



Ministry of Transport and Communications



Directorate of Water Resources and Improvement of River Systems

**Case Study
Of
Bo Myat Tun Bridge Waterway Improvement**

14 March , 2017

MICC II, Nay Pyi Taw

Content

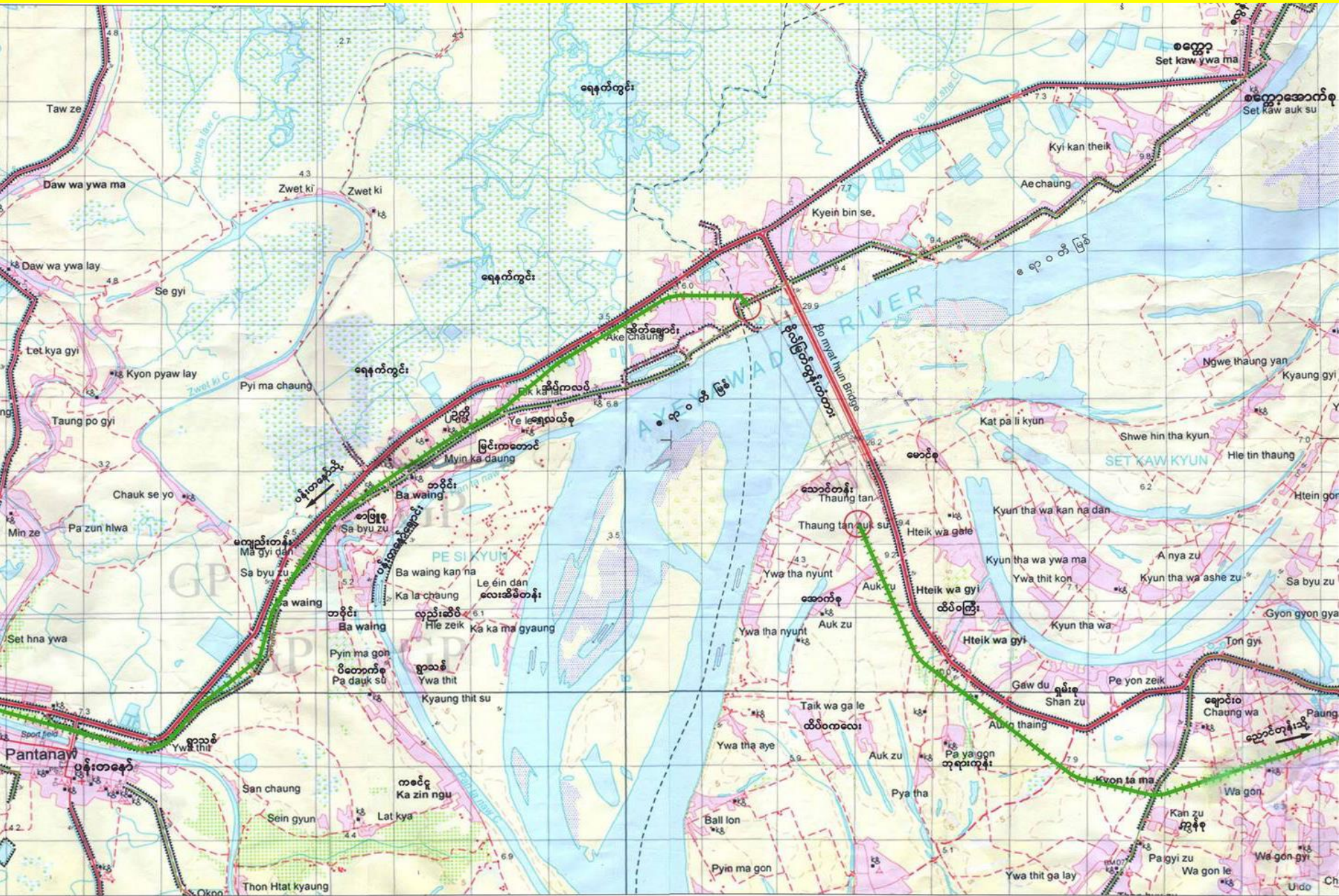
- **Overview of Bo Myat Tun Bridge Waterway**
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Objectives of DWIR



- to improve the navigation channel and to stabilize the inland river ports.
- to protect the river banks erosion.
- to cooperate with other organizations in demarcation of danger water level of the towns.
- to utilize the river water for domestic and agriculture all the year round.
- to protect bank erosion of border rivers.
- to observe the long term existence of the cross river bridges by river engineering point of views.
- to manage the prevention of the river water pollution.
- to achieve adequate depth for maximum loading capacity of the vessels.

Location of Bo Myat Tun Bridge Waterway



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Scale 1:25000

Bo Myat Tun Bridge



Opened Date - November , 1999

Length - 8544 ft

Total Pier – 17 nos

Waterway Map (1989)



Before construction of Bo Myat Tun Bridge, water depth near Kyein Pin Sal Village is about 2 to 4 meters.

After constructing of Bo Myat Tun Bridge, there are some erosion and land sliding problems along the bank of Kyein Pin Sal Village and near pier no.17.



Causes of Erosion

- According to the meandering of river, Sat-Kot Waterway became shallow and more water are flowing into Nyaung-Done Waterway.

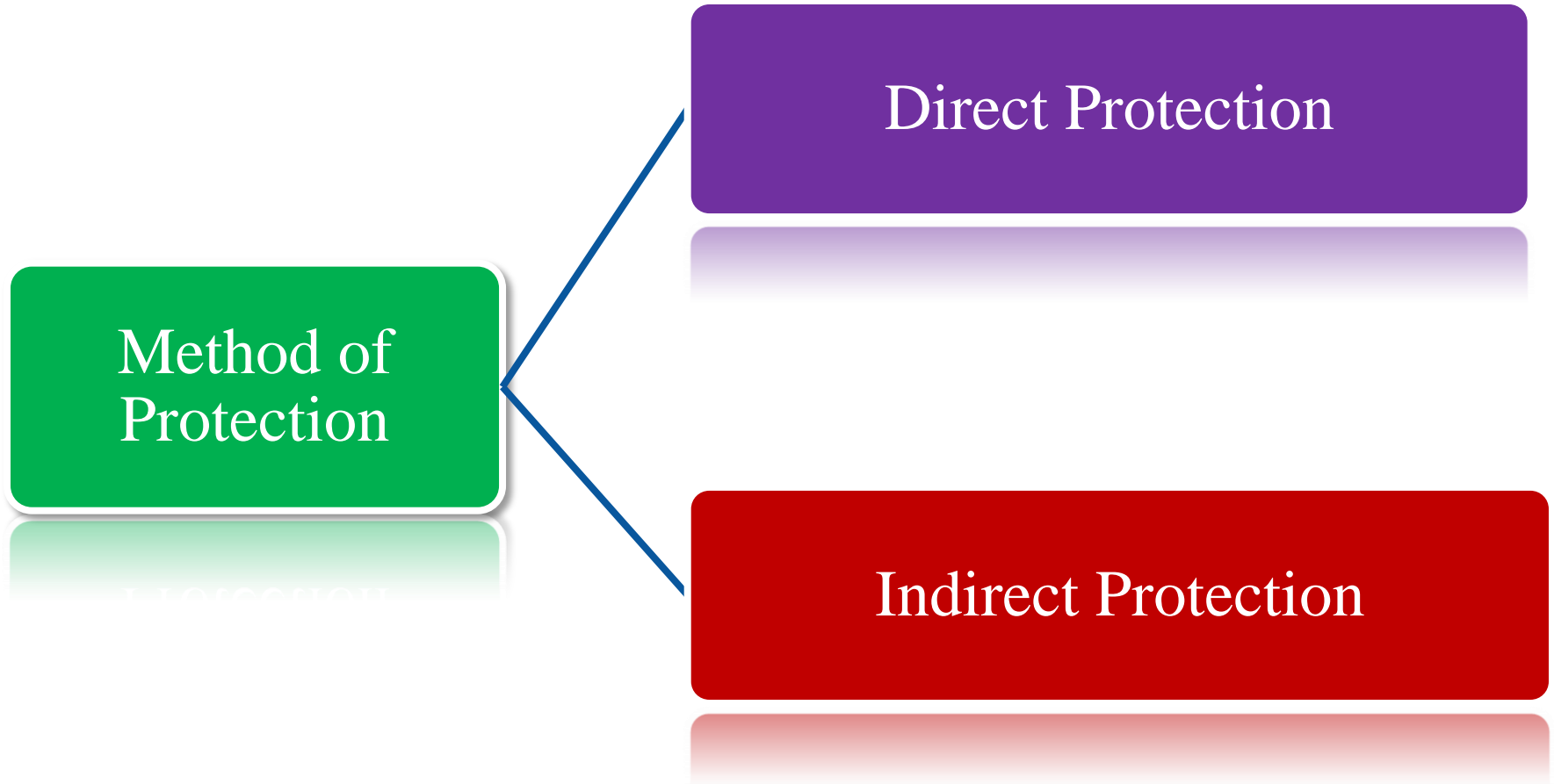
In consequence, the flow is leading directly to Kyein-Pin-Sal bank which causes deep whirls and reverse whirls

- While constructing the bridge, placing machines and materials on the river side caused changing direction of river flow as this acts as deflectors

As a result, the flow direction is changed to Kyein-Pin-Sal Bank and water depth became deeper.

- Because of Sandy Clay Soil
- Because of flood plain and Seepage

What are the solutions?



Method of
Protection

Direct Protection

Indirect Protection

Direct Protection works (1997 to 2009)

Year	Type of Work	Amount of Work
1997-1998	Stone Pitching Retaining Wall based with R.C piles	300 ft
2002-2003	Sand Filling in Flood Plain & semi-circle shaped bank	120000 cu-ft
2003-2004	Retaining Wall based with bored piles	800 ft
	Stone Pitching Retaining Wall based with palm posts.	1850 ft
2004-2005	Stone Pitching Retaining Wall based with bored piles	407 ft
	Stone Pitching Revetment based with palm posts and stone gabions.	500 ft
	Placing of Reno Mattress (2m x 2m x 0.3m)	1150 nos
	Placing of Steel Basket (15' x 10' x 3')	43 nos
	Placing of Stone Gabion (5' x 5' x 1.5')	2280 nos
	Placing of Sand Mattress (15' x 12')	612 nos
	Placing of Baffle Pier (13' x 3' x 2')	68 nos
2005-2006	Stone Pitching Retaining Wall with steel baskets	500 ft
2006-2007	Bamboo Grid for Bed Protection	6050 sq-ft

Direct Protection Works

2003



2003



2004



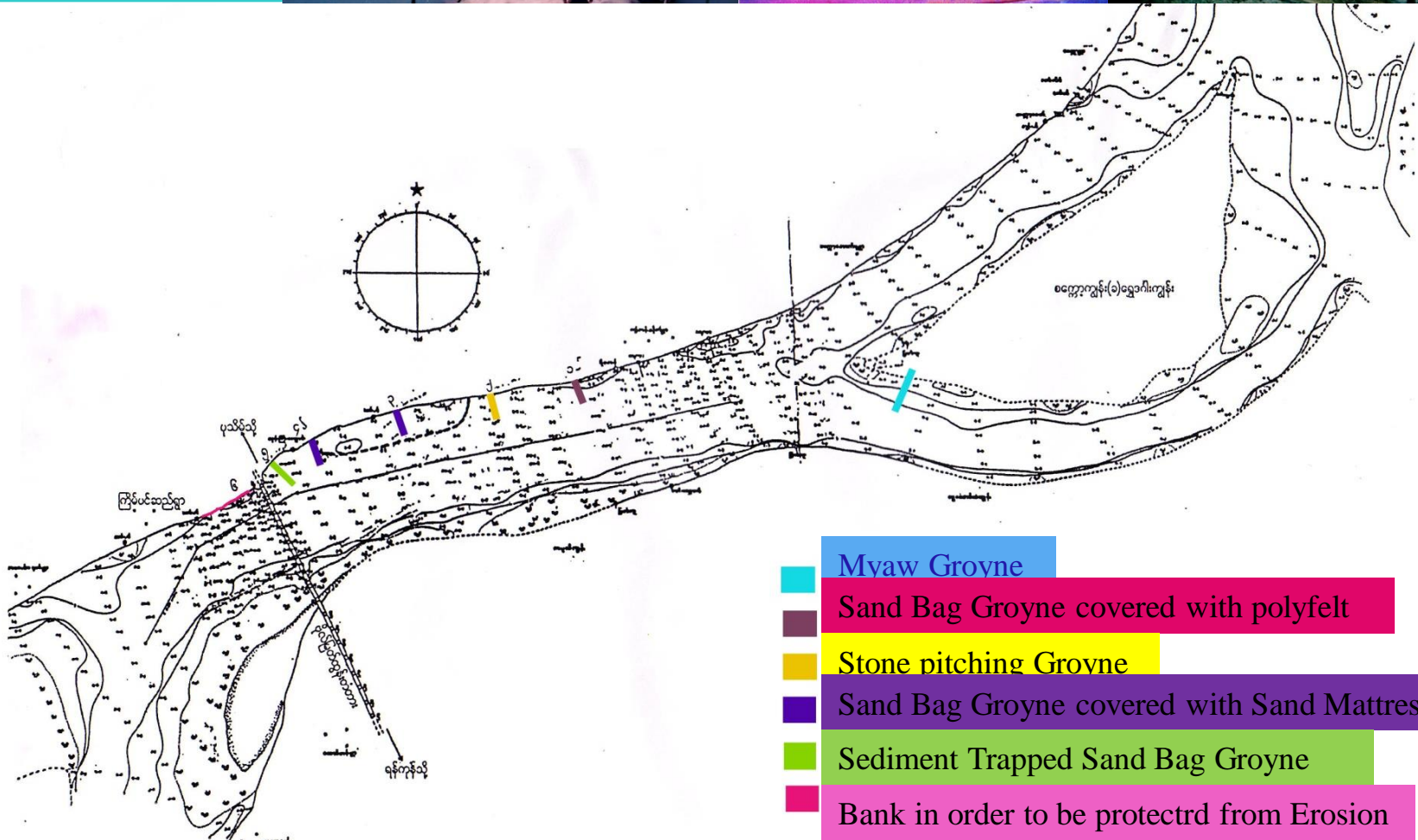
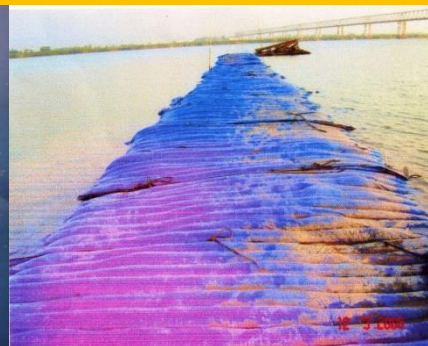
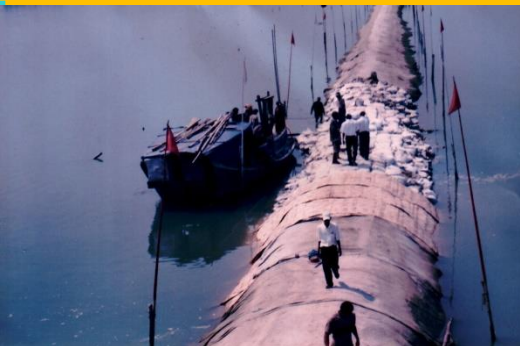
2005



Indirect Protection works (1997 to 2009)

Year	Type of Work	Amount of Work
1997-1998	Floating Structure	20 nos
	Dredging in Set-kot Waterway	L/S
2002-2003	Sand Bag Groyne covered with polyfelt	500 ft
2004-2005	Myaw post Groyne	2310 ft
	Dredging in front of pier 12 & pier 13	1350 ft
	Steel Cable Groyne	1850 ft
2005-2006	Myaw post Groyne	660 ft
	Stone pitching Groyne	650 ft
	Sand Bag Groyne	650 ft
	Sediment Trapped Sand Bag Groyne	300 ft
	Maintaining Steel Cable Groyne	500 ft
	Bamboo post Groyne	500 ft
	Dredging	568 m
2007-2008	Sand Bag Groyne covered with Sand Mattress	670 ft
2008-2009	Sand Bag Groyne covered with Sand Mattress	300 ft

Indirect Protection works



Comparison of River Bed Condition (1997 to 2009)

Ayeyarwady River

Bo Myat Tun Bridge (Nyaung Done)

River Bed Condition at the base of Piers

1997, Jan ()

2003, Dec ()

2006, Jan ()

2009, March ()

99.5m

120m

120m

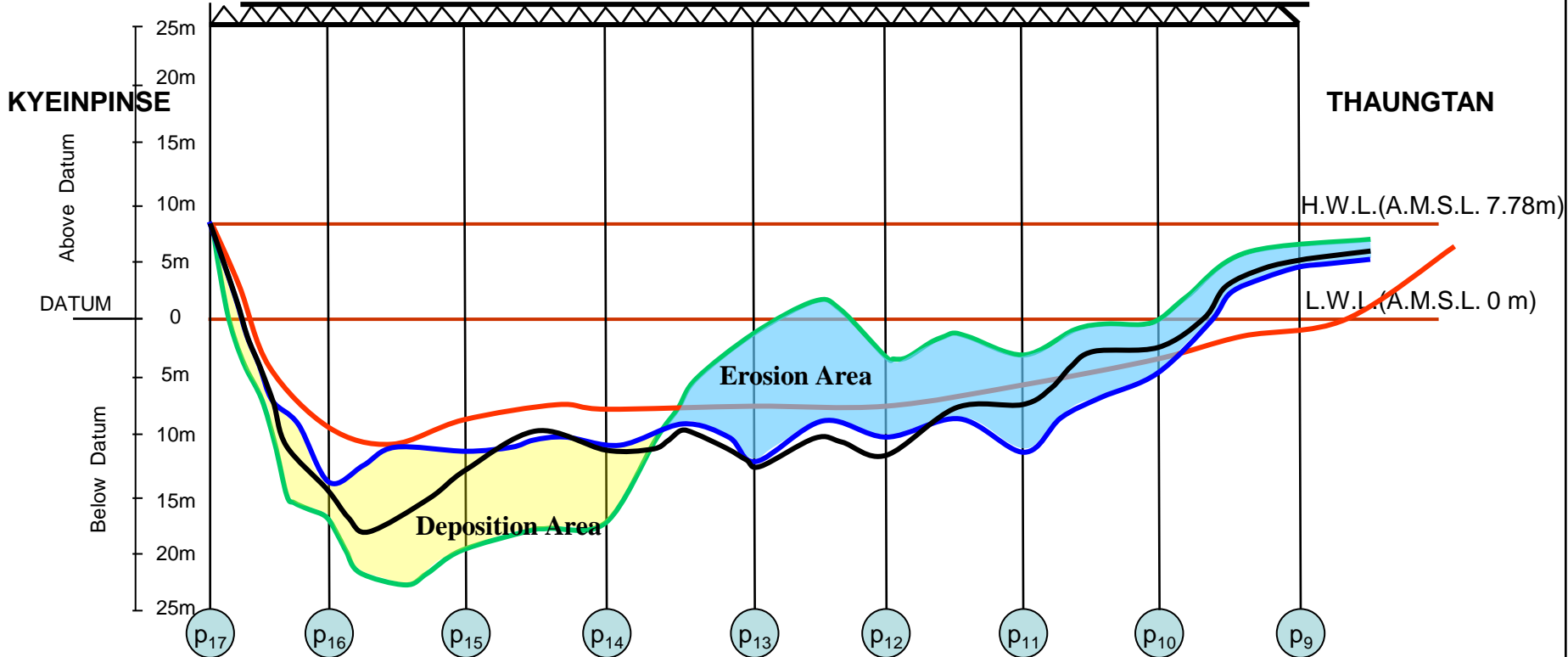
120m

120m

120m

120m

120m



tvsm;vdkufpau; 1 ; 5000

a'gifvdkufpau; 1 ; 500

Flow Rate between Piers

ရက်စွဲ	17/16	16/15	15/14	14/13	13/12	12/11	11/10
26.7.05 (5.6m)	1.56m/s	1.89m/s	1.83m/s	1.9m/s	1.72m/s	1.43m/s	1.23m/s
21.8.05 (6.44m)	1.2m/s	2.3m/s	2.27m/s	1.99m/s	1.99m/s	1.89m/s	1.4m/s
27.7.06 (6.3m)	1.07m/s	1.96m/s	1.9m/s	2.0m/s	2.56m/s	1.92m/s	1.39m/s
8.8.06 (6.0m)	1.0m/s	1.77m/s	1.86m/s	1.7m/s	2.58m/s	1.79m/s	1.35m/s
28.8.07 (6.6m)	1.28m/s	1.6m/s	1.85m/s	1.95m/s	2.26m/s	2.41m/s	1.74m/s
12.9.07 (7.0m)	1.23m/s	1.54m/s	1.8m/s	1.92m/s	2.15m/s	2.21m/s	1.7m/s
8.9.09 (6.75m)	1.0m/s	1.66m/s	.92m/s	1.94m/s	2.15m/s	1.93m/s	1.84m/s

Another Challenge



**Ayeyarwady Bridge
(Nyaung Done)**



Constructed in 2011-2012

About 1.5 miles from upstream of the Bo Myat Tun Bridge

Satellite image overview of Ayeyarwady River Stretch near Bo Myat Tun Bridge (20.12.2011)



Satellite image overview of Ayeyarwady River Stretch near Bo Myat Tun Bridge (8.12.2013)



Satellite image overview of Ayeyarwady River Stretch near Bo Myat Tun Bridge (2.12.2014)



River Training Works (2014-2015)

Description

Dredging

Amount of Work

84338 cubic feet

203090 cubic feet

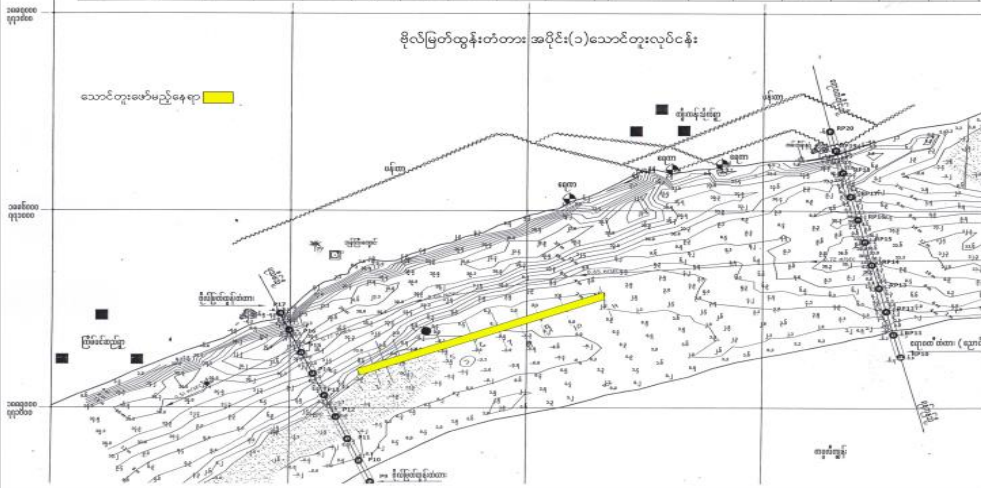


Before Dredging

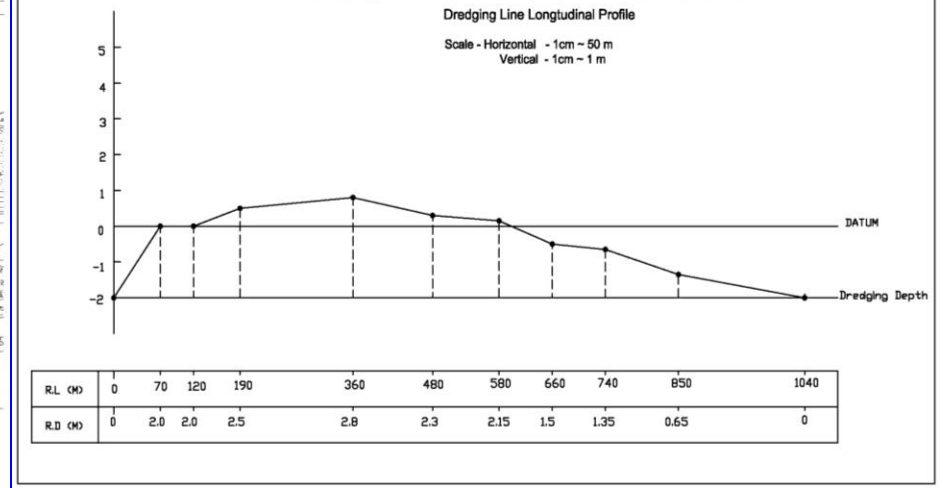


Google earth

အမှတ်	အမျိုးအမည်	ပမာဏ	အမျိုးအမည်	ပမာဏ
၁	ရေတံတိုင်း	၁၀၀	ရေတံတိုင်း	၁၀၀
၂	ရေတံတိုင်း	၁၀၀	ရေတံတိုင်း	၁၀၀
၃	ရေတံတိုင်း	၁၀၀	ရေတံတိုင်း	၁၀၀
၄	ရေတံတိုင်း	၁၀၀	ရေတံတိုင်း	၁၀၀
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၇	ရေတံတိုင်း	၁၀၀	ရေတံတိုင်း	၁၀၀
၈	ရေတံတိုင်း	၁၀၀	ရေတံတိုင်း	၁၀၀
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၁၀	ရေတံတိုင်း	၁၀၀	ရေတံတိုင်း	၁၀၀



အမှတ်	အမျိုးအမည်	ပမာဏ	အမျိုးအမည်	ပမာဏ
၁	ရေတံတိုင်း	၁၀၀	ရေတံတိုင်း	၁၀၀
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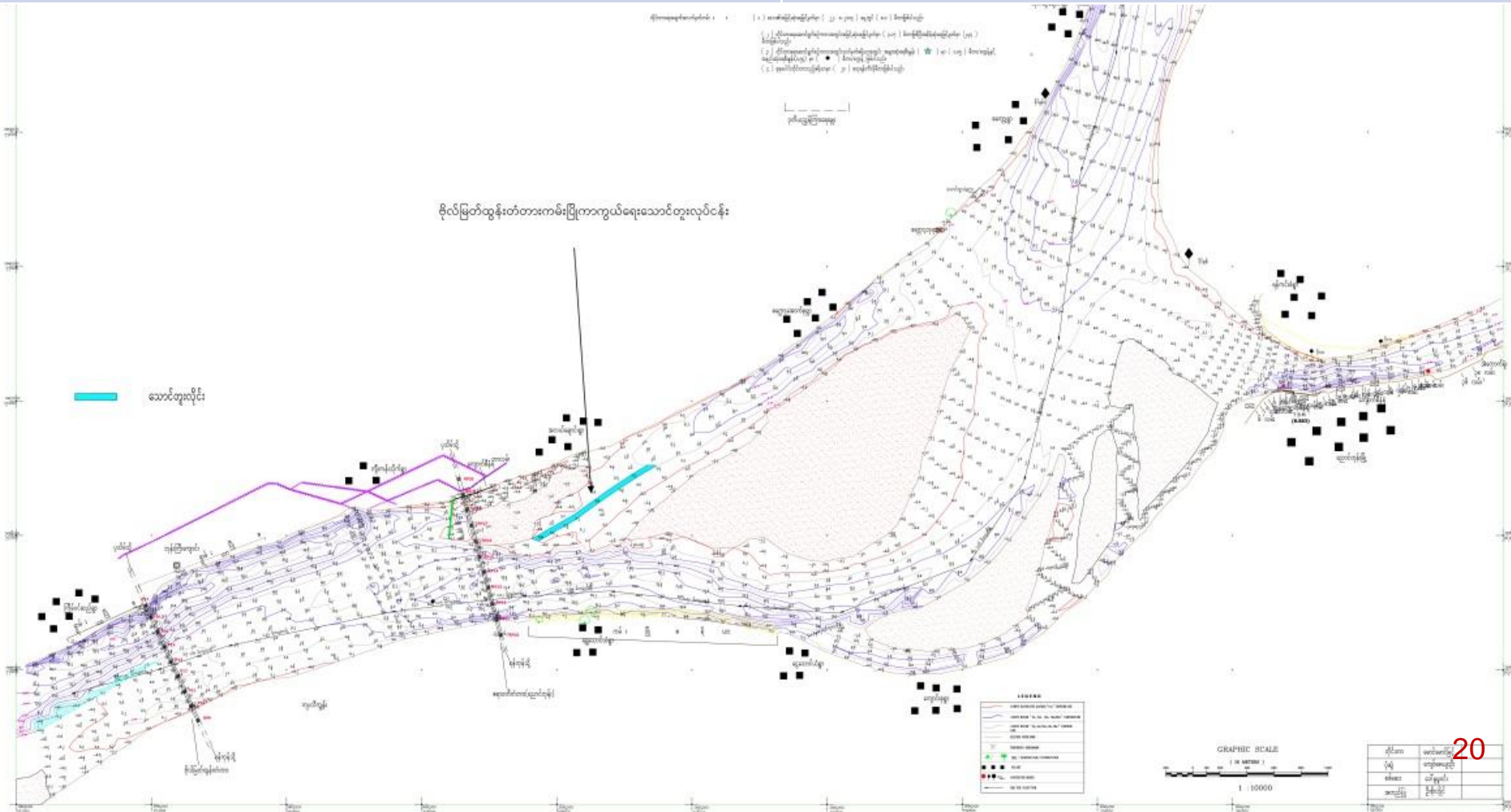
River Training Works (2015-2016)

Description

Dredging
Myaw Post groyne
Dredging

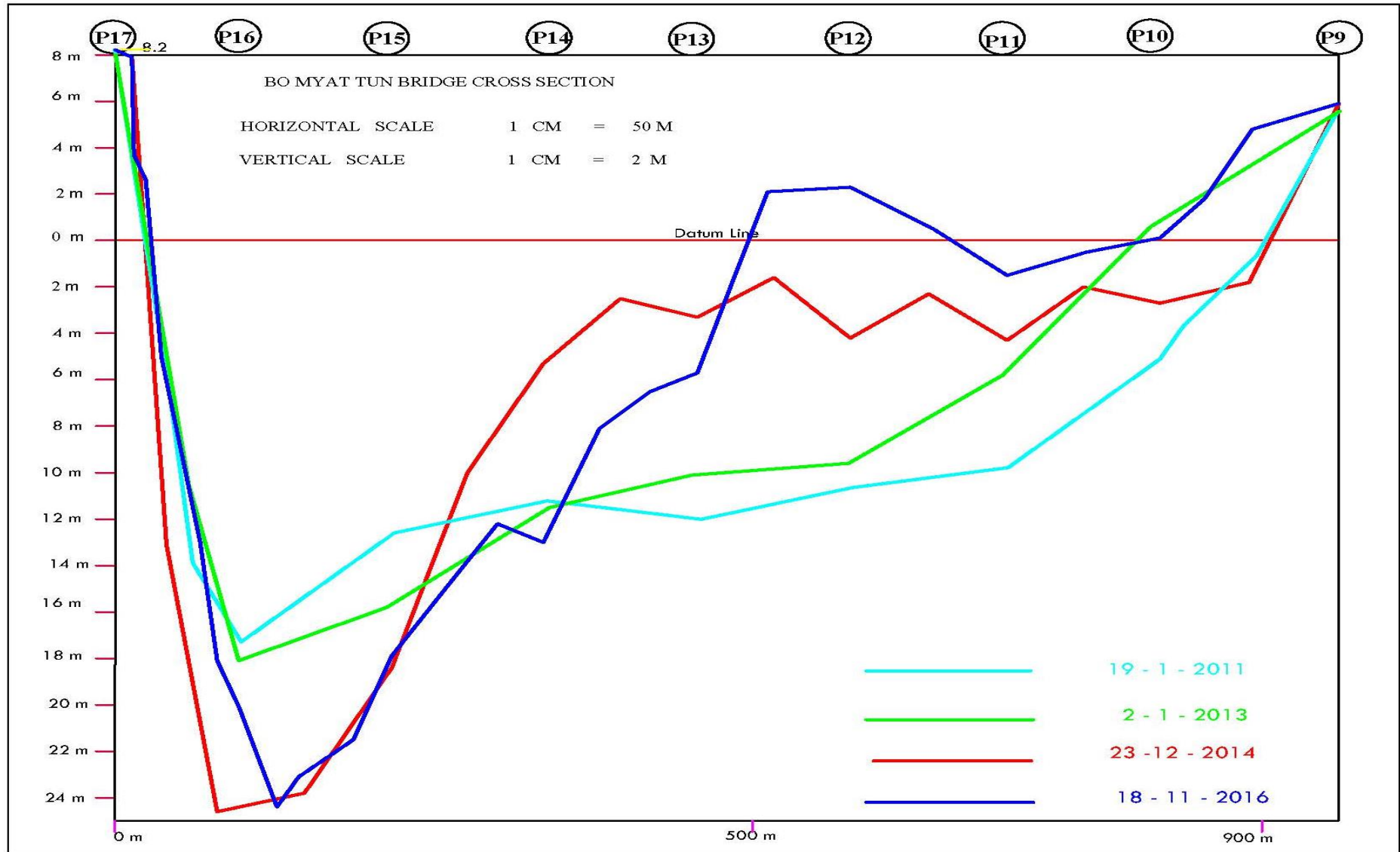
Amount of Work

126983 cubic feet
200 ft
120452 cubic feet



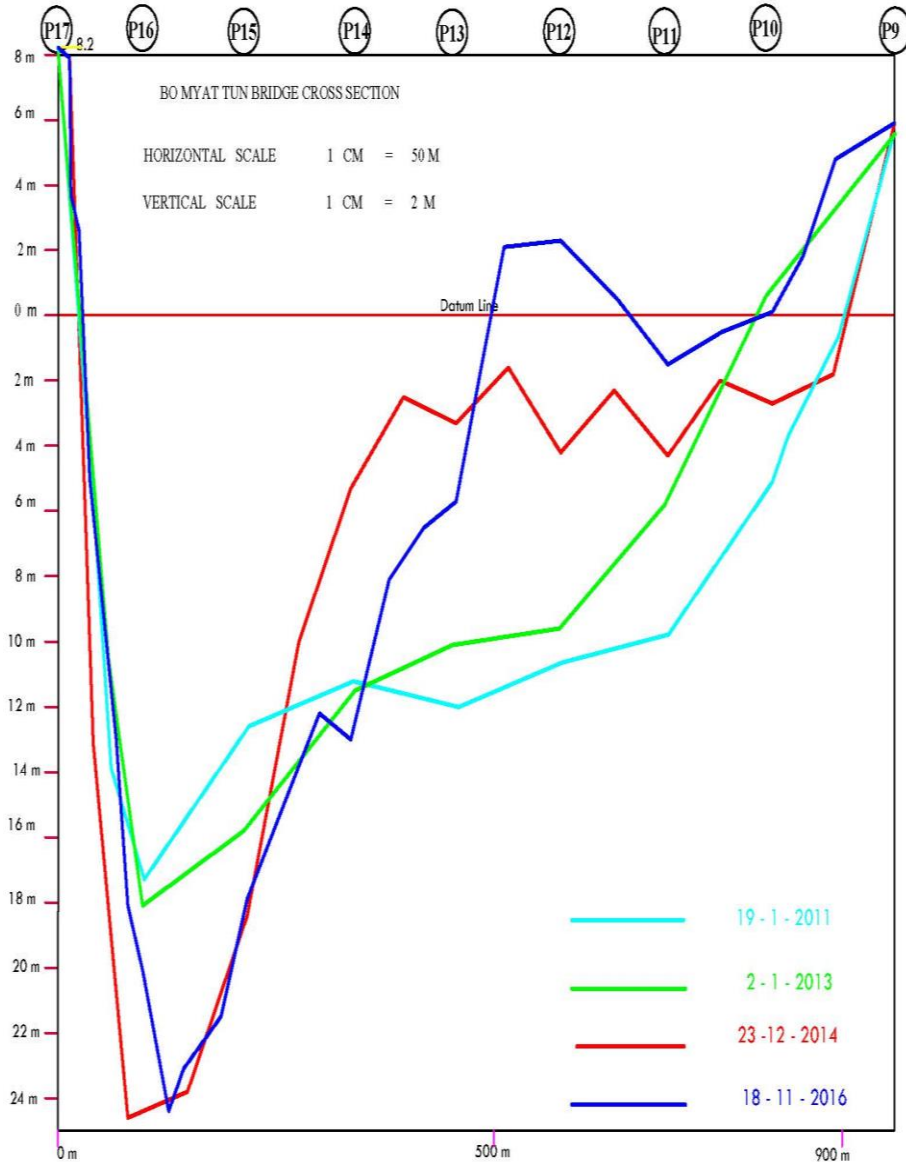
River Bed Condition (2011 to 2016)

Bo Myat Tun Bridge Cross Section

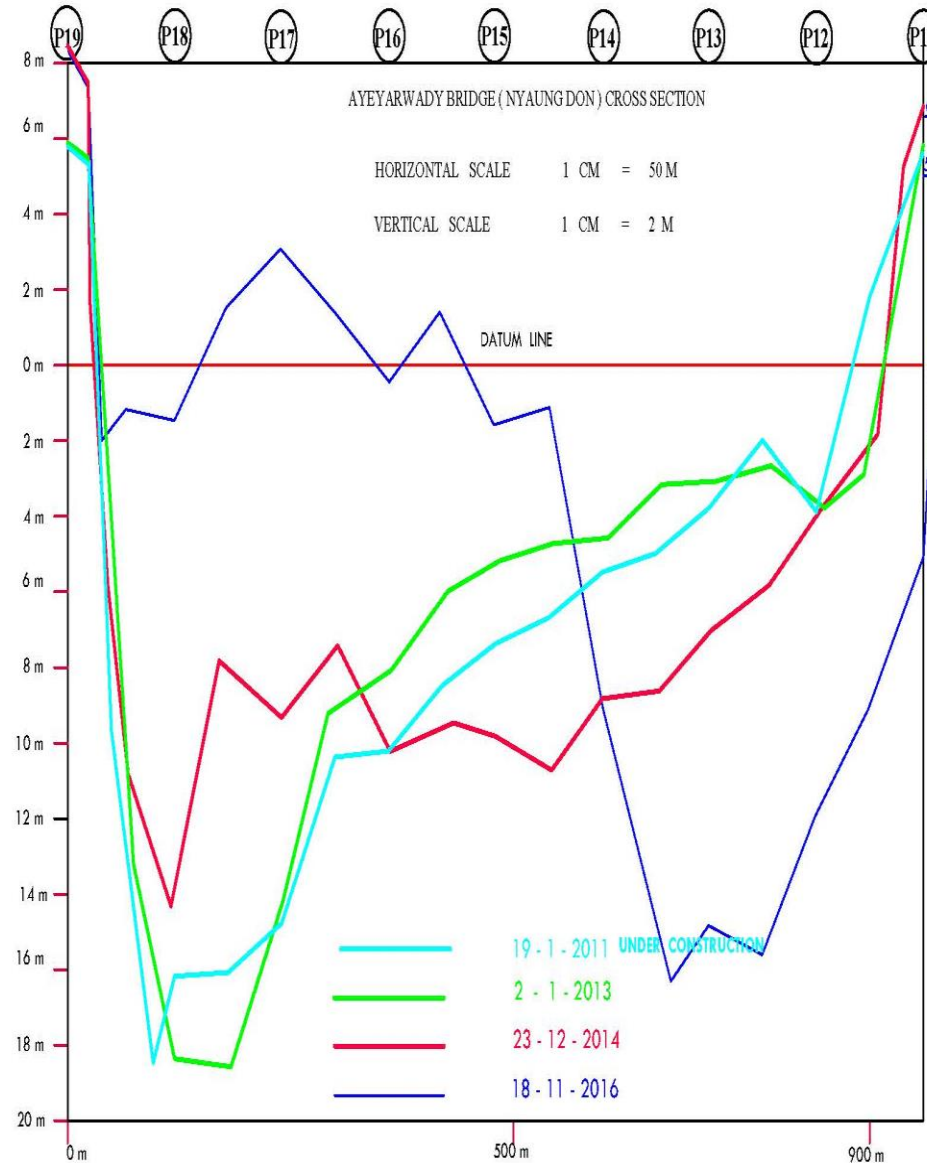


Comparison of River Bed Condition of Two Bridges

Bo Myat Tun Bridge



Nyaung Done Bridge



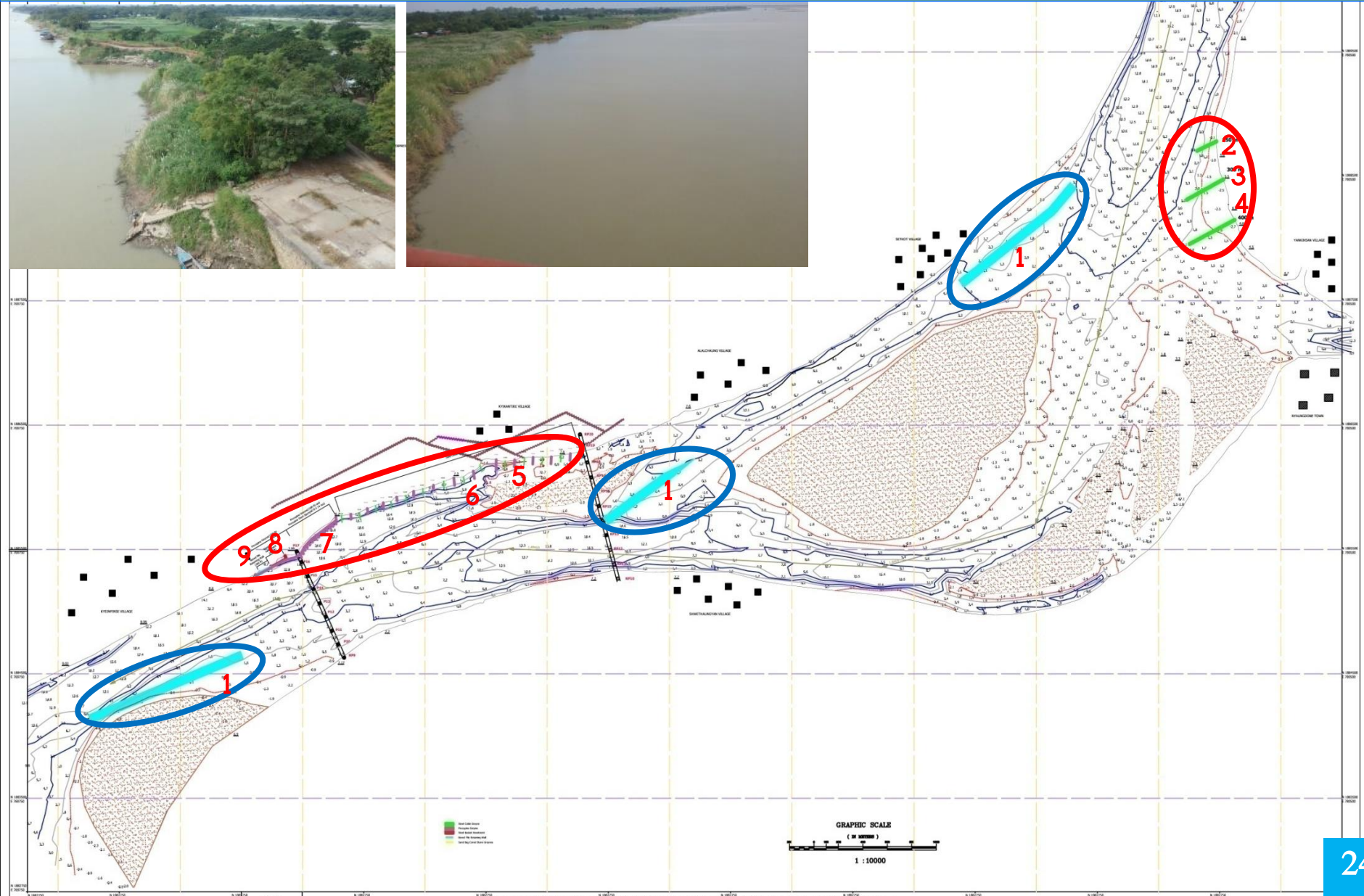


Work Plans for 2016-2017 Fiscal Year

Work Plans for 2016-2017 Fiscal Year

Work Plan for Bo Myat Tun Bridge Waterway Development (2016-2017)

Ayeyarwady Division



Work Plan for Bo Myat Tun Bridge Waterway Development (2016-2017)

Ayeyarwady Division

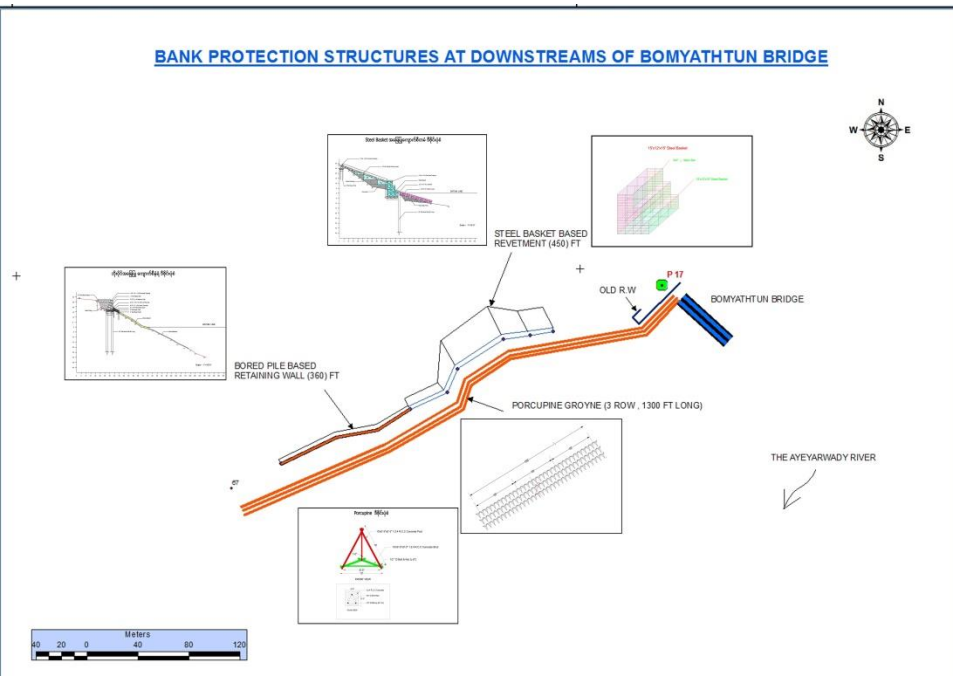
No	Type of Works	Amount	Estimated Cost (Million Kyats)	Start Date	Target Date to Finish	Progress up to 19.2.2017
1	Dredging (3Nos)	441229 cu-ft	251.570	28.1.2017	25.4.17	8%
2	Stone Pitching Groyne with sand bags	150 m	237.7	20.1.2017	30.4.17	12%
3	Stone Pitching Groyne with sand bags	300 m	457.7	20.1.2017	30.4.17	
4	Stone Pitching Groyne with sand bags	400 m	609.87	20.1.2017	30.4.17	
5	Porcupine Groyne	13 nos (2830 ft)	168.1	20.1.2017	30.4.17	
6	Steel Cable Groyne	150 ft x 14 nos	39.63	20.1.2017	31.3.17	85%
7	Porcupine Groyne	1300 ft x 2nos	119.06	20.1.2017	30.4.17	3%
	Porcupine short Groyne	60 ft x 14 nos	26.19	20.1.2017	30.4.17	3%
8	Stoned Pitching Retaining Wall based with bored pile	360 ft	442.6	20.1.2017	30.4.17	15%
9	Stoned Pitching Retaining Wall based with steel basket	450 ft	683.6	20.1.2017	30.4.17	10%
	Total		3036.02			16%

Bank Protection Structures

Downstreams



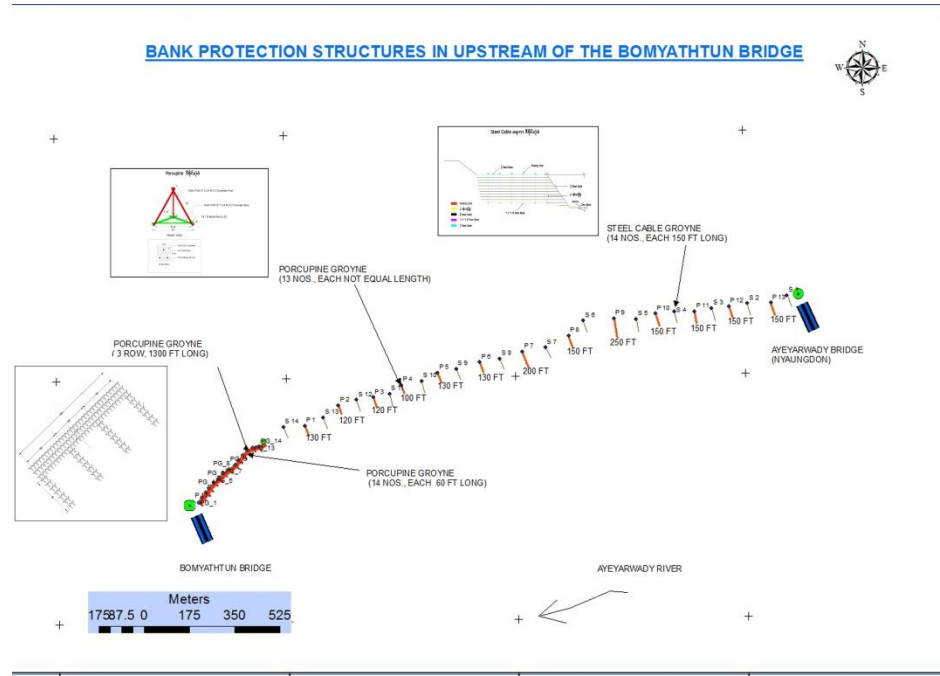
BANK PROTECTION STRUCTURES AT DOWNSTREAMS OF BOMYATHUN BRIDGE



Upstreams

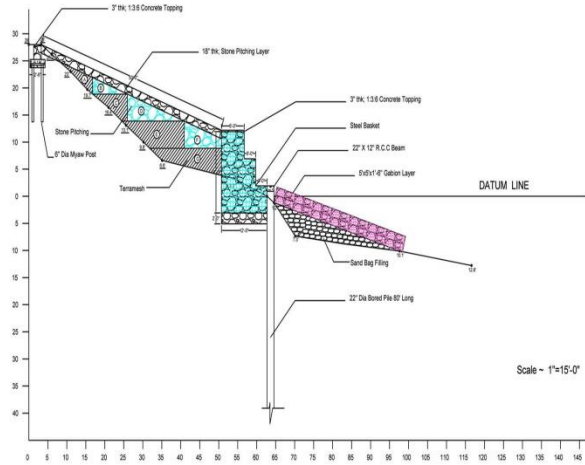


BANK PROTECTION STRUCTURES IN UPSTREAM OF THE BOMYATHUN BRIDGE



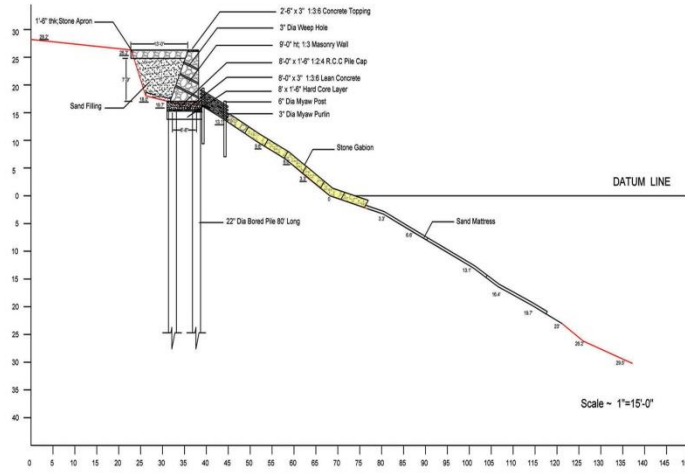
Stone Pitching Retaining Wall based with Steel Baskets

Steel Basket အခြေပြုကျောက်စိတမ် ဒီဇိုင်းပုံစံ



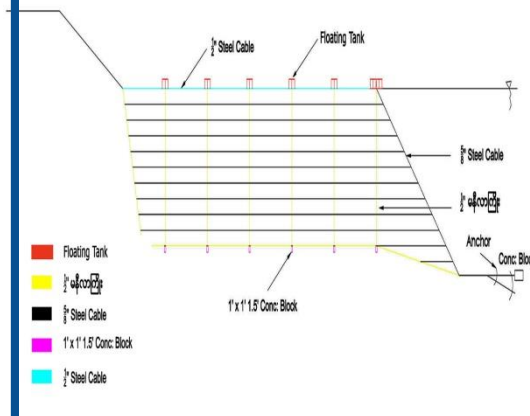
Stone Pitching Retaining Wall based with Bored Piles

သိုးပိုင်အခြေပြု ကျောက်စိန်နံရံ ဒီဇိုင်းပုံစံ



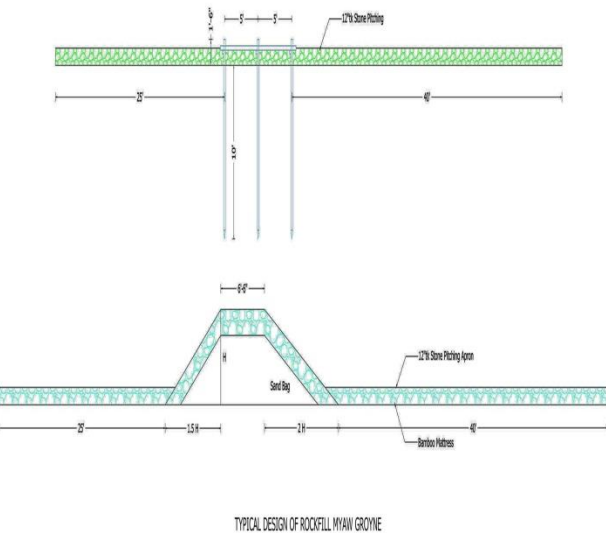
Steel Cable Groyne Design

Steel Cable ရေကာ ဒီဇိုင်းပုံစံ



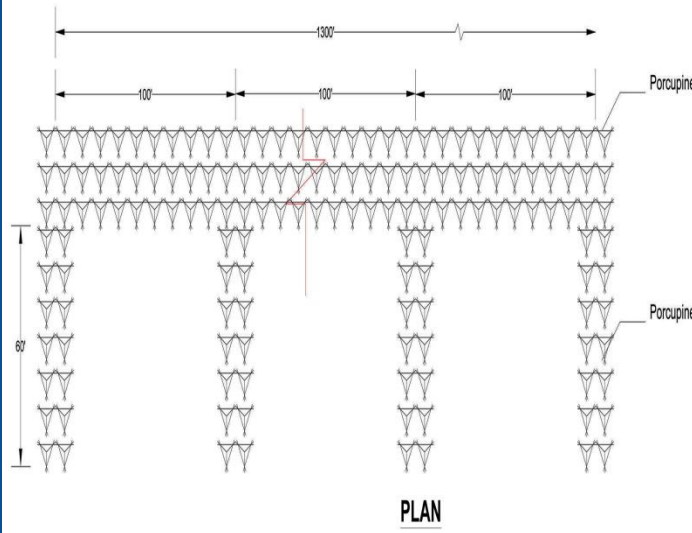
Stone Pitching groyne with sand Bag

သဲအိတ်နံ ကျောက်စိရေကာ ဒီဇိုင်းပုံစံ



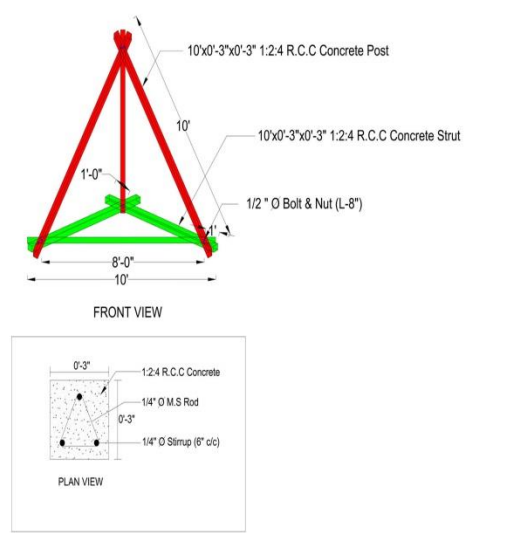
Porcupine Groyne Design

Porcupine ရေကာ ဒီဇိုင်းပုံစံ



Porcupine Design

Porcupine ဒီဇိုင်းပုံစံ



Conclusion

- ❖ Need of real time study and evaluation of the result of river training structures continuously
- ❖ Erosion and sedimentation situations should be monitored
- ❖ Existing river training works are done by water depth study of river morphology based on hydrographic map. Modelling tools should also be applied.
- ❖ Proper river channel improvement leads to advantages not only for the navigation improvement but also for extreme events mitigation (eg. Flood)
- ❖ DWIR is always trying the best to achieve sustainable inland waterways

Thanks for Your Kind
Attention

