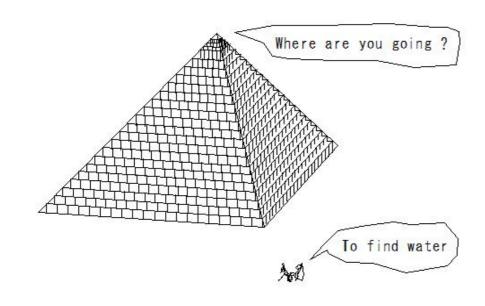
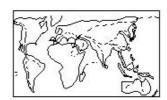
(26)Irrigation(Illustration) in Africa(1-349)

(26) Irrigation (Illustration) in Africa (1-349)

The Egyptian pyramids are ancient masonry structures located in Egypt.





只野敏夫 TADANO TOSHIO Reference

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Tadano Toshio

(I1) Culvert(Underdrain)(I2) Underdrain(Culvert)(I3) Underdrain(Culvert)(I4) Underdrain(Culvert)(I5) Underdrain(Culvert)

(I6) Underdrain(Culvert)

(I7) Ridge (Hilling)

(I8) N-type water loss measuring device

(I9)Apron

(I10)Liquefaction

(I11) Counterweight fill :loading berm:Reinforced embankment

(I12) Orifice

(I13) Greenhouse

(I14)water warming facilities (I15)water warming facilities

(I16) Talus

(I17)Dry Field reclamation (I18)Dry Field reclamation

(I19)Stepped chute(Staircase rapids construction)

(I20) Vortex sand discharge pipe (I21)River mouth improvement (I22)River mouth improvement (I23)River mouth improvement (I24)River mouth improvement

(I25) Igneous rock (I26)Stream order

(I27)river

(I28)River land (I29)River channel

(I30)Gully protection dam (I31)Shallow sump drainage (I32)Temporary cofferdam (I33)Temporary cofferdam

(I34) Paddy field irrigation methods

Culvert(Underdrain) Underdrain(Culvert) Underdrain(Culvert) Underdrain(Culvert) Underdrain(Culvert) Underdrain(Culvert) Ridge (Hilling)

N-type water loss measuring device

Apron

Liquefaction

Counterweight fill :loading berm:Reinforced embankment

Orifice

Greenhouse

Water warming facilities Water warming facilities

Talus

Dry Field reclamation
Dry Field reclamation

Stepped chute(Staircase rapids construction)

Vortex sand discharge pipe River mouth improvement River mouth improvement River mouth improvement River mouth improvement

Igneous rock Stream order

River

(I28)River land River channel

Gully protection dam Shallow sump drainage Temporary cofferdam Temporary cofferdam

Paddy field irrigation methods

- (I35) Paddy field irrigation methods
- (I36) Paddy field irrigation methods
- (I37) Irrigation efficiency
- (I38) Irrigation facilities
- (I39) Country Elevator
- (I40)reclamation in water area
- (I41) Reclamation embankment
- (I42) Reclamation embankment
- (I43) Reclamation embankment
- (I44) Tidal river
- (I45) Water faucet with angle valve
- (I46) Chute(Rapid flow works)
- (I47) Influent stream (Recharge River)
- (I48)cutting
- (I49) Cut and fill
- (I50) Cowshed (free stall cowshed)
- (I51) Conjugate depth
- (I52) Air valve
- (I53)Grouting
- (I54)Quicksand phenomenon
- (I55)Levee:border
- (I56) Evapotranspiration and water loss
- (I57) Evapotranspiration and water loss
- (I58)Energy dissipator
- (I59)Core type dam
- (I60) intersection
- (I61) Flood control
- (l62) Farmland block
- (163) flood sluice of fill dam
- (I64) flood sluice of fill dam
- (165) flood sluice of fill dam
- (I66) flood sluice of fill dam
- (167) flood sluice of fill dam
- (168) flood sluice of fill dam

Paddy field irrigation methods

Paddy field irrigation methods

Irrigation efficiency

Irrigation facilities

Country Elevator

Reclamation in water area

Reclamation embankment

Reclamation embankment

Reclamation embankment

Tidal river

Water faucet with angle valve

Chute(Rapid flow works)

(Influent stream (Recharge River)

cutting

Cut and fill

Cowshed (free stall cowshed)

Conjugate depth

Air valve

Grouting

Quicksand phenomenon

Levee:border

Evapotranspiration and water loss

Evapotranspiration and water loss

Energy dissipator

Core type dam

intersection

Flood control

Farmland block

flood sluice of fill dam

(169) flood sluice of fill dam

(170) flood sluice of fill dam

(I71) flood sluice of fill dam

(I72) Schedule

(173) revetment

(I74)Berm

(I75) Corrugated flume dimensions (mm)

(I76) Corrugated pipe

(177) Concrete lining

(I78) (Mixing tillage) Mixed layer cultivation

(179) Silo

(180) Silo

(I81) Siphon

(182) Erosion control works

(I83) Sand Ripples

(184) sand drain method

(185) Three phases of soil

(I86) Retarding basin

(187) Gate

(I88) Urbanization control area

(189) Urbanization control area

(190) Urbanization control area

(I91) Urbanization control area

(I92) Waterstop

(I93) Waterstop

(I94) Waterstop

(195)Landslide

(I96)sodding(Seed spraying)

(197)sodding(Seed spraying)

(198)sodding(Seed spraying)

(199)sodding(Seed spraying)

(I100)sodding(Seed spraying)

(I101)sodding(Seed spraying)

(I102)sodding(Seed spraying)

flood sluice of fill dam

flood sluice of fill dam

flood sluice of fill dam

Schedule

revetment

Berm

Corrugated flume dimensions (mm)

Corrugated pipe

Concrete lining

(Mixing tillage) Mixed layer cultivation

Silo Silo

Siphon

Erosion control works

Sand Ripples

sand drain method Three phases of soil

Retarding basin

Gate

Urbanization control area

Urbanization control area

Urbanization control area Urbanization control area

Waterstop Waterstop

Landslide

sodding(Seed spraying)

(I103)sodding(Seed spraying) (I104)Automatic cross regulator (I105)Automatic cross regulator (I106) Water-resistant sheet (I107) Compaction curve (I108) Fold (I109)Slope failure (I110)Slope failure (I111)Slope failure (I112) Settlement type (I113) Settlement type (I114) Settlement type (I115) Settlement type (I116)Inlet works(water intake facility) (I117) Wetted perimeter (I118) Diversion ditch (I119) Relief well(Water gate) (I120) Relief well(Water gate) (I121) Relief well(Water gate) (I122) Water consumption (I123) Water consumption (I124) Water consumption (I125) Cylinder gate (I126) Plowing (Puddling) (I127) Expansion joint (I128) Expansion joint (I129) Expansion joint (I130) Subsoil Breaking (I131) Subsoil Breaker (I132) Penetrating method (I133) Penetration method (I134) Penetration method (I135)Water level (I136) Waterway/farm road(Passable ditch) sodding(Seed spraying) sodding(Seed spraying) sodding(Seed spraying) Water-resistant sheet Compaction curve Fold Slope failure Slope failure Slope failure Settlement type Settlement type Settlement type Settlement type Inlet works(water intake facility) Wetted perimeter Diversion ditch Relief well(Water gate) Relief well(Water gate) Relief well(Water gate) Water consumption Water consumption Water consumption Cylinder gate Plowing (Puddling) **Expansion** joint Expansion joint **Expansion** joint Subsoil Breaking Subsoil Breaker Penetrating method Penetrating method Penetrating method

Water level

Waterway/farm road(Passable ditch)

(I137) Waterway/farm road(Passable ditch)	Waterway/farm road(Passable ditch)
(I138) Waterway/farm road(Passable ditch)	Waterway/farm road(Passable ditch)
(I139)Groin(groyne - spur dike)	Groin(groyne ⋅ spur dike)
(I140)Groin(groyne - spur dike)	Groin(groyne ⋅ spur dike)
(I141)Groin(groyne - spur dike)	Groin(groyne - spur dike)
(I142)Groin(groyne - spur dike)	Groin(groyne • spur dike)
(I143)Groin(groyne - spur dike)	Groin(groyne - spur dike)
(I144)Groin(groyne - spur dike)	Groin(groyne - spur dike)
(I145) Aqueduct bridge (water pipe bridge)	Aqueduct bridge (water pipe bridge)
(I146) Waterway bridge (flume type)	Waterway bridge (flume type)
(I147) Reinforced concrete L-shaped for waterways	Reinforced concrete L-shaped for waterways
(I148) Corner cutting	Corner cutting
(I149)Slide gate	Slide gate
(I150) Seiche	Seiche
(I151) Conformity/Unconformity	Conformity/Unconformity
(I152) Conformity/Unconformity	Conformity/Unconformity
(I153) Sand-static fences(Sand control hedge) and sand-retention fences	Sand-static fences(Sand control hedge) and sand-retention fences
(I154) Straightening basin (Baffle water tank)	Straightening basin (Baffle water tank)
(I155) Stone materials	Stone materials
(I156) Lime spreader	Lime spreader
(I157) Sprinkler	Sprinkler
(I158) Sprinkler	Sprinkler
(I159) Sprinkler	Sprinkler
(I160) Sprinkler	Sprinkler
(I161) Laminar flow, uniform flow	Laminar flow, uniform flow
(I162) Laminar flow, uniform flow	Laminar flow, uniform flow
(I163) Bedding	Bedding
(I164) Shallow water	Shallow water
(I165) Hydrological cycle	Hydrological cycle
(I166) Compost spreader	Compost spreader
(I167) Evacuation shelter(Passing place)	Evacuation shelter(Passing place)
(I168) Bench terraced fields	Bench terraced fields
(I169) Step cutting	Step cutting
(I170) Groundwater	Groundwater

(I171) Groundwater level (I172) Underground dam (I173)Replacement method (I174)Replacement method (I175) Surface irrigation (I176) Surface irrigation (I177) Surface irrigation (I178) Surface irrigation (I179)Geological profiile (I180)Geological column (I181)Regulating reservoir (I182)Fixed ruler: finishing stake (I183) Fixed ruler: finishing stake (I184)Alluvium (I185)Pressure Regulating Facility (Float Valve Type) (I186)Mattress (I187)Soil structure (I188)Thiessen method (I189)Peat (I190)Decreasing curve(Recession curve) (I191) Crest length (I192)Alignment of Dike (I193)Reinforced concrete built up canal(Fence plate) (I194)Levee (Dike • Embankment) (I195)Levee (dike - embankment) (I196) Reinforced concrete flume (I197) Reinforced concrete flume (I198) Reinforced concrete bench flume (I199) Reinforced concrete bench flume (I200) Tension meter (I201) Terrace channel (I202)Isohyetal method (I203)Earth pressure (I204)Contour cultivation

Groundwater level Underground dam Replacement method Replacement method Surface irrigation Surface irrigation Surface irrigation Surface irrigation Geological profiile Geological column Regulating reservoir Fixed ruler: finishing stake Fixed ruler: finishing stake Alluvium

Pressure Regulating Facility (Float Valve Type)

Mattress Soil structure Thiessen method

Peat

Decreasing curve(Recession curve)

Crest length Alignment of Dike

Reinforced concrete built up canal(Fence plate)

Levee (Dike • Embankment) Levee (dike • embankment) Reinforced concrete flume Reinforced concrete flume

Reinforced concrete bench flume Reinforced concrete bench flume

Tension meter Terrace channel Isohyetal method Earth pressure Contour cultivation (I205)head works(Intake weir) head works(Intake weir) (I206)head works(Intake weir) head works(Intake weir) (I207)head works(Intake weir) head works(Intake weir) (1208)ground sill consolidation works ground sill consolidation works (1209)ground sill consolidation works ground sill consolidation works (I210)groud sill consolidation works groud sill consolidation works (I211)ground sill consolidation works around sill consolidation works (I212)ground sill consolidation works ground sill consolidation works (I213) Right-of-way Right-of-way (I214)Soil stabilization treatment Soil stabilization treatment (I215)Soil stabilization treatment Soil stabilization treatment (I216)Soil stabilization treatment Soil stabilization treatment (I217)Soil stabilization treatment Soil stabilization treatment (I218)Soil stabilization treatment Soil stabilization treatment (I219)Soil stabilization treatment Soil stabilization treatment (I220)geotextile-Embankment drainage reinforcement Geotextile (I221)geotextile-Separation of different materials Geotextile (I222)geotextile- Reinforcement of ground, roadbed, etc. Geotextile (I223)geotextile- Preventing suction of earth and sand Geotextile (1224)Geotextile Geotextile (I225)Geotextile Geotextile (I226)Geotextile Geotextile (1227)Geotextile Geotextile (1228)Geotextile Geotextile (1229) Sedimentation Tank Sedimentation Tank (I230)Soil structure Soil structure (I231)Soil structure Soil structure (I232)Soil structure Soil structure (I233)Soil structure Soil structure (I234)Soil structure Soil structure (I235)Soil structure Soil structure (I236)Soil structure Soil structure (I237)Soil structure Soil structure (I238)Soil water Soil water

(I239)Soil water Soil water (I240)Soil water Soil water (I241)Mass curve Soil water (1242) Soil improvement Soil improvement (1243) Soil improvement Soil improvement (1244) Soil improvement Soil improvement (1245) Soil improvement Soil improvement (I246)Earth retaining work Earth retaining work (I247)Tractor excavator(attachment) Tractor excavator(attachment) (I248)Tractor excavator(attachment) Tractor excavator(attachment) (I249)Tractor excavator(attachment) Tractor excavator(attachment) (I250)Transition Transition (I251)Agricultural trailer Agricultural trailer Trencher (I252)Trencher (I253)Inland water level and outer water level Inland water level and outer water level (I254)Dip slope Dip slope (I255)Seedling bed(Rice nursery) Seedling bed(Rice nursery) (I256)Nappe Nappe (1257)Nappe Nappe (I258) Trench Excavation Trench Excavation (I259)Agricultural Promotion Areas **Agricultural Promotion Areas** (I260)Land reclamation (compound land reclamation) Land reclamation (compound land reclamation) (I261)Farm roads Farm roads (I262)Farm road landing and takeoff site Farm road landing and takeoff site (I263)Water balance Water balance (I264)Slope crib work Slope crib work (I265)Slope crib work Slope crib work (I266)Slope crib work Slope crib work (I267)Slope crib work Slope crib work (I268)Slope crib work Slope crib work (I269)Hyetograph Hyetograph (I270)Piping type(pipeline system) Piping type(pipeline system) (I271)Piping type(pipeline system) Piping type(pipeline system)

Drainage channel

(I272)Drainage channel

(1273)Pipeline (1274)Pipeline (1275)Pipeline (1276)hydrograph (1277) Crushing and Compacting Method (1278) Butterfly valve (1279)levee widening (1280)surface runoff (1281)Disk harrow (1282)Flume (1283)Hay baler (1284)Heaving (1285)Rice paddy vinyl sheet (1286)Radial gate (hinge type gate) (1287)High pressure radial gate (hinge type gate) (1288)hinge type gate (1289)miter gate (1290)fill-type dam (1291)fill-type dam (1291)fill-type dam (1292)fill-type dam (1293)fill-type dam (1293)fill-type dam (1294)Granite weathering (1295)Forage harvester (1296)Composite waterway (compound canal) (1297) Plastic greenhouse (1298)Plow (1299)Tractor excavator(attachment) (1300)ripper (1301)Diversion works (1302)Diversion works (1303)Diversion works (1304)Diversion works (1305)Farm Road	Pipeline Pipeline Pipeline Pipeline Pipeline hydrograph Crushing and Compacting Method Butterfly valve levee widening surface runoff Disk harrow Flume Hay baler Heaving Rice paddy vinyl sheet Radial gate (hinge type gate) High pressure radial gate (hinge type gate) hinge type gate miter gate fill-type dam fill-type dam fill-type dam Granite weathering Forage harvester Composite waterway (compound canal) Plastic greenhouse Plow Tractor excavator(attachment) ripper Diversion works Diversion works Diversion works Piversion works
(I306)Farm Road (I306)Farm Road	Farm Road Farm Road

(I307) Pavement (I308) Pavement (I309) Pavement (I310) Pavement (I311) Pavement (I312) Pavement (I313) Pavement (I314) Pavement (I315) Pavement

(I316) Diversion channel(detour ditch)

(I317) Mulching (I318) Butt

(I319)Water-route

(I320) Water management (I321) Water inlet and outlet

(I322) Open channel (I323) Planar erosion (I324) Mower (Frail type) (I325) Mower (Side rake) (I326) Capillary water

(I327) Capillary condensation

(I328) Molded drain

(I329)Detention basin (Retarding basin) (I330)Effective water storage amount

(I331)Upwelling

(I332) Water arrival time

(I333) Surface drainage (paddy fields) (I334) Irrigation and drainage facilities

(I335) Spillway

(I336) Waterway for drainage and irrigation

(I337) Embankment (I338) Embankment (I339)Sediment (I340)Flow net Pavement Pavement Pavement Pavement Pavement Pavement Pavement Pavement

Diversion channel(detour ditch)

Mulching Butt

Water-route

Water management Water inlet and outlet

Open channel
Planar erosion
Mower (Frail type)
Mower (Side rake)
Capillary water

Capillary condensation

Molded drain

Detention basin (Retarding basin) Effective water storage amount

Upwelling

Water arrival time

Surface drainage (paddy fields)
Irrigation and drainage facilities

Spillway

Waterway for drainage and irrigation

Embankment Embankment Sediment Flow net (I341)Flow net

(I342)Retaining wall

(I343)Head-fall-drop

(I344)Fixed wheel gate(roller gate)

(I345)Diversion works

(I346)Lining

(I347)Lysimeter

(I348)Rotary

(I349)Rotation block

Flow net

Retaining wall

Head-fall-drop

Fixed wheel gate(roller gate)

Diversion works

Lining

Lysimeter

Rotary

Rotation block

(I77) Concrete lining (I28)River land

(I47) Influent stream (Recharge River)

(I78) (Mixing tillage) Mixed layer cultivation

(I259)Agricultural Promotion Areas

(I251)Agricultural trailer

(I52) Air valve

(I192)Alignment of Dike

(I184)Alluvium

(I9)Apron

(I145) Aqueduct bridge (water pipe bridge)

(I163) Bedding

(I168) Bench terraced fields

(I74)Berm (I318) Butt

(I278) Butterfly valve

(I327) Capillary condensation

(I326) Capillary water

(I46) Chute(Rapid flow works) (I107) Compaction curve

(I296)Composite waterway(compound canal)

(I166) Compost spreader (I151) Conformity/Unconformity (I152) Conformity/Unconformity

(I51) Conjugate depth (I204)Contour cultivation (I59)Core type dam (I148) Corner cutting

(I75) Corrugated flume dimensions (mm)

(I76) Corrugated pipe

(I11) Counterweight fill :loading berm:Reinforced embankment

(I39) Country Elevator

(I50) Cowshed (free stall cowshed)

(I191) Crest length

Concrete lining (I28)River land

(Influent stream (Recharge River) (Mixing tillage) Mixed layer cultivation

Agricultural Promotion Areas

Agricultural trailer

Air valve

Alignment of Dike

Alluvium Apron

Aqueduct bridge (water pipe bridge)

Bedding

Bench terraced fields

Berm Butt

Butterfly valve

Capillary condensation

Capillary water

Chute(Rapid flow works)
Compaction curve

Composite waterway (compound canal)

Compost spreader Conformity/Unconformity Conformity/Unconformity

Conjugate depth
Contour cultivation
Core type dam
Corner cutting

Corrugated flume dimensions (mm)

Corrugated pipe

Counterweight fill :loading berm:Reinforced embankment

Country Elevator

Cowshed (free stall cowshed)

Crest length

(1277) Crushing and Compacting Method (I1) Culvert(Underdrain) (I49) Cut and fill (148)cutting (I125) Cylinder gate (I190)Decreasing curve(Recession curve) (I329) Detention basin (Retarding basin) (I254)Dip slope (I281)Disk harrow (I316) Diversion channel(detour ditch)

(I118) Diversion ditch (I301)Diversion works (I302)Diversion works (I303)Diversion works (I304)Diversion works (I345)Diversion works (I272)Drainage channel

(I17)Dry Field reclamation (I18)Dry Field reclamation

(I203)Earth pressure

(I246)Earth retaining work

(I330)Effective water storage amount

(I337) Embankment (I338) Embankment (I58)Energy dissipator (182) Erosion control works

(I167) Evacuation shelter(Passing place) (I56) Evapotranspiration and water loss

(I57) Evapotranspiration and water loss

(I127) Expansion joint (I128) Expansion joint (I129) Expansion joint (I305)Farm Road (I306)Farm Road

Crushing and Compacting Method

Culvert(Underdrain)

Cut and fill cutting

Cylinder gate

Decreasing curve(Recession curve) Detention basin (Retarding basin)

Dip slope Disk harrow

Diversion channel(detour ditch)

Diversion ditch Diversion works Diversion works Diversion works Diversion works Diversion works Drainage channel Dry Field reclamation Dry Field reclamation

Earth pressure Earth retaining work

Effective water storage amount

Embankment Embankment Energy dissipator Erosion control works

Evacuation shelter(Passing place) Evapotranspiration and water loss Evapotranspiration and water loss

Expansion joint Expansion joint Expansion joint Farm Road Farm Road

(I262)Farm road landing and takeoff site Farm road landing and takeoff site (I261)Farm roads Farm roads (I62) Farmland block Farmland block (I290)fill-type dam fill-type dam (I291)fill-type dam fill-type dam (I292)fill-type dam fill-type dam (I293)fill-type dam fill-type dam Fixed ruler :finishing stake (1182) Fixed ruler: finishing stake (I183) Fixed ruler: finishing stake Fixed ruler: finishing stake (I344)Fixed wheel gate(roller gate) Fixed wheel gate(roller gate) (I61) Flood control Flood control (I63) flood sluice of fill dam flood sluice of fill dam (I64) flood sluice of fill dam flood sluice of fill dam (I65) flood sluice of fill dam flood sluice of fill dam (166) flood sluice of fill dam flood sluice of fill dam (I67) flood sluice of fill dam flood sluice of fill dam (168) flood sluice of fill dam flood sluice of fill dam (169) flood sluice of fill dam flood sluice of fill dam (170) flood sluice of fill dam flood sluice of fill dam (I71) flood sluice of fill dam flood sluice of fill dam (I340)Flow net Flow net (I341)Flow net Flow net (I282)Flume Flume (I108) Fold Fold (I295)Forage harvester Forage harvester (187) Gate Gate (I180)Geological column Geological column (I179)Geological profiile Geological profiile (I220)geotextile-Embankment drainage reinforcement Geotextile (I221)geotextile-Separation of different materials Geotextile (I222)geotextile- Reinforcement of ground, roadbed, etc. Geotextile (I223)geotextile- Preventing suction of earth and sand Geotextile (1224)Geotextile Geotextile (I225)Geotextile Geotextile

(I226)Geotextile (I227)Geotextile (I228)Geotextile (1294) Granite weathering (I13) Greenhouse (I139)Groin(groyne - spur dike) (I140)Groin(groyne - spur dike) (I141)Groin(groyne • spur dike) (I142)Groin(groyne • spur dike) (I143)Groin(groyne • spur dike) (I144)Groin(groyne • spur dike) (I210)groud sill consolidation works (1208)ground sill consolidation works (I209)ground sill consolidation works (I211)ground sill consolidation works (1212)ground sill consolidation works (I170) Groundwater (I171) Groundwater level (I53)Grouting (I30)Gully protection dam (I283)Hay baler (I205)head works(Intake weir) (I206)head works(Intake weir) (I207)head works(Intake weir) (I343)Head-fall-drop (I284)Heaving (I287)High pressure radial gate (hinge type gate) (1288)hinge type gate (I276)hydrograph (1165) Hydrological cycle (I269)Hyetograph (I25) Igneous rock (I253)Inland water level and outer water level (I116)Inlet works(water intake facility)

Geotextile Geotextile Granite weathering Greenhouse Groin(groyne • spur dike) Groin(groyne - spur dike) groud sill consolidation works ground sill consolidation works ground sill consolidation works ground sill consolidation works ground sill consolidation works Groundwater Groundwater level Grouting Gully protection dam Hay baler head works(Intake weir) head works(Intake weir) head works(Intake weir) Head-fall-drop Heaving High pressure radial gate (hinge type gate) hinge type gate hydrograph Hydrological cycle Hyetograph Igneous rock Inland water level and outer water level

Inlet works(water intake facility)

Geotextile

(I60) intersection

(I334) Irrigation and drainage facilities

(I37) Irrigation efficiency (I38) Irrigation facilities

(I202)Isohyetal method

(I161) Laminar flow, uniform flow (I162) Laminar flow, uniform flow

(I260)Land reclamation (compound land reclamation)

(I95)Landslide

(1279)levee widening

(I194)Levee (Dike • Embankment) (I195)Levee (dike • embankment)

(I55)Levee:border (I156) Lime spreader

(I346)Lining (I10)Liquefaction (I347)Lysimeter (I186)Mattress

(I289)miter gate (I328) Molded drain

(I324) Mower (Frail type) (I325) Mower (Side rake)

(I317) Mulching (I256)Nappe (I257)Nappe

(I8) N-type water loss measuring device

(I322) Open channel

(I12) Orifice

(I34) Paddy field irrigation methods (I35) Paddy field irrigation methods (I36) Paddy field irrigation methods

(I307) Pavement (I308) Pavement (I309) Pavement intersection

Irrigation and drainage facilities

Irrigation efficiency Irrigation facilities Isohyetal method

Laminar flow, uniform flow Laminar flow, uniform flow

Land reclamation (compound land reclamation)

Landslide levee widening

Levee(Dike • Embankment)
Levee(dike • embankment)

Levee:border Lime spreader

Lining
Liquefaction
Lysimeter
Mattress
miter gate
Molded drain
Mower (Frail type)

Mower (Side rake) Mulching Nappe Nappe

N-type water loss measuring device

Open channel

Orifice

Paddy field irrigation methods Paddy field irrigation methods Paddy field irrigation methods

Pavement Pavement Pavement (I310) Pavement (I311) Pavement (I312) Pavement (I313) Pavement (I314) Pavement (I315) Pavement (I189)Peat (I132) Penetrating method (I133) Penetration method (I134) Penetration method (I273)Pipeline (I274)Pipeline (I275)Pipeline (I270)Piping type(pipeline system) (I271)Piping type(pipeline system) (I323) Planar erosion (1297) Plastic greenhouse (1298)Plow (I126) Plowing (Puddling) (I185)Pressure Regulating Facility (Float Valve Type) (I54)Quicksand phenomenon (I286)Radial gate (hinge type gate) (I41) Reclamation embankment (I42) Reclamation embankment (I43) Reclamation embankment (I40)reclamation in water area (I181)Regulating reservoir (I198) Reinforced concrete bench flume (I199) Reinforced concrete bench flume (I193)Reinforced concrete built up canal(Fence plate) (I196) Reinforced concrete flume (I197) Reinforced concrete flume (I147) Reinforced concrete L-shaped for waterways (I119) Relief well(Water gate)

Pavement Pavement **Pavement** Pavement Pavement Pavement Peat Penetrating method Penetrating method Penetrating method **Pipeline Pipeline Pipeline** Piping type(pipeline system) Piping type(pipeline system) Planar erosion Plastic greenhouse Plow Plowing (Puddling) Pressure Regulating Facility (Float Valve Type) Quicksand phenomenon Radial gate (hinge type gate) Reclamation embankment Reclamation embankment Reclamation embankment Reclamation in water area Regulating reservoir Reinforced concrete bench flume Reinforced concrete bench flume Reinforced concrete built up canal(Fence plate)

Reinforced concrete flume

Reinforced concrete flume

Relief well(Water gate)

Reinforced concrete L-shaped for waterways

(I120) Relief well(Water gate) (I121) Relief well(Water gate) (I173)Replacement method (I174)Replacement method (I342)Retaining wall (I86) Retarding basin (I73) revetment (I285)Rice paddy vinyl sheet (I7) Ridge (Hilling) (I213) Right-of-way (I300)ripper (I27)river (I29)River channel (I21)River mouth improvement (I22)River mouth improvement (I23)River mouth improvement (I24)River mouth improvement (I348)Rotary

(1349)Rotation block

(I84) sand drain method

(I83) Sand Ripples

(I153) Sand-static fences(Sand control hedge) and sand-retention fences

(I72) Schedule (I339) Sediment

(I229) Sedimentation Tank

(I255)Seedling bed(Rice nursery)

(I150) Seiche

(I112) Settlement type (I113) Settlement type (I114) Settlement type (I115) Settlement type

(I31)Shallow sump drainage

(I164) Shallow water

(179) Silo

Relief well(Water gate) Relief well(Water gate) Replacement method Replacement method

Retaining wall Retarding basin revetment

Rice paddy vinyl sheet

Ridge (Hilling) Right-of-way

ripper River

River channel

River mouth improvement River mouth improvement River mouth improvement River mouth improvement

Rotary

Rotation block sand drain method Sand Ripples

Sand-static fences(Sand control hedge) and sand-retention fences

Schedule Sediment

Sedimentation Tank

Seedling bed(Rice nursery)

Seiche

Settlement type Settlement type Settlement type Settlement type

Shallow sump drainage

Shallow water

Silo

(180) Silo (I81) Siphon (I149)Slide gate (I264)Slope crib work (I265)Slope crib work (I266)Slope crib work (I267)Slope crib work (I268)Slope crib work (I109)Slope failure (I110)Slope failure (I111)Slope failure (196)sodding(Seed spraying) (197)sodding(Seed spraying) (198)sodding(Seed spraying) (199)sodding(Seed spraying) (I100)sodding(Seed spraying) (I101)sodding(Seed spraying) (I102)sodding(Seed spraying) (I103)sodding(Seed spraying) (I104)Automatic cross regulator (I105)Automatic cross regulator (1242) Soil improvement (1243) Soil improvement (1244) Soil improvement (1245) Soil improvement (I214)Soil stabilization treatment (I215)Soil stabilization treatment (I216)Soil stabilization treatment (I217)Soil stabilization treatment (I218)Soil stabilization treatment (I219)Soil stabilization treatment (I187)Soil structure (I230)Soil structure (I231)Soil structure

Silo Siphon Slide gate Slope crib work Slope failure Slope failure Slope failure sodding(Seed spraying) Soil improvement Soil improvement Soil improvement Soil improvement Soil stabilization treatment Soil structure Soil structure

Soil structure

(1929) Coil atrustura	Cail atrustura
(I232)Soil structure	Soil structure
(I233)Soil structure	Soil structure Soil structure
(I234)Soil structure	
(I235)Soil structure	Soil structure
(I236)Soil structure	Soil structure
(I237)Soil structure	Soil structure
(I238)Soil water	Soil water
(I239)Soil water	Soil water
(I240)Soil water	Soil water
(I241)Mass curve	Soil water
(I335) Spillway	Spillway
(I157) Sprinkler	Sprinkler
(I158) Sprinkler	Sprinkler
(I159) Sprinkler	Sprinkler
(I160) Sprinkler	Sprinkler
(I169) Step cutting	Step cutting
(I19)Stepped chute(Staircase rapids construction)	Stepped chute(Staircase rapids construction)
(I155) Stone materials	Stone materials
(I154) Straightening basin (Baffle water tank)	Straightening basin (Baffle water tank)
(I26)Stream order	Stream order
(I131) Subsoil Breaker	Subsoil Breaker
(I130) Subsoil Breaking	Subsoil Breaking
(I333) Surface drainage (paddy fields)	Surface drainage (paddy fields)
(I176) Surface irrigation	Surface irrigation
(I177) Surface irrigation	Surface irrigation
(I178) Surface irrigation	Surface irrigation
(I175) Surface irrigation	Surface irrigation
(I280)surface runoff	surface runoff
(I16) Talus	Talus
(I32)Temporary cofferdam	Temporary cofferdam
(I33)Temporary cofferdam	Temporary cofferdam
(I200) Tension meter	Tension meter
(I201) Terrace channel	Terrace channel
(I188)Thiessen method	Thiessen method

(185) Three phases of soil

(I44) Tidal river

(I247)Tractor excavator(attachment)

(I248)Tractor excavator(attachment)

(I249)Tractor excavator(attachment)

(I299)Tractor excavator(attachment)

(I250)Transition

(I258) Trench Excavation

(I252)Trencher

(I2) Underdrain(Culvert)

(I3) Underdrain(Culvert)

(I4) Underdrain(Culvert)

(I5) Underdrain(Culvert)

(I6) Underdrain(Culvert)

(I172) Underground dam

(I331)Upwelling

(188) Urbanization control area

(189) Urbanization control area

(190) Urbanization control area

(I91) Urbanization control area

(I20) Vortex sand discharge pipe

(I332) Water arrival time

(I263)Water balance

(I122) Water consumption

(I123) Water consumption

(I124) Water consumption

(I45) Water faucet with angle valve

(I321) Water inlet and outlet

(I135)Water level

(I320) Water management

(I14)water warming facilities

(I15)water warming facilities

(I106) Water-resistant sheet

(I319)Water-route

Three phases of soil

Tidal river

Tractor excavator(attachment)

Tractor excavator(attachment)

Tractor excavator(attachment)

Tractor excavator(attachment)

Transition

Trench Excavation

Trencher

Underdrain(Culvert)

Underdrain(Culvert)

Underdrain(Culvert)

Underdrain(Culvert)

Underdrain(Culvert)

Underground dam

Upwelling

Urbanization control area

Urbanization control area

Urbanization control area

Urbanization control area

Vortex sand discharge pipe

Water arrival time

Water balance

Water consumption

Water consumption

Water consumption

Water faucet with angle valve

Water inlet and outlet

Water level

Water management

Water warming facilities

Water warming facilities

Water-resistant sheet

Water-route

(I92) Waterstop

(I93) Waterstop

(I94) Waterstop

(I146) Waterway bridge (flume type)

(I336) Waterway for drainage and irrigation

(I136) Waterway/farm road(Passable ditch)

(I137) Waterway/farm road(Passable ditch)

(I138) Waterway/farm road(Passable ditch)

(I117) Wetted perimeter

Waterstop

Waterstop

Waterstop

Waterway bridge (flume type)

Waterway for drainage and irrigation

Waterway/farm road(Passable ditch)

Waterway/farm road(Passable ditch)

Waterway/farm road(Passable ditch)

Wetted perimeter

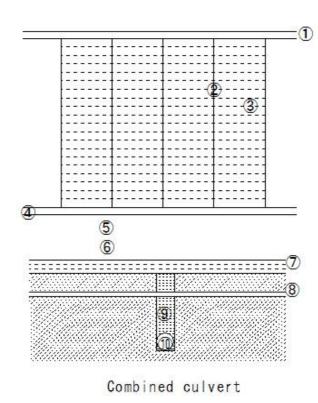
(I1) Culvert(Underdrain)

(I1) Culvert

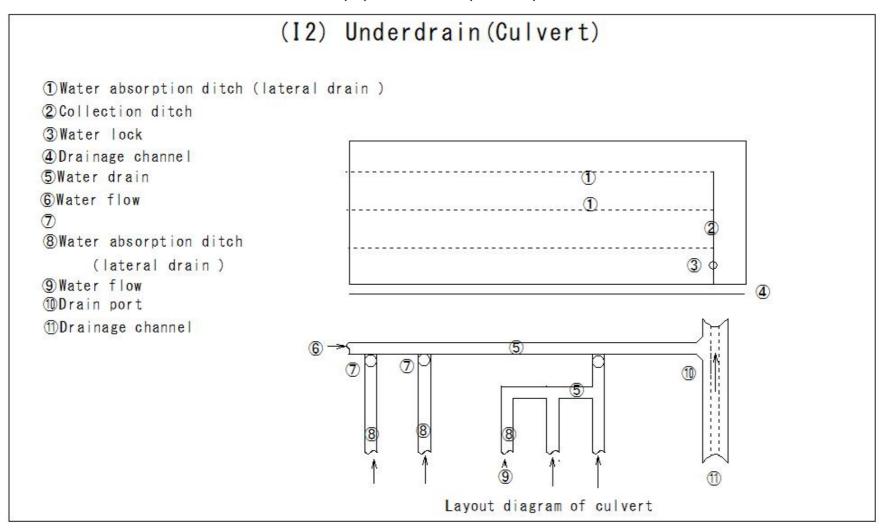
Culvert drainage

Culvert drainage is a drainage method that uses underground waterways (culverts) to improve drainage of land.

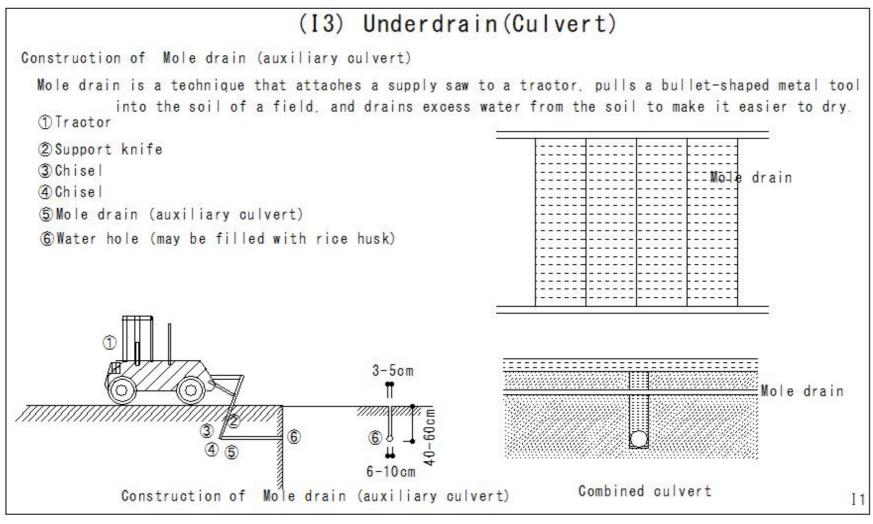
- 1 Waterway
- 2 Main culvert
- 3 Mole drain (auxiliary culvert)
- 4 Drainage channel
- (5) Main culvert interval: 10-20m
- 6 Auxiliary culvert interval: 2-5m
- 7 Cultivated soil layer
- Mole drain (auxiliary culvert)
- Water-repellent material (rice husk)
- 10 Main culvert



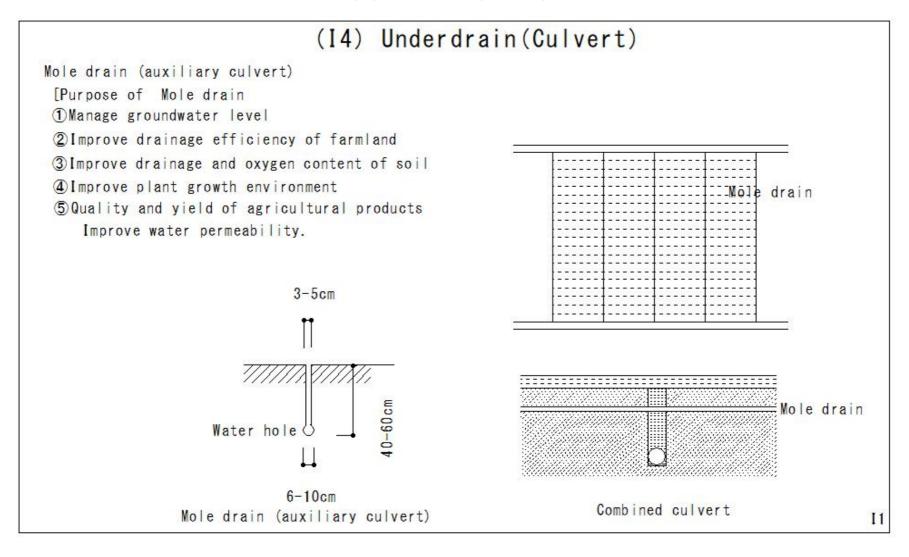
(I2) Underdrain(Culvert)



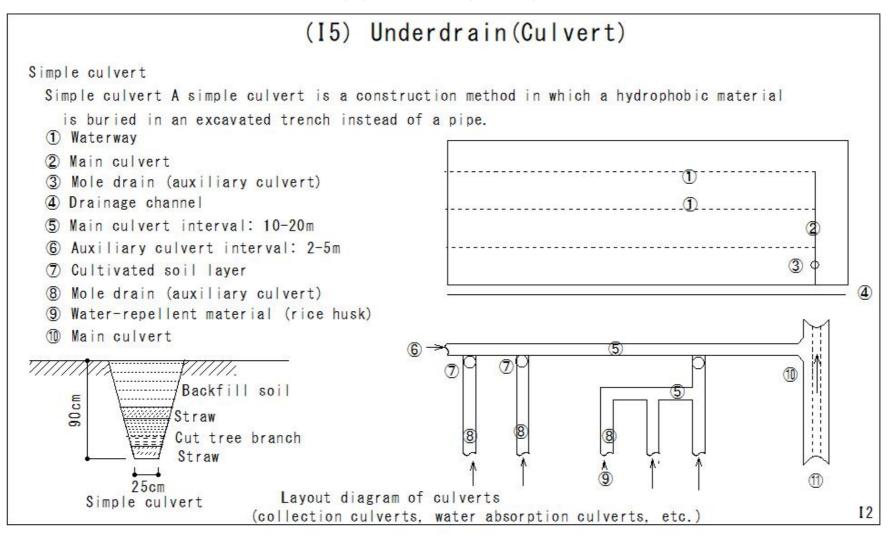
(I3) Underdrain(Culvert)

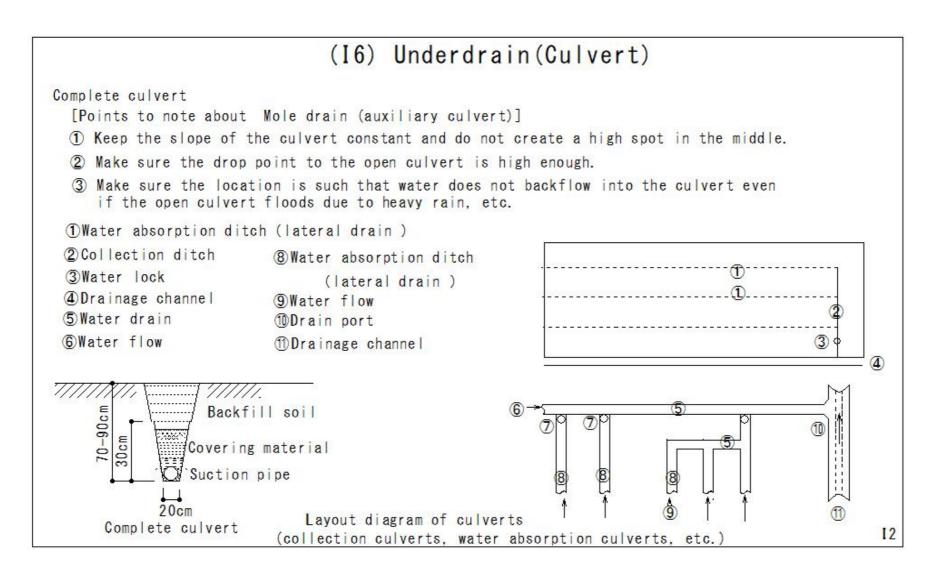


(I4) Underdrain(Culvert)



(I5) Underdrain(Culvert)





(I7) Ridge (Hilling)

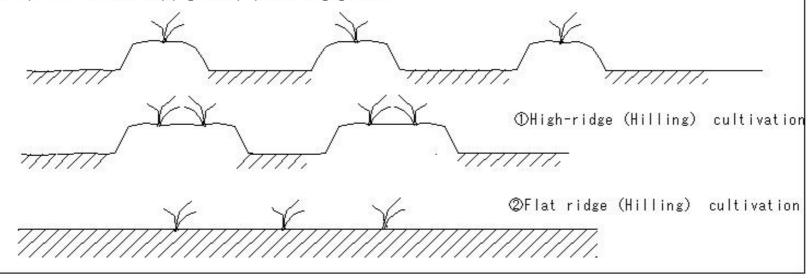
(I7) Ridge (Hilling)

Ridge (Hilling) means a bed of raised soil in a field, and a unit of land area.

- ①High-ridge (Hilling) cultivation
- ©Flat ridge (Hilling) cultivation

[Using ridges (Hilling) as cultivation beds]

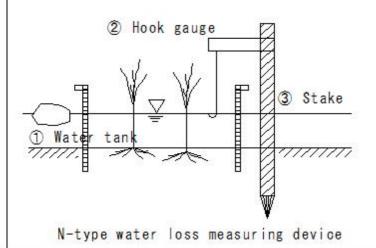
- ③By creating ridges (Hilling), you can secure space for the roots of vegetables and adjust the size of root vegetables.
- The ridges (Hilling) receive plenty of sunlight, which raises the ground temperature.
- The soil's drainage and breathability improve, allowing the roots of vegetables to to spread more easily, greatly promoting growth.

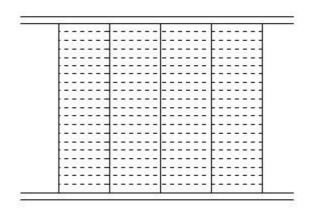


(I8) N-type water loss measuring device

(I8) N-type water loss measuring device

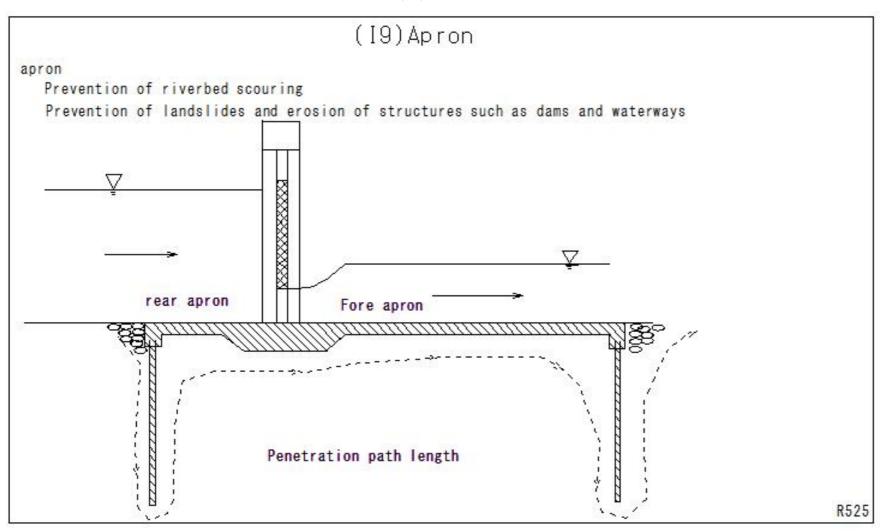
This is an instrument used to measure the amount of evapotranspiration infiltration (water loss) in paddy fields.



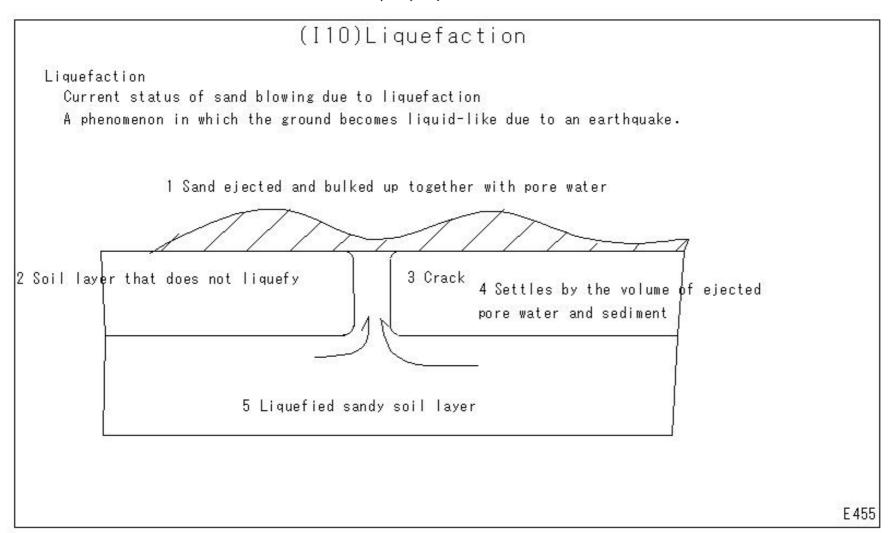


Paddy fields.

(I9)Apron



(I10)Liquefaction



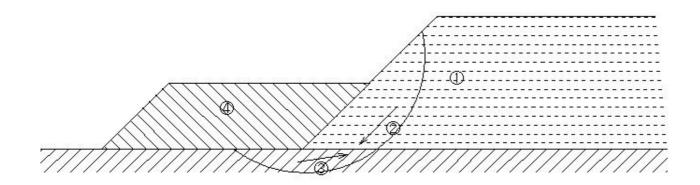
(I11) Counterweight fill :loading berm:Reinforced embankment

(I11) Counterweight fill : loading berm: Reinforced embankment

A construction method that is sometimes adopted as one of the measures against soft ground

Increases resistance to landslides

- ① Embankment
- 2 Force that causes the embankment to slide
- 3 Restraining force by the counterweight fill
- @Counterweight fill



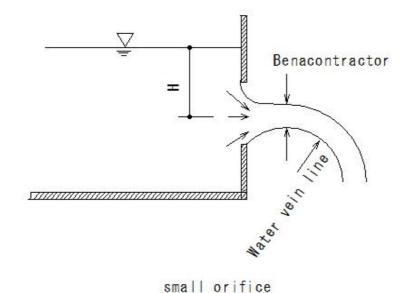
Counterweight fill : loading berm: Reinforced embankment

(I12) Orifice

(I12) Orifice

Orifice

Installed in crossing structures such as tanks, waterways, and dams to control flow rate



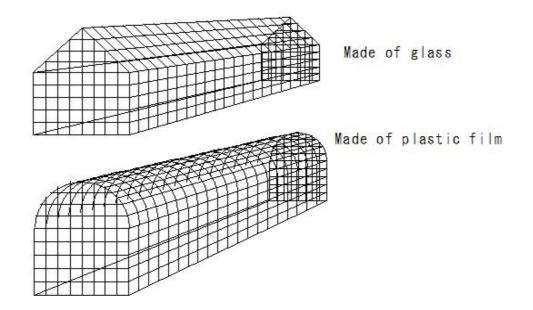
(I13) Greenhouse

(I13) Greenhouse

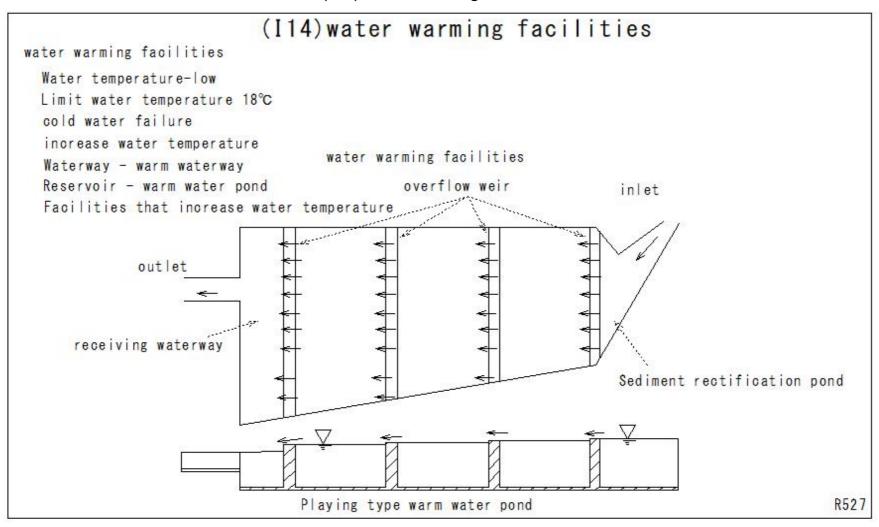
A greenhouse is a building made of glass or plastic film that maintains a constant temperature inside and is used for cultivating, displaying, and researching plants.

- Uses:

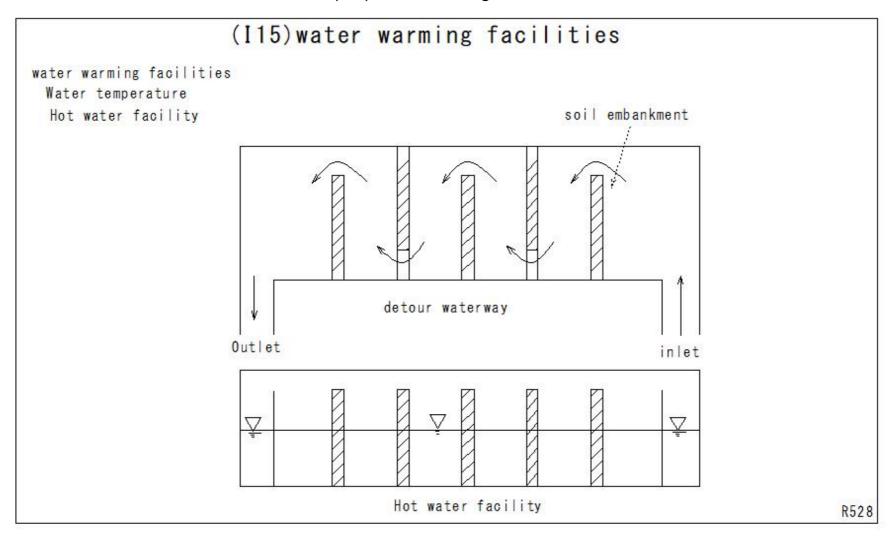
 ① Cultivating agricultural crops
- 2 Displaying and researching plants from warm regions in botanical gardens
- 3 Home gardens



(I14)water warming facilities



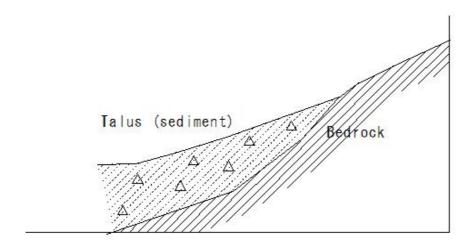
(I15)water warming facilities



(I16) Talus

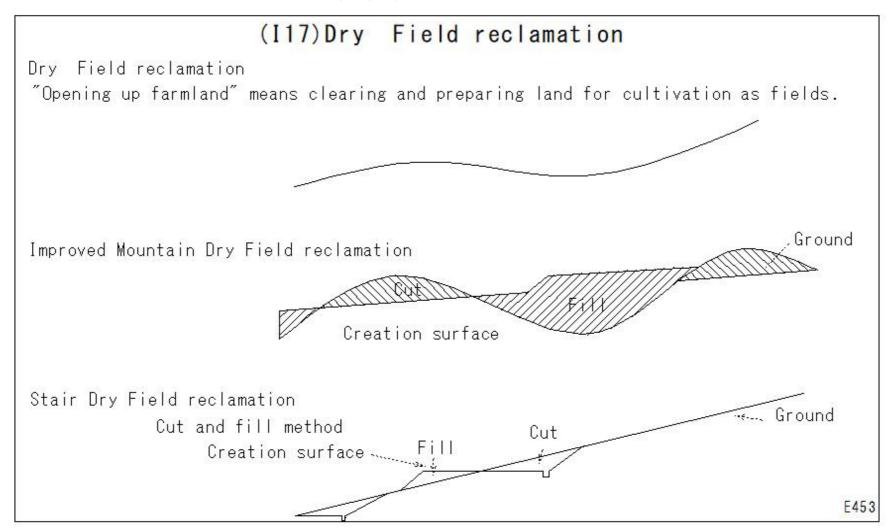
Talus (sediment)

A terrain formed by the accumulation of rock debris and soil that has fallen from steep slopes and cliffs.

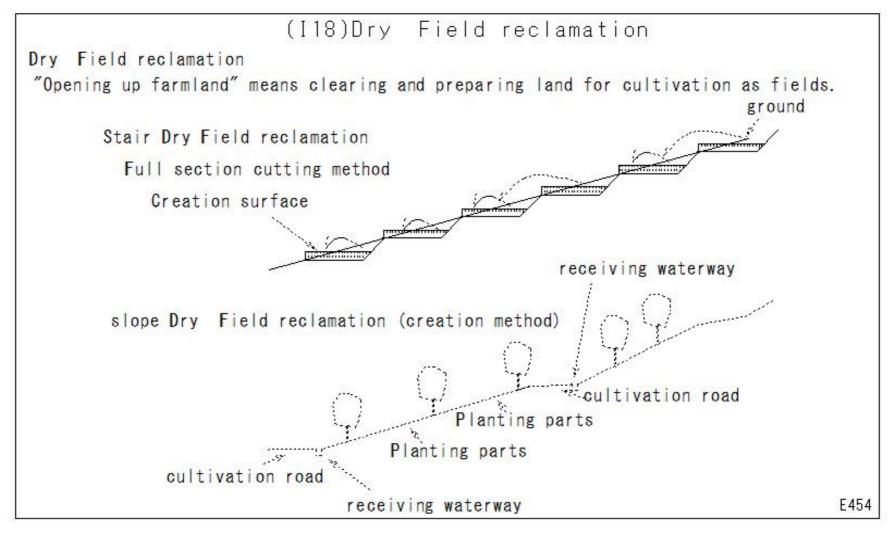


Talus (sediment)

(I17)Dry Field reclamation



(I18)Dry Field reclamation



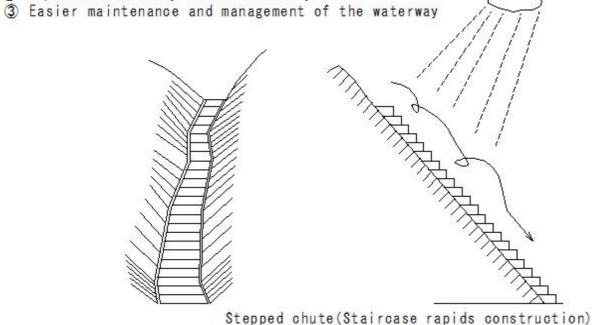
(I19)Stepped chute(Staircase rapids construction)

(I19) Stepped chute (Staircase rapids construction)

Step-and-rapid-flow construction is a waterway construction method that changes the gradient of the waterway at steep sections to mitigate sudden changes in the water flow and prevent sediment runoff.

Benefits:

- 1 Suppression of sediment runoff
- ② Improved stability of the waterway



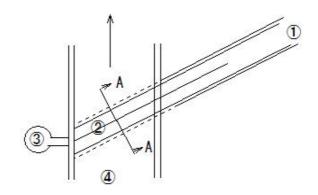
(I20) Vortex sand discharge pipe

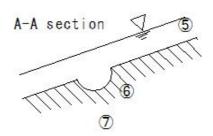
(I20) Vortex sand discharge pipe

vortex tube stand trap

Mountain-form field construction Drainage channel

- 1 Vortex sand discharge pipe
- 2 Slit
- 3 Intake pipe
- 4 Drainage channel
- 5 Drainage channel
- 6 Vortex sand discharge pipe
- 7 Vortex sand discharge pipe



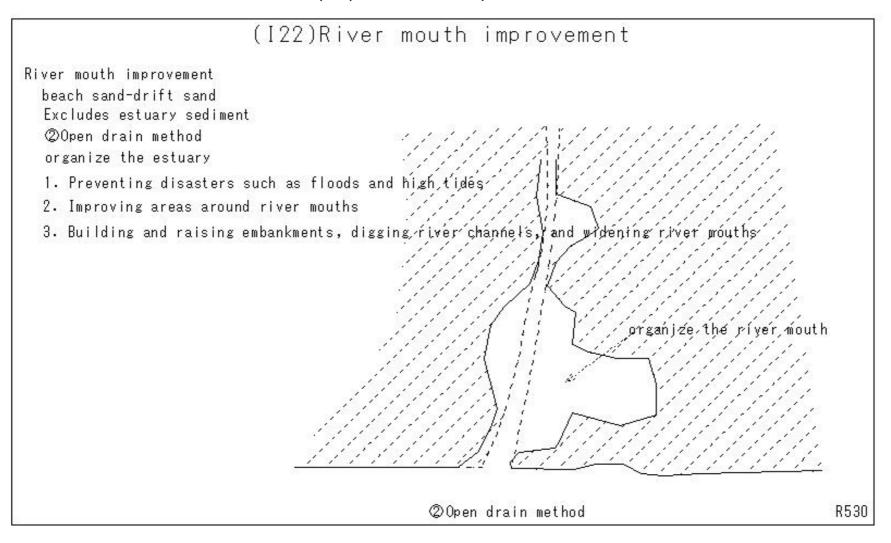


vortex tube stand trap

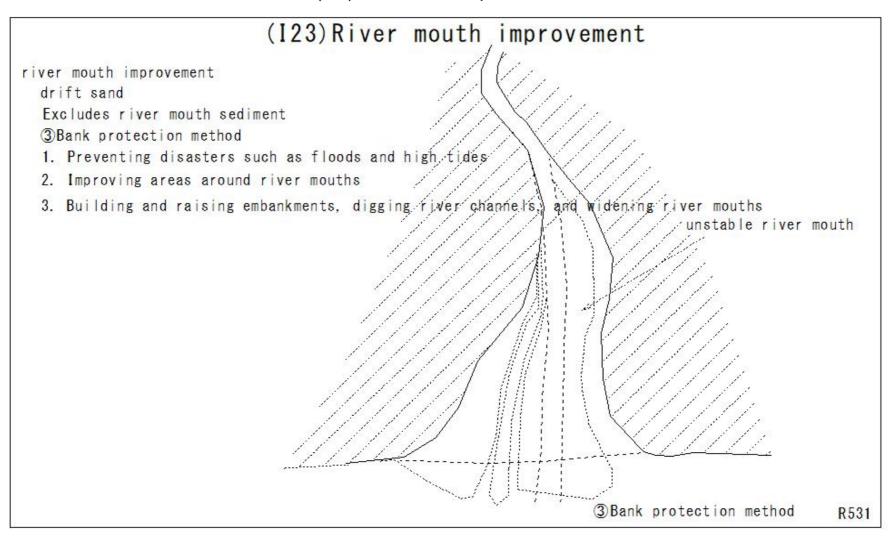
(I21)River mouth improvement

(I21) River mouth improvement River mouth improvement drift sand -beach sand Excludes estuary sediment 1. Preventing disasters such as floods and high tides 2. Improving areas around river mouths 3. Building and raising embankments, digging river channels, and widening river mouths Open one gate at a time to increase the sweeping effect Underdrain method R529

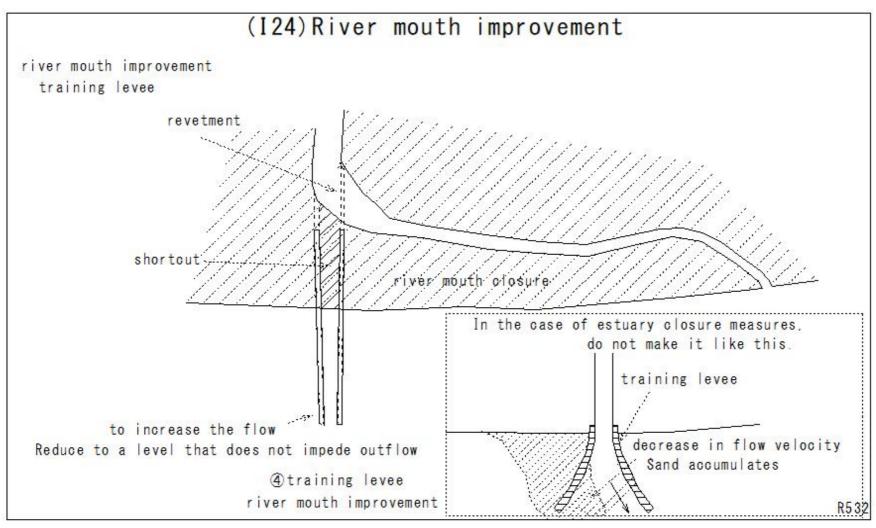
(I22)River mouth improvement



(I23)River mouth improvement



(I24)River mouth improvement



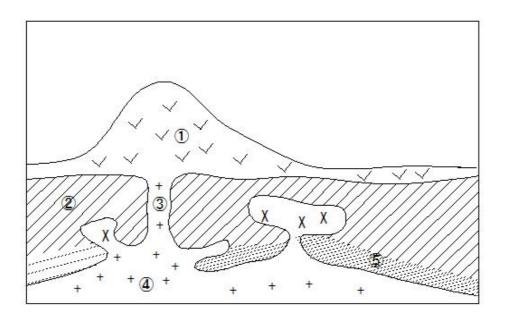
(I25) Igneous rock

(125) Igneous rock

Igneous rock is a rock formed when magma cools and solidifies.

It is broadly divided into volcanic rock and plutonic rock.

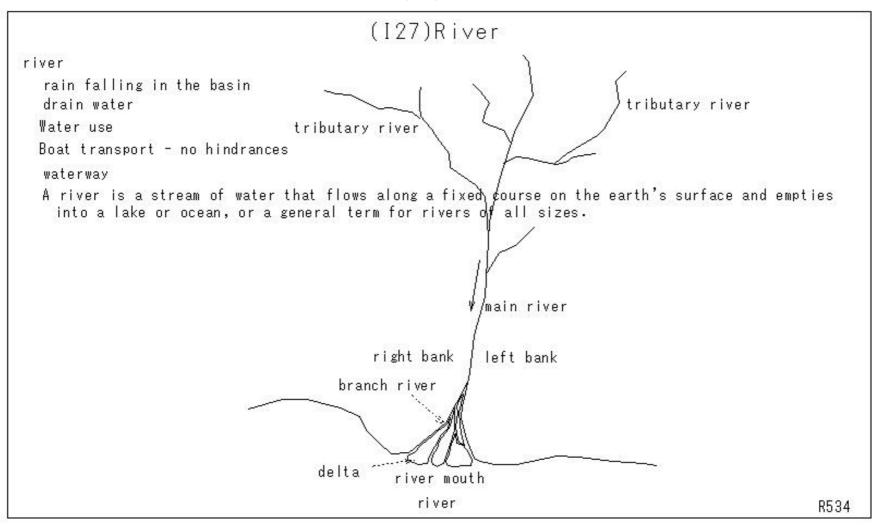
- 1 Volcanic rock
- 2 Sedimentary rock
- 3 Hemi-plutonic rock
- 4 Plutonic rock
- 5 Metamorphic rock



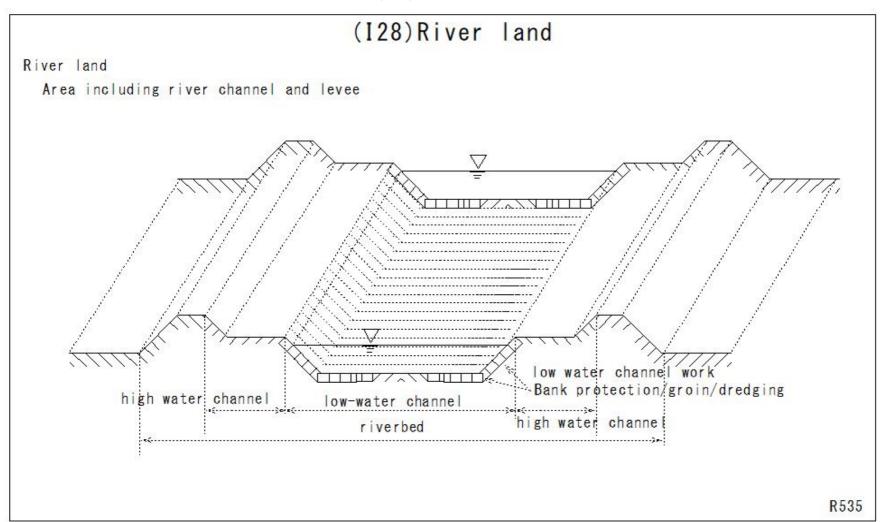
Schematic diagram of igneous rocks

(I26)Stream order

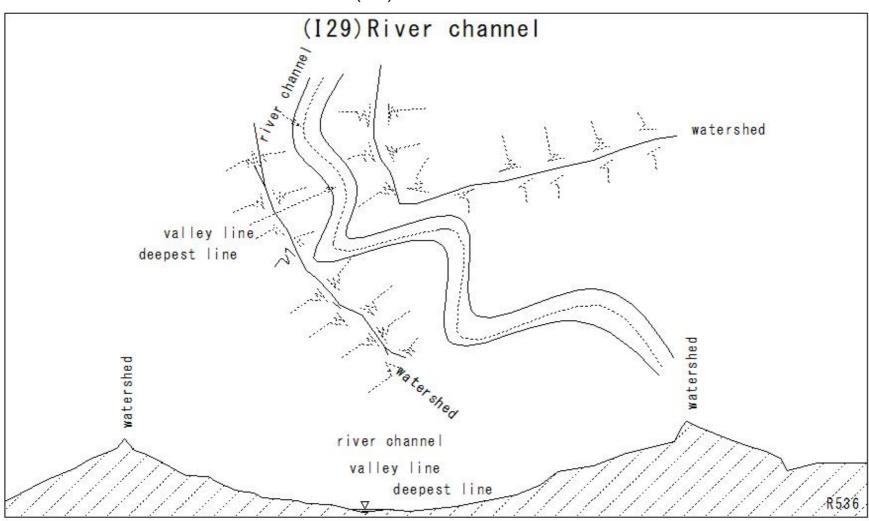
(I26)Stream order river order Horton (R.E. Horton) Trivial stream with no branches at the uppermost stream - primary river Confluence of primary rivers - secondary rivers Confluence of secondary rivers - Tertiary rivers River order is a number assigned to each link (river section) in a river network. R533



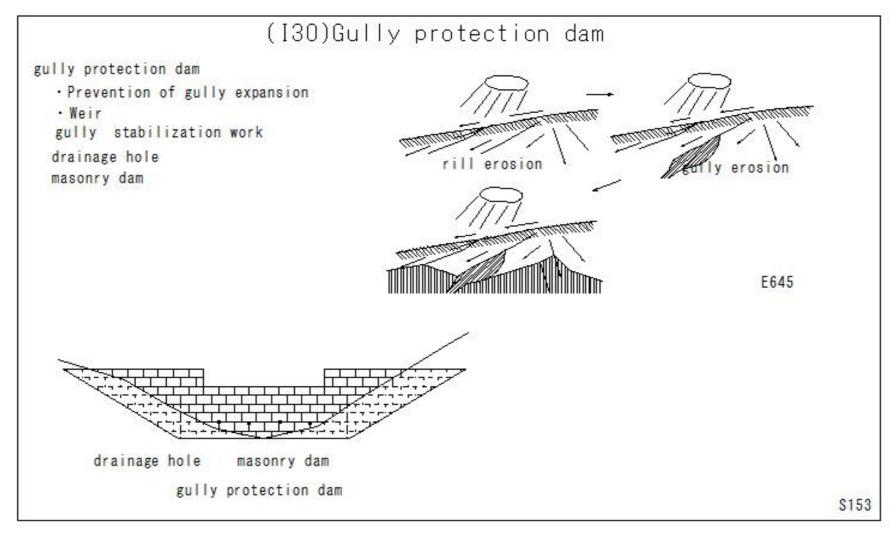
(I28)River land



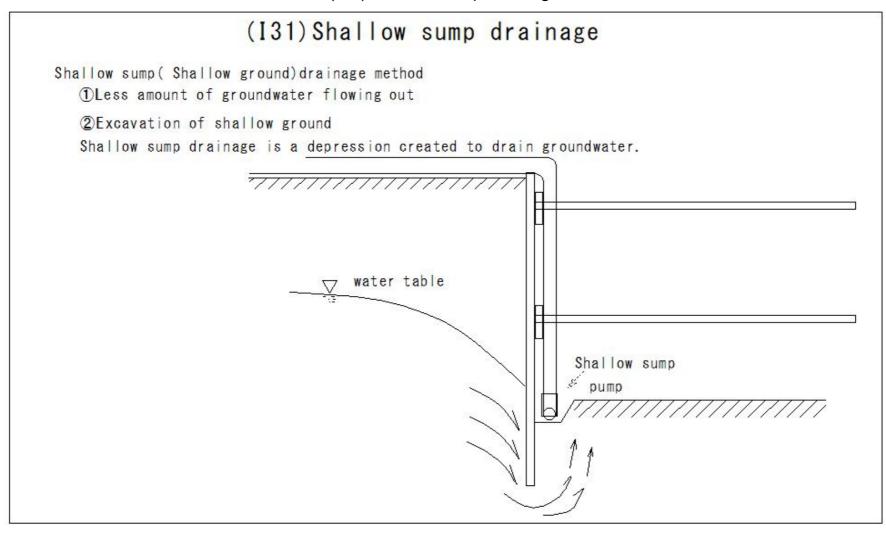
(I29)River channel



(I30)Gully protection dam



(I31)Shallow sump drainage



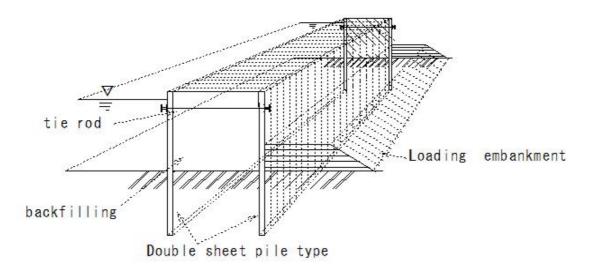
(I32)Temporary cofferdam

(132) Temporary cofferdam

temporary cofferdam

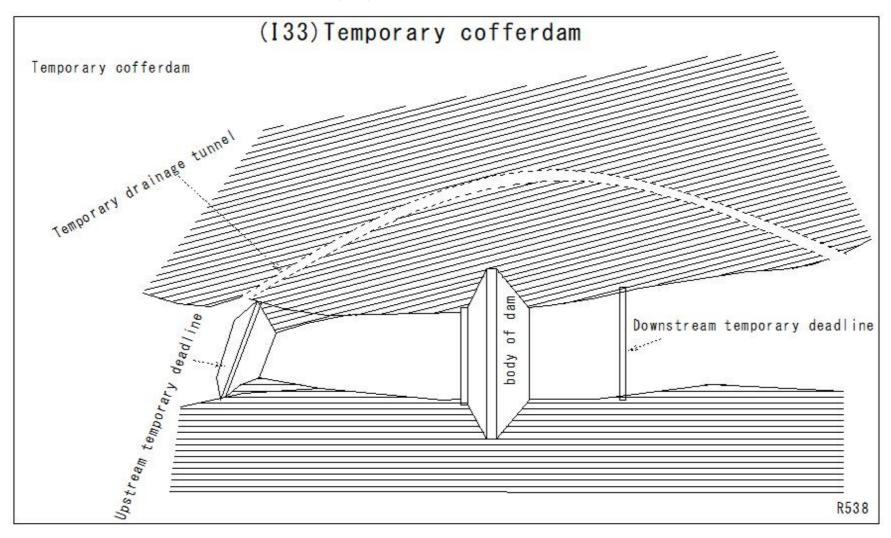
steel sheet pile

A temporary cofferdam is a structure that blocks water and ensures a dry working space when constructing a structure underwater such as in a river or the sea.



R537

(I33)Temporary cofferdam

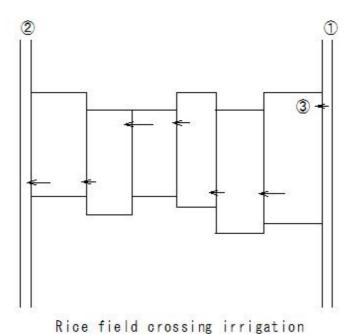


(I34) Paddy field irrigation methods

(I34) Paddy field irrigation methods

Rice field crossing irrigation

- 1 Irrigation channel
- 2 Drainage channel
- 3 Water is passed through an inlet cut into the bank and flows from paddy field to paddy field

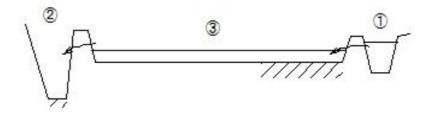


(I35) Paddy field irrigation methods

(I35) Paddy field irrigation methods

Continuous irrigation

- 1 Irrigation channel
- 2 Drainage channel
- 3 Water is passed through an inlet cut into the bank and flows from paddy field to paddy field



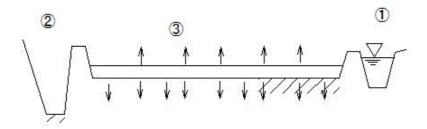
Continuous irrigation

(I36) Paddy field irrigation methods

(136) Paddy field irrigation methods

Flushing irrigation

- 1 Irrigation channel
- 2 Drainage channel
- 3 Water is replenished from the irrigation channel with a constant water level only in proportion to the amount consumed in the paddy field



Flushing irrigation

(I37) Irrigation efficiency

(I37) Irrigation efficiency

Irrigation efficiency (%)

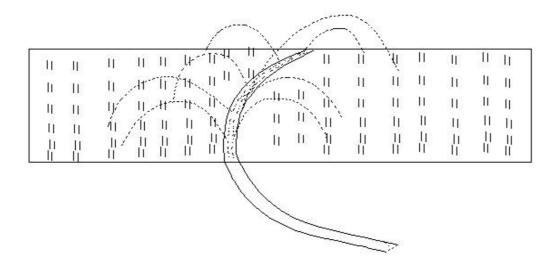
① Classification	Application efficiency	⑤ Transport efficiency	© Irrigation efficiency
② Sprinkler irrigation	80~90	90~95	70~85
③ Furrow irrigation	75	85~90	60~65

(I38) Irrigation facilities

(138) Irrigation facilities

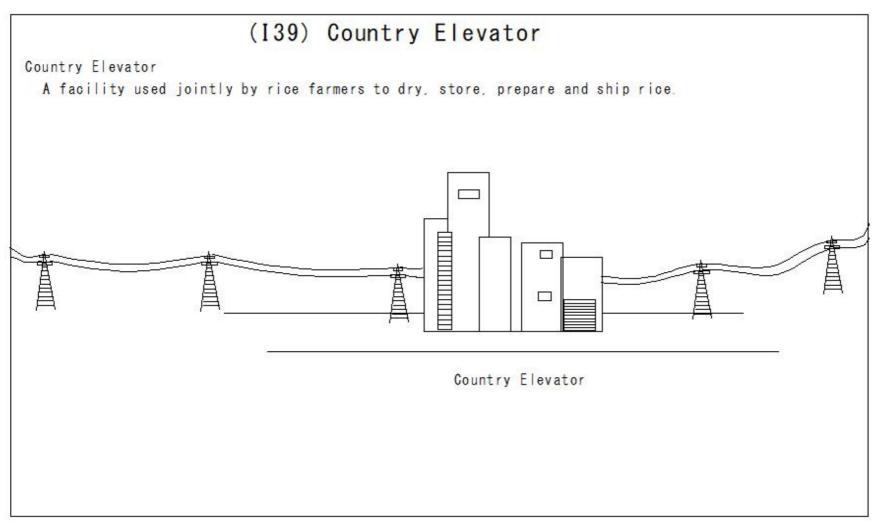
Perforated tube irrigation

An irrigation method that supplies water directly to the roots of crops by drilling small holes (emitters) in the water supply pipe and allowing water to drip from them.

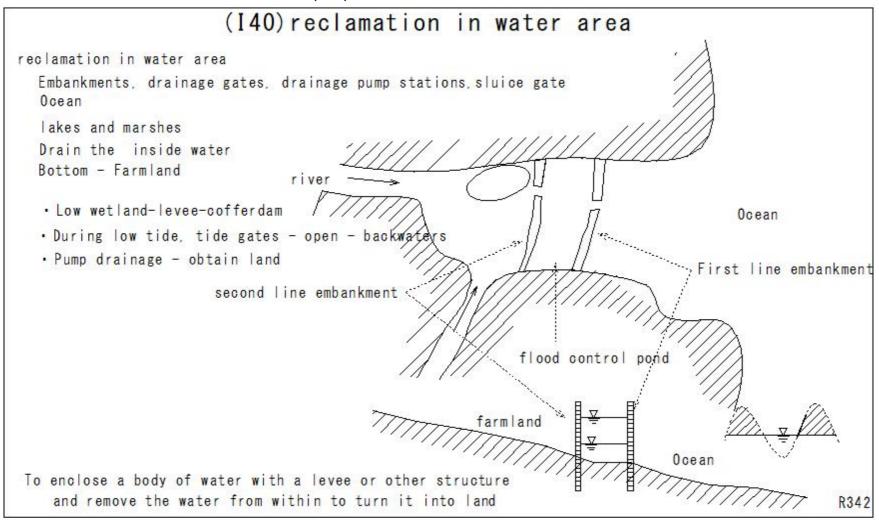


Perforated tube irrigation

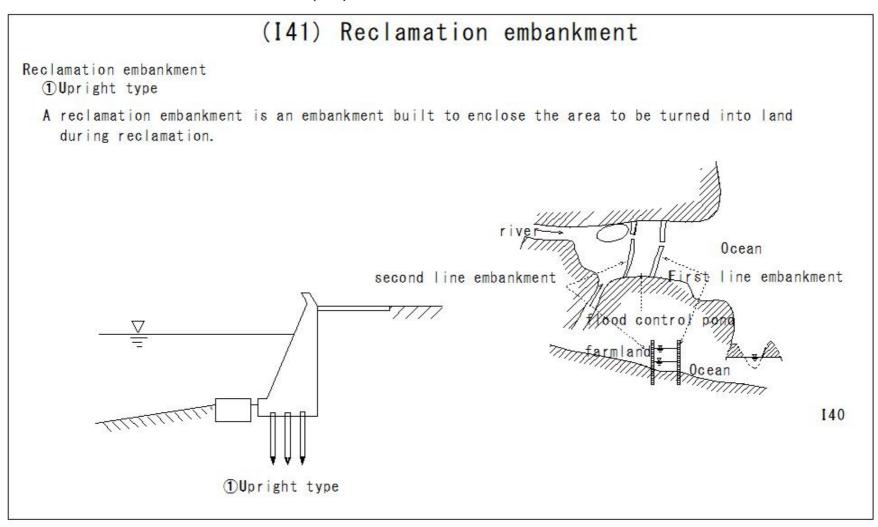
(I39) Country Elevator



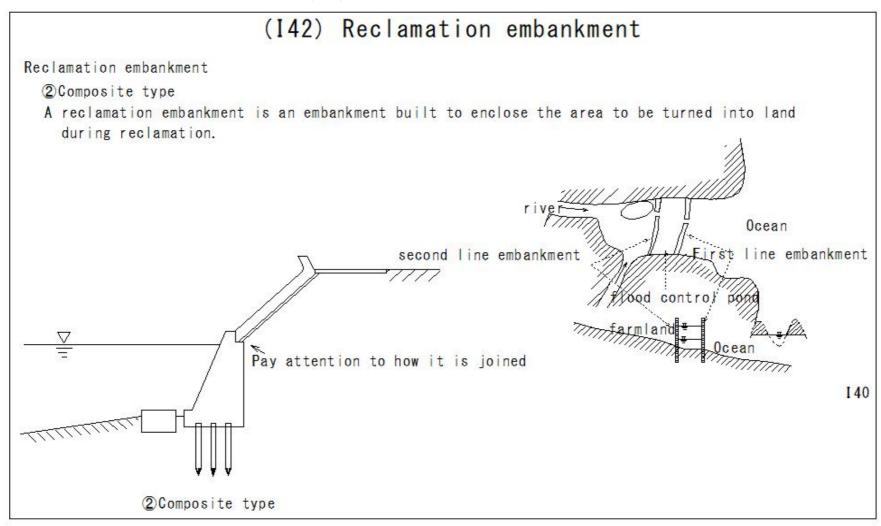
(I40)reclamation in water area



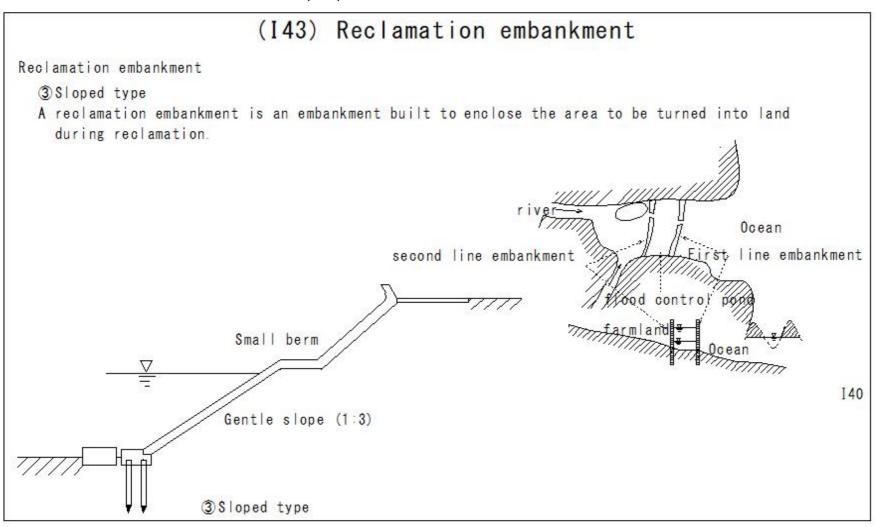
(I41) Reclamation embankment



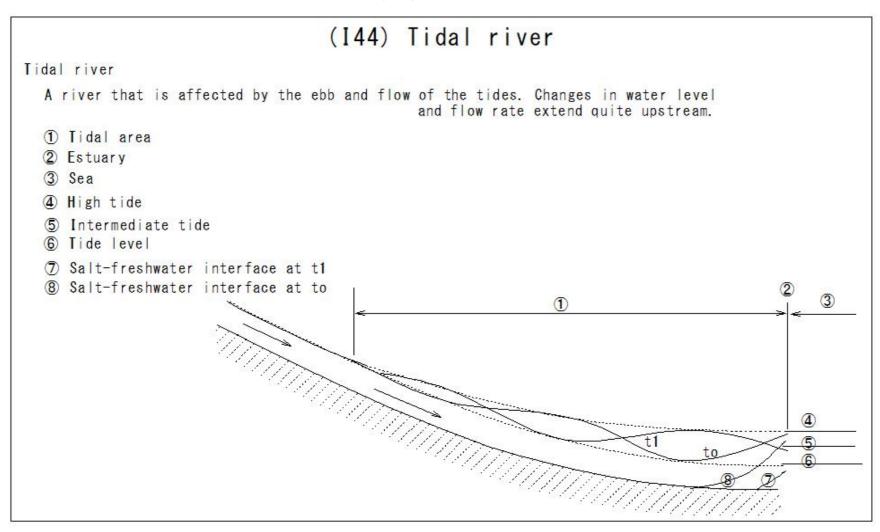
(I42) Reclamation embankment



(I43) Reclamation embankment



(I44) Tidal river



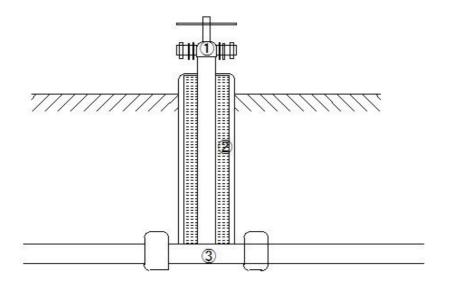
(I45) Water faucet with angle valve

(145) Water faucet with angle valve

Water faucet with angle valve

A water faucet is a device that turns water on and off.

- 1 Valve
- 2 Concrete
- 3 T-pipe



Water faucet with angle valve

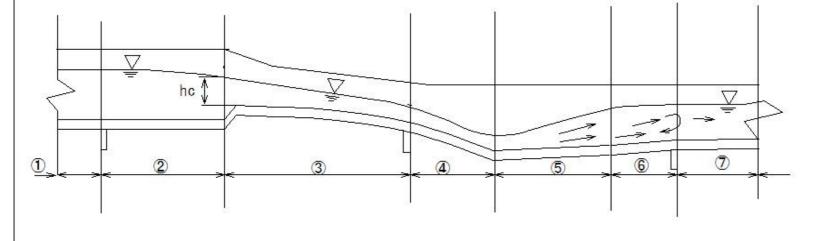
(I46) Chute(Rapid flow works)

(146) Chute (Rapid flow works)

Chute (Rapid flow works)

It is necessary to install rapid flow works and drop works to ensure the safety of the waterway.

- 1 Upstream waterway
- 2 Inlet attachment
- 3 Rapid flow section
- (4) Radial flow section
- 5 Energy dissipation works
- ©Outlet attachment waterway
- 7 Downstream waterway

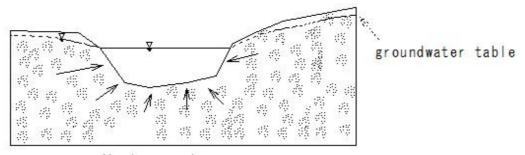


(I47) Influent stream (Recharge River)

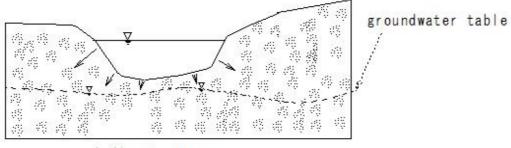
(I47) Influent stream (Recharge River)

influent stream

A "Influent stream (Recharge River)" is a river whose water volume is stabilized by rainwater, river water, etc. permeating underground and replenishing the



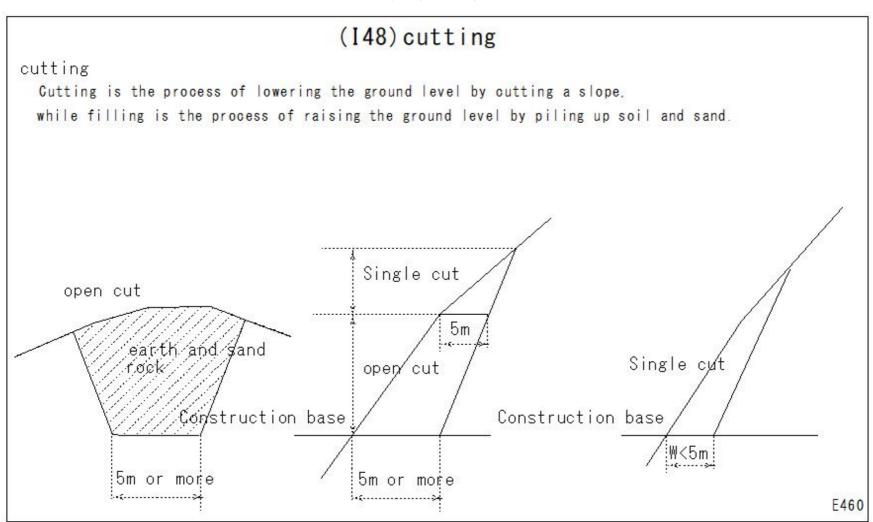
discharge river



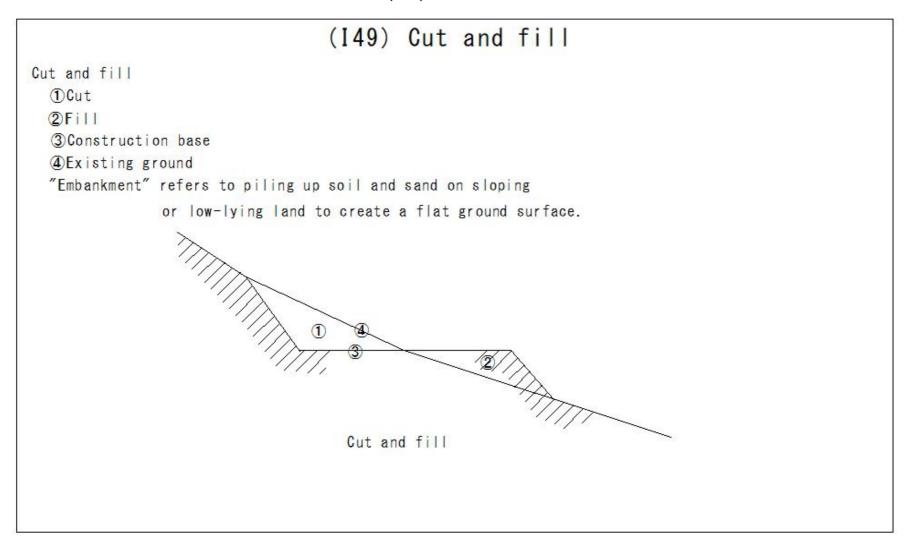
influent stream

R539

(I48)cutting



(I49) Cut and fill

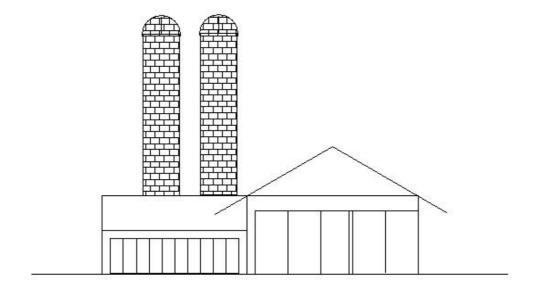


(I50) Cowshed (free stall cowshed)

(I50) Cowshed (free stall cowshed)

Cowshed (free stall cowshed)

- 1 A free stall cowshed is a cowshed where cows can roam freely without being tied up, and the cows' sleeping areas are separated.
- 2 This reduces stress for the cows, leading to improved health management and work efficiency.



(I51) Conjugate depth

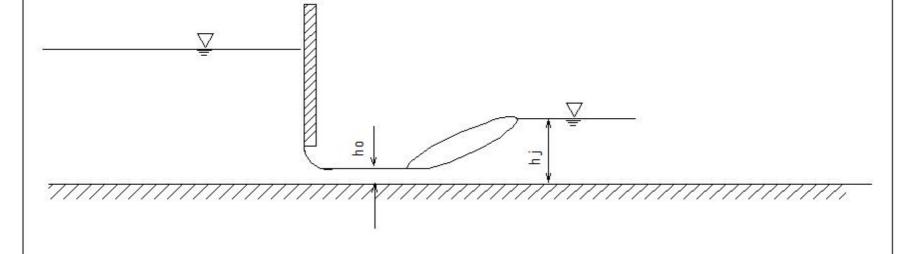
(I51) Conjugate depth

Conjugate depth

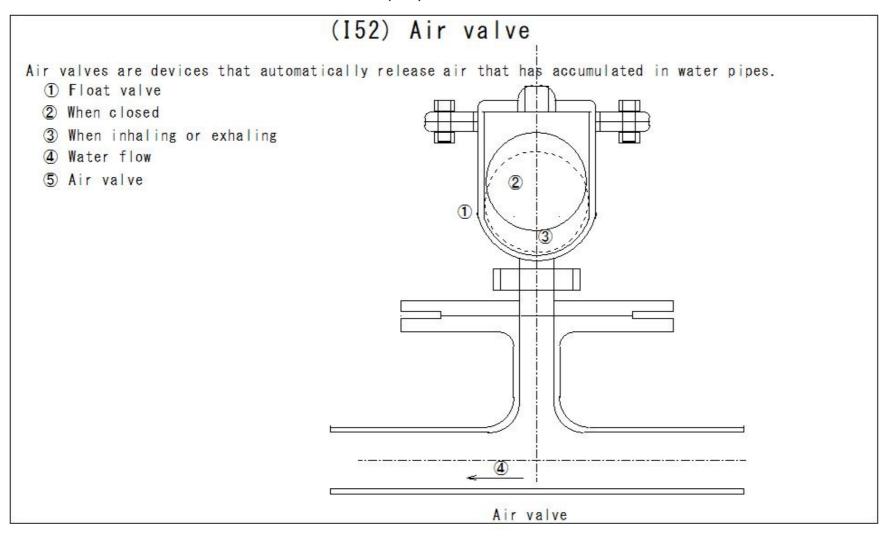
- ① Complete hydraulic jump
- 2 ho and hj are called conjugate depths

In an open channel, when the hydraulic jump phenomenon occurs, there are two water depths, supercritical water depth and subcritical water depth,

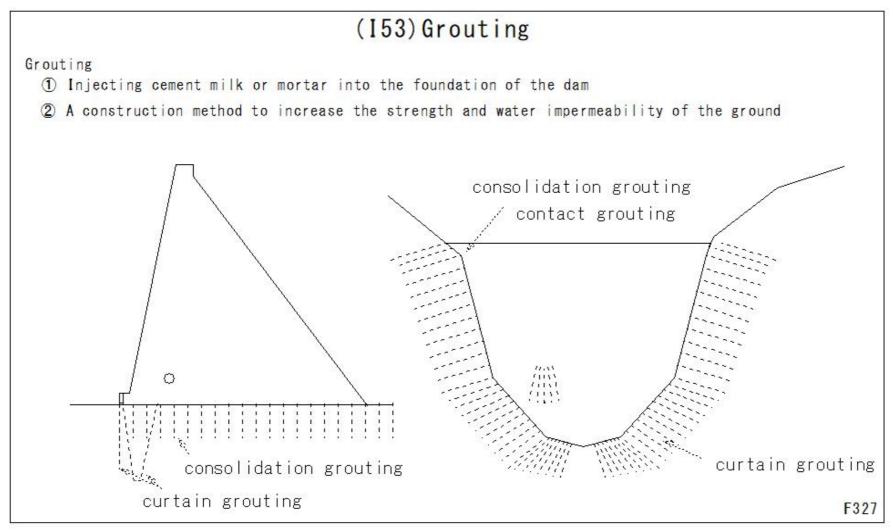
and these two water depths are called "conjugate depths"



(I52) Air valve



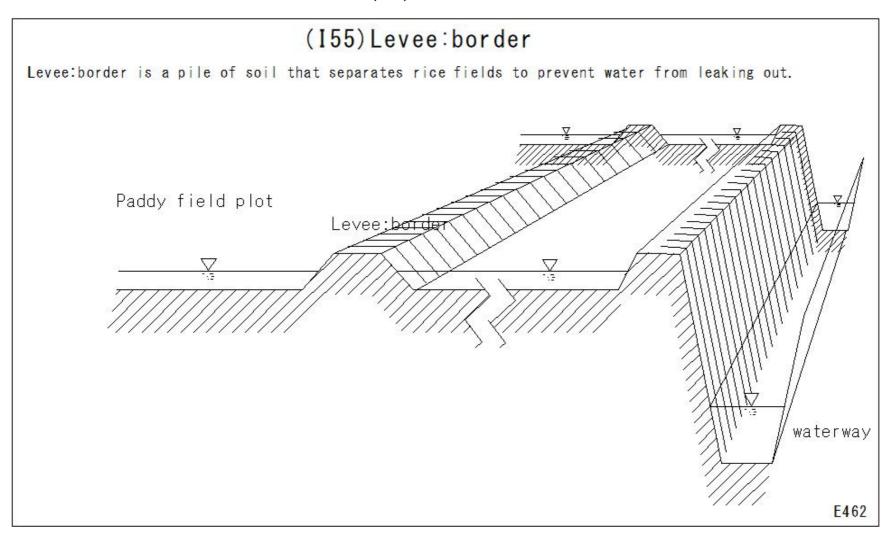
(I53)Grouting



(I54)Quicksand phenomenon

(154) Quicksand phenomenon Quicksand phenomenon The phenomenon in which groundwater rises and mixes with the sandy parts of the ground. 2 The phenomenon in which the ground becomes muddy. 3 A type of sand flow phenomenon that refers to the muddy water itself. sheet pile hydraulic gradient line Boiling Boiling permeable layer

(I55)Levee:border



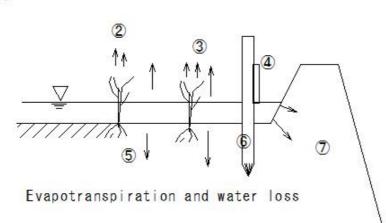
(I56) Evapotranspiration and water loss

(I56) Evapotranspiration and water loss

Evapotranspiration and water loss

The process by which water vapor moves from the Earth's surface into the atmosphere A combination of evaporation and transpiration

- 1 Evapotranspiration
- 2 Iranspiration
- 3 Evaporation
- 4 Hook gauge
- 5 Vertical infiltration
- 6 Water loss measurement
- 7 Ridge infiltration



(I57) Evapotranspiration and water loss

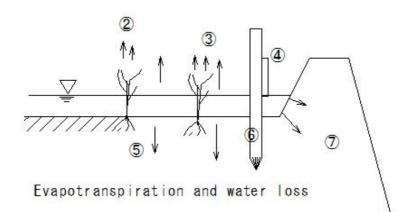
(I57) Evapotranspiration and water loss

Evapotranspiration and water loss

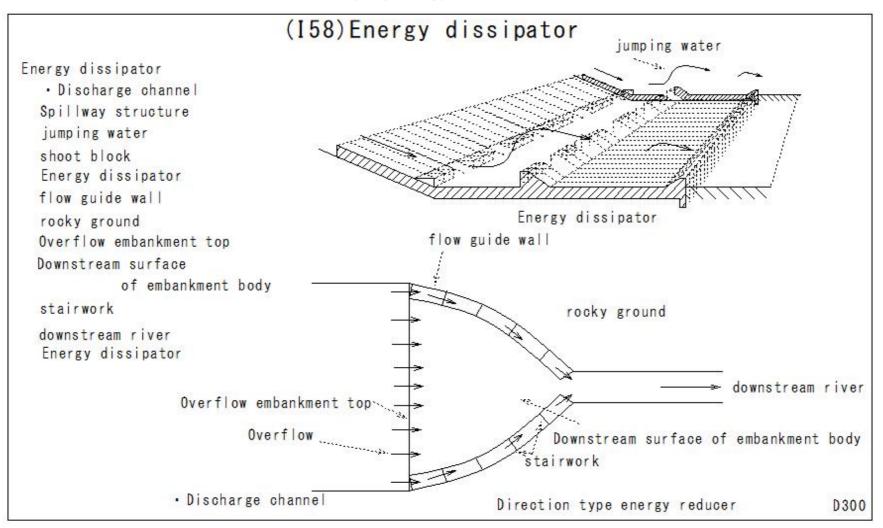
The reduced water level refers to the amount of water that falls in a paddy field in one day when it is filled with water.

- 1 Evapotranspiration
- 2 Transpiration
- 3 Evaporation
- 4 Hook gauge
- 5 Vertical infiltration
- 6 Water loss measurement
- 7 Ridge infiltration

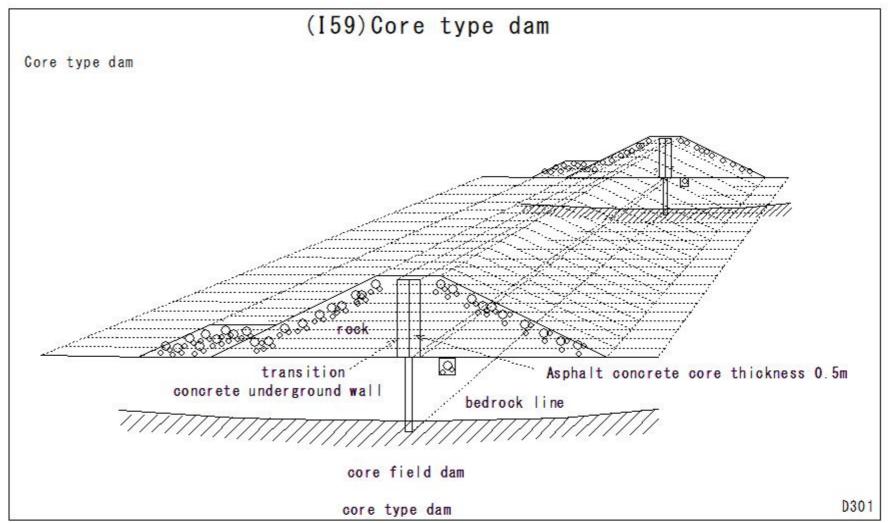




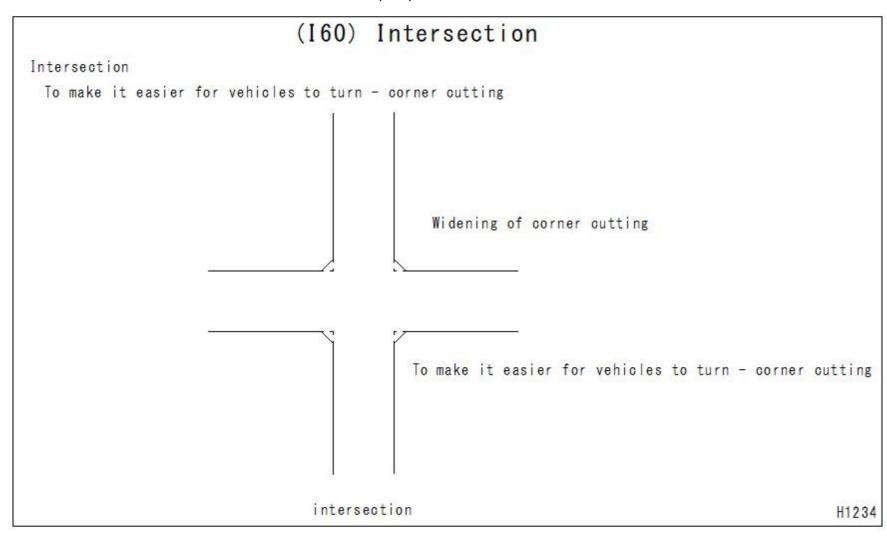
(I58)Energy dissipator



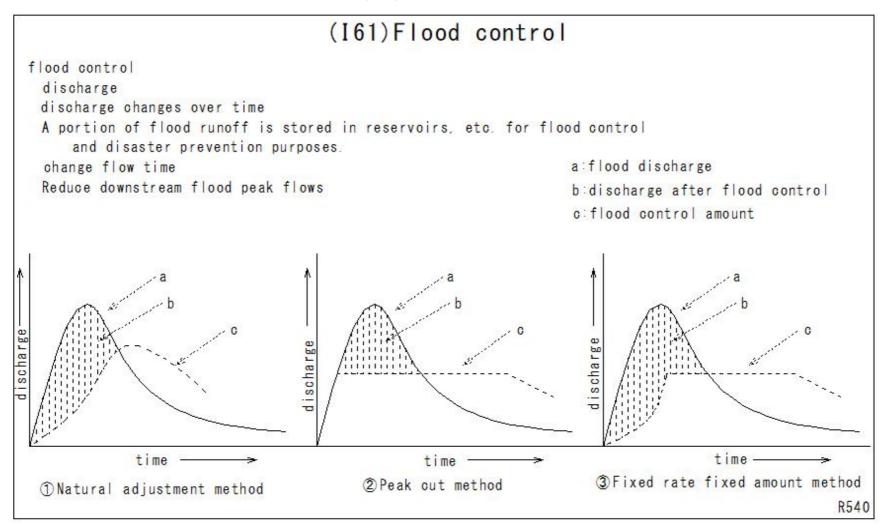
(I59)Core type dam



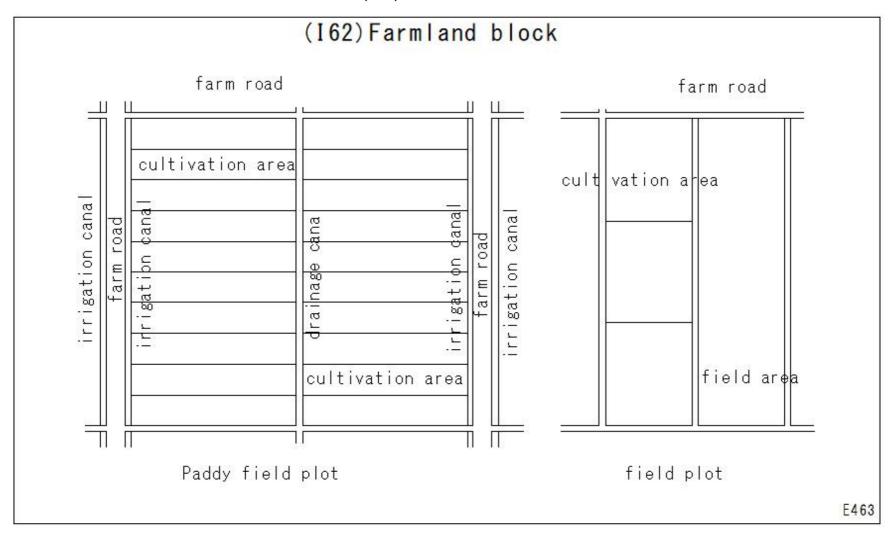
(I60) intersection



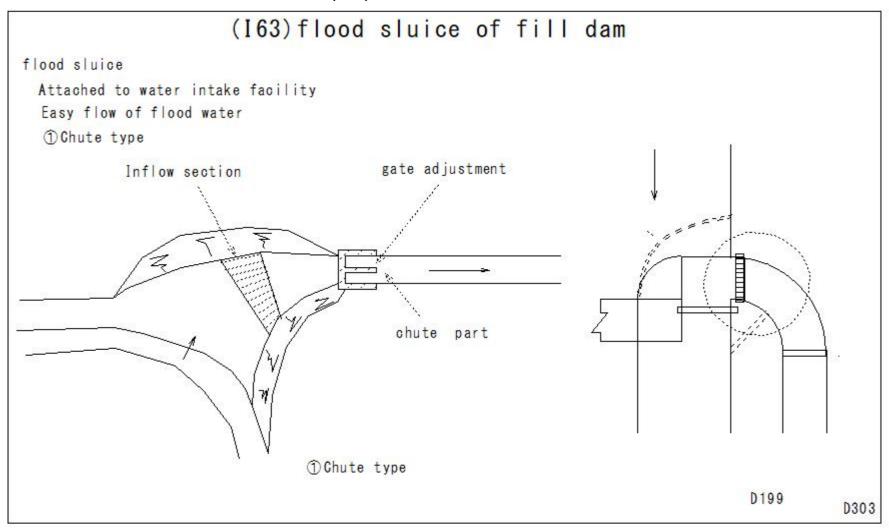
(I61)Flood control



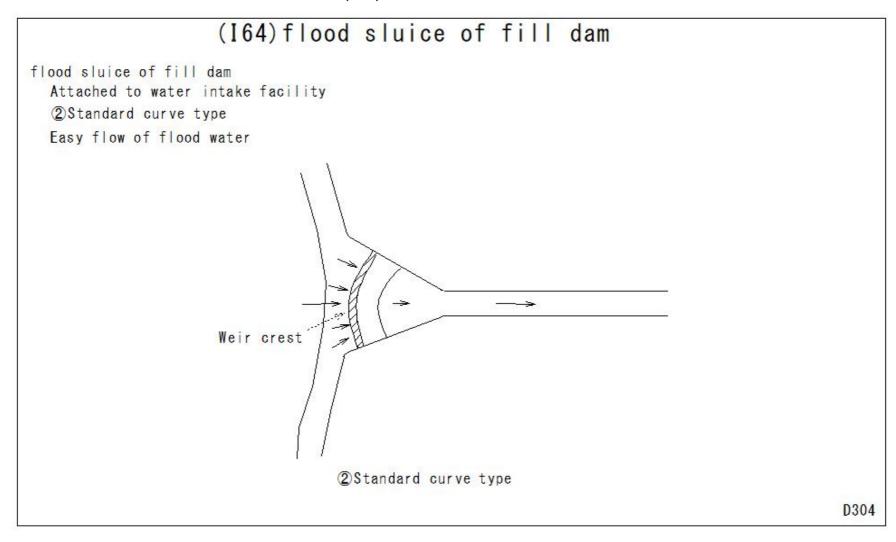
(I62)Farmland block



(I63)flood sluice of fill dam



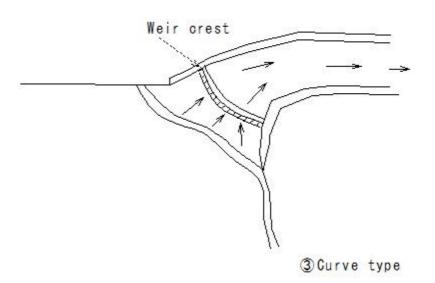
(I64)flood sluice of fill dam



(l65)flood sluice of fill dam

(I65) flood sluice of fill dam Attached to water intake facility

3 Curve type



D305

(l66)flood sluice of fill dam

(166) flood sluice of fill dam flood sluice of fill dam Attached to water intake facility (A) Standard type side waterway Weir crest

side channel

Standard type side waterway

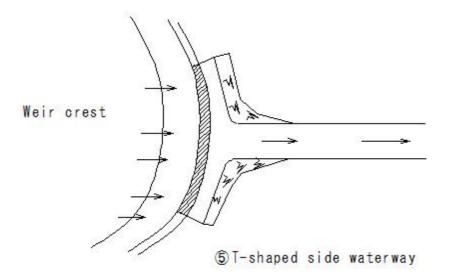
D306

(I67)flood sluice of fill dam

(167) flood sluice of fill dam

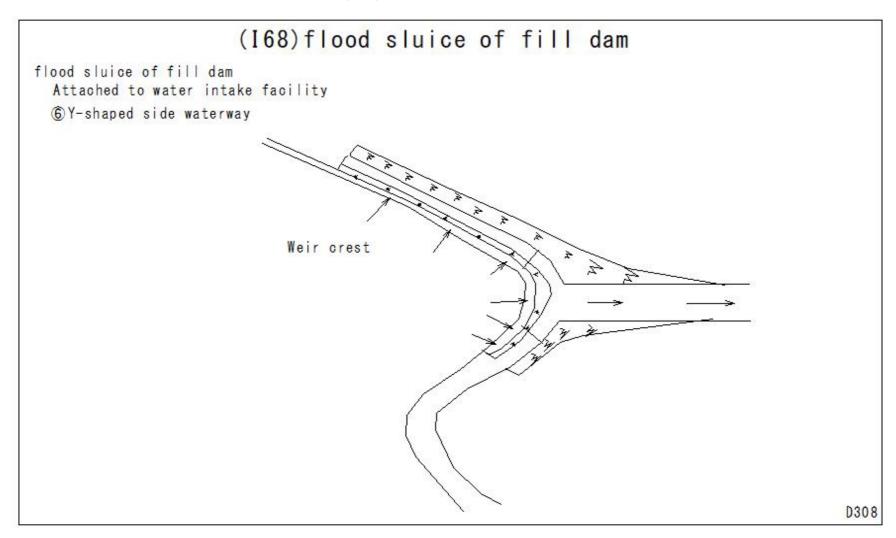
flood sluice of fill dam
Attached to water intake facility

⑤T-shaped side waterway

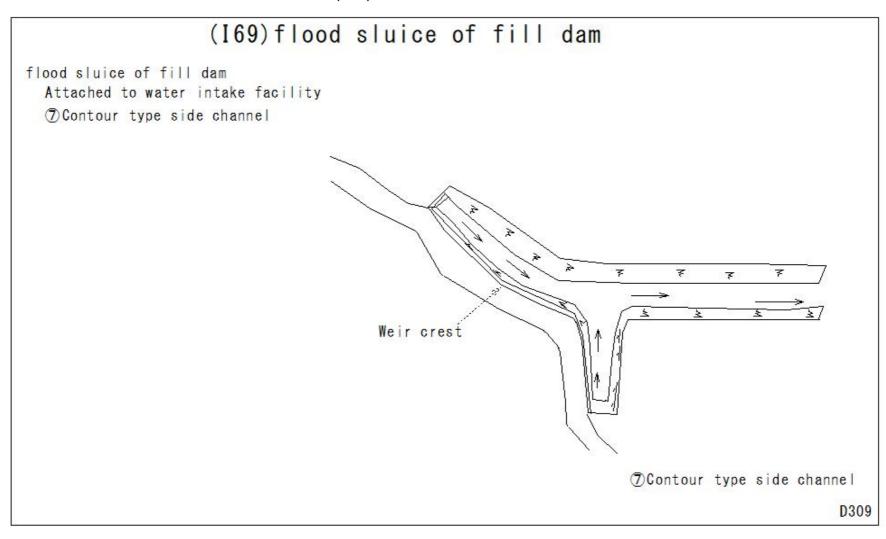


D307

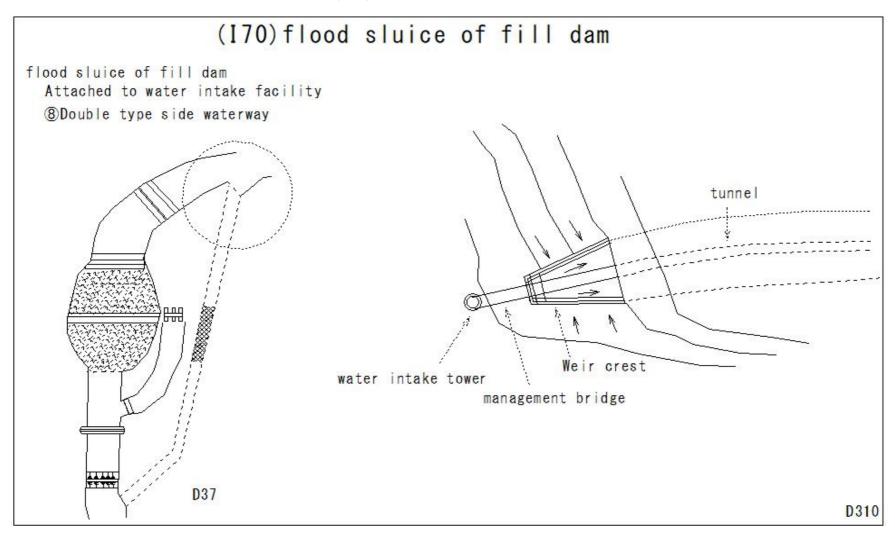
(I68)flood sluice of fill dam



(I69)flood sluice of fill dam



(I70)flood sluice of fill dam



(I71)flood sluice of fill dam

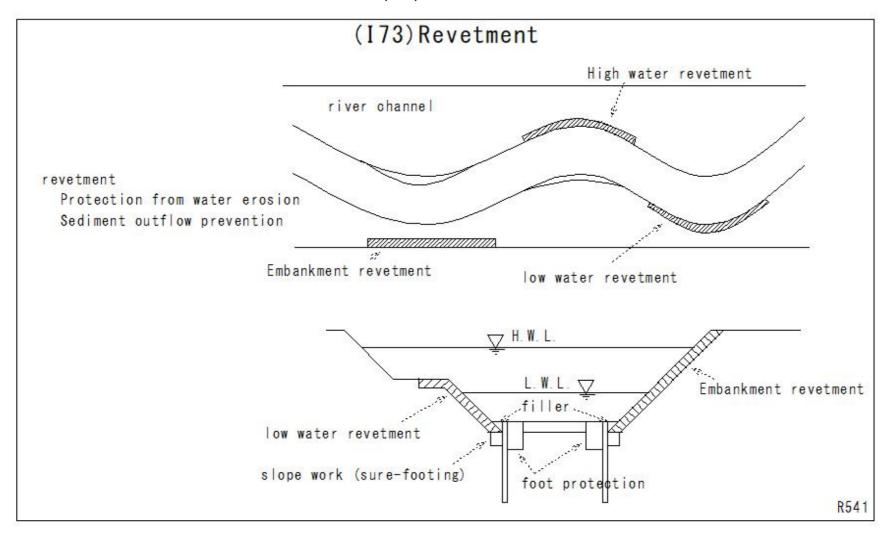
(I71) flood sluice of fill dam flood sluice of fill dam Attached to water intake facility Bathtub type separation wall Weir crest Bathtub type D311

(I72) Schedule

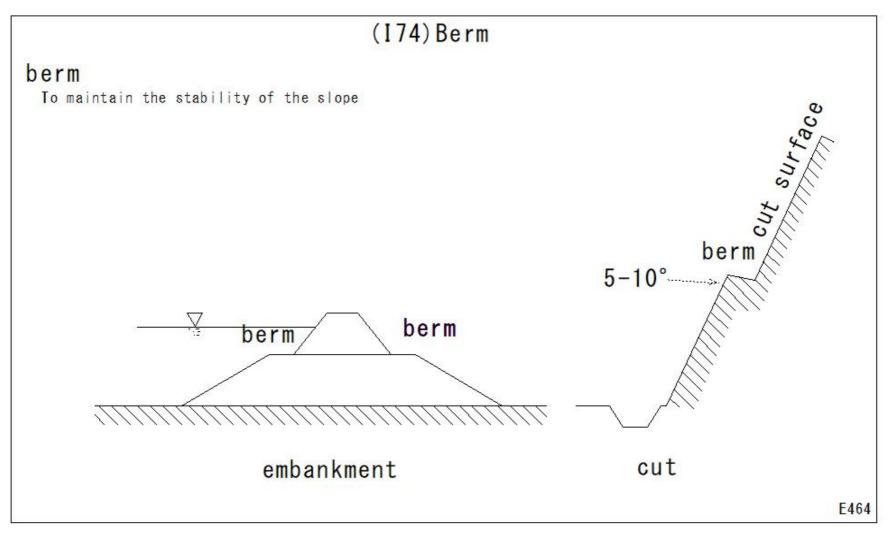
①Type of work			3Schedule												
		2Unit		7	8	9	10	11	12	1	2	3	4	5	
④ Tempora ry works	⑥Preparatory works	total	1												
	⑦Retaining sheet pile work	m	25												
⑤ Adjustme nt pond	®Topsoil removal	m [*]	1556												
	9Excavation	-	767.4					<u> </u>							
	10Backfilling	-	764												
	①Embankment	-	2004												
	Attachment channel: upstream	m	13												
	③Head work/sand removal work	-	61.2												
	(I)Attachment channel: downstream	-	15.3												
	(15)Spillway	total	1												
	®Asphalt panel	m²	3156	•											
	①Topsoil removal	Book	2												

A schedule is a table that summarizes the work content, schedule, and progress of a construction project.

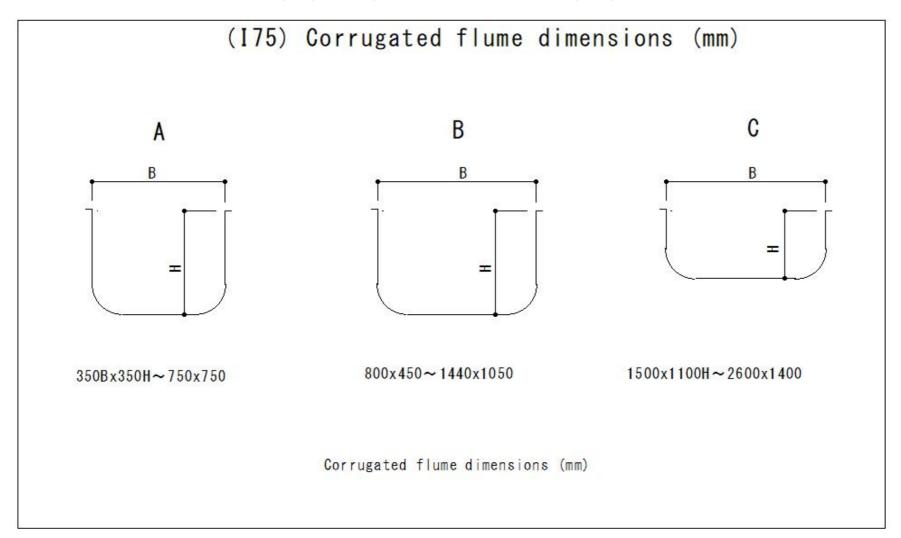
(I73)Revetment



(I74)Berm



(I75) Corrugated flume dimensions (mm)



(I76) Corrugated pipe

(176) Corrugated pipe

Corrugated pipe

- ① Corrugated pipe is a pipe made of thin steel plate with corrugations
- 2 Lightweight, strong, and easy to install
- 3 Wave-shaped
- ②Used for various purposes



1 Circular



6 Corrugated pipe cross-section

4 Under pass-shaped



7 Assembling corrugated pipe



2 Arch-shaped



⑤Erogation-shaped



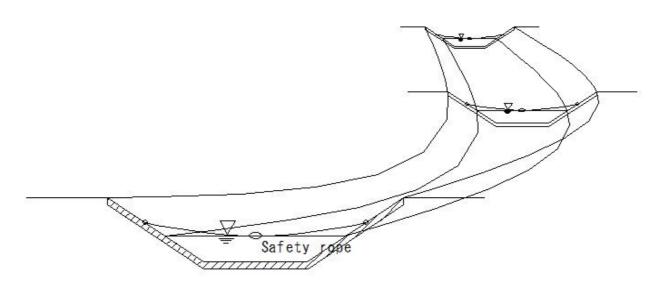
3Pipe arch-shaped

(177) Concrete lining

(177) Concrete lining

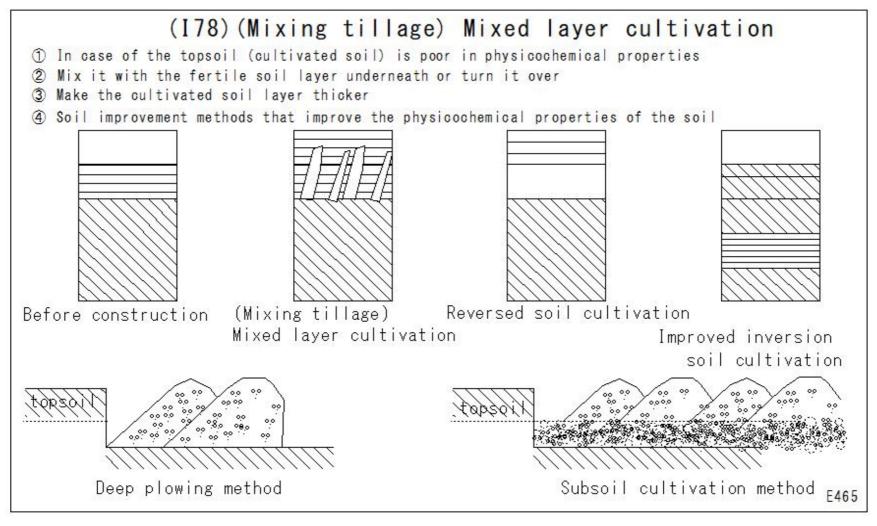
Concrete lining

- 1 Concrete lining waterway
- 2 Covering the surface of the waterway with materials such as concrete blocks and cement (mortar)
- 3 A construction method for protecting, repairing, and renovating waterways



Concrete lining

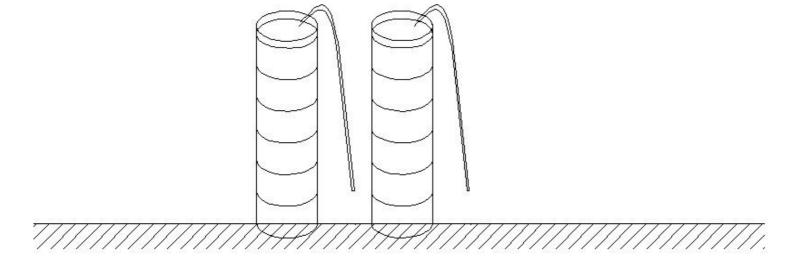
(I78)(Mixing tillage) Mixed layer cultivation



(179) Silo

- 1 Silo
- 2 Cylindrical storage facility for storing livestock feed (especially silage)
- 3 Tower silo
- 4 Above-ground silo with a circular or polygonal cross section and cylindrical structure

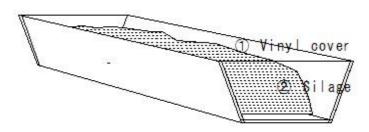
Airtight tower silo



(180) Silo

Bunker silo

- 1 Bunker silo
- 2 Box-shaped silo on a slope or flat ground
- 3 Made of concrete
- 4 Pool-like shape with walls on only three sides



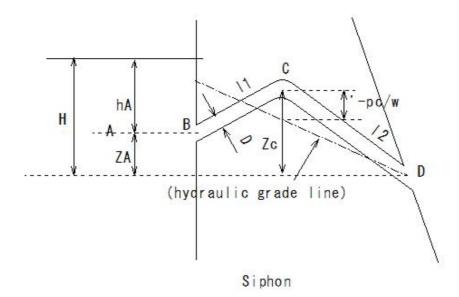
Bunker silo

(I81) Siphon

(181) Siphon

Siphon

- 1 Siphon principle
- 2 Fill the tube with liquid
- 3 A mechanism for flowing liquid from a higher position to a lower position

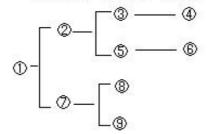


(182) Erosion control works

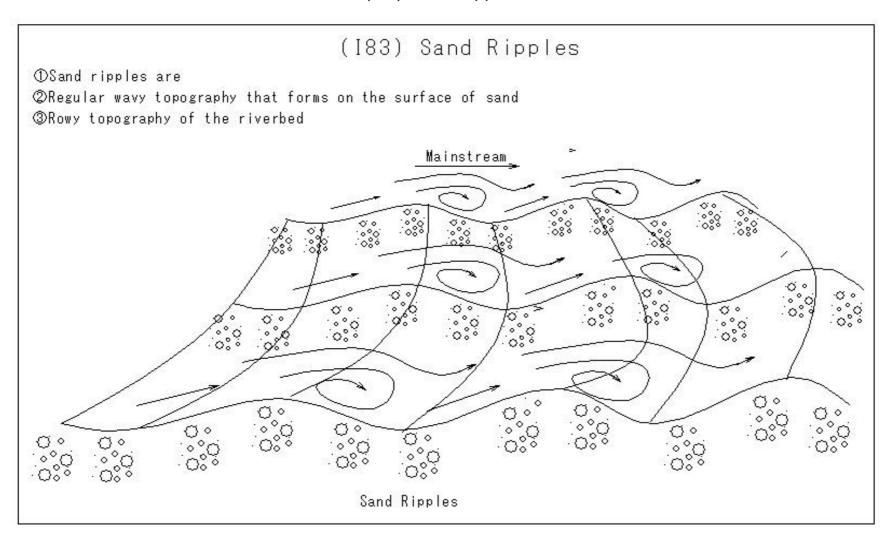
(182) Erosion control works

- 1 Erosion control works
- ② Civil engineering works carried out to protect people and property from landslides
- 3 Measures mainly aimed at preventing damage from mudslides and cliff collapses
 - ① Erosion control works
 - ② Mountainside construction
 - 3 Mountainside foundation construction
 - 4 Slope cutting, retaining wall construction, waterway construction
 - 5 Mountainside greening construction
 - ® Fence construction, seedling stacking, ridge construction, planting construction
 - Stream construction
 - ® Erosion control dam
 - Bank construction, water control construction, bed consolidation construction

Erosion control works



(I83) Sand Ripples



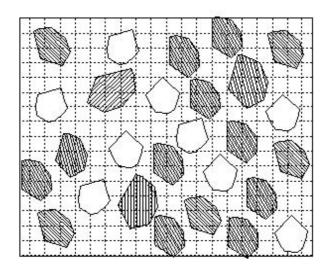
(184)sand drain method

(184) sand drain method The sand drain method is a method of increasing the strength of the ground by driving sand piles into the soft ground. sand drain method Embankment load: Sediment, etc. Sand mat Sand mat water Sandpile Sandpile Soft ground Sand drain F331

(I85) Three phases of soil

(185) Three phases of soil

Soil is a mixture of minerals, organic matter, gas, liquid, and living organisms
that covers the land of the Earth.

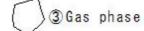


Three phases of soil

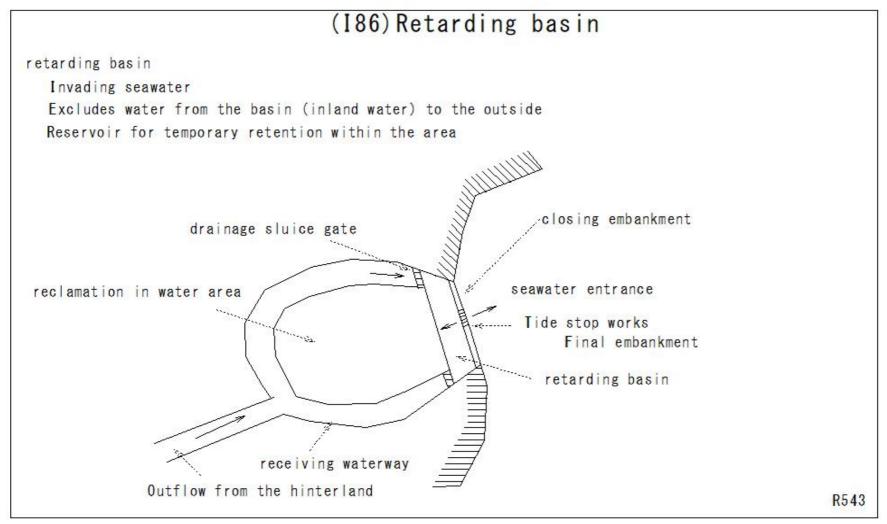


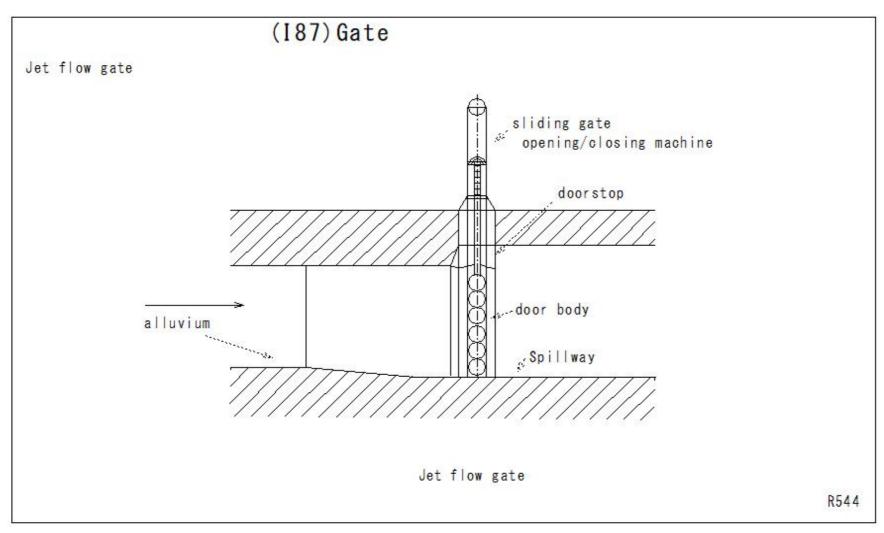
①Solid phase





(I86)Retarding basin





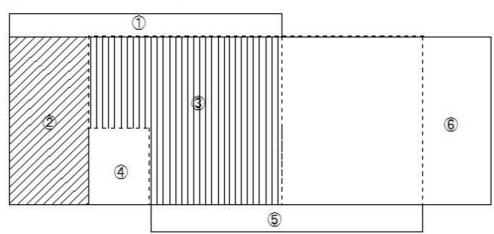
(I88) Urbanization control area

(188) Urbanization control area

Urbanization control area

- ① City planning area
- ② Urbanization area
- 3 Urbanization control area
- 4 White background
- ⑤ Agricultural promotion area
- 6 Mountainous area

① City planning area with demarcation



Types of zoning according to the City Planning Act and the Agricultural Promotion Act

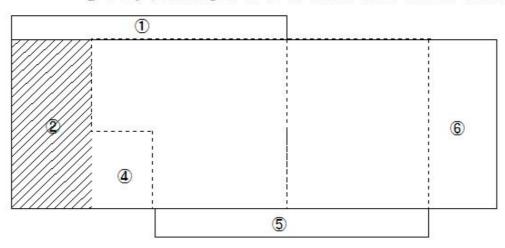
(189) Urbanization control area

(189) Urbanization control area

Urbanization control area

- 1 City planning area
- 2 Use zone
- 4 White background
- 5 Agricultural promotion area
- 6 Mountainous area

2 City planning area with final demarcation (with use zone)



Types of zoning according to the City Planning Act and the Agricultural Promotion Act

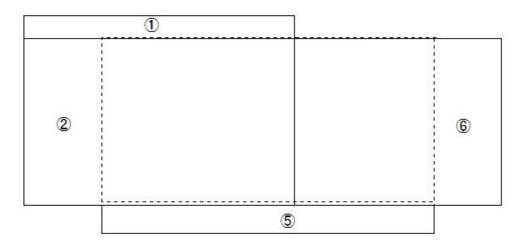
(190) Urbanization control area

(190) Urbanization control area

Urbanization control area

- 1 City planning area
- 2 Central urban area
- 5 Agricultural promotion area
- 6 Mountainous area

(without use zone)



Types of zoning according to the City Planning Act and the Agricultural Promotion Act

(I91) Urbanization control area

(I91) Urbanization control area Urbanization control area (2) Central urban area 5 Agricultural promotion area 6 Mountainous area 3 City planning area without designation (5) Types of zoning according to the City Planning Act and the Agricultural Promotion Act

(I92) Waterstop

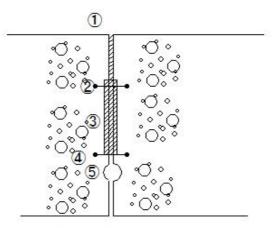
(192) Waterstop

Waterstop

It is used to prevent water leakage and flow.

Installation of metal waterstop

- 1 Reservoir side
- 2 Main waterstop
- 3 Compound
- 4 Secondary waterstop
- (5) Vertical drain



In case of dam

Installation of metal waterstop

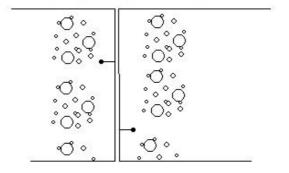
(I93) Waterstop

(193) Waterstop

Waterstop

It is used to prevent water leakage and flow.

① Sealing material



Z-shaped waterstop

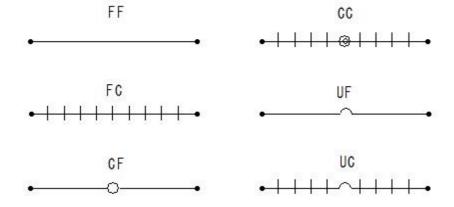
Installation of metal waterstop

(I94) Waterstop

(194) Waterstop

Waterstop

It is used to prevent water leakage and flow.

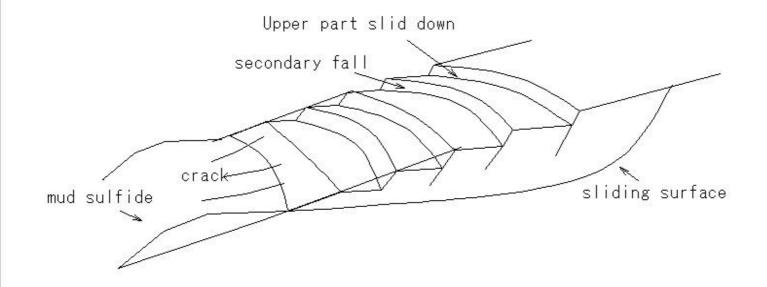


PVC waterstop shape
Installation of metal waterstop

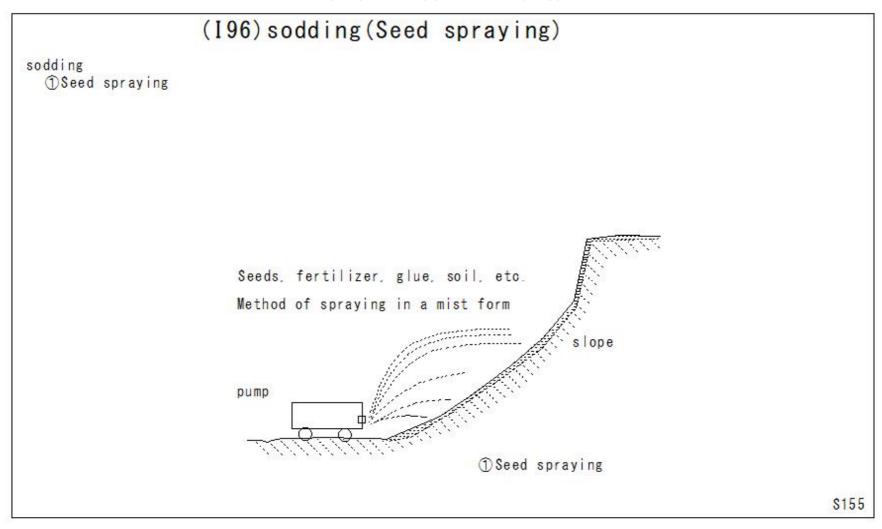
(I95)Landslide

(195) Lands lide

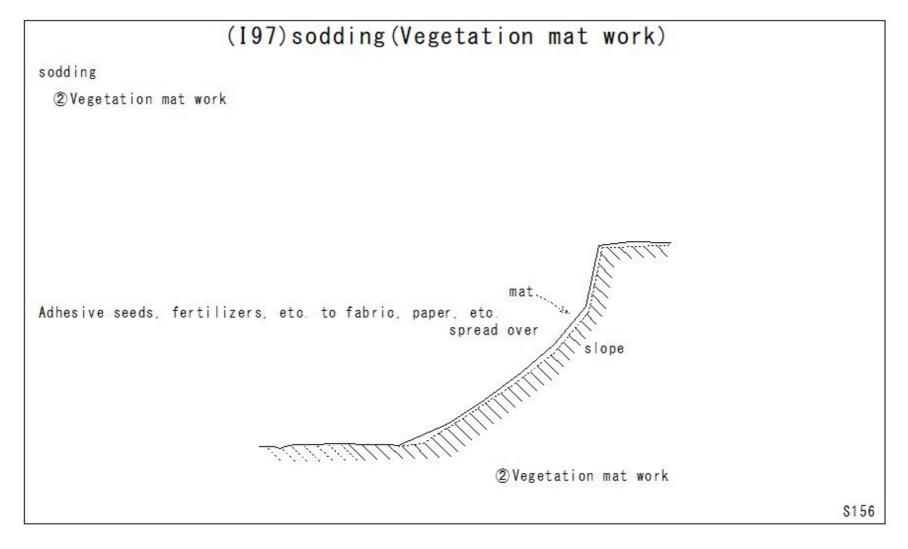
Landslides, also known as landslips, skyfalls or rockslides, are several forms of mass wasting that may include a wide range of ground movements, such as rockfalls, mudflows, shallow or deep-seated slope failures and debris flows.



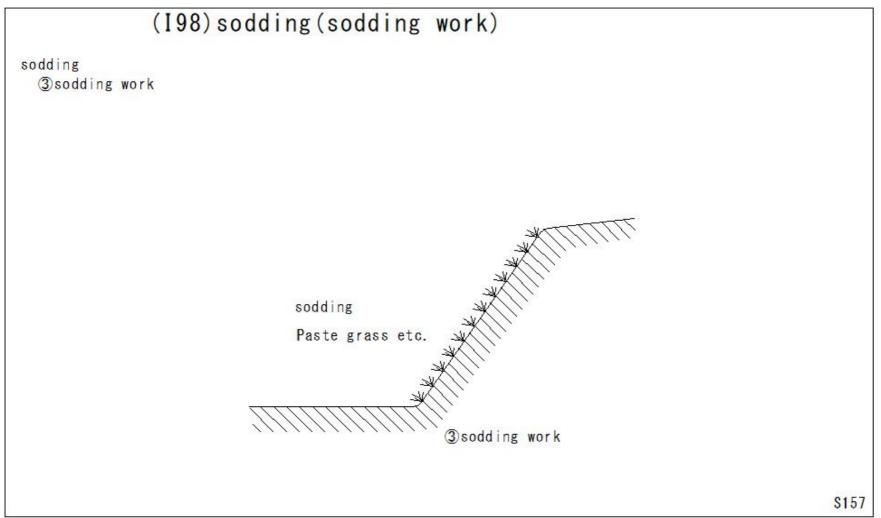
(I96)sodding(Seed spraying)



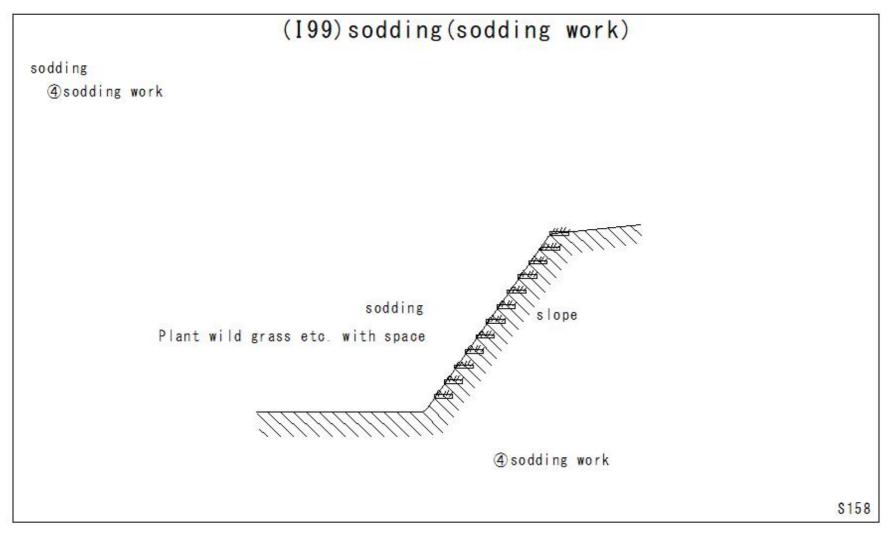
(I97)sodding(Seed spraying)



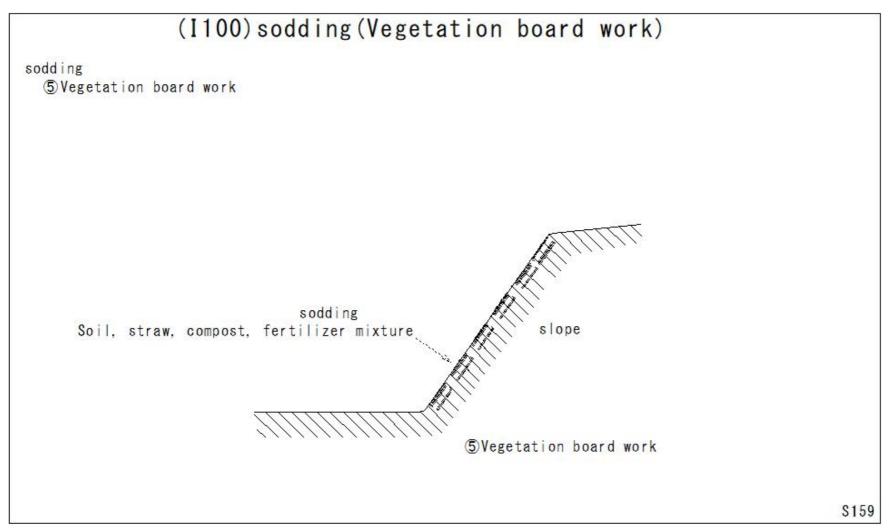
(I98)sodding(Seed spraying)



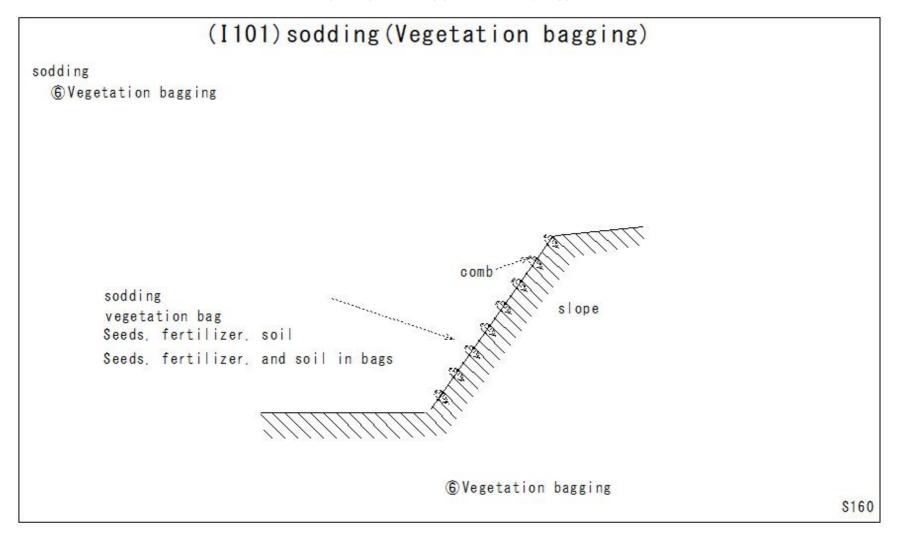
(I99)sodding(Seed spraying)



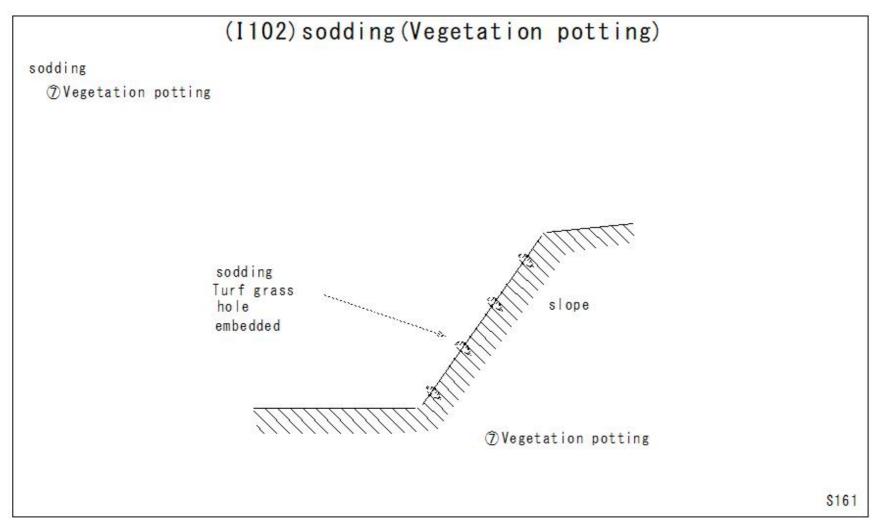
(I100)sodding(Seed spraying)



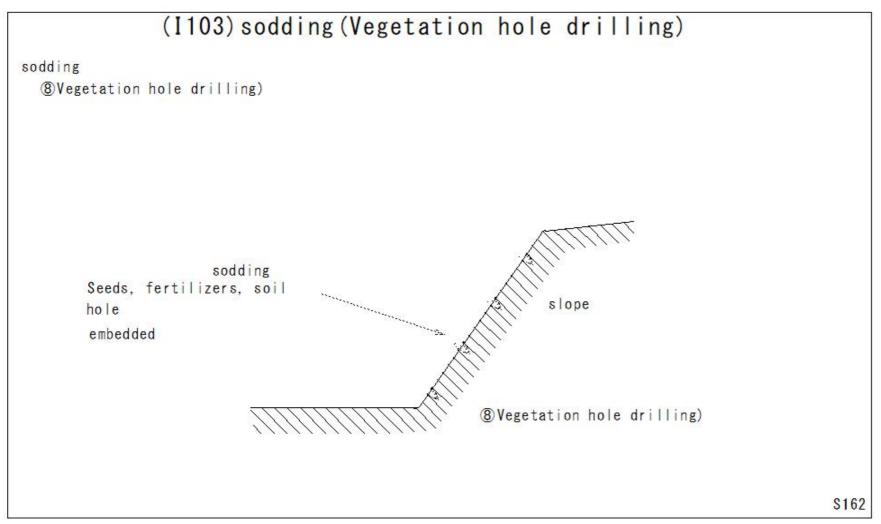
(I101)sodding(Seed spraying)



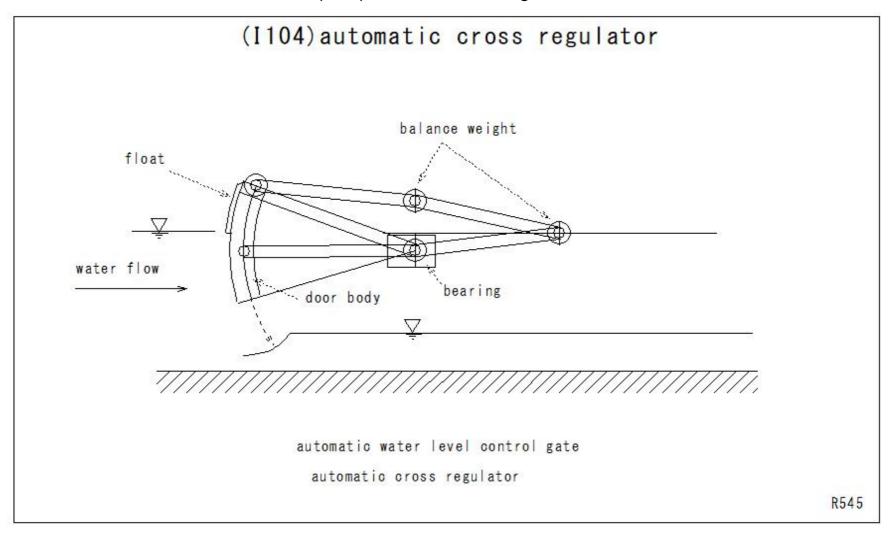
(I102)sodding(Seed spraying)



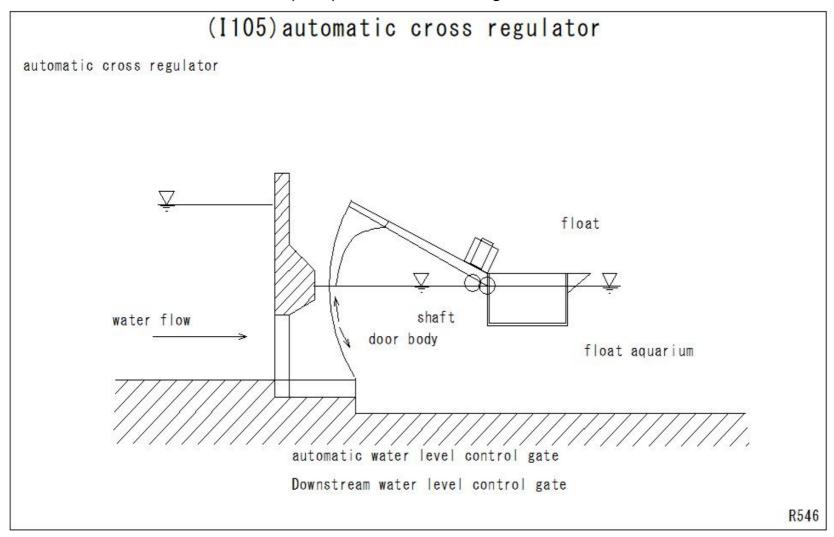
(I103)sodding(Seed spraying)



(I104)Automatic cross regulator



(I105)Automatic cross regulator

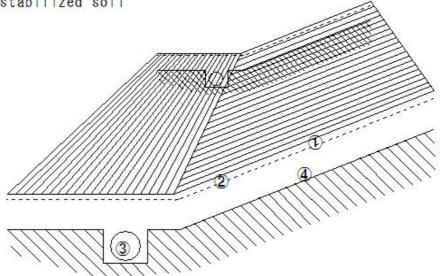


(I106) Water-resistant sheet

(I106) Water-resistant sheet

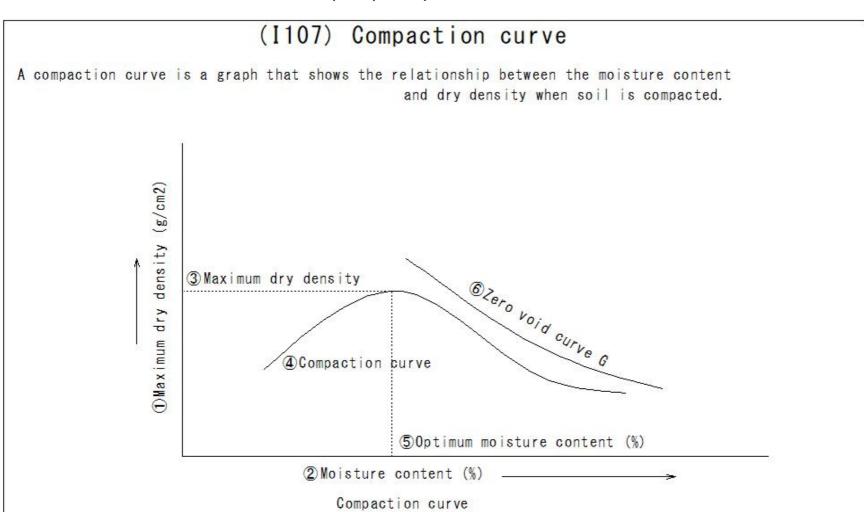
Water-resistant sheet

- 1 Water-resistant sheet
- 2 Treatment using geotextiles, etc.
- 3 Drain pipe
- (4) Installation of base treatment layer and drainage layer Crusher run, stabilized soil



Example of exposed water-resistant sheet paving

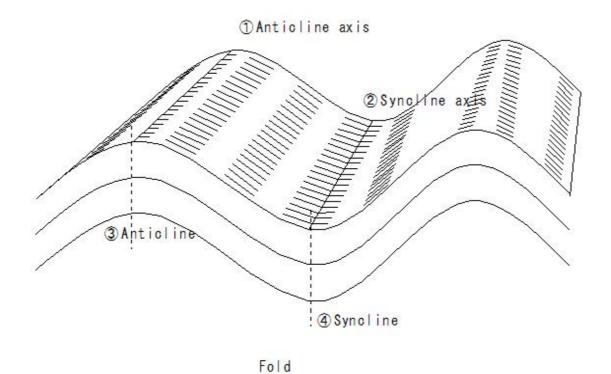
(I107) Compaction curve



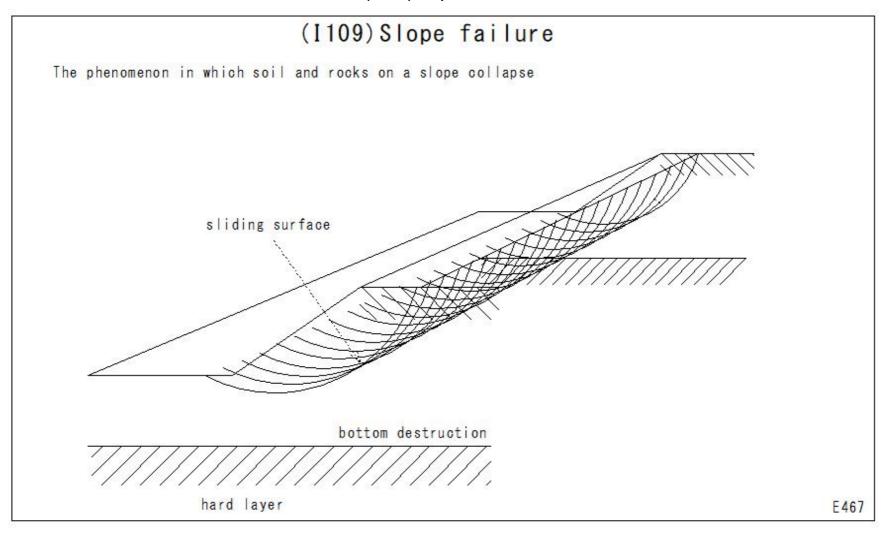
(I108) Fold

(I108) Fold

In structural geology, a fold is a stack of originally planar surfaces, such as sedimentary strata, that are bent or curved ("folded") during permanent deformation.



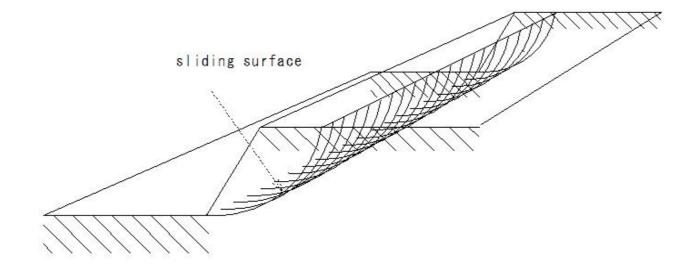
(I109)Slope failure



(I110)Slope failure

(I110)Slope failure

The phenomenon in which soil and rocks on a slope collapse

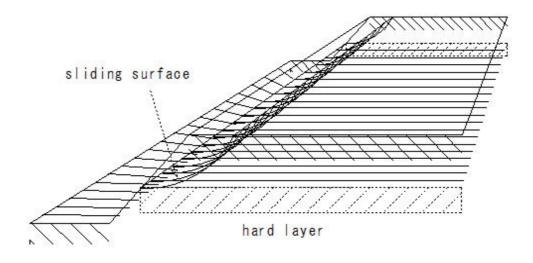


Slope toe failure

(I111)Slope failure

(I111) Slope failure

The phenomenon in which soil and rocks on a slope collapse



Failure within the slope

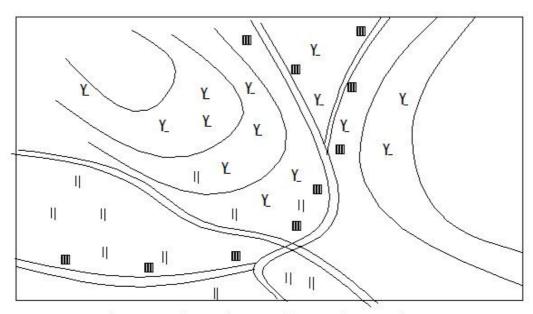
E467

(I112) Settlement type

(I112) Settlement type

Scattered settlement (mountain area)

Scattered settlement. This type of settlement is mainly seen in agricultural settlements in mountainous areas, where the houses are scattered across several valleys and are scattered from one another.



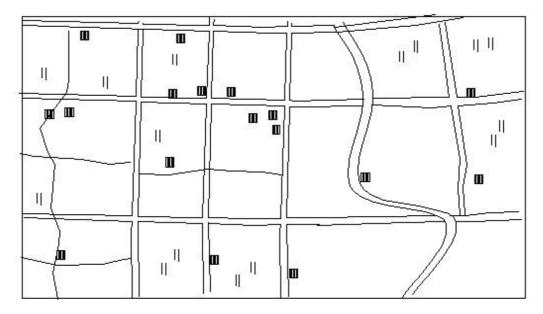
Scattered settlement (mountain area)

(I113) Settlement type

(I113) Settlement type

Scattered settlement (flat area)

A dispersed settlement is a type of settlement in which houses are scattered among fields.



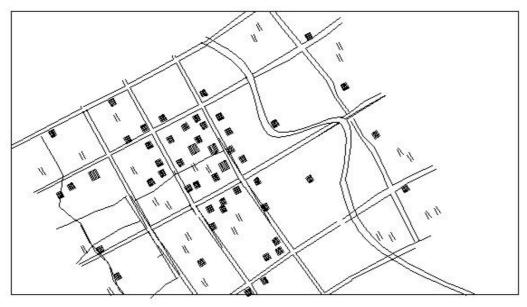
Scattered settlement (flat area)

(I114) Settlement type

(I114) Settlement type

Collected settlement

An agricultural village where houses are clustered together in a certain area and the plots are adjacent to each other, whether on flat land or in the mountains, and where residential areas and cultivated land are separated.



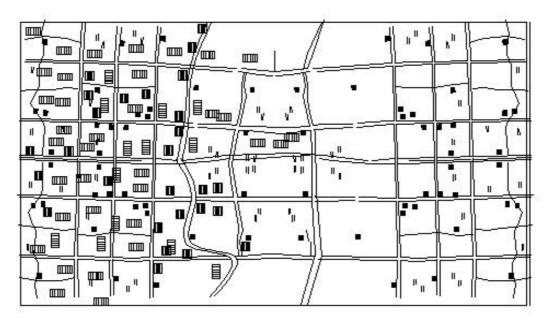
Collected settlement

(I115) Settlement type

(I115) Settlement type

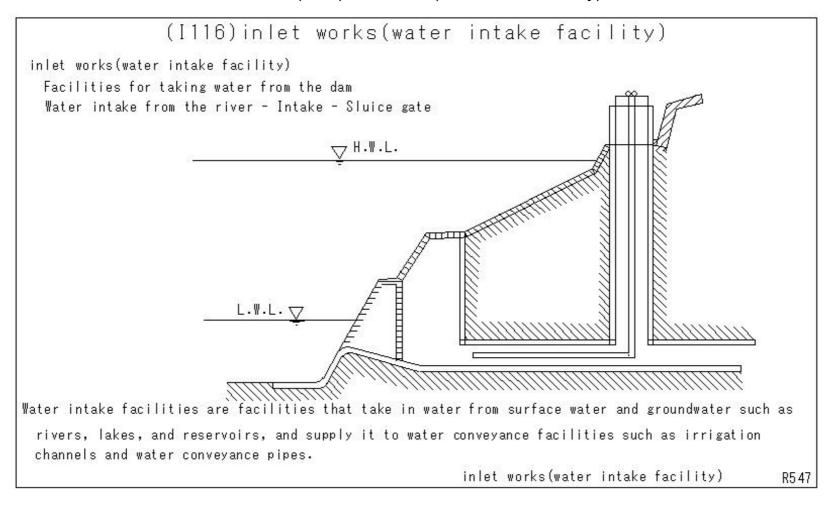
Densely populated settlement

Densely populated villages. A type of settlement found mainly in urbanized areas, where houses are densely packed together with non-farming residents living between farms and adjacent to urban areas.



Densely populated settlement

(I116)Inlet works(water intake facility)



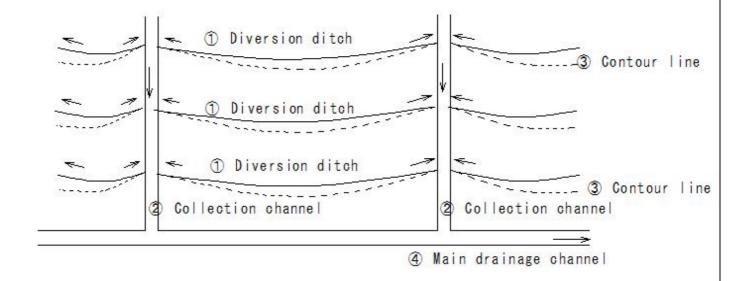
(I117) Wetted perimeter

(I117) Wetted perimeter 1 Running water 2Wetted perimeter

(I118) Diversion ditch

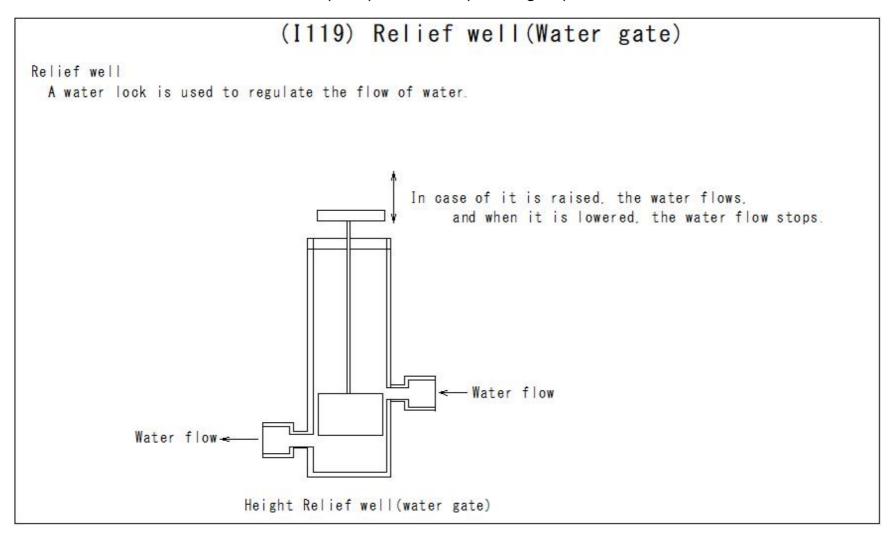
(I118) Diversion ditch

It is installed almost parallel to the contour lines of the terrain and receives drainage from higher areas.



Layout of Diversion ditch

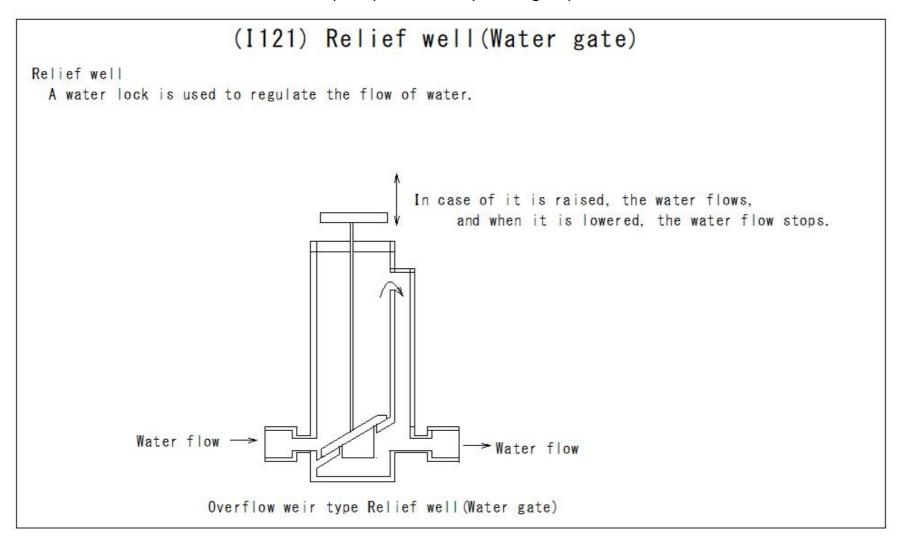
(I119) Relief well(Water gate)



(I120) Relief well(Water gate)

(I120) Relief well (Water gate) Relief well A water lock is used to regulate the flow of water. In case of it is raised, the water flows, and when it is lowered, the water flow stops. Water flow → Water flow Horizontal Relief well(Water gate)

(I121) Relief well(Water gate)



(I122) Water consumption

(I122) Water consumption

Water consumption

- A, total of I and II layers
- B, total of I, II and III layers
- C, total of I, II, III and iv layers

Limited soil layer: I layer for A, B and C

Water consumption type: A is I and II pattern, B is I, II and III pattern, C is I to iv pattern

Soil water consumption type

*Soil moisture loss in the effective soil layer under crop growth conditions

60% I 40% II

(I123) Water consumption

(I123) Water consumption

Water consumption

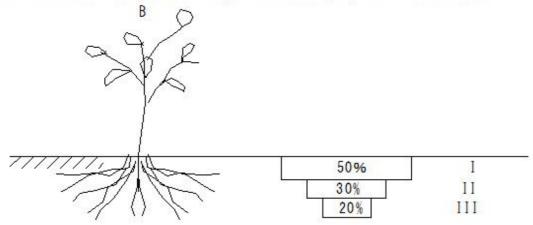
- A, total of I and II layers
- B, total of I, II and III layers
- C, total of I, II, III and iv layers

Limited soil layer: I layer for A, B and C

Water consumption type: A is I and II pattern, B is I, II and III pattern, C is I to iv pattern

Soil water consumption type

*Soil moisture loss in the effective soil layer under crop growth conditions



(I124) Water consumption

(I124) Water consumption

Water consumption

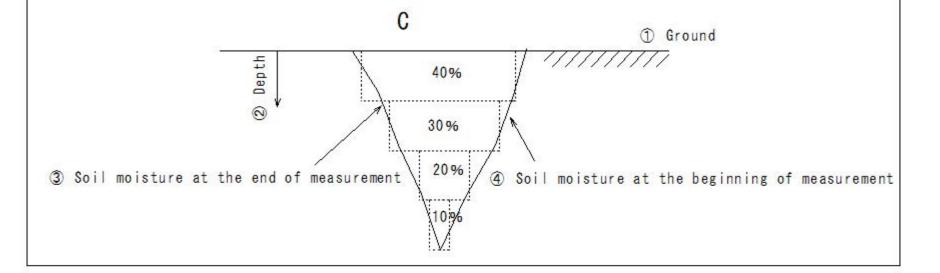
- A, total of I and II layers
- B, total of I, II and III layers
- C, total of I, II, III and iv layers

Limited soil layer: I layer for A, B and C

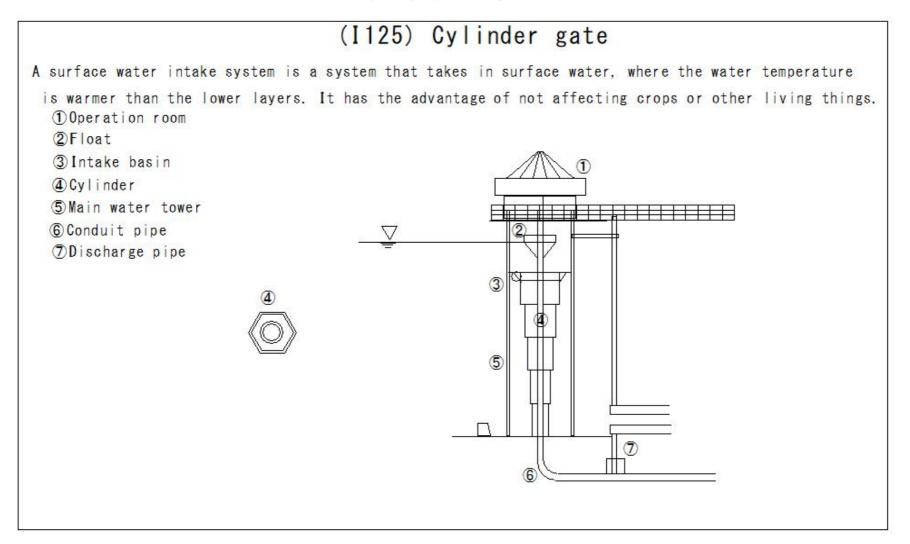
Water consumption type: A is I and II pattern, B is I, II and III pattern, C is I to iv pattern

Soil water consumption type

*Soil moisture loss in the effective soil layer under crop growth conditions



(I125) Cylinder gate

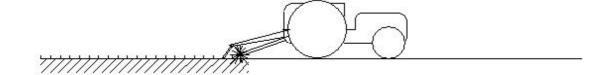


(I126) Plowing (Puddling)

(I126) Plowing (Puddling)

Puddling: In rice paddies, the soil is first plowed, then water is added and the soil is stirred up with a machine to turn it into a muddy state.



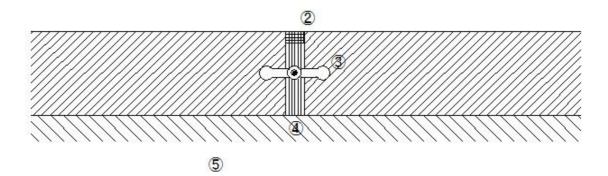


(I127) Expansion joint

(I127) Expansion joint

- ① Slip bars may be inserted to prevent misalignment of the joint
- 2 Injection joint material
- 3 Water stop plate
- 4 Joint plate
- (5) For side walls and lower slabs

1

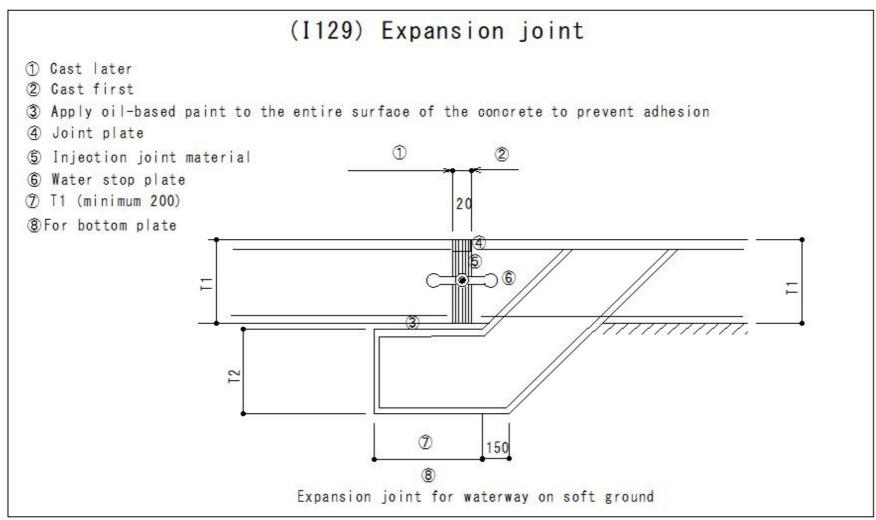


Expansion joint of concrete irrigation channel

(I128) Expansion joint

(I128) Expansion joint 1 Injection joint material 2 Bituminous paint 3 Slip bar 4 Cap 5 Round steel 6 Joint plate 7 Roadbed 7 Expansion joint of road concrete slab

(I129) Expansion joint

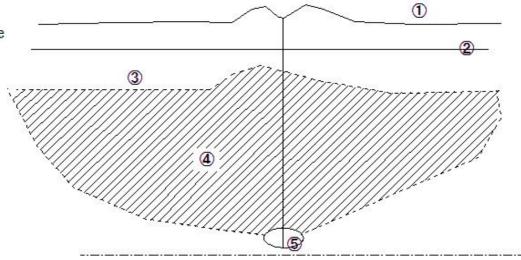


(I130) Subsoil Breaking

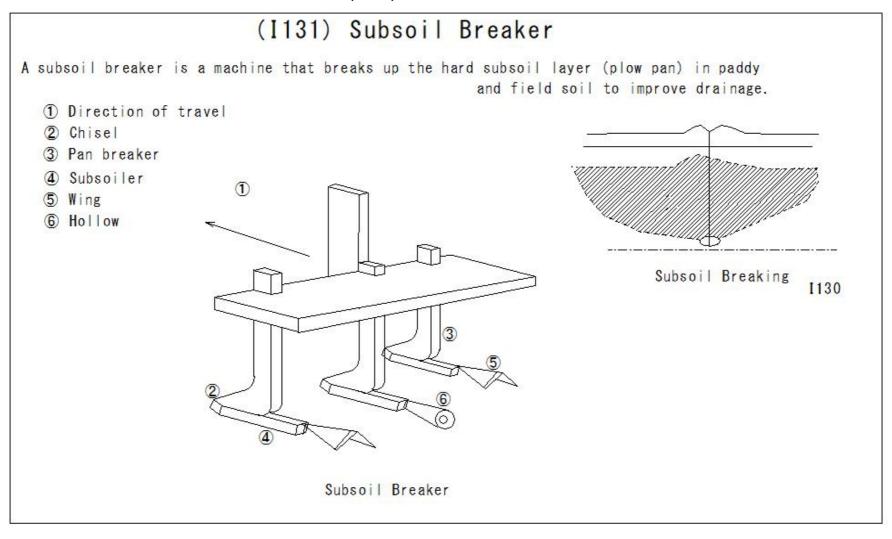
(I130) Subsoil Breaking

Subsoil breakage is the process of cutting into agricultural soil with a machine to improve drainage and water retention.

- 1 Surface after construction
- 2 Surface before construction
- 3 Topsoil
- 4 Breaking layer
- (5) Traces of chisel passage



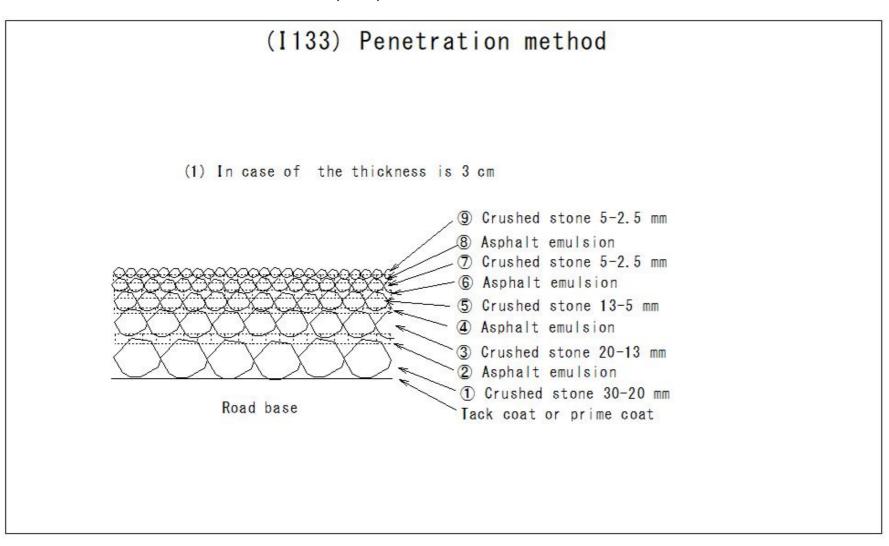
(I131) Subsoil Breaker



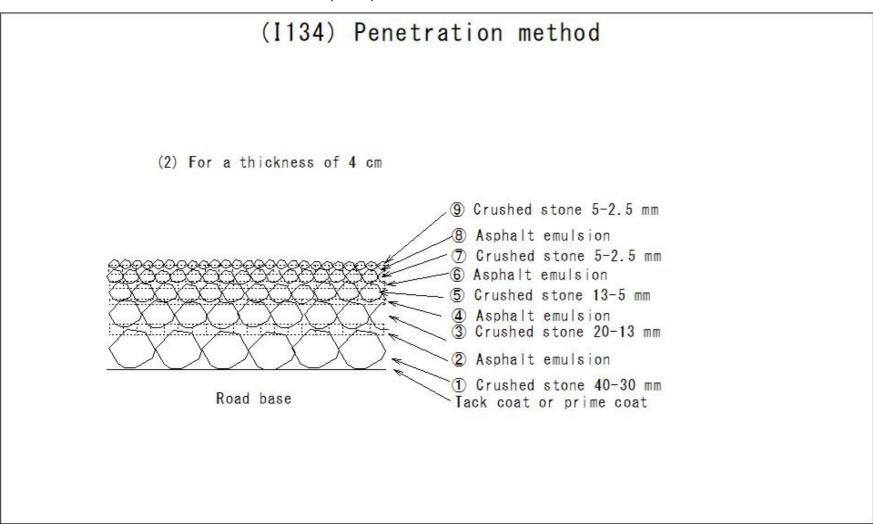
(I132) Penetrating method

(I132) Penetrating method 1 Penetrating method 2 Heated penetrating method (straight asphalt) 3 Room temperature penetrating method (Asphalt emulsion) (Cutback asphalt) 4 General method - Penetrating macadam 5 Straight asphalt spraying type Simple pavement surface 6 Asphalt emulsion spraying type Simple pavement surface Sidewalk pavement surface 7 Cutback asphalt spraying type Simple pavement surface Special method Rubber latex - bitumen emulsion Other Seal coat, armor coat, surface treatment, maintenance and repair 10 Fog seal, slurry seal

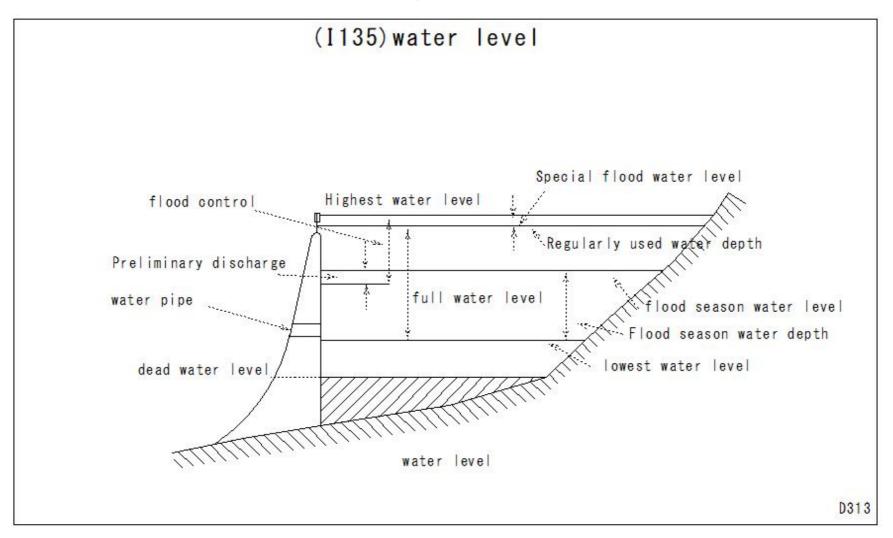
(I133) Penetration method



(I134) Penetration method



(I135)Water level

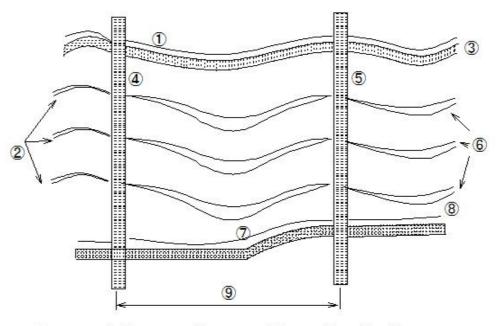


(I136) Waterway/farm road(Passable ditch)

(I136) Waterway/farm road(Passable ditch)

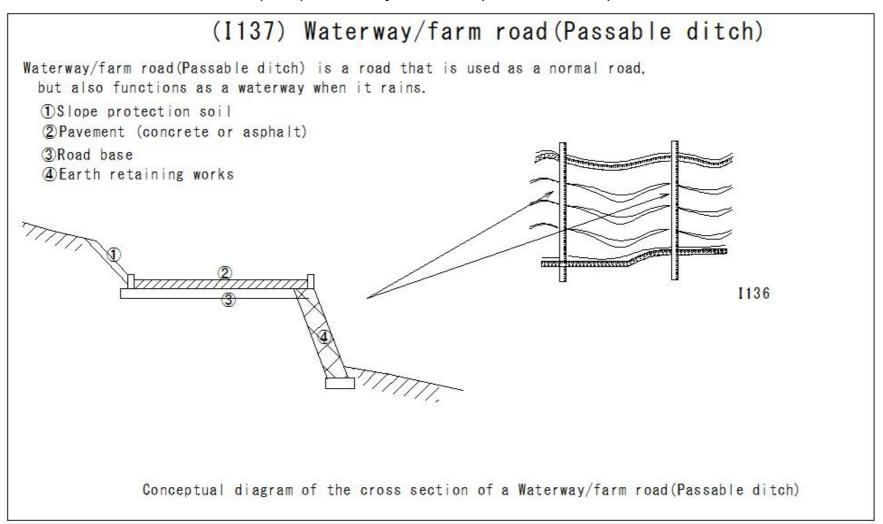
Waterway/farm road(Passable ditch) is a road that is used as a normal road, but also functions as a waterway when it rains.

- 1 Drainage channel
- 2 Contour line
- 3 Main farm road
- @Waterway/farm road
- ⑤Waterway/farm road
- @Cultivation road
- 7Drainage channel
- (8) Main farm road
- 9 In principle, within 200m



Layout of Waterway/farm road(Passable ditch)

(I137) Waterway/farm road(Passable ditch)

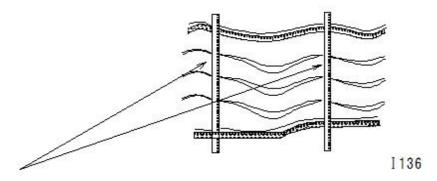


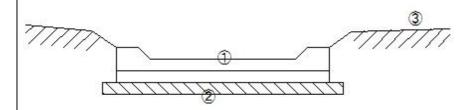
(I138) Waterway/farm road(Passable ditch)

(I138) Waterway/farm road(Passable ditch)

Waterway/farm road(Passable ditch) is a road that is used as a normal road, but also functions as a waterway when it rains.

- ① Concrete slab
- 2 Road base
- 3 Field





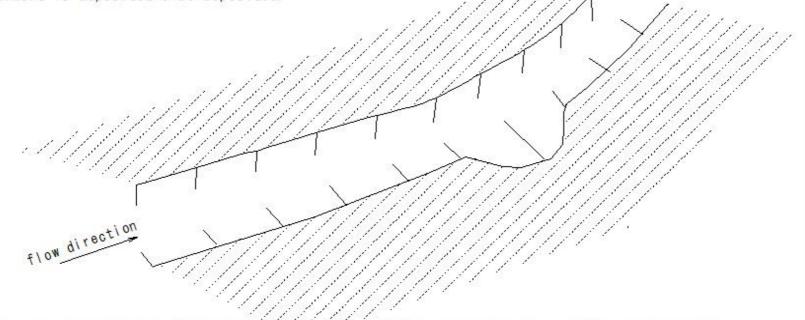
Conceptual diagram of the cross section of a Waterway/farm road(Passable ditch)

(I139)Groin(groyne • spur dike)

(I139) Groin (groyne · spur dike)

Groin (groyne · spur dike)

Allowing water to flow safely down river channels Stabilize the center of the flow in the center of the riverbed Sediment is deposited o be deposited.



A groyne is an underwater structure that weakens the force of water in a river or on a coast, prevents erosion of riverbanks and embankments, and regulates the direction of flow.

(I140)Groin(groyne • spur dike)

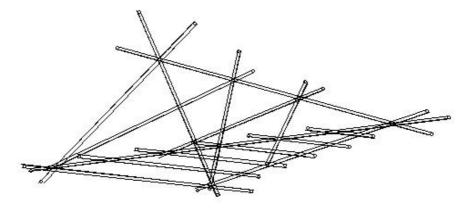
(I140) Groin (groyne · spur dike) Groin(groyne · spur dike) Allowing water to flow safely down river channels Stabilize the center of the flow in the center of the riverbed Sediment is deposited o be deposited Upward groin - pedestal - deposition Downward groin - pedestal right angle groin scour - better to avoid deposition Scouring deposition flow direction A groyne is an underwater structure that weakens the force of water in a river or on a coast, prevents erosion of riverbanks and embankments, and regulates the direction of flow.

(I141)Groin(groyne • spur dike)

(I141) Groin (groyne · spur dike)

Groin(groyne · spur dike)

Allowing water to flow safely down river channels Stabilize the center of the flow in the center of the riverbed Sediment is deposited o be deposited.



Groin-crib work

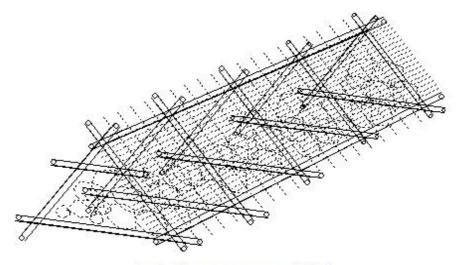
A groyne is an underwater structure that weakens the force of water in a river or on a coast, prevents erosion of riverbanks and embankments, and regulates the direction of flow.

(I142)Groin(groyne • spur dike)

(I142) Groin (groyne · spur dike)

Groin (groyne · spur dike)

Allowing water to flow safely down river channels Stabilize the center of the flow in the center of the riverbed Sediment is deposited o be deposited.



Groin(groyne · spur dike)
crib work

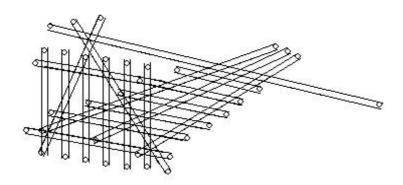
A groyne is an underwater structure that weakens the force of water in a river or on a coast, prevents erosion of riverbanks and embankments, and regulates the direction of flow.

(I143)Groin(groyne • spur dike)

(I143) Groin (groyne · spur dike)

Groin (groyne · spur dike)

Allowing water to flow safely down river channels Stabilize the center of the flow in the center of the riverbed Sediment is deposited o be deposited.



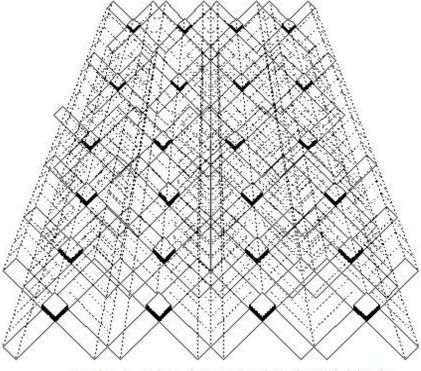
A groyne is an underwater structure that weakens the force of water in a river or on a coast, prevents erosion of riverbanks and embankments, and regulates the direction of flow.

(I144)Groin(groyne • spur dike)

(I144) Groin (groyne · spur dike)

Groin(groyne · spur dike)

Allowing water to flow safely down river channels Stabilize the center of the flow in the center of the riverbed Sediment is deposited o be deposited.



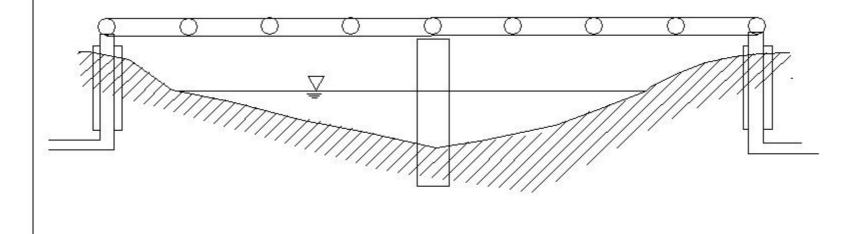
groin using irregularly shaped blocks

(I145) Aqueduct bridge (water pipe bridge)

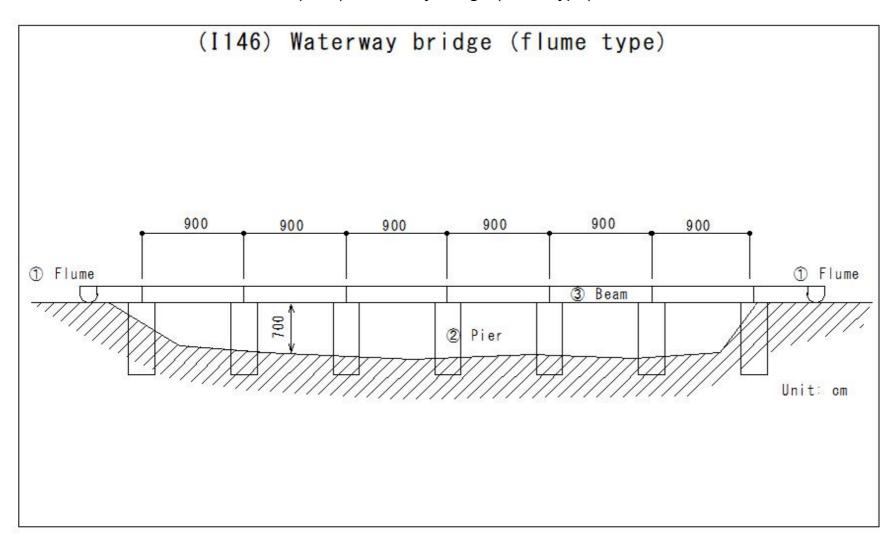
(I145) Aqueduct bridge (water pipe bridge)

- Aqueduct bridge is a general term for bridges that cross waterways, canals, and waterways of hydroelectric power plants.
- ② Aqueduct bridges are bridges used to transport water across rivers and valleys.

 Based on their shape, they are divided into open aqueduct bridges and water pipe



(I146) Waterway bridge (flume type)

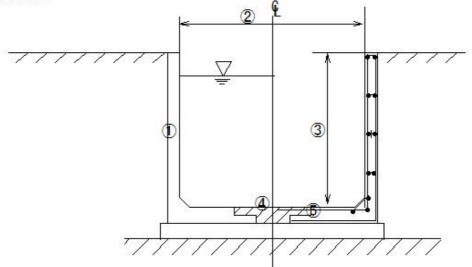


(I147) Reinforced concrete L-shaped for waterways

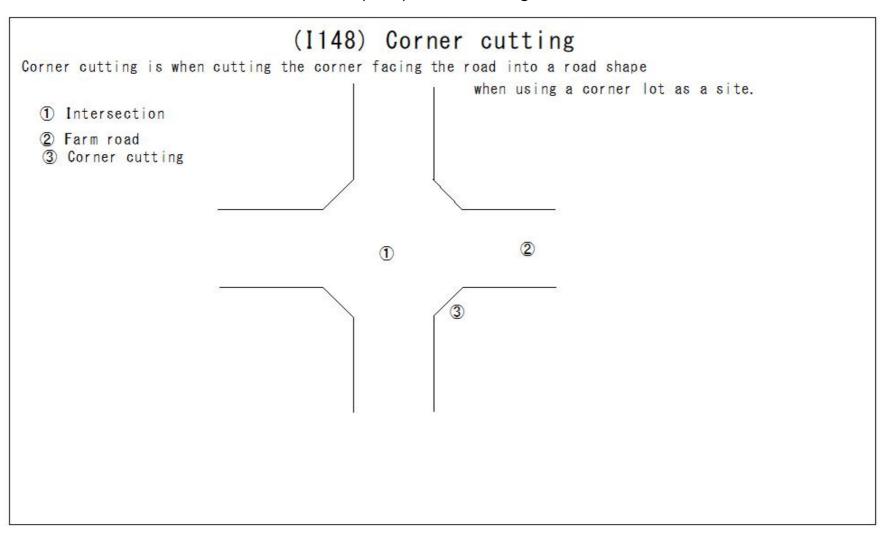
(I147) Reinforced concrete L-shaped for waterways

The L-shaped reinforced concrete for waterways is suitable for waterways that carry a relatively large flow rate.

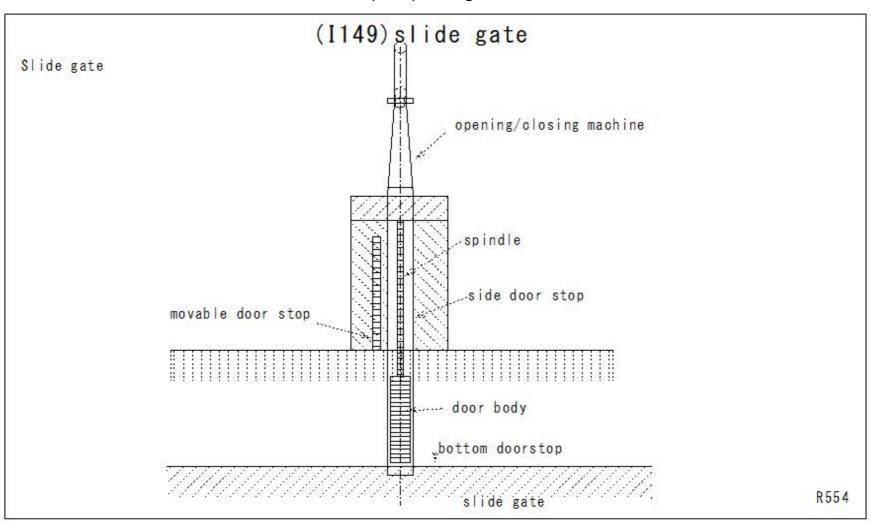
- 1L-shaped
- 2 Width
- 3 Height
- 4 Cast-in-place section
- (5) Reinforced bar welded



(I148) Corner cutting



(I149)Slide gate



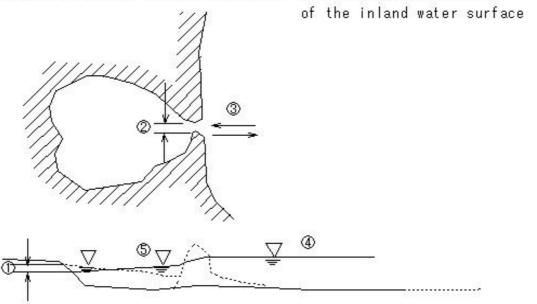
(I150) Seiche

(I150) Seiche

Seiche is a long-period water surface vibration phenomenon that occurs in lakes and harbors.

It is caused by changes in wind and air pressure, and changes in inflow and outflow.

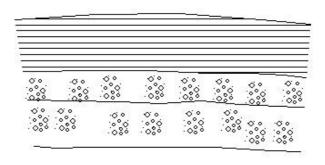
- ① It can be larger than the up and down movement of the sea surface due to resonance
- 2 Narrow
- ③ In and outflow due to tides
- A head occurs here, causing a phase difference between the up and down movement



(I151) Conformity/Unconformity

(I151) Conformity/Unconformity

Conformity refers to the state in which the strata are deposited continuously over time, that is, the deposition continues continuously without interruption. On the other hand,

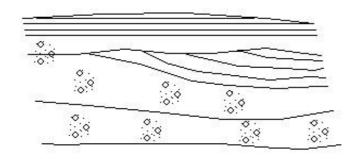


Conformity

(I152) Conformity/Unconformity

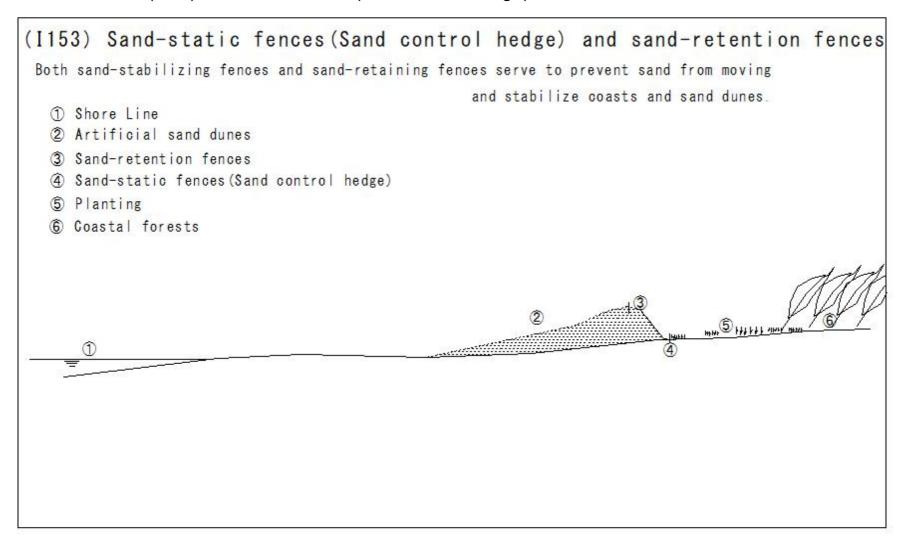
(I152) Conformity/Unconformity

Conformity refers to the state in which the strata are deposited continuously over time, that is, the deposition continues continuously without interruption. On the other hand,

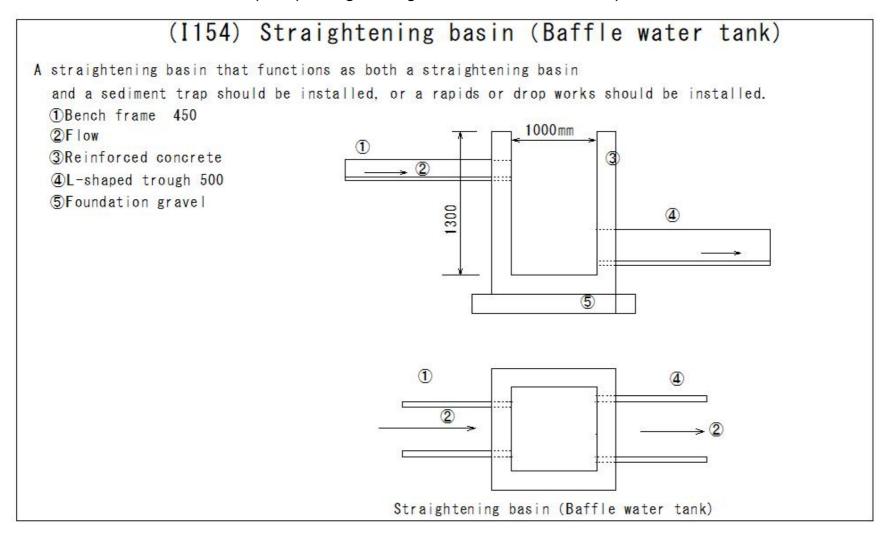


Unconformity

(I153) Sand-static fences(Sand control hedge) and sand-retention fences



(I154) Straightening basin (Baffle water tank)



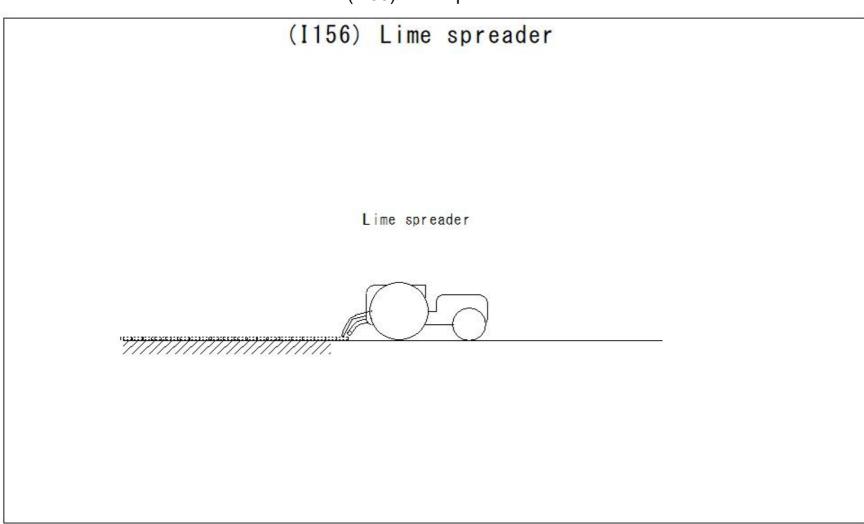
(I155) Stone materials

Classification of stone materials for civil engineering works by use

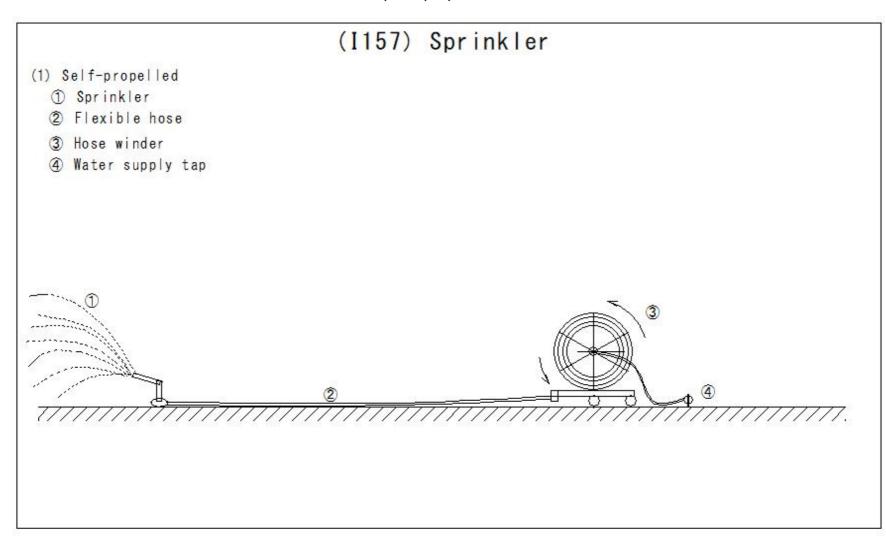
① Stone masonry/paving stones	① Corner stones/broken stones/flake stones
2 Pavement	② Flagstones/small paving stones
③ Foundation work/split stones	3 Cobbled stones/broken cobbled stones
4 Concrete	Natural gravel/natural sand/crushed gravel/crushed sand

- ⑤ Roadbed/road surface pavement ⑤ Crushed gravel/crushed sand/natural gravel/natural sand
- 6 Roadbed 6 Crushed gravel/natural gravel

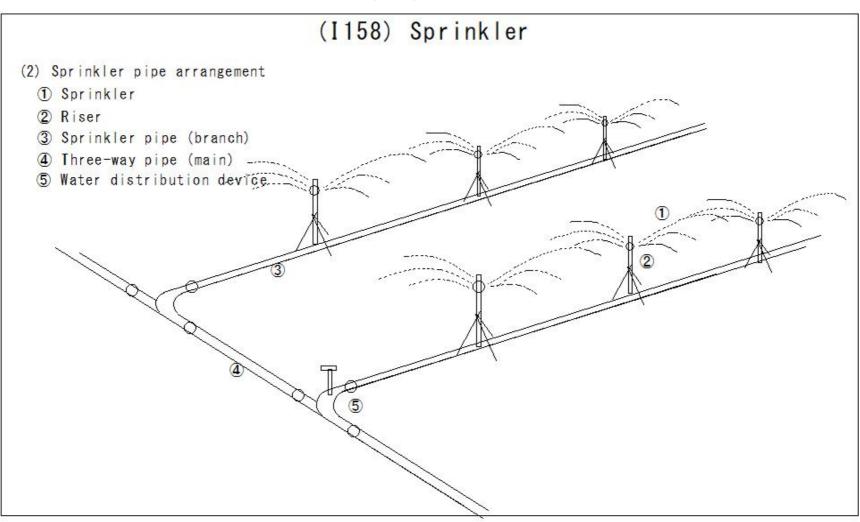
(I156) Lime spreader



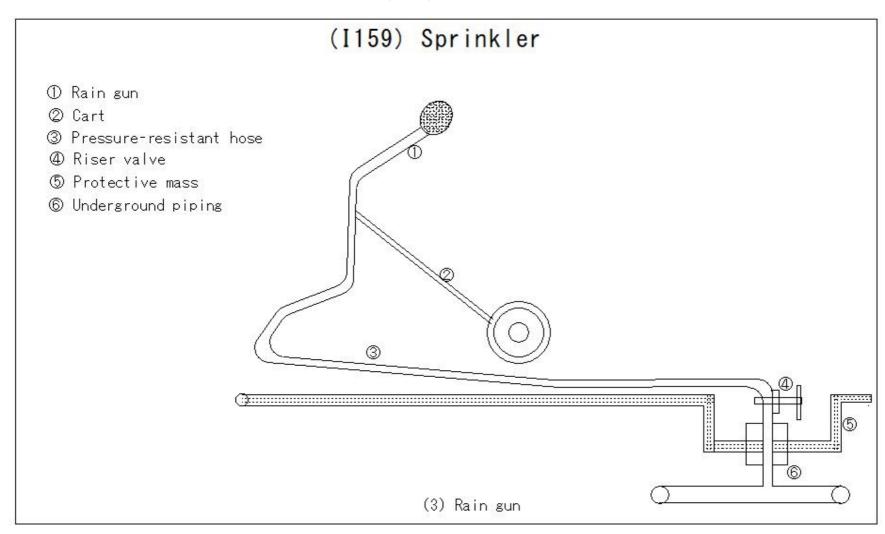
(I157) Sprinkler



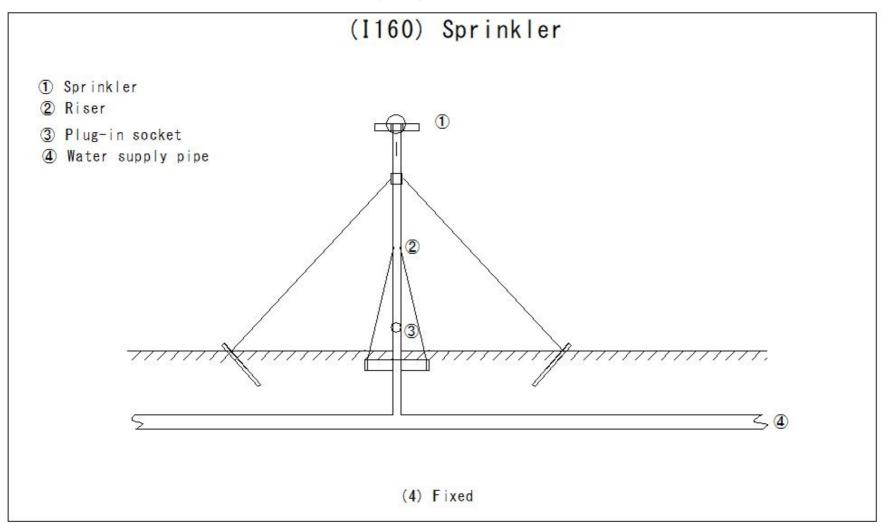
(I158) Sprinkler



(I159) Sprinkler



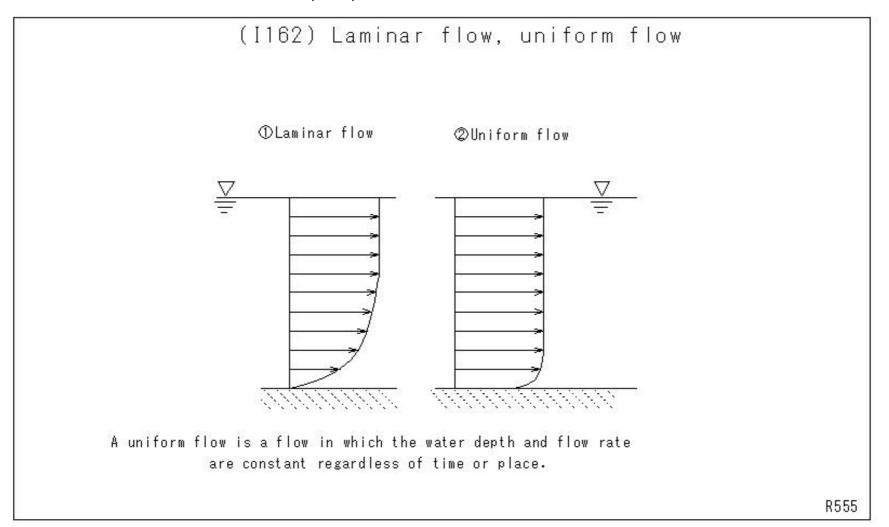
(I160) Sprinkler



(I161) Laminar flow, uniform flow

(I161) laminar flow · laminar flow laminar flow · laminar flow Fluid particles: move only in the direction of flow Open channel: Reynolds number 500 or less Laminar flow within the pipeline, approx. 2000 or less laminar flow ink Increased flow rate turbulence ink Laminar flow is a flow in which the fluid flows in parallel layers, R555 with no turbulence between the layers.

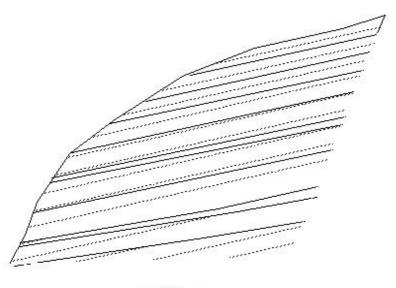
(I162) Laminar flow, uniform flow



(I163) Bedding

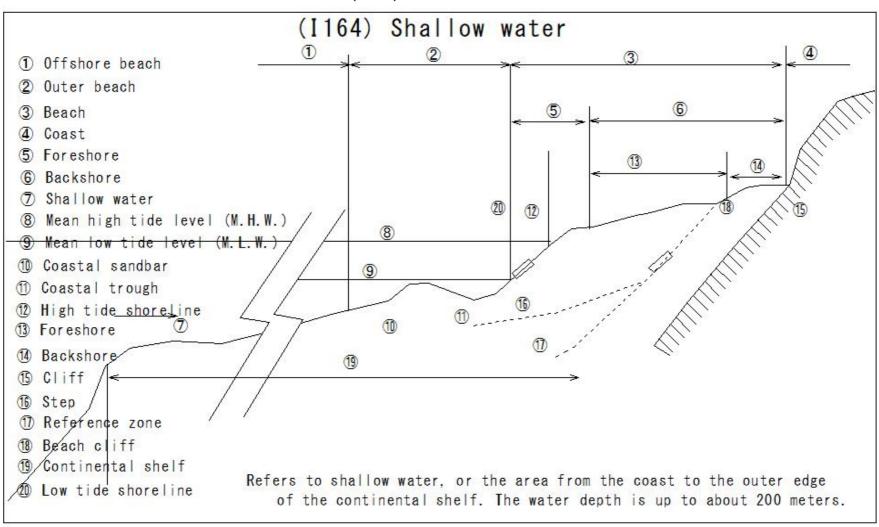
(I163) Bedding

Bedding is a layered structure found in sedimentary rocks and strata that occurs due to changes in sediments or depositional conditions.

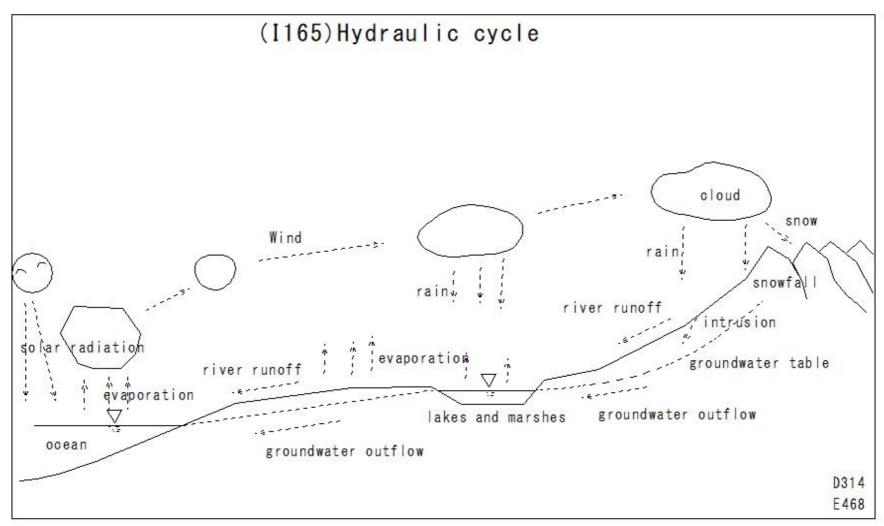


Bedding

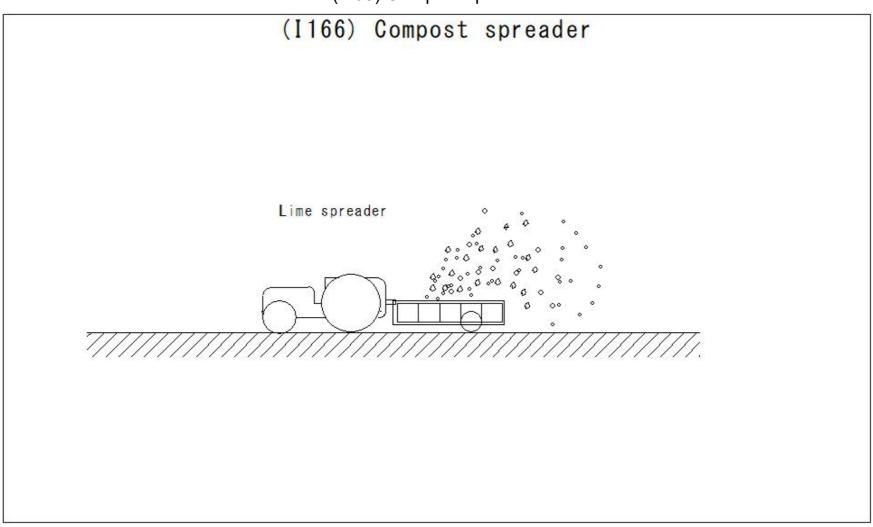
(I164) Shallow water



(I165)Hydrological cycle



(I166) Compost spreader

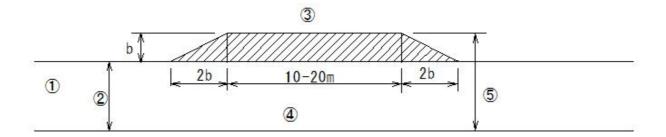


(I167) Evacuation shelter(Passing place)

(I167) Evacuation shelter(Passing place)

Evacuation shelter (Passing place) is a space on a narrow road where vehicles can pass each other (pass or separate).

- 1) Road
- 2 Less than 4m
- 3 Evacuation shelter (Passing place)
- 4 Road
- (5) Road width 5m or more



(I168)Bench terraced fields

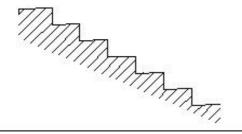
(I168)Bench terraced fields

Terraced fields: Fields built in a stepped pattern on the slopes of mountains or valleys (with a slope of 15 degrees or more).

horizontal bench terrace field

sloping bench terraced field

reverse bench slope terrace field

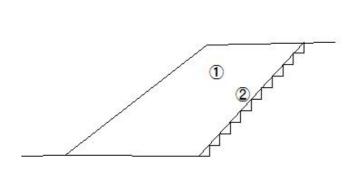


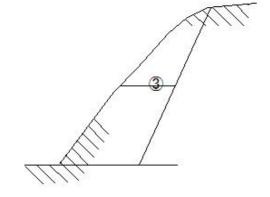
(I169) Step cutting

(I169) Step cutting

Step cutting: When building an embankment on a steep slope or ground, the ground is cut into steps to prevent slipping and stabilize the ground.

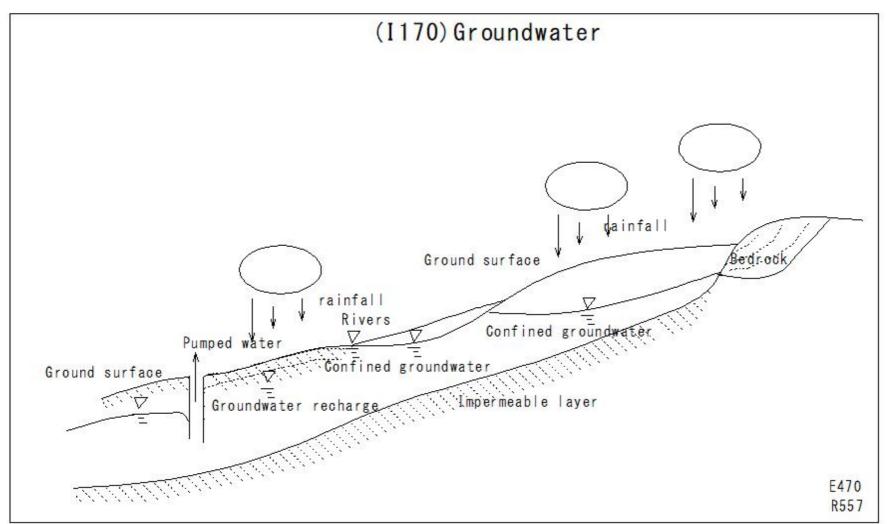
- 1 Embankment
- 2 Conventional ground surface
- 3 Construction base surface



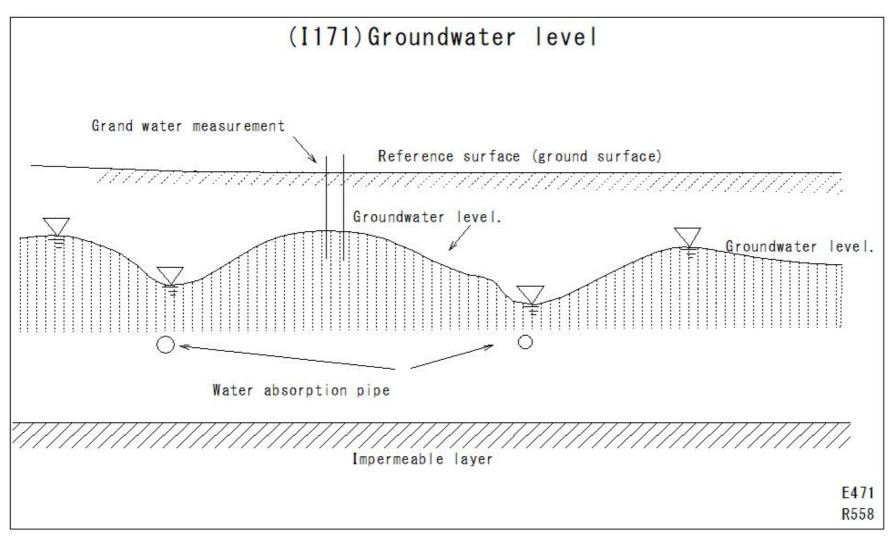


Step cutting

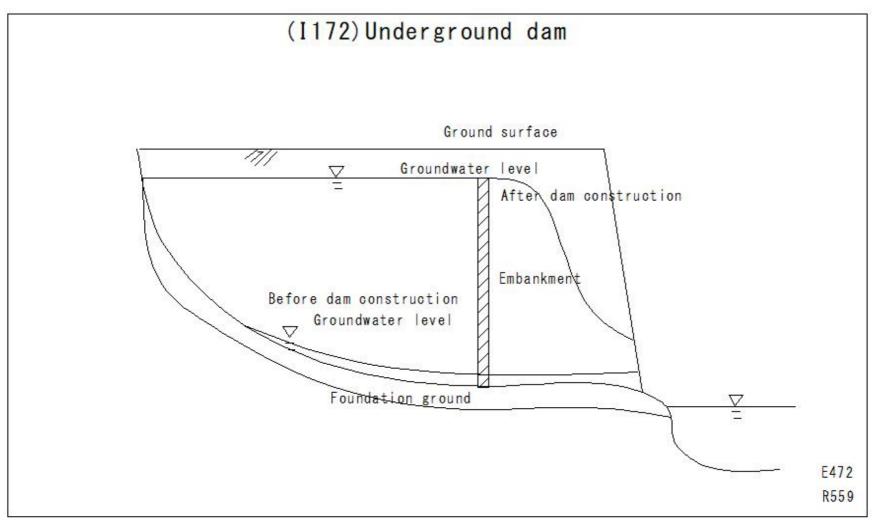
(I170)Groundwater



(I171)Groundwater level



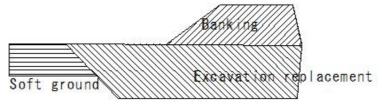
(I172)Underground dam



(I173)Replacement method

(I173) Replacement method

The replacement method is a method of strengthening the ground by replacing weak ground with high-quality materials.



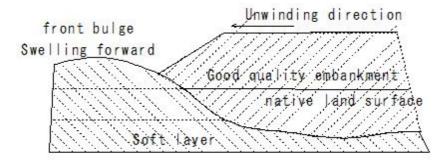
Excavation replacement part

Replacement method

(I174)Replacement method

(I174) Replacement method

The replacement method is a method of strengthening the ground by replacing weak ground with high-quality materials.



forced replacement

Replacement method

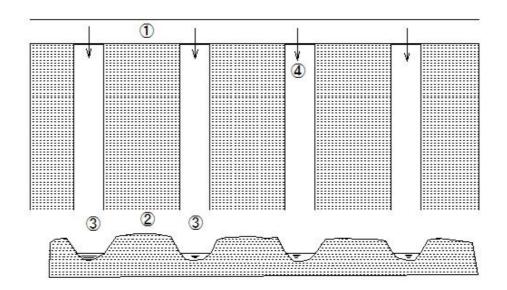
(I175) Surface irrigation

(I175) Surface irrigation

Irrigation: It can also be used to prevent weather disasters such as frost damage, wind erosion, and tidal damage.

Irrigation methods can be classified into sprinkler irrigation, fixed pipe irrigation, surface irrigation, and underground irrigation.

- 1 Water supply channel
- 2 Furrow
- 3 Furrow
- 4 Water

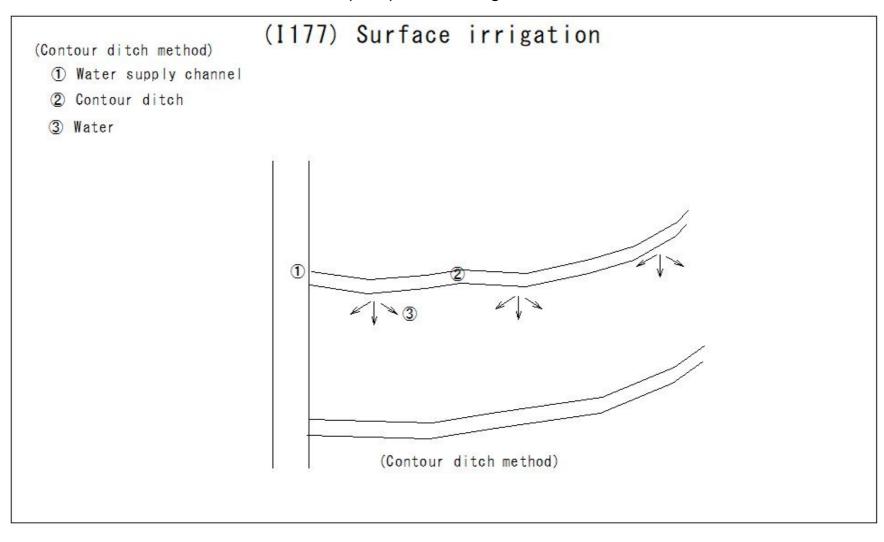


(Furrow irrigation)

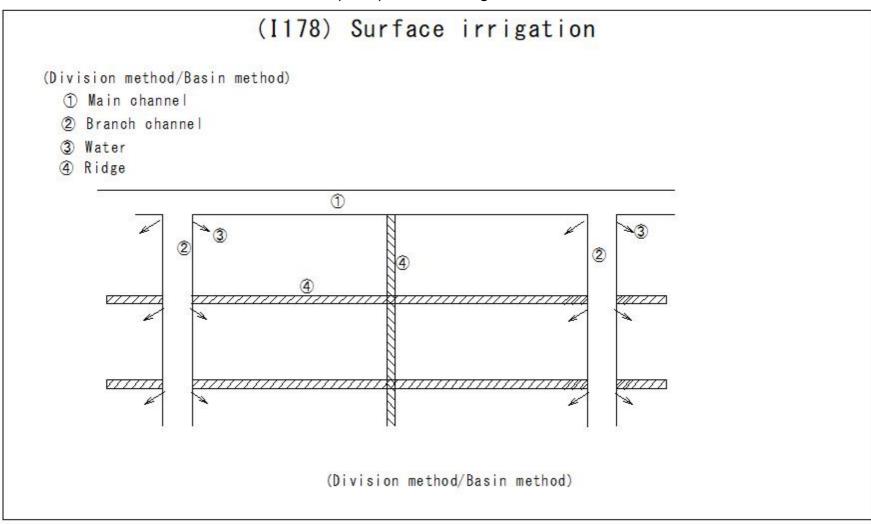
(I176) Surface irrigation

(I176) Surface irrigation (Border method) Partial irrigation that supplies water only to the base of the crop 1 Water supply channel 2 Bank 3 Water 1 (Border method)

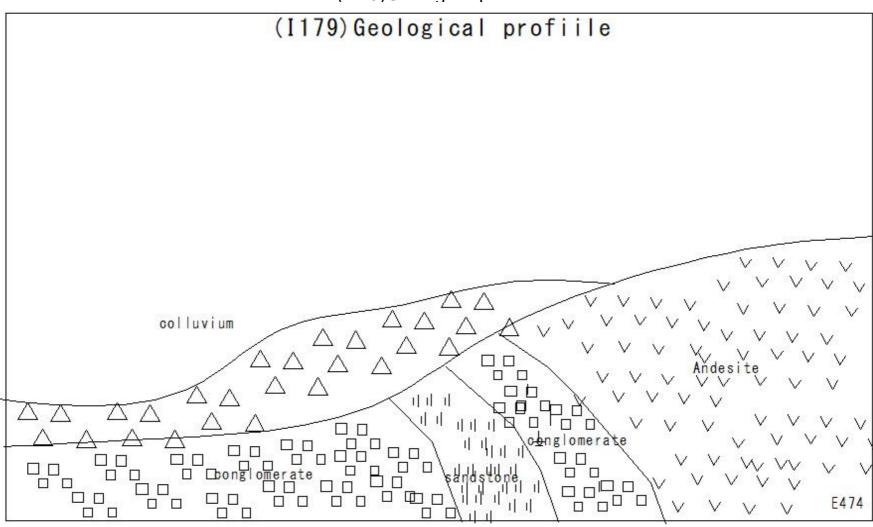
(I177) Surface irrigation



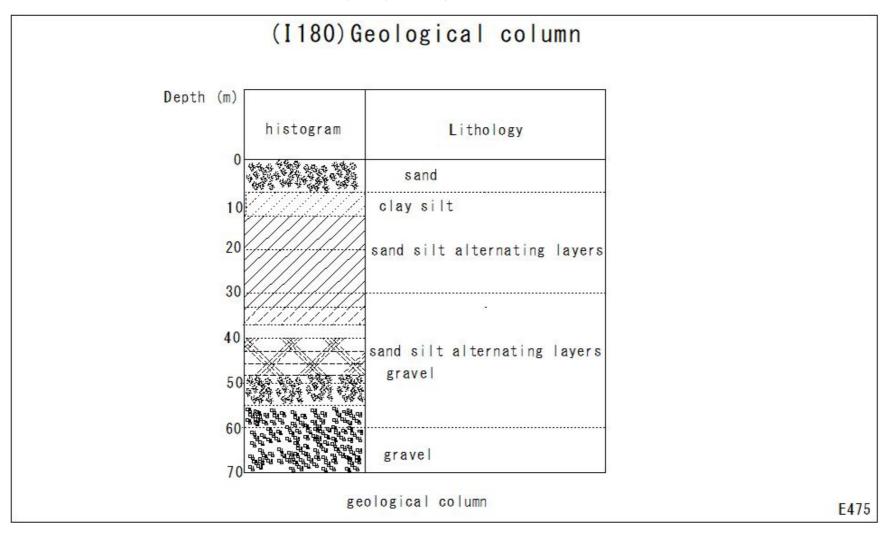
(I178) Surface irrigation



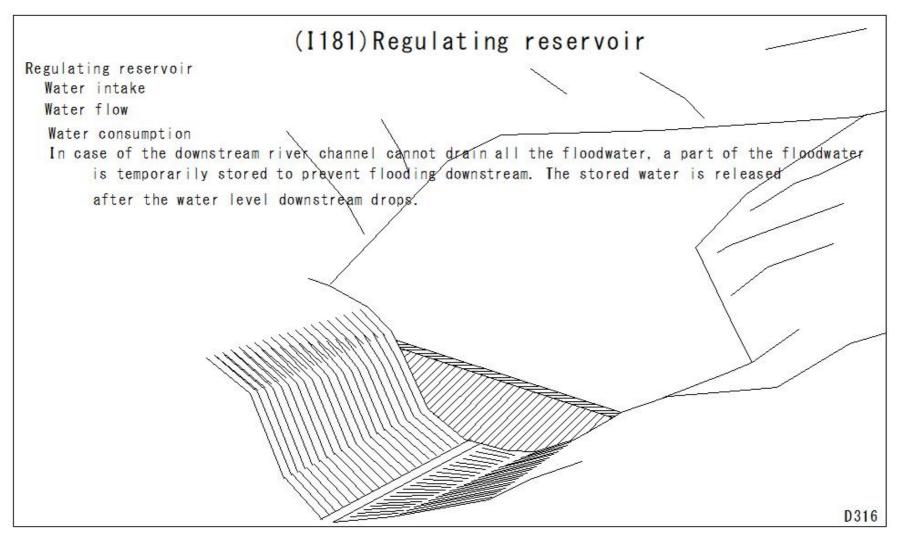
(I179)Geological profiile



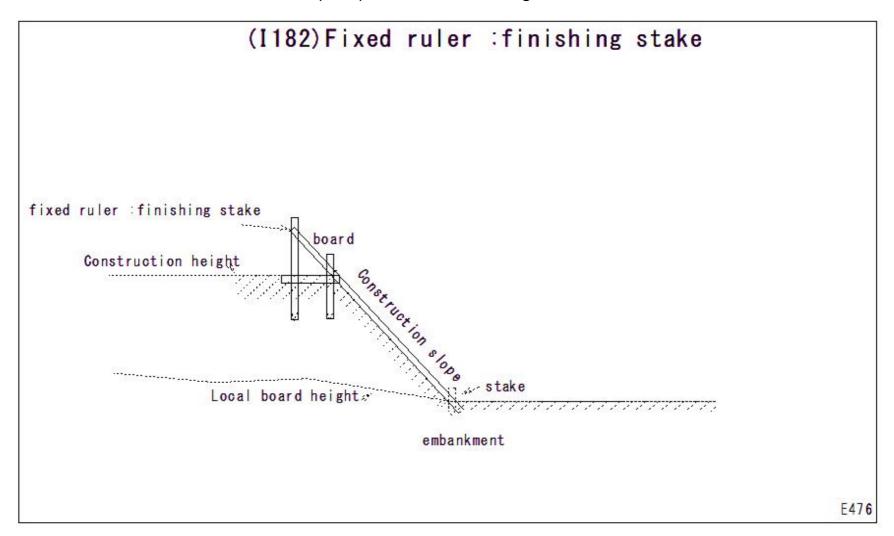
(I180)Geological column

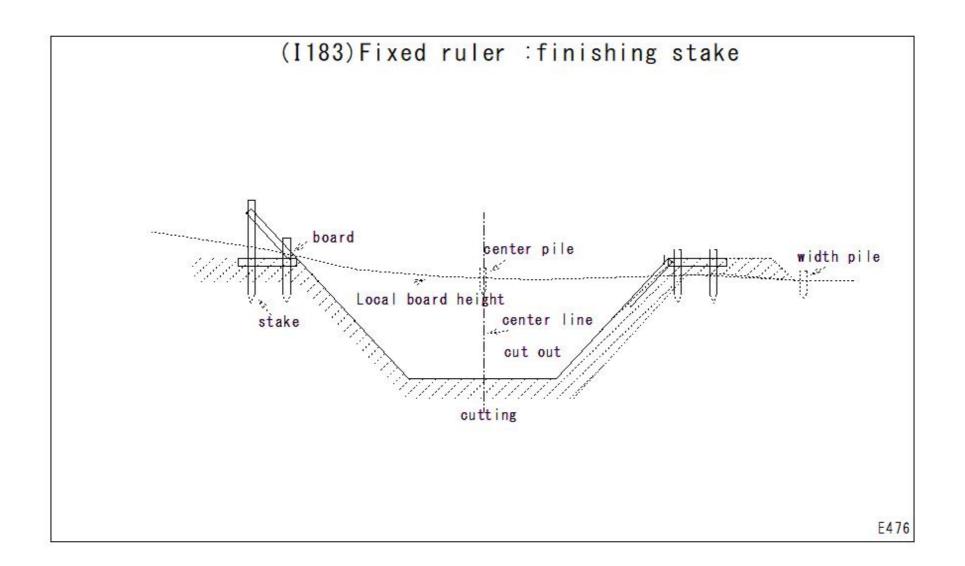


(I181)Regulating reservoir

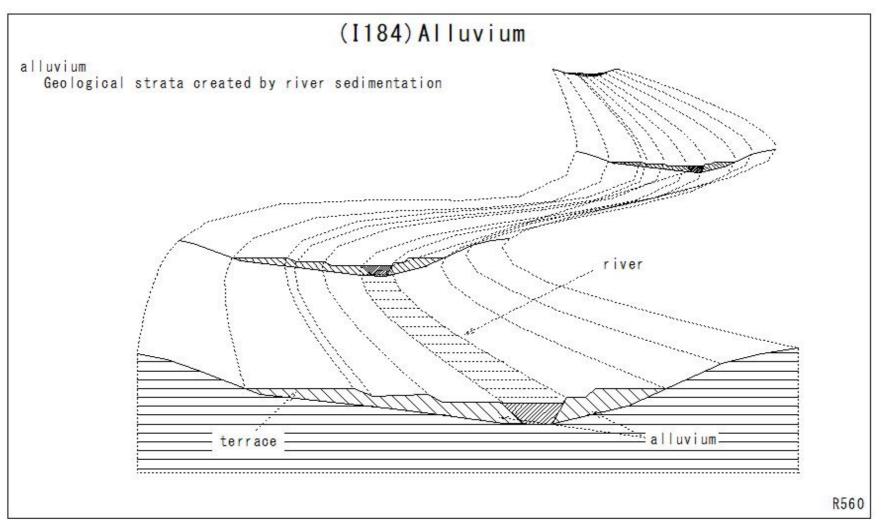


(I182)Fixed ruler :finishing stake





(I184)Alluvium

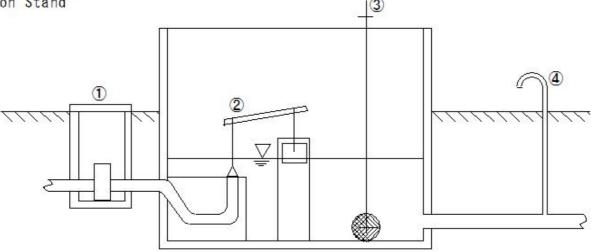


(I185) Pressure Regulating Facility (Float Valve Type)

(I185) Pressure Regulating Facility (Float Valve Type)

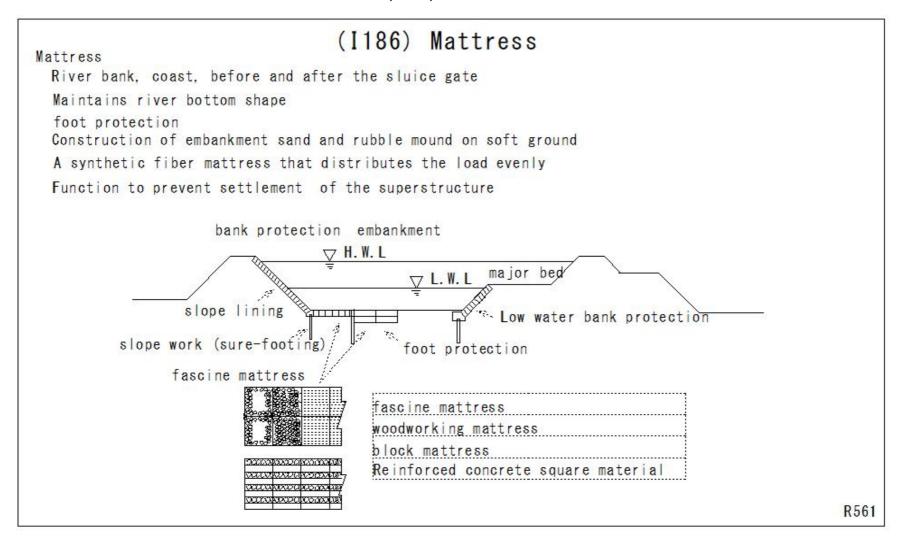
The water conveyance facility has a water conveyance pipe that conveys raw water from the intake pump to the receiving well, and a pressure regulating tank that

- (1) Water Control Valve
- 2 Submerged Desk Valve
- ③ Water Diversion Gate
- 4 Ventilation Stand

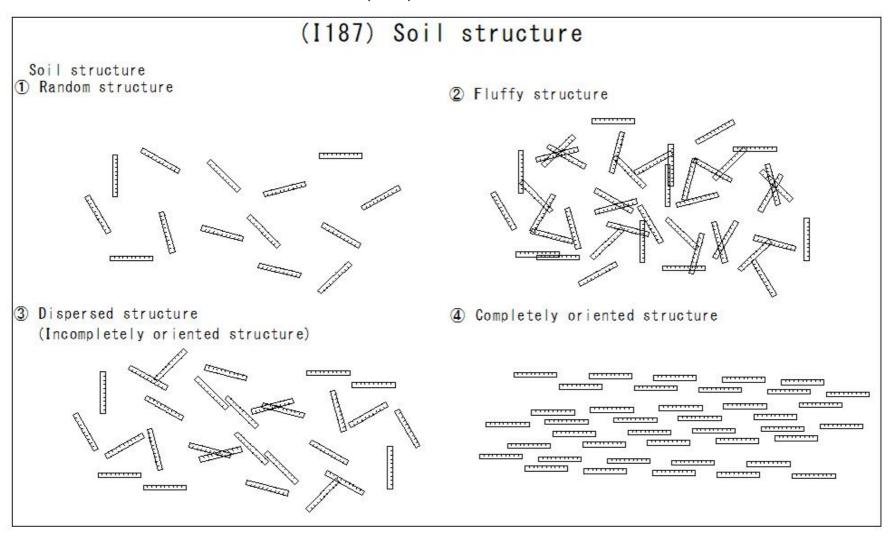


Pressure Regulating Facility (Float Valve Type)

(I186) Mattress



(I187) Soil structure



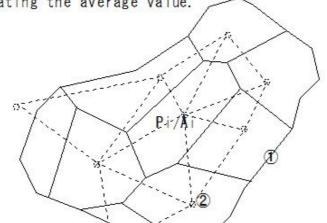
(I188) Thiessen method

(I188) Thiessen method

Calculating areal rainfall using the Thiessen method

- 1 Watershed boundary
- 2 Rainfall observation point
- 3 P: ΣPiAi/ΣAi
- 4 P: Area rainfall
- ⑤ Pi: Rainfall at point i
- 6 Ai: Area of the polygonal watershed that includes point i

The Thiessen method is a method of dividing the watershed into areas represented by point rainfall, overlaying them, and calculating the average value.



Calculating areal rainfall using the Thiessen method

(I189) Peat

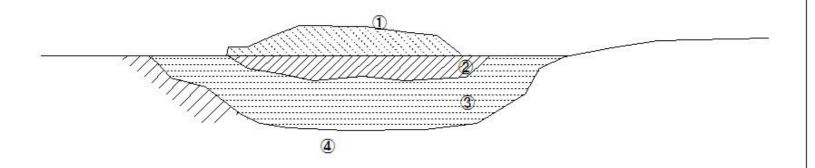
(I189) Peat

Peat

Peat is soil formed by the accumulation of plant remains, and is a type of coal.

It accumulates in thick layers in swamps and shallow marshes.

- 1 High peat
- 2 Intermediate peat
- 3 Low peat
- 4 Fill



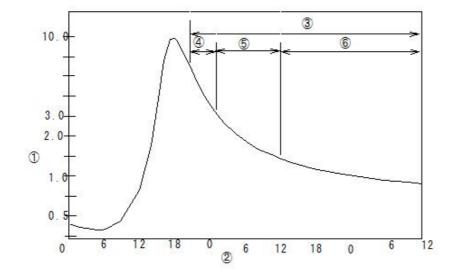
Examples of peat

(I190) Decreasing curve(Recession curve)

(I190) Decreasing curve (Recession curve)

Decreasing curve (Recession curve)

- ①Flow rate (m3/sec)
- ② Time (hr)
- 3 Decreasing curve (Recession curve)
- 4 Surface runoff
- 5 Intermediate runoff
- @Groundwater runoff



(I191) Crest length

(I191) Crest length Crest length The crest length is the distance from the right bank to the left bank at the crest of a dam. ① Crest 2 Part of the ground cut 3 Crest height 4 Lowest part of the bedrock ⑤ Crest 6 Crest height 1 Lowest part of the top of the water cutoff wall (8) Water cutoff wall

(I192)Alignment of Dike

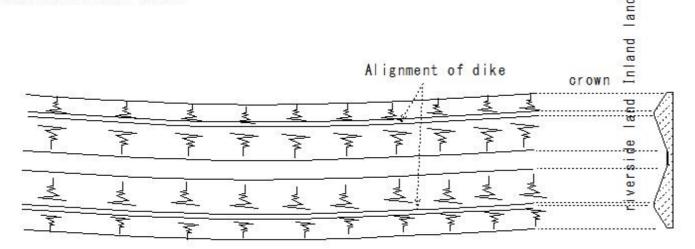
(I192) Alignment of dike

Alignment of dike

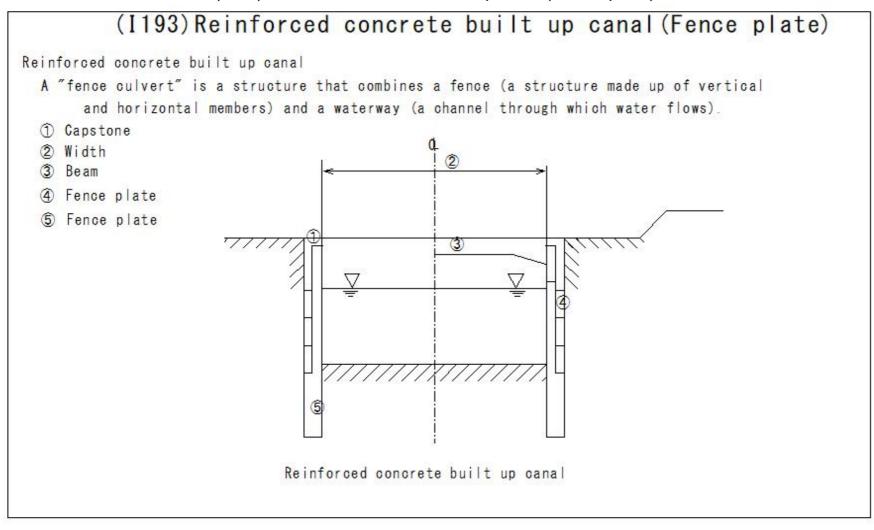
Plane shape of the inner shoulder of the embankment crown

Protecting cultivated land outside the embankment from minor flooding

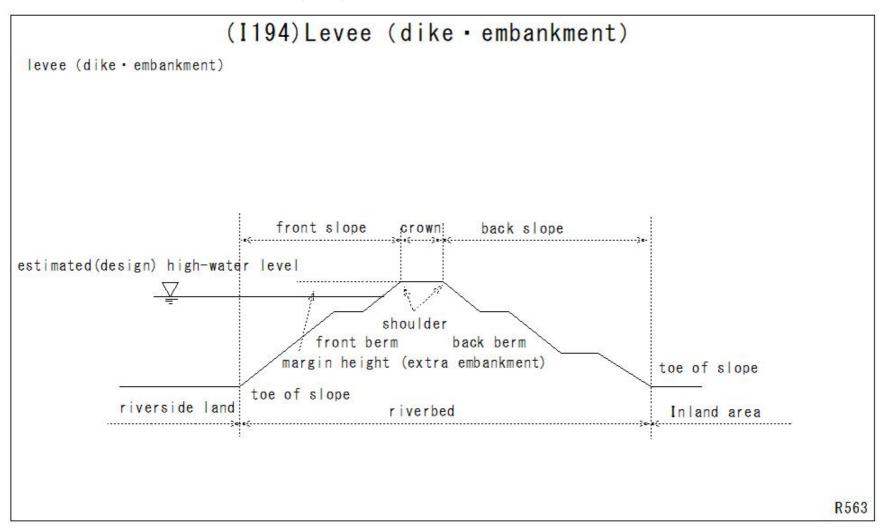
Determines the basic river width required for the planar shape to flow at the estimated flood level.



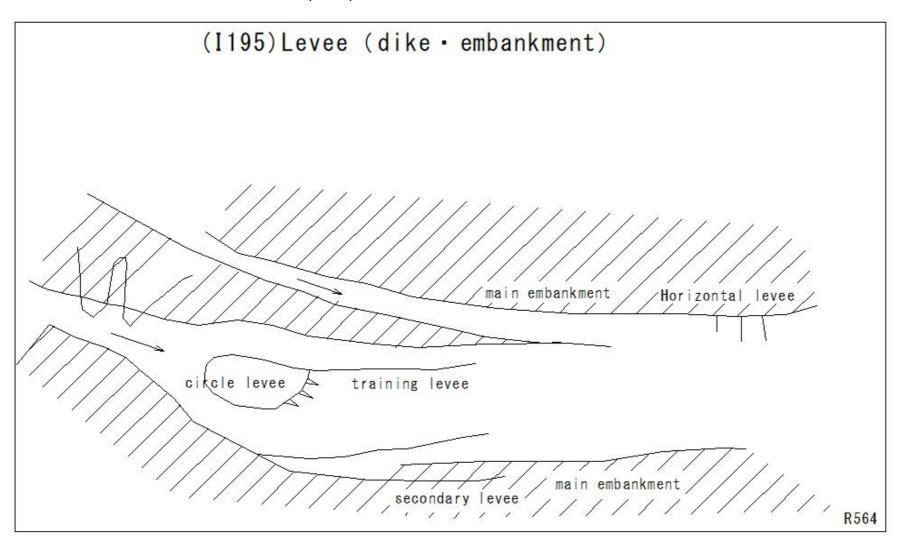
(I193)Reinforced concrete built up canal(Fence plate)



(I194)Levee (Dike • Embankment)



(I195)Levee (dike • embankment)



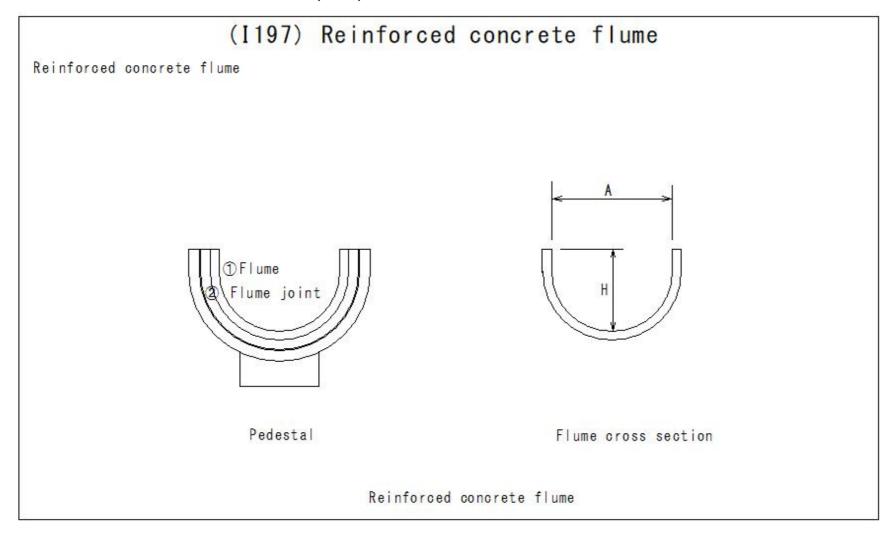
(I196) Reinforced concrete flume

Reinforced concrete flume

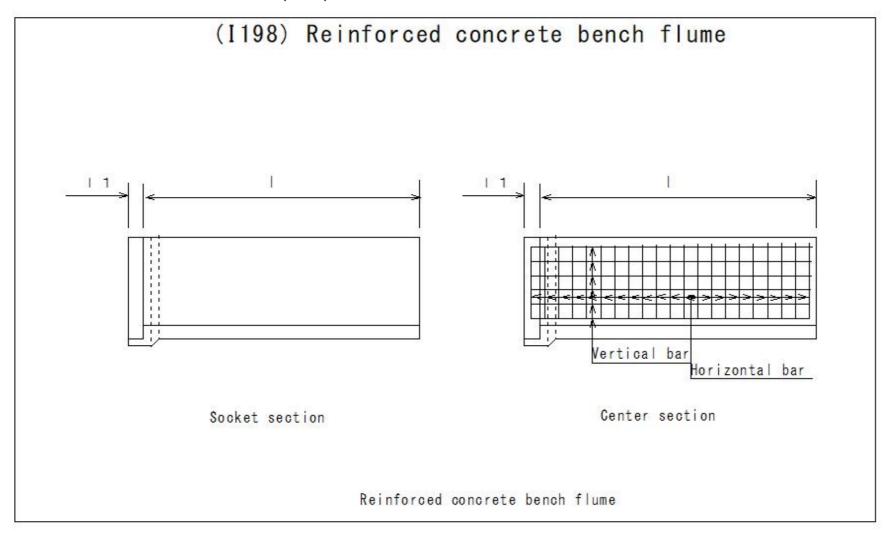
Category	Dimensions of each part (mm)												
	200	250	300	350	400	450	500	560	600	700	800	920	1000
Width A	210	260	310	360	425	480	530	600	640	745	845	965	1055
Depth H	200	240	275	315	350	390	425	480	500	575	650	740	800
Length L	3995								2995				

(unit:mm)

(I197) Reinforced concrete flume

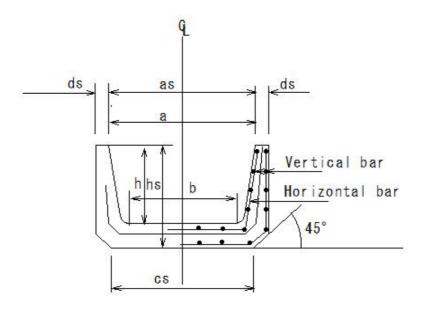


(I198) Reinforced concrete bench flume



(I199) Reinforced concrete bench flume

(I199) Reinforced concrete bench flume



Bench flume with socket

Reinforced concrete bench flume

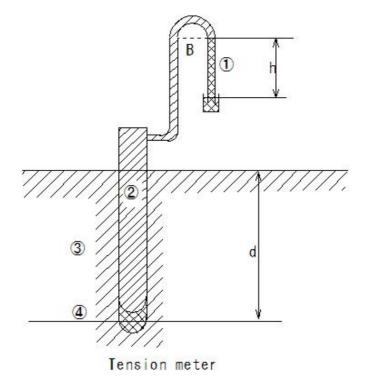
(I200) Tension meter

(I200) Tension meter

Tension meter

A digital tension meter is a type of tension meter that displays tension values ??in numbers.

- 1 Mercury
- 2 Water
- 3 Soil
- 4 Terracotta cup



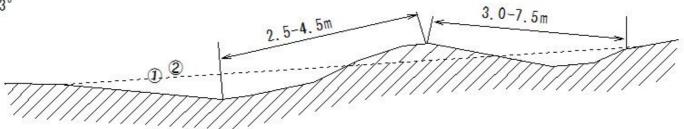
(I201) Terrace channel

Terrace channel

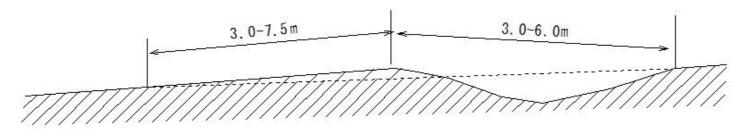
Prevention of soil runoff in large-scale sloping fields by introducing terrace channels, etc.

10riginal ground

②Slope 3°

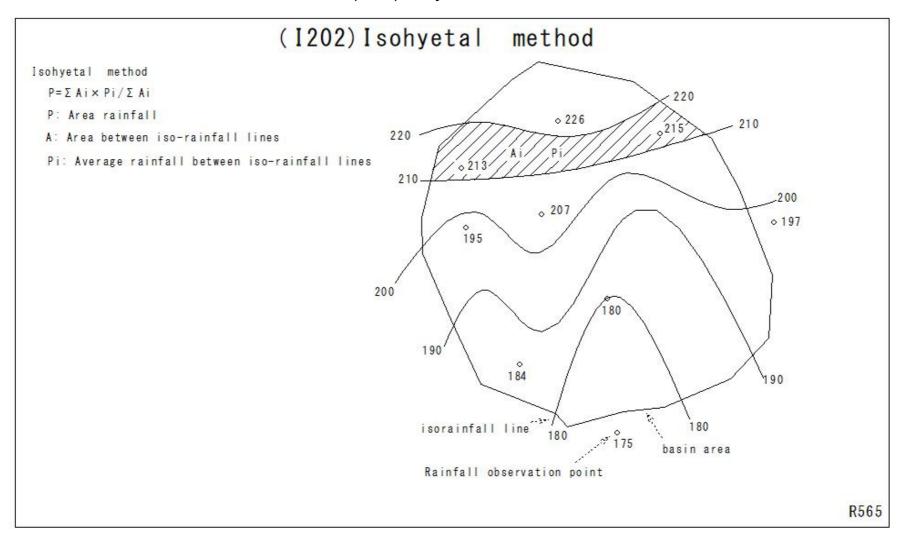


3 Ridge-type terrace channel

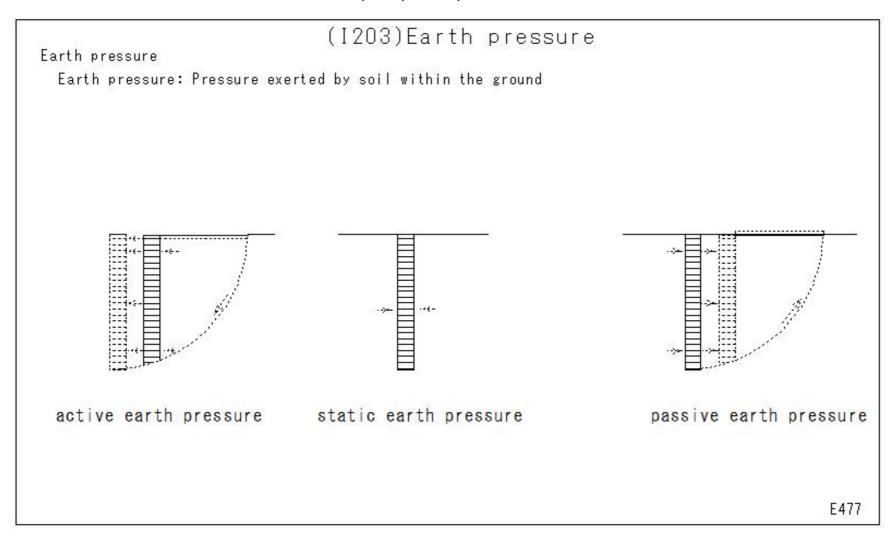


Wide-area channel-type terrace channel

(I202)Isohyetal method



(I203)Earth pressure



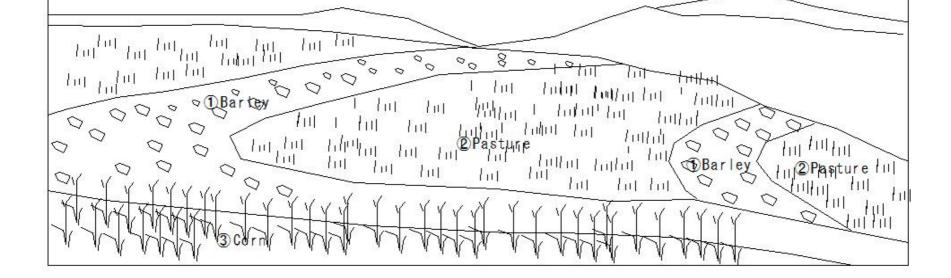
(I204)Contour cultivation

(I204) Contour cultivation

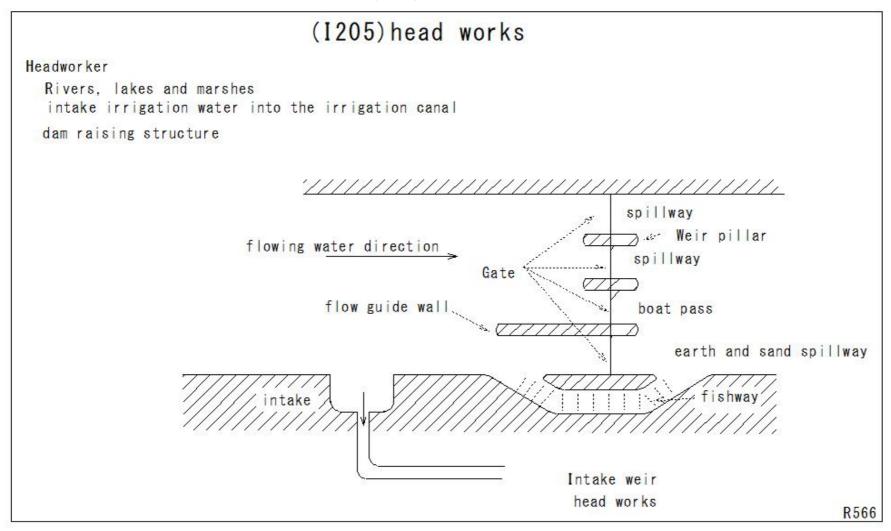
Contour cultivation

Soil erosion control

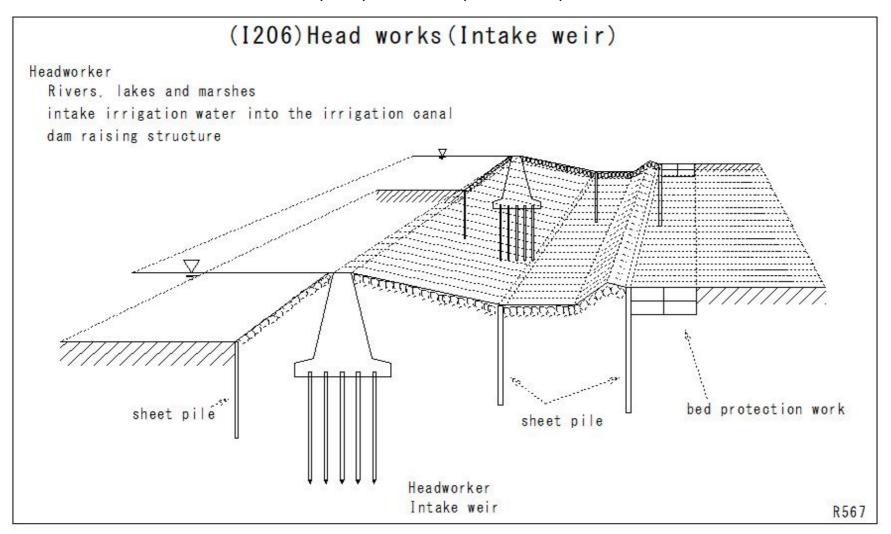
- ① Contour cultivation is an agricultural method in which crops are planted in ridges or strips along contour lines on sloping land.
- 2 Prevents soil erosion and fertilizer runoff.



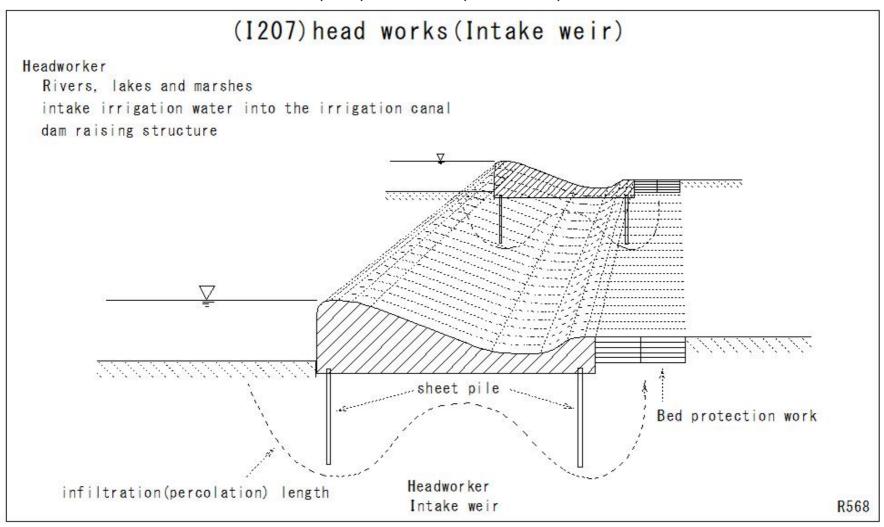
(I205)Head works



(I206)head works(Intake weir)



(I207)head works(Intake weir)

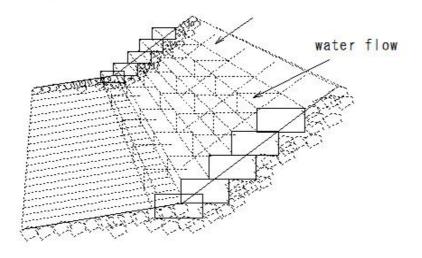


(I208)ground sill consolidation works

(I208) ground sill consolidation works

ground sill consolidation works Stabilizes riverbeds and major bed cross the river

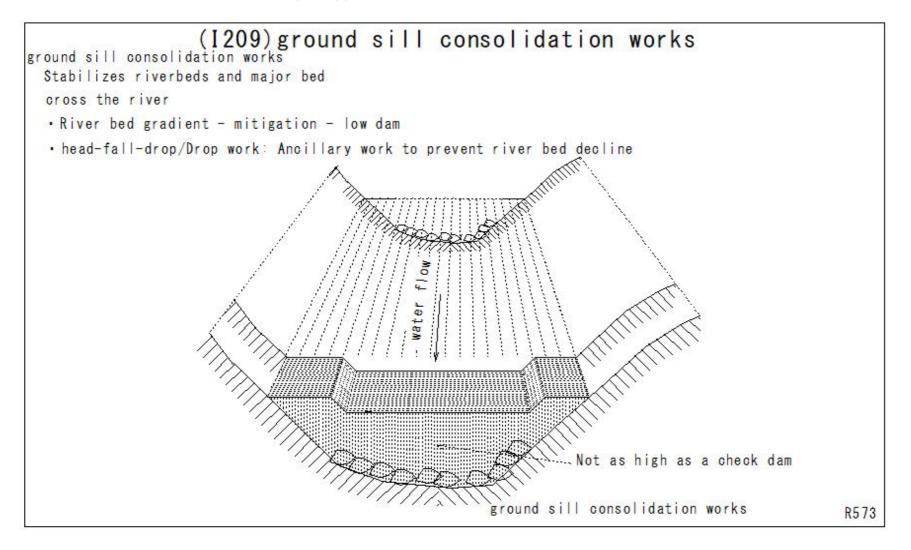
- · River bed gradient mitigation low dam
- · head-fall-drop/Drop work: Ancillary work to prevent river bed decline



ground sill consolidation works

R569

(I209)ground sill consolidation works

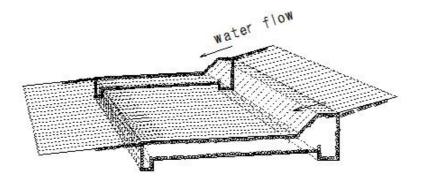


(I210)ground sill consolidation works

(I210) ground sill consolidation works

ground sill consolidation works Stabilizes riverbeds and major bed cross the river

- · River bed gradient mitigation low dam
- · head-fall-drop/Drop work: Ancillary work to prevent river bed decline



ground sill consolidation works

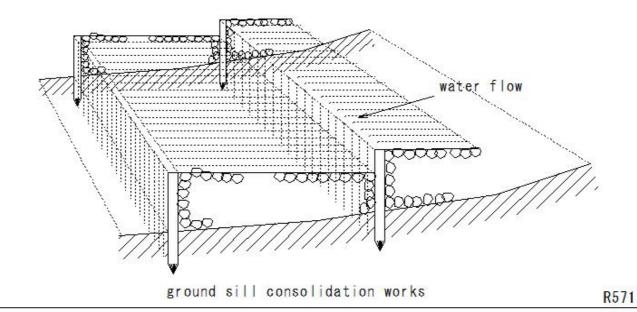
R570

(I211)ground sill consolidation works

(I211) ground sill consolidation works

ground sill consolidation works Stabilizes riverbeds and major bed cross the river

- · River bed gradient mitigation low dam
- · head-fall-drop/Drop work: Ancillary work to prevent river bed decline

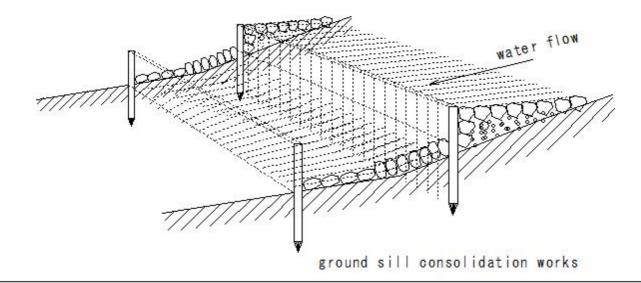


(I212)ground sill consolidation works

(I212) ground sill consolidation works

ground sill consolidation works Stabilizes riverbeds and major bed cross the river

- · River bed gradient mitigation low dam
- · head-fall-drop/Drop work: Ancillary work to prevent river bed decline

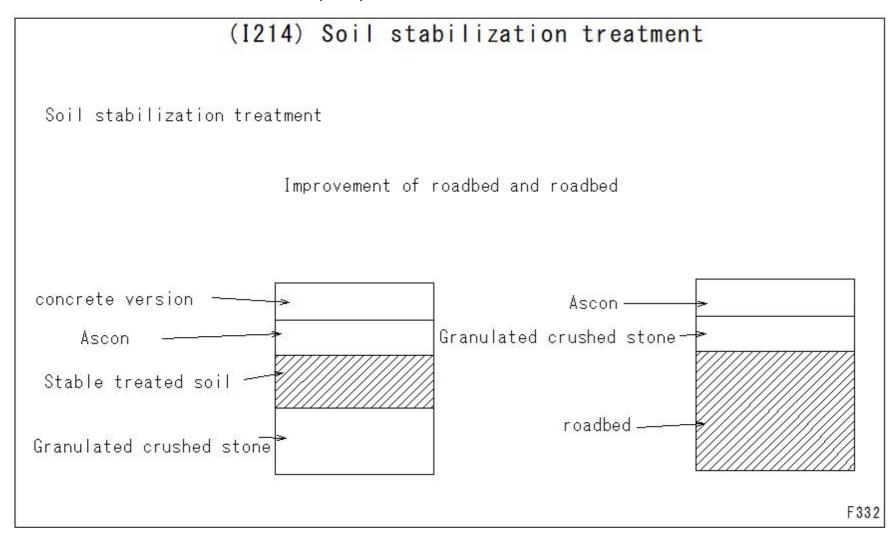


R572

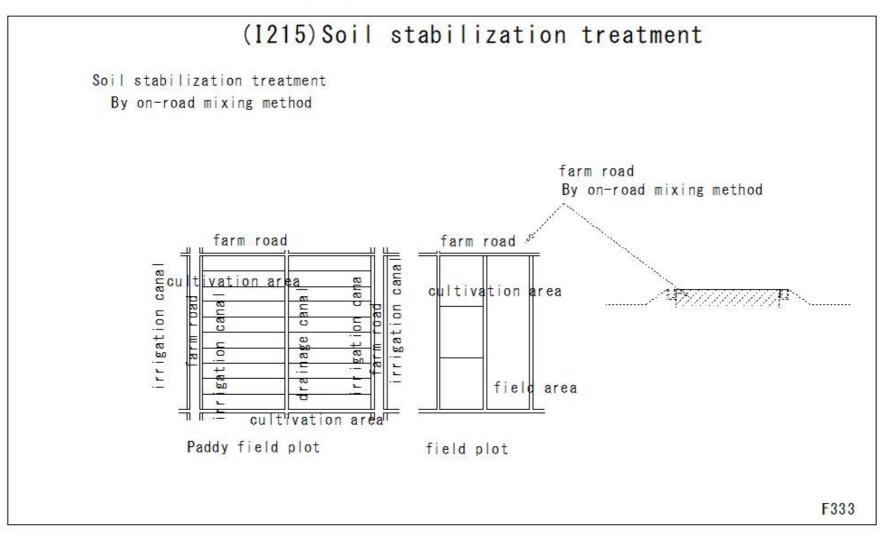
(I213) Right-of-way

(I213) Right-of-way Right-of-way A road paving is a piece of land used for roads and their accessories as defined by the Road Act. ① Right-of-way 2 Waterway paving 1 3 Cultivated land 2 4 Field ridges 5 Right-of-way 6 Field ridges (7) Cultivated land (5) 7 Right-of-way

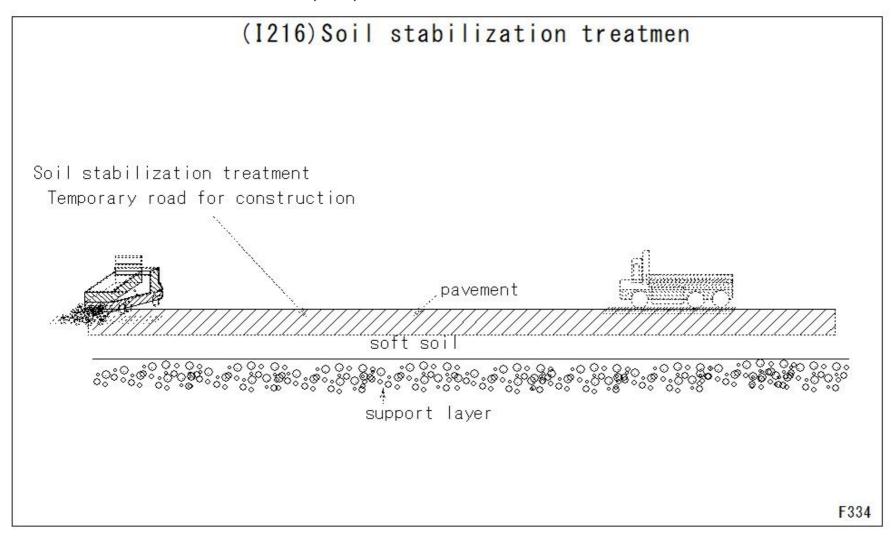
(I214)Soil stabilization treatment



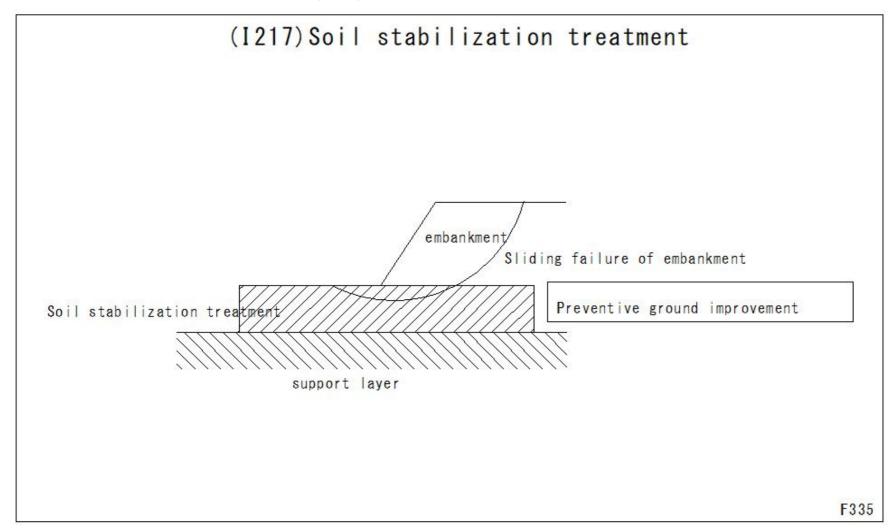
(I215)Soil stabilization treatment



(I216)Soil stabilization treatment



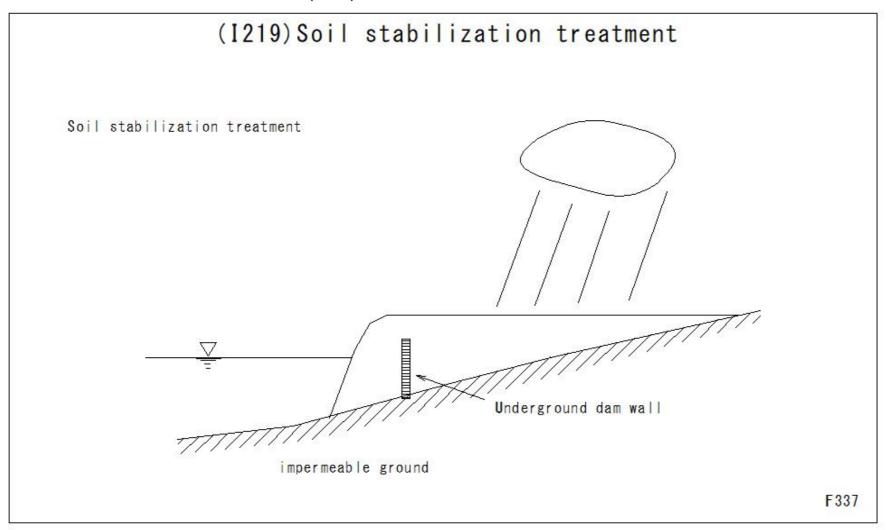
(I217)Soil stabilization treatment



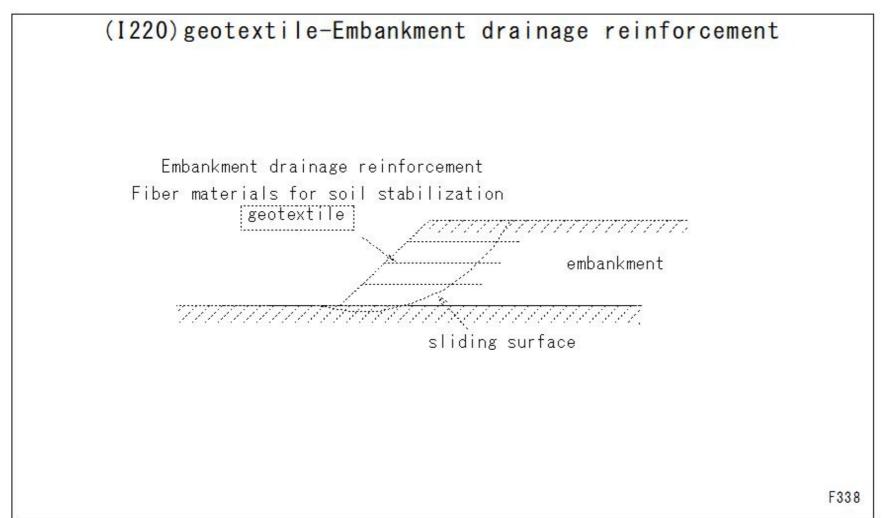
(I218)Soil stabilization treatment

(I218)Soil stabilization treatment
Soil stabilization treatment
Building foundation ground improvement Underground wall construction method
support layer
F336

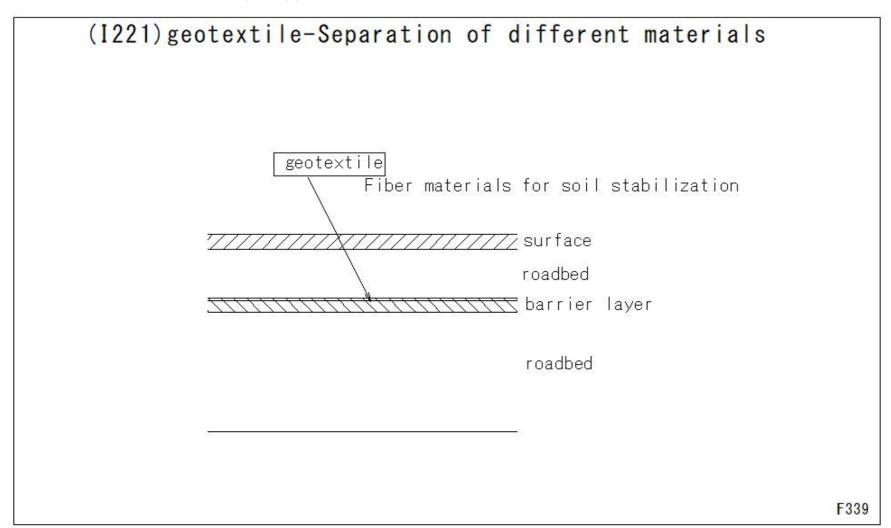
(I219)Soil stabilization treatment



(I220)geotextile-Embankment drainage reinforcement

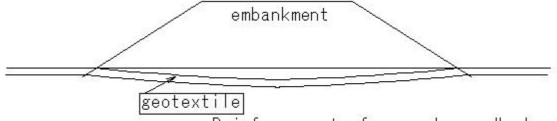


(I221)geotextile-Separation of different materials



(I222)geotextile- Reinforcement of ground, roadbed, etc.

(1222) geotextile-Reinforcement of ground, roadbed, etc.



Reinforcement of ground, roadbed, etc.

Savings in embankment materials

soft ground

F340

(I223)geotextile- Preventing suction of earth and sand

(I223) geotextile- Preventing suction of earth and sand stone/block geotextile Fiber materials for soil stabilization Preventing suction of earth and sand F341

(I224)Geotextile

(I224)Geotextile Geotextile Purpose:Uses ① Separation of layers of soil Separation of soil, gravel, and crushed stone, separation of ground and embankment, prevention of mud pumping 2 Reinforcement of soil structures Tensile reinforcement material for embankments and retaining walls, strip for Terre Armee type embankment 3 Reinforcement of ground Strengthening of soft ground, reinforcement of structure support ground geotextile 1220 I221 geotextile geotextile 1222 I223

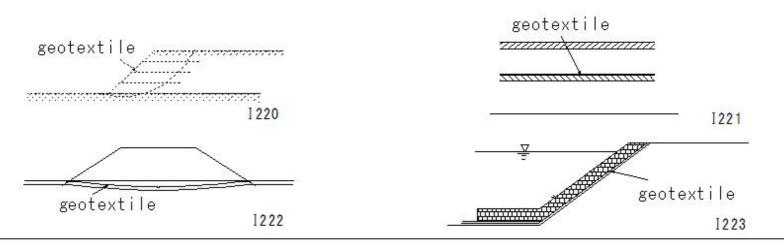
(I225) Geotextile

Geotextile

Purpose: Uses

- ② Drainage of soil structures and ground Horizontal drainage during embankment, drainage at the boundary surface of cut soil and embankment, drainage blanket, culvert drainage
- ⑤ Drainage behind structures

 Drainage material behind structures such as retaining walls, culvert boxes, bridge abutments, and NATM backfill
- Vertical drains
 Vertical drainage for soft ground materials



(I226)Geotextile

(I226)Geotextile Geotextile Purpose: Uses 7 Preventing suction DSuction prevention materials for rivers, lakes, coastal revetments, and embankments ® Erosion control ® Erosion control materials for embankments and cut slopes Anti-clogging filters 9 Side gutters, open channels, and perimeter covering materials geotextile geotextile 1220 1221 geotextile geotextile 1222 1223

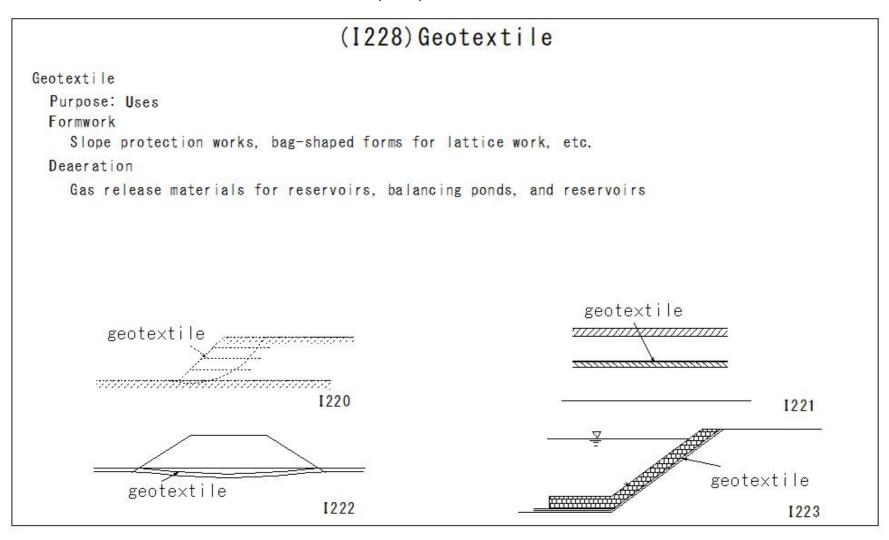
(I227)Geotextile

(I227) Geotextile Geotextile Purpose: Uses 10 Structures Construction materials for shovels, steep embankments, embankments, reinforced roadbeds, reinforced ground, etc. ① Dewatering Dewatering materials for muddy soil, sludge, etc. treatment ponds (tanks) 12 Preventing river pollution Silt fences geotextile geotextile 1220 1221 geotextile geotextile

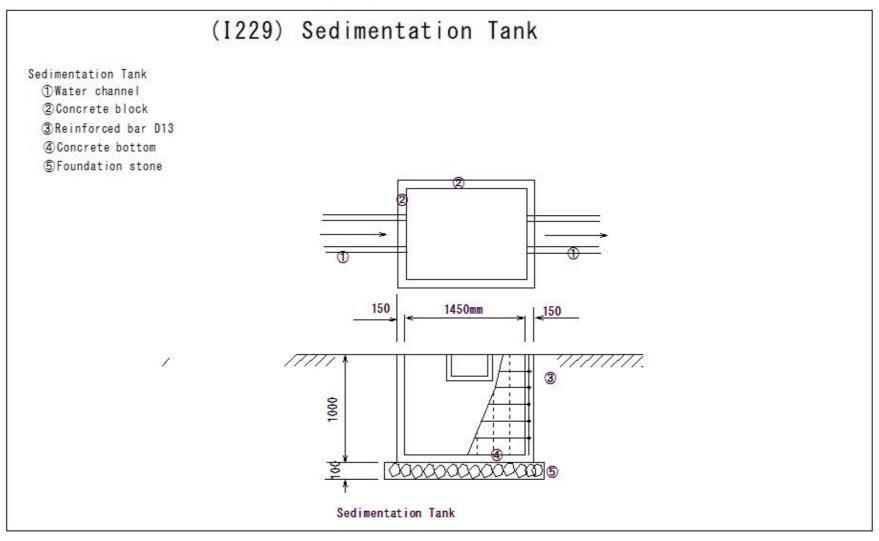
1223

1222

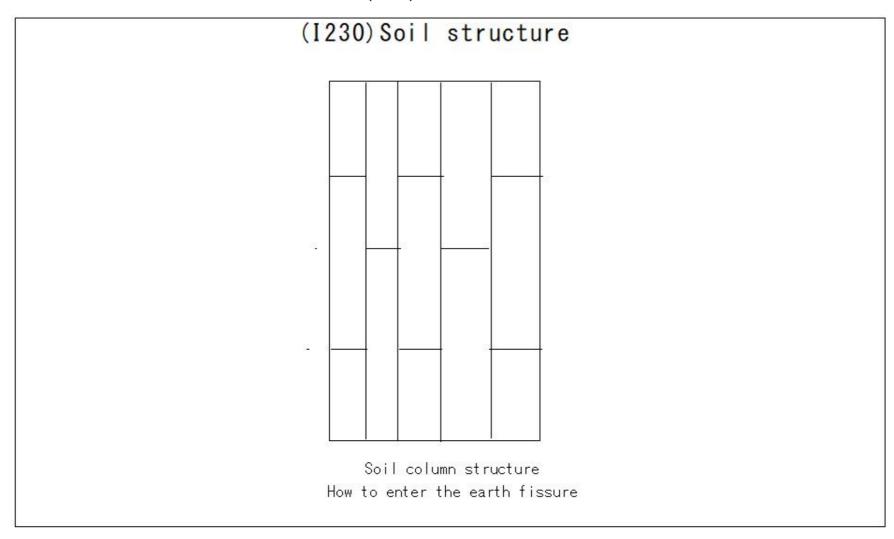
(I228)Geotextile



(I229) Sedimentation Tank



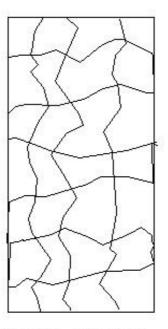
(I230)Soil structure



(I231)Soil structure

(I231) Soil structure2

How to enter the earth fissure



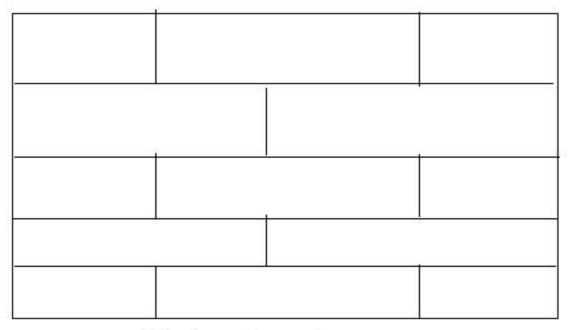
Angular structure

1370

(I232)Soil structure

(I232) Soil structure 3

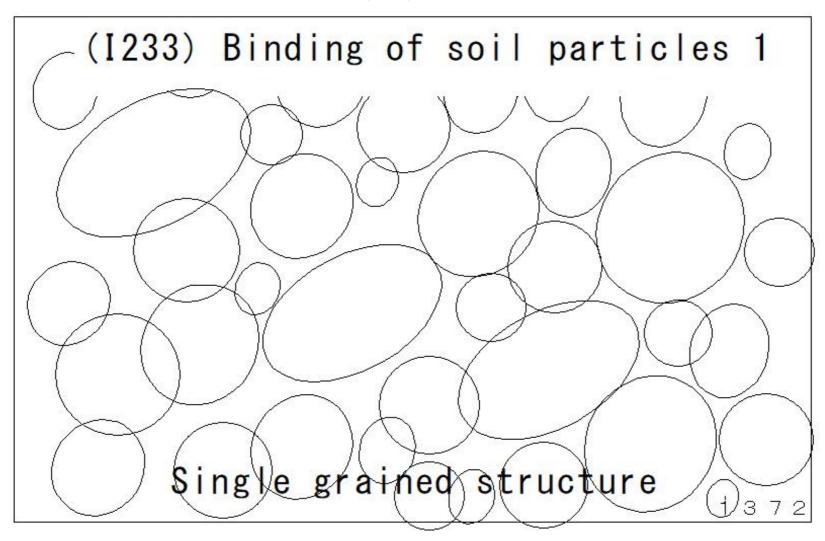
How to enter the earth fissure



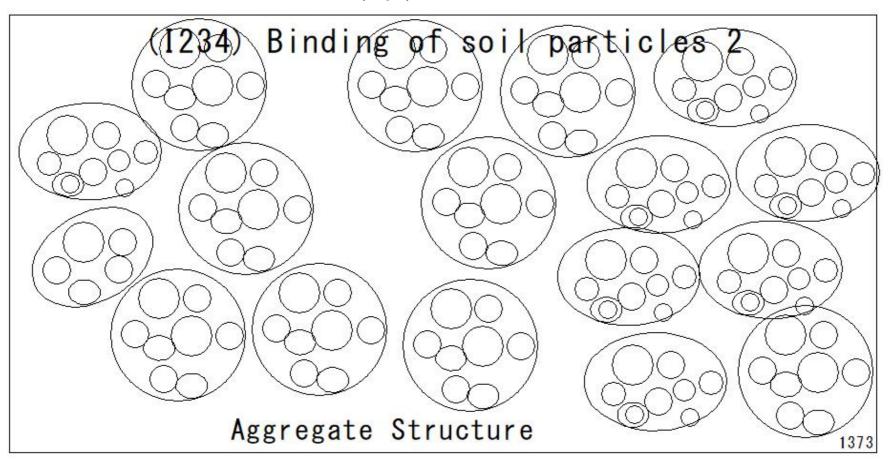
Platy structure

1 3 7 1

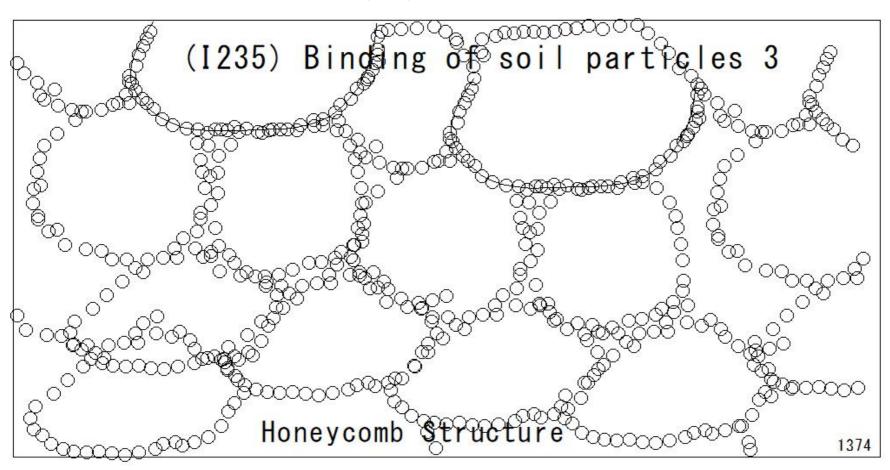
(I233)Soil structure

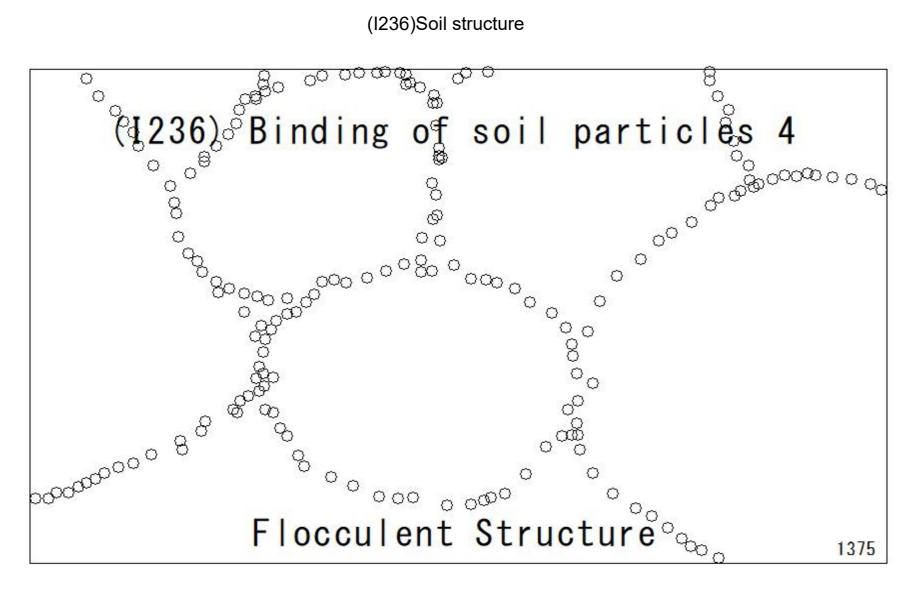


(I234)Soil structure

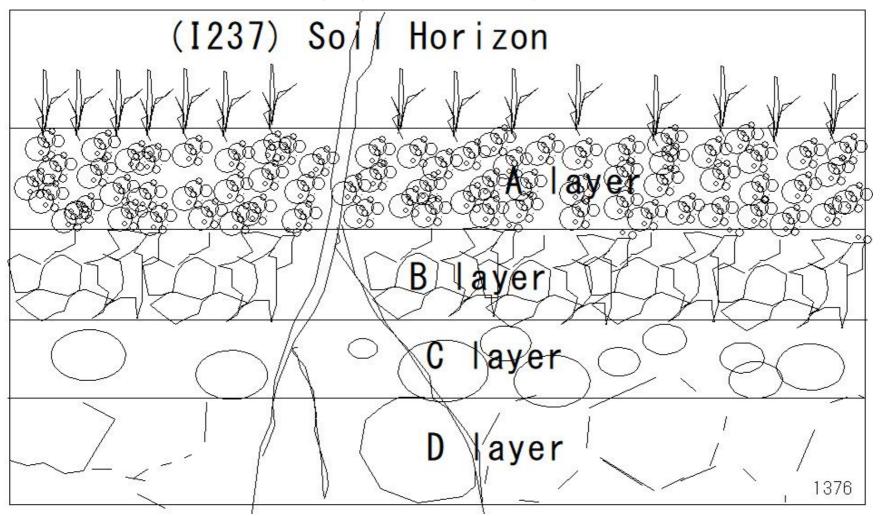


(I235)Soil structure





(I237) Soil Horizon; soil layer



(1238) Soil water

Classification of soil water

Forces held in soil

1 Hygroscopic water

Hygroscopic water is water that is strongly adsorbed to the surface of soil particles

2 Bound water

Bound water refers to water that is bound to a substance or is in a hydrated state.

3 Capillary water

Capillary water is water that is held in the soil's tiny pores by capillary force

④ Gravitational water

Gravity water is water that moves through the soil due to the action of gravity. It affects the soil moisture state and plant growth.

(I239)Soil water

(I239) Soil water

Classification of soil water

Difficulty of water movement

5Free water

Free water is water whose molecules can move freely, and is not bound to water molecules or water itself

6 Non-free water

Non-free water is bound water (water bound to food components) unlike free water (water that can move and move normally)

(I240)Soil water

(1240) Soil water

Classification of soil water

State of water presence

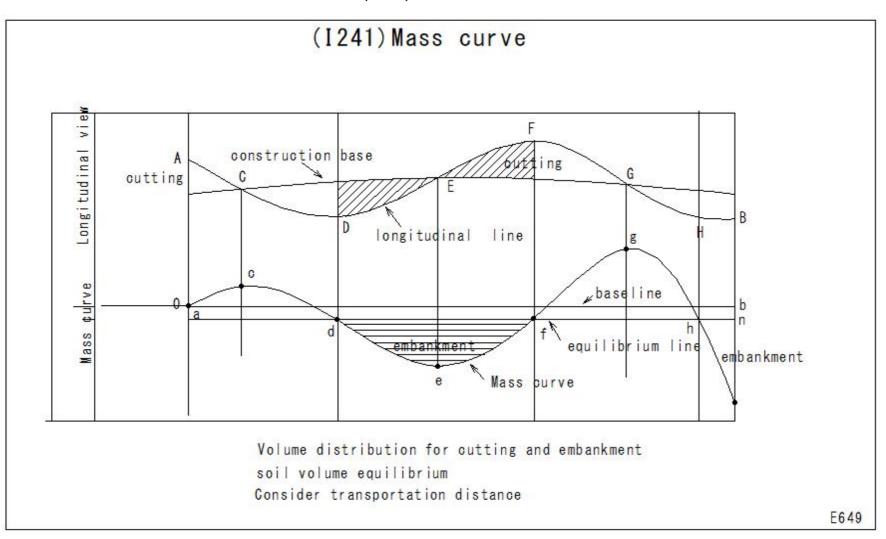
7 Suspended water

Suspended water is a type of soil water that remains as a thin film between soil particles

- ® Crystal water Crystal water refers to water molecules contained in crystals without forming covalent bonds with host molecules or ions
- 9 Swelling water

Swelling is a phenomenon in which a solid polymer absorbs a solvent and increases in volume

(I241)Mass curve



(1242) Soil improvement

(I242) Soil improvement

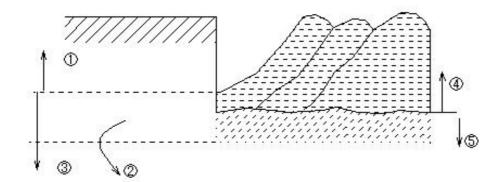
Soil layer and tillage cross section of the field

Normal tillage

- **①Topsoil**
- ②Tillage pan(Plow pan)
- 3 Subsoil
- @Plow soil

Normal tillage

(5) Subsoil



Soil improvement

Soil improvement is the process of enhancing soil quality and productivity

"Normal cultivation" refers to the process of cultivating the surface layer of the planting base, usually about 20 cm deep, to improve soil aggregates, air permeability, and water permeability, and to expand the effective soil layer.

(I243) Soil improvement

(I243) Soil improvement Soil layer and tillage cross section of the field (Deep tillage) 1 Topsoil 2 Plow soil 3 Subsoil (Deep tillage) Soil improvement Soil improvement is the process of enhancing soil quality and productivity Deep plowing is a specialized agricultural technique where soil is cultivated to a depth greater than 50 cm

(I244) Soil improvement

(I244) Soil improvement

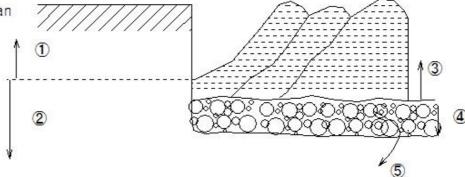
Soil layer and tillage cross section of the field

(Subsoil cultivation)

- 1 Topsoil
- 2 Subsoil

(Subsoil cultivation)

- Thicken plow soil layer
- 4 Subsoil
- 5 Fractured part of the tillage pan

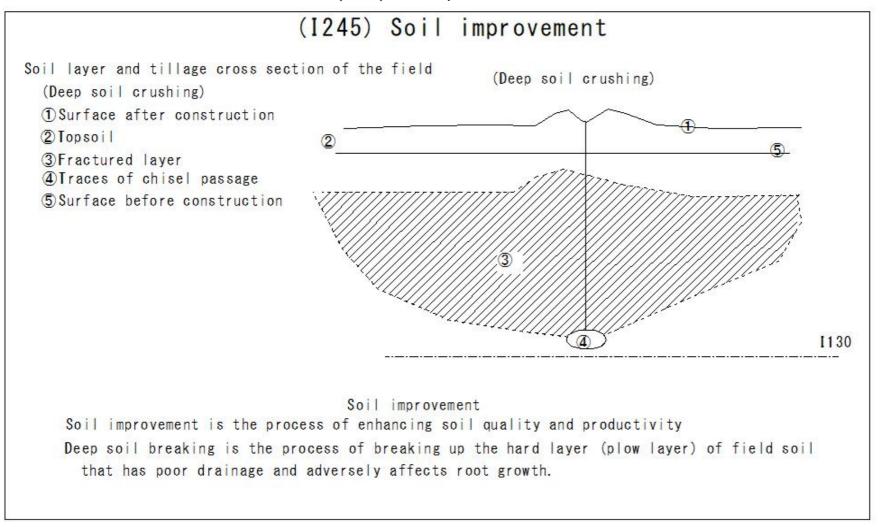


Soil improvement

Soil improvement is the process of enhancing soil quality and productivity

Subsoiling is a soil improvement process that destroys the impermeable subsoil layer and improves permeability and breathability.

(1245) Soil improvement

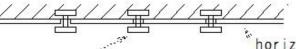


(I246)Earth retaining work

(1246) Earth retaining work

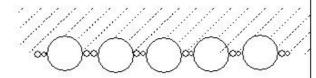
Earth retaining work

Main pile horizontal sheet pile work



horizontal sheet pile

H-type steel



Steel pipe sheet pile method



Steel sheet pile method

· Column pile method



· Continuous underground wall construction method

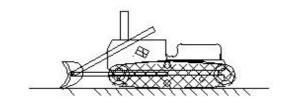
A retaining wall is a temporary structure that prevents the collapse of the ground and the outflow of groundwater when excavating the ground.

F342

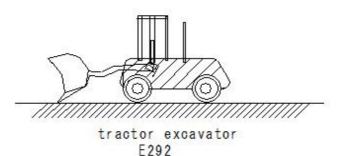
(I247)Tractor excavator(attachment)

(1247) Tractor excavator (attachment)

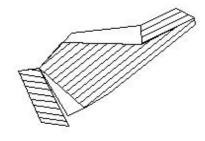
Tractor excavator attachment loading bucket

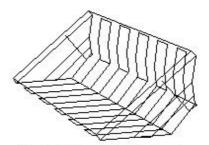


Crawler type tractor excavator E291



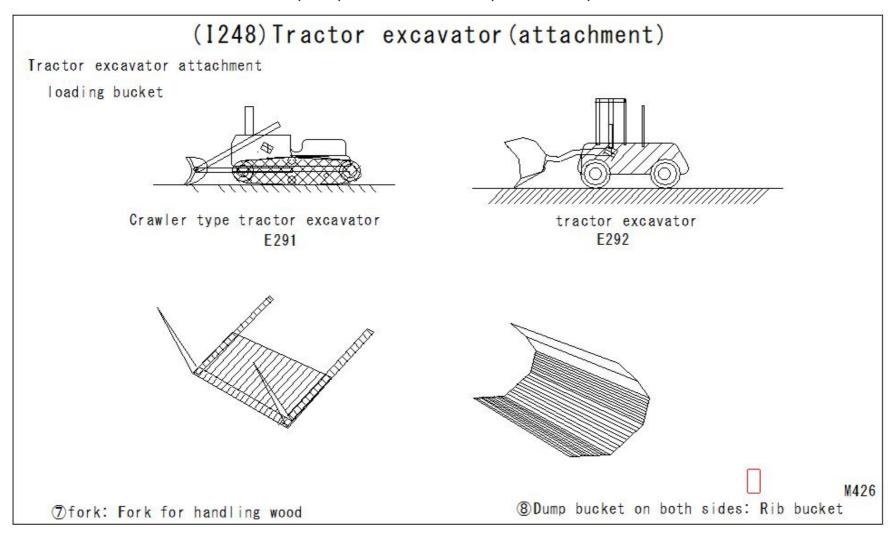
M413



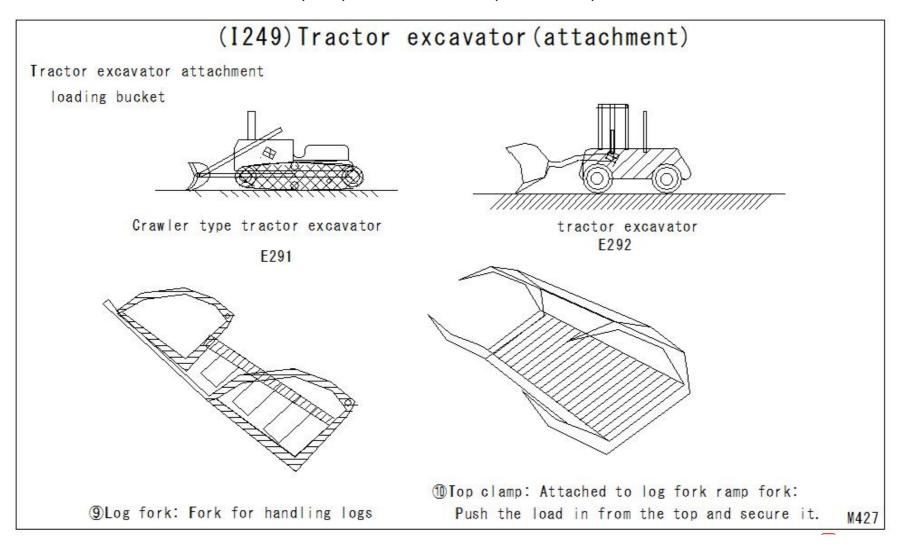


(5) Multi-purpose bucket: For general work: dossing, (6) Skeleton bucket: Can excavate large rocks topsoil stripping, land leveling from loose earth and sand.

(I248)Tractor excavator(attachment)



(I249)Tractor excavator(attachment)



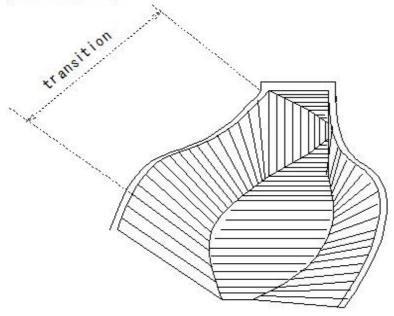
(I250)Transition

(I250) Transition

Transition

Attachment part that connects two water channels

- · Gradual change in shape and dimensions
- · Less water head loss
- · Flow water safely and smoothly



A change or transition in the structure or function of a waterway

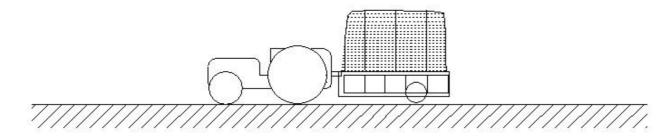
R576

(I251)Agricultural trailer

(I251) Agricultural trailer

Agricultural trailer

- ① An agricultural trailer is a vehicle that generally does not have an engine and is connected to a tractor to pull it.
- 2 It is used to transport agricultural products, agricultural equipment, and farm tools.



Agricultural trailer

(I252)Trencher

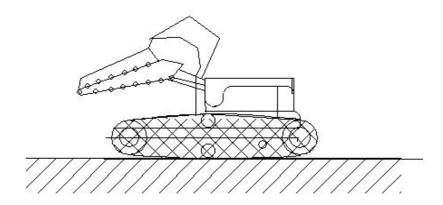
(1252) Trencher

Trencher

Excavation of culverts in rice fields

For burying water pipes

Excavation of deep open channels for installation of culverts

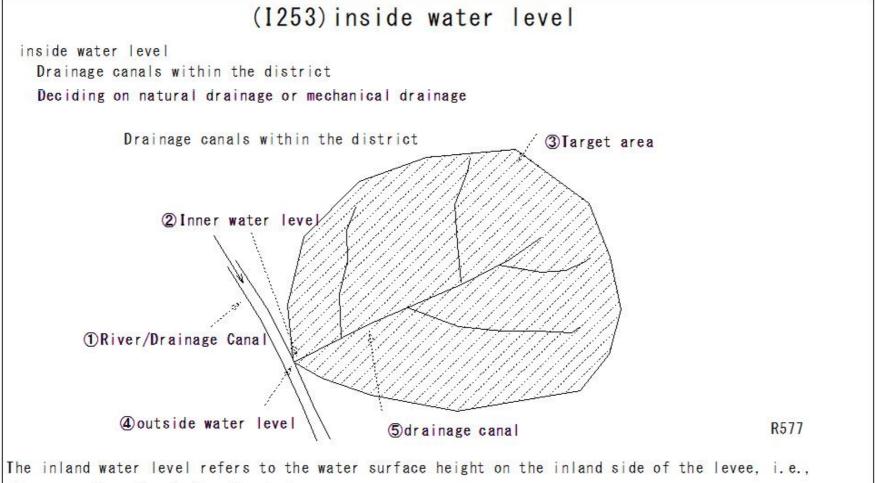


Trencher

A trencher is a piece of construction equipment used to dig trenches, especially for laying pipes or electrical cables, for installing drainage, or in preparation for trench

M132

(I253)Inland water level and outer water level



the opposite side of the riverbed.

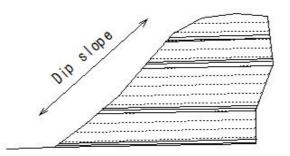
(I254)Dip slope

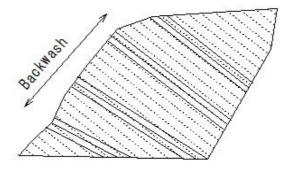
(I254) Dip slope

Dip slope

A dip slope is a topographic or geomorphic surface which slopes in the same direction, and often by the same angle, as the true dip or apparent dip of the underlying strata.

A backwash is a slope where the inclination of the slope and the inclination of the strata are in the opposite direction.



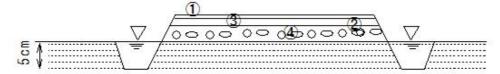


(I255)Seedling bed(Rice nursery)

(1255) Seedling bed (Rice nursery)

Seedling bed (Rice nursery)

- 1 Covering material
- 2 Burnt rice husks
- 3 Covering soil
- 4 Rice seeds



Insulated seedling bed

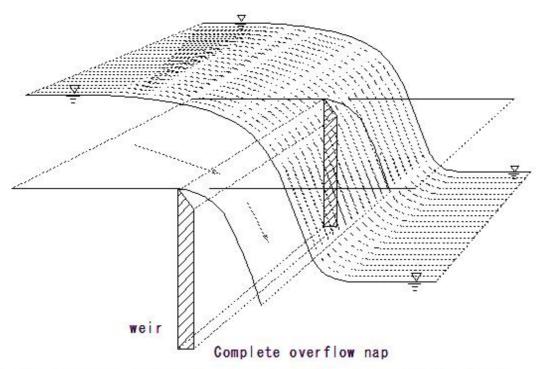
Seedling bed (Rice nursery)

A rice seedbed is a bed for growing rice seeds using irrigation.

(1256) Nappe

Nappe

water vein -water overflows a weir



A complete nap is when the water that has passed over the dam falls freely without flowing along the wall.

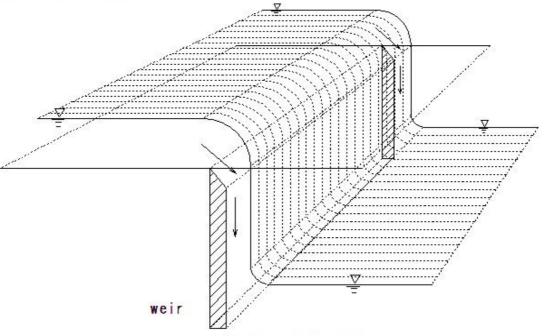
R578

(I257)Nappe

(1257) Nappe

Nappe

water vein -water overflows a weir



Incomplete overflow nap

- 2 Adhesion nap is a state in which the water vein flows while adhering to the wall.
- 3 An incomplete nap is a state between a complete nap and an attached nap.

R579

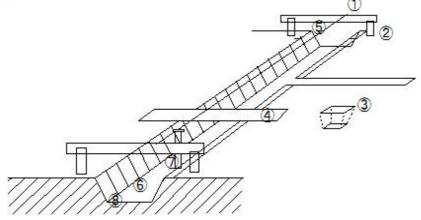
(I258) Trench Excavation

(1258) Trench Excavation

Trench Excavation

Trench Excavation is the work of digging a long, narrow trench in the soil to fit the walls of a building in order to build foundations, walls, basements, etc.

- ① Water drainage
- 2 Water stake
- 3 Pot trench
- 4 Walking board
- (5) Water line
- 6 Trench Excavation
- 7 Ruler
- ® Pit Excavation



(I259) Agricultural Promotion Areas

(1259) Agricultural Promotion Areas Agricultural Promotion Areas ①Urbanized Areas 2 Use Zones 3 Mountainous Areas Agricultural Promotion Areas (5) Settlements 6 Agricultural Promotion Areas (3) 12 Agricultural Promotion Areas Agricultural Promotion Areas Schematic Diagram of Agricultural Promotion Areas, Settlements, and Agricultural Promotion Areas

(I260) Land reclamation (compound land reclamation)

(I260) Land reclamation (compound land reclamation)

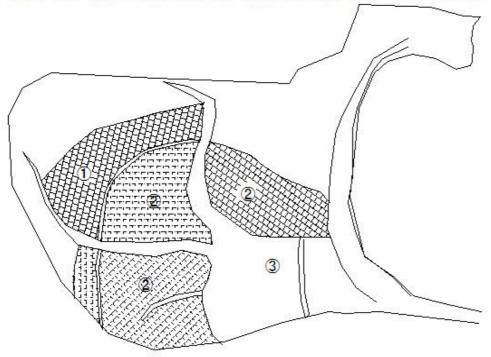
Land reclamation (compound land reclamation)

123 Construction sequence

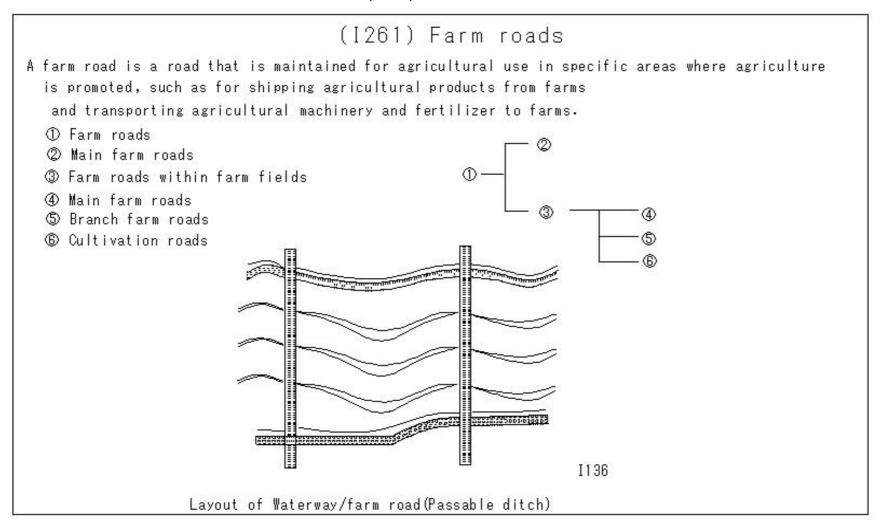
Freshwater lake

A waterway that collects and removes inflowing water

from the river basin outside the bank to lead the water out of the area,



(I261) Farm roads



(I262) Farm road landing and takeoff site(Rural air port using farm road)

(1262) Farm road landing and takeoff site Farm road landing and takeoff site (Rural air port using farm road) A type of airport built by widening a farm road as part of the Ministry of Agriculture, Forestry and Fisheries' Farm Road Landing and Takeoff Site Improvement Project. 1 Railway crossing and other safety facilities 2 Road sign 3 Detour Approximately 800m 5 Farm road 6 Windsock 4 (7) Administrative office ® Heliport (9) Apron

Farm road landing and takeoff site (Rural air port using farm road)

(I263) Water balance

(I263) Water balance Water balance ① Surface water runoff D2 2 Groundwater runoff G3 ③ Land surface ④ △M Soil moisture change 5 Pe Effective porosity ® Precipitation P 7) Impermeable layer ® Evapotranspiration 2 < ⑤ △₩S Change in surface water storage @ D1 Surface water inflow ① Groundwater level before change 1 Groundwater level after change ③ △H Groundwater level change 4 G1: Groundwater inflow Water balance (5) Area boundary $P = (D2-D1) + E + (G2-G1) + \Delta S$ $\triangle S = Pe \triangle H + \triangle M + \triangle Ws$ ① Water balance is the balance between the amount of water inflow and outflow per unit time

- in a certain area or system.
- ② Specifically, we calculate the change in water storage by taking into account precipitation, evaporation, transpiration, ground infiltration, river flow, etc.

(I264)Slope crib work

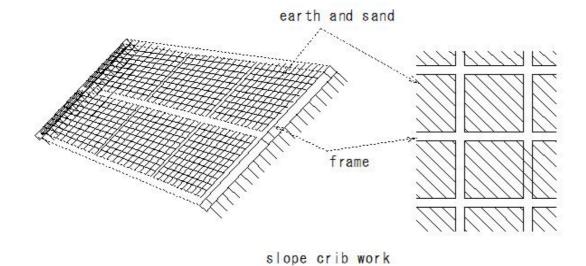
(I264) slope crib work

slope crib work

Filling material for slope crib work (earth and sand)

Earth and sand filling work

- +Seed spreader
- + Vegetation base material spraying work
- +Fill earth and sand into the frame



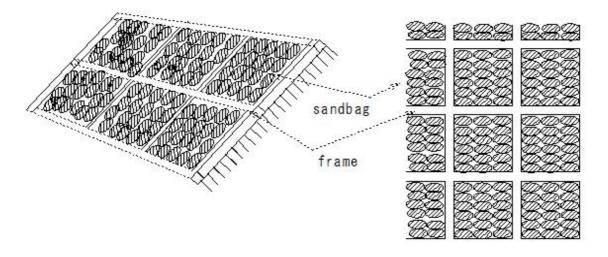
R580

(I265)Slope crib work

(1265) slope crib work

slope crib work

Filling material for sandbag construction (vegetation sandbag construction)



slope crib work

R581

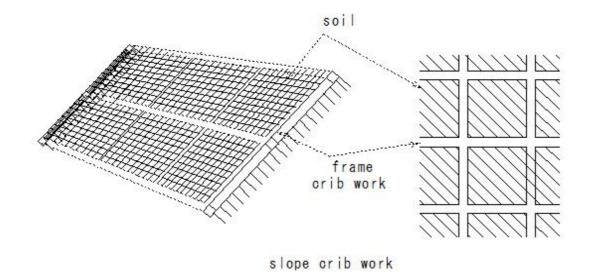
(I266)Slope crib work

(1266) slope crib work

slope crib work

Filling material for slope crib work (replacement soil seed spraying work)

Spray soil mixed with seeds, fertilizer, etc. into the frame to a depth of about 1 to 3 cm.



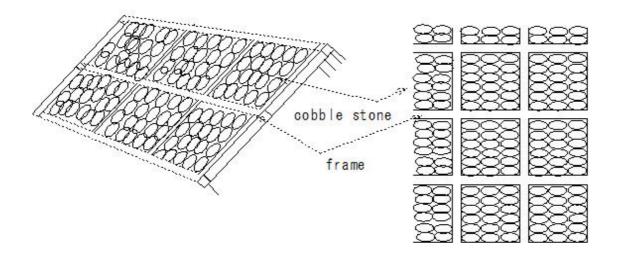
R582

(I267)Slope crib work

(1267) slope crib work

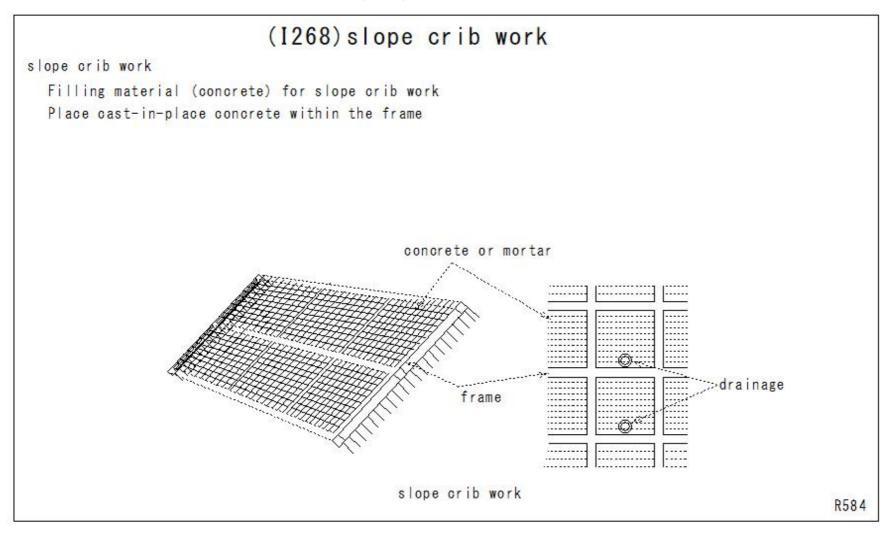
slope orib work

Filling material for slope crib work (stone masonry work)
A method of filling the frame with cobble stone, etc.



slope crib work

(I268)Slope crib work

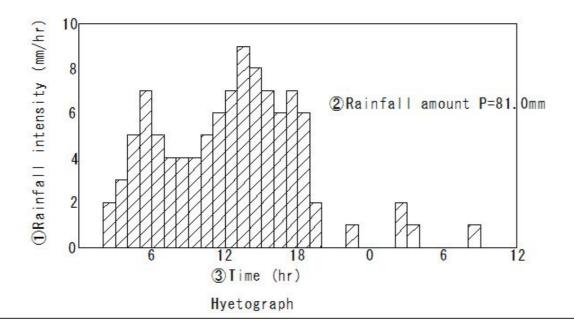


(I269) Hyetograph

(1269) Hyetograph

Hyetograph

A hyetograph is a graph showing the change in rainfall amount over time, and is used in meteorology, hydrology, etc.



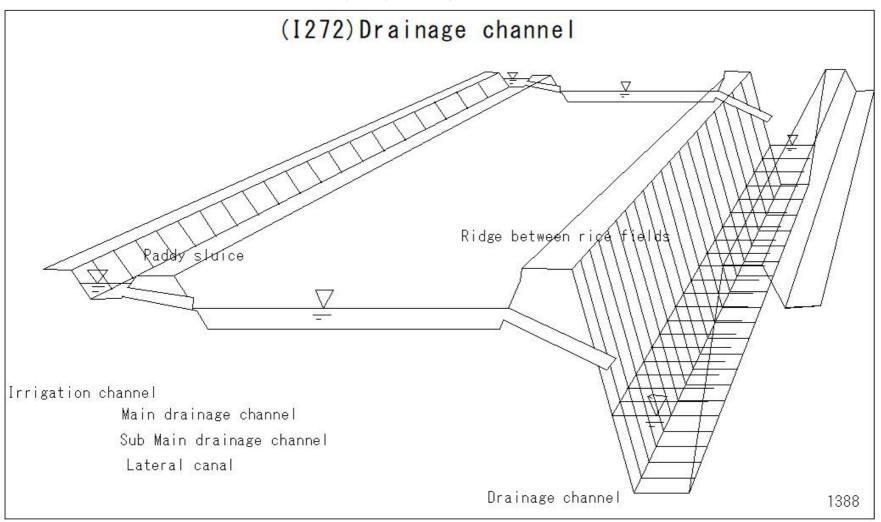
(I270) Piping type(pipeline system)

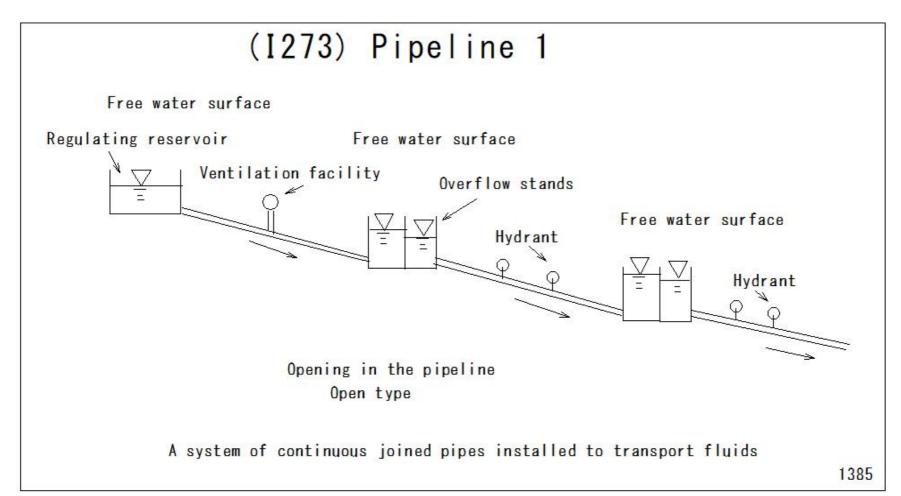
(I270) Piping type(pipeline system) Piping type (pipeline system) (a) Dendritic piping method Pump: P Valve: (a) Dendritic piping method

(I271) Piping type(pipeline system)

(I271) Piping type(pipeline system) Piping type(pipeline system) Pump:P Valve:⊳⊲ (b) Pipe network piping method

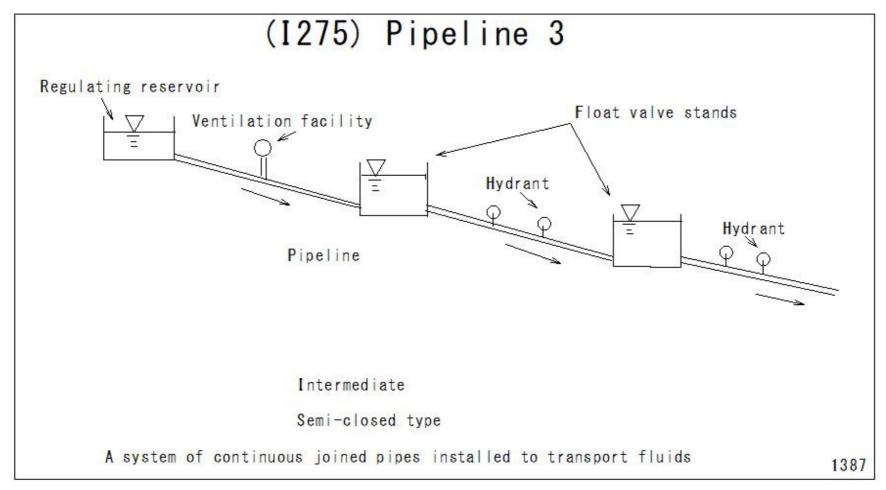
(I272)Drainage channel





(I274) Pipeline 2 Free water surface Hydrant Regulating Reservoir √Ventilation façi¶ety Water regulating valve **Pipeline** No Free water surface Effective use of water head Closed type A system of continuous joined pipes installed to transport fluids

1386

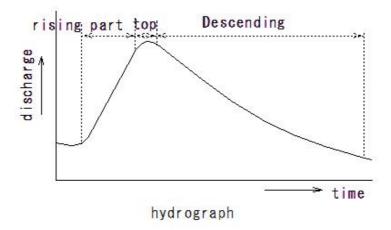


(I276)hydrograph

(1276) hydrograph

hydrograph

Curve diagram showing water level and discharge over time water level or discharge discharge changes over time



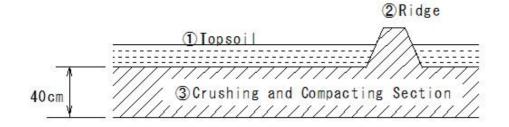
A hydrograph is a diagram that shows the changes in flow rate or water level, with time on the horizontal axis and flow rate or water level on the vertical axis.

It is also called a discharge diagram.

(I277) Crushing and Compacting Method

(1277) Crushing and Compacting Method

Crushing and Compacting Method

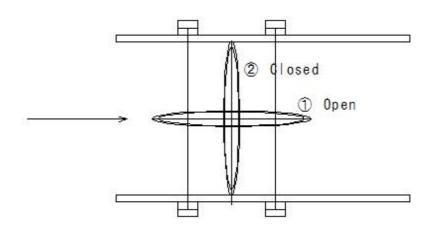


The crushing and compacting method is a method in which the ground soil is plowed and crushed, and then compacted. In particular, when the bearing capacity of the

(I278) Butterfly valve

(1278) Butterfly valve

Butterfly valve



Butterfly valve

The disk-shaped disc is held in place by a stem, and is opened and closed by rotating it 90 degrees. The butterfly valve has a thin, disk-shaped valve body that rotates when the handle is turned, controlling the amount of material flowing through.

(I279)levee widening-Cross-sectional expansion of the existing levee (filling)

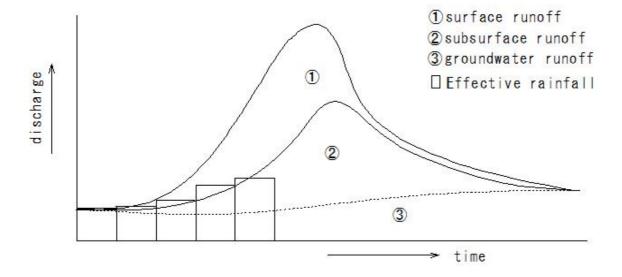
(I279)levee widening-Cross-sectional expansion of the existing levee (filling) levee widening both sides attached Raise front under · Walling embankment to existing embankment · Walling embankment · For rolling compaction, make the layer thin and compact it sufficiently. Step cutting - adhesion · Soft ground - whole embankment - Settlement E492

(I280)surface runoff

(1280) surface runoff

surface runoff

Runoff components (surface runoff, subsurface runoff, groundwater runoff)
Rainwater that reaches the ground surface flows down the ground surface
Components that enter the river channel and flow out



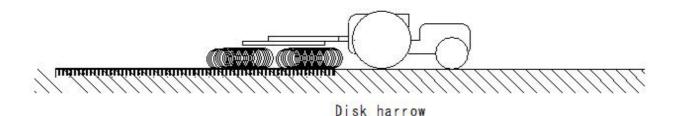
R587

(I281)Disk harrow

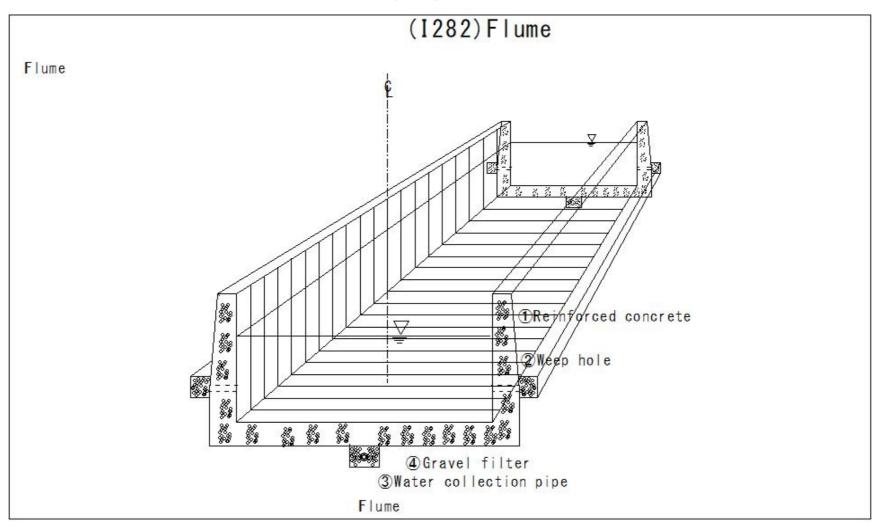
(I281)Disk harrow

Disk harrow

- ① A disk harrow is an agricultural tool that uses multiple disks arranged side by side and rotated to break up the soil and level the land.
- 2 It is mainly used for plowing, plowing in green manure, and preparing the soil before sowing seeds.



(I282)Flume

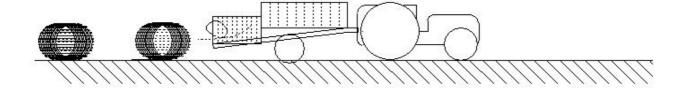


(I283)Hay baler

(1283) Hay baler

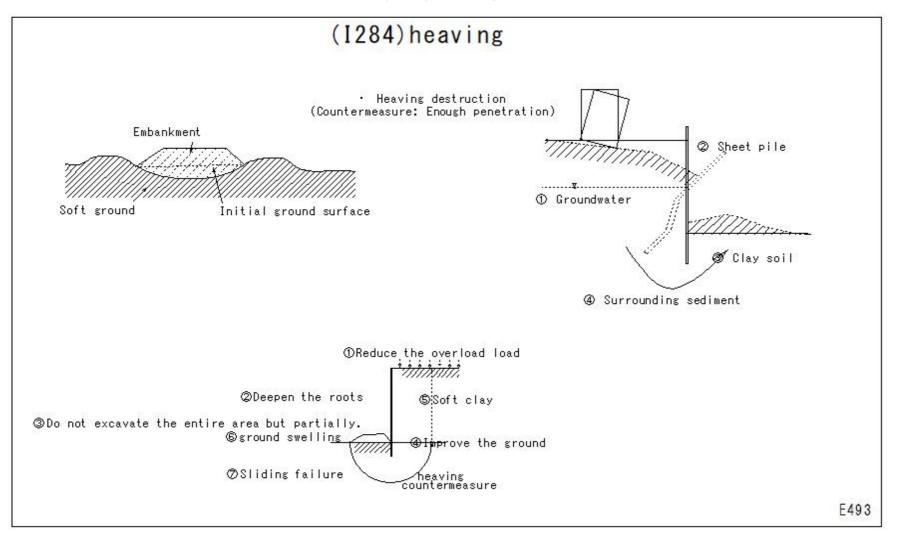
Hay baler

A machine that compresses and packs dried grass, etc., and usually works while moving.



Hay baler

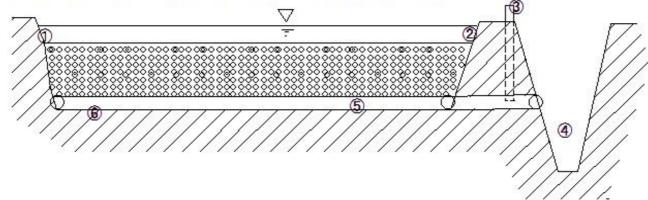
(I284)Heaving



(I285)Rice paddy vinyl sheet

(I285) Rice paddy vinyl sheet

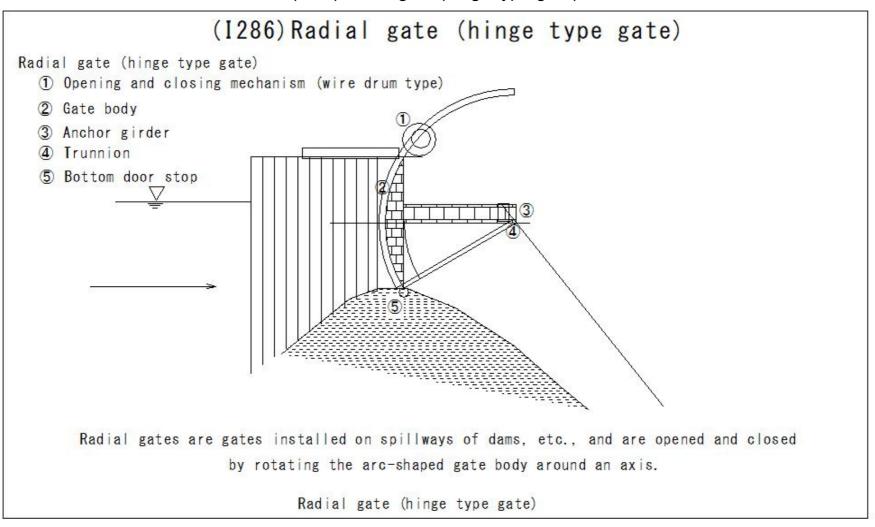
- (1) Plastic sheet
- Plastic sheet
- 3 Water gate
- 4 Drainage ditch
- 5 Water drainage culvert
- 6 Through holes in the plastic sheet to reach the drainage ditch

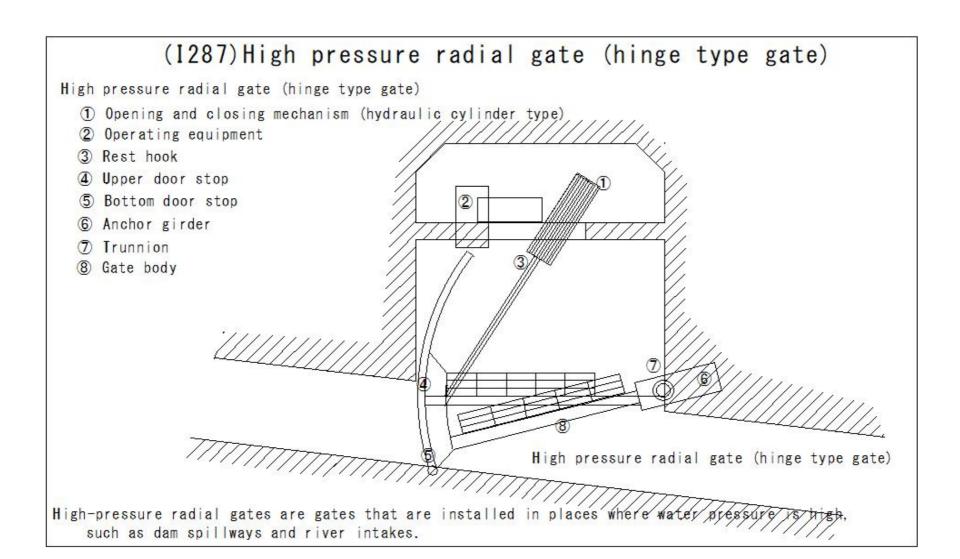


Plastic rice paddies are paddies that are made by laying plastic sheets about 50 cm underground on sand dunes and other areas that have no water retention, allowing water to accumulate.

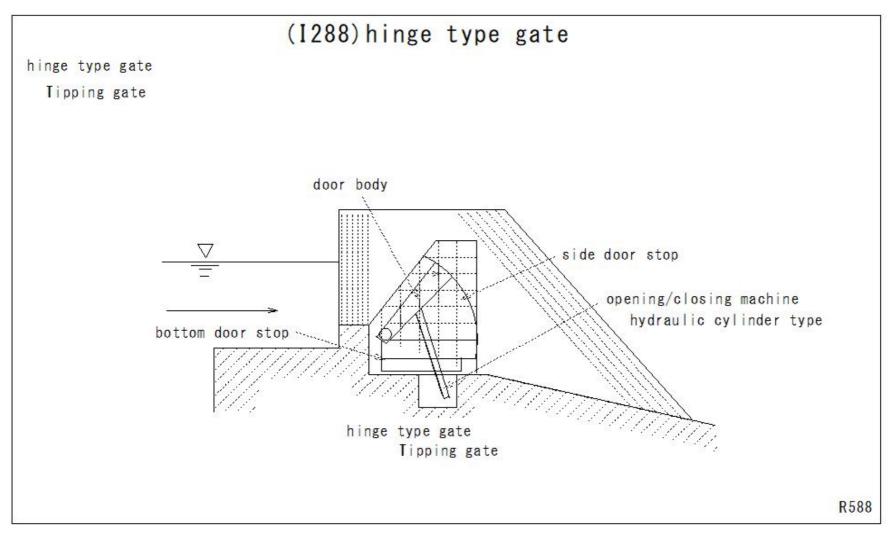
1393

(I286)Radial gate (hinge type gate)

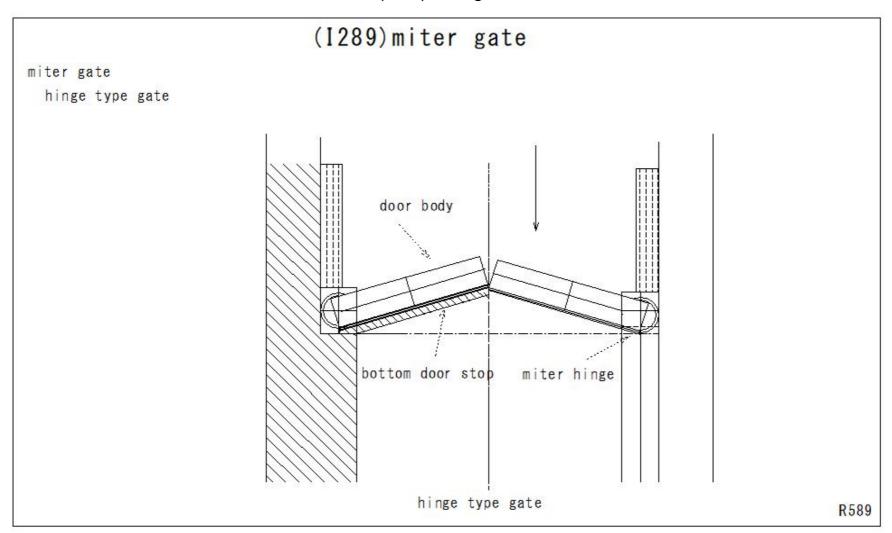




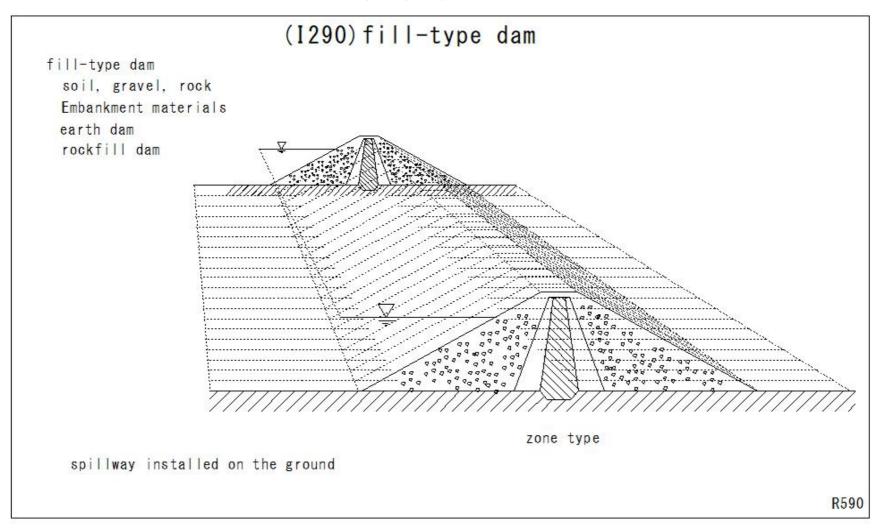
(I288)hinge type gate



(I289)miter gate



(I290)fill-type dam

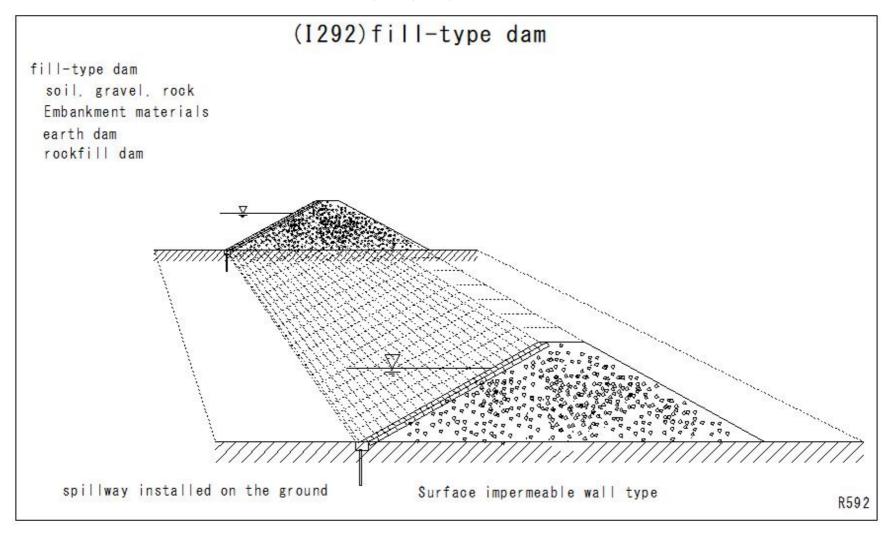


(I291)fill-type dam

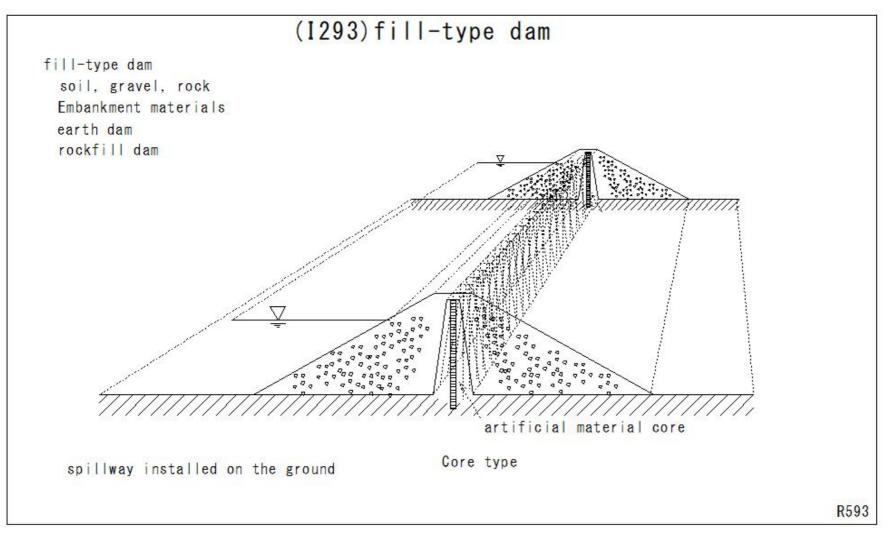
(I291) fill-type dam fill-type dam soil, gravel, rock Embankment materials earth dam rockfill dam Uniform type spillway installed on the ground

R591

(I292)fill-type dam



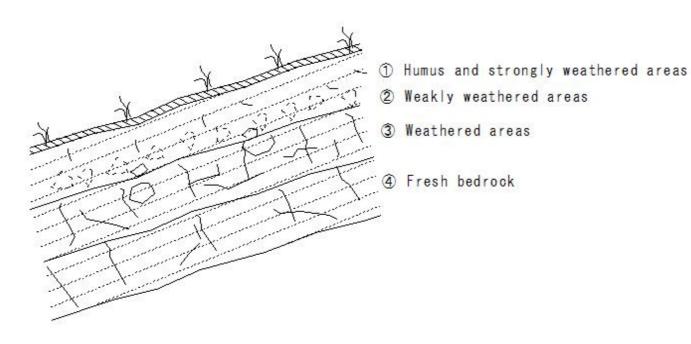
(I293)fill-type dam



(I294)Granite weathering

(1294) Granite weathering

Granite weathering

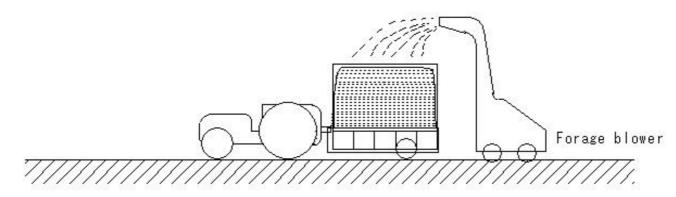


Granite weathering schematic diagram

(I295)Forage harvester

(I295)Forage harvester

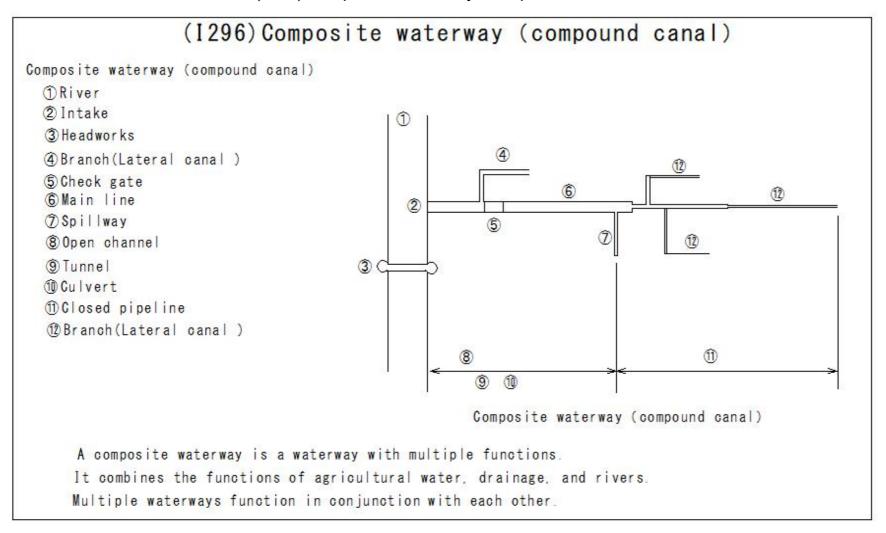
Forage harvester Forage blower



Forage harvester

A forage harvester is a farm machine used to cut, pick up, and collect grass and forage crops, chop them, and load them into a forage wagon, etc.

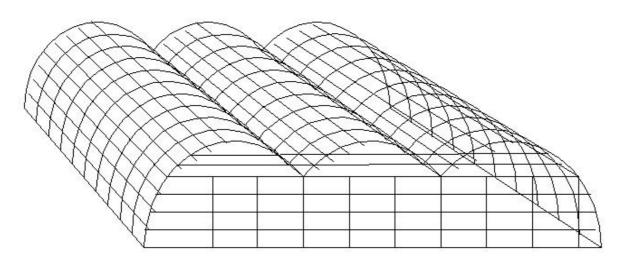
(I296)Composite waterway(compound canal)



(I297) Plastic greenhouse

(1297) Plastic greenhouse

Plastic greenhouse



Plastic greenhouse

A plastic greenhouse is an agricultural facility that is covered with plastic material. Also called vinyl greenhouses, they are mainly used for growing crops.

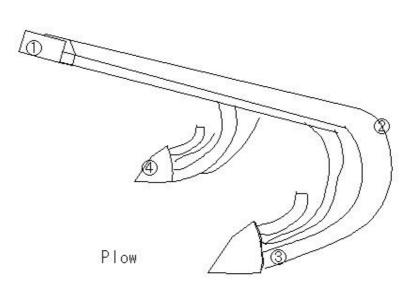
The structure can be made of pipes (pipe greenhouses) or steel frames.

(1298) Plowing

Plow

Tillage

- ①Hitch
- ②Beam
- ④Sub-plow

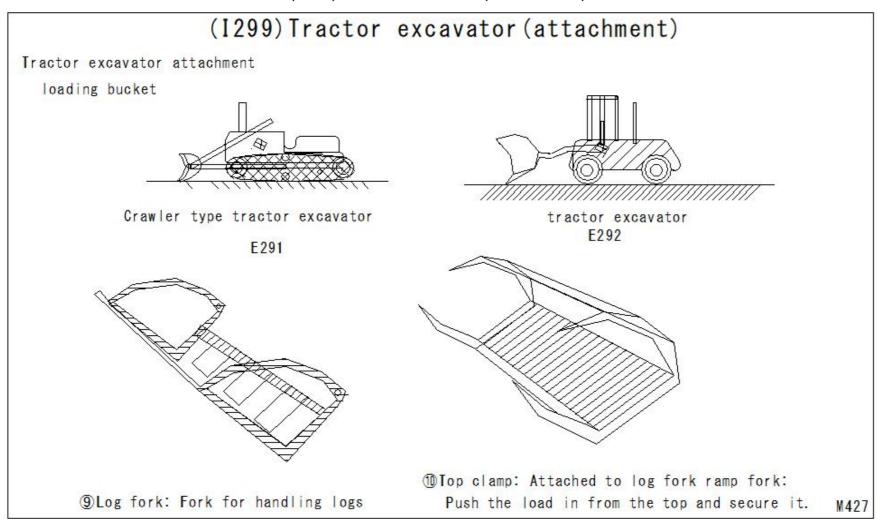


Reversing Throwing Crushing

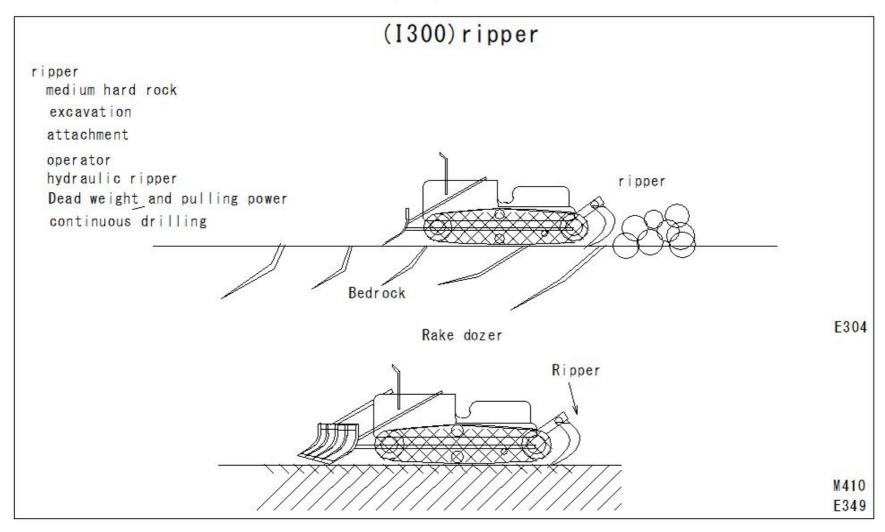
A plow is an agricultural tool used to till the soil, and is attached to a tractor.

1399

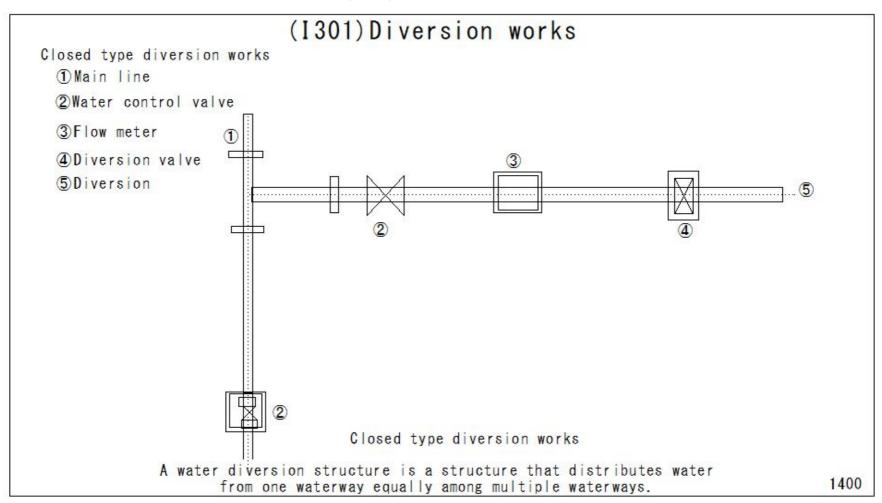
(I299)Tractor excavator(attachment)



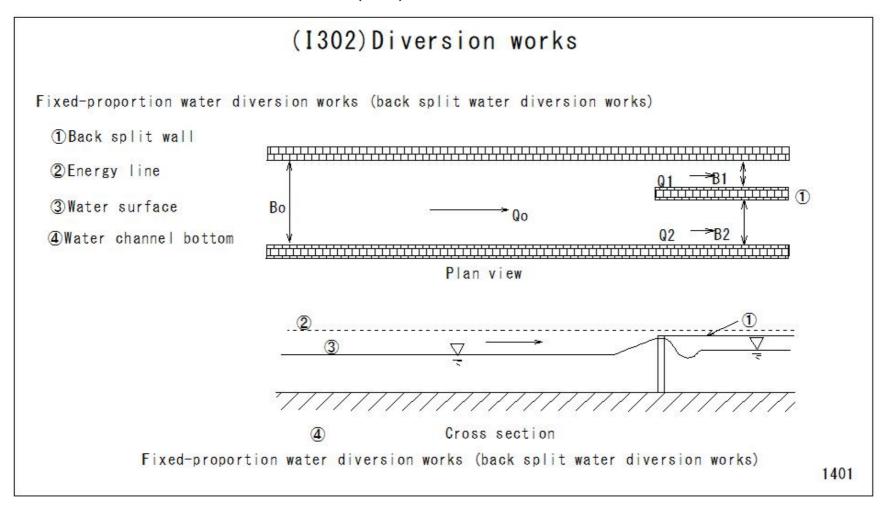
(I300)ripper



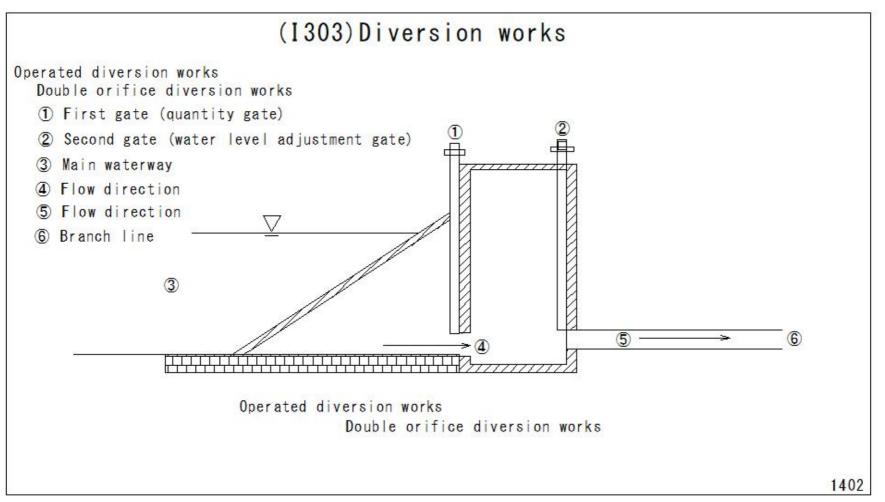
(I301)Diversion works



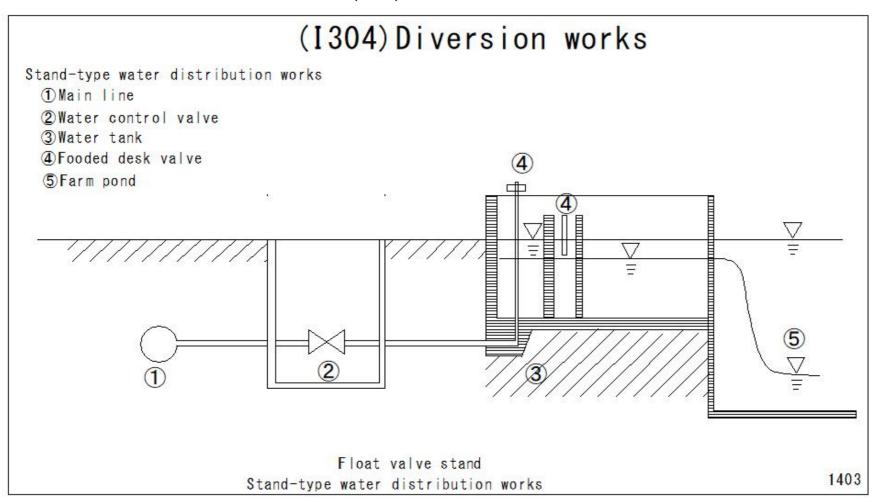
(I302)Diversion works



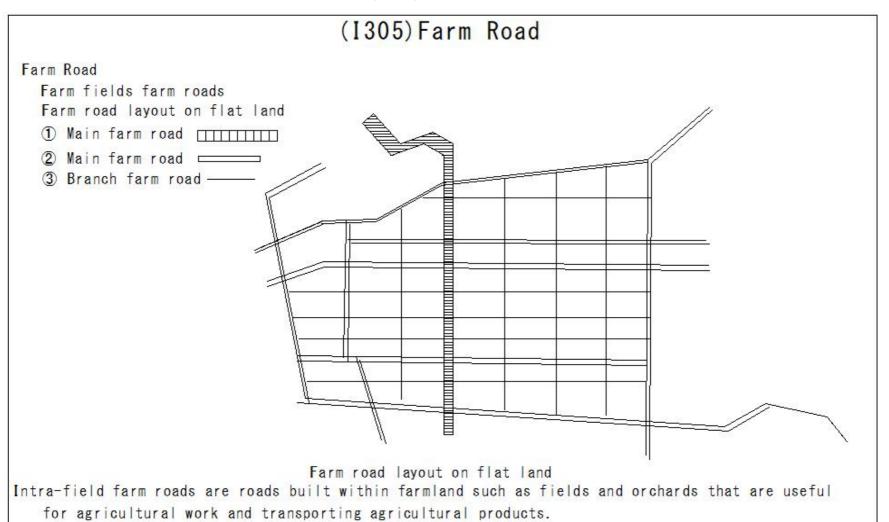
(I303)Diversion works



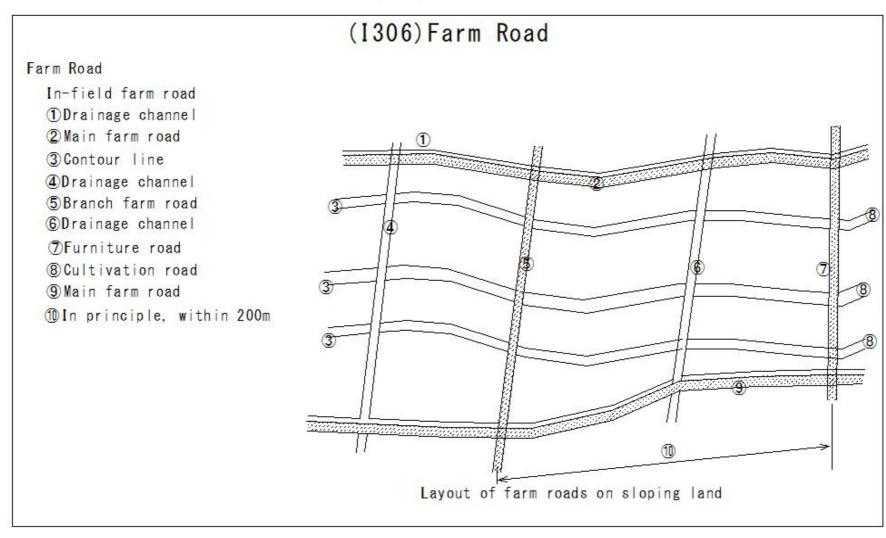
(I304)Diversion works



(I305)Farm Road



(I306)Farm Road



(I307) Pavement

(1307) Pavement Asphalt pavement (a) Simple pavement 1 Surface 2 Subgrade 3 Pavement Road body (approx. 1m) 4 (a) Simple pavement

(I308) Pavement

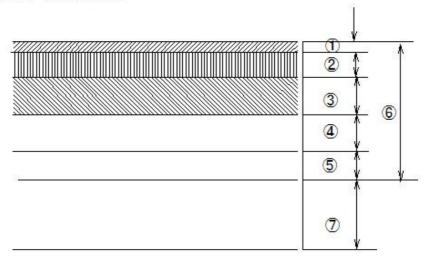
(I308) Pavement Asphalt pavement (b) General pavement 1 Surface 2 Upper roadbed 3 Lower roadbed Pavement ⑤ Roadbed (approx. 1m) (b) General pavement

(I309) Pavement

(I309) Pavement

Asphalt pavement

- (c) Pavement with wear layer
- ① Wear layer (not included in pavement thickness)
- 2 Surface layer
- 3 Base layer
- 4 Upper roadbed
- 5 Lower roadbed
- 6 Pavement
- 7 Subgrade (approx. 1m)



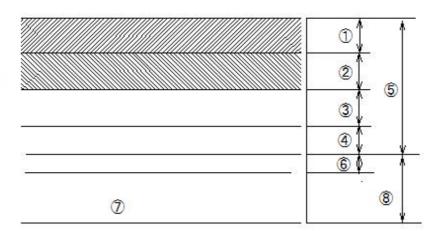
(c) Pavement with wear layer

(I310) Pavement

(I310) Pavement

Asphalt pavement

- (d) Pavement with barrier layer
- 1 Surface layer
- 2 Base layer
- 3 Upper roadbed
- 4 Lower roadbed
- 3 Pavement
- 6 Barrier layer approx. 15-30 cm
- Subgrade (approx. 1 m)



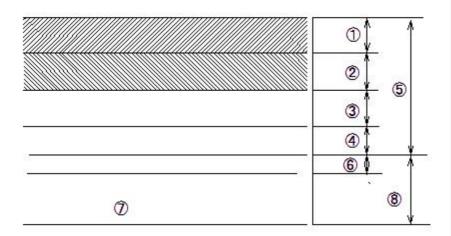
(d) Pavement with barrier layer

(I311) Pavement

(I311) Pavement

Asphalt pavement

- (e) Pavement with frozen soil suppression layer
- 1 Surface layer
- 2 Base layer
- 3 Upper roadbed
- (4) Lower roadbed
- 5 Pavement
- 6 Frozen soil suppression layer
- Subgrade subjected to freezing and thawing
- Subgrade (approx. 1m)



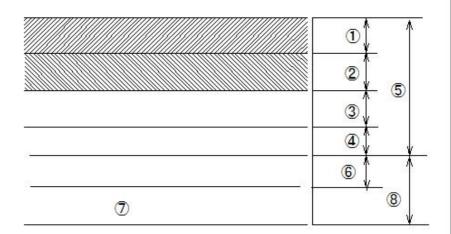
(e) Pavement with frozen soil suppression layer

(I312) Pavement

(I312) Pavement

Asphalt pavement

- (f) Pavement with replacement or stabilization layer
- 1 Surface layer
- 2 Base layer
- 3 Upper roadbed
- 4 Lower roadbed
- 5 Pavement
- 6 Replacement or stabilization layer
- 7 CBR < 2 (soft roadbed)
- 8 Subgrade (approx. 1m)



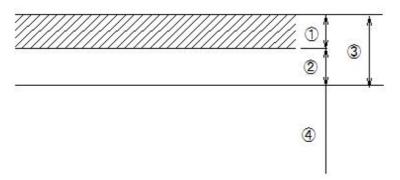
(f) Pavement with replacement or stabilization layer

(I313) Pavement

(I313) Pavement

Concrete pavement

- (a) Simple pavement
- ① Concrete slab
- 2 Roadbed
- 3 Pavement
- Subgrade



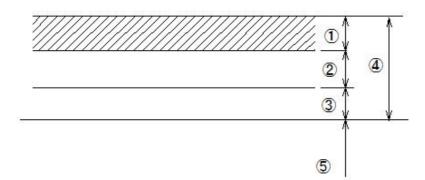
(a) Simple pavement

(I314) Pavement

(I314) Pavement

Concrete pavement

- (b) General pavement
- 1 Concrete slab
- 2 Upper roadbed
- 3 Lower roadbed
- 4 Pavement
- 5 Subgrade



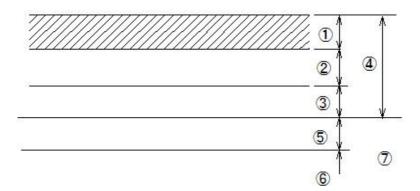
(b) General pavement

(I315) Pavement

(I315) Pavement

Concrete pavement

- (c) Pavement with barrier layer
- 1 Concrete slab
- 2 Upper roadbed
- 3 Lower roadbed
- 4 Pavement
- 5 Barrier layer
- 6 CBR 2-3
- Subgrade (approx. 1m)



(c) Pavement with barrier layer

(I316) Diversion channel(detour ditch)

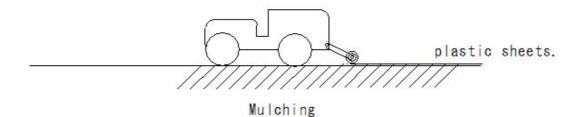
(I316) Diversion channel (detour ditch) Diversion channel (detour ditch) 1 Irrigation channel 2 Diversion channel (detour ditch) 3 Paddy field Reservoir type ⑤ Overflow weir Diversion channel (detour ditch) A device to raise the temperature of the water put into the paddy field 1405

(I317) Mulching

(I317) Mulching

Mulching

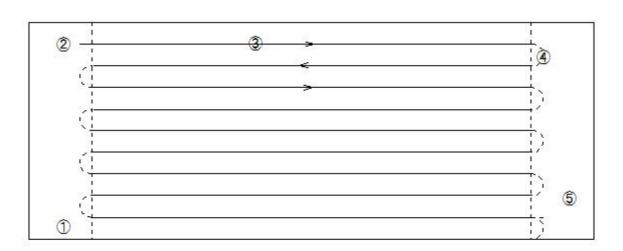
- ①Covering the base of plants and the ground with straw or plastic sheets.
- 2 Keeps the soil moist and warm, suppresses weeds, and prevents pests and diseases.



(I318) Butt

Butt

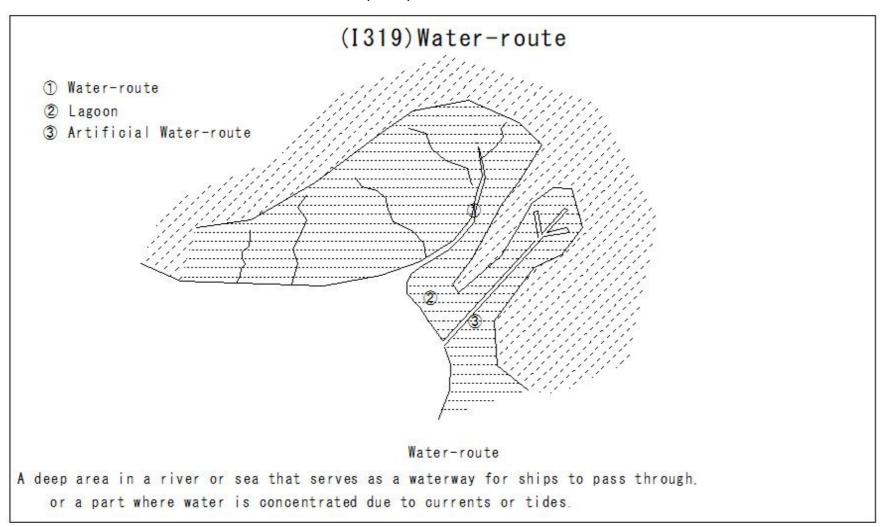
- ① Butt
- 2 Farm fields
- 3 Work
- Turning
- 3 Butt



Butt

In agriculture, the space required for agricultural machinery to turn and change direction.

(I319)Water-route



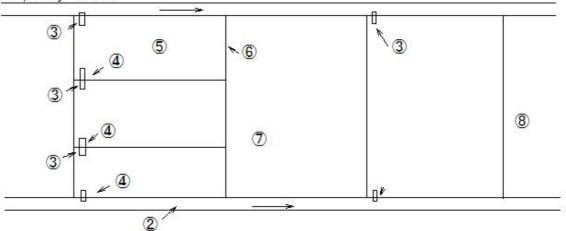
(I320) Water management

(I320) Water management Water management ① Watering, plowing ② Rice planting (young seedlings planted/sowed seedlings → drainage) 3 Rooting period (deep water: protect young seedlings, suppress evaporation, absorb water) ④ Tillering period (shallow water: promote tilling, when using herbicide/top dressing → drainage) (5) Maximum tillering period (drainage/mid-drying for 1 week: suppress ineffective tillers, supply oxygen to the ground) 6 Heading period (deep water: requires a lot of water, promotes infiltration) Ripening period (shallow water: reduces evapotranspiration, intermittent irrigation: supplies oxygen) (8) Harvest period (drainage about 30 days after ears are uniform) 2 4 (7) 3 Water depth Water depth (8) Water management

(I321) Paddy sluice-Paddy field Drainage

1 ---

- 1) Water channel
- 2 Drainage channel
- 3 Water inlet Intake of irrigation water
- 4 Water outlet Drainage from paddy field
- 5 Paddy field
- 6 Ridge
- 7 Rice field crossing
- 8 Large paddy field

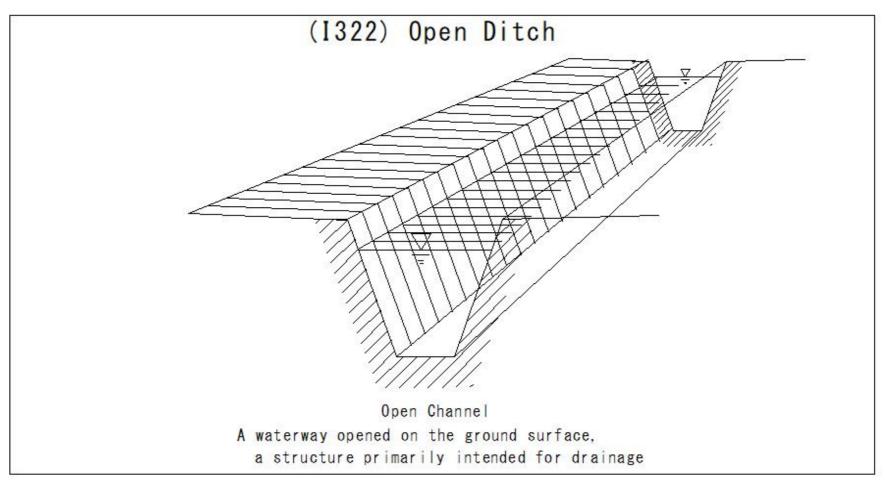


Water inlet and outlet

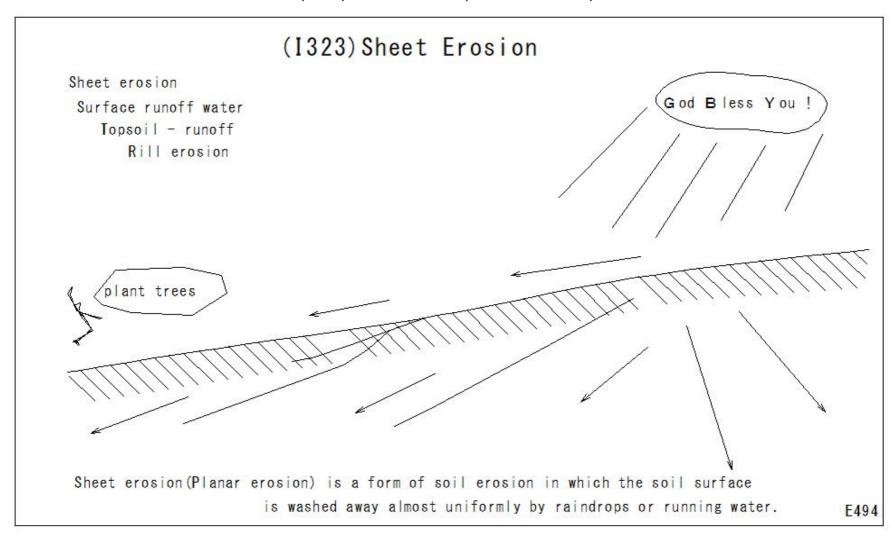
The water inlet is the place where water is drawn in, and the water outlet is the place where water is drained.

1406

(I322) Open channel



(I323)Sheet erosion(Planar erosion)

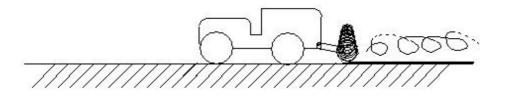


(I324) Mower (Frail type)

(I324) Mower (Frail type)

Mower (Frail type)

- 1 A mower (Frail type) is a type of rotary mower
- 2 A type that cuts grass with a blade (frail) that is freely attached to a rotating shaft

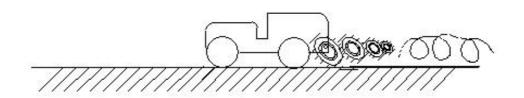


Mower (Frail type)

(I325) Mower (Side rake)

(I325) Mower (side rake)

Mower (side rake)



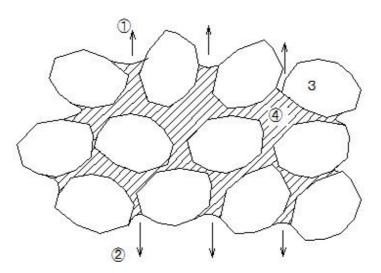
A grass harvester that collects dry grass that has been cut and scattered on the ground.

(I326) Capillary water

(I326) Capillary water

Capillary water

- 1 Large capillary force (large curvature)
- 2 Small capillary force (small curvature)
- 3 Soil particles
- Water



Capillary water

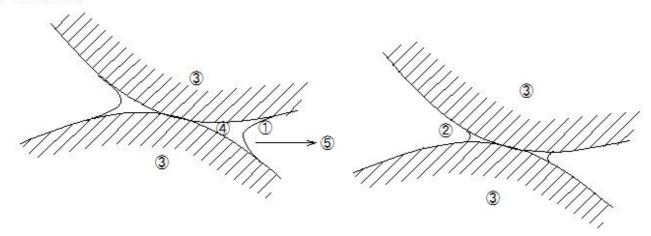
Capillary water is water that is held in the tiny pores of soil by capillary force.

(I327) Capillary condensation

(I327) Capillary condensation

Capillary condensation

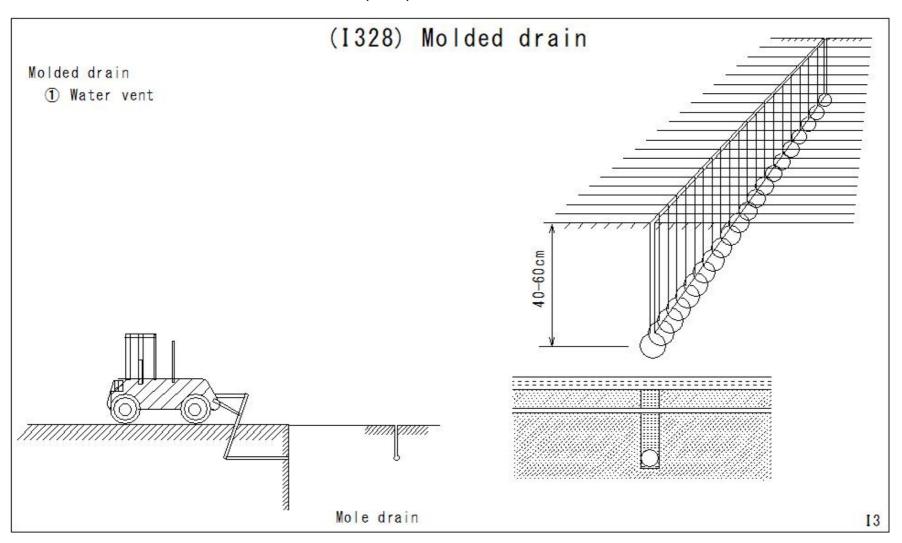
- ① Small curvature (evaporation)
- 2 Large curvature (capillary condensation)
- 3 Soil particles
- Water
- 5 Water vapor movement



Capillary condensation

The phenomenon in which gases such as water vapor condense and liquefy in a material with tiny pores (capillaries)

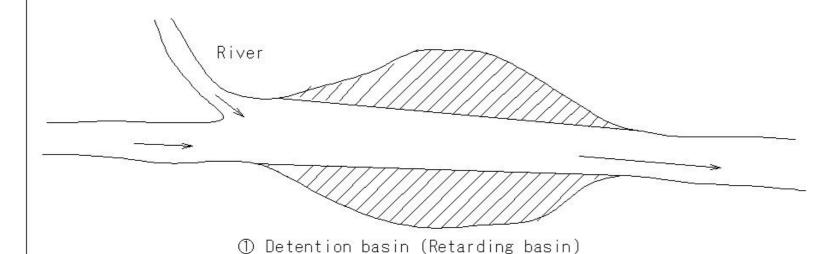
(I328) Molded drain



(I329)Detention basin (Retarding basin)

(I329) Detention basin (Retarding basin)

In the case of rivers



A facility or piece of land that temporarily stores river water during floods to reduce flood damage downstream.

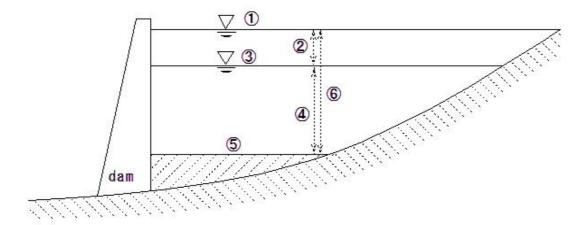
1411

(I330)Effective water storage amount

(I330) Effective storage capacity

Effective water storage amount

- (1) full water level
- ②Flood control capacity (B)
- 3Flood season limit water level
- 4Flood season water usage capacity (A)
- (5) sand surface
- **©** Water usage capacity during non-flood season



Effective storage capacity is the capacity that can actually use water in a dam. The combined capacity for water use and flood control capacity.

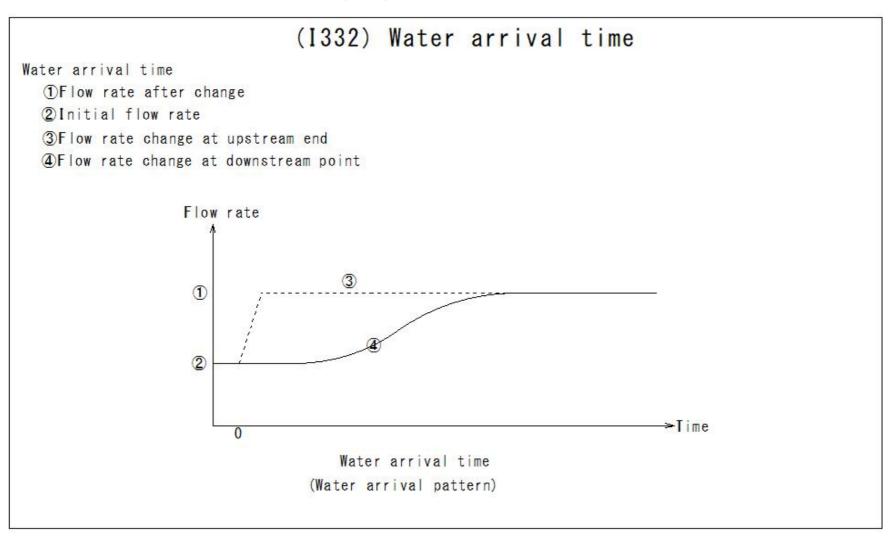
D321

(I331)Upwelling

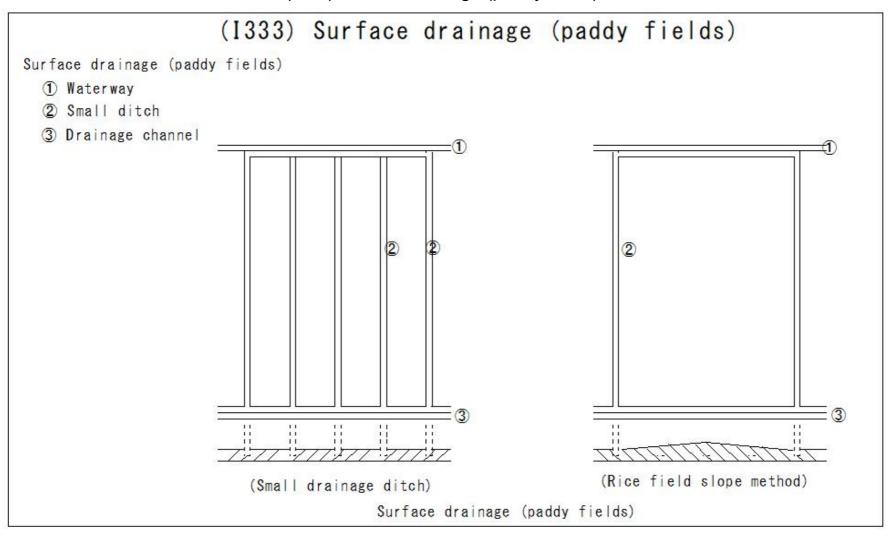
(I331) Upwelling Upwelling 1 Drift 2 Upwelling 3 Tidal current 4 Protrusion

- ① Upwelling refers to the phenomenon in the ocean where deep water rises to the surface.
- ② Wind, topography, ocean currents, etc. cause nutrient-rich water from the deep ocean to be carried to the surface.
- 3 Phytoplankton proliferates, creating good fishing grounds.

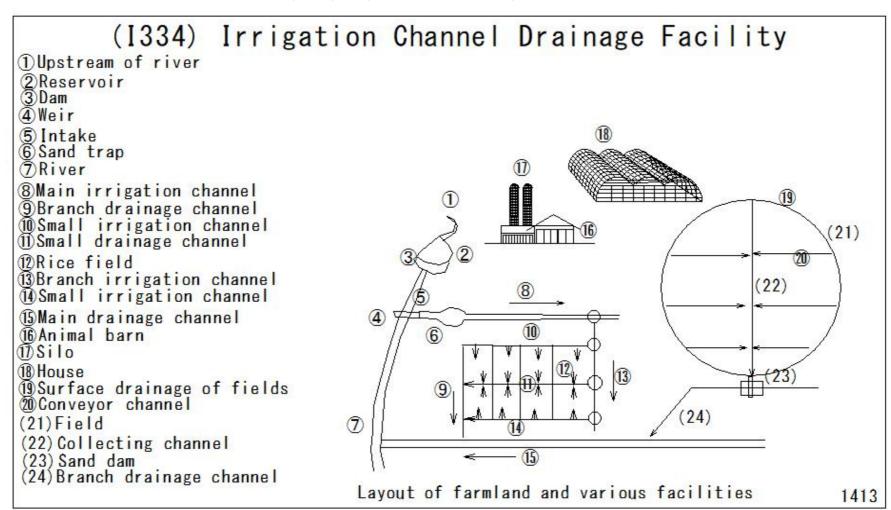
(I332) Water arrival time



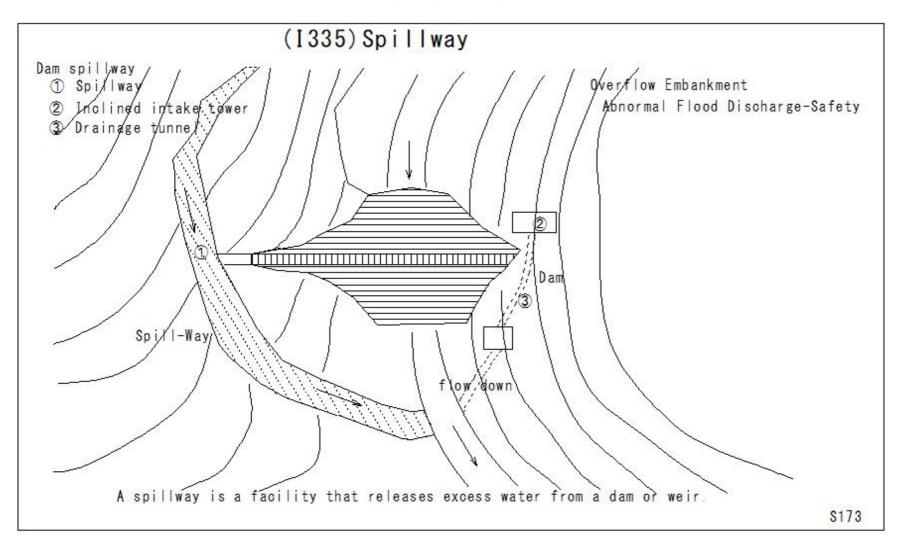
(I333) Surface drainage (paddy fields)



(I334) Irrigation and drainage facilities



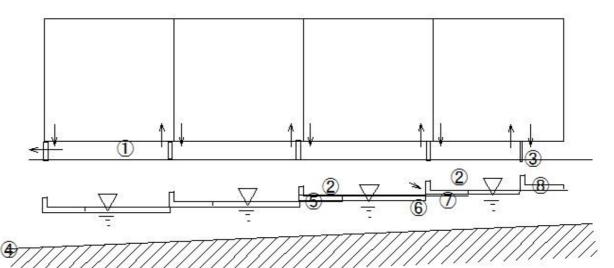
(I335) Spillway



(1336) Waterway for drainage and irrigation

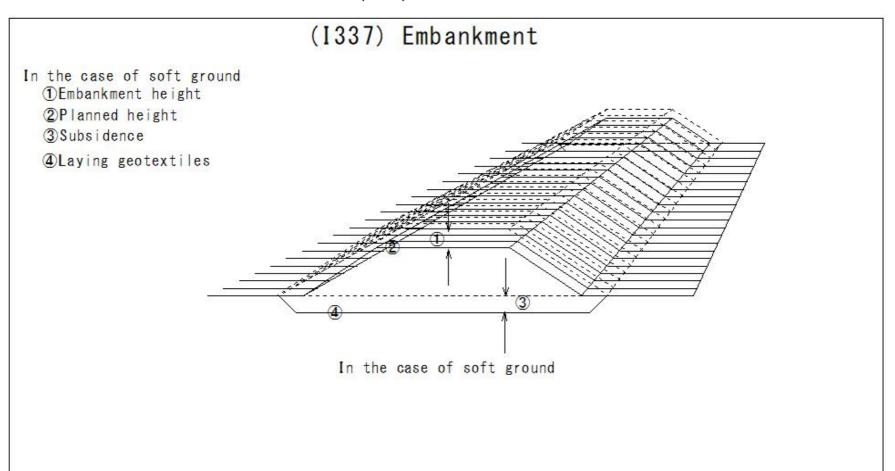
(I336) Waterway for drainage and irrigation

- 1 Waterway for drainage and irrigation
- 2 Paddy field surface
- 3 Weir
- 4 Waterway bottom
- 5 Drainage level
- 6 Waterway level
- 7 Drainage level
- 8 Waterway level



A waterway for drainage and irrigation is a type of waterway that supplies water directly from a pipeline to each plot through a water tap and also drains water at the same time.

(I337) Embankment



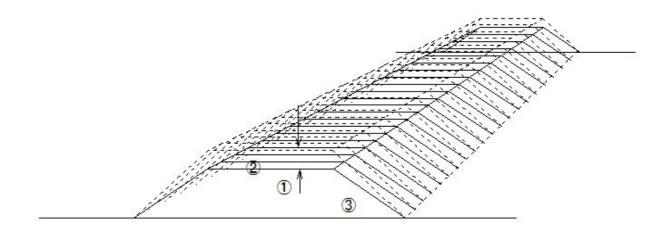
Embankment is the process of building up a pile in advance in consideration of the possibility of of subsidence after completion.

(I338) Embankment

(1338) Embankment

In the case of normal ground

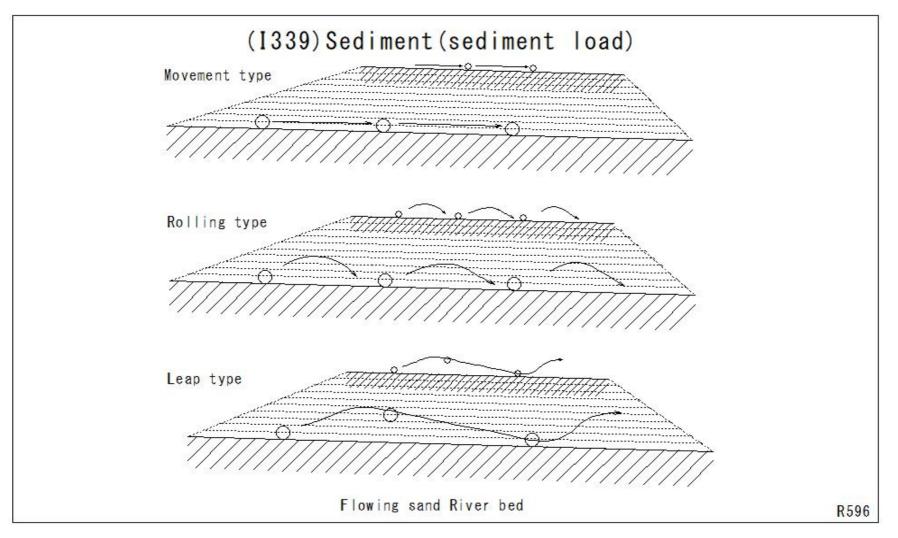
- 1 Embankment height
- 2 Planned height
- 3 Embankment



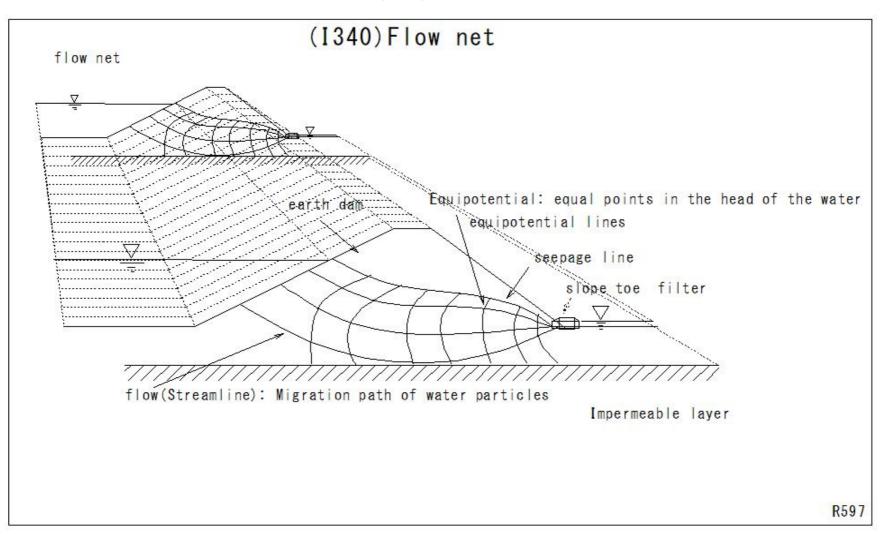
In the case of normal ground

Embankment is the process of building up a pile in advance in consideration of the possibility of of subsidence after completion.

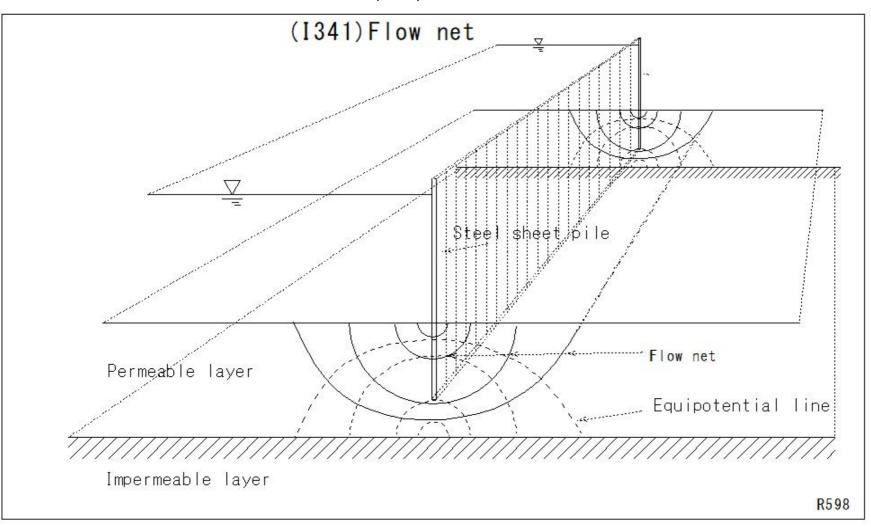
(I339)Sediment



(I340)Flow net



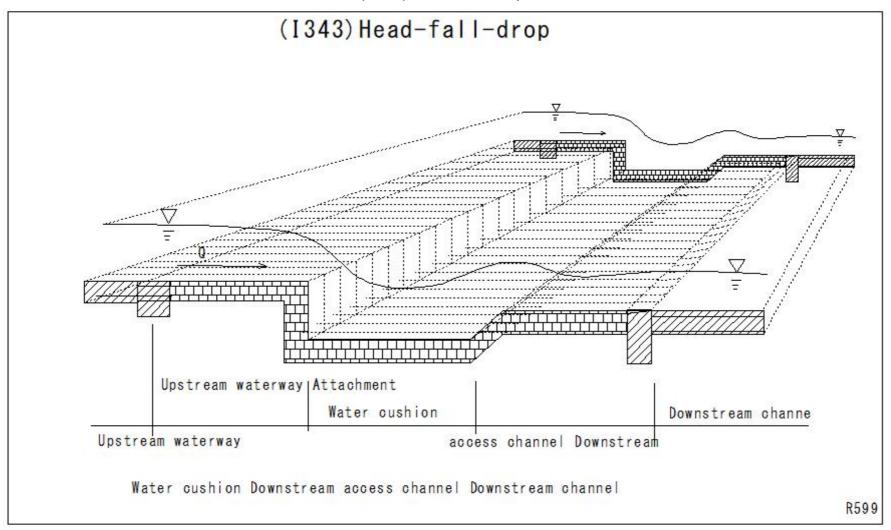
(I341)Flow net



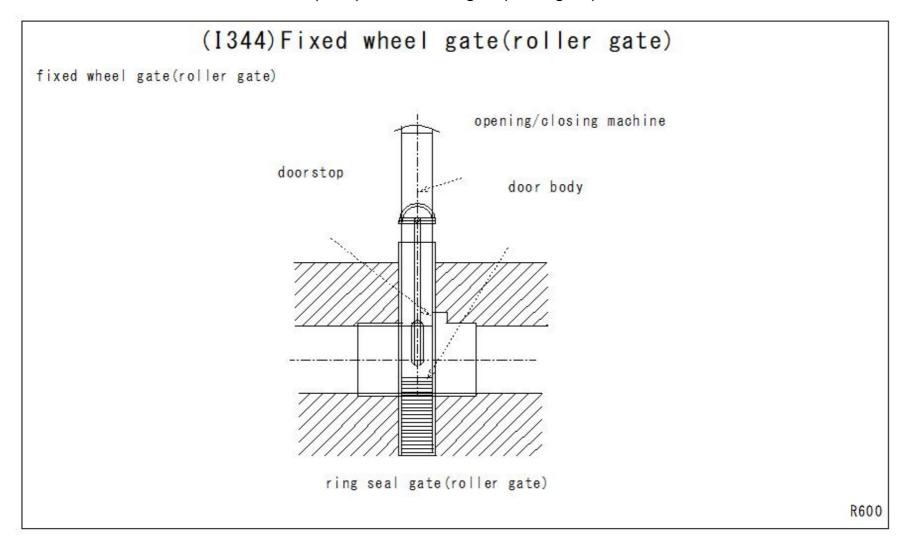
(I342)Retaining wall

(I342)Retaining wall Retaining wall ① Earth retaining wall (skin) 2 Embankment 3 Reinforcement material (strips) Reinforced soil retaining wall

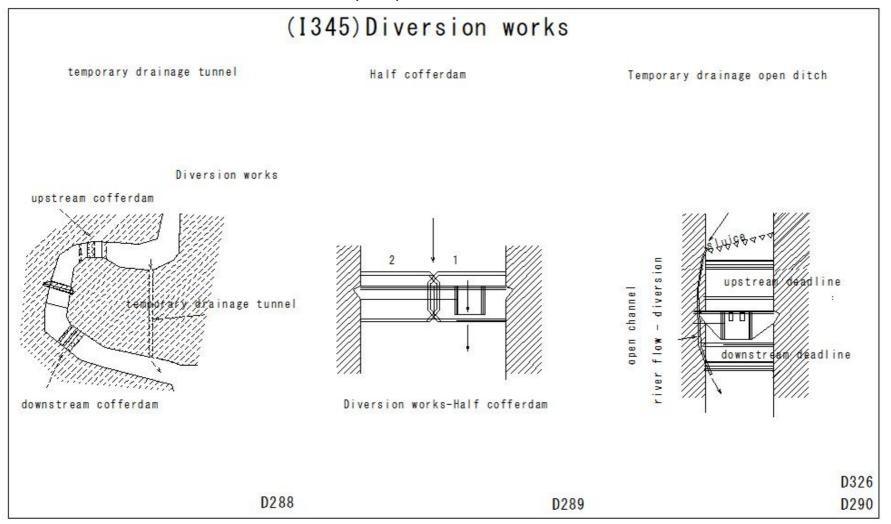
(I343)Head-fall-drop



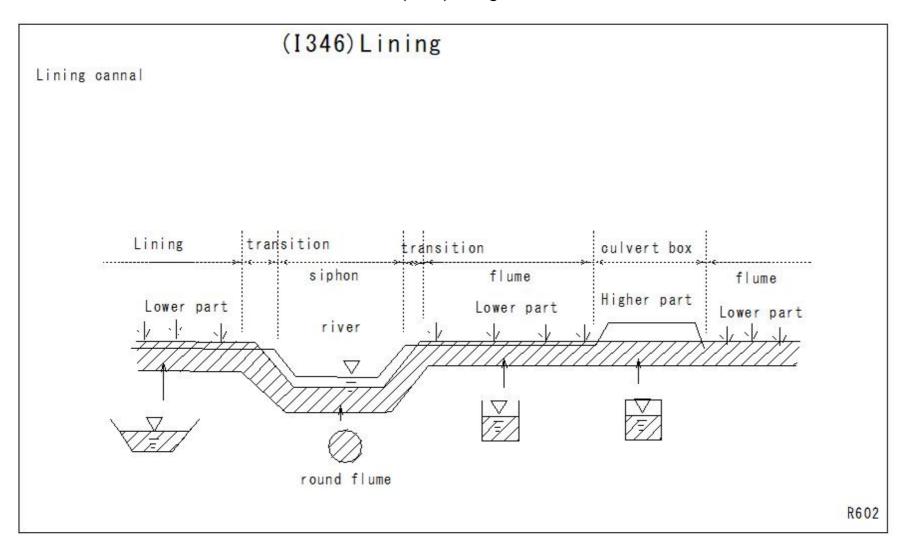
(I344)Fixed wheel gate(roller gate)



(I345)Diversion works



(I346)Lining



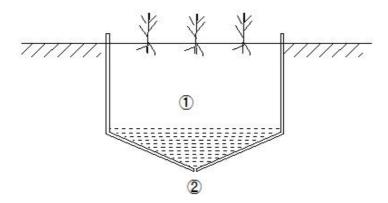
(I347)Lysimeter

(1347) Lysimeter

Lysimeter

- 1 Soil
- ② Drainage

A facility or device that measures the movement of moisture and nutrients in soil.



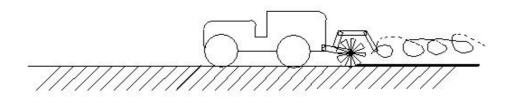
Lysimeter

(I348)Rotary

(I348)Rotary

Rotary

Rotary (side drive type)



Rotary (side drive type)

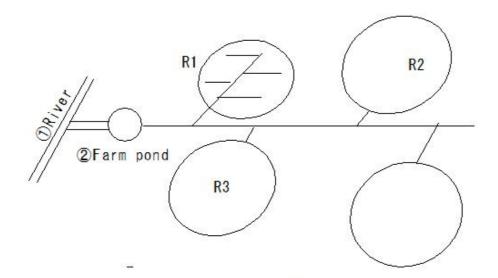
(I349)Rotation block

(I349) Rotation block

Rotation block

Block rotation is a method in agriculture where a field is divided into sections and crops are rotated each year.

Divide the irrigation planning area into several areas and determine the order of irrigation within each area.



Rotation block