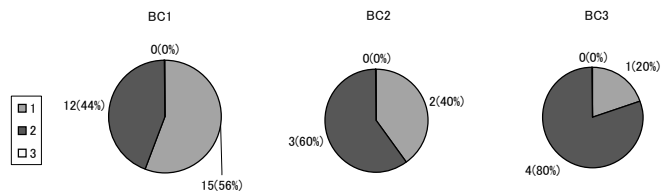
1. Yes
2. No



Almost all of the farmers (more than 95%) in each BC recognize that they participate cooperative activities.

A-4-3 If you select 2 in Question A-4-2, what is the reason?

1. Water doesn't reach to your land from canal
2. You do not know its activities
3. Others

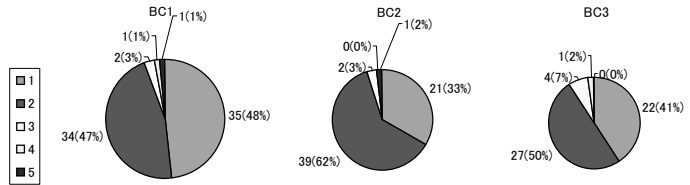


The first reason to prevent farmers to participate cooperative's activities in BC1 is "water doesn't reach to their land from canal" (almost 60 %), and first reason in BC2,3 is "the farmers don't know the activities of cooperative"(60`80%). (It has to be noted that numbers of answer are less than 10 in BC2,3.)

Result of Questionnaire Survey (3/6)

A-5 What do you expect for farmers organization most?

- 1.To conduct its activities appropriately
- 2.To inform usage of collected money from you
- 3.To disseminate information of activities
- 4.Nothing special
- 5.Others

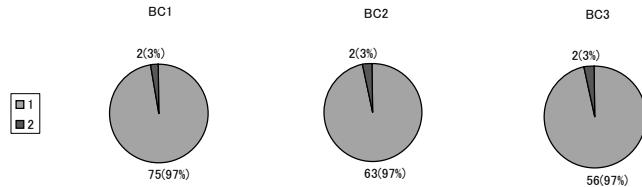


In every BC, more than 50% of the farmers expect that cooperative should inform usage of collected money from them, 30-50% of the farmers think that cooperative should conduct its activities appropriately.

Water fee

A-6 Did you pay water fee last year?

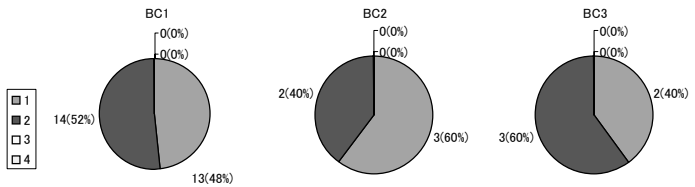
- 1.Yes
- 2.No



Almost all of the farmers in each BC reply that they paid water fee.

A-6-1 If you select 2 in Question A-6, what is the reason?

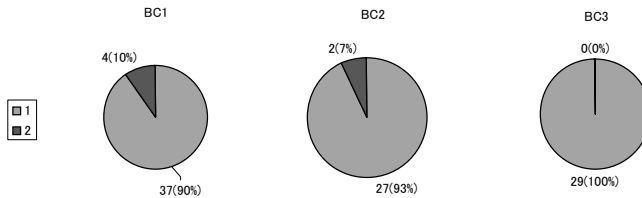
- 1.Water doesn't reach to your land from canal
- 2.Water reaches to your land from canal but you do not know the usage of collected money from you
- 3.You don't have enough money to pay.
- 4.Others



As the reason why farmers didn't pay water fee, "Water doesn't reach to your land from canal", and "They don't know the usage of collected money" account for 40-60% respectively in each BC. (It has to be noted that numbers of answer are less than 10 in BC2,3.)

A-6-2 If you select 2 in Question A-6-2, do you surely pay water fee if you receive water from canal?

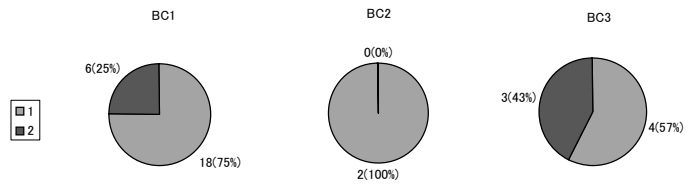
- 1.Yes
- 2.No



Opinion "farmers surely pay water fee if they receive water from canal" is dominant in every BC.

A-6-3 If you select 2 in Question A-6-2, what is the reason?

- 1.You do not know the usage of collected money from you
- 2.Others

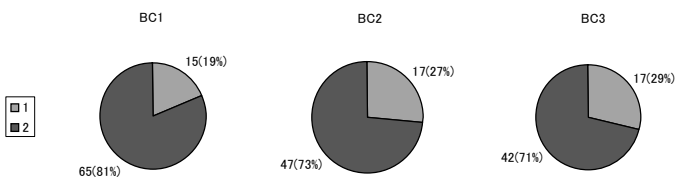


Regarding the reason not to pay even though water comes to the field from canal, opinion of the distrust "they do not know the usage of money which they pay" accounts for more than 60% through each BC. (It has to be noted that numbers of answer are less than 10 in BC2,3.)

Land levelling

A-7 Is your land levelled?

- 1.Yes
- 2.No

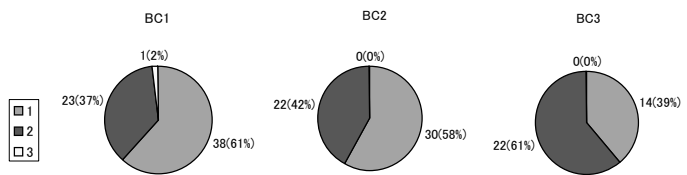


70-80% of the farmers which answered this question think their land is not leveled.

Result of Questionnaire Survey (4/6)

A-7-1 If you select 2 in Question A-7, what is your dissatisfaction on your land not levelled ?

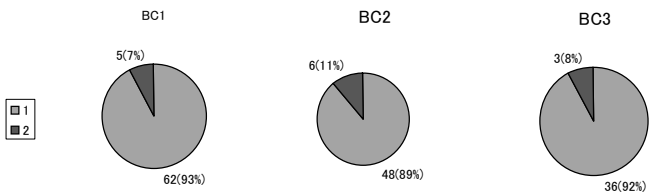
1. Water doesn't reach to your land from canal
2. It is not fair because some lands have already been levelled
3. Others



In BC1, 2 opinion "water doesn't reach to the land" as dissatisfaction of unlevelled land account for 60% and 40% of the opinion is "unfairness because of levelled land which is possessed by other farmers". In BC3, 60% of the opinions is unfairness.

A-7-2 If you select 2 in Question A-7, do you want your land to be levelled?

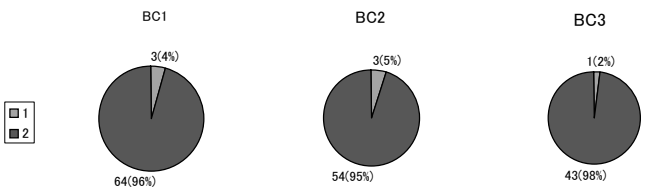
1. Yes
2. No



Around 90% of all the farmers want their land to be levelled.

A-7-3 If you select 1 in Question A-7-2, do you level your land by yourself?

1. Yes
2. Difficult

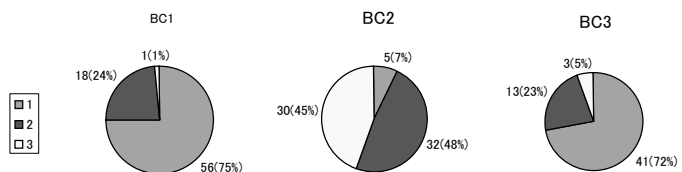


Almost all the farmers in every BC think it is difficult for them to level their land by themselves.

B. Future plan for Bwanje Valley Irrigation System, which is now under examination by Government of Malawi and Government of Japan

B-1 If your land can not receive water from canal based on the technical examination, what do you think about this assumption?

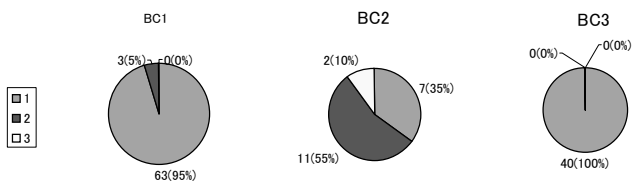
1. Object
2. No way, accept
3. No particular problem



In BC1 and 3, more than 70 % of the farmers object a plan "their land can not receive water from canal" and around 20% of the farmers accept such a plan for lack of an alternative. On the other hand, in BC2 more than 90% of the farmers accept such a plan for some reason or other "no choice but to accept" (48%), "no problem" (45%); these answers are far more than those of the objection (7%).

B-1-1 If you select 1 in Question B-1, what is the reason?

1. You do agriculture only at your land inside Bwanje Valley Irrigation System so if water doesn't come to your land, production would decrease and this result in serious problem for your life
2. You merely object to stopping water distribution due to the plan although water is received right now
3. Others

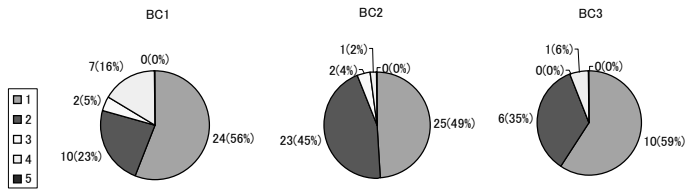


In BC1 and 3, opinion No.1 accounts for more than 90% and this implies the scheme is important. However, 55% of the farmers in BC2 answer opinion No.2, that means infringement of the vested right.

Result of Questionnaire Survey (5/6)

B-1-2 If you select 2 or 3 in Question B-1, what is the reason?

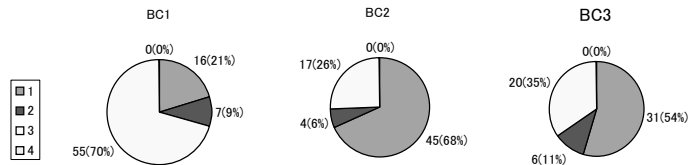
- 1.It is no way to accept if the plan would be technically right
- 2.There is no problem because you can cultivate this land inside Bwanje valley irrigation system by use of rainfall
- 3.There is no problem because you can cultivate other land outside Bwanje valley irrigation system
- 4.The situation would not be changed because water doesn't reach to your land right now, too.
- 5.Others



In each BC, the reason that is no choice but to accept if a plan is technically right accounts for 50-60%. As for the second reason through all BCs (opinion No.2), the proportion in BC2 and 3 (45%,35%) is bigger than that in BC1 (23%). The third reason in BC1 (opinion No.4) accounts for 16%, bigger than the proportion in other BCs.

B-2 If your land can not receive water from canal as a result of the technical examination, how do you do your farming activities?

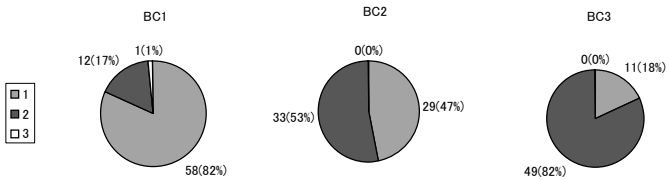
- 1.Continue your farming activities in the same land by use of rainfall even if water might not come from canal
- 2.Not continue your farming activities in the land and leave the land
- 3.Need other land (to be re-distributed, for example) inside Bwanje Valley Irrigation System
- 4.Others



In BC2 and 3, 50% ~70% of opinions is "Continue their farming activities in the same land by use of rainfall", following "need other land in the scheme" (26%, 35%). On the other hand in BC1, 70% of opinions is "need other land in the scheme" and opinion "Continuation of their farming by rainfall" accounts for 20%.

B-3 If all the lands inside Bwanje Valley irrigation system are re-distributed again, how do you think of possibility of the realization?

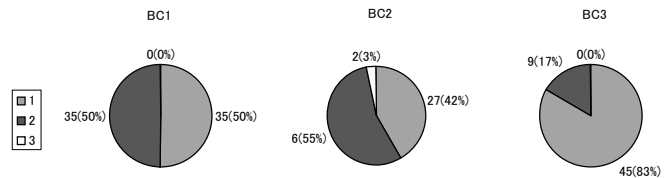
- 1.Possible
- 2.Difficult
- 3.Others



In BC1, more than 80% of opinions is that land re-distribution is possible. In BC2, both opinions, "difficult" and "possible" have almost same proportion(47%,53%, respectively). On the other hand in BC3, opinion "Land re-distribution is difficult" accounts for more than 80% on the contrary of BC1's case.

B-4 If size of your land decreases as a result of re-distribution of the land, what do you think?

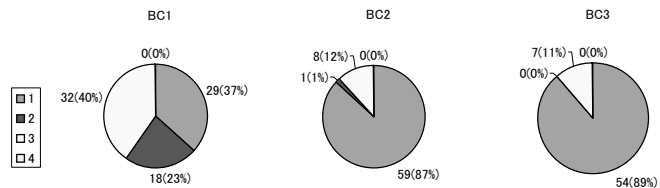
- 1.Object
- 2.No way, accept
- 3.Others



Both opinions "difficult" and "accept" is competitive in BC1. In BC2, opinion "accept" (55%) is more than "difficult" (42%). In BC3, opinion "difficult" accounts for more than 80%, and this is far more than that of "accept" (17%)

B-5 Do you have any request for both governments in order to mitigate future flood damage by Namikokwe river?

- 1.Change and stabilize river channel apart from present main canal
- 2.Keep as it is because it is not good to change the nature any more
- 3.Basically any plan is acceptable as far as present land and canal system would be protected
- 4.Others



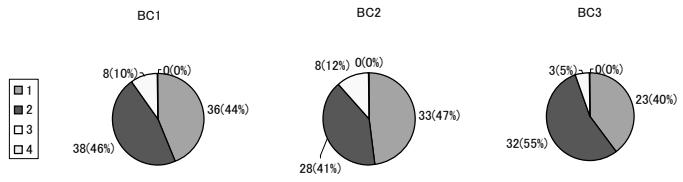
In BC1, proportion of the opinion "change and stabilize river course apart from present main canal" is almost same as that of "any plan is acceptable as far as present land and canal system would be protected" (around 40%). And Opinion No.2 accounts for around 20%, this implies their concern about future flood due to uncertainty of the nature.

In BC2,3, proportion of the opinions "change and stabilize river course apart from present main canal" is almost 90%.

C. Others

C-1 Suppose future plan would be decided and include some contents which is different from your opinion, as the result of technical examination in order to mitigate future flood damage to Bwanje Valley Irrigation System. Do you accept such plan?

- 1.Accept without any condition
- 2.Accept with some condition
- 3.Not Accept
- 4.Others



Around 90% of the farmers (opinion No.1 and opinion No.2) in every BC accept a plan which include some contents that is diferent from their opinions for protection of the scheme from flood dmage, for some reason or other.

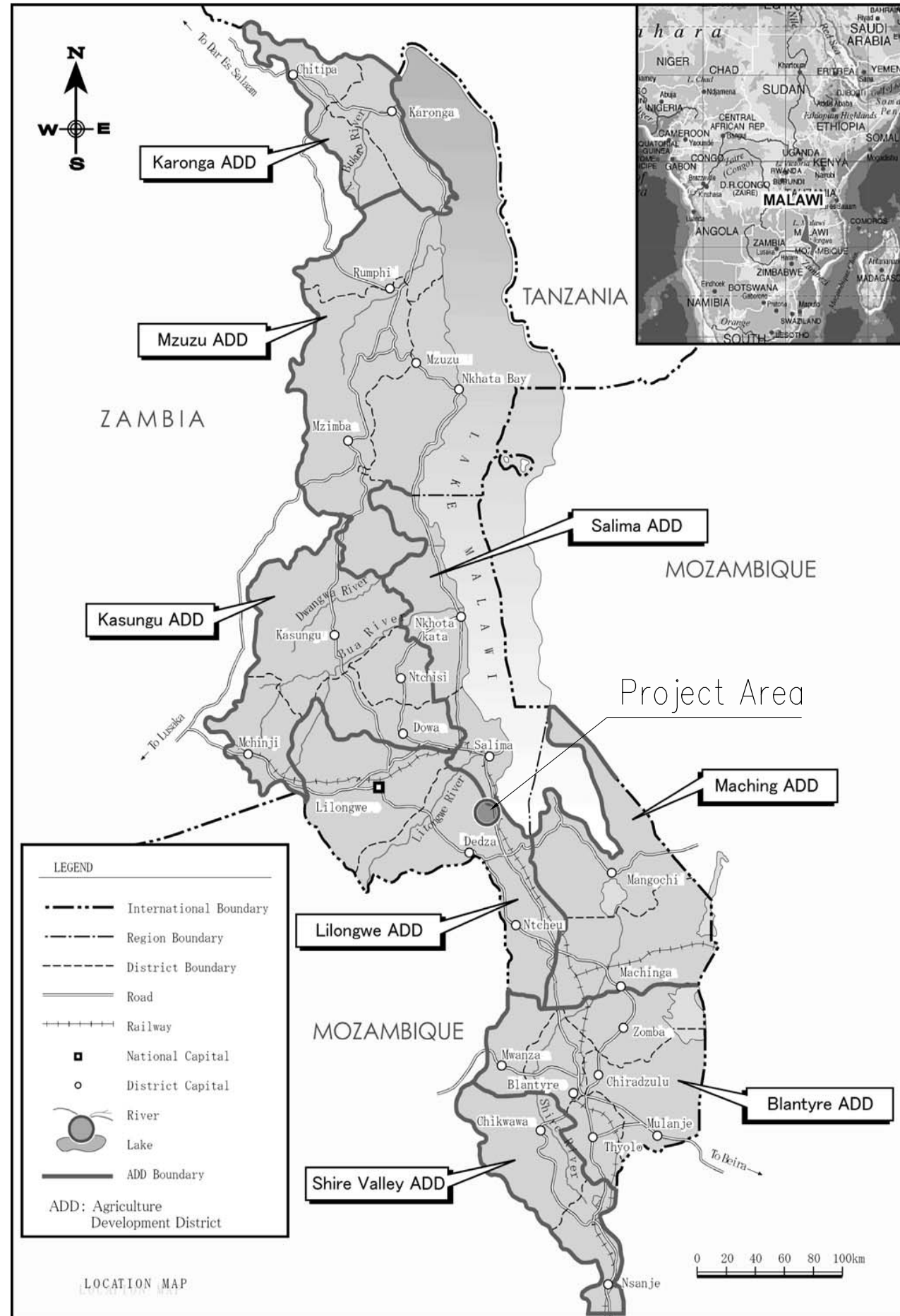
8. Basic Design Drawings

THE PROJECT FOR REHABILITATION OF BWANJE VALLEY IRRIGATION SYSTEM
LIST OF DRAWING

NO.	DRAWING NO.	TITLE OF DRAWINGS
I. GENERAL		
1	MP-01	LOCATION MAP
2	MP-02	GENERAL LAYOUT
II. HEADWORKS REHABILITATION WORKS		
3	HW-01	GENERAL LAYOUT OF BWANJE VALLEY HEADWORKS
4	HW-02	RIVER PROFILE OF NAMIKOKWE RIVER
5	HW-03	PLAN OF BWANJE VALLEY HEADWORKS
6	HW-04	SECTION(1/4)
7	HW-05	SECTION(2/4)
8	HW-06	SECTION(3/4)
9	HW-07	SECTION(4/4)
10	HW-08	REHABILITATION OF GATE PART OF SLUICE WAY(1/2)
11	HW-09	REHABILITATION OF GATE PART OF SLUICE WAY(2/2)
12	HW-10	REHABILITATION OF INTAKE STRUCTURE
13	HW-11	CONCRETE FRAME REVETMENT
14	HW-12	OPERATION BRIDGE
15	HW-13	REMOVAL OF EXISTING GABION
III. SETTLING BASIN REHABILITATION WORKS		
16	SB-01	PLAN AND PROFILE OF SETTLING BASIN
17	SB-02	SECTION(1/3)
18	SB-03	SECTION(2/3)
19	SB-04	SECTION(3/3)
20	SB-05	LONGITUDINAL SECTION (INTAKE TO BC.4)
21	SB-06	DEMOLITION OF EXISTING SETTLING BASIN
22	SB-07	GATES FOR SETTLING BASIN (1/2)
23	SB-08	GATES FOR SETTLING BASIN (2/2)
IV. MAIN CANAL RELOCATION WORKS		
24	ID-01	CANAL LAYOUT
25	ID-02	IRRIGATION DIAGRAM
26	ID-03	DRAINAGE DIAGRAM
27	ID-04	TYPICAL SECTION OF CANALS AND INSPECTION ROAD (1/2)
28	ID-05	TYPICAL SECTION OF CANALS AND INSPECTION ROAD (2/2)
29	ID-06	PLAN AND PROFILE OF MC(1/4)
30	ID-07	PLAN AND PROFILE OF MC(2/4)

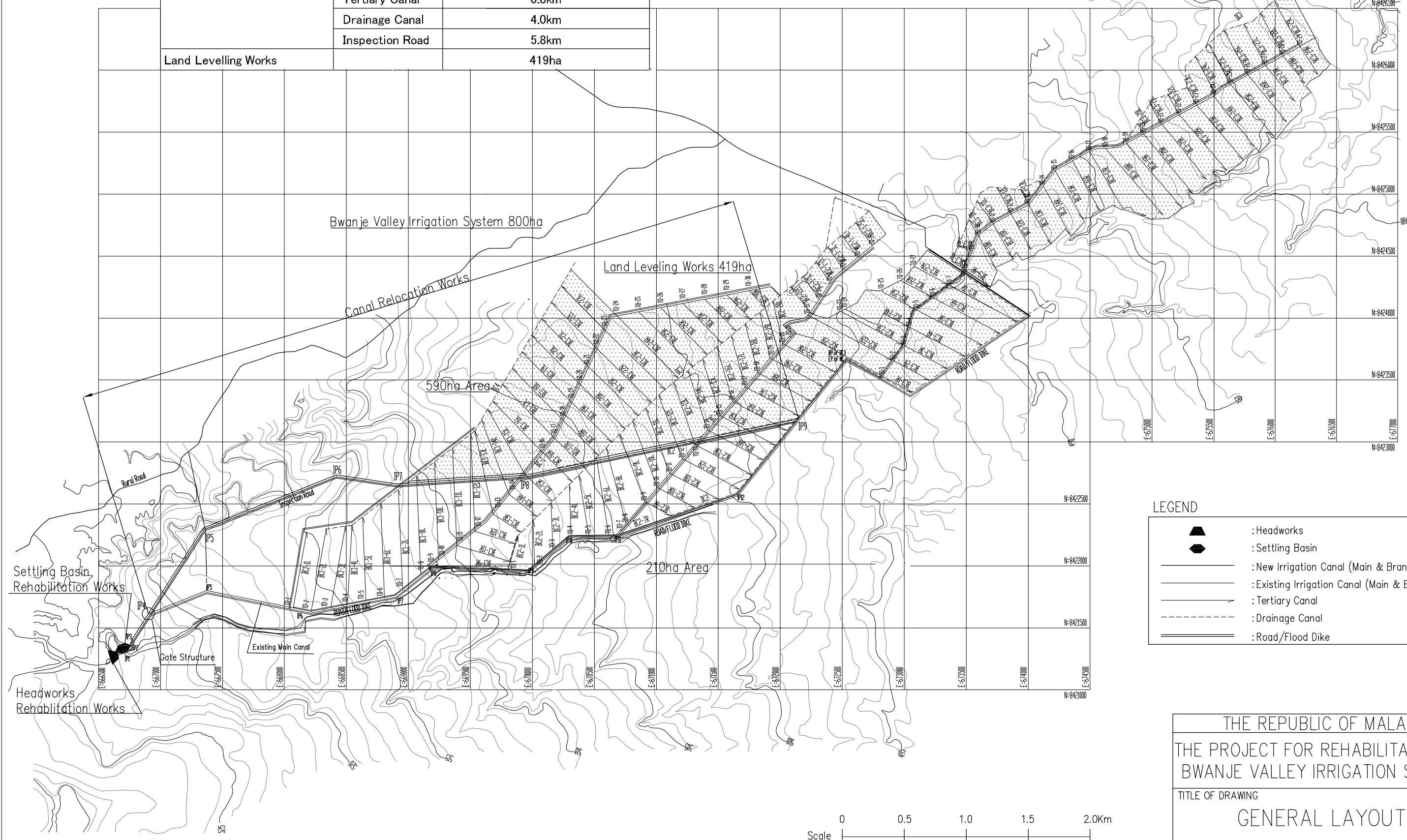
NO.	DRAWING NO.	TITLE OF DRAWINGS
31	ID-08	PLAN AND PROFILE OF MC(3/4)
32	ID-09	PLAN AND PROFILE OF MC(4/4)
33	ID-10	PLAN AND PROFILE OF BC-1
34	ID-11	PLAN AND PROFILE OF BC-2
35	ID-12	PLAN AND PROFILE OF BC-1-A, 2-A FOR 210HA AREA
36	ID-13	FLUME AND CANAL CONNECTION
37	ID-14	UNDERDRAIN AND JOINT FOR FLUME AND LINING CANAL
38	ID-15	GATE STRUCTURE(1/2)
39	ID-16	GATE STRUCTURE(2/2)
40	ID-17	NO.1 BIFURCATION (1/4)
41	ID-18	NO.1 BIFURCATION (2/4)
42	ID-19	NO.1 BIFURCATION (3/4)
43	ID-20	NO.1 BIFURCATION (4/4)
44	ID-21	NO.2 BIFURCATION (1/4)
45	ID-22	NO.2 BIFURCATION (2/4)
46	ID-23	NO.2 BIFURCATION (3/4)
47	ID-24	NO.2 BIFURCATION (4/4)
48	ID-25	TURNOUT (1/2)
49	ID-26	TURNOUT (2/2)
50	ID-27	DROP AND FOOT BRIDGE
51	ID-28	CULVERT
52	ID-29	WASHING BASIN
53	ID-30	FARM STRUCTURE
54	ID-31	DIVISION BOX FOR 210HA AREA
55	ID-32	PLAN AND PROFILE OF DRAINAGE CANAL DC 2-A, 3-A
56	ID-33	PLAN AND PROFILE OF DRAINAGE CANAL DC 2-B FOR 210HA AREA
57	ID-34	PLAN AND PROFILE OF DRAINAGE CANAL DC 3-B FOR 210HA AREA
58	ID-35	DRAINAGE DROP
59	ID-36	DRAINAGE CULVERT
60	ID-37	DRAINAGE CULVERT FOR DC 2-B, 3-B
61	ID-38	END POINT OF MC
62	ID-39	GATES FOR CANAL STRUCTURE (1/2)
63	ID-40	GATES FOR CANAL STRUCTURE(2/2)
64	ID-41	MISCELLANEOUS WORKS
V. LAND LEVELING WORKS		
65	OF-01	PLAN OF LAND LEVELING
66	OF-02	TYPICAL PLAN (LESSER DEGREE IN LEVELING VOLUME)
67	OF-03	TYPICAL PLAN (MIDDLE DEGREE IN LEVELING VOLUME)
68	OF-04	TYPICAL PLAN (GREATER DEGREE IN LEVELING VOLUME)

LOCATION MAP



THE REPUBLIC OF MALAWI	
THE PROJECT FOR REHABILITATION OF BWANJE VALLEY IRRIGATION SYSTEM	
TITLE OF DRAWING	
LOCATION MAP	
DRAWING NO.	MP-01
NIPPON KOEI CO., LTD.	

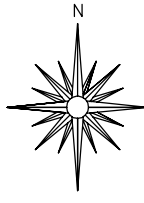
Works		Description
Irrigation Area		590ha
Headworks Rehabilitation		1nos.
Settling Basin Rehabilitation		1nos.
Canal Relocation Works	Main Canal	5.8km
	Branch Canal	3.0km
	Tertiary Canal	0.8km
	Drainage Canal	4.0km
	Inspection Road	5.8km
Land Levelling Works		419ha



LEGEND

	: Headworks
	: Settling Basin
	: New Irrigation Canal (Main & Branch)
	: Existing Irrigation Canal (Main & Branch)
	: Tertiary Canal
	: Drainage Canal
	: Road/Flood Dike

THE REPUBLIC OF MALAWI	
THE PROJECT FOR REHABILITATION OF BWANJE VALLEY IRRIGATION SYSTEM	
TITLE OF DRAWING GENERAL LAYOUT	
DRAWING NO.	MP-02
NIPPON KOEI CO., LTD.	



N=8421500

N=8421400

N=8421300

N=8421200

E=666700

E=666800

E=666900

E=667000

E=667100

IP.1
 X = 666,649.50
 Y = 8,421,301.74
 IA = 90°00'00"
 R = 10.00 TL = 10.00
 CL = -15.71 SL = 4.14

New IP.2A
 X = 666,729.77
 Y = 8,421,332.53
 IA = 40°00'00"
 R = 28.00 TL = 7.27
 CL = -13.96 SL = 1.28

New IP.2B
 X = 666,764.35
 Y = 8,421,391.10
 IA = 12°05'31"
 R = 20.00 TL = 2.12
 CL = 4.22 SL = 0.11

IP.3
 X = 660,770.00
 Y = 8,421,408.00
 IA = 14°10'52"
 R = 30.00 TL = 3.73
 CL = 7.43 SL = 3.73

15708
 6000
 27000
 50000

64000

IP.0(666,661.38, 8,421,268.09)
 Namikokwe River
 FLOW

New Construction

Concrete Block

Stone Pitching

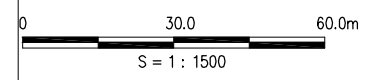
Stone Pitching

Concrete Block

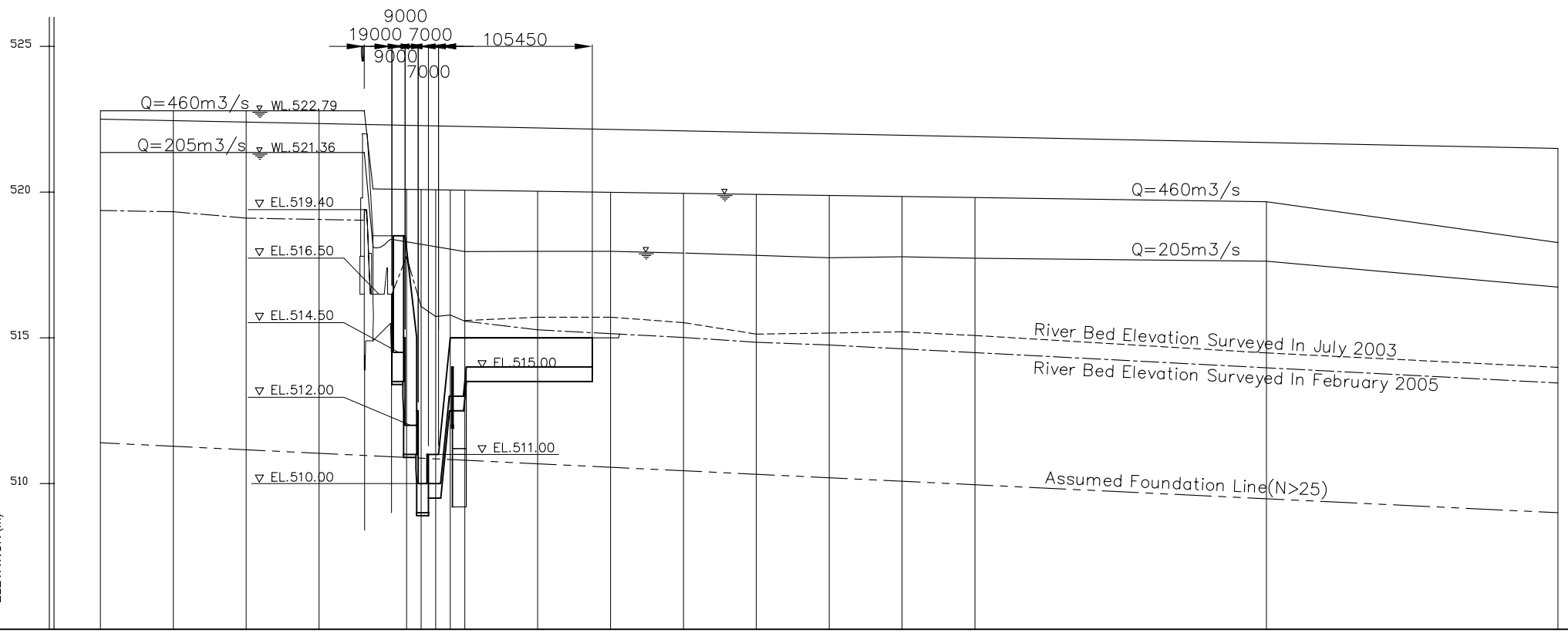
New Main Canal

FLOW

SCALE



THE REPUBLIC OF MALAWI	
THE PROJECT FOR REHABILITATION OF BWANJE VALLEY IRRIGATION SYSTEM	
TITLE OF DRAWING GENERAL LAYOUT OF BWANJE VALLEY HEADWORKS	
DRAWING NO.	HW-01
NIPPON KOEI CO., LTD.	

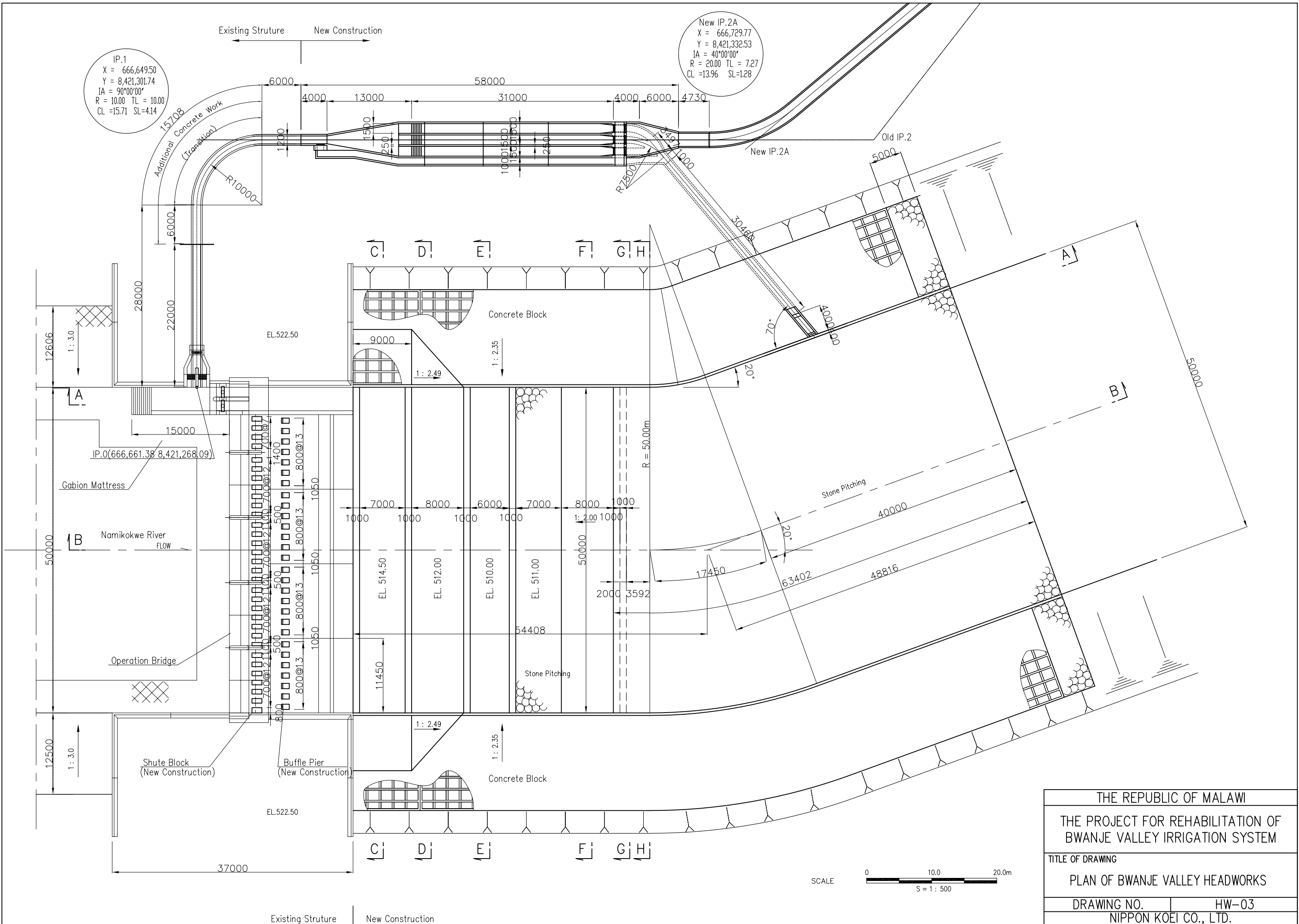


WATER LEVEL under Q=460m ³ /s	522.79	522.79	522.79	522.79	520.11	520.11	520.11	520.11	520.11	520.02	519.89	519.88	519.92	519.83	519.67	518.20			
WATER LEVEL under Q=205m ³ /s	521.36	521.36	521.36	521.36	521.38	521.38	521.38	521.38	521.38	520.02	517.78	517.75	517.78	517.73	517.63	516.74			
ELEVATION OF STRUCTURE					516.50	514.50	512.00	510.00	511.00	515.00									
RIVERBED ELEVATION (JUL. 2003)	519.37	519.33	519.11	519.06	516.52				515.59	515.71	515.71	515.52	515.13	515.16	515.21	515.08	514.48	513.99	
RIVERBED ELEVATION (FEB. 2005)	519.37	519.33	519.11	519.06	516.50	517.79	516.08	515.73	515.78	515.57	512.27	515.14	515.01	514.85	514.75	514.62	514.49	513.97	513.45
ACCUMULATED DISTANCE	-200.00	-150.00	-100.00	-50.00	0.00	10.00	20.00	30.00	40.00	50.00	100.00	150.00	200.00	250.00	300.00	350.00	400.00	600.00	800.00
DISTANCE	0.00	50.00	50.00	50.00	50.00	100.00	100.00	100.00	100.00	100.00	50.00	50.00	50.00	50.00	50.00	50.00	50.00	200.00	500.00

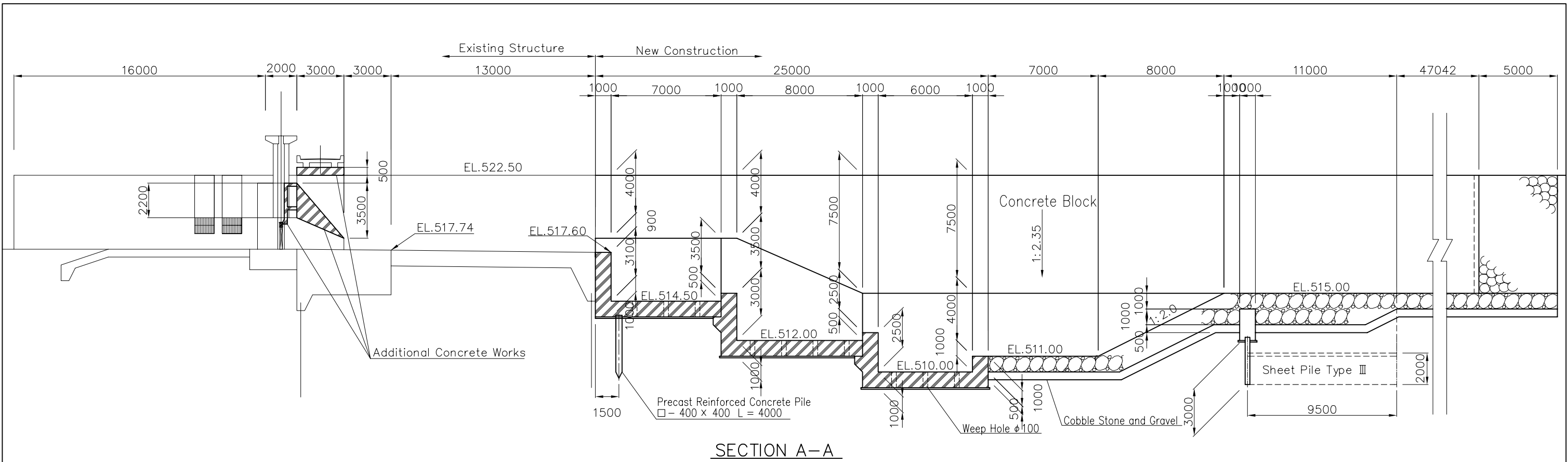
THE REPUBLIC OF MALAWI
 THE PROJECT FOR REHABILITATION OF
 BWANJE VALLEY IRRIGATION SYSTEM
 TITLE OF DRAWING
 RIVER PROFILE OF NAMIKOKWE RIVER
 DRAWING NO. HW-02
 NIPPON KOEI CO., LTD.

IP.1
 X = 666,649.50
 Y = 8,421,301.74
 IA = 90°00'00"
 R = 10.00 TL = 10.00
 CL = 15.71 SL = 4.14

New IP.2A
 X = 666,729.77
 Y = 8,421,332.53
 IA = 40°00'00"
 R = 20.00 TL = 7.27
 CL = 13.96 SL = 1.28

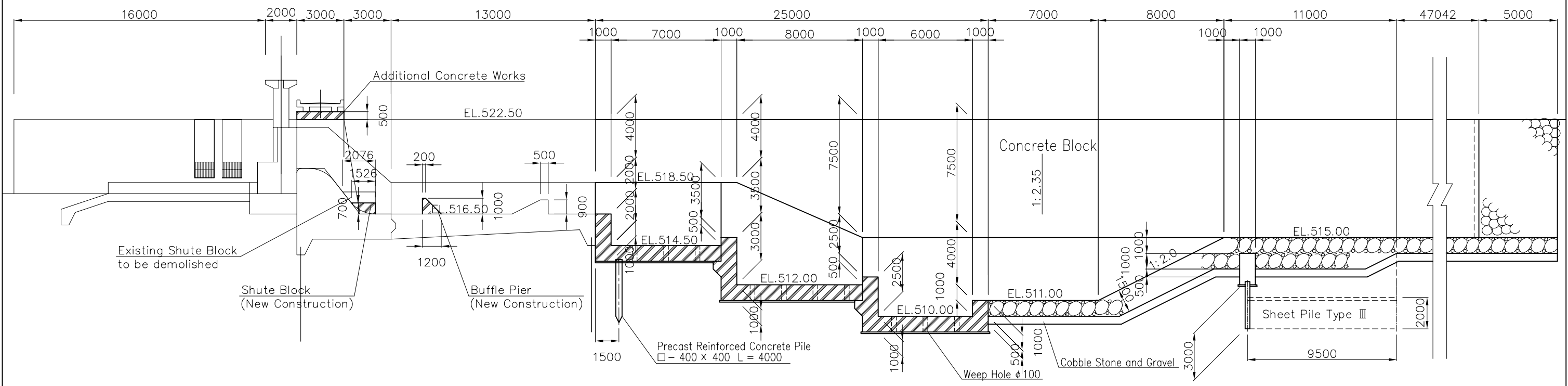


THE REPUBLIC OF MALAWI	
THE PROJECT FOR REHABILITATION OF BWANJE VALLEY IRRIGATION SYSTEM	
TITLE OF DRAWING	
PLAN OF BWANJE VALLEY HEADWORKS	
DRAWING NO.	HW-03
NIPPON KOEI CO., LTD.	

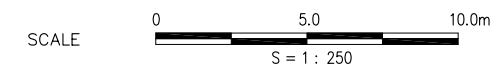


SECTION A-A

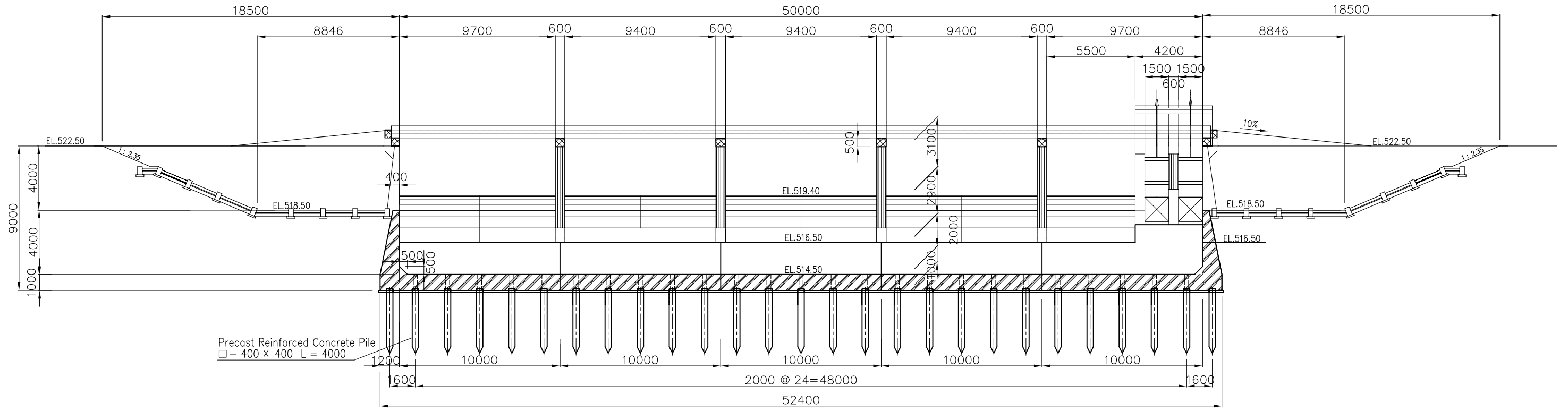
C | D | E | F | G | H



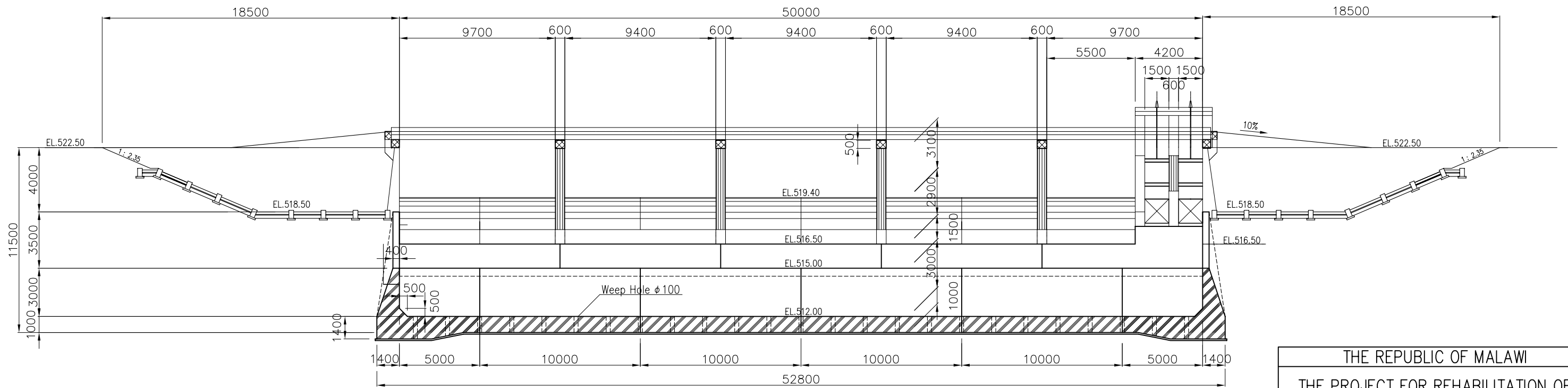
SECTION B-B



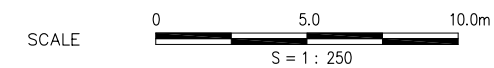
THE REPUBLIC OF MALAWI	
THE PROJECT FOR REHABILITATION OF BWANJE VALLEY IRRIGATION SYSTEM	
TITLE OF DRAWING	
SECTION (1/4)	
DRAWING NO.	HW-04
NIPPON KOEI CO., LTD.	



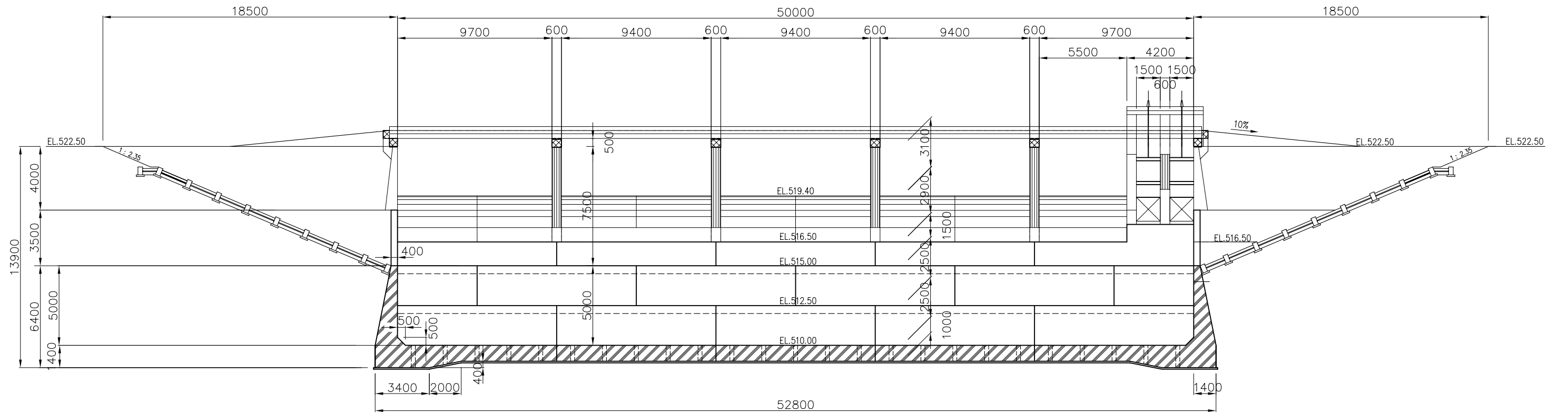
SECTION C-C



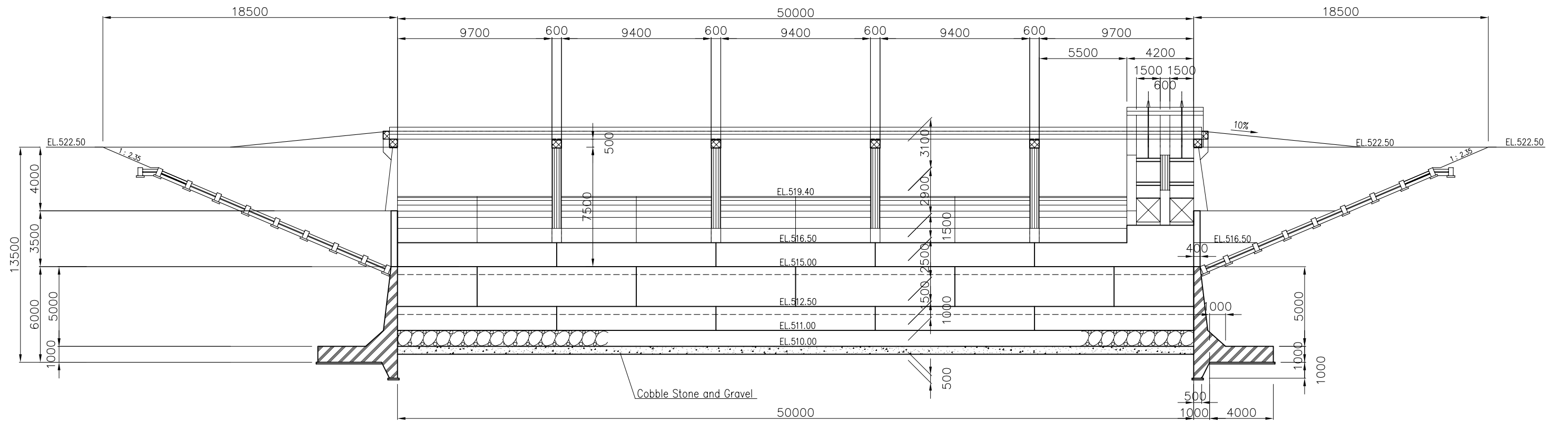
SECTION D-D



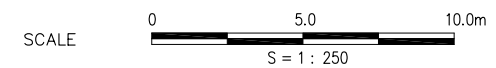
THE REPUBLIC OF MALAWI	
THE PROJECT FOR REHABILITATION OF BWANJE VALLEY IRRIGATION SYSTEM	
TITLE OF DRAWING	
SECTION (2/4)	
DRAWING NO.	HW-05
NIPPON KOEI CO., LTD.	



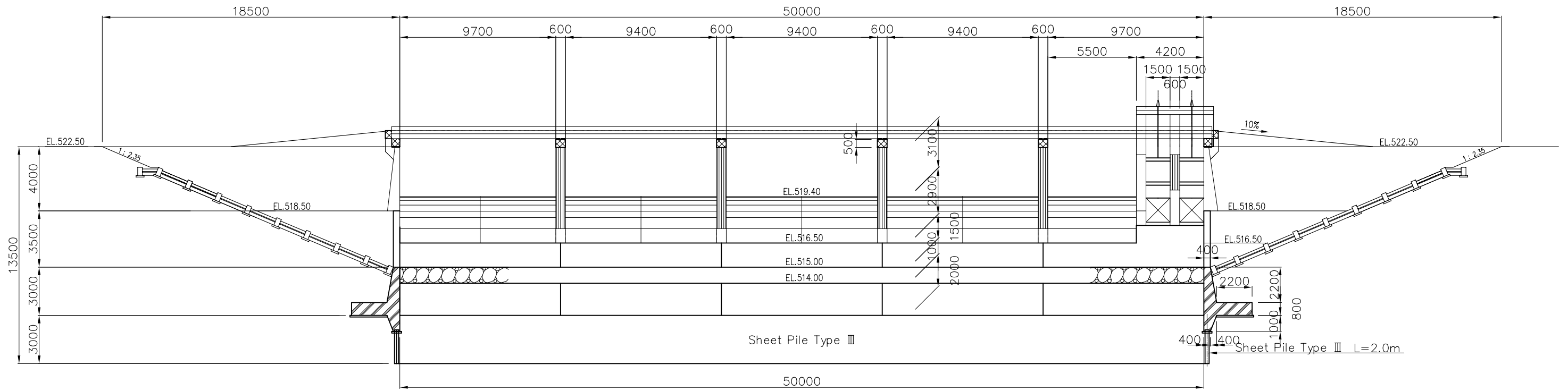
SECTION E-E



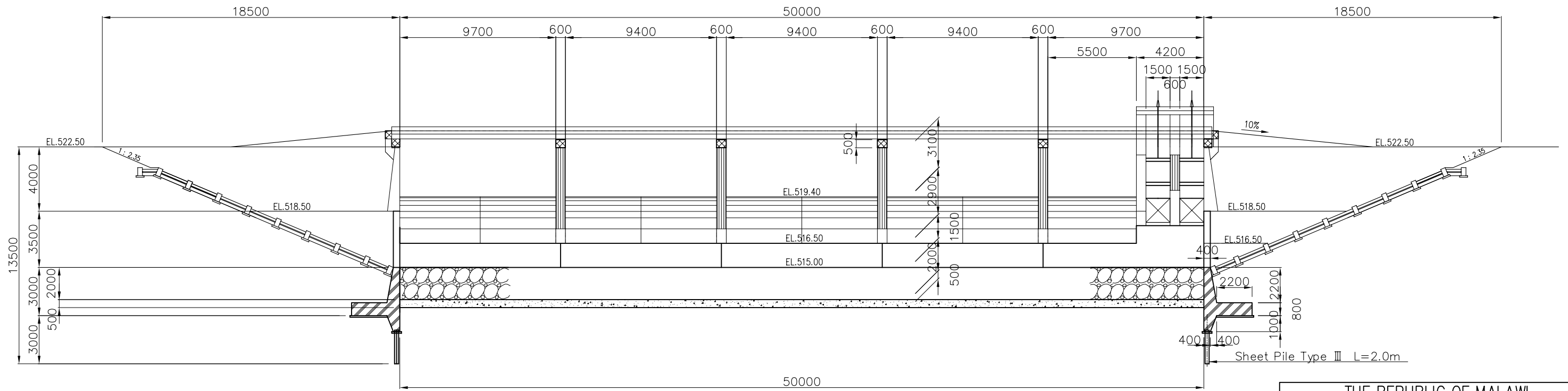
SECTION F-F



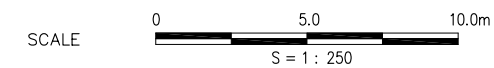
THE REPUBLIC OF MALAWI	
THE PROJECT FOR REHABILITATION OF BWANJE VALLEY IRRIGATION SYSTEM	
TITLE OF DRAWING	
SECTION (3/4)	
DRAWING NO.	HW-06
NIPPON KOEI CO., LTD.	



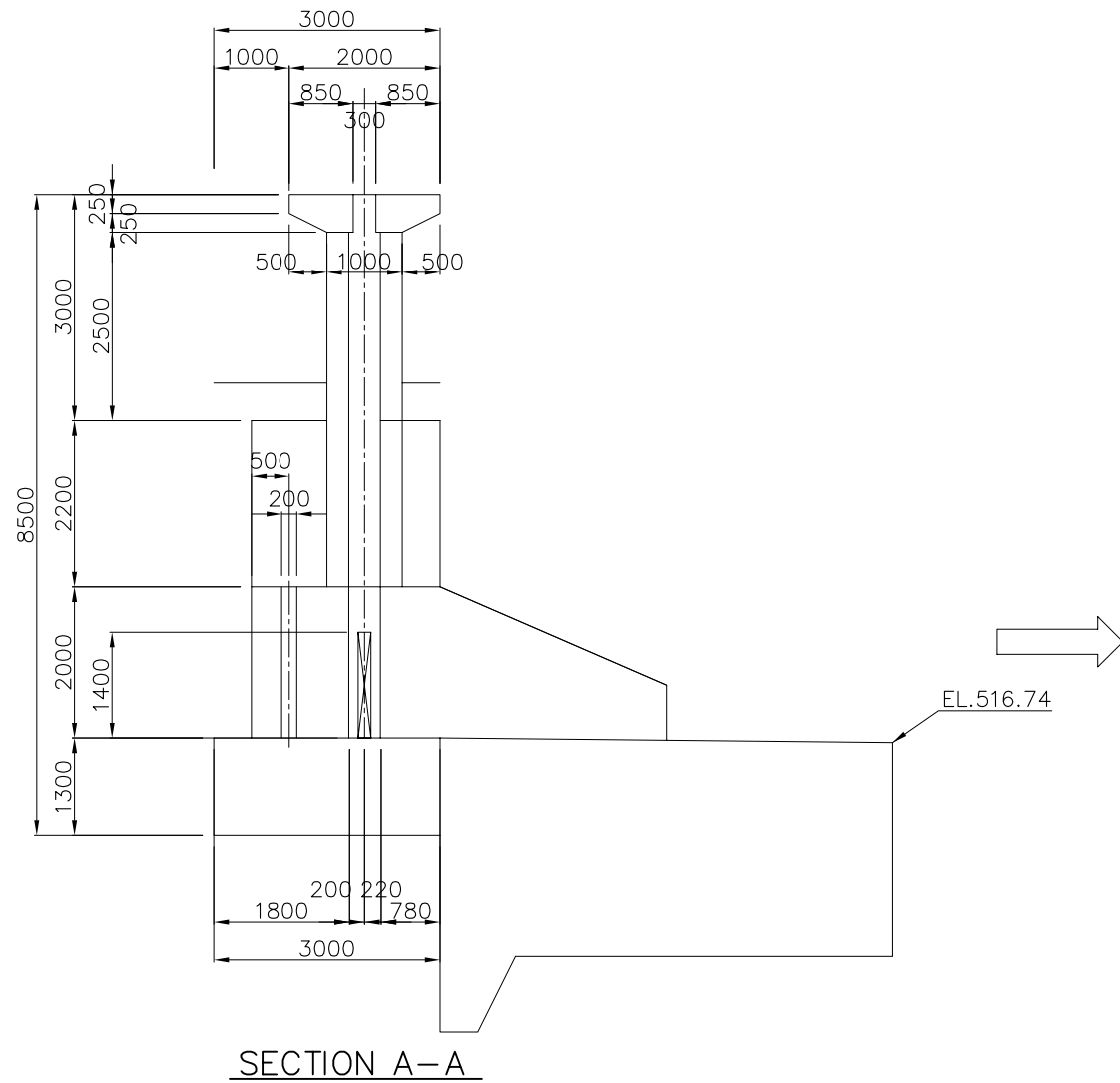
SECTION G-G



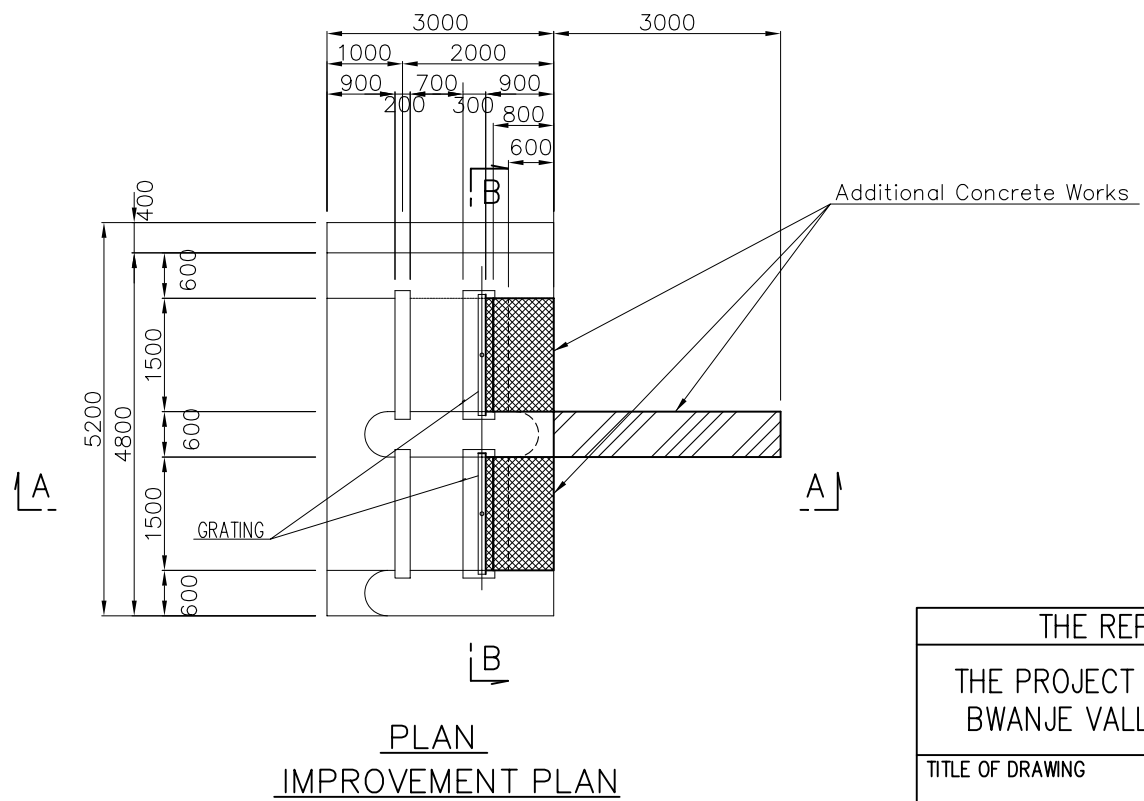
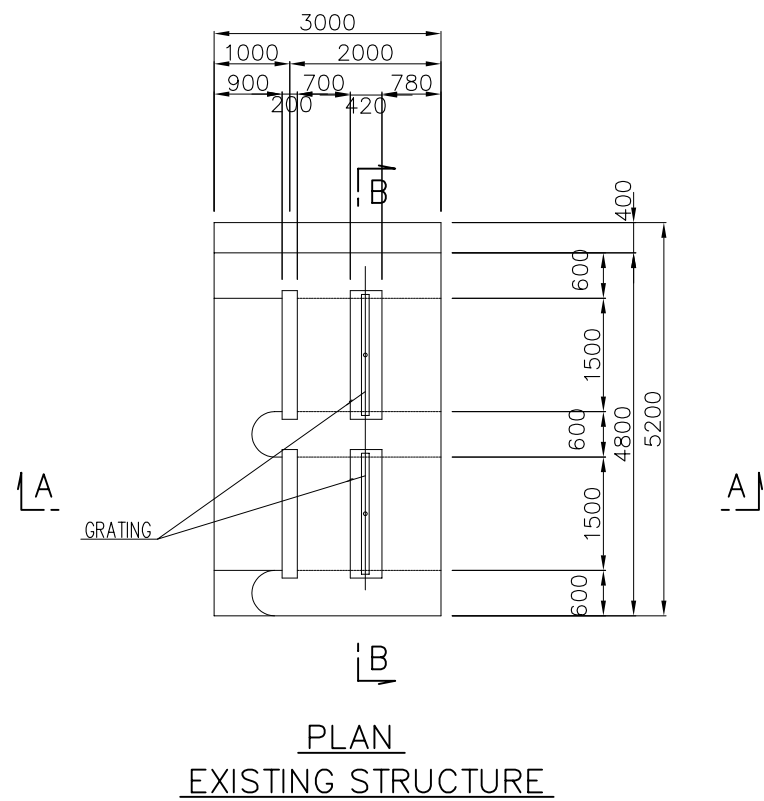
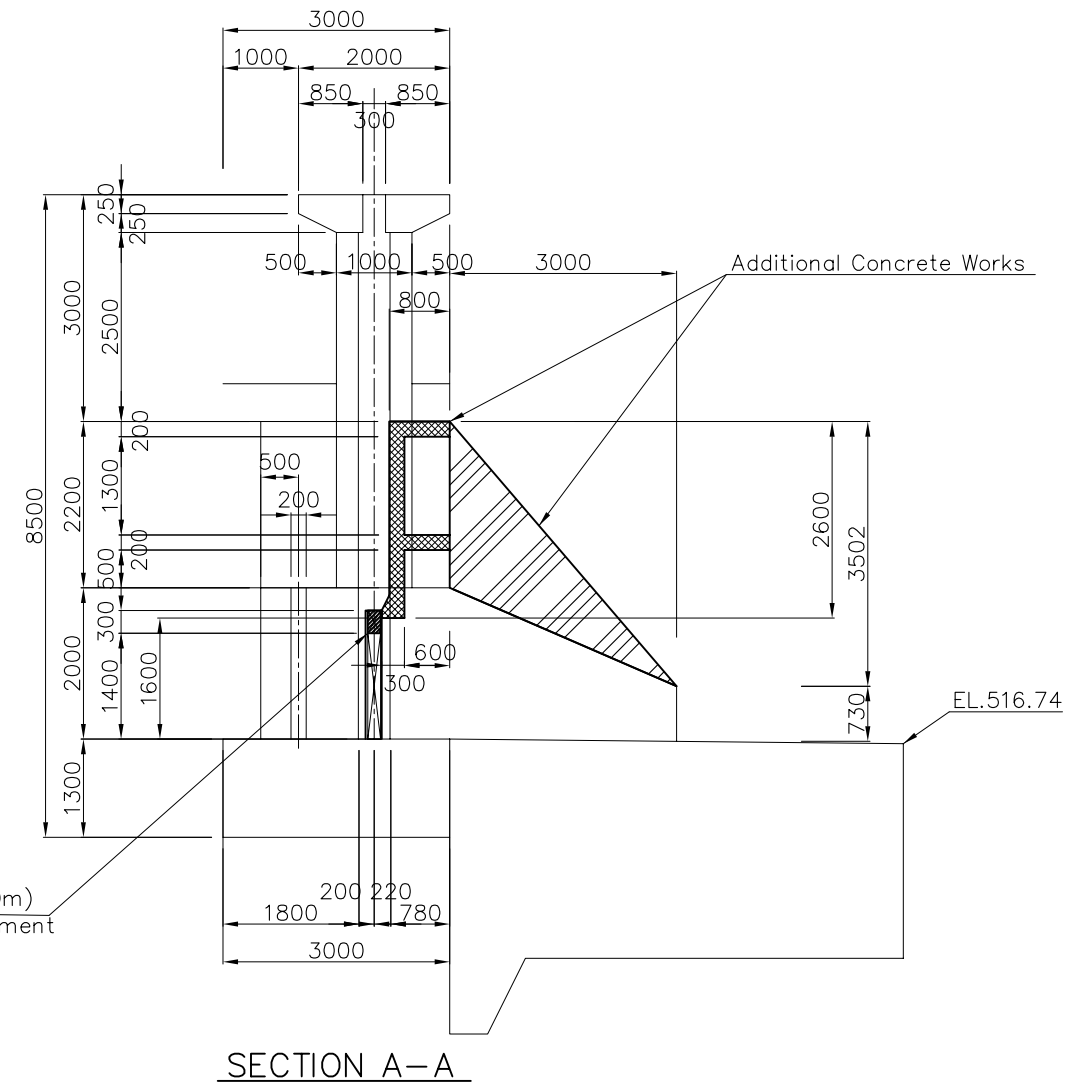
SECTION H-H



THE REPUBLIC OF MALAWI	
THE PROJECT FOR REHABILITATION OF BWANJE VALLEY IRRIGATION SYSTEM	
TITLE OF DRAWING	
SECTION (4/4)	
DRAWING NO.	HW-07
NIPPON KOEI CO., LTD.	

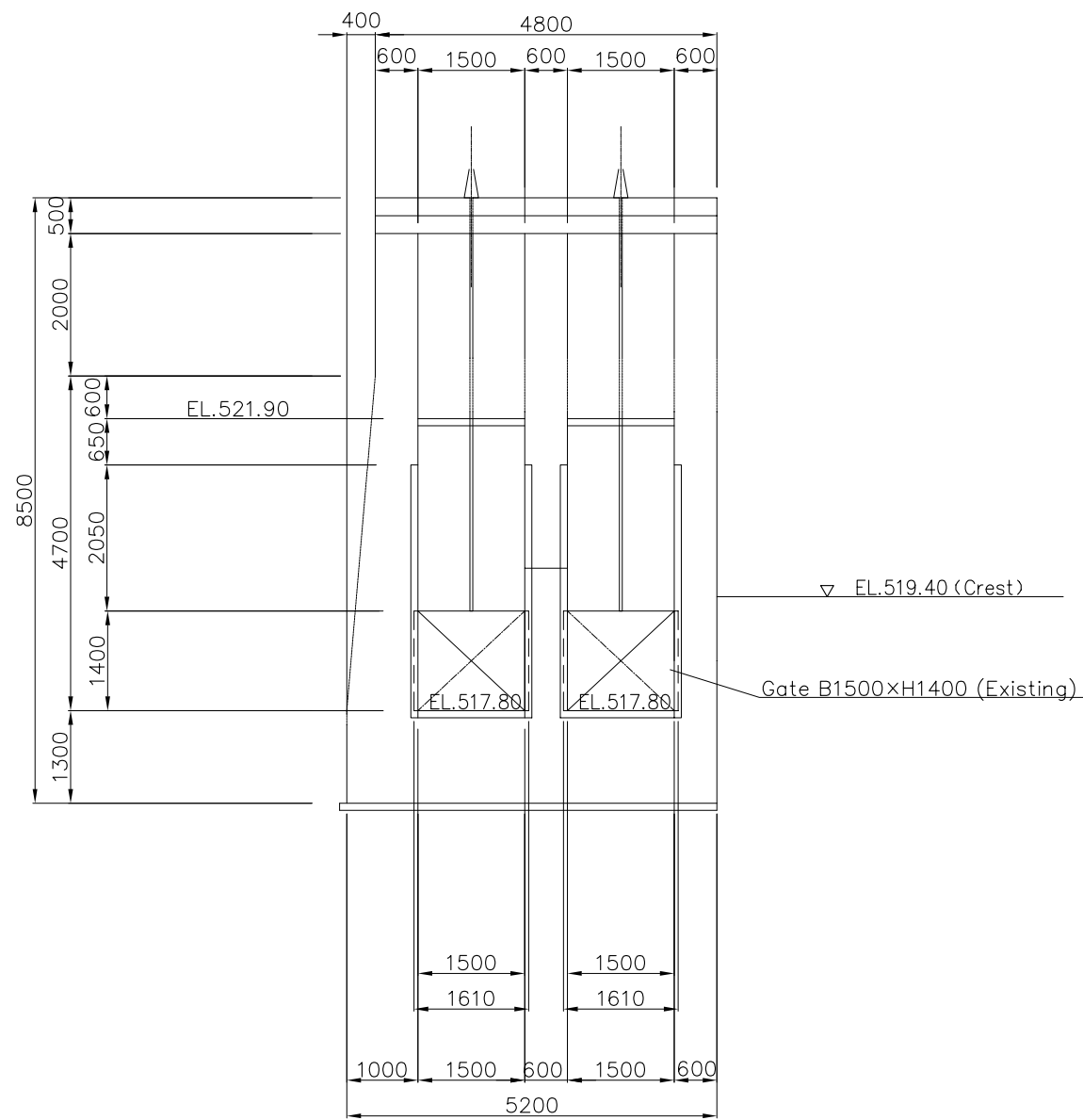


Heightening of Gate (h=0.30m)
B1500xH1700 after improvement



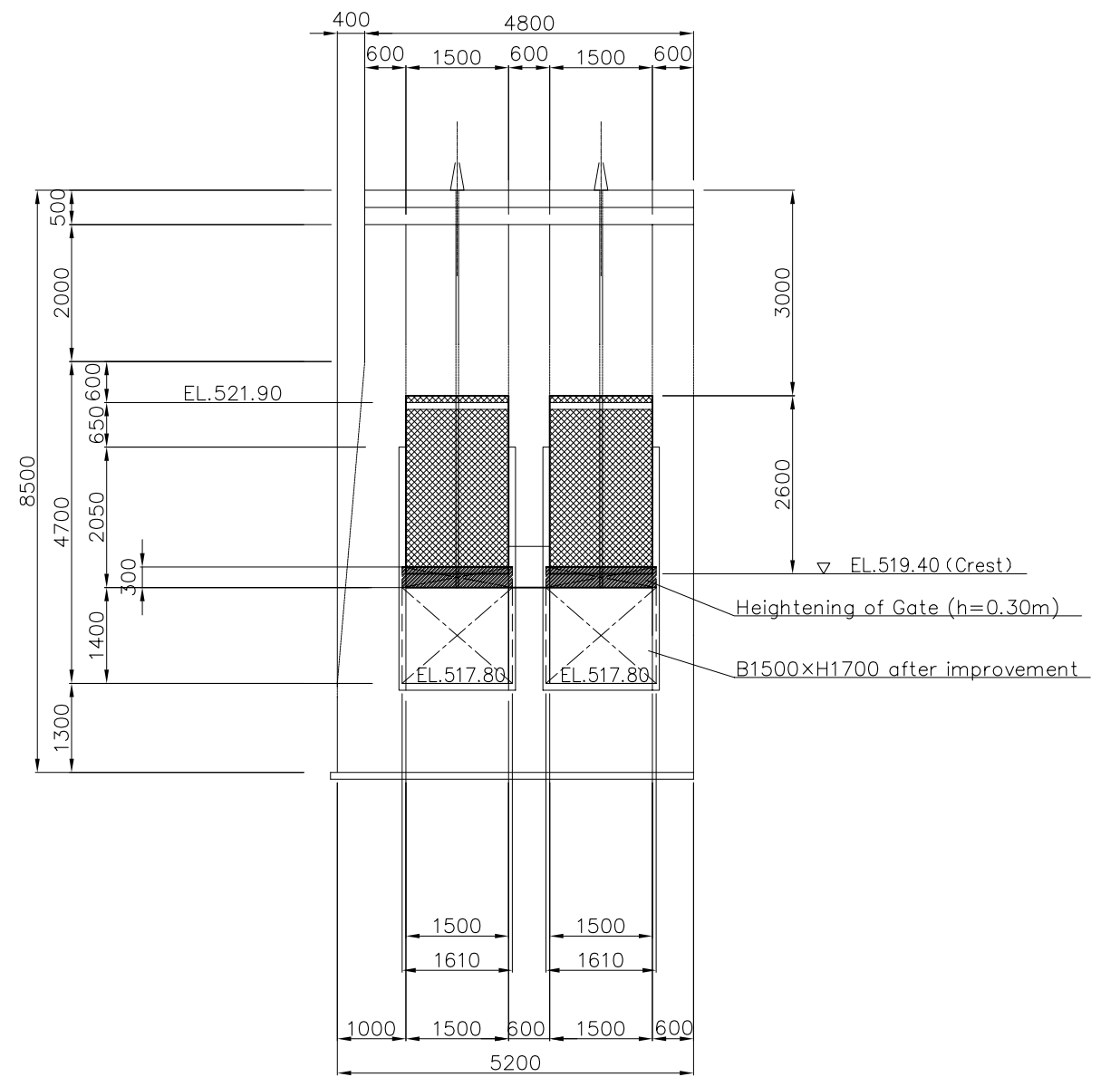
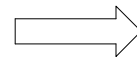
SCALE 0 2.0 4.0m
S = 1 : 100

THE REPUBLIC OF MALAWI	
THE PROJECT FOR REHABILITATION OF BWANJE VALLEY IRRIGATION SYSTEM	
TITLE OF DRAWING REHABILITATION OF GATE PART OF SLUICE WAY (1/2)	
DRAWING NO.	HW-08
NIPPON KOEI CO., LTD.	



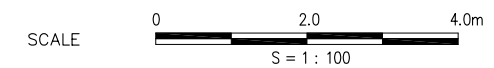
SECTION B-B

EXISTING STRUCTURE

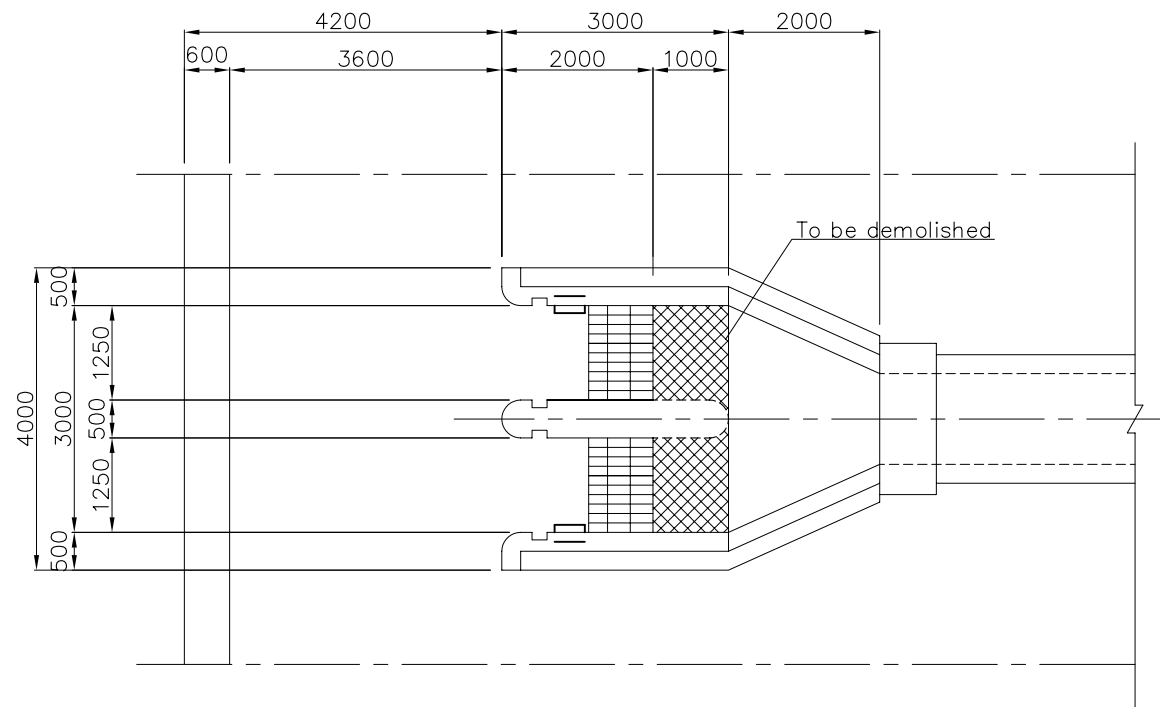


SECTION B-B

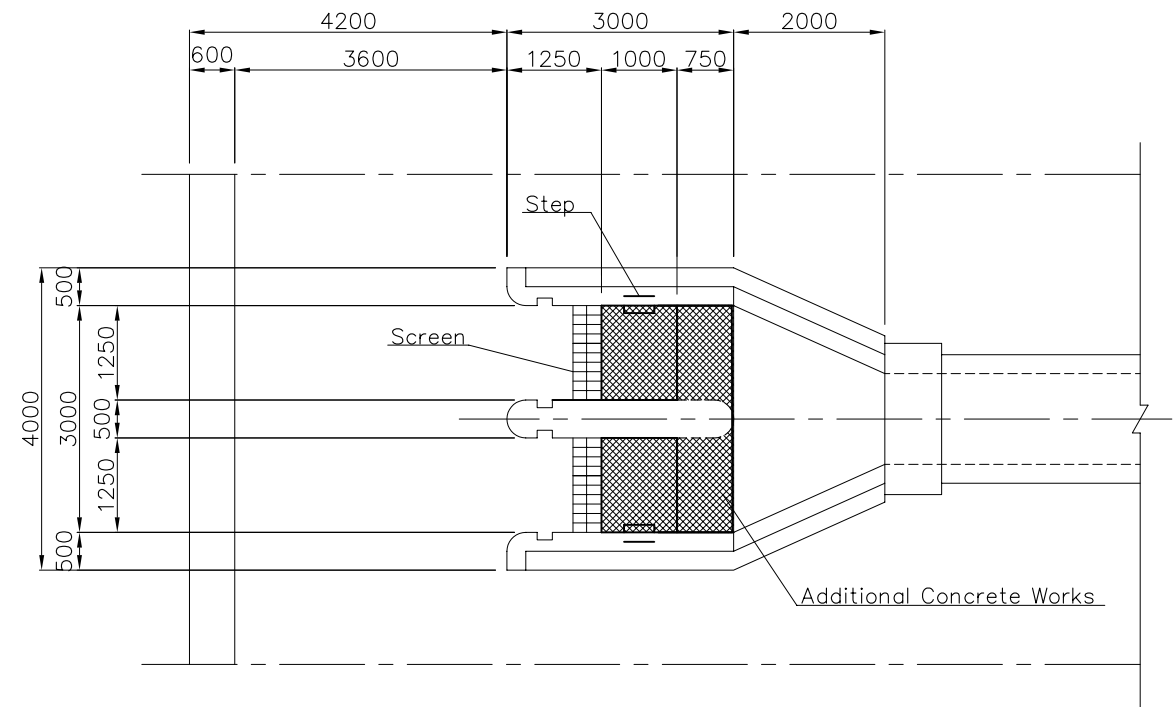
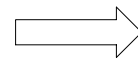
IMPROVEMENT PLAN



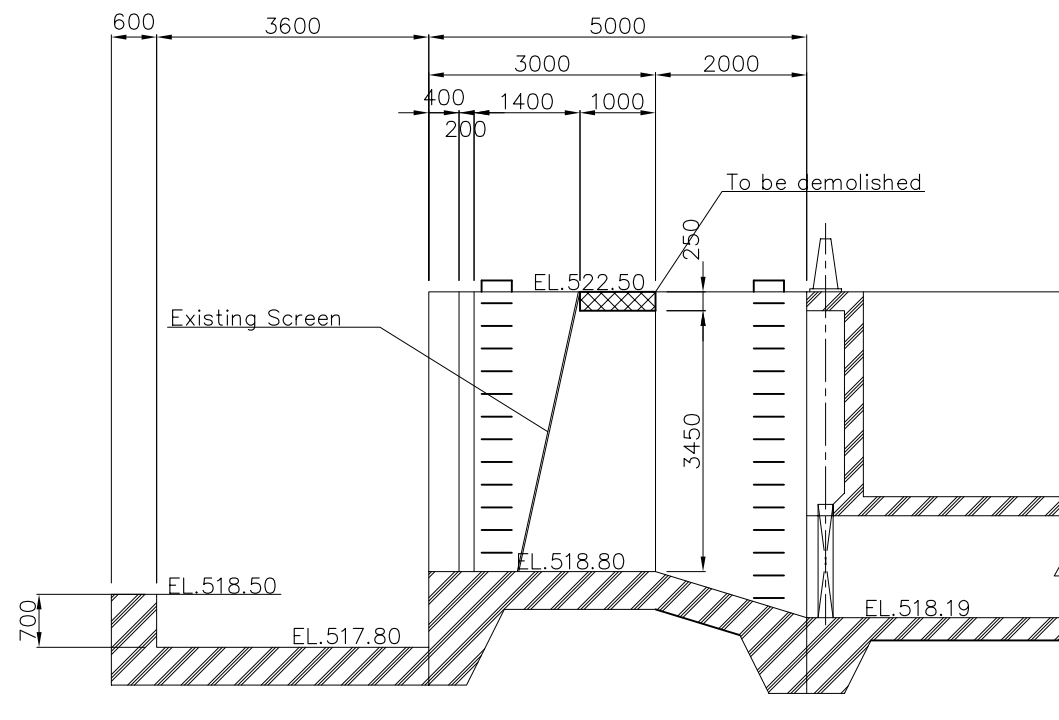
THE REPUBLIC OF MALAWI	
THE PROJECT FOR REHABILITATION OF BWANJE VALLEY IRRIGATION SYSTEM	
TITLE OF DRAWING REHABILITATION OF GATE PART OF SLUICE WAY (2/2)	
DRAWING NO.	HW-09
NIPPON KOEI CO., LTD.	



PLAN

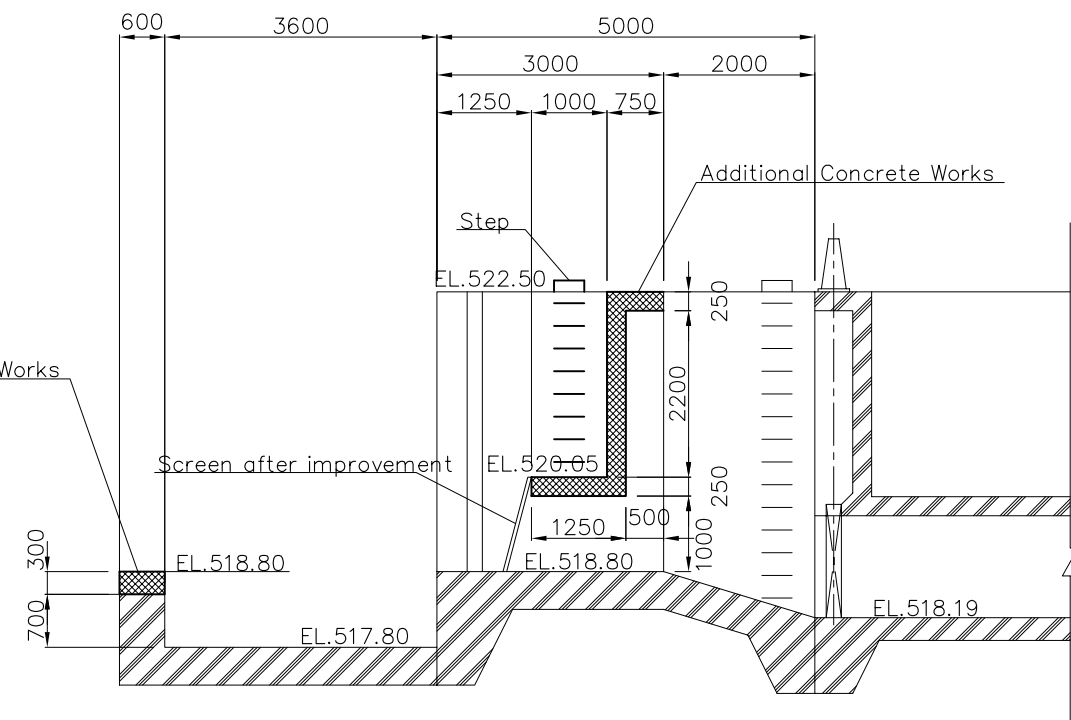
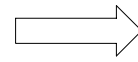


PLAN



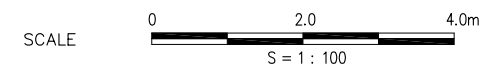
PROFILE

EXISTING STRUCTURE

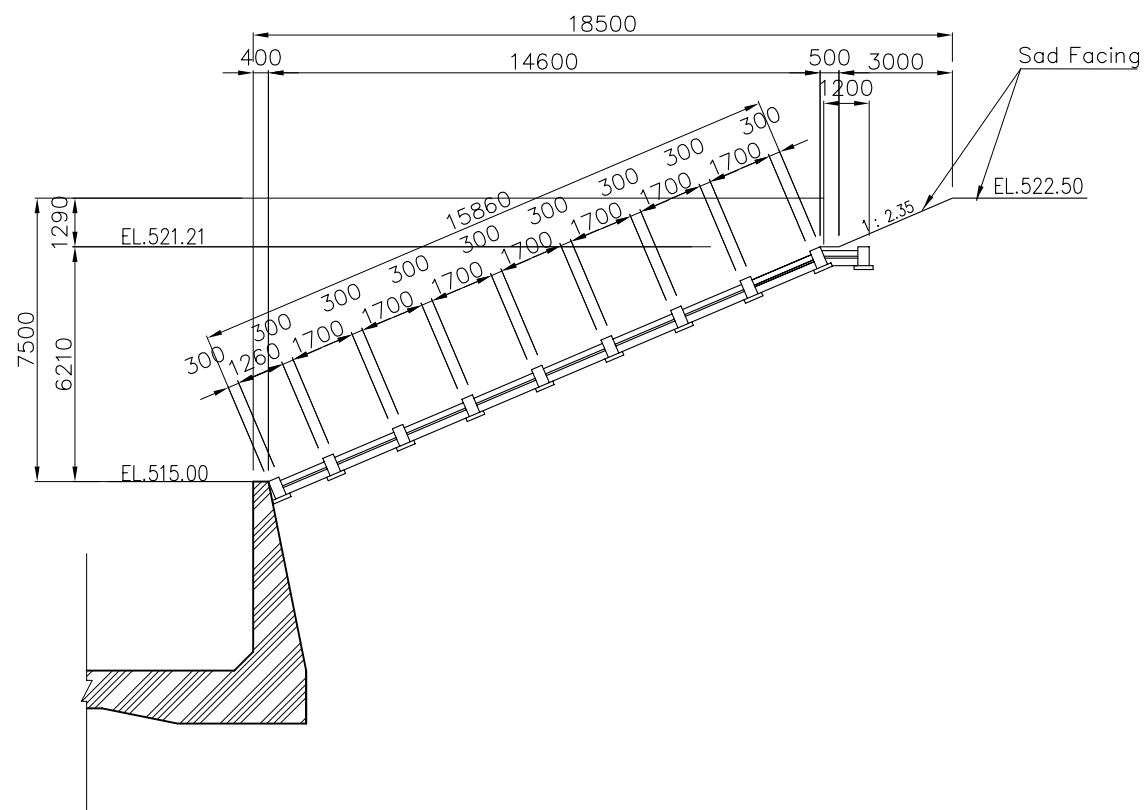


PROFILE

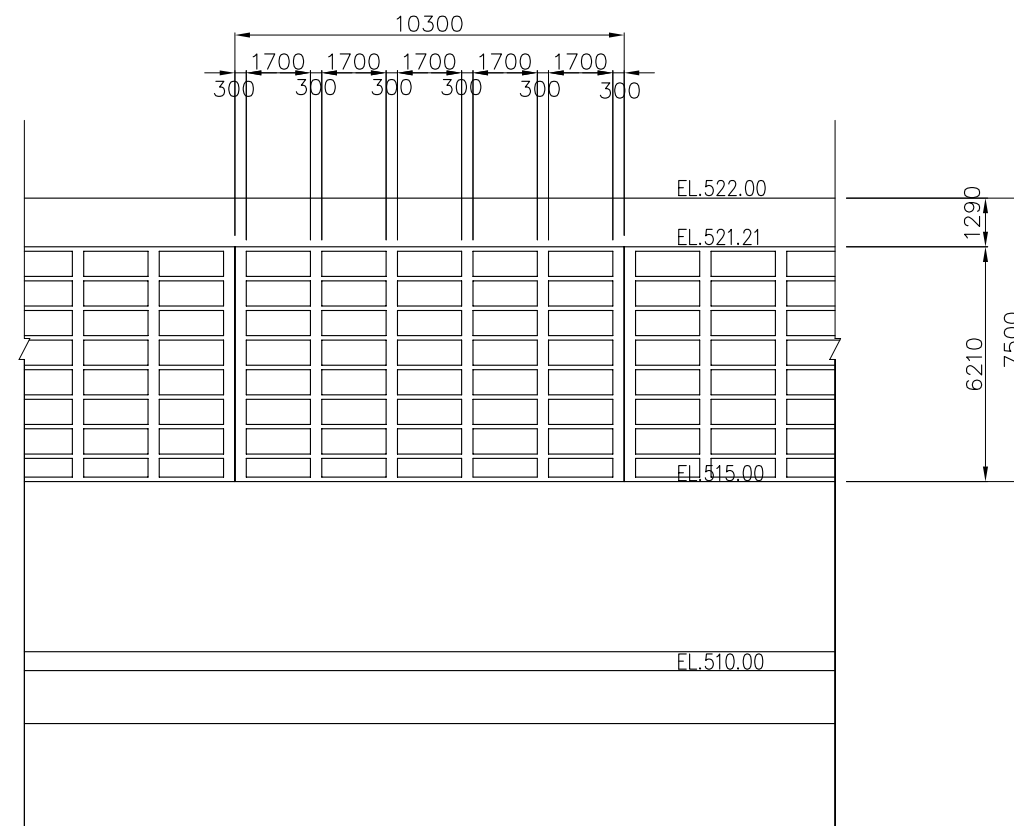
IMPROVEMENT PLAN



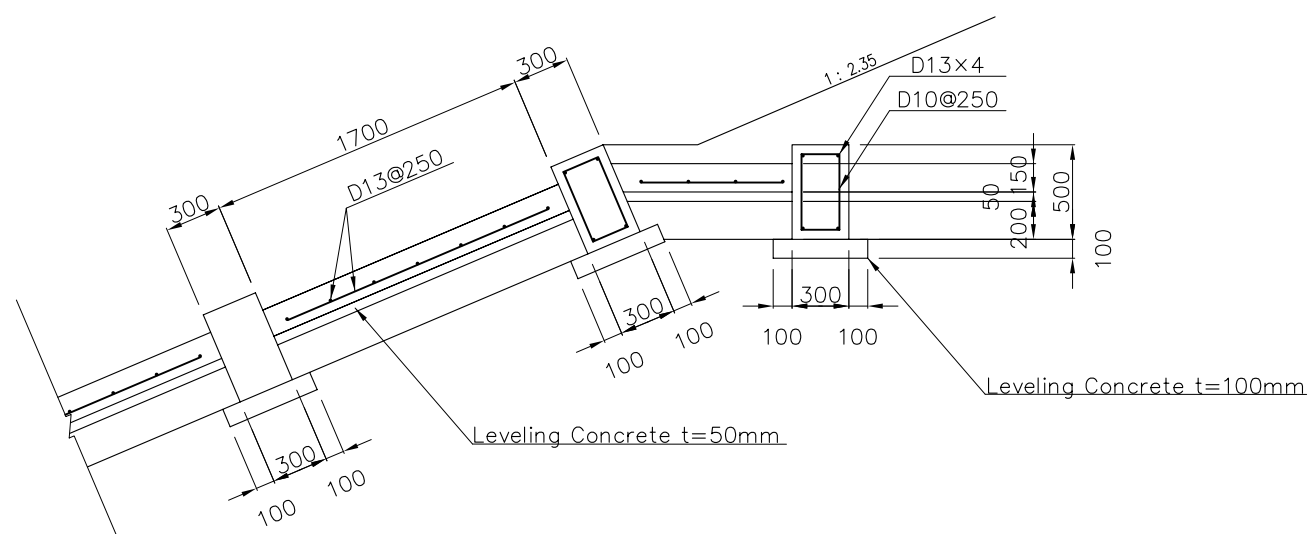
THE REPUBLIC OF MALAWI	
THE PROJECT FOR REHABILITATION OF BWANJE VALLEY IRRIGATION SYSTEM	
TITLE OF DRAWING REHABILITATION OF INTAKE STRUCTURE	
DRAWING NO.	HW-10
NIPPON KOEI CO., LTD.	



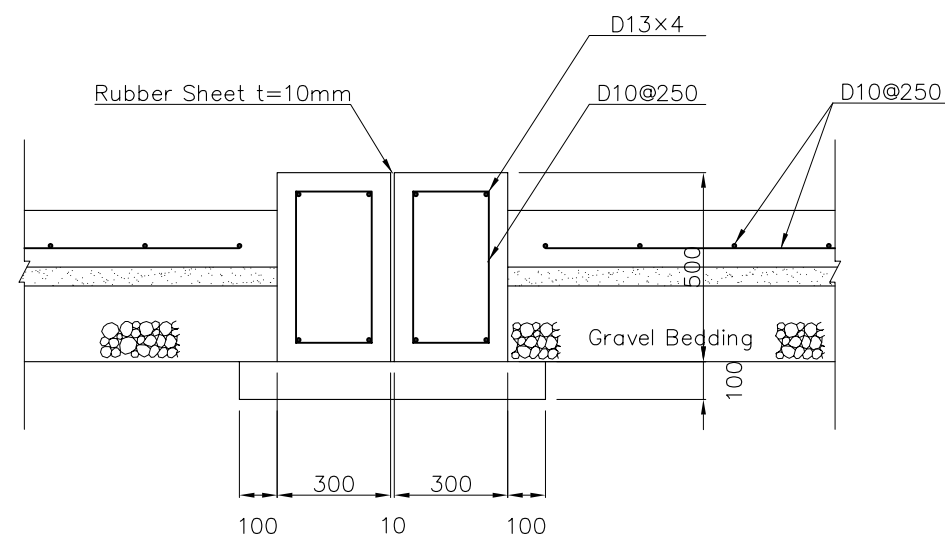
TYPICAL CROSS SECTION SCALE A



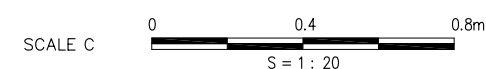
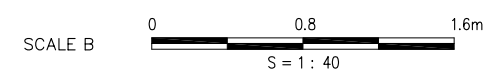
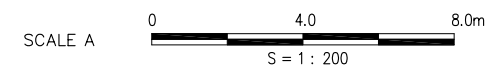
SECTION A-A SCALE A



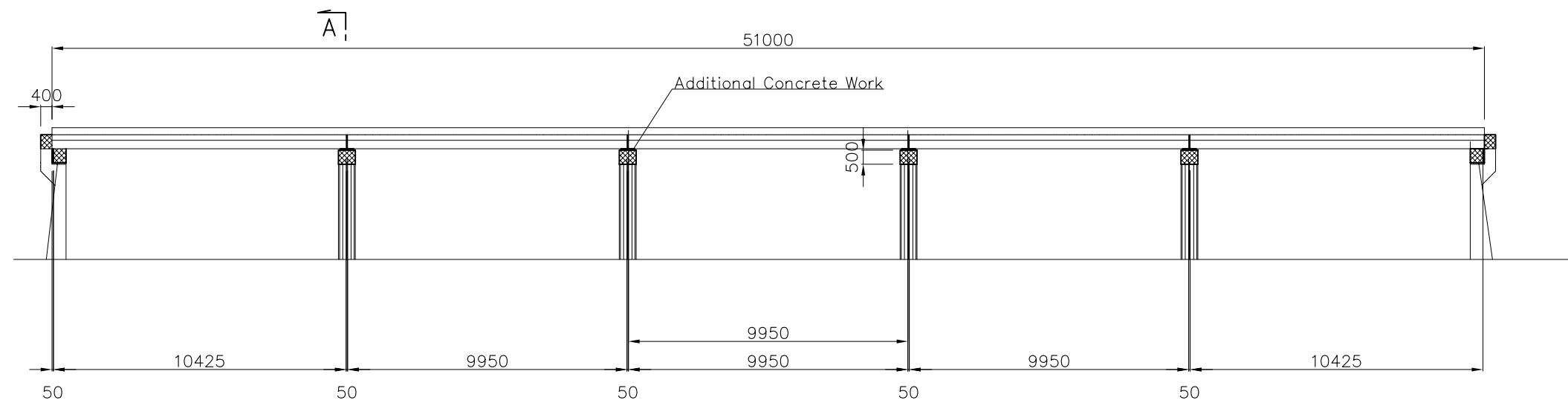
DETAIL OF FRAME SCALE B



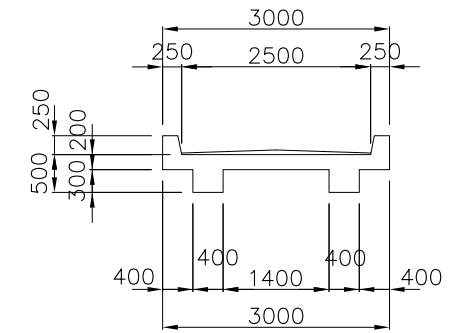
DETAIL OF CONTRACTION JOINT SCALE C



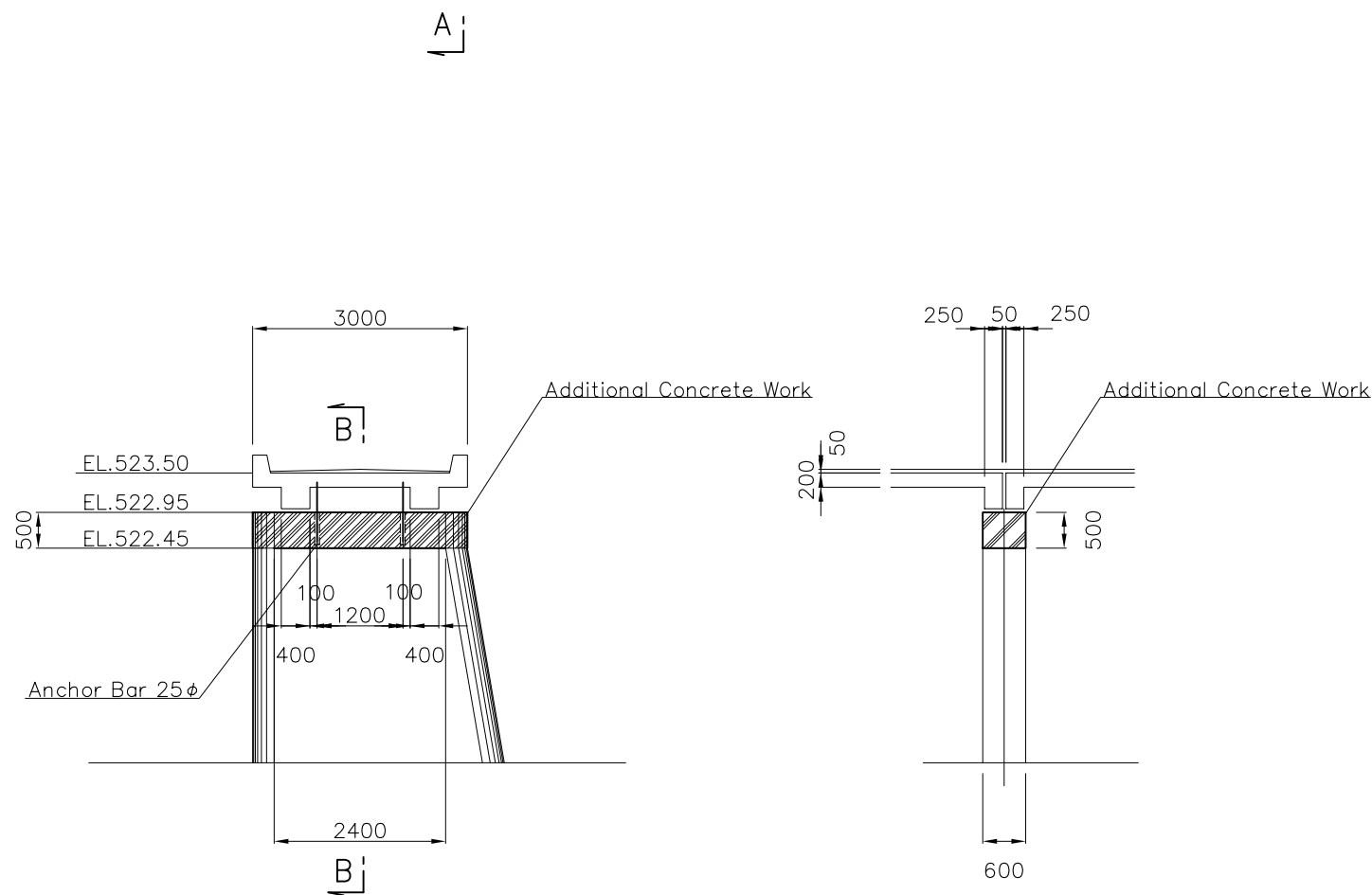
THE REPUBLIC OF MALAWI	
THE PROJECT FOR REHABILITATION OF BWANJE VALLEY IRRIGATION SYSTEM	
TITLE OF DRAWING	
CONCRETE FRAME REVETMENT	
DRAWING NO.	HW-11
NIPPON KOEI CO., LTD.	



SIDE ELEVATION SCALE A

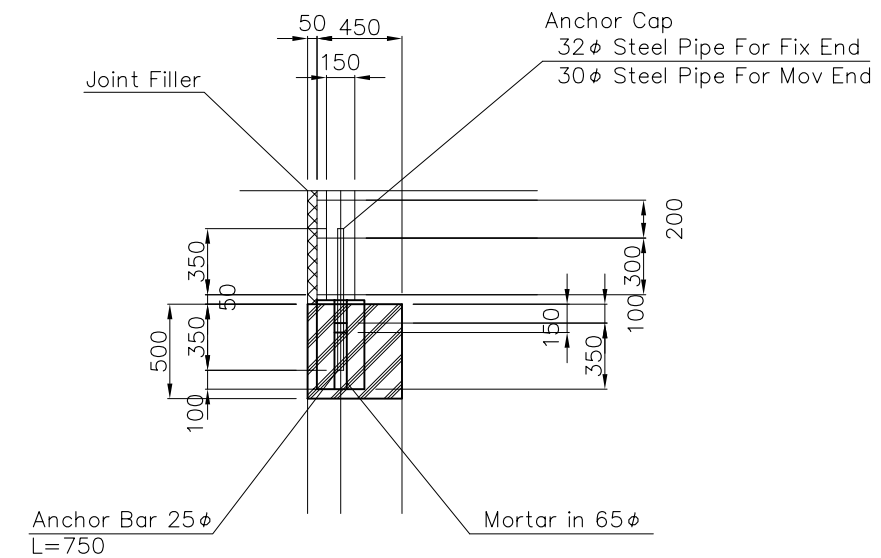


TYPICAL SECTION SCALE B

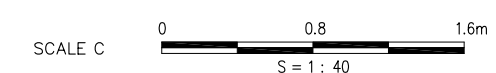
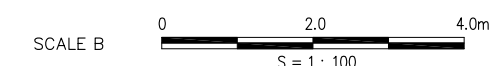
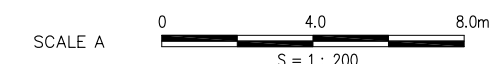


SECTION A-A SCALE B

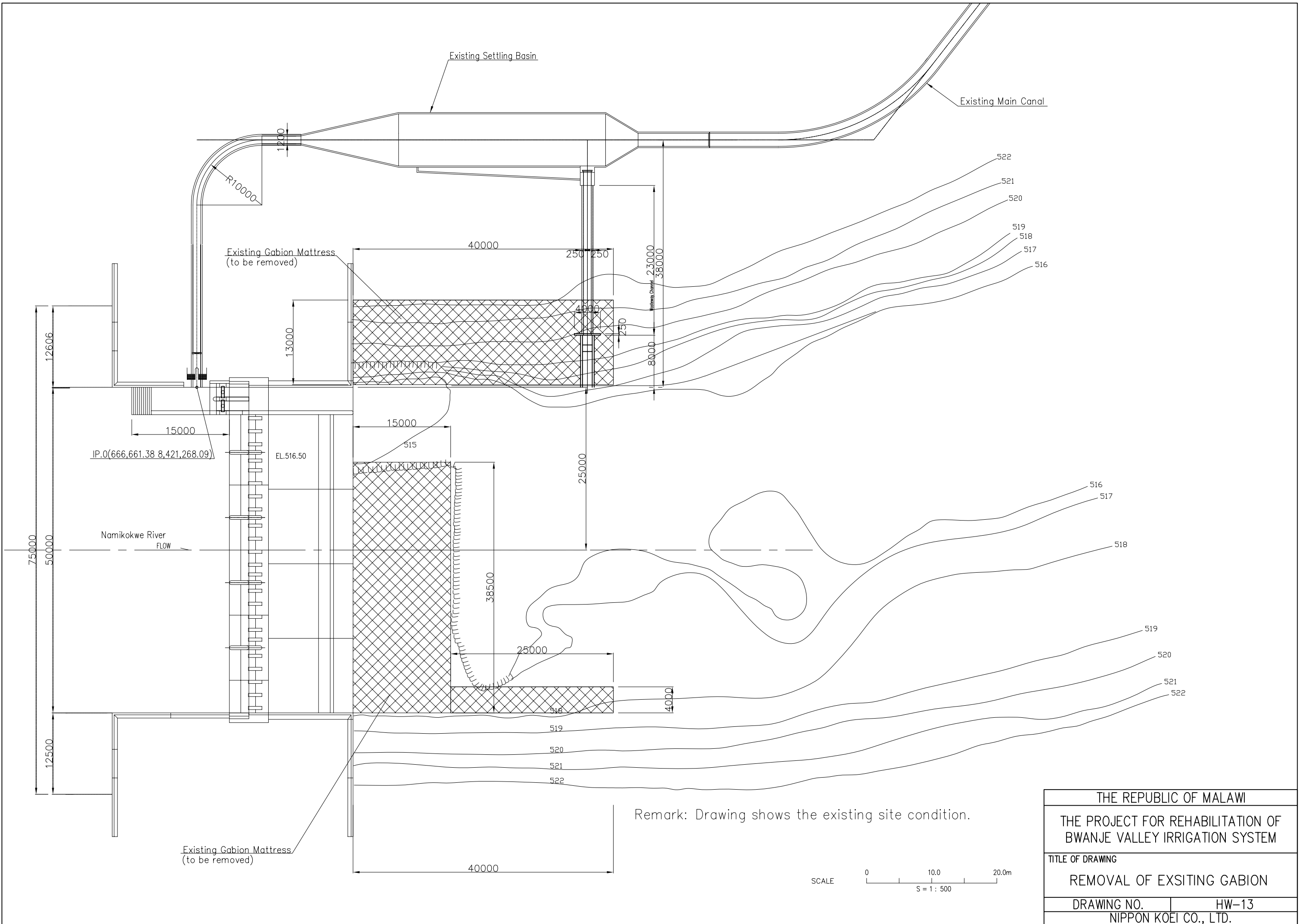
SECTION B-B SCALE B



DETAIL "A" SCALE C



THE REPUBLIC OF MALAWI	
THE PROJECT FOR REHABILITATION OF BWANJE VALLEY IRRIGATION SYSTEM	
TITLE OF DRAWING	
OPERATION BRIDGE	
DRAWING NO.	HW-12
NIPPON KOEI CO., LTD.	



THE REPUBLIC OF MALAWI	
THE PROJECT FOR REHABILITATION OF BWANJE VALLEY IRRIGATION SYSTEM	
TITLE OF DRAWING	
REMOVAL OF EXSITING GABION	
DRAWING NO.	HW-13
NIPPON KOEI CO., LTD.	