# ARCHITECTURE DRAFTING

# **Competency Standards**

National Vocational Certificate Level 2

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	A: Apply Drafting Fundamentals         B: Perform Technical Mathematics         C: Apply Computer Aided Design/Drafting         D: Assist in managing Architectural Projects         E: Develop Professionalism

### **Title A: Apply Drafting Fundamentals**

**Overview:** This Competency Standard identifies the competencies required to apply drafting fundamentals at workplace by an architect in accordance with the organization's approved guidelines and procedures. You will be expected to create geometrical construction, single view drawings and orthographic projections, either manually or computerized at workplace. Your underpinning knowledge regarding drafting fundamentals will be sufficient to provide you the basis for your work.

Unit of Competency	Performance Criteria	Knowledge	Tools & Equipment
A1: Know free- hand drawings/ sketching & basic lines	<ul> <li>You will be able to:</li> <li>P1. Draw rough lines in different angles</li> <li>Draw lines in different direction using grades of pencils</li> <li>P2. Draw (free hand) basic shapes</li> <li>P3. Familiarize with the use of T-scale &amp; Set-square</li> <li>P4. Handle drafting tools appropriately</li> </ul>	You will be able to: K1. Describe the methodology of stretching of sheet for drawing K2. Describe division of sheet K3. Describe drawing different lines (Free hand, Straight, Angular And Curves) K4. Demonstrate Construction of Seal / Title Strip K5. Demonstrate flow of pencil and line joinery	Manual: • A-3 sketchbook • Various grades of soft & hard lead pencil • Eraser • Sharpener
A1. <mark>Draw basic</mark> geometric shapes	<ul> <li>You will be able to:</li> <li>P1. Select tools required for the job</li> <li>P2. Specify construction details as per assignment</li> <li>P3. Select scale required for the object according to construction detail</li> <li>P4. Draw construction lines according to object sizes</li> </ul>	You will be able to: K1. Describe usage of tools for this job K2. Explain the concept of geometrical construction • Triangle • Square/rectangle • Circle • polygon	Manual: Drafting table with necessary attachments (horizontal and vertical bar with angle adjustment), architectural triangular scale, stationary items (pencil, rubber, paper), geometry box (compass, divider, attachments, protector)

Unit of Competency	Performance Criteria	Knowledge	Tools & Equipment
		K3. Describe the use of scale for the	Computer:
	P5. Convert construction lines into object lines	assignment	
	as per object requirement		Workstation, Drafting
		K4. Describe the types of line	software (latest version),
	P6. Mark dimensions of the whole object as per		output devices for printing,
	drawn sizes	K5. Describe dimensioning standards	personal protective equipment (PPE)
	P7. Prepare backup file for the assignment to avoid data loss	K6. Describe the file saving and backup method	
	P8. Apply health and safety precautions at workplace	K7. Describe specific safety precautions and guidelines	
A2. Create single view drawing	You will be able to:	You will be able to:	Manual:
	P1. Select tools required for the job	K1. Describe usage of tools for this job	Drafting table with necessary attachments
	P2. Specify object details as per assignment	K2. Explain the concept of single view drawing	(horizontal and vertical bar with angle adjustment),
	P3. Select scale required for the object according to the view	K3. Describe the use of scale for the assignment	architectural triangular scale, stationary items,
	P4. Draw construction lines according to object sizes	K4. Describe the types of line	geometry box (compass, divider, attachments, protector)
	P5. Convert construction lines into object lines	K5. Describe the concept and types of projection	Computer:
	as per view requirement, to represent actual object	K6. Describe dimensioning standards	Workstation, Drafting software (latest version),
	P6. Mark dimensions of the whole object as per		output devices for printing,

Unit of Competency	Performance Criteria	Knowledge	Tools & Equipment
	drawn size		PPE
A3. Create orthographic	You will be able to:	You will be able to:	Manual:
projections	P1. Select tools required for the job	K1. Describe the use of tools for this job	Drafting table with necessary attachments
	P2. Specify object details as per assignment	K2. Explain the concept of orthographic projection	(horizontal and vertical bar with angle adjustment),
	P3. Select scale required for the object according to the view	K3. Describe the following	architectural triangular scale, stationary items, geometry box (compass,
	P4. Draw construction lines according to object sizes P5. Use the following:	<ul><li>III. First angle projection method</li><li>IV. Third Angle projection method</li></ul>	divider, attachments, protector)
	I. First angle projection method II. Third Angle projection method	K4. Describe dimensioning standards	<b>Computer:</b> Workstation, Drafting
	P6. Convert construction lines into object lines as per view requirement		software (latest version), output devices for printing, PPE
	P7. Mark dimensions of the whole object as per drawn sizes		
A5: Develop drawing format & read technical drawings	You will be able to: P1. Format the drawings according to the following specifications: Required scale & dimensioning Required labeling and symbols	You will be able to: K1. Describe drawing format for the particular assignment including: • Required scale & dimensioning • Required labeling and symbols • Specified title block (seal)	

Unit of Competency	Performance Criteria	Knowledge	Tools & Equipment
	<ul> <li>Specified title block (seal)</li> <li>P2. Read and analyze technical drawings as per standards</li> <li>P3. Communicate technical drawings as per standards</li> </ul>	K2. Describe how to read and analyze technical drawings K3. Describe how to communicate technical drawings	

# Title B. Carry out Technical Mathematics

**Overview:** This Competency Standard identifies the competencies required to perform technical mathematics at workplace by an architect in accordance with the organization's approved guidelines and procedures. You will be expected to Calculate decimals and fractions, Apply unit conversion in system of measurement, Apply ratio/proportion using scales, Calculate perimeter, area and volume of objects and Derive area and perimeter using trigonometric formula, either manually or computerized at workplace. Your underpinning knowledge regarding technical mathematics will be sufficient to provide you the basis for your work.

Unit of Competency	Performance Criteria	Knowledge	Tools & Equipment
<mark>B1. Calculate</mark>	You will be able to:	You will be able to:	Computer, calculator,
<mark>decimals and</mark>			stationary items,
fractions	P1. Arrange tools required for the job	K1. Describe the usage of tools required for	
		this job	
	P2. Apply tools to calculate mathematical		
	fractions	K2. Identify the symbols of mathematical	
		fractions	

Unit of Competency	Performance Criteria	Knowledge	Tools & Equipment
B2. Apply unit conversion in system	You will be able to:	You will be able to:	Computer, calculator, stationary items
of measurement	P1. Arrange tools required for the job	K1. Describe the usage of tools required for this job	
	P2. Apply tools to calculate mathematical conversion factors	K2. Explain the systems of measurements	
	P3. Apply the FPS (foot pound second) and MKS (meter, kilogram, second) systems of measurement	K3. Describe the FPS (foot pound second) and MKS (meter, kilogram, second) systems of measurement	
B3. Apply ratio/proportion	You will be able to:	You will be able to:	Architectural triangular scale, measuring tape,
using scales	P1. Select scales required for the job P2. Apply the concept of ratio of scale (e.g: 1/96 to a foot) P3. Select the scale ratio appropriate to draw	K1. Describe the usage of scale required for this job K2. Describe the concept of proportion	computer, stationary items
	larger object into a smaller one and vice versa	K3. Describe the concept of ratio of scale (e.g: 1/96 to a foot)	
<mark>B4. Calculate</mark> perimeter, area and	You will be able to:	You will be able to:	Computer, calculator, stationary items
volume of objects	P1. Select tools required for calculation	K1. Describe the usage of tools required for this job	
	P2. Calculate area of square, rectangle, triangle and circle etc using formula	K2. Describe the geometrical figures	
	P3. Calculate perimeter of square, rectangle,	K3. Describe the formula for calculating area	

Unit of Competency	Performance Criteria	Knowledge	Tools & Equipment
	triangle and circle etc using formula		
	P4. Calculate volume of cube, slab, prism, sphere etc using formula	K4. Describe the formula for calculating perimeter	
		K5. Describe the formula for calculating	
	P5. Add standard units to the derived quantity (e.g: Square foot Sft etc.)	volume	
	P6. Calculate area and perimeter using Auto CAD (software)	K6. Explain the standard units for area, perimeter and volume	
		K7. Describe the Auto CAD commands used for calculation of area and perimeter	
<mark>B5. Derive area and</mark>	You will be able to:	You will be able to:	Calculator, stationary item,
<mark>perimeter using</mark>			trigonometric table
<mark>trigonometric</mark> formulae	P1. Select tools required for calculation	K1. Describe the usage of tools required for this job	
	P2. Use trigonometric table		
	P3. Calculate area of triangle by using trigonometric formula	K2. Explain use of trigonometric table	
		K3. Describe formulas for derivation of	
	P4. Calculate perimeters of triangle using trigonometric formula	perimeter and area	
		K4. Explain the standard units for area,	
	P5. Add standard units to the derived quantity	perimeter and volume	
	(e.g: Square foot Sft etc.)	K5 <mark>. Explain the use of standard units to the</mark>	
		derived quantity (e.g: Square foot Sft etc.)	

### Title C. Apply Computer Aided Design/Drafting

**Overview:** This Competency Standard identifies the competencies required to apply Computer Aided Design/drafting at workplace by an architect in accordance with the organization's approved guidelines and procedures. You will be expected to Apply Auto-CAD fundamentals, Apply CAD draw tools to make a sketch, Apply Auto CAD modify tools, Apply layer, text and dimension tools, Build and use library of components (blocks), Create working set of drawings and submission drawing, Apply plotting/printing to design and Create 3D model (presentation) of architect's concept at workplace. Your underpinning knowledge regarding Computer Aided Design/drafting will be sufficient to provide you the basis for your work.

Unit of Competency	Performance Criteria	Knowledge	Tools & Equipment
C1. Apply Auto-CAD	You will be able to:	You will be able to:	Compatible Computer
fundamentals	P1. Specify the uses of the software Auto-CAD	K1. Describe the uses of software AutoCAD K2. Describe the features of drawing window including	system for using Auto-CAD, Auto-CAD software (latest version) CD, personal
	P2. Install the Auto-CAD on the system following installation instructions P3. Specify the unit (scale), precision, drawing	<ul> <li>Main menu</li> <li>Down drop menu, sub menu</li> <li>Tool bar</li> <li>Task bar</li> </ul>	protective equipment (PPE)

Unit of Competency	Performance Criteria	Knowledge	Tools & Equipment
	limits in the model space for a specific drawing assignment	<ul> <li>Command area</li> <li>User coordinate system (UCS)</li> </ul>	
	P4. Specify grid, snap and selection tool for specific drawing assignment	K3. Explain the followings I. Unit II. Drawing limits	
	P5. Prepare backup file for the assignment to avoid data loss P6. Apply health and safety precautions at	III. Grid IV. Snap <mark>V. Selection</mark>	
	workplace	K4. Describe the file saving and backup method	
		K5. Describe specific safety precautions and guidelines	
C2. Apply Auto- CAD draw toolbar	You will be able to:	You will be able to:	Compatible Computer system for using Auto-CAD,
<mark>to make a sketch</mark>	<ul> <li>P1. Draw following lines, as per assignment</li> <li>requirement:</li> <li>Construction line</li> </ul>	K1. Describe the usage of tools required for this job	Auto-CAD software (latest version), PPE
	Ray line	K2. Describe the method to carry out the	
	<ul><li>Line</li><li>Poly line</li></ul>	<ul> <li>following commands using lines</li> <li>Construction line</li> </ul>	
	P2. Draw following geometric objects, as per	<ul><li>Ray line</li><li>Line</li></ul>	
	assignment requirement:	Poly line	
	<ul> <li>Rectangle/square</li> <li>Circle/arc</li> <li>Ellipse/ elliptical arc</li> </ul>	K3. Describe the method to draw the following objects:	

Unit of Competency	Performance Criteria	Knowledge	Tools & Equipment
	<ul> <li>Polygon</li> <li>P3. divide and measure specific space using point command</li> <li>P4. Apply boundary and hatch command for filling space, with specific symbols and solid colors</li> </ul>	<ul> <li>Rectangle/square</li> <li>Circle/arc</li> <li>Ellipse/ elliptical arc</li> <li>Polygon</li> <li>K4. Describe how to divide and measure a line or object with the help of point command</li> <li>K5. Describe how to fill up space with specific</li> </ul>	
CAD modify CAD modify toolbar	You will be able to: P1. Apply following tools to modify objects in Auto CAD • Erase • Trim • Chamfer • Fillet • Break/join P2. Apply following tools to modify objects in Auto CAD • Off set / mirror • Copy • Extend • Array • Move • Rotate • Scale	material symbol and colorsYou will be able to:K1. Describe the usage of tools required for this jobK2. Describe the use of the following tools to modify drawings in Auto CAD• Erase • Trim • Chamfer • Fillet • Break/joinK3. Describe the use of the following tools to modify objects in Auto CAD• Off set / mirror • Copy • Extend • Array	System compatible for using Auto-CAD, Auto-CAD software(latest version), PPE

		Knowledge	Tools & Equipment
text and dimension toolbar pe bo	<ul> <li>Align</li> <li>Du will be able to:</li> <li>Create layers for an object in Auto CAD as er assignment's requirement (e.g: line, bundary, hatch, text, dimension, fixture etc.)</li> <li>Prepare text style and create text as per assignment's requirement</li> </ul>	<ul> <li>Rotate</li> <li>Scale</li> <li>Stretch</li> <li>Align</li> <li>You will be able to:</li> <li>K1. Describe the concept of layers and its application <ul> <li>Line weight</li> <li>Line type</li> <li>Color</li> <li>Defpoint layer</li> </ul> </li> </ul>	System compatible for using Auto-CAD, installed Auto CAD software, PPE
fol	<ul> <li>B. Prepare dimensional style and create allowing dimensions <ul> <li>Linear</li> <li>Aligned</li> <li>Base line</li> <li>Continuous</li> <li>Oblique</li> <li>Diameter/radius</li> <li>Angular</li> </ul> </li> <li>4. Create and modify dimensions as per assignment</li> <li>Align text</li> <li>Update dimensions</li> </ul>	<ul> <li>K2. Describe working of layer</li> <li>Freeze/thaw</li> <li>Lock/unlock</li> <li>Current</li> <li>Filter</li> <li>Layer match</li> <li>Layer delete</li> <li>K3. Describe text type and style</li> <li>K4. Explain dimension style as per following</li> <li>Linear</li> <li>Aligned</li> <li>Base line</li> <li>Continuous</li> <li>Oblique</li> </ul>	

Unit of Competency	Performance Criteria	Knowledge	Tools & Equipment
		<ul> <li>Angular</li> <li>K5. Explain modify dimensions</li> </ul>	
C5. Build and use library of components (blocks)	You will be able to: P1. Create a specific small object (symbols etc) to be used in a drawing as per assignment's requirement Door Window Ventilator Furniture / interior items Fixtures Landscape P2. Insert block in a drawing as per assignment P3. Modify blocks required for a specific drawing	<ul> <li>You will be able to:</li> <li>K1. Explain block creation for the following <ul> <li>Door</li> <li>Window</li> <li>Ventilator</li> <li>Furniture / interior items</li> <li>Fixtures</li> <li>Landscape</li> </ul> </li> <li>K2. Describe method of insertion of a block</li> <li>K3. Explain how to modify a block for specific requirement in a drawing</li> </ul>	System compatible for using Auto-CAD, installed Auto CAD software, PPE
C6. Create working set of drawings, submission drawing	<ul> <li>You will be able to:</li> <li>P1. Create working set of drawings as per assignment <ul> <li>Layout plan</li> <li>Working plan</li> <li>Elevation</li> <li>Section</li> <li>block diagram</li> </ul> </li> <li>P2. Create working details of following as per assignment</li> </ul>	<ul> <li>You will be able to:</li> <li>K1. Explain working set of drawing as per following: <ul> <li>Layout plan</li> <li>Working plan</li> <li>Elevation</li> <li>Section</li> <li>block diagram</li> </ul> </li> <li>K2. Describe detail working drawing including <ul> <li>Doors /windows</li> </ul> </li> </ul>	System compatible for using Auto-CAD, installed Auto CAD software, PPE

Unit of Competency	Performance Criteria	Knowledge	Tools & Equipment
	Doors /windows	Kitchen/bath	
	Kitchen/bath	Foundation	
	Foundation	• Stair	
	Stair	• Tanks (septic, water storage)	
	<ul> <li>Tanks (septic, water storage)</li> <li>Floor finishing</li> </ul>	Floor finishing	
C7. Create 3D model (presentation) of	You will be able to:	You will be able to:	System compatible for using Auto-CAD, installed
architect's concept	P1. Create 3D model ( wireframe) of an architectural assignment as per requirement	K1. Explain 3D model (wireframe) for an architectural assignment	Auto CAD software, PPE
	<ul><li>P2. Apply followings to the wireframe model</li><li>Material application</li></ul>	K2. Describe how to prepare 3D model including the following	
	Light application	Material application	
	Camera as per view requirement	Light application	
		Camera as per view requirement	
	P3. Apply render command and create raster		
	image of the assigned model	K3. Explain how to render and create raster image of 3D model	
C8. Apply printing to design	You will be able to:	You will be able to:	System compatible for using Auto-CAD, installed
	P1. Install/select the printer/ plotter software as per installation manual	K1. Define printing/plotting process and its importance	Auto CAD software, printer, plotter, scanner, PPE
	P2. Set up printing/plotting detail for a particular	K2. Explain set up procedure for	
	drawing/assignment	printing/plotting a drawing	
	Paper size	Paper size	
	Orientation	Orientation	
	• Scale	• Scale	
	Color / monochrome	Color / monochrome	

Unit of Competency	Performance Criteria	Knowledge	Tools & Equipment
	P3. Apply printing/plotting command in different formats	K3. Describe printing/plotting command for the following out put	
	Hard copy	Hard copy	
	Raster image	Raster image	
	• PDF	• PDF	

# TITLE D. Assist in managing Architectural Projects

**Overview:** This Competency Standard identifies the competencies required to manage the Architectural Project at workplace by an architect in accordance with the organization's approved guidelines and procedures. You will be expected to manage work flow and maintain documentation of architectural projects at workplace. Your underpinning knowledge regarding management of Architectural Project will be sufficient to provide you the basis for your work.

Unit of Competency	Performance Criteria	Knowledge	Tools & Equipment
D1. Steps involved in completion of an	You will be able to:	You will be able to:	<ul> <li>Stationery items</li> <li>Notebook</li> </ul>
Architectural Project	P1. Carry out the steps involved in an	K1. Describe the steps involved in an	
	architectural project from conception to	architectural project from conception to	
	completion P2. Complete and fulfil the requirements and	completion K2. Describe the requirements and implications	
	implications of individual steps involved	of individual steps involved	
	P3. Perform in accordance with the timeline	K3. Describe the importance of the timeline	
	required for each step involved during a project	required for each step involved during a project	
D1. Manage work	You will be able to:	You will be able to:	Computer, printer,
flow of an	P1. Specify the process of developing an		stationary items, PPE
architectural project	architectural product	K1. Explain the process of developing an architectural product	
	P2. Specify timeframe of a particular project as		
	per project requirement	K2. highlight the importance of timeframe for	
		different activities in an architectural project	
	P3. Perform quality control of deliverables as per		
	architectural organization's policy	K3. Define quality control for an architectural	
	architectural organization's policy	project regarding	
	P4. Apply health and safety precautions at	<ul> <li>Printing (size etc)</li> </ul>	
	workplace	<ul> <li>Hierarchy wise signature</li> </ul>	
		Date/revised date	
		Sheet number/record number	
		Scale	

Unit of Competency	Performance Criteria	Knowledge	Tools & Equipment
		<ul> <li>Scheme number/project</li> <li>K5. Describe standard operating procedure (s) of the organization</li> <li>K6. Describe specific safety precautions and guidelines</li> </ul>	
D2. Maintain documentation of architectural project	<ul> <li>You will be able to:</li> <li>P1. Manage record for the projects following the organizational instructions</li> <li>P2. Maintain the following records of architectural project: <ul> <li>Agreement</li> <li>Correspondence</li> <li>Approval</li> <li>Design data</li> <li>Delivery data</li> <li>Revised data</li> </ul> </li> </ul>	You will be able to: K1. Describe organizational record keeping procedure: Agreement Correspondence Approval Design data Delivery data Revised data	Computer, Stationary items, PPE

# TITLE E: Develop Professionalism

**Overview:** This Competency Standard identifies the competencies required to develop professionalism at workplace by an architect in accordance with the organization's approved guidelines and procedures. You will be expected to perform communication in an architectural organization, upgrade professional skills, work in a team and apply health and safety at workplace. Your underpinning knowledge regarding management of Architectural Project will be sufficient to provide you the basis for your work.

Unit of Competency	Performance Criteria	Knowledge	Tools & Equipment
E <mark>1. Communicate in</mark> an architectural	You will be able to: <b>P1.</b> Communicate with supervisor following	You will be able to:	Computer
organization	communication procedure	<b>K1.</b> Identify factors required to communicate effectively and precisely within	<ul> <li>Internet facility</li> <li>Telephone</li> </ul>
	<b>P2.</b> Communication with other departments following communication procedure	organisation. K2. Justify the appropriate use of electronic and relative media as per need	
	P3. Use media to communicate effectively (e.g: email, telephone etc)		
E2. Upgrade professional skills	You will be able to:	You will be able to:	Computer, internet facility
	P1. Participate in Skill test for professional development	<b>K1.</b> Identify the need of skills sets by getting involved in seminars, workshops and competitions.	
	P2. Attend seminars / workshops related to architectural developments	<b>K2.</b> Describe the importance of and carry out market research.	
	<b>P3.</b> Perform market research for professional growth	<b>K3.</b> Describe the importance of and adopt changing market trends	
	P4. Adopt upcoming market trends in		

Unit of Competency	Performance Criteria	Knowledge	Tools & Equipment
	architectural field		
E3. Work in a team	You will be able to:	You will be able to:	Computer, internet facility
	<ul> <li>P1. Demonstrate good team skills including</li> <li>Cooperation/coordination</li> <li>Work ethics</li> <li>Etiquettes/manners</li> </ul>	<ul> <li>K1. Identify the importance of being a good team player including <ul> <li>Cooperation/coordination</li> <li>Work ethics</li> <li>Etiquettes/manners</li> </ul> </li> </ul>	
	<b>P2.</b> Carry an appropriate appearance at workplace	<b>K2.</b> Identify the importance of carrying an appropriate appearance in workplace	
	<b>P3.</b> Show comfort and tolerance at workplace	<ul><li>K3. Describe the importance of showing comfort and tolerance at workplace</li><li>K4. Describe the importance of observing</li></ul>	
	<b>P4.</b> Present and observe good work ethics at workplace	good work ethics at workplace	
E4. Apply health and safety precautions	You will be able to:	You will be able to:	Computer, Personal protective equipment (PPE)
	<b>P1</b> . Follow safety precautions for different types of tools and equipment	<b>K1.</b> Describe the importance of following safety precautions necessary to use different types of tools and equipment	including Hand rest, foot rest, back rest adjustable chairs, proper
	<b>P2</b> . Follow operating instructions to use tools properly	<b>K2</b> . Define the importance to follow operating instructions given for tools	lighting in the room, screen filters, adjustable keyboard and
	<ul> <li>P3. Use following protective measures while working on computer</li> <li>Protective screen</li> <li>Maintain position/posture and distance from monitor</li> </ul>	<b>K3</b> . Describe the importance of ergonomics in using computers	mouse etc

Unit of Competency	Performance Criteria	Knowledge	Tools & Equipment
	Ergonomics		

# List of Tools, Equipment and Machinery

- Drafting table with necessary attachments (horizontal and vertical bar with angle adjustment),
- architectural triangular scale,
- stationary items (pencil, rubber, paper),
- geometry box (compass, divider, attachments, protector)
- Drafting software (latest version)
- Calculator
- measuring tape
- trigonometric table
- Compatible Computer system for using Auto-CAD
- Auto-CAD software (latest version) CD
- Printer
- scanner
- Internet facility
- Hand rest,
- foot rest,
- backrest
- Adjustable chairs,
- Proper lighting in the room,
- Screen filters
- Adjustable keyboard
- Adjustable mouse

## National Vocational and Technical Training Commission (NAVTTC)

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