CURRICULUM GUIDE

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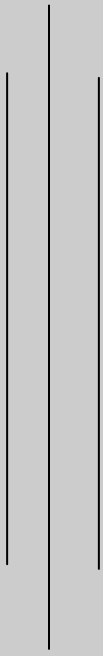
Trail Bridge Technician

(Short Course)



Council for Technical Education and Vocational Training
CURRICULUM DEVELOPMENT DIVISION
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Introduction

The competency based and market oriented curriculum guide for **Trail Bridge Practioners** is designed to equip the trail bridge practiceners as a in service training with sound knowledge, skills and attitudes. In this curriculum, the trainees will practice skills of Trail Bridge in the trail bridge industries. Once the trainees acquired the competencies they will have ample opportunity for employment and self-employment through which they will contribute in the national streamline of poverty reduction in the country. The skills and knowledge included in this curriculum improve their knowledge and skills and make them competent trail bridge technician needed for the occupation.

Aims

The main aim of this program is to equip the trail bridge practioners who could provide trail bridge construction services in rural and remote location of the country.

Objectives

After completion of training the trainees will be able to:

1. Familiarise with Trail Bridge
2. Conduct Social/Technical Survey
3. Carry-out Bridge Standard Design
4. Supervise/Support Trail Bridge Construction
5. Construct Model Trail Bridge
6. Perform Social-Organisation-Support (SOS) at Community Level
7. Perform Self-Orientation on Social Organisation Support (SOS) at District Level
8. Maintain Trail Bridge

Course Description

This course is designed to equip Trail Bridge Practioners with the sound knowledge and skills on trail bridge construction related to the occupation.

This course deals with concept of Trail Bridge, conducting social and technical survey, carrying out trail bridge design, supervise/supporting trail bridge construction, constructing Model Bridge, performing social organizational support at the community and district level and maintaining Trail Bridge. This course also includes hands on practical exposure for constructing Trail Bridge.

Duration

The total duration of the course extends over 175 hours.

Target Group

The target group for this training program will be all interested individuals working at trail bridge building sector in central, local governmental and Non governmental organizations including private sector organizations.

Target location

The target group for this training program will be all over Nepal.

Group Size

The group size of this training program will be maximum 30, provided all necessary resources to practice the tasks/ competencies as specified in this curriculum guide.

Medium of Instruction

The medium of instruction for this program will be Nepali or English or both

Pattern of Attendance

The trainees should attend 80% class in theory and 90% class in practical/ performance.

Focus of Curriculum

This is a competency-based curriculum. This curriculum emphasizes on competency performance. 80% time is allocated for performance and remaining 20% time is for related technical knowledge. So, the main focus will be on performance of the specified competencies in the curriculum.

Eligibility and Entry Criteria

Individuals who meet the following criteria will be allowed to enter this curricular program:

- Engineer, Overseer and Sub Overseers and others working in trail bridge sector.

Instructional Media and Materials

The following instructional media and materials are suggested for the effective instruction and demonstration.

- ***Printed Media Materials*** (Assignment sheets, Case studies, Handouts, Information sheets, Individual training packets, Procedure sheets, Performance Check lists, Textbooks etc.).
- ***Non-projected Media Materials*** (Display, Models, Flip chart, Poster, Writing board etc.).
- ***Projected Media Materials*** (Opaque projections, Overhead transparencies, Slides etc.).
- ***Audio-Visual Materials*** (Audiotapes, Films, Slide-tape programs, Videodiscs, Videotapes etc.).
- ***Computer-Based Instructional Materials*** (Computer-based training, Interactive video etc.).

Teaching Learning Methodologies

The methods of teaching for this program will be a combination of several approaches. Such as Illustrated Lecture, Group Discussion, Demonstration, Simulation, Guided practice, Practical experiences, Fieldwork and Other Independent learning.

- Theory: Lecture, Discussion, Assignment, Group work.
  Practical: Demonstration, Observation, Guided practice, Self-practice and hands on practice.

Follow up Provision

First follow up: Six months after the completion of the program

Grading System

The trainees will be graded as follows based on the marks in percentage secured by them in tests/ evaluations.

- Distinction: Passed with 80% or above
- First Division: passed with 75% or above

- Second Division: passed with 65% or above
- Third Division: passed with 60% or above

Students Evaluation Details

- Continuous evaluation of the trainees' performance is to be done by the related instructor/ trainer to ensure the proficiency over each competency under each area of sub-module.
- Related technical knowledge learnt by trainees will be evaluated through written or oral tests as per the nature in the institutional phase of training.
- Trainees must secure minimum marks of 60% in an average of both theory and practical evaluations.
- The aptitude test will be administered by the concerned training institute.

Trainers' Qualification (Minimum)

- Masters /Bachelors, in civil engineering or equivalent in related field
- Good communicative and instructional skills
- Experience in related field
- Sound communication skill both in Nepali and in English.

Trainer-Trainees Ratio

- 1:12 for practical classes
- For theory, as per the class room situation

Suggestions for Instruction

1. **Select objectives**
   - Write objectives of cognitive domain.
   - Write objectives of psychomotor domain.
   - Write objectives of affective domain
2. **Select Subject matter**
   - Study subject matter in detail.
   - Select content related to cognitive domain.
   - Select content related to psychomotor domain.
   - Select content related to affective domain.
3. **Select Instructional Methods**
   - Teacher centered methods: like lecture, demonstration, question answers inquiry, induction and deduction methods.
   - Student initiated methods like experimental, field trip/excursion, discovery, exploration, problem solving, and survey methods.
   - Interaction methods like discussion, group/team teaching, microteaching and exhibition.
   - Dramatic methods like role play and dramatization
4. Select Instructional method (s) on the basis of objectives of lesson plans and KAS domains.
5. Select appropriate educational materials and apply at right time and place.
6. Evaluate the trainees applying various tools to correspond the KAS domains.
7. Make plans for classroom / field work / workshop organization and management.
8. Coordinate among objectives, subject matter and instructional methods.
9. Prepare lesson plan for theory and practical classes.

10. Deliver /conduct instruction / program.
11. Evaluate instruction/ program.

Special suggestion for the performance evaluation of the trainees

1. Perform task analysis.
2. Develop a detail task performance checklist.
3. Perform continuous evaluation of the trainees by applying the performance checklist.

Suggestion for skill training

1. Demonstrate task performance in normal speed.
2. Demonstrate slowly with verbal description of each and every step in the sequence of activity of the task performance using question and answer techniques.
3. Repeat 2 for the clarification on trainees demand if necessary.
4. Perform fast demonstration of the task.

Provide trainees the opportunities to practice the task performance demonstration

1. Provide opportunity to trainees to have guided practice.
2. Create environment for practicing the demonstrated task performance.
3. Guide the trainees in each and every step of task performance.
4. Provide trainees to repeat and re-repeat as per the need to be proficient on the given task performance.
5. Switch to another task demonstration if and only trainees developed proficiency in the task performance.

Other suggestions

1. Apply principles of skill training.
2. Allocate 20% time for theory classes and 80% time for task performance while delivering instructions.
3. Apply principles of adult learning.
4. Apply principles of intrinsic motivation.
5. Facilitate maximum trainees' involvement in learning and task performance activities.
6. Instruct the trainees on the basis of their existing level of knowledge, skills and attitude.

Certificate Requirements

The related training institute will provide the certificate of "**Trail Bridge Technician**" after the successfully completion of the course as prescribed by the curriculum.

Physical facilities

- Well equipped workshop with adequate space 1 (No.)
- Well furnished class room with adequate space 1 (No.)
- Office room equipped with modern facilities 1 (No.)
- Principle room equipped with modern facilities 1 (No.)
- Reception room equipped with modern facilities 1 (No.)

Tools and Equipment

1. Marking gauge
2. Measuring tape
3. Folding tape
4. Mallet
5. Claw hammer
6. Cross cut saw
7. T- bevel
8. Scratch awl
9. Hand drill
10. Basila
11. Chisel (Different size)
12. L square
13. Line level
14. Carpenter's level
15. Bar clamp
16. Pincer
17. Pliers
18. Chisel
19. Hammer
20. Drawing Board
21. Bench Vice
22. Working table

Summary of Duties and Tasks

S.No.	Duties/Tasks	Time (hours)		
		Theory	Practical	Total
1	**Familiarise with Trail Bridge**	**9**	**0**	**9**
1.1	Explain Trail bridges	3	0	3
1.2	Recognise crossings/bridge types	1.5	0	1.5
1.3	Explain Trail bridge terminology	3	0	3
1.4	Categorise Trail bridge implementation approaches	1.5	0	1.5
2	**Conduct Social/Technical Survey**	**7.5**	**22.5**	**30**
2.1	Prepare for site survey	1.5	3	4.5
2.2	Conduct reconnaissance survey	1.5	4.5	6
2.3	Conduct social assessment	1.5	4.5	6
2.4	Conduct technical survey	1.5	7.5	9
2.5	Prepare survey report	1.5	3	4.5
3	**Carry-out Bridge Standard Design**	**6**	**21**	**27**
3.1	Position bridge foundation on profile	1.5	5	6.5
3.2	Select cable combination	1.5	3	4.5
3.3	Select bridge foundation structure	1	3	4
3.4	Design adjacent structure	0.5	3	3.5
3.5	Compile/ complete bridge standard drawings	0.5	3	3.5
3.6	Prepare general arrangement drawing	0.5	2	2.5
3.7	Prepare cost estimate	0.5	2	2.5
4	**Supervise/Support Trail Bridge Construction**	**6**	**35**	**41**
4.1	Lay-out trail bridge	1	11	12
4.2	Supervise collection of local materials	1	3	4
4.3	Supervise stone dressing works	0.5	3	3.5
4.4	Supervise civil construction works	1	3	4
4.5	Supervise non-local material transportation/storage	0.5	3	3.5
4.6	Hoist cable mechanically	0.5	3	3.5
4.7	Illustrate/Supervise walk-way parts fittings	0.5	4.5	5
4.8	Conduct final assessment	1	4.5	5.5
Sub-total		**28.5**	**78.5**	**107**

S.No.	Duties/Tasks	Time (hours)		
		Theory	**Practical**	**Total**
5	**Construct Model Trail Bridge**	**6**	**24**	**30**
5.1	Lay-out model trail bridge	1	4.5	5.5
5.2	Collect construction materials	1	1.5	2.5
5.3	Dress stones for masonry	1	3	4
5.4	Construct foundation structures	1	4.5	5.5
5.5	Hoist Cable Manually	0.5	4.5	5
5.6	Complete Gravity Structure	1	3	4
5.7	Erect walkways	0.5	3	3.5
6	**Perform Social-Organisation-Support (SOS) at Community Level**	**6**	**10**	**16**
6.1	Facilitate Users Committee (UC)formation	1	1.5	2.5
6.2	Educate Users Committee	1	1.5	2.5
6.3	Conduct social assessment (Follow 2.3)	0	0	0
6.4	Facilitate mobilising local resources	0.5	1	1.5
6.5	Establish community agreement	0.5	1.5	2
6.6	Assist in conducting public audit	1	1.5	2.5
6.7	Facilitate formation of Bridge Maintenance Committee (BMC)	1	1.5	2.5
6.8	Orient BMC/Bridge Warden (BW) on maintenance	1	1.5	2.5
7	**Perform Self-Orientation on Social Organisation Support (SOS) at District Level**	**3**	**6**	**9**
7.1	Obtain information on partnership of collaboration	1	1.5	2.5
7.2	Obtain information on yearly planning	0.5	1.5	2
7.3	Report bridge progress	1	1.5	2.5
7.4	Assist in maintaining district bridge records	0.5	1.5	2
8	**Maintain Trail Bridge**	**6**	**7**	**13**
8.1	Explain maintenance concept	1.5	0	1.5
8.2	Classify maintenance types	1.5	0	1.5
8.3	Demonstrate/ Monitor /Assist routine maintenance	1	3	4
8.4	Conduct bridge condition investigation	1	2	3
8.5	Assist in conducting major maintenance	1	2	3
Sub-total		**21**	**47**	**68**
Total		**49.5**	**125.5**	**175**
Ratio of Theory/Practical with total hour in percentage		**28.28%**	**71.71%**	**100%**

Tasks Analysis

TASK ANALYSIS

Module : Construction of Trail Bridges Practical: 0hr

Duty 1 : Familiarize with Trail Bridges Theory: 3hrs

Task 01 : Explain Trail Bridges Time : 3 hrs

STEPS	TERMINAL PERFORMANCE OBJECTIVE (TPO)	RELATED TECHNICAL KNOWLEDGE (RTK)
1. Illustrate Trail Network of Nepal 2. Define Trail Bridges 3. Elaborate Historical Background on Trail Bridges Development 4. Mention Present Scenario on Trail Bridges and Future Demands	CONDITION (GIVEN): - Classroom, Trail maps, handouts TASK (WHAT?): - Explain Trail Bridges STANDARD (HOW WELL): - Trail Bridges explained	• Trail Network • Types of Rivers • Definition of Trail Bridges • Historical Background on Trail Bridges Development • Present Scenario on Trail Bridges and Future Demand

Required Tools:

Safety Measures:

Developed by:

TASK ANALYSIS

Module : Construction of Trail Bridges Practical: 0 hr

Duty 1 : Familiarize with Trail Bridges Theory: 1.5 hrs

Task 02 : Recognize Crossing/ Bridges Types Time : 1.5 hrs

STEPS	TERMINAL PERFORMANCE OBJECTIVE (TPO)	RELATED TECHNICAL KNOWLEDGE (RTK)
1. Describe Trail Bridge Types 2. Classify Trail Bridge 3. Describe Demarcation Policy	CONDITION (GIVEN): - Classroom, Trail maps, handouts, manual TASK (WHAT?): - Recognize Crossing/Bridge Types STANDARD (HOW WELL): - Crossing/bridge types recognized	• Bridges Types and its application • Classification of Trail Bridge Standard • Demarcation Policy *(Only Short Span Trail Bridge, SSTB will be dealt for sub overseer course)*

Required Tools:

Safety Measures:

Developed by:

TASK ANALYSIS

Module : Construction of Trail Bridges Practical: 0 hr

Duty 1 : Familiarize with Trail Bridges Theory: 3hrs

Task 03 : Explain Trail Bridge Terminologies Time : 3 hrs

STEPS	TERMINAL PERFORMANCE OBJECTIVE (TPO)	RELATED TECHNICAL KNOWLEDGE (RTK)
1. Introduce Major components/Structure of Trail Bridges 2. Recognize steel parts used in trail bridges 3. Receive information about cable and its configuration	CONDITION (GIVEN): - Classroom, handouts, books, manuals, wire rope samples TASK (WHAT?): - Explain Trail Bridge Terminology STANDARD (HOW WELL): - Trail Bridge Terminology Explained	• Major Components and structures of Trail Bridges • Function of Major Component and structures of Trail Bridges • Steel Parts Used in Trail Bridges • Cable and its configuration

Required Tools:

Safety Measures:

Developed by:

TASK ANALYSIS

Module : Construction of Trail Bridges Practical: 0 hrs

Duty 1 : Familiarize with Trail Bridges Theory: 1.5 hr

Task 04 : Categorize Trail Bridge Implementation Approaches Time : 1.5 hrs

STEPS	TERMINAL PERFORMANCE OBJECTIVE (TPO)	RELATED TECHNICAL KNOWLEDGE (RTK)
1. Describe Bridge Implementation Approaches 2. Explain Community/Self-help Approach 3. Explain Contracting Approach	CONDITION (GIVEN): - Classroom, handouts, books TASK (WHAT?): - Categorize Trail Bridge Implementation Approaches STANDARD (HOW WELL): - Trail Bridges Implementation Approaches Categorized	• Community/Self-help Approach Procedures • Contracting Approach Procedure

Required Tools:

Safety Measures:

Developed by:

TASK ANALYSIS

Module : Construction of Trail Bridges Practical: 3hrs

Duty 2 : Conduct Social/Technical Survey Theory: 1.5 hrs

Task 01 : Prepare for Site Survey Time : 4.5 hrs

STEPS	TERMINAL PERFORMANCE OBJECTIVE (TPO)	RELATED TECHNICAL KNOWLEDGE (RTK)
1. Collect Application for Bridge Request 2. Prepare check list for site survey 3. Collect / go through the survey form/ checklist 4. Collect tools, equipment for survey 5. Check / calibrate equipment 6. Complete office procedures 7. Ensure community presence during site assessment 8. Proceed for site survey	CONDITION (GIVEN): - Report/Data of Pre-feasibility Survey, Request from community for a bridge, Trail Map TASK (WHAT?): - Prepare for site survey STANDARD (HOW WELL): - Preparation work for site survey completed	• Pre-feasibility study and bridge request form • Field Trip Designing Procedure • Checking and calibration of survey equipment • Checklist preparation

Required Tools: Abney Level, Survey Form & Check List, Camera, Film Roll

Safety Measures:

Developed by:

TASK ANALYSIS

Module : Construction of Trail Bridges Practical: 4.5hrs

Duty 2 : Conduct Social/Technical Survey Theory: 1.5 hrs

Task 02 : Conduct Reconnaissance Survey Time: 6 hrs

STEPS	TERMINAL PERFORMANCE OBJECTIVE (TPO)	RELATED TECHNICAL KNOWLEDGE (RTK)
1. Identify existing Traditional Crossing Point 2. Detour within permissible range upstream and down stream (Only if unavoidable) 3. Observe High Flood Level 4. Estimate Tentative span at proposed bridge site 5. Determine bridge location	CONDITION (GIVEN): - Proposed site and the community TASK (WHAT?): - Conduct Reconnaissance Survey STANDARD (HOW WELL): - Reconnaissance Survey Conducted as per SSTB standard	• Existing Traditional Crossing Point and proposed site • Detour Range • River bank condition • Span and Freeboard situation at the proposed site • Quick observation about the proposed site condition

Required Tools:

Safety Measures:

Developed by:

TASK ANALYSIS

Module : Construction of Trail Bridges Practical: 4.5hrs

Duty 2 : Conduct Social/Technical Survey Theory: 1.5hrs

Task 03 : Conduct Social Assessment Time : 6hrs

STEPS	TERMINAL PERFORMANCE OBJECTIVE (TPO)	RELATED TECHNICAL KNOWLEDGE (RTK)
1. Introduce participants 2. Explain self-help community approach 3. Explain Roles and responsibility of different stakeholders 4. Assess the commitment of the Users, DDC, VDC and others 5. Identify Site location disputes, if any 6. Fix bridge site location 7. Prepare action plan 8. Proceed for Technical survey if users are committed to work on self-help community approach	CONDITION (GIVEN): - Community at proposed bridge site TASK (WHAT?): - Conduct Social Assessment STANDARD (HOW WELL): - Social Assessment conducted as per guidelines	• Community Meeting (Facilitation) • Reassess/Reconfirm bridge need (PRA) • Self-help community approach of the project • Broad Based Participation • Local capacity and their commitment (Focus Group Discussion) • Action Plan • Photography

Required Tools: Flip Chart, Posters, Brochure,

Safety Measures:

Developed by:

TASK ANALYSIS

Module : Construction of Trail Bridges Practical: 7.5 hrs

Duty 2 : Conduct Social/Technical Survey Theory: 1.5 hr

Task 04 : Conduct Technical Survey Time: 9hrs

STEPS	TERMINAL PERFORMANCE OBJECTIVE (TPO)	RELATED TECHNICAL KNOWLEDGE (RTK)
1. Collect general information about the bridge site 2. Observe River condition of the bridge site 3. Record slope and bank condition of the river 4. Identify soil and rock prevailing in the bridge site 5. Evaluate the bridge site 6. Set bridge centerline 7. Carryout abney level survey 8. Keep records/ Fill survey form/ checklists 9. Take photographs	CONDITION (GIVEN): - Survey Form and Checklist, necessary tools/ equipment and materials TASK (WHAT?): - Conduct Technical Survey STANDARD (HOW WELL): - Technical Survey conducted as per SSTB guidelines	• General Data Collection • Bridge site selection criteria/ guidelines (Avoid Adjacent structures as far as possible) • Trail Bridge Survey Form and Checklist • Topographic Survey • Photography

Required Tools: Group meeting, Community Meeting, Facilitation,

Safety Measures:

Developed by:

TASK ANALYSIS

Module : Construction of Trail Bridges Practical: 3hrs

Duty 2 : Conduct Social/Technical Survey Theory: 1.5hrs

Task 05 : Prepare Survey Report Time : 4.5hrs

STEPS	TERMINAL PERFORMANCE OBJECTIVE (TPO)	RELATED TECHNICAL KNOWLEDGE (RTK)
1. Receive Survey Data 2. Check horizontal distance/ elevation calculation 3. Complete Survey form and check list 4. Draw Bridge Profile along bridge axis 5. Fix Photographs with captions 6. Finalize Survey Report	CONDITION (GIVEN): - Survey Data, Calculator, Graph paper, Drawing Set TASK (WHAT?): - Prepare survey report STANDARD (HOW WELL): - Survey report prepared as per the SSTB Standard	• Data Plotting Procedures

Required Tools: Drawing Table, Set Square, Calculator

Safety Measures:

Developed by:

TASK ANALYSIS

Module : Construction of Trail Bridges Practical: 5 hrs

Duty 3 : Carryout Bridge Standard Designs Theory: 1.5hr

Task 01 : Position Bridge Foundation on Profile Time : 6.5 hrs

STEPS	TERMINAL PERFORMANCE OBJECTIVE (TPO)	RELATED TECHNICAL KNOWLEDGE (RTK)
1. Receive Survey Report 2. Fix Front of Tower 3. Check with slope line 4. Fix position of walkway saddle 5. Fix bridge span 6. Check the level difference between walkway saddle 7. Check the vertical distance f_{min} and freeboard 8. Finalize the bridge profile	CONDITION (GIVEN): - Bridge Survey Report TASK (WHAT?): - Position Bridge Foundation on Profile STANDARD (HOW WELL): - Bridge Foundation Positioned on profile as per SSTB Standard	• Bridge Foundation Position • Soil and rock type • Level difference between walkway cable saddles of two banks and its limits • Tower height limits • Free board

Required Tools: Calculator, Set Squares

Safety Measures:

Developed by:

TASK ANALYSIS

Module : Construction of Trail Bridges Practical: 3 hrs

Duty 3 : Carryout Bridge Standard Designs Theory: 1.5 hr

Task 02 : Select Cable Combination Time : 4.5 hrs

STEPS	TERMINAL PERFORMANCE OBJECTIVE (TPO)	RELATED TECHNICAL KNOWLEDGE (RTK)
1. Select appropriate walkway width 2. Fix span of the bridge 3. Identify difference in elevation between cable saddles of the right bank and left bank 4. Select a cable combination according to the span and walkway width of the bridge 5. Calculate cable cutting length	CONDITION (GIVEN): - Span and Walkway Width of the bridge is given TASK (WHAT?): - Select Cable Combination STANDARD (HOW WELL): - Cable combination selected as per SSTB Standard	• Survey Data & Calculation of Freeboard • Loads on Trail Bridge • Selection of Cable size and number • Calculation of Cable Length

Required Tools:

Safety Measures:

Developed by:

TASK ANALYSIS

Module : Construction of Trail Bridges Practical: 3 hrs

Duty 3 : Carryout Bridge Standard Designs Theory: 1 hr

Task 03 : Select Bridge Foundation Structures Time : 4 hrs

STEPS	TERMINAL PERFORMANCE OBJECTIVE (TPO)	RELATED TECHNICAL KNOWLEDGE (RTK)
1. Select Walkway Width (Refer Duty 3 Task 02 Step 1) 2. Select span of the bridge (Refer Duty 03 Task 01, Step 5) 3. Determine topography of the ground where the anchorage block is to be placed 4. Determine soil/ rock type from survey report 5. Determine tower height form the bridge profile 6. Select anchor type and corresponding drawing of Foundation	CONDITION (GIVEN): - Bridge Span, Walkway Width, Topography of ground, cable combination data, soil & rock type TASK (WHAT?): - Select Bridge Foundation Structure STANDARD (HOW WELL): - Bridge Foundation Structure selected based upon SSTB Standard	• Typical Designs of Anchor Block & its selection

Required Tools:

Safety Measures:

Developed by:

TASK ANALYSIS

Module : Construction of Trail Bridges — Practical: 3 hrs

Duty 3 : Carryout Bridge Standard Designs — Theory: 0.5hrs

Task 04 : Design Adjacent Structures — Time : 3.5 hrs

STEPS	TERMINAL PERFORMANCE OBJECTIVE (TPO)	RELATED TECHNICAL KNOWLEDGE (RTK)
1. Provide necessary Data/ Information 2. Assist Design Engineer in designing Retaining Structures, Slope Protection, River Bank Protection, drainage works	CONDITION (GIVEN): - Cable combination, bridge foundation structure is completed TASK (WHAT?): - Design Adjacent Structure STANDARD (HOW WELL): - Design of Adjacent Structure for the stability and safety of the bridge assisted, as per requirement and SSTB Standard	• Retaining Structure • Slope Protection works • River Bank Protection • Drainage works

Required Tools:

Safety Measures:

Developed by:

TASK ANALYSIS

Module : Construction of Trail Bridges — Practical: 3hrs

Duty 3 : Carryout Bridge Standard Designs — Theory: 0.5 hrs

Task 05 : Compile/Complete Bridge Construction Standard Drawing — Time : 3.5 hrs

STEPS	TERMINAL PERFORMANCE OBJECTIVE (TPO)	RELATED TECHNICAL KNOWLEDGE (RTK)
1. Select Steel Drawings - Walkway Crossbeam - Saddles and Reinforcement for RCC Deadman and Gravity Soil Anchor - Saddles and Reinforcement for RCC Deadman Anchor in Soft or Fractured Hard Rock - Saddle and Reinforcement for Drum Rock Anchor - Steel Deck 2. Select Construction Drawings - Walkway Fitting - Details of Cement Stone Masonary Tower & RCC Core - RCC Deadman and Gravity Soil Anchor	CONDITION (GIVEN): - Required Standard Drawings, Calculator TASK (WHAT?): - Compile/Complete Bridge Construction Standard Drawing STANDARD (HOW WELL): - Steel/ Construction Drawing for the bridge compiled/Completed as per SSTB Standard	• Standard Steel Drawing • Standard Construction Drawing • Relation Between Construction and Steel Drawing

Block for Flat Ground - RCC Deadman and Gravity Soil Anchor Block for Hill Slopes - RCC Single Drum Rock Anchor in Hard Rock - RCC Double Drum Rock Anchor in Hard Rock - RCC Single Drum Rock Anchor in Soft or Fractured Rock - RCC Double Drum Rock Anchor in Soft or Fractured Rock - RCC Deadman in Soft or Fractured Hard Rock 3. Compute/Fill in necessary Data in Steel/ Construction Drawings		

Required Tools:

Safety Measures:

Developed by:

TASK ANALYSIS

Module : Construction of Trail Bridges Practical: 2 hrs

Duty 3 : Carryout Bridge Standard Designs Theory: 0.5hr

Task 06 : Prepare General Arrangement Drawing Time : 2.5 hrs

STEPS	TERMINAL PERFORMANCE OBJECTIVE (TPO)	RELATED TECHNICAL KNOWLEDGE (RTK)
1. Receive Bridge Profile 2. Mention Span 3. Mention Dead Load Sag 4. Mention HFL and WL 5. Mention distance from axis point A and B/ center of the tower 6. Mention cable elevations at saddle 7. Mention elevation of the lowest bridge point 8. Mention Elevation of Bridge Foundation 9. Mention overall dimension of the bridge structure/ its elevation	CONDITION (GIVEN): - Bridge profiles already drawn TASK (WHAT?): - Prepare General Arrangement Drawing STANDARD (HOW WELL): - General Arrangement Drawing (Plan and Profile) Prepared as per SSTB Standard	• Plan and Profile of Bridge • Span and Deadload Sag • Bridge Axis and center of Tower • Elevation of bridge elements • Bridge Structures Dimension • Curve Drawing (3 point method) • Calculation of f_{min} and "e" distance

Required Tools: Flexible Curve, Drawing Set

Safety Measures:

Developed by:

TASK ANALYSIS

Module : Construction of Trail Bridges Practical: 2 hrs

Duty 3 : Carryout Bridge Standard Designs Theory: 0.5 hr

Task 07 : Prepare Cost Estimate Time : 2.5 hrs

STEPS	TERMINAL PERFORMANCE OBJECTIVE (TPO)	RELATED TECHNICAL KNOWLEDGE (RTK)
1. Receive Design/Drawing data 2. Prepare quantity estimate 3. Collect local rate 4. Prepare rate analysis 5. Prepare abstract of cost 6. Prepare summary of cost	CONDITION (GIVEN): - Estimate forms, design/drawings of trail bridge TASK (WHAT?): - Prepare Cost Estimate STANDARD (HOW WELL): - Cost estimate prepared as per the requirements of the bridge building approach adopted	• Cost estimate for community approach of implementation • Cost approach for contracting approach of implementation • Quantity estimation • Rate Analysis • Abstract of cost

Required Tools: Calculator, Estimate forms

Safety Measures:

Developed by:

TASK ANALYSIS

Module : Construction of Trail Bridges — Practical: 11 hrs

Duty 4 : Supervise/ Support Trail Bridge Construction — Theory: 1 hr

Task 01 : Layout Trail Bridge — Time : 12hrs

STEPS	TERMINAL PERFORMANCE OBJECTIVE (TPO)	RELATED TECHNICAL KNOWLEDGE (RTK)
1. Read General Arrangement Drawing 2. Find out approximate bridge position 3. Find out existing pegs and benchmark 4. Measure the horizontal distance between axis pegs A (L) and B (R) 5. Readjust design if axis pegs differ in elevation and distance 6. Layout the foundation sizes applying off-sets or 3-4-5 method if the horizontal distance and elevation measured matches to GA or with adjusted design 7. Fix the datum level and indicate the depth of excavation work for tower and anchorage as per drawing	CONDITION (GIVEN): - At bridge site all the Tools and Equipment and General Arrangement Drawings are given. TASK (WHAT?): - Layout Trail Bridge STANDARD (HOW WELL) Layout of trail bridge completed as per design and Drawings	• Survey Tools and Equipment handling procedures • Distance and angle measurement • Offset setting • Axis pegs • Bench Mark • General Arrangement Drawing • Safety Measures

Required Tools: Mason Thread, 5 m & 50 m. Measuring Tape, Square Bottom, Pegs, Abney Level, Ranging Rod, General Arrangement Drawing, Permanent Markers, Lime

Safety Measures:

Developed by:

TASK ANALYSIS

Module : Construction of Trail Bridges Practical: 3 hrs

Duty 4 : Supervise/ Support Trail Bridge Construction Theory: 1 hr

Task 02 : Supervise Collection of Local Materials Time: 4 hrs

STEPS	TERMINAL PERFORMANCE OBJECTIVE (TPO)	RELATED TECHNICAL KNOWLEDGE (RTK)
1. Identify Stone Quarry 2. Identify sources of sand, aggregates 3. Check Quality of Sand, Aggregate (broken/river bed materials) and stone 4. Locate Storage Area 5. Inform quantity of local materials required 6. Arrange for collection and transportation 7. Recommend for washing sand if impurities are unavoidable 8. Check quantity of collected materials	CONDITION (GIVEN): - Quarry Sources and Quality Assurance devices are given TASK (WHAT?): - Supervise Collection of Local Materials STANDARD (HOW WELL) Stone, Sand and Aggregates collected as per specified quality requirement	• Stone Quarry • Sources of Local Materials • Quality requirement of Sand, Aggregate, and Stones • Environmental Awareness • Storage of Local materials • Measurement of the works accomplished

Required Tools: 5 m. Measuring Tape, Transparent Bottle, Metal Hammer, Progress Assessment Format

Safety Measures: Use Metal Ring while crushing Aggregate

Developed by:

TASK ANALYSIS

Module : Construction of Trail Bridges Practical: 3 hrs

Duty 4 : Supervise/ Support Trail Bridge Construction Theory: 0.5 hr

Task 03 : Supervise Stone Dressing Works Time: 3.5 hrs

STEPS	TERMINAL PERFORMANCE OBJECTIVE (TPO)	RELATED TECHNICAL KNOWLEDGE (RTK)
1. Assist/ Instruct in selecting stones 2. Assist/ Instruct in deciding dressing type 3. Assist Instruct in selecting suitable tools 4. Assist/Instruct in marking the stones to the required size 5. Assist/ Instruct Dressing Corner stone/Face Stones /Bond Stone 6. Assist/ Instruct in preparing Filling Stones 7. Check shape and size of the dressed stones as necessary	CONDITION (GIVEN): - Stone Dressing Tools and Quality Assurance Devices are given TASK (WHAT?): - Supervise Stone Dressing works STANDARD (HOW WELL) Corner Stone/Face Stone/Bond Stone dressed as per requirement Filling Stones prepared as per the requirement	• Characteristics of good stones and use of chisel and hammer dressed & broken stone • Different types/ shapes of Stones (Corner/Face/Bond & Fill Stones) • Handling procedures of tools and Equipment for stone dressing works

Required Tools: Metal Hammer, 5 m measuring Tape, Square Bottom, Chisel

Safety Measures: Wear Safety Goggles

Developed by:

TASK ANALYSIS

Module : Construction of Trail Bridges — Practical: 3 hr

Duty 4 : Supervise/Support Trail Bridge Construction — Theory: 1 hr

Task 04 : Supervise Civil Construction Works — Time: 4 hrs

STEPS	TERMINAL PERFORMANCE OBJECTIVE (TPO)	RELATED TECHNICAL KNOWLEDGE (RTK)
1. Assist/ Instruct in excavation of Tower foundation 2. Assist/Instruct in dry & cement stone Masonry work simultaneously upto bottom of Limb wall level 3. Assist/ Instruct in fixing Walkway Saddles and check its position and level 4. Assist/Instruct in continuing Tower construction work 5. Assist/Instruct in concreting works (placing reinforcement bars, mixing, placing and compacting) for Limb Wall of Towers 6. Assist/Instruct in fixing Handrail Cable Saddle and check its Position and Level 7. Assist/Instruct in place and fixing reinforcement bars, stirrups and erection hook in the anchorage structure 8. Construct deadman anchorage 9. Construct drum anchorage 10. Assist/ Instruct in crossing cables and temporary anchoring to drum/ deadman 11. Cure masonry/ concreting work for required time	CONDITION (GIVEN): - • Bridge Site, necessary tools, equipment, construction materials and drawing are given. TASK (WHAT?): - Supervise/Support Civil Construction works STANDARD (HOWELL):- • Foundation structure constructed as per design, drawing and specification • Saddles placed as per drawing	• Stability of cutting slopes for different types of soil/rock • Excavation Procedure (No Blasting Materials) • Concreting works • Cement Stone Masonry works • Dry Stone Masonry Works • Function & Construction of Tower, Deadman/ Drum • Saddle and its accessories, fixation • Positioning and details of hole drilling works • Cable crossing on both banks

Required Tools: Working Drawings, Square Bottom, 5 m Measuring Tape, Clear Pipe, Metal Hammer

Safety Measures: Wear Gloves, Boots

Developed by:

TASK ANALYSIS

Module : Construction of Trail Bridges Practical: 3 hrs

Duty 4 : Supervise/Support Trail Bridge Construction Theory: 0.5 hr

Task 05 : Supervise non-local material Transportation/Storage Time : 3.5 hrs

STEPS	TERMINAL PERFORMANCE OBJECTIVE (TPO)	RELATED TECHNICAL KNOWLEDGE (RTK)
1. Assist/Instruct in Handing over non local materials at road head to Users Committee 2. Assist/Instruct in arranging means of Transportation 3. Assist/Instruct in packing to transport materials 4. Assist/Instruct in collecting/verifying items transported at site 5. Assist/Instruct in storing cement under a roof and with protection from damp 6. Assist/Instruct in storing tools and materials in suitable stores	CONDITION (GIVEN): - Materials at Road head and Inventory Format are Given TASK (WHAT?): - Supervise non-local material transportation STANDARD (HOW WELL):- All non local materials transported upto the bridge site without loosing quality and quantity	• Material Handing Over • Cable, Cement, Steel parts and Tools Transportation • Material Inventory Lists • Storage of materials at construction site • Security/Safety of stored Materials

Required Tools: Material Inventory List, Handing over form

Safety Measures: Be careful while transporting materials

Developed by:

TASK ANALYSIS

Module : Construction of Trail Bridges — Practical: 3 hrs

Duty 4 : Supervise/Support/Trail Bridge Construction — Theory: 0.5 hr

Task 06 : Hoist Cables Mechanically — Time : 3.5 hrs

STEPS	TERMINAL PERFORMANCE OBJECTIVE (TPO)	RELATED TECHNICAL KNOWLEDGE (RTK)
1. Calculate Hoisting Sag 2. Assist/Instruct in placing cable in the pulling machine 3. Assist/Instruct in placing bulldog grips 4. Assist/Instruct in pulling Cable using pulling machine (20 cm higher than calculated) 5. Leave the pulled cable for 24 hours 6. Instruct/Assist in resetting the sag next day to the calculated level 7. Check that the parallel cables have equal hoisting sag at the same time 8. Assist/Instruct erecting 13 mm dia. Fixation Cable 9. Assist/Instruct in tightening the bulldog grips 10. Complete Gravity Structure 11. Construct Adjacent Structure if necessary (retaining wall/steps, protection works, drains)	CONDITION (GIVEN): - Bridge Site upto Cable Hoisting Stage, Tools and Equipment, Sag Calculation Forms are given TASK (WHAT?): - Hoist cables mechanically STANDARD (HOW WELL): - The cables are handled without causing damages The hoisting sag and sag setting are done as per design Bulldog grips placed/ tightened as per standard	• Types and uses of Cable Pulling Machines • Hoisting Sag Calculation and sag setting • Bulldog Grips and their application • Gravity Load • Fixation Cable *Limitations:* *Some of the procedures in real and model trail bridge are not exact imitation of each other specially for cable laying and hoisting (refer to Duty 5)*

Required Tools: Abney Level, Bulldog Grips, Cable Pulling Machine Set, and Wrenches

Safety Measures: Take Precaution while hoisting Cables!

Developed by:

TASK ANALYSIS

Module : Construction of Trail Bridges Practical: 4.5hrs

Duty 4 : Supervise/Support Trail Bridge Construction Theory: 0.5 hr

Task 07 : Illustrate/Supervise Walkway Parts Fitting Time: 5 hrs

STEPS	TERMINAL PERFORMANCE OBJECTIVE (TPO)	RELATED TECHNICAL KNOWLEDGE (RTK)
1. Demonstrate Fixing of crossbeam at walkway cable from one bank 2. Demonstrate Fixing Suspender at Handrail Cable 3. Demonstrate Fixing of another crossbeam at walkway 4. Demonstrate Fixing another Suspender at Handrail Cable 5. Assist/Instruct in fixing remaining crossbeam and suspender till next tower at the other bank 6. Assist/Instruct in fixing steel deck with nuts, bolts 7. Assist/Instruct in knitting GI Wire mesh between Handrail Cable and Fixation Cable	CONDITION (GIVEN): - All civil works, dead load and cable hoisting is completed TASK (WHAT?): - Supervise/Illustrate walkway parts and fittings STANDARD (HOW WELL): - Crossbeam, Suspenders Walkway deck are fixed as per drawing GI Wire mesh knitted as per standard	• Fixing procedures of crossbeam suspender and steel deck • GI Wire mesh knitting procedure • Fixation Cable

Required Tools: Crossbeams, Nut, Bolt, Washers, GI Pipe, Steel deck

Safety Measures: Be careful while fixing Walkway Steel parts

Developed by:

TASK ANALYSIS

Module : Construction of Trail Bridges — Practical: 4.5 hrs

Duty 4 : Supervise/Support Trail Bridge Construction — Theory: 1 hr

Task 08 : Conduct Final Assessment — Time: 5.5 hrs

STEPS	TERMINAL PERFORMANCE OBJECTIVE (TPO)	RELATED TECHNICAL KNOWLEDGE (RTK)
1. Assess riverbanks condition 2. Assess tower structure, anchorage block 3. Assess walkway fitting 4. Assess Deadload Gravity Structure 5. Assess overall condition of the completed bridge 6. Assess adjacent structure if any 7. Evaluate overall quality of the bridge	CONDITION (GIVEN): - Completed bridge at site, Final Assessment form TASK (WHAT?): - Conduct Final Assessment STANDARD (HOW WELL): - Bridge assessed according to SSTB Standard	• Technical evaluation procedures of bridge components

Required Tools: Final assessment forms

Safety Measures

Developed by:

TASK ANALYSIS

Module : Construction of Trail Bridges Practical: 4.5 hrs

Duty 5 : Construct Model Trail Bridge Theory: 1 hr

Task 01 : Layout Model Trail Bridge Time: 5.5 hrs

STEPS	TERMINAL PERFORMANCE OBJECTIVE (TPO)	RELATED TECHNICAL KNOWLEDGE (RTK)
1. Read General Arrangement Drawing 2. Find out approximate Model Trail Bridge Position 3. Find out axis pegs and benchmark of Model Trail Bridge 4. Measure the horizontal distance between axis pegs A (L) and B (R) of Model Bridge 5. Readjust design if axis pegs differs in elevation and distance of model bridge 6. Layout the foundation sizes applying off-sets or 3-4-5 method if the horizontal distance and elevation measured matches the designed model bridge or with readjusted design 7. Fix the datum level and indicate the depth of excavation work for tower and anchorage as per drawing of model bridge	CONDITION (GIVEN): - At bridge site all the Tools and Equipment and General Arrangement Drawings of Model Trail Bridge are given. TASK (WHAT?): - Layout Model Trail Bridge STANDARD (HOW WELL) Layout of model trail bridge completed as per design and Drawings	• Survey Tools and Equipment handling procedures • Distance and angle measurement • Offset setting • Axis pegs • Bench Mark • General Arrangement Drawing • Safety Measures

Required Tools: Mason Thread, 5 m & 50 m. Measuring Tape, Square Bottom, Pegs, Abney Level, Ranging Rod, General Arrangement Drawing, Permanent Markers, Lime

Safety Measures:

Developed by:

TASK ANALYSIS

Module : Construction of Trail Bridges — Practical: 1.5 hrs

Duty 5 : Construct Model Trail Bridge — Theory: 1hr

Task 02 : Collect Construction Materials — Time: 2.5 hrs

STEPS	TERMINAL PERFORMANCE OBJECTIVE (TPO)	RELATED TECHNICAL KNOWLEDGE (RTK)
1. Identify Stone Quarry 2. Identify sources of sand, aggregates 3. Check Quality of Sand, Aggregate and stone 4. Locate Storage Area 5. Calculate/Inform quantity of local materials required 6. Arrange for collection and transportation 7. Recommend for washing sand if impurities are unavoidable 8. Check quantity of collected materials	CONDITION (GIVEN): - Quarry Sources and Quality Assurance devices are given TASK (WHAT?): - Supervise Collection of Local Materials STANDARD (HOWWELL) Stone, Sand and Aggregates collected as per specified quality requirement	• Stone Quarry • Sources of Local Materials • Quality requirement of Sand, Aggregate (broken/ river bed), and Stones • Environmental Awareness • Storage of Local materials • Measurement of the works accomplished

Required Tools: 5 m. Measuring Tape, Transparent Bottle, Metal Hammer, Progress Assessment Format

Safety Measures: Use Metal Ring while Crushing Aggregate

Developed by:

TASK ANALYSIS

Module : Construction of Trail Bridges Practical: 3hrs

Duty 5 : Construct Model Trail Bridges Theory: 1 hr

Task 03 : Dress Stones for Masonry Time : 4 hrs

STEPS	TERMINAL PERFORMANCE OBJECTIVE (TPO)	RELATED TECHNICAL KNOWLEDGE (RTK)
1. Select Stones 2. Decide Stones Dressing Type 3. Select Suitable Tools 4. Mark the stones to the required size 5. Dress Corner Stones, Face Stones, and Bond Stones 6. Assist/ Instruct Dressing Bond stone 7. Prepare Filling stone 8. Calculate/Inform required quantity of different types of stones to be dressed 9. Check the quality and quantity of dressed stones	CONDITION (GIVEN): - Stone Dressing Tools and Quality Assurance Devices are given TASK (WHAT?): - Dress Stones for Masonry STANDARD (HOW WELL) Corner Stones/Face Stones/ Bond Stones dressed as per the requirement Filling Stones Prepared as per requirement	• Characteristics of good stones • Different types/shapes of Stone used in bridge construction • Handling procedures of tools and Equipment for stone dressing works

Required Tools: Metal Hammer, 5 m measuring Tape, Square Bottom, Chisel

Safety Measures: Wear Safety Goggles

Developed by:

TASK ANALYSIS

Module : Construction of Trail Bridges — Practical: 4.5 hrs

Duty 5 : Construct Model Trail Bridge — Theory: 1 hr

Task 04 : Construct Foundation Structures — Time: 5.5 hrs

STEPS	TERMINAL PERFORMANCE OBJECTIVE (TPO)	RELATED TECHNICAL KNOWLEDGE (RTK)
1. Excavate Tower Foundation 2. Construct dry & cement stone Masonry work simultaneously upto bottom of Limb wall level 3. Fix Walkway Saddles 4. Check position and level of walkway saddles 5. Continue Tower Construction work 6. Pour concrete for Limb Wall of Towers 7. Fix Handrail Cable Saddle/ check its Position and Level 8. Place and fix reinforcement bars, stirrups and erection hook in the anchorage structure 9. Construct deadman anchor 10. Construct drum anchorage 11. Cross cables and temporary anchoring to drum/ deadman 12. Cure masonry and concreting work for required time	CONDITION (GIVEN): - • Model Bridge site, necessary tools, equipment and drawing are given. TASK (WHAT?): - Construct Foundation Structures STANDARD (HOWELL):- • Foundation structure constructed as per design, drawing and specification • Saddles placed as per drawing	• Stability of cutting slopes for different types of soil/rock • Excavation Procedure (No Blasting Materials) • Cement Stone Masonry works • Dry Stone Masonry Works • Function & Construction of Tower, Deadman/ Drum • Saddle and its accessories, fixation • Positioning and details of hole drilling works • Cable crossing on both banks

Required Tools: Working Drawings, Square Bottom, 5 m Measuring Tape, Clear Pipe, Metal Hammer

Safety Measures: Wear Gloves, Boots

Developed by:

TASK ANALYSIS

Module : Construction of Trail Bridges Practical: 4.5 hrs

Duty 5 : Construct Model Trail Bridges Theory: 0.5 hr

Task 05 : Hoist Cables Manually Time : 5 hrs

STEPS	TERMINAL PERFORMANCE OBJECTIVE (TPO)	RELATED TECHNICAL KNOWLEDGE (RTK)
1. Calculate Hoisting Sag 2. Obtain cables 3. Place cable on both banks 4. Fix Bulldog Grips 5. Pull Cable manually 6. Reset hoisting sag 7. Check/Readjust that the parallel cables have equal hoisting sag at the same time 8. Tighten Bulldog Grips	CONDITION (GIVEN): - Bridge Site upto Cable Hoisting Stage, Tools and Equipment, Sag Calculation Forms are given TASK (WHAT?): - Hoist cables manually STANDARD (HOW WELL): - The cables are handled without causing damages The hoisting sag and sag setting are done as per design Bulldog grips placed/ tightened as per standard	• Types and uses of Cable Pulling Machines • Hoisting Sag Calculation and sag setting • Bulldog Grips and their application • Gravity Load *Some of the procedures in real and model trail bridge are not exact imitation of each other specially for cable laying and hoisting (refer to Duty 4)*

Required Tools: Abney Level, Bulldog Grips, Cable Pulling Machine Set, Wrenches

Safety Measures: Take Precaution while hoisting Cables!

Developed by:

TASK ANALYSIS

Module : Construction of Trail Bridges Practical: 3 hrs

Duty 5 : Construct Model Trail Bridge Theory: 1 hr

Task 06 : Complete Gravity Structure Time: 4 hrs

STEPS	TERMINAL PERFORMANCE OBJECTIVE (TPO)	RELATED TECHNICAL KNOWLEDGE (RTK)
1. Perform Cement Stone Masonry Works upto the required level 2. Lay dry stone masonry works on layers upto the required level 3. Check the dead load works as per design	CONDITION (GIVEN): - All civil works and cable hoisting is completed TASK (WHAT?): - Complete Gravity Structure STANDARD (HOW WELL): - Gravity Structure completed as per design and drawing	• Dry Stone Masonry • Cement Stone Masonry

Required Tools: Mason Trowel, Head pan, Plumb-bob, String, Level Pipe, Sprit Level, Hammer, Square Bottom

Safety Measures: Wear Gloves

Developed by:

TASK ANALYSIS

Module : Construction of Trail Bridges — Practical: 3 hrs

Duty 5 : Construct Model Trail Bridge — Theory: 0.5 hr

Task 07 : Erect Walkways — Time: 3.5 hrs

STEPS	TERMINAL PERFORMANCE OBJECTIVE (TPO)	RELATED TECHNICAL KNOWLEDGE (RTK)
1. Fix crossbeam at walkway cable from one bank 2. Fix Suspender at Handrail Cable 3. Fix remaining crossbeam/ suspender till next tower at the other bank 4. Fix steeldeck with nuts, bolts 5. Knitt GI Wiremesh between Handrail Cable and Fixation Cable	CONDITION (GIVEN): - Work upto Gravity Structure is completed TASK (WHAT?): - Erect Walkways STANDARD (HOW WELL): - Crossbeam, Suspenders Walkway deck fixed as per drawing GI Wiremesh knitted as per standard	• Fixing procedures of crossbeam suspender and steeldeck • GI Wiremesh knitting procedure

Required Tools: Wrenches, Pliers, Hacksaw blade frame, Bending Die, Die bar, GI Pipe,

Safety Measures: Be careful while fixing Walkway Steel parts

Developed by:

TASK ANALYSIS

Module : Construction of Trail Bridges Practical: 1.5 hrs

Duty 6 : Perform Social Organizational Support at Community Level Theory: 1 hr

Task 01 : Facilitate Users Committee (UC) Formation Time : 2.5 hrs

STEPS	TERMINAL PERFORMANCE OBJECTIVE (TPO)	RELATED TECHNICAL KNOWLEDGE (RTK)
1. Inform for community meeting 2. Contact key persons 3. Receive Broad based community participation for meeting 4. Record the participants name list 5. Explain potential sources for supporting bridge construction 6. Explain roles and responsibility of UC members 7. Create awareness choosing capable persons in the UC	CONDITION (GIVEN): - Community pre informed about the meeting and gathered at bridge site TASK (WHAT?): - Facilitate Users Committee (UC) Formation STANDARD (HOW WELL): - Balanced Users Committee (UC) Formation Facilitated	• Facilitating Community Meeting • Information Dissemination • Explaining roles and responsibility of Users Committee • Seeking Consensus forming representative UC.

Required Tools: Group Discussion, Facilitation, Presentation, Community Meeting, Brochure, Charts

Safety Measures:

Developed by:

TASK ANALYSIS

Module : Construction of Trail Bridges — Practical: 1.5 hrs

Duty 6 : Perform Social Organizational Support at Community Level — Theory: 1 hr

Task 02 : Educate Users Committee — Time : 2.5 hrs

STEPS	TERMINAL PERFORMANCE OBJECTIVE (TPO)	RELATED TECHNICAL KNOWLEDGE (RTK)
1. Describe norms and procedures of the UC meeting 2. Identify responsibility of UC 3. Assign responsibility to each members of UC 4. Illustrate how to use the project book 5. Introduce participatory decision making 6. Establish action plan 7. Introduce minutes taking	CONDITION (GIVEN): - Users Committee already formed TASK (WHAT?): - Educate Users Committee STANDARD (HOW WELL): - Increased Users Committee performance	• Facilitating users Committee Meeting • Roles and Responsibility Assignment of UC members • Project Book • Participatory Decision making Process • Establishing Further Action Plan • Minute Keeping • Conflict Resolution

Required Tools: Group Discussion, Facilitation, Presentation, Community Meeting, Project Book

Safety Measures:

Developed by:

TASK ANALYSIS

Module : Construction of Trail Bridges Practical: 0 hrs

Duty 6 : Perform Social Organizational Support at Community Level Theory: 0 hr

Task 03 : Conduct Social Assessment (*Follow Duty 2 Task 3)* Time : 0 hrs

STEPS	TERMINAL PERFORMANCE OBJECTIVE (TPO)	RELATED TECHNICAL KNOWLEDGE (RTK)
1. Introduce Participants 2. Describe selfhelp/ Community Approach 3. Explain Roles and Responsibility of different stakeholders 4. Assess site location disputes if any 5. Fix Bridge Site Location 6. Prepare action plan 7. Proceed for Technical survey if users are committed to work on self-help/ community approach	CONDITION (GIVEN): - Community at proposed bridge site TASK (WHAT?): - Conduct Social Assessment STANDARD (HOW WELL): - Social Assessment Conducted as per the guidelines	• Community meeting (Facilitation) • Reassess/Reconfirm bridge need (PRA) • Self-help community approach of the project • Broad Based Participation • Local Capacity and their commitment • Action Plan • Photography *(Also refer to Duty 2, Task 03)*

Required Tools: Flip Chart, Postures, Brochures

Safety Measures:

Developed by:

TASK ANALYSIS

Module : Construction of Trail Bridges — Practical: 1 hrs

Duty 6 : Perform Social Organizational Support at Community Level — Theory: 0.5 hr

Task 04 : Facilitate mobilizing local resources — Time: 1.5 hrs

STEPS	TERMINAL PERFORMANCE OBJECTIVE (TPO)	RELATED TECHNICAL KNOWLEDGE (RTK)
1. Receive the financial commitment letter from DDC, VDC 2. Inform the users about the quantity of work, both labor and materials required 3. Facilitate on deciding the work to be executed by the users 4. Facilitate on deciding the work to be executed on payment basis 5. Search additional sources of resources like MP Fund, local organization	CONDITION (GIVEN): - Agreement for bridge building support completed, Community, Users Committee TASK (WHAT?): - Facilitate mobilizing Local Resources STANDARD (HOW WELL): - Local Resources mobilization is decided by the community	• Facilitating users Committee Meeting • Local Resource Mobilization Techniques • Participatory Decision making Process • Establishing Further Action Plan • Record Keeping

Required Tools: Group Discussion, Facilitation, Presentation, Community Meeting

Safety Measures:

Developed by:

TASK ANALYSIS

Module : Construction of Trail Bridges — Practical: 1.5 hrs

Duty 6 : Perform Social Organizational Support at Community Level — Theory: 0.5 hr

Task 05 : Establish Community Agreement — Time: 2hrs

STEPS	TERMINAL PERFORMANCE OBJECTIVE (TPO)	RELATED TECHNICAL KNOWLEDGE (RTK)
1. Reconfirm the resource declaration from the involved actors 2. Reconfirm the commitment of the users 3. Establish the collaboration Agreement between the involved actors 4. Establish Further Action Plan 5. Keep records of the decisions taken 6. Inform UC about the Demonstration Model Bridge Training Programme	CONDITION (GIVEN): - Bridge survey, design and cost estimate is completed, Relevant Formats given TASK (WHAT?): - Establish Community Agreement STANDARD (HOW WELL): - Community Agreement Established	• Facilitating users Committee Meeting • Local Resource Mobilization Techniques • Participatory Decision making Process • Agreement of Collaboration • Establishing Further Action Plan • Record Keeping

Required Tools:

Safety Measures:

Developed by:

TASK ANALYSIS

Module : Construction of Trail Bridges — Practical: 1.5 hr

Duty 6 : Perform Social Organizational Support at Community Level — Theory: 1hr

Task 06 : Assist in conducting Public Audit — Time : 2.5 hrs

STEPS	TERMINAL PERFORMANCE OBJECTIVE (TPO)	RELATED TECHNICAL KNOWLEDGE (RTK)
1. Compile actual cost/ contribution 2. Show the expenditure details publicly 3. Assist in keeping records	CONDITION (GIVEN): - Cost, Contribution, expenditure details and necessary formats TASK (WHAT?): - Assist in conducting public audit STANDARD (HOW WELL): - Public Audit Conducted	• Community Meeting conducting Procedures • Account Keeping procedures

Required Tools: Calculator

Safety Measures:

Developed by:

TASK ANALYSIS

Module : Construction of Trail Bridges — Practical: 1.5 hr

Duty 6 : Perform Social Organizational Support at Community Level — Theory: 1 hr

Task 07 : Facilitate Formation of Bridge Maintenance Committee (BMC) — Time : 2.5 hrs

STEPS	TERMINAL PERFORMANCE OBJECTIVE (TPO)	RELATED TECHNICAL KNOWLEDGE (RTK)
1. Describe Maintenance Concepts/ schedule 2. Support forming Bridge maintenance committee 3. Facilitate Appointing Bridge Inspector/Bridge warden 4. Assist handing over tools/documents 5. Orient BMC for maintenance tools handling	CONDITION (GIVEN): - Completed Bridge community at bridge site TASK (WHAT?): - Facilitate Formation of Bridge Maintenance Committee (BMC) STANDARD (HOW WELL): - Bridge maintenance committee formation facilitated	• Maintenance Types • Bridge Inspector • Routine bridge maintenance schedule • Routine maintenance tools and equipment handling procedure • Bridge Maintenance Report/ records

Required Tools: Routine Maintenance Manual, Maintenance Agreement, BMC documents

Safety Measures:

Developed by:

TASK ANALYSIS

Module : Construction of Trail Bridges — Practical: 1.5 hr

Duty 6 : Perform Social Organizational Support at Community Level — Theory: 1hr

Task 08 : Orient BMC/ Bridge Warden (BW) on Maintenance — Time : 2.5 hrs

STEPS	TERMINAL PERFORMANCE OBJECTIVE (TPO)	RELATED TECHNICAL KNOWLEDGE (RTK)
1. Invite BW/BMC 2. Mention major duty/responsibility of Bridge warden/ Bridge Inspector/ Bridge Maintenance Committee 3. Enlist Maintenance tools 4. Arrange Maintenance Tools 5. Prepare maintenance schedule	CONDITION (GIVEN): - Bridge maintenance committee formed, Bridge inspector/warden appointed TASK (WHAT?): - Orient BMC/ Bridge Warden (BW) on Maintenance STANDARD (HOW WELL): - BMC/BW oriented on maintenance	• Duty/responsibility of Bridge warden/ Bridge Inspector/BMC • Maintenance types /schedule • Maintenance tools handling Procedure • Record Keeping

Required Tools: Tools Handover form, Maintenance Manual

Safety Measures:

Developed by:

TASK ANALYSIS

Module : Construction of Trail Bridges — Practical: 1.5 hr

Duty 7 : Perform Self-orientation on Social Organizational Support at District Level — Theory: 1 hr

Task 01 : Obtain Information on Partnership of Collaboration — Time : 2.5 hrs

STEPS	TERMINAL PERFORMANCE OBJECTIVE (TPO)	RELATED TECHNICAL KNOWLEDGE (RTK)
1. Receive information on institutional arrangement made to implement trail bridge project 2. Identify roles/ responsibility of different stakeholders	CONDITION (GIVEN): - Collaboration Agreement, Brochures and related documents TASK (WHAT?): - Obtain Information on Partnership of collaboration STANDARD (HOW WELL): - Information on Partnership of collaboration obtained.	• Self-help/community nature of the project • Flow-diagram of step-wise procedures for new construction • Record Keeping/ Note Taking

Required Tools: Collaboration Agreement Documents

Safety Measures:

Developed by:

TASK ANALYSIS

Module : Construction of Trail Bridges — Practical: 1.5 hr

Duty 07 : Perform self-orientation on Social Organizational Support at District Level — Theory: 0.5 hr

Task 02 : Obtain Information on yearly planning — Time: 2 hrs

STEPS	TERMINAL PERFORMANCE OBJECTIVE (TPO)	RELATED TECHNICAL KNOWLEDGE (RTK)
1. Identify sources of Annual Plan 2. Obtain information about the planning and coordination work 3. Receive the lists of the ongoing projects 4. Receive the lists of the new proposed and prioritized bridges	CONDITION (GIVEN): - Annual Plan TASK (WHAT?): - Obtain information on yearly planning STANDARD (HOW WELL): - Information on yearly planning obtained	• Trail Bridge Yearly Plan • Planning and coordination procedure of trail bridge • Organizational Structure of DDC

Required Tools:

Safety Measures:

Developed by:

TASK ANALYSIS

Module : Construction of Trail Bridges Practical: 1.5 hrs

Duty 7 : Perform self-orientation on Social Organizational Support at District Level Theory: 1hr

Task 03 : Report Bridge Progress Time: 2.5 hrs

STEPS	TERMINAL PERFORMANCE OBJECTIVE (TPO)	RELATED TECHNICAL KNOWLEDGE (RTK)
1. Visit on going projects 2. Receive information on projects under construction 3. Prepare Trail Bridge Progress Report 4. Submit Trail Bridge Progress Report	CONDITION (GIVEN): - Bridge projects under progress, Progress Format, camera TASK (WHAT?): - Report Bridge Progress STANDARD (HOW WELL): - Bridge Progress Reported/ Submitted	• Progress Format • Measurements • Photographs

Required Tools: Camera, Film Roll, Measuring Tape, Calculator, Progress Assessment Form

Safety Measures:

Developed by:

TASK ANALYSIS

Module : Construction of Trail Bridges — Practical: 1.5 hr

Duty 7 : Perform self-orientation on Social Organizational Support at District Level — Theory: 0.5 hr

Task 04 : Assist in maintaining district bridge records — Time: 2 hrs

STEPS	TERMINAL PERFORMANCE OBJECTIVE (TPO)	RELATED TECHNICAL KNOWLEDGE (RTK)
1. Collect information on Bridge Status 2. Provide information on district bridge records 3. Assist in locating bridges on district map 4. Compile cost and contribution 5. Show the expenditure details publicly	CONDITION (GIVEN): - Bridge Projects under progress, Progress Format, District Map TASK (WHAT?): - Assist in maintaining district bridge records STANDARD (HOW WELL): - Assisted in maintaining district bridge records	• Local Bridge Register • District map

Required Tools: District Bridge Records, Cost contribution formats, Transport Infrastructure maps

Safety Measures:

Developed by:

TASK ANALYSIS

Module : Construction of Trail Bridges — Practical: 0 hr

Duty 8 : Maintain Trail Bridges — Theory: 1.5 hrs

Task 01 : Explain maintenance concepts — Time: 1.5hrs

STEPS	TERMINAL PERFORMANCE OBJECTIVE (TPO)	RELATED TECHNICAL KNOWLEDGE (RTK)
1. Describe Trail Bridge Maintenance 2. Obtain information about the maintenance need	CONDITION (GIVEN): - Classroom, Brochure, Handouts, Manual TASK (WHAT?): - Explain maintenance concepts STANDARD (HOW WELL): - Maintenance concept explained	• Definition of maintenance • Maintenance need

Required Tools: Maintenance concepts documents

Safety Measures:

Developed by:

TASK ANALYSIS

Module : Construction of Trail Bridges Practical: 0 hr

Duty 8 : Maintain Trail Bridges Theory: 1.5 hrs

Task 02 : Classify Maintenance Types Time : 1.5 hrs

STEPS	TERMINAL PERFORMANCE OBJECTIVE (TPO)	RELATED TECHNICAL KNOWLEDGE (RTK)
1. Describe Routine Maintenance 2. Describe Major Maintenance	CONDITION (GIVEN): - Classroom, Handouts, Chart Figures, Brochure TASK (WHAT?): - Classify maintenance Types STANDARD (HOW WELL): - Maintenance types classified	• Classification of Maintenance

Required Tools: Maintenance concepts documents

Safety Measures:

Developed by:

TASK ANALYSIS

Module : Construction of Trail Bridges — Practical: 3 hrs

Duty 8 : Maintain Trail Bridges — Theory: 1 hr

Task 03 : Demonstrate/Monitor/ Assist in Routine Maintenance — Time : 4 hrs

STEPS	TERMINAL PERFORMANCE OBJECTIVE (TPO)	RELATED TECHNICAL KNOWLEDGE (RTK)
1. Visit the bridge site 2. Clean around the most important bridge elements 3. Fix/Retighten of bridge parts 4. Repair the walkway deck 5. Repair the gabion boxes 6. Prepare maintenance report 7. Submit the maintenance report	CONDITION (GIVEN): - Bridge site with necessary tools and materials TASK (WHAT?): - Demonstrate/Monitor/Assist in performing Routine Maintenance STANDARD (HOW WELL): - Routine Maintenance demonstrated/monitored/assisted.	• Importance of Bridge Parts maintenance • Maintenance schedule • Maintenance tools • Maintenance Manual

Required Tools: Maintenance tools, Routine maintenance manual

Safety Measures:

Developed by:

TASK ANALYSIS

Module : Construction of Trail Bridges Practical: 2hrs

Duty 8 : Maintain Trail Bridges Theory: 1 hr

Task 04 : Conduct Bridge Condition Investigation (BCI) Time: 3 hrs

STEPS	TERMINAL PERFORMANCE OBJECTIVE (TPO)	RELATED TECHNICAL KNOWLEDGE (RTK)
1. Collect general information about the bridge to be investigated 2. Inform the community in advance about the survey 3. Check the anchorage condition 4. Check the walkway parts 5. Check the river bank condition 6. Prepare BCI Report 7. Submit BCI Report	CONDITION (GIVEN): - Old Bridges, and necessary tools TASK (WHAT?): - Conduct Bridge Condition Investigation STANDARD (HOW WELL): - Bridge Condition investigation conducted	• Bridge Condition Investigation survey conducting procedures • Bridge Structures condition/ Assessing Procedure

Required Tools: BCI format, camera, Film roll, measuring tape 50 or 100m, Vernier caliper, 3 m tape

Safety Measures:

Developed by:

TASK ANALYSIS

Module : Construction of Trail Bridges Practical: 2 hrs

Duty 8 : Maintain Trail Bridges Theory: 1 hr

Task 05 : Assist in Conducting Major Maintenance Time : 3 hrs

STEPS	TERMINAL PERFORMANCE OBJECTIVE (TPO)	RELATED TECHNICAL KNOWLEDGE (RTK)
1. Receive bridge condition investigation report 2. Analyze bridge structure/ parts condition 3. Assist in designing/ cost estimate Major Maintenance Report 4. Assist in implementing Major Maintenance 5. Prepare Major Maintenance Report 6. Submit Major Maintenance Report	CONDITION (GIVEN): - Existing bridge, Major maintenance design TASK (WHAT?): - Assist in conducting Major Maintenance STANDARD (HOW WELL): - Assisted in Major Maintenance	• Bridge Condition Investigation report Analyzing Procedure • Preparing major maintenance report • Possible Major Maintenance Activities • Responsible Organization for Major Maintenance

Required Tools: BCI format, photograph
Safety Measures:

Developed by:

References

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3 Punmia B.C. Dr., *Building Construction* (Latest Edition).

4 Kumar Sushil *Building Construction* (Latest Edition).

5 Sharma S.K. & Kaul B.K., *Building Construction* (Latest Edition).

6 Singh Gurucharan, *Building Planning & Design* (Latest Edition).

7 Arya A.S., *Masonry and Timber Structure including Earth* (Latest Edition).

8 A Course Manual on Trail Bridge Construction for Civil Sub Overseer Volume- I: Manual, CTEVT

9 A Course Manual on Trail Bridge Construction for Civil Sub Overseer Volume- II : Forms, CTEVT

10 A Course Manual on Trail Bridge Construction for Civil Sub Overseer Volume – III: Drawings and Maps, TBSSP/Helvetas

Glossary used in the technical and vocational curricula

Competency: A performance capability needed by workers in a specific area.

Curriculum guide: A curriculum guide is a detail resource for teachers to conduct training programs effectively. The guide intends to add the teacher in developing lesson plan, handouts, training manuals, and evaluation criteria etc, which are basic elements in the teaching learning process.

Curriculum: A plan for providing sets of learning opportunity to achieve broad goal and related specific objectives for an identifiable population serves by a single school center.

DACUM: Developing A Curriculum. DACUM is a technique that uses a group consultative process to identify the competencies relevant to a particular occupation. These competencies are then built on to form a vocational curriculum.

Duty: is an arbitrary clustering of related tasks in to broad functional area or general area of responsibility.

Enabling Objective: The Objectives are defined as to set for guiding the teacher and students to attain the end result of the particular unit of work or lesson.

Instructional Guide: is a well-planned and structured document for the instructor to deliver effective instruction so that trainees can attain learning is objectives as per training standards.

Module: A module is defined as a specific learning material. Modules are essentially self-contained. Self-instructional packages, with learning paced by each learner according to his/her

individual ability and needs. A module covers either a single element of subject matter content or a group of content elements forming a discrete unit of subject matter or area of skills.

Occupational Analysis: is a process used to identify the duties and tasks that are important to workers in any given occupation. A number of alternative and acceptable approaches to occupational analysis are available.

Program guide: A program guide is a comprehensive resource for teachers, planners, and top-level management for planning and implementation of any training programs.

Program Objectives: The objectives are set in a broad way to target to achieve mastery learning of the complete occupation.

Related Technical Knowledge: Knowledge essential to perform a task/ step in complete, accurate and safe manner.

Skill: The ability to perform on occupational task with the degree of proficiency required for a given occupation

Step: The smallest discrete or observable aspect of a task.

Task Analysis: Task analysis is the process of identifying and writing down the specific skills, knowledge and attitudes that distinguish someone who performs a task competently from someone who cannot perform the task at all.

Task: A unit of work complete in itself that forms a logical part of on occupation. It can be broken down into discrete steps.

Terminal Performance Objective: The objectives set to attain at the end of the training completion. It includes condition, unit of work and standard of teaching and learning.