4.10 DESIGN OF SHORT SPAN TRAIL BRIDGES (SSTB)

4.10.1 The Typical Design

There are two types of SSTB bridges.

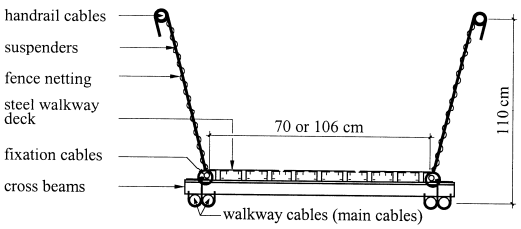
- Suspended Type
- Suspension Type

The typical design of the SSTB standard **suspended type** of bridge and its major components and parameters are as given in the following pages.

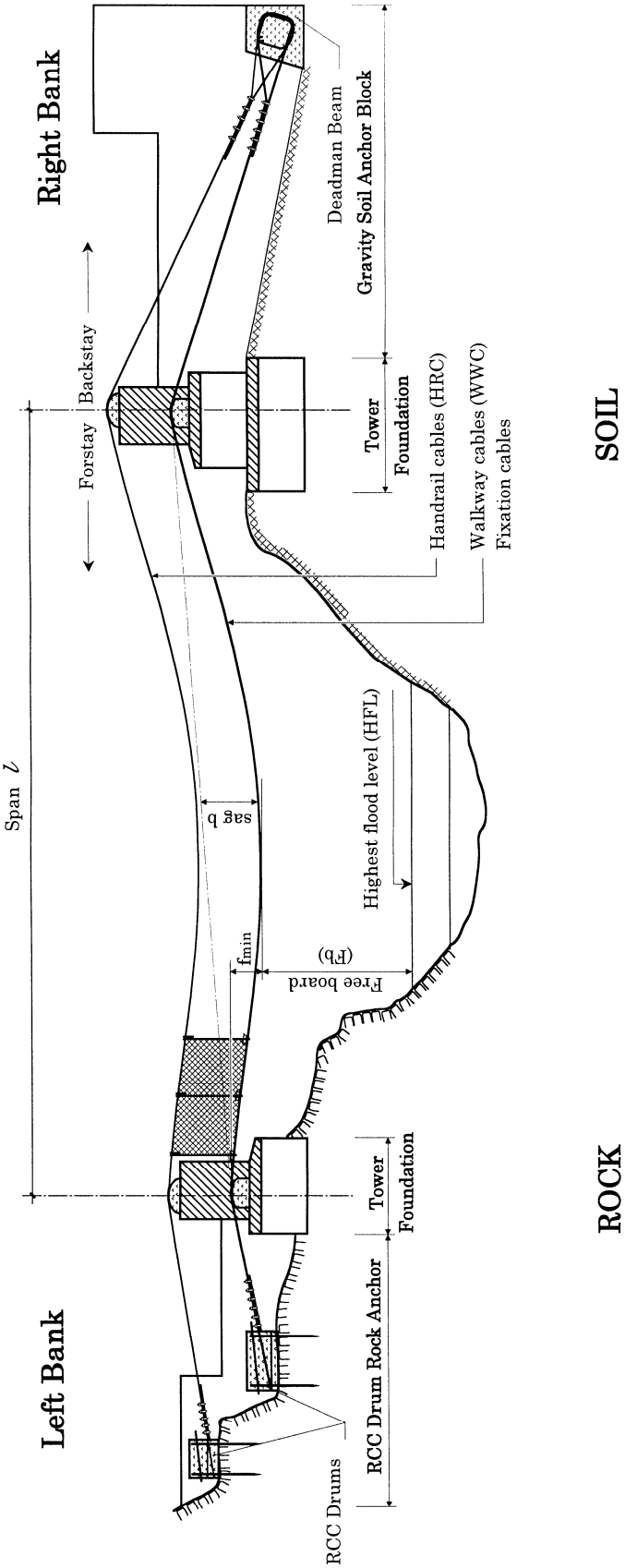
Suspended Type :

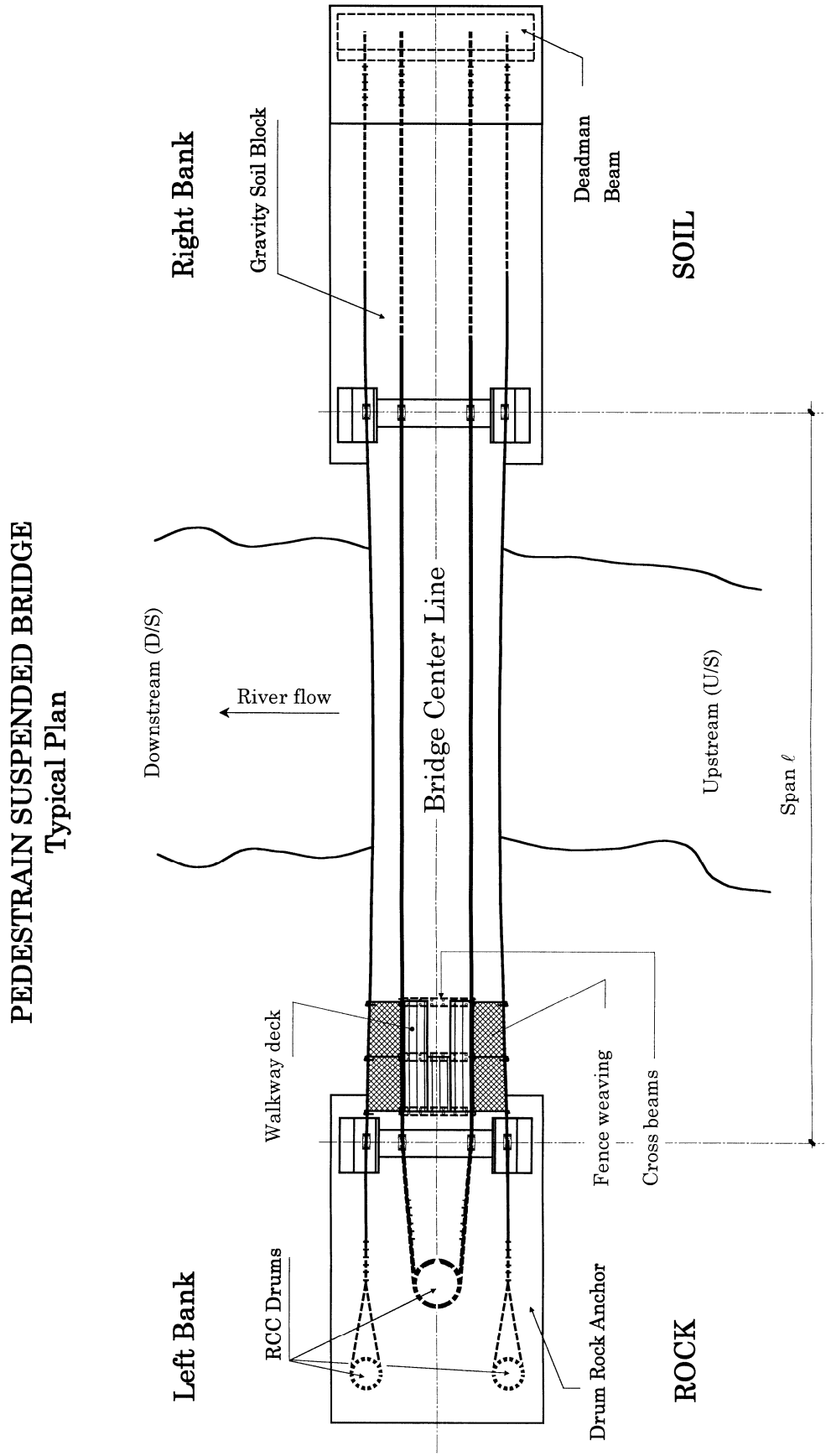
Walkway Section.
There are two types
of walkway width:

70cm & 106cm



PEDESTRAIN SUSPENDED BRIDGE
Typical Profile



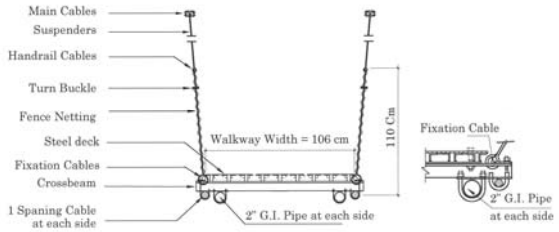

PEDESTRAIN SUSPENDED BRIDGE
Typical Plan
Right Bank
Gravity Soil Block
Deadman
Beam
SOIL
Downstream (D/S)
River flow
Bridge Center Line
Upstream (U/S)
Span ℓ
Walkway deck
Fence weaving
Cross beams
Left Bank
RCC Drums
Drum Rock Anchor
ROCK

The typical design of the SSTB standard suspension type of bridge and its major components and parameters are as given in the following pages.

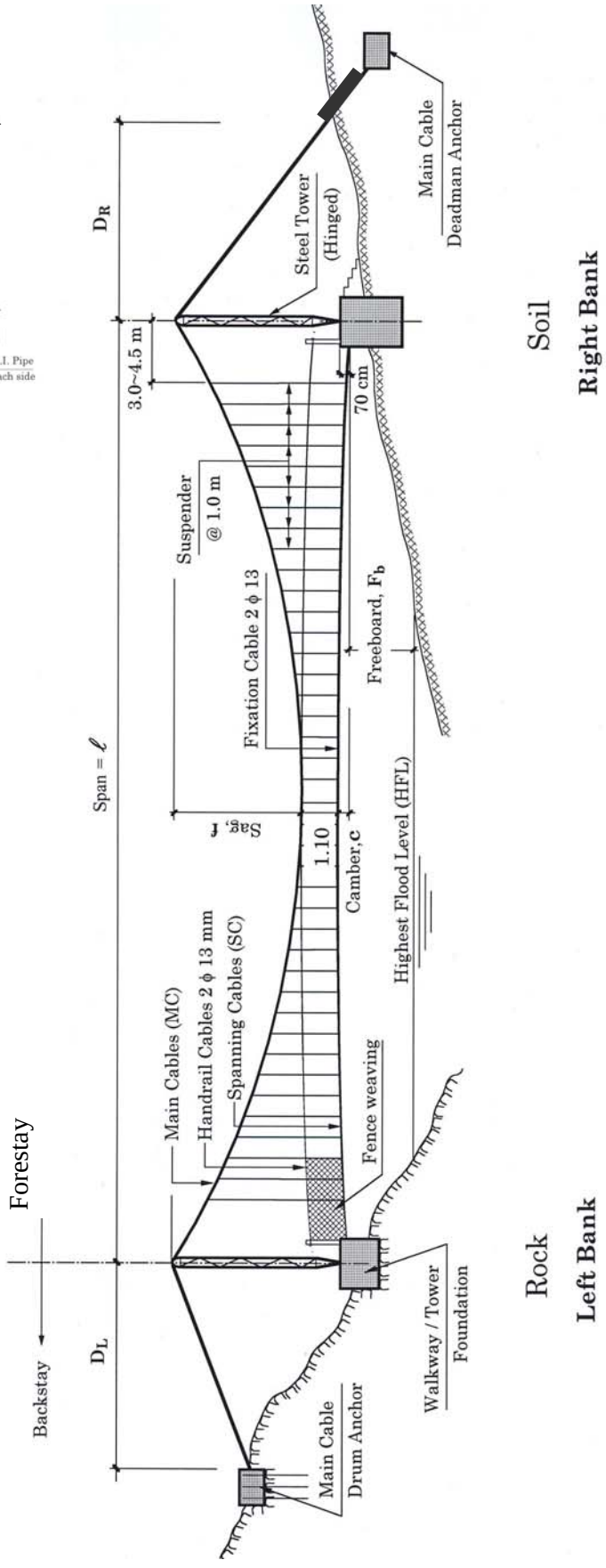
Suspension Type :

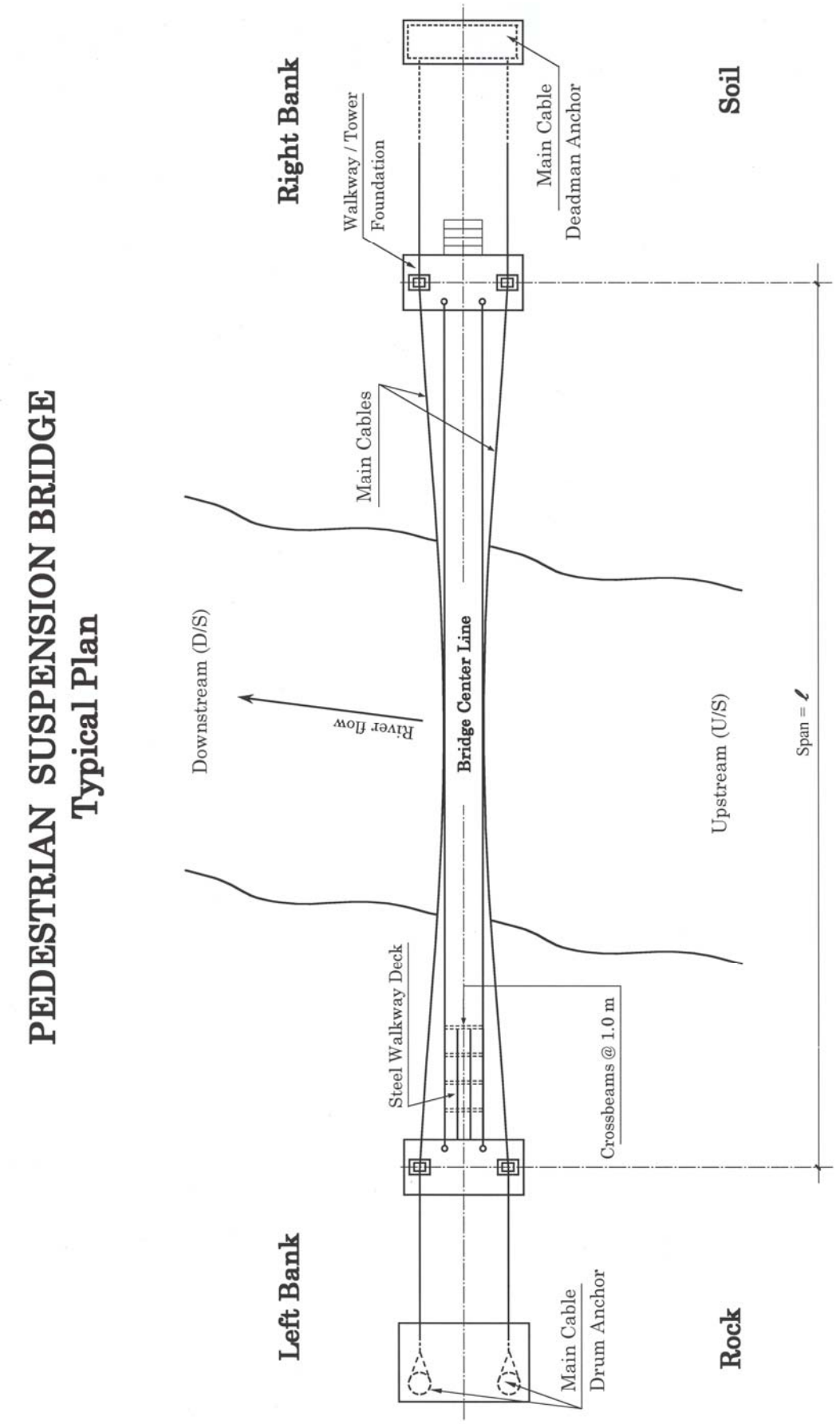
Walkway Section

Walkway width = 106 Cm



Working Drawing

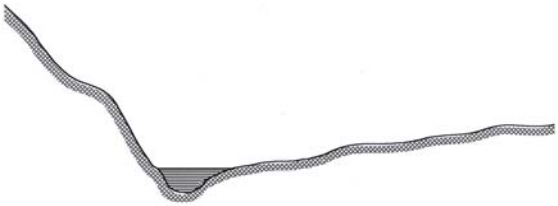



PEDESTRIAN SUSPENSION BRIDGE
Typical Plan
Right Bank
Walkway / Tower
Foundation
Main Cable
Deadman Anchor
Soil
Main Cables
Downstream (D/S)
River flow
Bridge Center Line
Upstream (U/S)
Span = ℓ
Steel Walkway Deck
Crossbeams @ 1.0 m
Left Bank
Main Cable
Drum Anchor
Rock

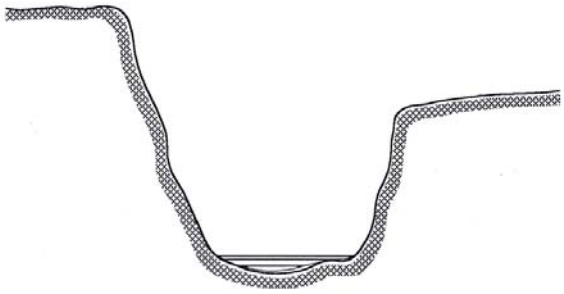
4.10.2 SELECTION OF BRIDGE TYPE

According to the bridge profile, assess the possibility of designing a Suspended type bridge. It is more preferable due to the economic (cost per meter) reasons and easy construction technology, which is more appropriate for the community bridge building approach.

Guideline for selection of a bridge type as per the prevailing topography of the bridge site:

Topography	Recommended Bridge Type
	The suspended bridge type (raised foundation blocks on both banks) may be feasible only for small spans. Most likely only the Suspension type may be feasible. It is necessary to assess both the types and adopt whichever is feasible and more cost effective.
	The Suspended bridge type (raised foundation blocks on the lower bank) may be feasible only for small spans. Most likely only the Suspension type may be feasible. It is necessary to assess both the types and adopt whichever is feasible and more cost effective.
	Both the Suspended and Suspension types are feasible. It is necessary to assess both the types and adopt whichever is more cost effective. The Suspended type is preferable.
	The Suspended type is most appropriate. If the

Suspended type is not feasible, the Suspension type with one tower may also be feasible. The present handbook does not deal with this. Refer to the Volume A of LSTB (SBD) Manual for the design. The Suspension type with both towers is not feasible.



The Suspended type is most appropriate.

If both the Suspended and Suspension types are feasible, make a cost (total cost) comparison and adopt the more cost effective one.

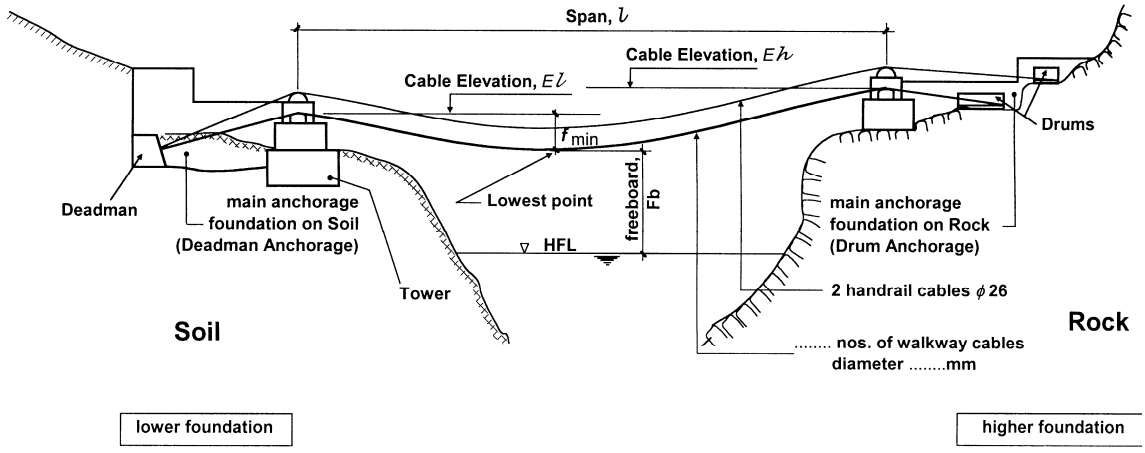
If the cost is nearly equal for both the bridge types, choose the Suspended type.

Select the Suspension type only, if the Suspended type is not feasible for the given topography or it is more economical than the Suspended type.

4.11. DESIGN OF SHORT SPAN TRAIL BRIDGE (SSTB) SUSPENDED TYPE

4.11.1 The Major Bridge Components

The sketch below shows the major bridge components and parameters of the suspended type bridge.



4.11.2 Design Procedure

For designing a suspended standard bridge, follow the steps in sequence as follows:

Draw the bridge profile from the survey data

Fix the position of the bridge foundations and the span

Select walkway width

Select walkway cables and handrail cables

Design walkway tower

Design main anchorage foundations

Transfer data to the bridge profile and prepare the General Arrangement Drawing

Compile and fill in the standard design drawings

Calculate the quantities of works and prepare the Cost Estimate

4.11.3 Designing the Position of the Bridge Foundations

Fix the position of the bridge foundations and the actual span of the bridge in the bridge profile. This bridge profile will be the basis for the layout of the bridge at the construction site. Fulfill following criteria while fixing the position of the bridge foundations.

Criteria for fixing the Bridge Foundations

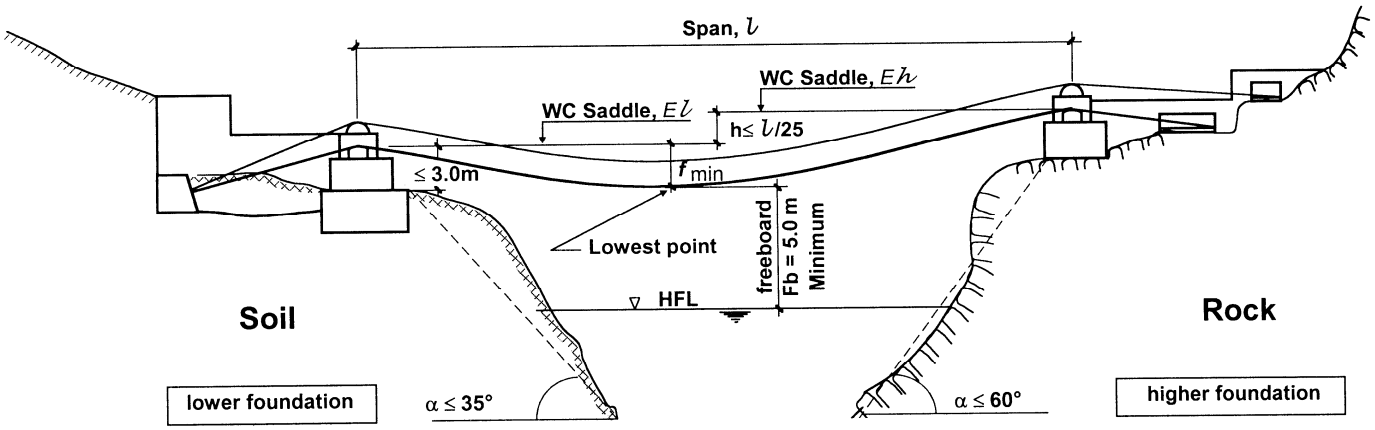
The Bridge Foundations should be placed at least 3 meter back form the soil slope and 1.5 meter back from the rock slope

The Bridge Foundations should be placed behind the line of angle of internal friction of the soil or rock. This angle is 35° for soil and 60° for rock.

Level difference between the walkway cable saddles of two banks, h should not be more than span/25

Walkway tower height should be as small as possible. However, walkway cable saddle should be at least a height of 1.3 meter from ground but should not be at a height more than 3.0 meter.

Free board F, between lowest point of the bridge in dead load case and the high flood level should be not less than 5.0 m



Criteria for fixing the location of the bridge foundation

Procedure for fixing the Bridge Foundations

According to the above criteria, draw the bridge profile as per following steps.

Draw the bridge axis profile on an A3 size paper in a scale 1:200 (for up to 50m span) or 1: 400 (for span above 50m) with all details like axis points A and B, HFL, WL and tentative location of the walkway towers at both banks based on the survey data as described in the chapter 3.1.3 : Topographic Maps.

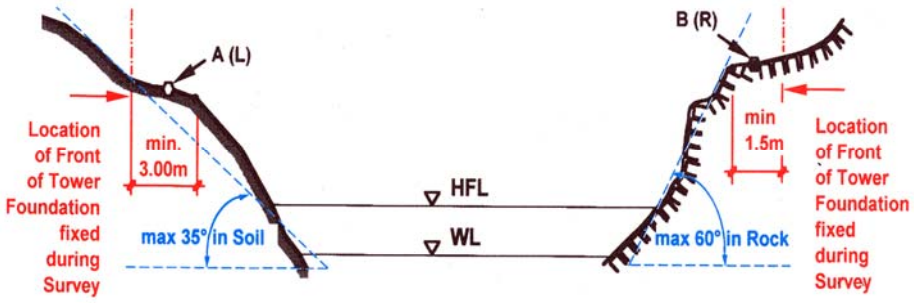
Fix location of the walkway towers at both banks as per following procedure.

Case-1: When Tentative Position of the Towers has been fixed during the Survey.

Step 1:Fix the Front of the Tower and check with Slope Line.

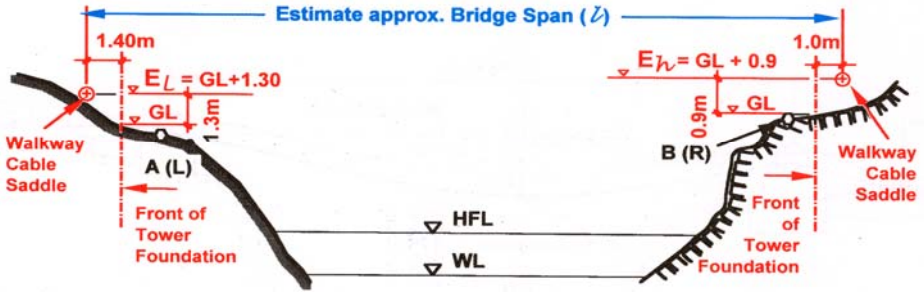
Mark front of the tower as fixed during the survey. Check position of the front of the tower as per minimum required distance from bank edge and slope line.

If minimum required distance from bank edge is not sufficient, shift its position backward. Towers should be located behind the slope line. If tower is out of the slope line, shift its position backward.



Step 2:Fix the Position of the Walkway Saddle and Bridge Span, *l*.

Mark position of the walkway cable saddles. Walkway cable saddles should be at height of 1.3m at soil slope and 0.8m at rock slope from the ground at tower front. Thus, fix its elevations, E_l, E_h & l.



Step 3:Check the Level Difference, h.

Level difference 'h' between walkway cable saddles of two banks should be less than *l*/25. If 'h' is found more than the limit:

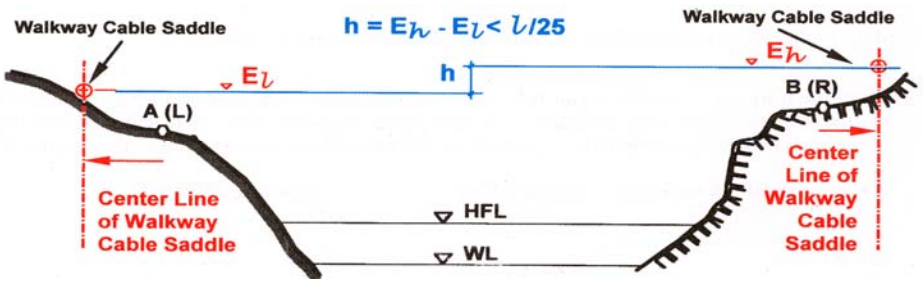
Rise the elevation of the walkway cable saddle of lower bank by increasing saddle height (in the series of 1.3, 2.3, 3.3 meter) but not more than 3.3 meter from the ground level in case of Flat slope

Or

Shift the position of the tower of lower bank backward to gain the required walkway cable elevation in case of Hill Slope.

Or

Lower the elevation of the walkway cable saddle of higher bank. Avoid deep earth cutting.



Case-1: *(continued)*

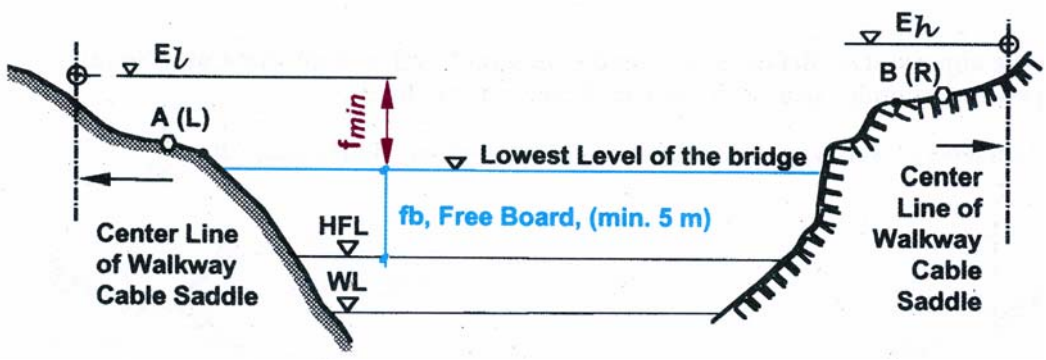
Step 4:Calculate the vertical Distance, f_{min} and check the Free Board, f_b.
Calculate vertical distance f_{min} between the lowest point of the bridge and walkway cable saddle of lower bank,

$$f_{min} = \frac{(4 \cdot \ell - 20h)^2}{320 \cdot \ell}$$

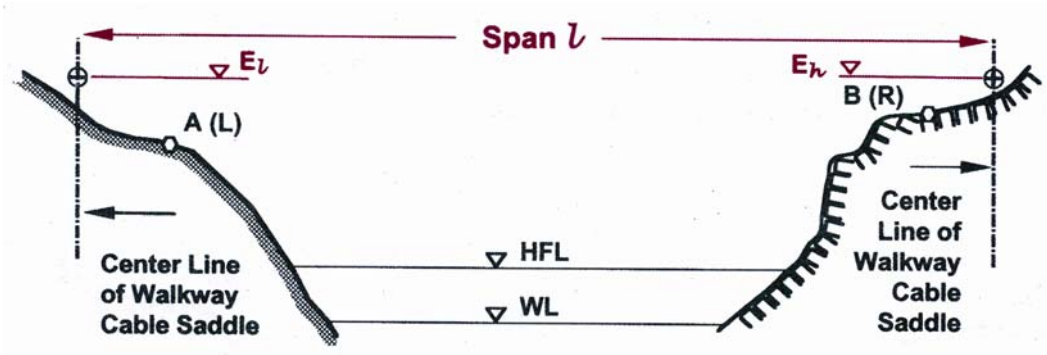
Draw line of lowest point of the bridge.

Check available free board between lowest level of the bridge and high flood level.

Freeboard should be not less than 5.0m. If free board is not sufficient:
Raise the elevations of walkway cable saddles at both banks. This can be done either by raising the tower height in case of the flat ground or by placing the tower further back in case of the hill slope.



Step 5:Finalize the Bridge Profile.
Finalize bridge profile with final span and elevation of the walkway cable saddles.

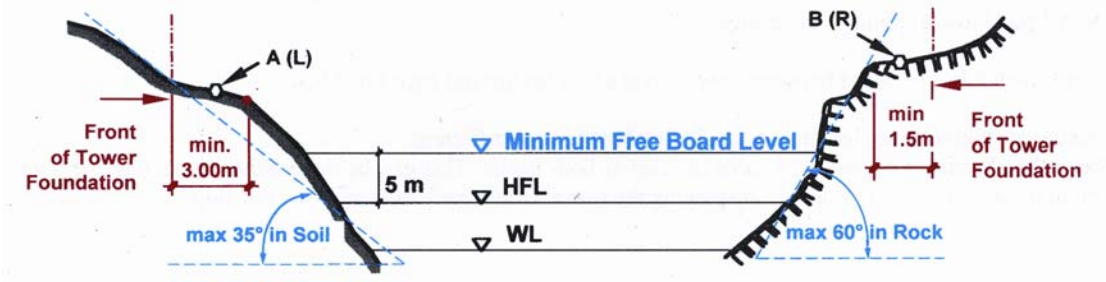


Case-2: When the Position of the Towers has not been fixed during the Survey.

Step 1:Fix the Free Board Line and Front of the Towers.

Mark minimum free board level. Minimum free board from high flood level is 5.0 meter.

Fix the position of the front of the tower maintaining minimum required distance from bank edge and slope line.



Step 2:Fix the approximate Bridge Span, *l* and minimum Level of Walkway Cable Saddles.

Calculate approximate bridge span as distance between the tower fronts.

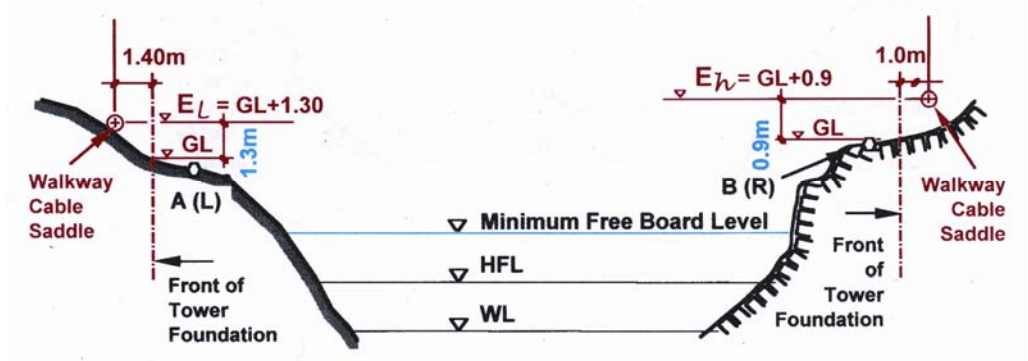
Mark minimum level of walkway cable saddles as per required sag of the cable, $b = \frac{\ell}{20}$

Step 3:Fix the Position of the Walkway and Cable Saddles.

Walkway cable saddles should not be below the minimum level.

Walkway cable saddles should be 1.3 meter above the ground level at soil slope and 0.9 meter at rock slope.

Thus, fix the elevations of the walkway cable saddles, E_l and E_h.



Case-2: (continued)

Step 4: Check the Level Difference, h.

Level difference 'h' between walkway cable saddles of two banks should be less than *l*/25. If 'h' is found more than the limit:

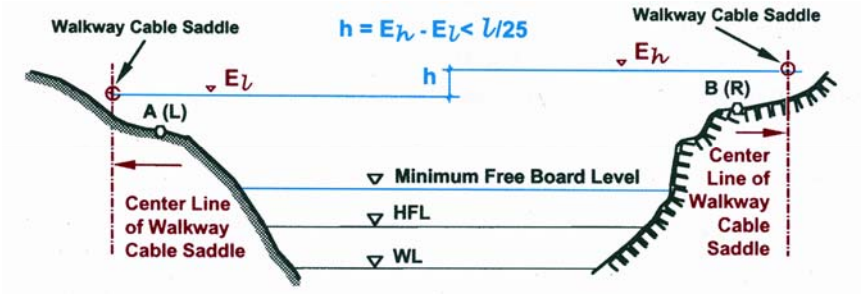
Rise the elevation of the walkway cable saddle of lower bank by increasing saddle height (in the series of 1.3, 2.3, 3.3 meter) but not more than 3.3 meter form the ground level in case of flat ground.

or

Shift the position of the tower of lower bank backward to gain the required walkway cable elevation in case of hill slope.

or

Lower the elevation of the walkway cable saddle of higher bank. Avoid deep earth cutting.



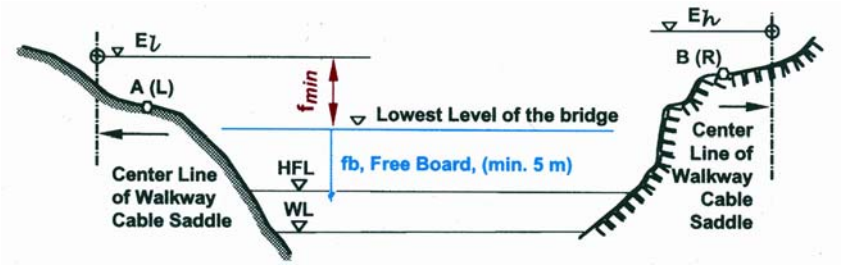
Step 5: Calculate the vertical Distance f_{min} and check the Free Board f_b.

Calculate vertical distance f_{min} between the lowest point of the bridge and walkway cable saddle of lower bank.

Draw actual line of lowest point of the bridge $$f_{min} = \frac{(4 \cdot \ell - 20h)^2}{320 \cdot \ell}$$

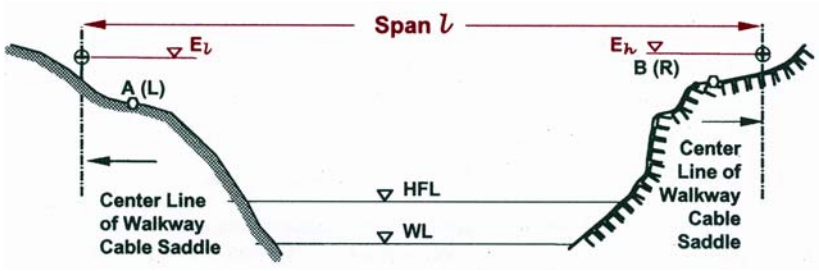
Check available free board between lowest level of the bridge and high flood level.

Freeboard should be not less than 5.0 meter. If free board is not sufficient:
Raise the elevations of walkway cable saddles at both banks. This can be done either by raising the tower height in case of the flat ground or by placing the tower further back in case of the hill slope.



Step 6: Finalize the Bridge Profile.

Finalize bridge profile with final span and elevation of the walkway cable saddles.



4.11.4 Cable Design

Designing the cable for a bridge involves selecting required numbers and diameter of the handrail and walkway cables for given span and selected walkway width.
To design the cable proceed as per the steps below.

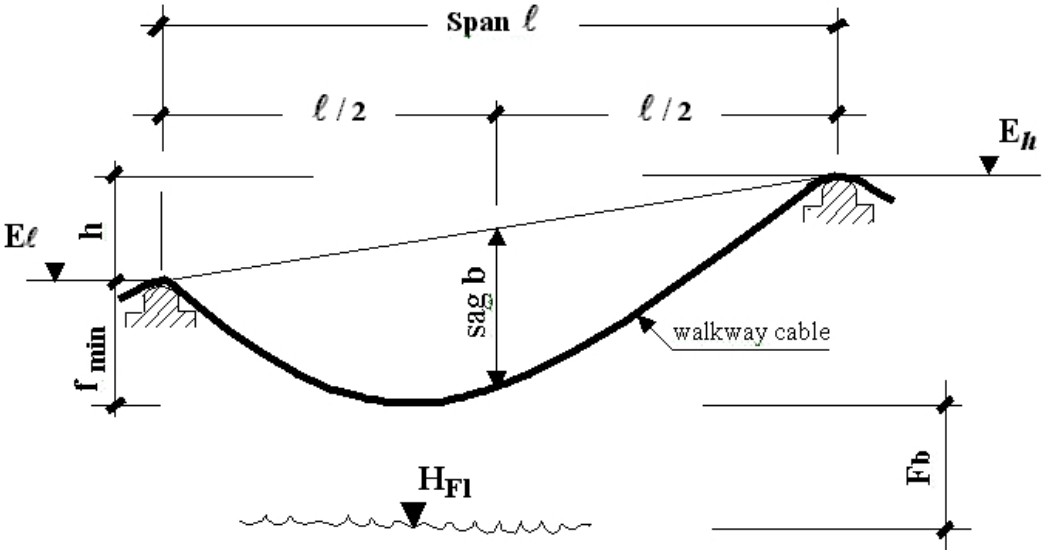
Select the appropriate walkway width (70cm or 106cm) according to the nature of the traffic and type of trail.

Fix the span of the bridge and height difference of cable saddles of the right bank and left bank from the bridge profile (refer chapter 4.11.3).

Select cables from the Table: Selection of Cable according to the span and selected walkway width.

Design the Cable Structure as per following Checklist.

A. Survey Data & Calculation of Freeboard



1. Span of the Bridge ℓ = ... m
2. Saddle Elevation of the Walkway Cable *on the **higher** Side* $\mathbf{E_h}$ = ... m
3. Saddle Elevation of the Walkway Cable *on the **lower** Side* $\mathbf{E_\ell}$ = ... m
4. Difference in Elevation $\mathbf{h = E_h - E_\ell}$ = $\mathbf{h}$ = ... m
   (max. permissible height: $h_{max} = \ell/25$)
5. **Dead Load Sag:** *for Span up to 80m* $\mathbf{b_d} = \dfrac{\ell}{\mathbf{20}}$ = $\mathbf{b_d}$ = ... m

   for Span over 80m $\mathbf{b_d} = \dfrac{\ell}{\mathbf{22}}$ = $\mathbf{b_d}$ = ... m
6. f_{min} in Dead Load Case (at the lowest point of the cable) $\mathbf{f_{min}} = \dfrac{(\mathbf{4 \cdot b_d - h})^2}{\mathbf{16 \cdot b_d}}$ = $\mathbf{f_{min}}$ = ... m
7. Highest Flood Level $\mathbf{H_{Fl}}$ = ... m
8. **Free Board** (min. 5.00m) $\mathbf{F_b = E_\ell - H_{Fl} - f_{min}}$ = $\mathbf{F_b}$ = ... m

*(if freeboard is less than 5.00m, **try** either to raise the saddle elevations or to adjust the span, but keep the ratio between span and sag always **fixed** at ℓ / b_d =20 or ℓ / b_d =22)*

B. Selection of Cables

Select a cable combination according to the span and walkway width of the bridge from the following table. Always select the higher cable combination when the span is in between two values.

Maximum Span for Walkway Width: 70cm	**106cm**	**Cable Combinations Handrail Cables**		**Walkway Cables**		**Weight of all Cables g_h**
span [m]	span [m]	nos	∅mm	nos	∅mm	[kg/m]
50	40	**2**	**26**	**2**	**26**	10.04
90	60	**2**	**26**	**2**	**32**	12.62
100	75	**2**	**26**	**4**	**26**	15.06
120	105	**2**	**26**	**4**	**32**	20.22
----	120	**2**	**32**	**4**	**32**	22.80

C. Calculation of Cable Length

Type of Cable	**dia [mm]**	**Nos**	**Backstay Length * [m]**	**Cutting Length** [m/pc]**
Fixation Cable	13	2	…….	……
Handrail Cable	……..	2	……	……
Walkway Cable	……..	……	..…….	……

*Backstay Length = Cable length between saddle center and center of dead man or drum as per foundation drawing (both banks) + 6.0m.

**Cutting Length = 1.1 x Span + Backstay Lengths

D. Calculation of (f_{min}) Hoisting Sag

This calculation has to be made after tower and foundation work is completed

1. Actual Span measured in the Field ℓ = ...m
2. Saddle Elevation of the Walkway Cable *on the **higher** Side* E_h = ...m
3. Saddle Elevation of the Walkway Cable *on the **lower** Side* E_ℓ = ...m
4. Difference in Elevation $h = E_h - E_\ell = h$ = ...m
5. Dead Load Sag: *for Spans up to 80m* $b_d = \frac{\ell}{20} = b_d$ = ...m

   or for Spans over 80m $b_d = \frac{\ell}{22} = b_d$ = ...m
6. Hoisting Sag $b_h = 0.95 \times b_d = b_h$ = ...m
7. f_{min} in hoisting Case $f_{min} = \frac{(4 \cdot b_h - h)^2}{16 \cdot b_h} = f_{min}$ = ...m

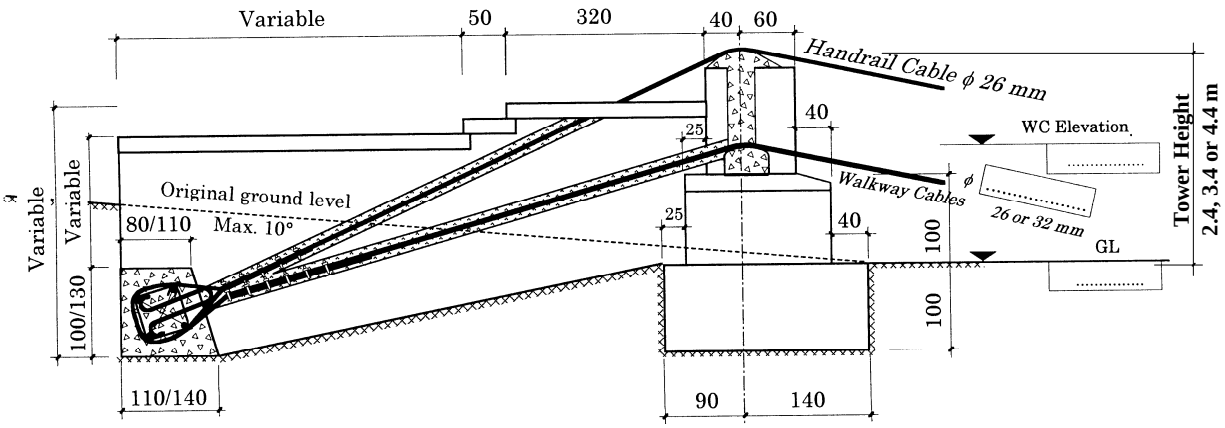
4.11.5 Design of Bridge Foundation Structures

Design of a bridge foundation structure is mainly to select the standard anchor block types for right bank and for left bank and fill in the required data in the selected drawings.

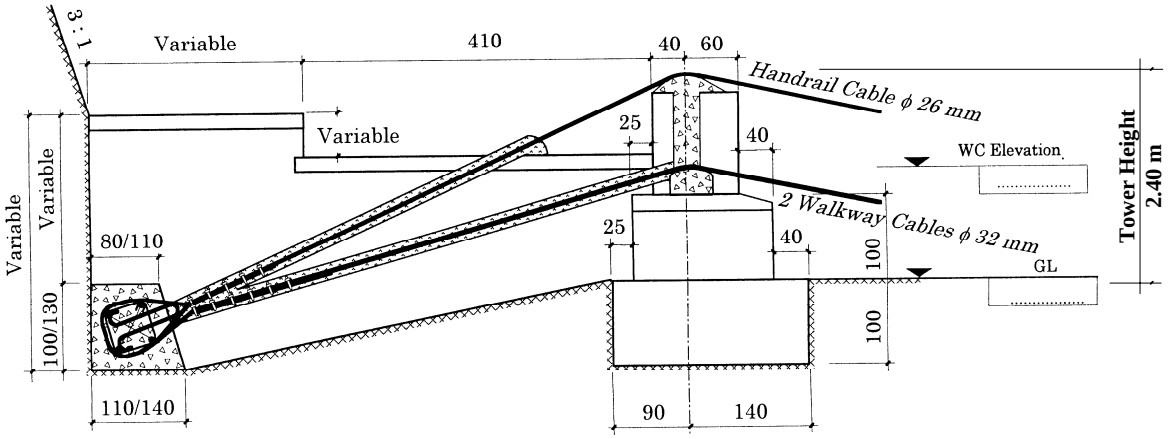
Standard anchor block (bridge foundation structure) types have been developed for all possible cases up to span 120m.

There are basically **seven types of anchor blocks** depending upon the soil or rock type, whereof the **typical designs** are illustrated below:

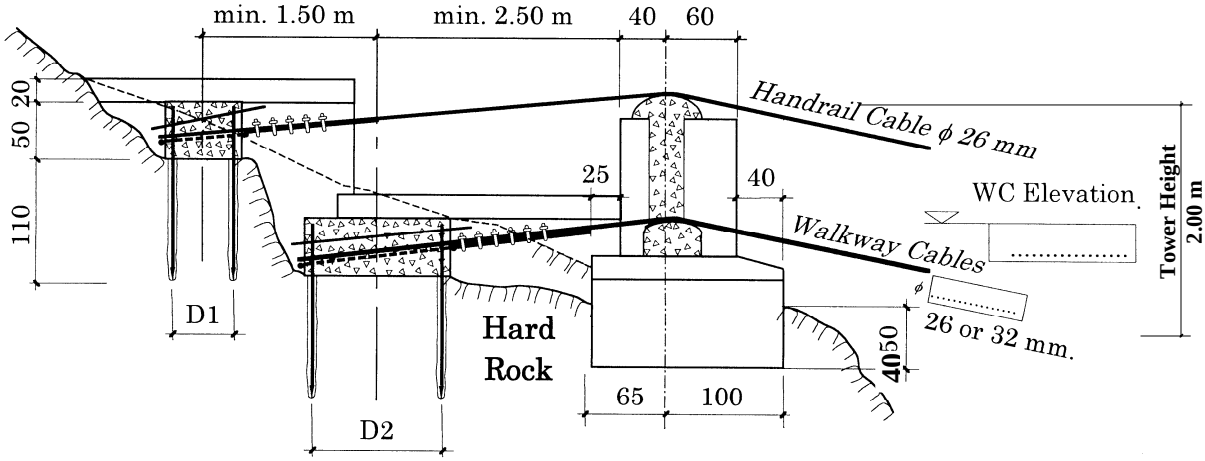
1. RCC Deadman and Gravity Soil Anchor Block on Flat Topography



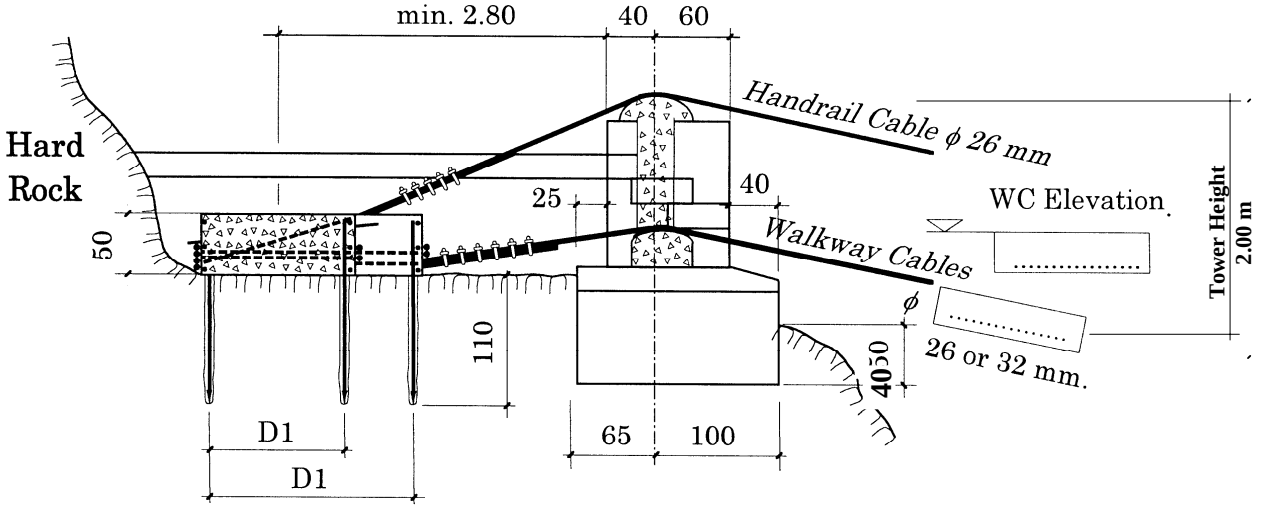
2. RCC Deadman and Gravity Soil Anchor Block on Slope Topography



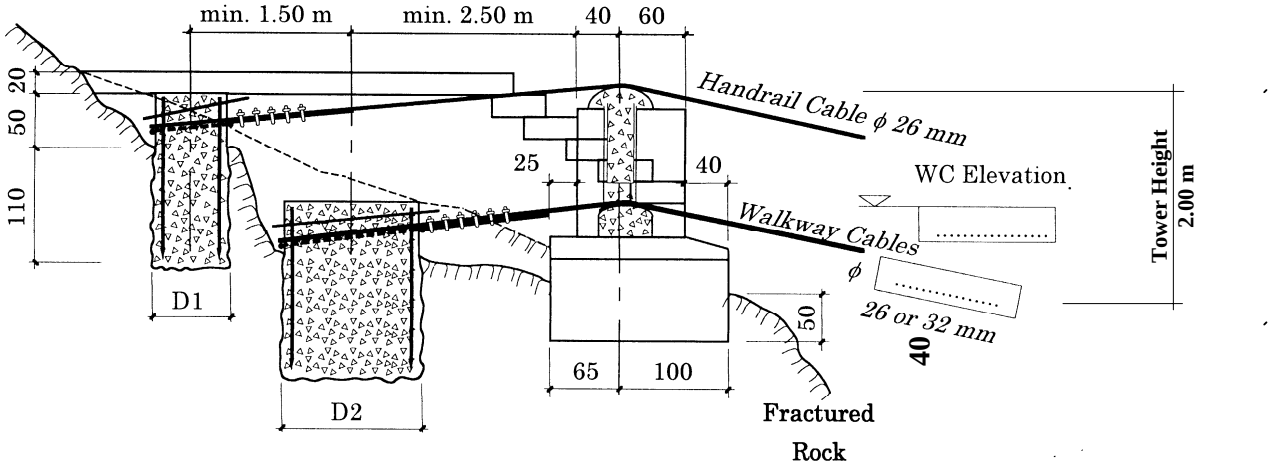
3. RCC Single Drum Rock Anchor Block in Hard Rock.



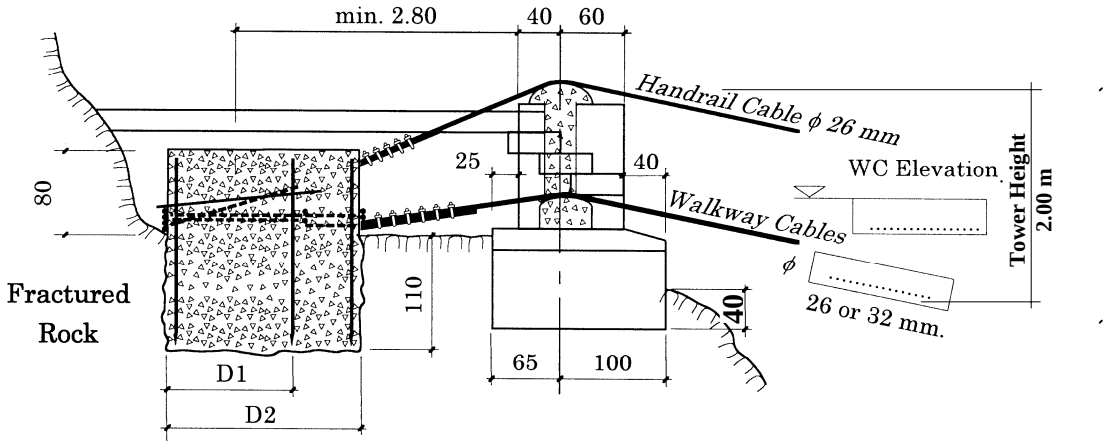
4. RCC Double Drum Rock Anchor Block in Hard Rock.



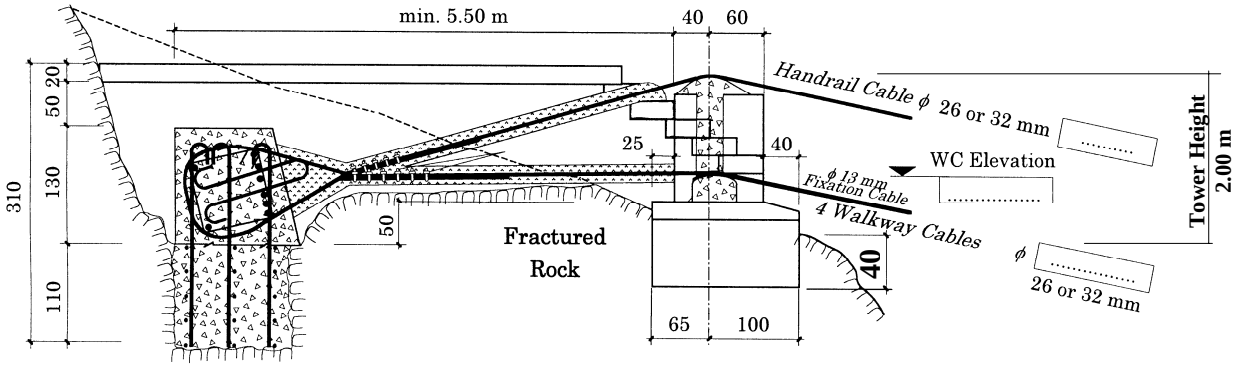
5. RCC Single Drum Rock Anchor Block in Fractured Hard Rock and Soft Rock



6. RCC Double Drum Rock Anchor Block in Fractured Hard Rock and Soft Rock



7. RCC Deadman Anchor Block in Fractured Hard Rock and Soft Rock



To select an Anchor Block Type proceed as follows.

define the walkway width.

define the span of the bridge from the bridge profile (refer chapter 4.11.3).

define the topography of the ground where the anchorage block will be placed as **flat** or **slope**.

The topography is defined as flat if the ground slope is less than 10°, and slope if the ground slope is more than 10°.

define the soil or rock type.

define the tower height from bridge profile (refer chapter 4.11.3). Tower height = Height of walkway cable saddle from the ground + 1.1m in case of soil bank and flat topography. Tower height = 2.4m (fixed) in case of soil bank and slope topography. Tower height = 2.0 m (fixed) in case of Rock bank.

select the anchor type and the corresponding drawing from the selection tables according to the above design data.

Design the Anchor Types as per following Checklist.

A. Design Data

☞ **Fill in the following Design Data from Survey Form and Checklist**

- **Walkway Width, WW (70 or 106cm):** ..... cm
- **Bridge Span:** ....m

Right Bank Condition			
Geology:	Soil ☐		
If **Soil**, how is the Ground Surface?	Flat ☐ (up to 10° slope)	or	Hill Slope ☐ (more than 10° slope)
What is the Soil Type?	Gravelly ☐	Sandy ☐	Silty ☐
Tower Height from Ground up to H.C.Saddle (data from bridge profile):	2.4m ☐	3.4m ☐	4.4m ☐
If **Rock**, what is the Rock Type?	Hard Rock ☐ (only few fractures)	Hard Rock ☐ (highly fractured)	Soft Rock ☐
Tower Height	2.0m in Case of Rock ☐		
Left Bank Condition			
Geology	Soil ☐		
If **Soil**, how is the Ground Surface?	Flat ☐ (up to 10° slope)	or	Hill Slope ☐ (more than 10° slope)
What is the Soil Type?	Gravelly ☐	Sandy ☐	Silty ☐
Tower Height from Ground up to H.C.Saddle (data from bridge profile):	2.4m ☐	3.4m ☐	4.4m ☐
If **Rock**, what is the Rock Type?	Hard Rock ☐ (only few fractures)	Hard Rock ☐ (highly fractured)	Soft Rock ☐
Tower Height	2.0m in Case of Rock ☐		

B. Selection of Anchorage Types

Select appropriate anchorage type at Right Bank and Left Bank according to the above design data.

Procedure for Selection:

According to the Soil/Rock type and Slope of the ground, refer to respective tables for selection of Anchorage Block as per below.

for Soil and Flat Ground : **Table 5.1**
for Soil and Hill Slope : **Table 5.2**
for Hard Rock : **Table 5.3** or **Table 5.4**
for Fractured Hard Rock or Soft Rock:
Span up to 90m (WW = 70cm) and up to 60m (WW = 106cm) : **Table 5.5** or **Table 5.6**
Span Range 91-120m (WW = 70cm), 61-120m (WW = 106cm) : **Table 5.7**

In the table match the design data:

Selected Walkway Width → Bridge Span → Tower Height → Soil type → Select the corresponding Anchor Type and Drawing No. for right bank and left bank respectively.

C. Anchor Type Selection Tables

- **In Soil and Flat Ground:**

Table 5.1: Selection of RCC Deadman and Gravity Soil Anchor Block in Flat Ground

Span Range, m		Tower Height [m]	Foundation Soil Type	Block Type	Drawing No.
Walkway: 70cm	Walkway: 106cm				
Up to 45m	Up to 30m	2.4	All	1F	21Dcon
		3.4		2F	22Dcon
		4.4		3F	23Dcon
46 - 90	31 - 60	2.4	All	4F	24Dcon
		3.4		5F	25Dcon
		4.4		6F	26Dcon
91 - 120	61 - 75	2.4	All	7F	27Dcon
		3.4		8F	28Dcon
		4.4		9F	29Dcon
-	76 - 90	2.4	All	10F	30Dcon
		3.4		8F	28Dcon
		4.4		11F	31Dcon
-	91 - 105	2.4	All	12F	32Dcon
		3.4		8F	28Dcon
		4.4		13F	33Dcon
-	106 – 120	2.4	Gravely	12F	32Dcon
			Sandy, Silty	14F	34Dcon
		3.4	All	15F	35Dcon
		4.4		13F	33Dcon

- **In Soil and Slope Ground:**

Table 5.2: Selection of RCC Deadman and Gravity Soil Anchor Block in Hill Slope

Span Range, m		Tower Height [m]	Foundation Soil Type	Block Type	Drawing No.
Walkway: 70cm	Walkway: 106cm				
Up to 60m	Up to 40m	2.4	All	1S	41Dcon
61 – 90	41- 60	2.4	All	2S	42Dcon
91 - 120	61-75	2.4	All	3S	43Dcon
-	76 - 90	2.4	Gravely	4S	44Dcon
			Sandy	5S	45Dcon
			Silty	6S	46Dcon
-	91 - 105	2.4	Gravely, Sandy	7S	47Dcon
			Silty	8S	48Dcon
-	106 - 120	2.4	Gravely, Sandy	8S	48Dcon
			Silty	9S	49Dcon

- **In Hard Rock for all Span Range:**

Table 5.3: Selection of RCC Single Drum Anchor in Hard Rock

Span Range, m		Tower Height [m]	Block Type	Drawing No
Walkway: 70cm	Walkway: 106cm			
up to 90	up to 60	2.0	1HRS	61Dcon
91 – 120	61 - 120	2.0	2HRS	62Dcon

When slope is too steep and there is not enough space for single drum anchorage system (Table 5.3), select the double drum system from following table 5.4.

Table 5.4: Selection of RCC Double Drum Anchor in Hard Rock

Span Range, m		Tower Height [m]	Block Type	Drawing No
Walkway: 70cm	Walkway: 106cm			
up to 90	up to 60	2.0	1HRD	63Dcon
91 – 120	61 - 120	2.0	2HRD	64Dcon

- **In Fractured Hard Rock/Soft Rock for Span Range up to 90m (WW = 70 cm) and 60m (WW = *106cm):***

Table 5.5: Selection of RCC Single Drum Anchor in Fractured Hard Rock/Soft Rock

Span Range, m		Tower Height [m]	Block Type	Drawing No
Walkway: 70cm	Walkway: 106cm			
up to 90	up to 60	2.0	1FRS	65Dcon

When slope is too steep and there is not enough space for a single drum anchorage system (Table 5.5), select the double drum system from following table 5.6.

Table 5.6: Selection of RCC Double Drum Anchor in Fractured Hard Rock/Soft Rock

Span Range, m		Tower Height [m]	Block Type	Drawing No
Walkway: 70cm	Walkway: 106cm			
up to 90	up to 60	2.0	1FRD	66Dcon

- **In Fractured Hard Rock/Soft Rock for Span Rang of 91- 120m (WW = 70 cm) and 61-120m (WW = 106cm):**

Table 5.7: Selection of RCC Deadman Anchor in Fractured Hard Rock/Soft Rock

Span Range, m		Tower Height [m]	Block Type	Drawing No
Walkway: 70cm	Walkway: 106cm			
91-120	61-120	2.0	2FRD	67Dcon

Selected Anchorage Foundation Type and corresponding Drawings from the Tables above:

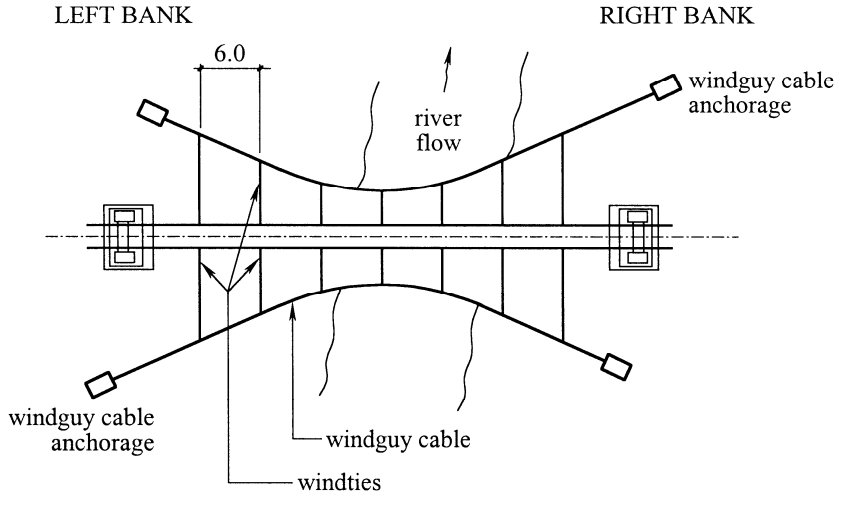
Right Bank:	Anchor Type	Drawing No.....
Left Bank:	Anchor Type	Drawing No.....

4.11.6 Windguy Arrangement

Generally Windguy Arrangements are not required for bridges with span of up to 120m. Therefore, no lateral stabilizing measures (windguy system) is considered in this standard suspended bridge design. However, for special cases (spans more than 120m or extreme windy areas exceeding wind speed of 160km/h) there is a provision for fixing a windguy system (see also chapter 4.1.1: Loadings). For such cases the general layout for Windguy Arrangements is shown on the following pages. For detailed geometric calculations refer to the Chapter 4.6.2.

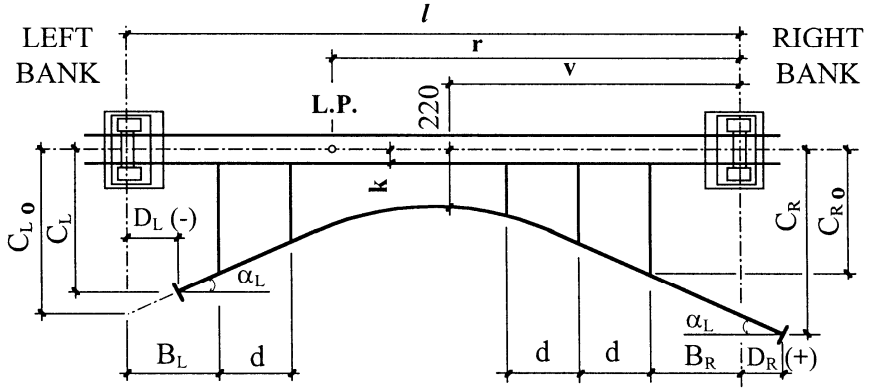
The Steel Drawing for the windtie cable clamps is shown on Drawing No. 11A and respective Construction Drawings for different types of windguy cable anchorages are given in Drawing Nos 51Acon, 52Acon, 53Acon, 54Acon, 57Acon and 58Acon in Volume III, Reference 1: SSTB Suspended Type Manual.

The Layout of the Windguy Arrangement

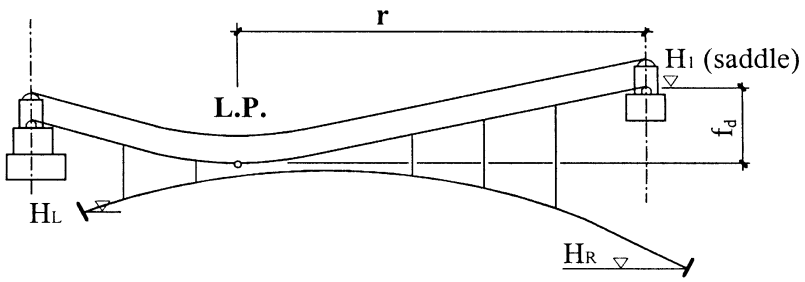


The Geometry of the Windguy Arrangement

Plan



Profile



The design of the Windguy Arrangement is to:

select the windguy cable and windties cable

select the windguy cable anchor blocks

calculate geometry of the windguy arrangement

- **Selection of Windguy Cable and Windties Cable:**

  Select the windguy & windtie cables from the following table according to the span of the bridge.

  Selection of Windguy Cable and Windtie Cable

Span, m	Windguy Cable, mm	Windtie Cable, mm
Up to 150	26mm	13
150 - 200	32mm	13

- **Selection of Windguy Cable Anchor Type:**

  There are **each two types of gravity Soil Anchor Blocks**, **gravity Rock Anchor Blocks** and **Drum Anchors** depending on the soil or rock type and the diameter of the Windguy Cable. For details refer to respective construction drawings in Volume III of Reference 1: SSTB Suspended Type Manual.

☞ Select the Windguy Cable Anchorage Type from following Tables:

Selection of Windguy Cable Gravity Anchor Block on Soil

Windguy Cable ∅ [mm]	Block type	Drawing No
26	Soil Block	51Acon
32	Soil Block	53Acon

Selection of Windguy Cable Gravity Block on Rock *

Windguy Cable ∅ [mm]	Block type	Drawing No
26	Rock Block	52Acon
32	Rock Block	54Acon

Selection of Windguy Cable Drum Anchor on Hard Rock*

Windguy Cable ∅ [mm]	Block type	Drawing No
26 or 32	Hard Rock Drum	57Acon

Selection of Windguy Cable Drum Anchor on Fractured Hard Rock or Soft Rock*

Windguy Cable ∅ [mm]	Block type	Drawing No
26 or 32	Soft Rock Drum	58Acon

* If both banks are rock, select the Drum Anchor for one bank and the Gravity Rock Anchor for the other bank.
If one bank is rock and the other bank is soil, select always the Drum Anchor for the rock bank.

4.11.7 List of Drawings

Select the required Steel Drawings and Construction Drawings according to the walkway width, selected cables and selected Anchorag
e Block types. For this, refer to Chapter bellow: Bridge Standard Drawings.

Prepare a General Arrangement drawing for individual bridge design. For this, refer to Chapter 4.11.9: General Arrangement and Design Example.

4.11.8 Bridge Standard Drawings

4.11.8.1 Introduction and Overview of Drawings

The Bridge Standard Drawings represent the centerpiece of the Short Span Trail Bridge Standard. They are composed as a unit component system and are categorized in two categories:

- **Construction Drawings**
- **Steel Drawings**

*** see Volume III, Steel & Construction Drawings, SSTB Suspended Type Manual.**

Both drawing categories are linked with each other and depending on the bridge design the required drawings are selected.

Construction Drawings

Drawing Titles			Drawing Nos.
FITTING DETAILS		Walkway Fitting for 70 cm Walkway Width	19Dcon70
		Walkway Fitting for 106 cm Walkway Width	19Dcon106
TOWER DETAILS		CSM Tower & RCC Core for 70 cm Walkway Width	20Dcon70
		CSM Tower & RCC Core for 106 cm Walkway Width	20Dcon106
SOIL ANCHORS	**FLAT GROUND**	RCC Deadman & Gravity Soil Anchor Block in Flat Ground for 2 Walkway Cables	21Dcon - 26Dcon (6 Drawings)
		RCC Deadman & Gravity Soil Anchor Block in Flat Ground for 4 Walkway Cables	27Dcon - 35Dcon (9 Drawings)
	HILL SLOPE	RCC Deadman & Gravity Soil Anchor Block in Hill Slope for 2 Walkway Cables	41Dcon & 42Dcon
		RCC Deadman & Gravity Soil Anchor Block in Hill Slope for 4 Walkway Cables	43Dcon - 49Dcon (7 Drawings)
ROCK ANCHORS	**HARD ROCK**	RCC Single Drum Anchor in Hard Rock for 2 Walkway Cables	61Dcon
		RCC Single Drum Anchor in Hard Rock for 4 Walkway Cables	62Dcon
		RCC Double Drum Anchor in Hard Rock for 2 Walkway Cables	63Dcon
		RCC Double & Single Drum Anchor in Hard Rock for 4 Walkway Cables	64Dcon
	FRACTURED ROCK	RCC Single Drum Anchor in fractured Rock for 2 Walkway Cables	65Dcon
		RCC Double Drum Anchor in fractured Rock for 2 Walkway Cables	66Dcon
		RCC Deadman Anchor in fractured Rock for 4 Walkway Cables	67Dcon
Anchor Drawings for Windguy Cables *optional*		Gravity Soil Block for Cable ø 26mm	51Acon
		Gravity Rock Block for Cable ø 26mm	52Acon
		Gravity Soil Block for Cable ø 32mm	53Acon
		Gravity Rock Block for Cable ø 32mm	54Acon
		RCC single Drum Anchor in Hard Rock, Cable ø 26 or 32mm	57Acon
		RCC single Drum Anchor in Fractured Rock, Cable ø 26 or 32mm	58Acon

Steel Drawings

Drawing Titles			Drawing Nos.
WALKWAY CROSS BEAMS		Crossbeam for 2 Walkway Cables for walkway width = 34 cm*	01D*
		Crossbeam for 2 Walkway Cables for walkway width = 70 cm	02D
		Crossbeam for 4 Walkway Cables for walkway width = 70 cm	02D4
		Crossbeam for 2 Walkway Cables for walkway width = 106 cm	03D
		Crossbeam for 4 Walkway Cables for walkway width = 106 cm	03D4
STEEL DECK		Steeldeck Standard Panel, length = 198 cm / width = 34 cm	08A
		Steeldeck Standard Half Panel, length = 98 cm / width = 34 cm	09A
		Steeldeck Special Panel,length = 223 cm / width = 34 cm	10A
SADDLES & REINFORCEMENT	**SOIL**	Saddles & Reinforcement for RCC Deadman & Gravity Soil Anchor for 2 Walkway Cables	20D2
		Saddles & Reinforcement for RCC Deadman & Gravity Soil Anchor for 4 Walkway Cables	20D4
	ROCK	Saddles & Reinforcement for RCC Deadman Anchor in fractured Rock for 4 Walkway Cables	20D4S
		Saddles & Reinforcement for Drum Rock Anchor for 2 Walkway Cables	60D2
		Saddles & Reinforcement for Drum Rock Anchor for 2 Walkway Cables	60D4
optional		Windties Cable Clamps for Windguys Cable ø 26 or 32 mm	11A
		Windguys Cable Anchorage for one Cable End ø 26 or 32 mm	50A

***Also a narrow walkway of 34cm width (1pannel wide only) has been developed, but is not used very often and is, therefore not considered in this Handbook; but can be used, if dimensions of anchor blocks are designed accordingly.**

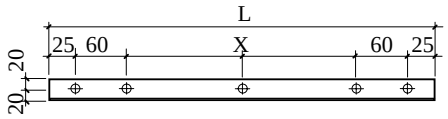
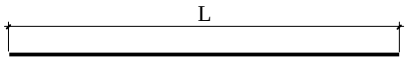
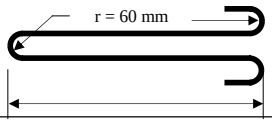
Legend for the Drawing Numbers and Suffixes:

Drawing No.	Suffix	Bridge or Drawing Type
STEEL DRAWINGS	11 **A**	For **A**ll bridge types
	02 **D**	For suspende**d** bridge types
	02 D**4**	For **4** walkway cables
	02 D4**W**	Suitable for **W**indguy cables
	20 D4**S**	**S**pecial
CONSTRUCTION DRAWINGS	42 D**con**	**con**struction drawings
	20 Dcon **70**	For **70** cm walkway width
	Anchor Drawings (Block Types)	
	3F	Block Type **3** in **F**lat Ground
	5S	Block Type **5** in Hill **S**lope
	1HRS	Block Type **1** in **H**ard **R**ock for **S**ingle Drum
	1HRD	Block Type **1** in **H**ard **R**ock for **D**ouble Drum
	1FRS	Block Type **1** in **F**ractured **R**ock for **S**ingle Drum
	1FRD	Block Type **1** in **F**ractured **R**ock for **D**eadman

4.11.8.2 Concept of the Standard Drawings

Steel Drawings

Each Drawing is providing the necessary information and specifications for manufacturing the desired steel parts. Depending on the width of the walkway, the size of walkway cable and the span the empty spaces in the materials list have to be filled in and the total weight has to be calculated as per example below.

Part No.	Section [mm]	Quantity [nos]	Tower Height 2.40 m	Weight	
				kg/pc	total Kg
3	Angle (spacer) 40/40/5 l = …..	1	 Width of walkway L X Weight / pc 70 cm 910 740 2.73 kg 106 cm 1270 1100 3.81 kg 5 holes ϕ 14	……	…..u
8	Ri-Bar ϕ 16 l = …..	2	 Width of walkway L Weight / pc 70 cm 2100 3.32 kg 106 cm 2500 3.95 kg	……	..R
9	Bulldog Grip ϕ ….	2	for fixing first suspender at handrail cable ϕ 26 or 32 MS forged. according to ISI standard, galvanized.	……	..D
10	Plain Rod ϕ 20	2*	 * Erection Hooks needed at one bank only	……	..R

fill in weight and length per piece (kg/pc) according to width of walkway and multiply by the quantity for computing total Kg.

fill in the ϕ and corresponding weight of the handrail cable

fill in the weight of erection hooks if needed.