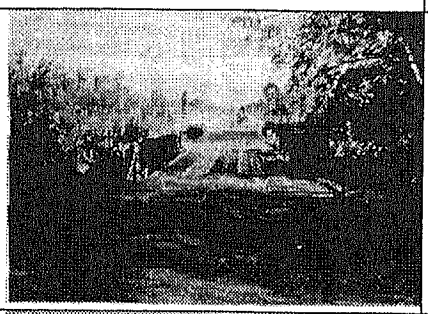
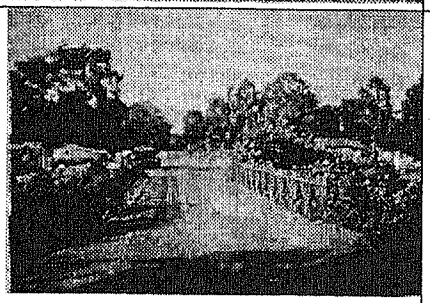
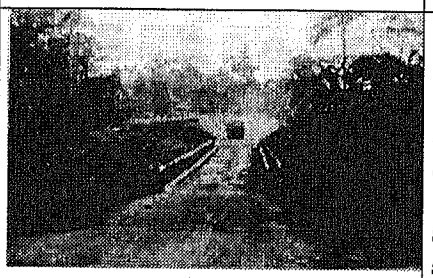
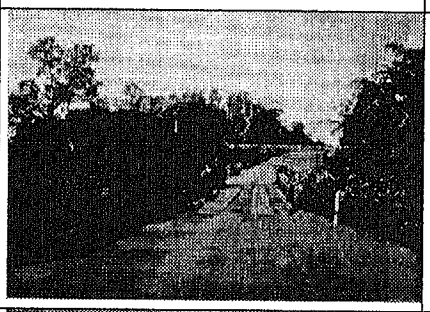
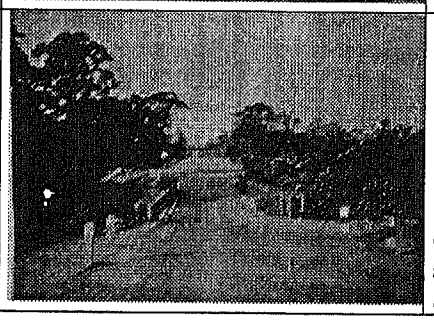
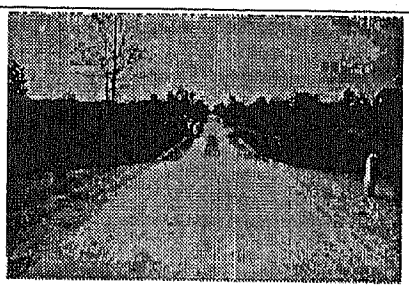
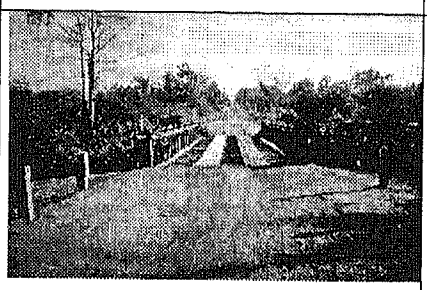
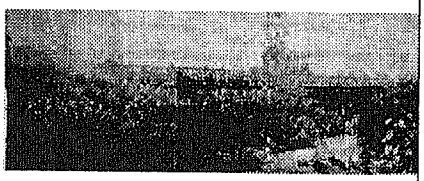
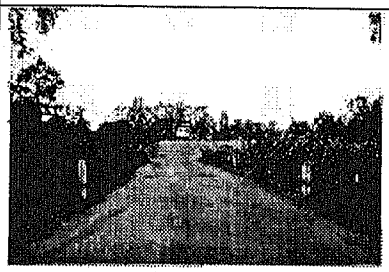
Table 2．3．3 Basic Improvement Policies (Thakhek to Xeno 2／3)

Bridge Name	Present Condition	Structural Outline	Present Structure and Characteristics	Improvement Policies
TX NO.06 Location 19.3km from Thakhek		Length : 12.0m No. of spans : 1 (m+ m+ m) Lane width : 4.0m Superstructure type: Bailey bridge Substructure type: Superstructure load : 20ton Clearance : 3.3m	HWL (below road surface) : -1.5m Main girder : OK under load limits Slab : wood Handrail : Bailey girder Abutment: placed directly on ground Pier: - Bank protection : none River type : small river (unstable) Environment : Agricultural (rice paddies)	Live load : B live load Location : Same as present Clearance : 0.75m Effective width : 8.0m Superstructure : RC girder Substructure : Inverted "T" type abutment
TX NO.07 Location 23.7km from Thakhek		Length : 18.0m No. of spans : 1 (m+ m+ m) Lane width : 4.0m Superstructure type: Bailey bridge Substructure type: Superstructure load : 20ton Clearance : 4.4m	HWL (below road surface) : -0.5m Main girder : OK under load limits Slab : wood Handrail : Bailey girder Abutment: placed directly on ground Pier: - Bank protection : Rock piling (not fully extant) River type : small river (unstable) Environment : Agricultural (rice paddies)	Live load : B live load Location : Same as present Clearance : 1.0m Effective width : 8.0m Superstructure : PC girder Substructure : Rigid frame abutment
TX NO.08 Location 26.3km from Thakhek		Length : 15.0m No. of spans : 1 (m+ m+ m) Lane width : 4.0m Superstructure type: Bailey bridge Substructure type: Superstructure load : 20ton Clearance : 3.3m	HWL (below road surface) : -0.9m Main girder : OK under load limits Slab : wood Handrail : Bailey girder Abutment: placed directly on ground Pier: - Bank protection : none River type : small river (unstable) Environment : Agricultural (rice paddies)	Live load : B live load Location : Same as present Clearance : 0.75m Effective width : 8.0m Superstructure : RC girder Substructure : Inverted "T" type abutment
TX NO.09 Location 27.9km from Thakhek		Length : 27.0m No. of spans : 1 (m+ m+ m) Lane width : 4.0m Superstructure type: Bailey bridge Substructure type: Superstructure load : 20ton Clearance : 5.0m	HWL (below road surface) : -0.9m Main girder : OK under load limits Slab : wood Handrail : Bailey girder Abutment: placed directly on ground Pier : Remains of old RC Bank protection : none River type : small river (unstable) Environment : Agricultural (rice paddies)	Live load : B live load Location : Same as present Clearance : 0.75m Effective width : 8.0m Superstructure : PC girder Substructure : Inverted "T" type abutment
TX NO.10 Location 36.45km from Thakhek		Length : 21.0m No. of spans : 1 (m+ m+ m) Lane width : 4.0m Superstructure type: Bailey bridge Substructure type: Superstructure load : 20ton Clearance : 4.4m	HWL (below road surface) : -1.0m Main girder : OK under load limits Slab : wood Handrail : Bailey girder Abutment: placed directly on ground Pier : Remains of old RC Bank protection : none River type : small river (unstable) Environment : Agricultural (rice paddies)	Live load : B live load Location : Same as present Clearance : 0.75m Effective width : 8.0m Superstructure : PC girder Substructure : Inverted "T" type abutment

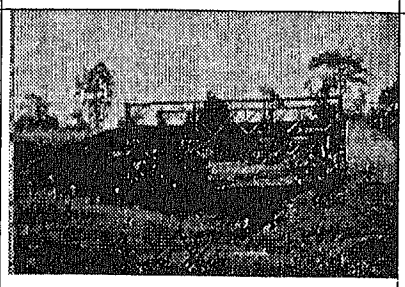
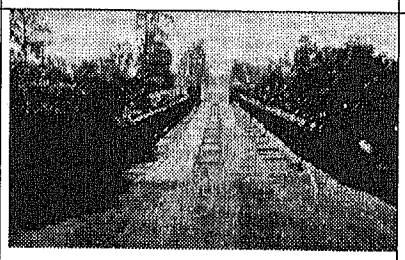
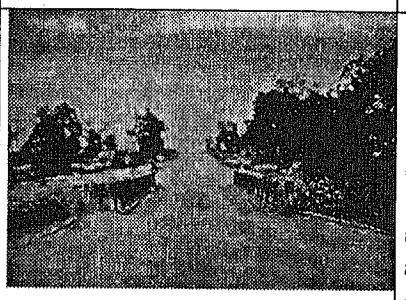
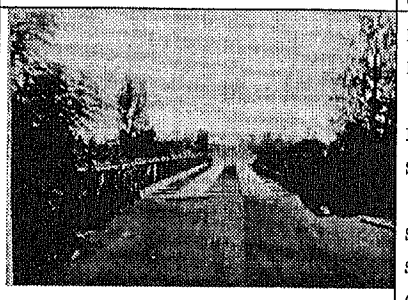
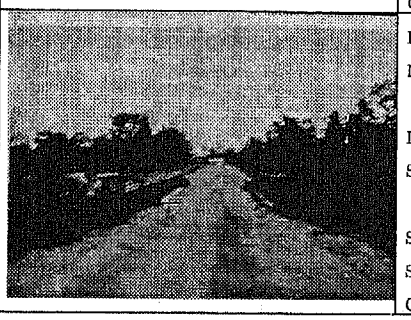
Clearance : between bottom of bridge and maximum flood water level.

Table 2．3．3 Basic Improvement Policies (Thakhek to Xeno 3／3)

Bridge Name	Present Condition	Structural Outline	Present Structure and Characteristics	Improvement Policies
TX NO.11 Location 38.5km from Thakhek		Length : 27.0m No. of spans : 1 (m+ m+ m) Lane width : 4.0m Superstructure type: Bailey bridge Substructure type: Superstructure load : 20ton Clearance : 5.6m	HWL (below road surface) : -1.2m Main girder : OK under load limits Slab : wood Handrail : Bailey girder Abutment: placed directly on ground Pier : Remains of old RC Bank protection : none River type : small river (unstable) Environment : Agricultural (rice paddies)	Live load : B live load Location : Same as present Clearance : 0.75m Effective width : 8.0m Superstructure : PC girder Substructure : Inverted "T" type abutment
TX NO.13 Location 58.4km from Thakhek		Length : 30.0m No. of spans : 1 (m+ m+ m) Lane width : 4.0m Superstructure type: Bailey bridge Substructure type: Superstructure load : 20ton Clearance : 6.1m	HWL (below road surface) : -1.5m Main girder : OK under load limits Slab : wood Handrail : Bailey girder Abutment: placed directly on ground Pier : Remains of old wooden piers Bank protection : none River type : small river, full of floating wood Environment : Agricultural (rice paddies)	Live load : B live load Location : Same as present Clearance : 1.2m Effective width : 8.0m Superstructure : PC girder Substructure : Rigid frame abutment
TX NO.14 Location 65.4km from Thakhek		Length : 21.0m No. of spans : 1 (m+ m+ m) Lane width : 4.0m Superstructure type: Bailey bridge Substructure type: Superstructure load : 20ton Clearance : 5.0m	HWL (below road surface) : 0m Main girder : OK under load limits Slab : wood Handrail : Bailey girder Abutment: placed directly on ground Pier : Remains of old wooden piers Bank protection : none River type : small river (unstable) Environment : Agricultural (rice paddies)	Live load : B live load Location : Same as present Clearance : 1.0m Effective width : 8.0m Superstructure : PC girder Substructure : Inverted "T" type abutment
TX NO.15 Location 74.,1km from Thakhek		Length : 72.0m No. of spans : 1 (m+ m+ m) Lane width : 4.0m Superstructure type: Bailey bridge Substructure type: Superstructure load : 20ton Clearance : 10.4m	HWL (below road surface) : 0m Main girder : OK under load limits Slab : wood Handrail : Bailey girder Abutment: placed directly on ground Pier : Corroded Bank protection : none River type: mid-scale river (unstable) Environment : Agricultural (rice paddies)	Live load : B live load Location : Same as present Clearance : 1.2m Effective width : 8.0m Superstructure : PC girder Substructure : Box type abutment

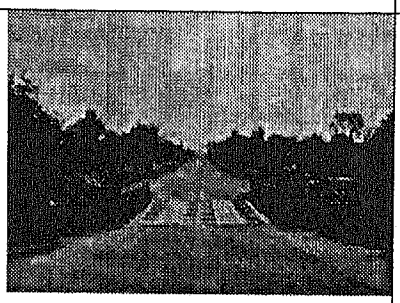
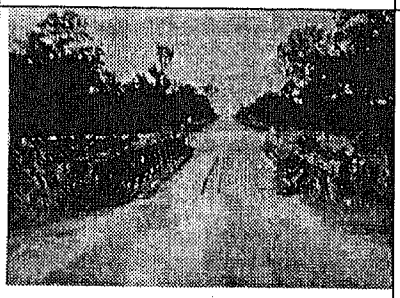
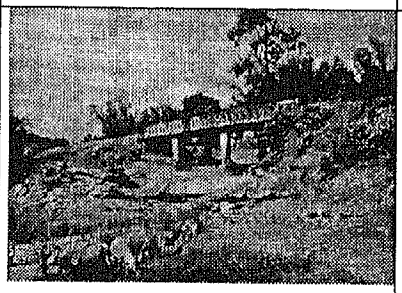
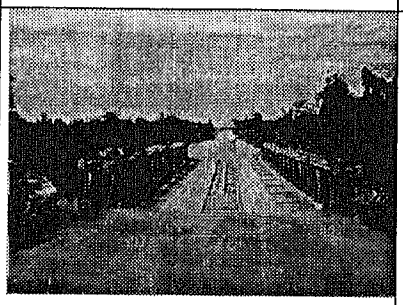
Clearance : between bottom of bridge and maximum flood water level.

Table 2．3．4 Basic Improvement Policies (Xeno to Pakxe 1／8)

Bridge Name	Present Condition	Structural Outline	Present Structure and Characteristics	Improvement Policies
XP NO.01 Location 103.4km from Thakhek		Length : 9.0m No. of spans : 1 (m+ m+ m) Lane width : 4.0m Superstructure type: Bailey bridge Substructure type: Superstructure load : 20ton Clearance : 3.80m	HWL (below road surface) : 2.5m Main girder : OK under load limits Slab : wood Handrail : Bailey girder Abutment : sound (RC, wall type) Pier : - Bank protection : none River type : small river (unstable) Environment :Inhabitation, agricultural (rice paddies)	Live load : B live load Location : Same as present Clearance : 0.75m Effective width : 8.0m Superstructure : RC girder Substructure : Inverted "T" type abutment
XP NO.02 Location 176.9km from Thakhek		Length : 54.0m No. of spans : 3 (10.5 m+ 27.0 m+ 16.5 m) Lane width : 4.0m Superstructure type: Bailey bridge Substructure type: Superstructure load : 20ton Clearance : 9.1m	HWL (below road surface) : -1.5m Main girder : OK under load limits Slab : wood Handrail : Bailey girder Abutment : placed directly on ground Pier : sound (RC, wall type) Bank protection : none River type : small river (unstable) Environment:: agricultural(rice paddies)	Live load : B live load Location: 20m to the west Clearance : 1.0m Effective width : 8.0m Superstructure : RC girder Substructure : Box type abutment
XP NO.03 Location 178.6km from Thakhek		Length : 18.0m No. of spans : 1 (m+ m+ m) Lane width : 4.0m Superstructure type: Bailey bridge Substructure type: Superstructure load : 20ton Clearance : 4.6m	HWL (below road surface) : 0.5m Main girder : OK under load limits Slab : wood Handrail : Bailey girder Abutment : sound (RC, wall type) Pier : - Bank protection : none River type : small river (unstable) Environment: agricultural (rice paddies)	Live load : B live load Location : Same as present Clearance : 0.75m Effective width : 8.0m Superstructure : RC girder Substructure : Rigid frame abutment
XP NO.05 Location 198.9km from Thakhek		Length : 36.0m No. of spans : 1 (m+ m+ m) Lane width : 4.0m Superstructure type: Bailey bridge Substructure type: Superstructure load : 20ton Clearance : 8.4m	HWL (below road surface) : -2.0m Main girder : OK under load limits Slab : wood Handrail : Bailey girder Abutment : placed directly on ground Pier : remains of old wooden piers Bank protection : none River type : small river (unstable) Environment: agricultural (rice paddies)	Live load : B live load Location : 20m to the east Clearance : 1.0m Effective width : 8.0m Superstructure : PC girder Substructure : Rigid frame abutment
XP NO.07 Location 214.3km from Thakhek		Length : 21.0m No. of spans : 1 (m+ m+ m) Lane width : 4.0m Superstructure type: Bailey bridge Substructure type: Superstructure load : 20ton Clearance : 4.0m	HWL (below road surface) : -0.6m Main girder : OK under load limits Slab : wood Handrail : Bailey girder Abutment : fairly sound Pier : - Bank protection : none River type : small river (unstable) Environment:: agricultural(rice paddies)	Live load : B live load Location: Same as present Clearance : 0.75m Effective width : 8.0m Superstructure : PC girder Substructure : Inverted "T" type abutment

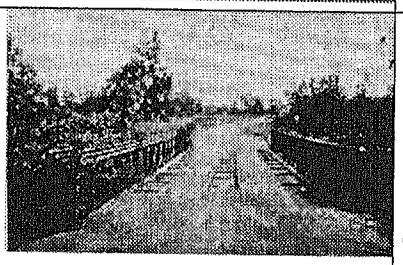
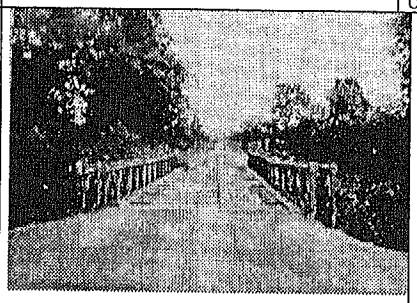
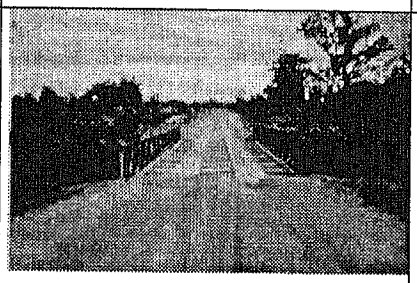
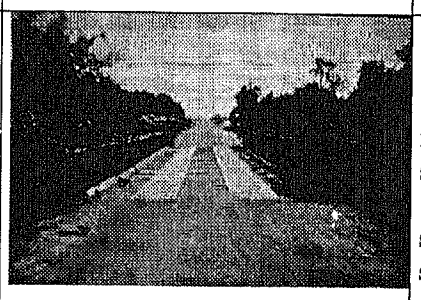
Clearance : between bottom of bridge and maximum flood water level.

Table 2．3．4 Basic Improvement Policies (Xeno to Pakxe 2／8)

Bridge Name	Present Condition	Structural Outline	Present Structure and Characteristics	Improvement Policies
XP NO.08 Location 215.9km from Thakhek		Length : 9.0m No. of spans : 1 (m+ m+ m) Lane width : 4.0m Superstructure type: Bailey bridge Substructure type: Superstructure load : 20ton Clearance : 2.9m	HWL (below road surface) : -1.0m Main girder : OK under load limits Slab : wood Handrail : Bailey girder Abutment : fairly sound Pier : - Bank protection : none River type : small river (unstable) Environment:: agricultural(rice paddies)	Live load : B live load Location: Same as present Clearance : 0.75m Effective width : 8.0m Superstructure : RC girder Substructure : Inverted "T" type abutment
XP NO.09 Location 216.8km from Thakhek		Length : 21.0m No. of spans : 1 (m+ m+ m) Lane width : 4.0m Superstructure type: Bailey bridge Substructure type: Superstructure load : 20ton Clearance : 4.5m	HWL (below road surface) : -0.5m Main girder : OK under load limits Slab : wood Handrail : Bailey girder Abutment : fairly sound Pier : - Bank protection : none River type : small river (unstable) Environment:: agricultural (rice paddies)	Live load : B live load Location: Same as present Clearance : 0.75m Effective width : 8.0m Superstructure : PC girder Substructure : Inverted "T" type abutment
XP NO.10 Location 218.0km from Thakhek		Length : 45.0m No. of spans : 3 (15.0m+ 15.0m+ 15.0 m) Lane width : 4.0m Superstructure type: Bailey bridge Substructure type: Superstructure load : 20ton Clearance : 6.4m	HWL (below road surface) : -0.8m Main girder : OK under load limits Slab : wood Handrail : Bailey girder Abutment : fairly sound Pier : fairly sound Bank protection : fairly sound (natural) River type : mid-scale river (fairly stable) Environment:: Inhabitation, rice paddies, school	Live load : B live load Location: 15m to the east Clearance : 1.2m Effective width : 8.0m Superstructure : PC girder Substructure : Box type abutment
XP NO.11 Location 220.3km from Thakhek		Length : 21.0m No. of spans : 1 (m+ m+ m) Lane width : 4.0m Superstructure type: Bailey bridge Substructure type: Superstructure load : 20ton Clearance : 5.0m	HWL (below road surface) : -0.5m Main girder : OK under load limits Slab : wood Handrail : Bailey girder Abutment : fairly sound Pier : - Bank protection : none River type : small river (unstable) Environment:: agricultural (rice paddies)	Live load : B live load Location: Same as present Clearance : 0.75m Effective width : 10.0m Superstructure : PC girder Substructure : Inverted "T" type abutment
XP NO.12 Location 223.6km from Thakhek		Length : 15.0m No. of spans : 1 (m+ m+ m) Lane width : 4.0m Superstructure type: Bailey bridge Substructure type: Superstructure load : 20ton Clearance : 3.7m	HWL (below road surface) : -0.4m Main girder : OK under load limits Slab : wood Handrail : Bailey girder Abutment : fairly sound Pier : Remains of wooden pile Bank protection : none River type : small river (unstable) Environment:: agricultural (rice paddies)	Live load : B live load Location: Same as present Clearance : 0.75m Effective width : 10.0m Superstructure : PC girder Substructure : Inverted "T" type abutment

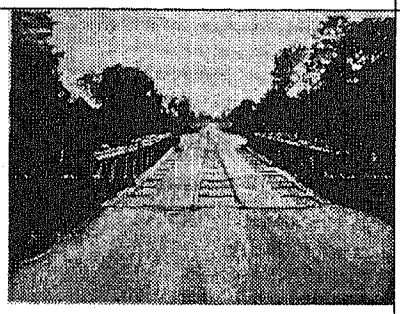
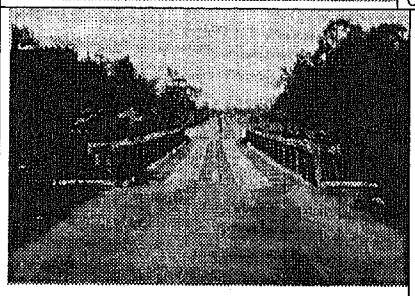
Clearance : between bottom of bridge and maximum flood water level.

Table 2．3．4 Basic Improvement Policies (Xeno to Pakxe 3／8)

Bridge Name	Present Condition	Structural Outline	Present Structure and Characteristics	Improvement Policies
XP NO.13 Location 225.3km from Thakhek		Length : 18.0m No. of spans : 1 (m+ m+ m) Lane width : 4.0m Superstructure type: Bailey bridge Substructure type: Superstructure load : 20ton Clearance : 5.2m	HWL (below road surface) : -0.5m Main girder : OK under load limits Slab : wood Handrail : Bailey girder Abutment : placed directly on ground Pier : - Bank protection : none River type : small river (unstable) Environment:: agricultural (rice paddies)	Live load : B live load Location: Same as present Clearance : 0.75m Effective width : 8.0m Superstructure : PC girder Substructure : Box type abutment
XP NO.14 Location 226.4km from Thakhek		Length : 21.0m No. of spans : 1 (m+ m+ m) Lane width : 4.0m Superstructure type: Bailey bridge Substructure type: Superstructure load : 20ton Clearance : 4.0m	HWL (below road surface) : -0.5m Main girder : OK under load limits Slab : wood Handrail : Bailey girder Abutment : fairly sound Pier : - Bank protection : none River type : small river (unstable) Environment:: agricultural (rice paddies)	Live load : B live load Location: Same as present Clearance : 0.75m Effective width : 8.0m Superstructure : PC girder Substructure : Inverted "T" type abutment
XP NO.15 Location 227.8km from Thakhek		Length : 24.0m No. of spans : 1 (m+ m+ m) Lane width : 4.0m Superstructure type: Bailey bridge Substructure type: Superstructure load : 20ton Clearance : 5.6m	HWL (below road surface) : -0.5m Main girder : OK under load limits Slab : wood Handrail : Bailey girder Abutment : placed directly on ground Pier : - Bank protection : none River type : small river (unstable) Environment:: agricultural (rice paddies)	Live load : B live load Location: Same as present Clearance : 1.0m Effective width : 8.0m Superstructure : PC girder Substructure : Box type abutment
XP NO.16 Location 230.6km from Thakhek		Length : 21.0m No. of spans : 1 (m+ m+ m) Lane width : 4.0m Superstructure type: Bailey bridge Substructure type: Superstructure load : 20ton Clearance : 5.8m	HWL (below road surface) : 0m Main girder : OK under load limits Slab : wood Handrail : Bailey girder Abutment : placed directly on ground Pier : - Bank protection : none River type : small river (unstable) Environment:: agricultural (rice paddies)	Live load : B live load Location: Same as present Clearance : 0.75m Effective width : 8.0m Superstructure : PC girder Substructure : Inverted "T" type abutment
XP NO.17 Location 239.6km from Thakhek		Length : 21.0m No. of spans : 1 (m+ m+ m) Lane width : 4.0m Superstructure type: Bailey bridge Substructure type: Superstructure load : 20ton Clearance : 5.7m	HWL (below road surface) : -0.2m Main girder : OK under load limits Slab : wood Handrail : Bailey girder Abutment : placed directly on ground Pier : - Bank protection : none River type : small river (unstable) Environment:: agricultural (rice paddies)	Live load : B live load Location: Same as present Clearance : 0.75m Effective width : 8.0m Superstructure : PC girder Substructure : Inverted "T" type abutment

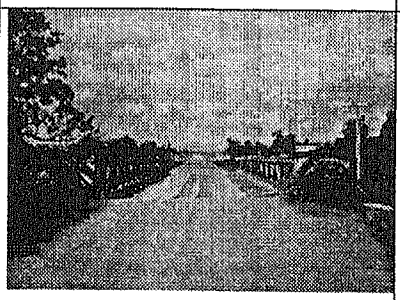
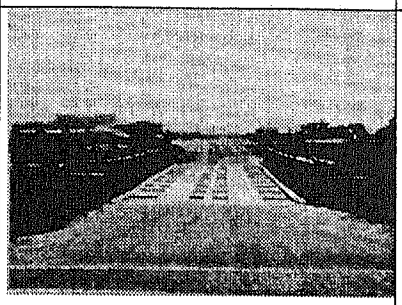
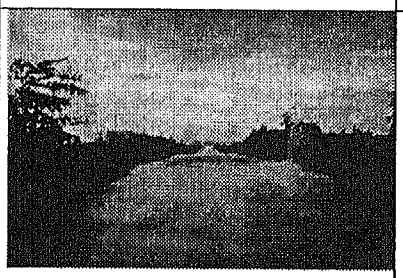
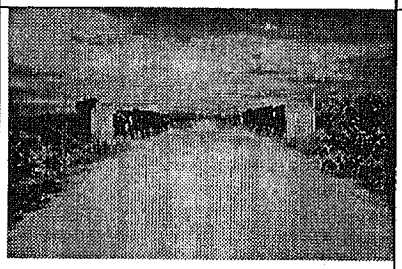
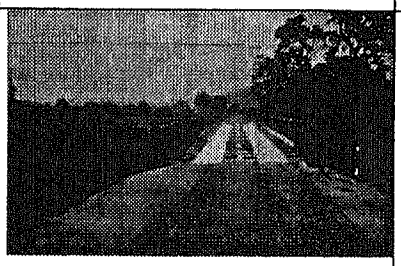
Clearance : between bottom of bridge and maximum flood water level.

Table 2．3．4 Basic Improvement Policies (Xeno to Pakxe 4／8)

Bridge Name	Present Condition	Structural Outline	Present Structure and Characteristics	Improvement Policies
XP NO.18 Location 246.5km from Thakhek		Length : 21.0m No. of spans : 1 (m+ m+ m) Lane width : 4.0m Superstructure type: Bailey bridge Substructure type: Superstructure load : 20ton Clearance : 6.5m	HWL (below road surface) : -1.0m Main girder : OK under load limits Slab : wood Handrail : Bailey girder Abutment : placed directly on ground Pier : - Bank protection : none River type : small river (unstable) Environment:: agricultural (rice paddies)	Live load : B live load Location: Same as present Clearance : 1.0m Effective width : 8.0m Superstructure : PC girder Substructure : Inverted "T" type abutment
XP NO.19 Location 250.2km from Thakhek		Length : 27.0m No. of spans : 1 (m+ m+ m) Lane width : 4.0m Superstructure type: Bailey bridge Substructure type: Superstructure load : 20ton Clearance : 6.1m	HWL (below road surface) : -0.8m Main girder : OK under load limits Slab : wood Handrail : Bailey girder Abutment : placed directly on ground Pier : - Bank protection : none River type : small river (unstable) Environment:: agricultural (rice paddies)	Live load : B live load Location: Same as present Clearance : 0.75m Effective width : 8.0m Superstructure : PC girder Substructure : Inverted "T" type abutment
XP NO.20 Location 252.2km from Thakhek		Length : 18.0m No. of spans : 1 (m+ m+ m) Lane width : 4.0m Superstructure type: Bailey bridge Substructure type: Superstructure load : 20ton Clearance : 3.8m	HWL (below road surface) : -0.8m Main girder : OK under load limits Slab : wood Handrail : Bailey girder Abutment : placed directly on ground Pier : - Bank protection : none River type : small river (unstable) Environment:: agricultural (rice paddies)	Live load : B live load Location: Same as present Clearance : 0.75m Effective width : 8.0m Superstructure : PC girder Substructure : Inverted "T" type abutment
XP NO.21 Location 253.8km from Thakhek		Length : 27.0m No. of spans : 1 (m+ m+ m) Lane width : 4.0m Superstructure type: Bailey bridge Substructure type: Superstructure load : 20ton Clearance : 5.4m	HWL (below road surface) : -0.5m Main girder : OK under load limits Slab : wood Handrail : Bailey girder Abutment : placed directly on ground Pier : - Bank protection : none River type : small river (unstable) Environment:: agricultural (rice paddies)	Live load : B live load Location: Same as present Clearance : 1.0m Effective width : 8.0m Superstructure : PC girder Substructure : Inverted "T" type abutment
XP NO.22 Location 262.4km from Thakhek		Length : 18.0m No. of spans : 1 (m+ m+ m) Lane width : 4.0m Superstructure type: Bailey bridge Substructure type: Superstructure load : 20ton Clearance : 6.5m	HWL (below road surface) : -1.0m Main girder : OK under load limits Slab : wood Handrail : Bailey girder Abutment : fairly sound Pier : - Bank protection : none River type : small river (unstable) Environment:: agricultural (rice paddies)	Live load ; B live load Location: Same as present Clearance : 1.0m Effective width : 10.0m Superstructure : PC girder Substructure : Inverted "T" type abutment

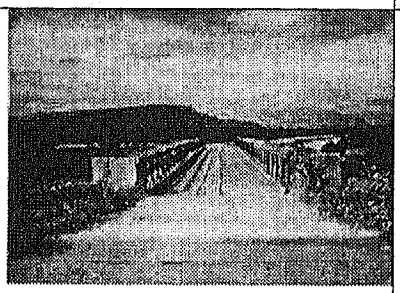
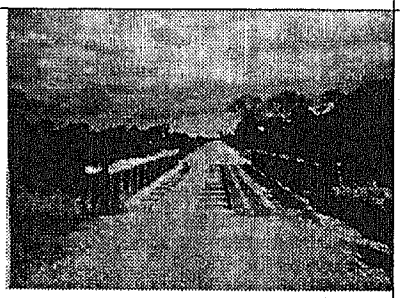
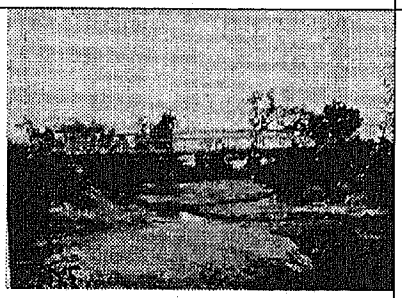
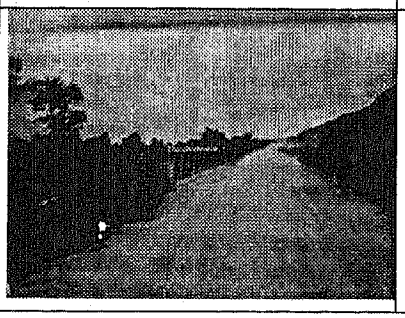
Clearance : between bottom of bridge and maximum flood water level.

Table 2．3．4 Basic Improvement Policies (Xeno to Pakxe 5／8)

Bridge Name	Present Condition	Structural Outline	Present Structure and Characteristics	Improvement Policies
XP NO.23 Location 264.9km from Thakhek		Length : 18.0m No. of spans : 1 (m+ m+ m) Lane width : 4.0m Superstructure type: Bailey bridge Substructure type: Superstructure load : 20ton Clearance : 5.4m	HWL (below road surface) : -1.5m Main girder : OK under load limits Slab : wood Handrail : Bailey girder Abutment : fairly sound Pier : - Bank protection : none River type : small river (unstable) Environment:: agricultural (rice paddies)	Live load : B live load Location: Same as present Clearance : 1.0m Effective width : 8.0m Superstructure : PC girder Substructure : Inverted "T" type abutment
XP NO.24 Location 267.3km from Thakhek		Length : 15.0m No. of spans : 1 (m+ m+ m) Lane width : 4.0m Superstructure type: Bailey bridge Substructure type: Superstructure load : 20ton Clearance : 5.6m	HWL (below road surface) : 0.3m Main girder : OK under load limits Slab : wood Handrail : Bailey girder Abutment : placed directly on ground Pier : - Bank protection : none River type : small river (unstable) Environment:: agricultural (rice paddies)	Live load : B live load Location: Same as present Clearance : 0.75m Effective width : 10.0m Superstructure : PC girder Substructure : Inverted "T" type abutment
XP NO.25 Location 270.1km from Thakhek		Length : 18.0m No. of spans : 1 (m+ m+ m) Lane width : 4.0m Superstructure type: Bailey bridge Substructure type: Superstructure load : 20ton Clearance : 4.5m	HWL (below road surface) : 1.2m Main girder : OK under load limits Slab : wood Handrail : Bailey girder Abutment : placed directly on ground Pier : - Bank protection : none River type : small river (unstable) Environment:: agricultural (rice paddies)	Live load : B live load Location: Same as present Clearance : 0.75m Effective width : 8.0m Superstructure : PC girder Substructure : Inverted "T" type abutment
XP NO.26 Location 270.9km from Thakhek		Length : 18.0m No. of spans : 1 (m+ m+ m) Lane width : 4.0m Superstructure type: Bailey bridge Substructure type: Superstructure load : 20ton Clearance : 6.0m	HWL (below road surface) : 1.0m Main girder : OK under load limits Slab : wood Handrail : Bailey girder Abutment : fairly sound Pier : - Bank protection : none River type : small river (unstable) Environment:: agricultural (rice paddies)	Live load : B live load Location: Same as present Clearance : 0.75m Effective width : 8.0m Superstructure : PC girder Substructure : Box type abutment
XP NO.27 Location 271.6km from Thakhek		Length : 36.0m No. of spans : 3 (9.0m+ 18.0m+ 9.0m) Lane width : 4.0m Superstructure type: Bailey bridge Substructure type: Superstructure load : 20ton Clearance : 9.0m	HWL (below road surface) : 2.4m Main girder : OK under load limits Slab : wood Handrail : Bailey girder Abutment : placed directly on ground Pier : RC, wall type Bank protection : none River type : mid-scale river (unstable) Environment:: agricultural (rice paddies)	Live load : B live load Location : 2.0m to the west Clearance : 1.0m Effective width : 8.0m Superstructure : PC girder Substructure : Rigid frame abutment

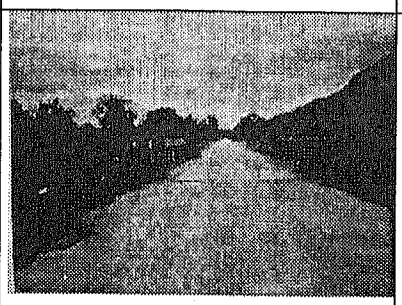
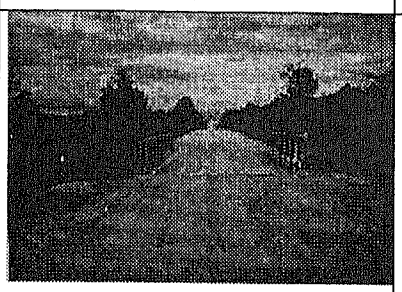
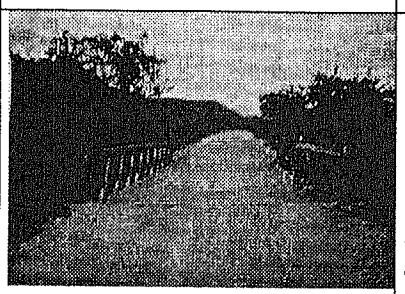
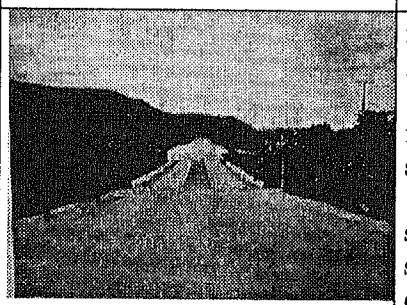
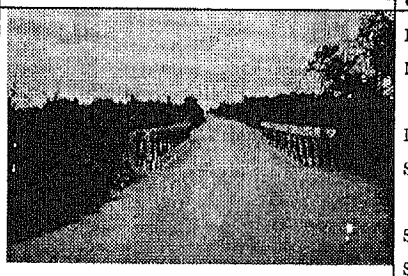
Clearance : between bottom of bridge and maximum flood water level.

Table 2．3．4 Basic Improvement Policies (Xeno to Pakxe 6／8)

Bridge Name	Present Condition	Structural Outline	Present Structure and Characteristics	Improvement Policies
XP NO.28 Location 279.5km from Thakhek		Length : 48.0m No. of spans : 2 (24.0m+ 24.0m+ m) Lane width : 4.0m Superstructure type: Bailey bridge Substructure type: Superstructure load : 20ton Clearance : 11.2m	HWL (below road surface) : 0m Main girder : OK under load limits Slab : wood Handrail : Bailey girder Abutment : placed directly on ground Pier : RC, wall type Bank protection : none River type : mid-scale river (unstable) Environment:: agricultural (rice paddies)	Live load : B live load Location : 2.0m to the west Clearance : 1.2m Effective width : 8.0m Superstructure : PC girder Substructure : Rigid frame abutment
XP NO.29 Location 281.0km from Thakhek		Length : 42.0m No. of spans : 3 (12.0m+ 18.0m+ 12m) Lane width : 4.0m Superstructure type: Bailey bridge Substructure type: Superstructure load : 20ton Clearance : 9.6m	HWL (below road surface) : -1.5m Main girder : OK under load limits Slab : wood Handrail : Bailey girder Abutment : placed directly on ground Pier : RC, wall type Bank protection : none River type : mid-scale river (unstable) Environment:: agricultural (rice paddies)	Live load : B live load Location : 2.0m to the west Clearance : 0.75m Effective width : 8.0m Superstructure : PC girder Substructure : Rigid frame abutment
XP NO.30 Location 283.3km from Thakhek		Length : 21.0m No. of spans : 1 (m+ m+ m) Lane width : 4.0m Superstructure type: Bailey bridge Substructure type: Superstructure load : 20ton Clearance : 5.2m	HWL (below road surface) : 0m Main girder : OK under load limits Slab : wood Handrail : Bailey girder Abutment : fairly sound Pier : - Bank protection : none River type : small river (unstable) Environment:: agricultural (rice paddies)	Live load : B live load Location : Same as present Clearance : 0.75m Effective width : 8.0m Superstructure : PC girder Substructure : Inverted "T" type abutment
XP NO.31 Location 284.3km from Thakhek		Length : 21.0m No. of spans : 1 (m+ m+ m) Lane width : 4.0m Superstructure type: Bailey bridge Substructure type: Superstructure load : 20ton Clearance : 3.8m	HWL (below road surface) : -0.4m Main girder : OK under load limits Slab : wood Handrail : Bailey girder Abutment : placed directly on ground Pier : - Bank protection : none River type : small river (unstable) Environment:: agricultural (rice paddies)	Live load : B live load Location : Same as present Clearance : 0.75m Effective width : 8.0m Superstructure : PC girder Substructure : Inverted "T" type abutment
XP NO.32 Location 285.0km from Thakhek		Length : 15.0m No. of spans : 1 (m+ m+ m) Lane width : 4.0m Superstructure type: Bailey bridge Substructure type: Superstructure load : 20ton Clearance : 4.0m	HWL (below road surface) : -0.8m Main girder : OK under load limits Slab : wood Handrail : Bailey girder Abutment : placed directly on ground Pier : - Bank protection : none River type : small river (unstable) Environment:: agricultural (rice paddies)	Live load : B live load Location : Same as present Clearance : 0.75m Effective width : 8.0m Superstructure : RC girder Substructure : Inverted "T" type abutment

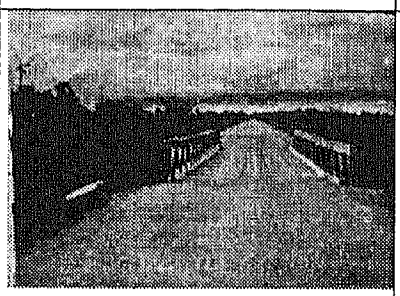
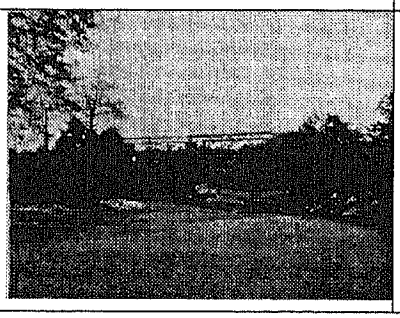
Clearance : between bottom of bridge and maximum flood water level.

Table 2．3．4 Basic Improvement Policies (Xeno to Pakxe 7／8)

Bridge Name	Present Condition	Structural Outline	Present Structure and Characteristics	Improvement Policies
XP NO.33 Location 285.7km from Thakhek		Length : 15.0m No. of spans : 1 (m+ m+ m) Lane width : 4.0m Superstructure type: Bailey bridge Substructure type: Superstructure load : 20ton Clearance : 5.0m	HWL (below road surface) : -0.25m Main girder : OK under load limits Slab : wood Handrail : Bailey girder Abutment : fairly sound Pier : - Bank protection : none River type :small river (unstable) Environment:: agricultural (rice paddies)	Live load : B live load Location : Same as present Clearance : 0.75m Effective width : 8.0m Superstructure : PC girder Substructure : Inverted "T" type abutment
XP NO.34 Location 287.7km from Thakhek		Length : 12.0m No. of spans : 1 (m+ m+ m) Lane width : 4.0m Superstructure type: Bailey bridge Substructure type: Superstructure load : 20ton Clearance : 4.8m	HWL (below road surface) : -1.5m Main girder : OK under load limits Slab : wood Handrail : Bailey girder Abutment : fairly sound Pier : - Bank protection : none River type :small river (unstable) Environment:: agricultural (rice paddies)	Live load : B live load Location : Same as present Clearance : 0.75m Effective width : 8.0m Superstructure : RC girder Substructure : Inverted "T" type abutment
XP NO.35 Location 288.0km from Thakhek		Length : 15.0m No. of spans : 1 (m+ m+ m) Lane width : 4.0m Superstructure type: Bailey bridge Substructure type: Superstructure load : 20ton Clearance : 4.1m	HWL (below road surface) : -0.7m Main girder : OK under load limits Slab : wood Handrail : Bailey girder Abutment : placed directly on ground Pier : - Bank protection : none River type :small river (unstable) Environment:: agricultural (rice paddies)	Live load : B live load Location : Same as present Clearance : 0.75m Effective width : 8.0m Superstructure : RC girder Substructure : Inverted "T" type abutment
XP NO.36 Location 289.2km from Thakhek		Length : 27.0m No. of spans : 1 (m+ m+ m) Lane width : 4.0m Superstructure type: Bailey bridge Substructure type: Superstructure load : 20ton Clearance : 4.25m	HWL (below road surface) : -1.0m Main girder : OK under load limits Slab : wood Handrail : Bailey girder Abutment : placed directly on ground Pier : - Bank protection : none River type :small river (unstable) Environment:: agricultural (rice paddies)	Live load : B live load Location : Same as present Clearance : 0.75m Effective width : 8.0m Superstructure : PC girder Substructure : Inverted "T" type abutment
XP NO.37 Location 293.6km from Thakhek		Length : 21.0m No. of spans : 1 (m+ m+ m) Lane width : 4.0m Superstructure type: Bailey bridge Substructure type: Superstructure load : 20ton Clearance : 5.0m	HWL (below road surface) : -0.7m Main girder : OK under load limits Slab : wood Handrail : Bailey girder Abutment : fairly sound Pier : - Bank protection : none River type :small river (unstable) Environment:: agricultural (rice paddies)	Live load : B live load Location : Same as present Clearance : 1.0m Effective width : 8.0m Superstructure : PC girder Substructure : Inverted "T" type abutment

Clearance : between bottom of bridge and maximum flood water level.

Table 2．3．4 Basic Improvement Policies (Xeno to Pakxe 8／8)

Bridge Name	Present Condition	Structural Outline	Present Structure and Characteristics	Improvement Policies
XP NO.38 Location 294.3km from Thakhek		Length : 18.0m No. of spans : 1 (m+ m+ m) Lane width : 4.0m Superstructure type: Bailey bridge Substructure type: Superstructure load : 20ton Clearance : 5.6m	HWL (below road surface) : 0.55m Main girder : OK under load limits Slab : wood Handrail : Bailey girder Abutment : fairly sound Pier : - Bank protection : none River type :small river (unstable) Environment:: agricultural (rice paddies)	Live load : B live load Location : Same as present Clearance : 1.0m Effective width : 8.0m Superstructure : PC girder Substructure : Box type abutment
XP NO.39 Location 306.5km from Thakhek		Length : 18.0m No. of spans : 1 (m+ m+ m) Lane width : 4.0m Superstructure type: Bailey bridge Substructure type: Superstructure load : 20ton Clearance : 4.2m	HWL (below road surface) : -0.5m Main girder : OK under load limits Slab : wood Handrail : Bailey girder Abutment : fairly sound Pier : - Bank protection : none River type :small river (unstable) Environment:: agricultural (rice paddies)	Live load : B live load Location : Same as present Clearance : 1.0m Effective width : 10.0m Superstructure : PC girder Substructure : Inverted "T" type abutment

Clearance : between bottom of bridge and maximum flood water level.

(2) Bridge locations

As a result of survey, it was deemed that six of the bridges were in need of a shift of location, due to topographical and environmental considerations, as well as possibility of traffic detouring, as shown in Table -2.3.5.

Table-2.3.5 New Bridge Location

Bridge No.	Reiver Name	Shift Distance	Remarks
XP No. 2	Enang	20m to the west	-9m clearance -difficult to set detour
XP No. 5	Piane	20m to the east	-8.4m clearance -difficult to set detour
XP No. 10	Lamphong	15m to the east	-primary school nearby the site -difficult to set detour
XP No. 27	Katine	20m to the west	-9m clearance -deep river road -difficult to set detour
XP No. 28	Sao	20m to the west	-11m clearance -deep river road -difficult to set detour
XP No. 29	Iane	20m to the west	-10m clearance -difficult to set detour

(3) Bridge Length

The length of the bridge is determined by considering characteristics of river width (upstream and downstream), scouring conditions near the abutment and position of present abutment, flood history, etc. In particular, since most of the bridges in this project are within flood regions, the bridge length must be determined in consideration of maximum flow volume of rainwater as well as flood volume from the Xedon river. Therefore, in order to avoid detrimental effects of blockage of flow by bridge piers, scouring due to alluvial effluence, etc., a method should be determined in which the piers are not constructed within the river course. The standard span length is calculated by the following equation (River Law : Japan).

$$L = 20 + 0.005Q \ (m)$$

In this equation, L= standard span length (m)

Q= volume (m^3/s) Discharge

In cases where the effluent rainwater volume does not exceed 500 m^3/s, and the river width is less than 30 m, the standard span length will be set at 15.0 m.
Type of bridge and length determined by river conditions are shown in Table 2.3.6.

(4) Clearance

As a result of interviews and on-site surveys, it was found that many of the bridges have experienced water overflow. Furthermore, wooden debris has been known to be the cause of blockage of flow at the point of the bridge, which in turn causes water overflow, washing out of Bailey bridges, as well as parts of piers and abutments due to scouring.

In light of these circumstances, in accordance with the Japanese river structure standards, a sufficient sub-girder allowance must be procured. The relationship between the projected highwater flow volume and girder allowance is shown in Table-2.3.7. Furthermore, to get the data of flooding records is not enough in Lao PDR as compare with Japanese data, etc., a 20% further increase in allowance is recommended.

Table-2.3.7 Relationship between the projected highwater flow volume and girder allowance

Projected highwater flow volume Q(m^3/s)	Q<200	200≦ Q <500	500≦ Q <2,000	2,000 ≦ Q <5,000	5,000 ≦ Q < 1,000	10,000 < Q
Clearance (m)	0. 6	0. 8	1. 0	1. 2	1. 5	2. 0
Planned Clearance (m)	0. 75	1. 0	1. 2	1. 45	1. 8	2. 4

The proposed HWL obtained from actual rainwater flow records and/or calculations are shown in Table-2.3.8.
The flooding records of Khongxedon is shown in Figure-2.3.3.

(5) Superstructure types

1) Selection of basic types of superstructure

In determining whether the superstructures of the bridges in this project are to be concrete or steel structures, the following criteria were considered.

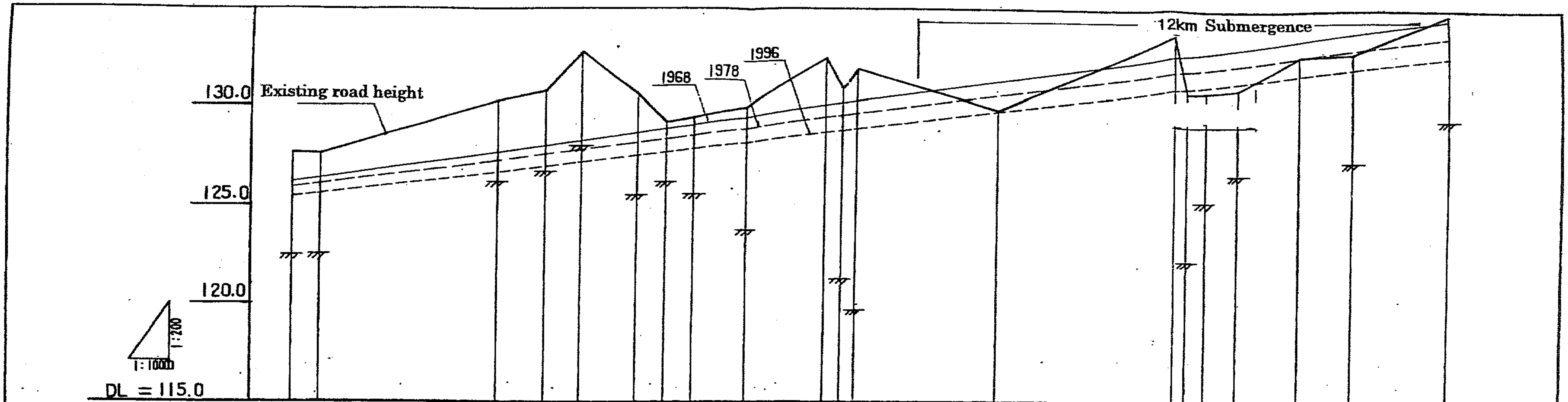
① Economic feasibility and constructability when considered with substructure and foundation
② Easy and economical maintenance
③ Use in Lao PDR and transfer of technical skills

Table 2.3.6 Bridge Type and Length

No.	Bridge No.	River	Present bridge length (m)	Projected bridge type		Determination factor of bridge type							
				PC (m)	RC (m)	Standard span (m)	Present flow width (m)	Velocity of flow			Flood volume	Form of front abutment		Flooding
								rapid	moderate	slow		Slope	Opening	
1	TX No.1	Saad	15.0	22.0		15.0	15.0	O					O	
2	TX No.2	Vanghing	15.0		15.0	15.0	12.0	O				O		
3	TX No.3	Hongnoy	5.5		10.0	-	5.5	O					O	
4	TX No.4	So	21.0	22.0		15.0	18.0	O				O		
5	TX No.5	Meuanpa-1	18.0		18.0	15.0	15.0	O				O		
6	TX No.6	Meuanpa-2	12.0		18.0	15.0	12.0	O				O		O
7	TX No.7	Khamboune	18.0	22.0	+2@5.0	15.0	15.0	O				O		
8	TX No.8	Langmeu	15.0		15.0	15.0	9.0	O				O		
9	TX No.9	Tad	27.0	30.0		15.0	27.0	O				O		
10	TX No.10	Ton	21.0	22.0		15.0	18.0	O				O		
11	TX No.11	Phao	27.0	30.0		15.0	24.0	O				O		
12	TX No.13	Sykhay	30.0	30.0	+2@8.0	24.0	30.0	O				O		O
13	TX No.14	Nakoktang	21.0	30.0		15.0	21.0	O				O		O
14	TX No.15	Thahao	72.0	3@25.0		24.0	72.0	O				O		O
15	XP No.1	Sompoy	9.0		18.0	15.0	9.0			O			O	
16	XP No.2	Enang	54.0		3@18.0	18.0	54.0		O			O		
17	XP No.3	Katho	18.0		18.0+2@5.0	15.0	18.0		O				O	
18	XP No.5	Piane	36.0	30.0	+2@5.0	18.0	33.0	O			O	O		O
19	XP No.7	Teaue	21.0	22.0		15.0	15.0	O					O	O
20	XP No.8	Naviene	9.0		15.0	15.0	9.0	O					O	O
21	XP No.9	Okad	21.0	22.0		15.0	15.0	O					O	
22	XP No.10	Lamphong	45.0	30.0	+2@8.0	24.0	45.0	O					O	O
23	XP No.11	Kennoy	21.0	25.0		15.0	21.0	O					O	O
24	XP No.12	Kapho	15.0	22.0		15.0	15.0	O					O	O
25	XP No.13	Hinsoung	18.0	25.0		15.0	18.0		O			O		O
26	XP No.14	Va	21.0	22.0		15.0	15.0	O				O		O
27	XP No.15	Muanxay	24.0	30.0		15.0	24.0	O				O		O
28	XP No.16	Phabath	21.0	30.0		15.0	15.0	O					O	O
29	XP No.17	Makthane	21.0	25.0		15.0	21.0	O				O		O
30	XP No.18	Mee	21.0	25.0		15.0	21.0	O				O		O
31	XP No.19	Liao	27.0	30.0		15.0	27.0	O				O		
32	XP No.20	Hinlath	18.0	22.0		15.0	18.0	O				O		
33	XP No.21	Khene	27.0	30.0		18.0	27.0	O				O		O
34	XP No.22	Khay	18.0	25.0		15.0	18.0	O					O	
35	XP No.23	Mone-1	18.0	25.0		15.0	18.0	O			O		O	
36	XP No.24	Mone-2	15.0	22.0		15.0	15.0	O			O	O		O
37	XP No.25	Phaneng	18.0	25.0		15.0	18.0	O			O	O		O
38	XP No.26	Kasong	18.0	25.0		15.0	18.0	O			O		O	
39	XP No.27	Katine	36.0	30.0	+2@5.0	18.0	36.0	O			O	O		
40	XP No.28	Sao	48.0	30.0	+2@10.0	24.0	48.0	O			O	O		
41	XP No.29	Iane	42.0	30.0	+2@7.0	18.0	42.0	O			O	O		
42	XP No.30	Nonesene	21.0	25.0		15.0	21.0	O			O		O	O
43	XP No.31	Khammuang	15.0	22.0		15.0	15.0	O			O	O		O
44	XP No.32	Kok	15.0		18.0	15.0	15.0	O			O	O		
45	XP No.33	Vangmane	15.0	22.0		15.0	15.0	O			O		O	
46	XP No.34	Kampoon	12.0		18.0	15.0	12.0	O			O		O	
47	XP No.35	Huakhao	15.0		18.0	15.0	15.0	O			O	O		
48	XP No.36	Soa	27.0	30.0		15.0	24.0	O			O	O		
49	XP No.37	Epeng	21.0	25.0		15.0	21.0	O			O		O	
50	XP No.38	Kadi	18.0	22.0		15.0	15.0	O			O		O	
51	XP No.39	Sonenak	18.0	25.0		15.0	18.0			O			O	

Table 2.3.8 Proposed High-Water Level

Bridge No.	Projected Water level (m)	Present surface level (m)	Proposed high-water level HWL (m)	Girder allowance (m)	Projected girder allowance (m)	Girder height (m)	Level of above girder (m)	Thickness of pavement (m)	Proposed height Bridges (m)
TX No.1	-1.5	152.488	150.988	0.750	151.738	1.400	153.138	0.150	153.288
TX No.2	-2.0	152.239	150.239	0.750	150.989	1.450	152.439	0.150	152.589
TX No.3	1.0	152.622	153.622	0.750	154.372	1.000	155.372	0.150	155.522
TX No.4	-0.5	154.386	153.886	0.750	154.636	1.400	156.036	0.150	156.186
TX No.5	-0.3	156.009	155.709	0.750	156.459	1.750	158.209	0.150	158.359
TX No.6	-1.5	155.857	154.357	0.750	155.107	1.750	156.857	0.150	157.007
TX No.7	-0.5	156.923	156.423	1.000	157.423	1.400	158.823	0.150	158.973
TX No.8	-0.9	156.700	155.800	0.750	156.550	1.450	158.000	0.150	158.150
TX No.9	-1.0	157.750	156.750	0.750	157.500	1.800	159.300	0.150	159.471
TX No.10	-1.2	152.245	151.045	0.750	151.795	1.400	153.195	0.150	153.345
TX No.11	-1.5	151.347	149.847	0.750	150.597	1.800	152.397	0.150	152.547
TX No.13	0.0	154.371	154.371	1.200	155.571	1.600	157.171	0.150	157.321
TX No.14	0.0	155.833	155.833	1.000	156.833	1.800	158.633	0.150	158.783
TX No.15	2.5	152.377	154.877	1.200	156.077	1.800	157.877	0.150	158.027
XP No.1	-1.5	181.889	180.389	0.750	181.139	1.750	182.889	0.150	183.039
XP No.2	0.5	140.862	141.362	0.750	142.112	1.750	143.862	0.150	144.012
XP No.3	-2.0	145.238	143.238	0.750	143.988	1.750	145.738	0.150	145.888
XP No.5	-1.0	133.728	132.728	1.000	133.728	1.800	135.528	0.150	135.678
XP No.7	-0.6	143.500	142.900	0.750	143.650	1.400	145.050	0.150	145.200
XP No.8	-1.0	143.658	142.658	0.750	143.408	1.450	144.858	0.150	145.008
XP No.9	-0.5	143.104	142.604	0.750	143.354	1.400	144.754	0.150	144.904
XP No.10	-0.8	145.302	144.502	1.200	145.702	1.600	147.302	0.150	147.452
XP No.11	-0.5	150.053	149.553	0.750	150.303	1.600	151.903	0.150	152.053
XP No.12	-0.4	157.723	157.323	0.750	158.073	1.400	159.473	0.150	159.623
XP No.13	-0.3	160.924	160.624	0.750	161.374	1.600	162.974	0.150	163.124
XP No.14	-0.5	158.597	158.097	0.750	158.847	1.400	160.247	0.150	160.900
XP No.15	-0.5	162.726	162.226	1.000	163.226	1.800	165.026	0.150	165.176
XP No.16	0.0	170.991	170.991	0.750	171.741	1.400	173.141	0.150	173.291
XP No.17	-0.2	166.368	166.168	0.750	166.918	1.600	168.518	0.150	169.400
XP No.18	-1.0	158.855	157.855	1.000	158.855	1.600	160.455	0.150	160.605
XP No.19	-0.8	163.033	162.233	0.750	162.983	1.800	164.783	0.150	164.933
XP No.20	-0.8	154.823	154.023	0.750	154.773	1.400	156.173	0.150	156.323
XP No.21	-0.5	151.496	150.996	1.000	151.996	1.800	153.796	0.150	153.946
XP No.22	-1.0	138.052	137.052	1.000	138.052	1.600	139.652	0.150	139.802
XP No.23	-0.8	135.560	134.760	1.000	135.760	1.600	137.360	0.150	137.510
XP No.24	0.3	133.786	134.086	0.750	134.836	1.400	136.236	0.150	136.386
XP No.25	1.2	131.998	133.198	0.750	133.948	1.600	135.548	0.150	135.698
XP No.26	1.0	132.062	133.062	0.750	133.812	1.600	135.412	0.150	135.562
XP No.27	-0.8	133.605	132.805	1.000	133.805	1.800	135.605	0.150	135.755
XP No.28	-1.3	131.882	130.582	1.200	131.782	1.600	133.382	0.150	133.532
XP No.29	-1.5	132.440	130.940	0.750	131.690	1.400	133.090	0.150	133.240
XP No.30	0.0	130.149	130.149	0.750	130.899	1.600	132.499	0.150	132.649
XP No.31	-0.4	130.199	129.799	0.750	130.549	1.400	131.949	0.150	132.099
XP No.32	-0.8	129.953	129.153	0.750	129.903	1.750	131.653	0.150	131.803
XP No.33	-0.3	130.576	130.276	0.750	131.026	1.400	132.426	0.150	132.576
XP No.34	-1.5	132.760	131.260	0.750	132.010	1.750	133.760	0.150	133.910
XP No.35	-0.7	130.755	130.055	0.750	130.805	1.750	132.555	0.150	132.705
XP No.36	-1.0	130.248	129.248	0.750	129.998	1.800	131.798	0.150	131.948
XP No.37	-0.7	127.669	126.969	1.000	127.969	1.600	129.569	0.150	129.719
XP No.38	0.5	127.937	128.437	1.000	129.437	1.400	130.837	0.150	130.987
XP No.39	-0.6	117.758	117.158	1.000	118.158	1.600	119.758	0.150	119.908



Bridge NO.	Sta. (km)	Distance (km)	H.W.L in 1968	H.W.L in 1978	H.W.L in 1996	Existing road height	Overflow depth in 1968
No.38	Ban	0.00	126.13	125.93	125.50	127.64	+1.51
No.37	Nanay	0.70	126.34	126.11	125.67	127.58	+1.24
No.36		4.40	127.64	127.25	126.72	130.14	+2.50
No.35		1.20	128.00	127.56	127.01	130.75	+2.75
No.34		0.90	128.27	127.80	127.23	132.72	+4.45
No.33		1.40	128.68	128.16	127.56	130.58	+1.90
No.32		0.70	128.89	128.34	127.73	129.21	+0.32
No.31		0.70	129.10	128.52	127.90	129.41	+0.31
No.30		1.30	129.48	128.86	128.21	129.97	+0.49
No.29		2.00	130.07	129.38	128.69	132.40	+2.33
		0.40	130.19	129.48	128.78	130.90	+0.71
No.28		0.40	130.31	129.58	128.88	131.88	+1.57
		3.50	131.48	130.49	129.72	129.80	-1.68
No.27		4.40	132.65	131.63	130.77	133.60	+0.95
		0.30	132.75	131.71	130.84	130.60	
No.26		0.40	132.86	131.81	130.94	130.71	-2.15
No.25		0.80	133.08	132.02	131.13	130.86	-2.22
	Kong Sedone	2.00 (25.50K)	133.68	132.54	131.61	132.60	-1.08
No.24		0.80	133.92	132.75	131.80	132.69	-1.23
No.23		2.40	134.63	133.37	132.38	134.77	+0.14

Figure-2.3.3. The flooding records of Khongxedon

As the rivers under almost all of the bridges within the project area experience rapid current flow during the rainy season, construction of piers during this season is to be avoided as much as possible. As a result, the type of bridge and bridge length are determined by river width. For each bridge length, comparison of bridge types is required, and should ultimately be determined with further considerations of structure, constructability, economics, etc.

As shown in Table-2.3.6, determination of bridge type is greatly influenced by bridge length. However, it goes without saying that maintenance costs for concrete bridges are less than those for steel bridges. Up to the present, concrete bridges have been most popular in Lao PDR, with exceptions being steel bridges provided by aid from the former Soviet Union and through grants from Japan (The Project for the reconstruction of Bridges on the National Road Route 13, Phase 1). Due to the existence of these bridges, there will be a need for sufficient transfer of technical skills.

2) Review of superstructure types

Upon review of bridge length and span arrangement, the type of superstructure most suited to the length of each bridge is indicated in Table 2.3.9 through 2.3.11. Bridge lengths and bridge types as related to this project are as follows:

① Bridge length of 18 m: RC girder, Steel girder
② Bridge length of 25 m: Steel girder, PC girder, RC girder
③ Bridge length of 30 m: Steel girder, PC girder

(6) Substructure type

The following points are considered in selection of substructure type, particularly concerning abutment.

① The axis of the bridge is planned so as to be set perpendicular to the course of the river. Scouring- prevention measures and abutment protective works are also considered.

② The abutment is to be of a structure secure in the face of floodwater levels, placed at an appropriate depth in regards to flow speed and the soil quality of the riverbed. These bridges have particularly been subjected to the effects of scouring. Therefore, the top of the footing should be at least a depth of 2.0 meters below the riverbed surface.

③ Since abutment type is closely related to structure height, an appropriate structure needs to be selected, as indicated in Table 2.3.12. The appropriate pier type is indicated in Table-2.3.13.

Table 2.3.9 Comparison of Superstructure (Pile span : 15～20m)

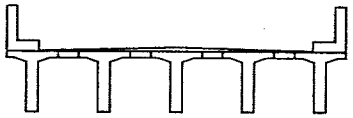
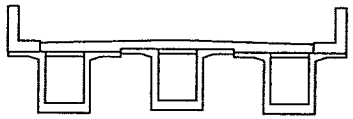
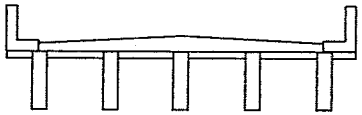
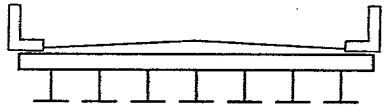
	T－Type Pile	U－Type Pile	I －Type Pile	I －Type Pile(Steel)
General View				
Structure	-Reasonable structure and less steel member due to wider range of eccentricity. -Smaller weight per pile. ○	-Fewer piles than other alternatives in the case of same height for each clearance. -Heavier weight per pile. -Less concrete. △	-Reasonable structure and less steel member. -Smallest weight per pile. ○	-Same sectional structure as I －Type Pile and more reasonable structure. -Fairly big rigidity. ×
Construction	-Fairly easy to divert molds to other type in the case of different clearances. -Unstable during temporary pile set and erection. -Smaller erection facilities than U-Type Pile. △	-Difficult to divert molds to other type in the case of different clearances. -Easy to handle and stable during temporary pile set and erection. -Simple work after erection. -Biggest erection facilities. ×	-Easy to divert molds to other type in the case of different clearances. -Requires caution due to low rigidity against vertical level and unstableness during temporary pile set and erection. -Fairly simple work after erection. -Smallest erection weight. ○	-Easy to erect by truck crane. -Stable. -Very simple work after erection. -Small support facilities. -Increase painting maintenance fee after installation due to rigid section. △
Duration	-Smaller than U-Type Pile despite requisite cross prestressing work. △	-Longer due to heavy weight and complicated erection work. ×	-Shortest due to lighter pile which needs shorter period for erection. ○	-Needs quite a time for jig installation despite easy erection work. △
Economy	1.05	1.20	1.00	1.10
Evaluation	△	×	○	△

Table 2.3.10 Comparison Table of Superstructure Type for 25m Length Span Bridge

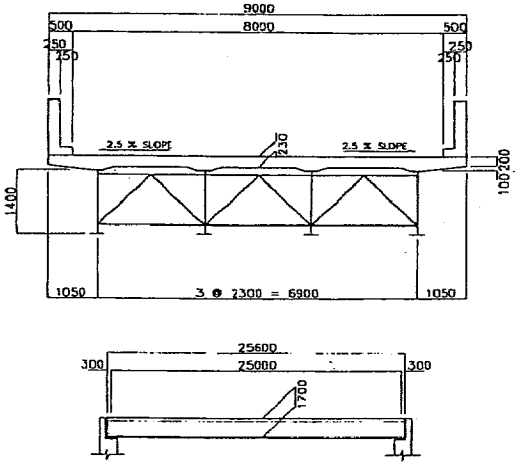
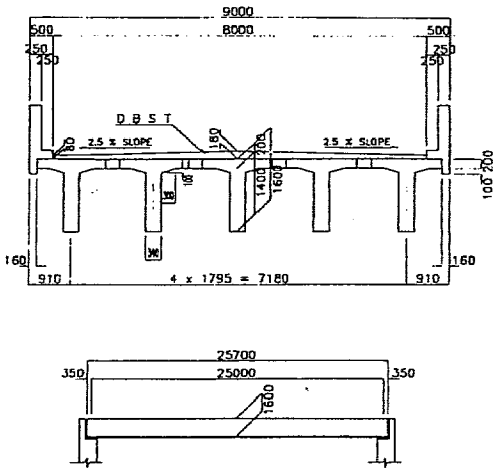
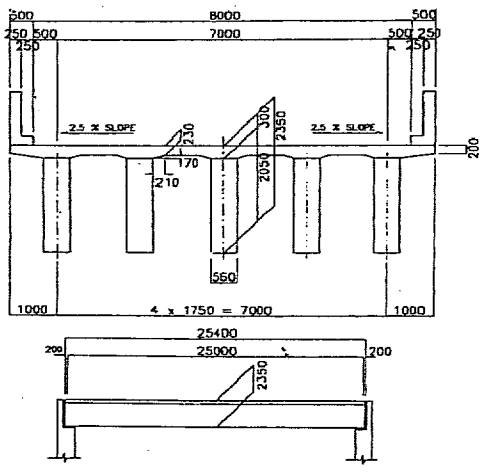
	Alternative 1: Steel Plate Girder	Alternative 2: PC T- Girder (Post - Tension)	Alternative 3: RC T- Girder
General View			
Structure	– Resist to load with composite section of plate girder and RC slab. – <u>The dead weight is lightest</u> (steel : 28.5 ton). – The torsional rigidity is lower than RC structure. ○	– Resist to loads with composite section of T-shape girder and slab. – <u>The dead weight is lighter than Alternative 3</u> (270 ton). – High torsional rigidity. △	– Resist to loads with composite section of T-shape girder and slab – <u>The girder length is over of upper limit of appreciation for RC girder</u>. – <u>The dead weight is heaviest</u> (520 ton). ×
Construction	– The main girders are shop fabrication. – Main girder and accessories are importation. – <u>Possible to fabricate complete with progress of construction of substructure.</u> ○	– <u>Possible to fabricate the girders at workshop yard with progress of construction of substructure.</u> – The execution period is shorter than Alternative 3. ○	– Possible to fabricate the girder at workshop yard with progress of construction of substructure. – <u>Because of the girder dead weight is heavy, the timbering equipment increases.</u> ×
Maintenance	– <u>Necessary to re-painting</u> ×	– Easy because of concrete structure ○	– Easy because of concrete structure ○
Economy	– 1.10 ×	– 1.00 ×	– 1.05 △
Evaluation	△	○	×

Table 2.3.11 Comparison Table of Superstructure Type for 30m Length More Span Bridge

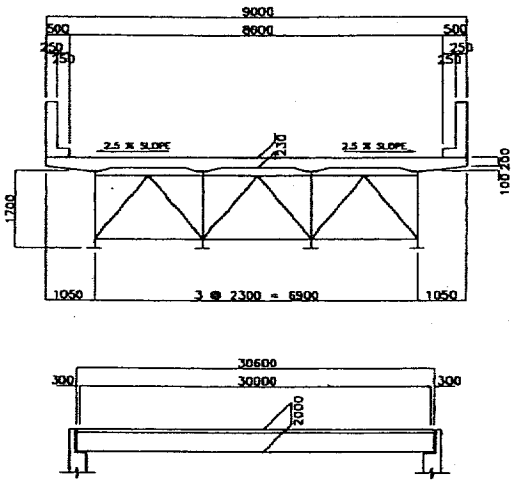
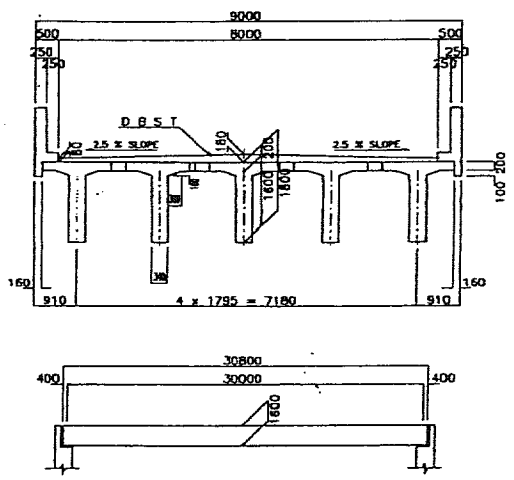
	Alternative 1: Steel Plate Girder	Alternative 2: PC T- Girder (Post - Tension)
General View		
Structure	– Resist to loads with composite section of I-shape main girders and RC slab. – The girder length is effective against 30m length more. – <u>The dead weight is light</u> (37.9 ton). ○	– Resist to loads with composite section of T - shape main girder and slab. – <u>The dead weight is heavy</u> (350 ton). – High torsional rigidity. △
Construction	– The main girders are shop fabrication. – The main girder and accessories are importation. – <u>Possible to fabricate complete with progress of construction of substructure</u>. ○	– <u>Because of the girder dead weight is heavy, the timbering equipment increases</u>. – The execution period of girder election is more longer than Alternative 1 △
Maintenance	– <u>Necessary to re-painting</u> ×	– <u>Easy because of concrete</u> ○
Economy	1.15 ×	1.10 ○
Evaluation	×	○

Table 2.3.12 Comparison Table of Substructure for Abutment

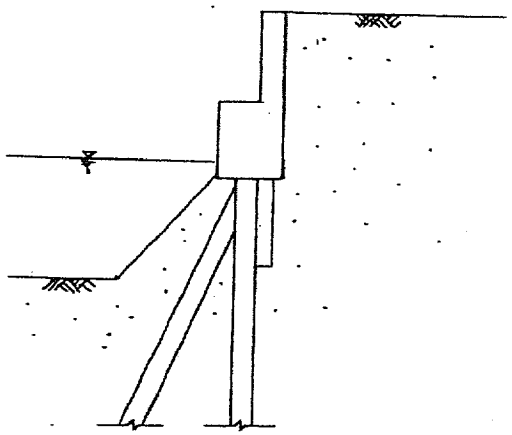
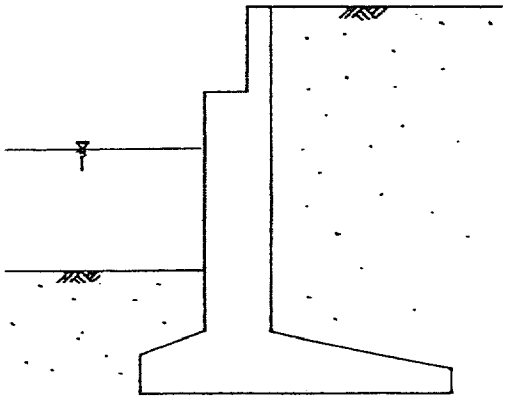
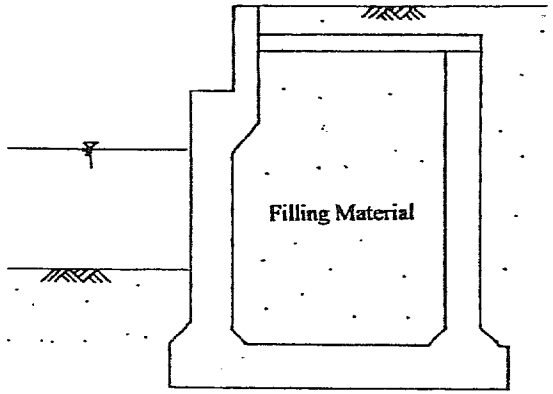
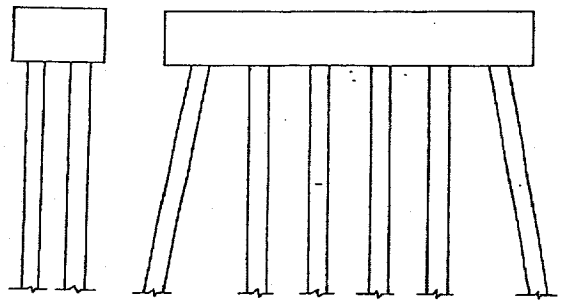
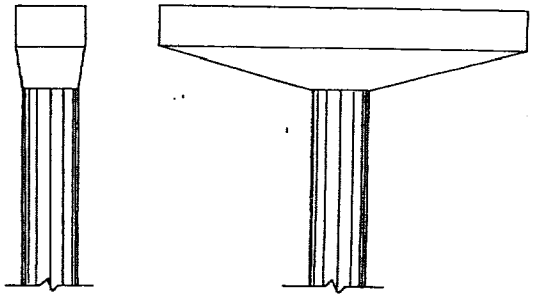
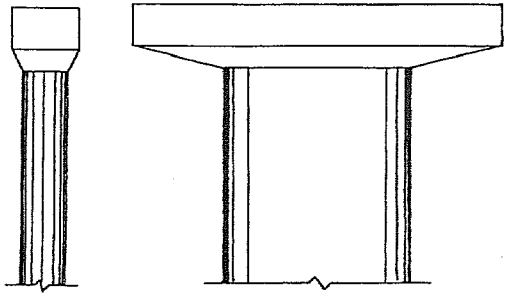
	Alternative 1: Pile - bent Type	Alternative 2: T - Shaped Type	Alternative 3: Box Type
General View			
Structure	– The footing is connected with the top of piles. – The piles are generally used the RC pre-cast pile or PC pre-cast pile. – The bottom of footing is constructed by the concrete panel to protect the flow out of back-filling material. – Horizontal deflection of footing is large. ×	– The dead weight of abutment is light, but the stability of abutment is kept with back-filling materials. – The applicable height is generally 12m. – Stability against horizontal force is high. ○	– The dead weight of abutment is light, but the box is filled up with soil due to the stability. – The applicable height is generally 12m height over. – Stability against horizontal force is high. ○
Construction	– After the piles were driven , the abutment is constructed with RC structure on the piles. – Protection for scouring of the front of piles is increased. ×	– The footing is constructed after the closing dyke was complete in the river. – Easy construction ○	– The footing is constructed after the closing dyke was complete in the river. – Execution period is longer than Alternative 2. △
Evaluation	×	○	○

Table 2.3.13 Comparison Table of Substructure for Pier

	Alternative 1: Pile - bent Type	Alternative 2: Cylinder Type	Alternative 3: Oval Type
General View			
Structure	– The footing is connected with the top of piles. – The structure is a flexible type. – No available for scouring by eddies in the river. – Deflection is large. ×	– The structure is general type. – The cylinder type is suitably for the irregular current. – The cylinder shape is easy to occur the eddies. △	– The structure is general type. – The oval type is suitable for river flow. ○
Construction	– The temporary equipment is very few. – The construction is possible without closing dyke. – Necessary to protect by scouring around pile on riverbed. ×	– The temporary equipment is very few. – To be necessary the closing dyke to construct in the river. △	– The temporary equipment is very few. – To be necessary the closing dyke to construct in the river △
Evaluation	×	△	○