Engineering Drafting



Youth Apprenticeship

ENGINEERING DRAFTING

Engineering Drafting youth apprentices prepare engineering drawings using current industry software, integrating concepts of building materials, engineering practices, and mathematics. Apprentices must adhere to industry safety and security standards.

Length of Apprenticeship: One year. This pathway is the prerequisite to second year engineering programs.

REQUIRED COMPETENCIES

Youth apprentices must become proficient in both general employability and occupation-specific competencies. All of these, and examples of how each can be demonstrated, are found in the following pages. A total of 13 occupational competencies must be learned for this occupation. Employers may substitute out two of these and should write in the competencies they are adding. Youth apprentices must be evaluated on these competencies at least two times each year of their apprenticeship.

Competencies

- 1. Interpret technical drawings
- 2. Use measuring devices
- 3. Organize databases, files, and drawings
- 4. Reproduce documents and plans
- 5. Use engineering drafting software
- 6. Develop 2D (orthographic) view drawings
- 7. Develop 3D view models
- 8. Prepare auxiliary views
- 9. Prepare section views
- 10. Complete drawing dimensions
- 11. Apply lettering and basic annotation to drawings
- 12. Revise draft drawings
- 13. Participate on an engineering project

POST-SECONDARY PATHWAY OPPORTUNITIES

There are several post-secondary pathway opportunities in this area. The following is a partial list.

- Civil Engineering Technology
- Mechanical Design Technology



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Youth Apprenticeship

ON-THE-JOB LEARNING PERFORMANCE STANDARDS GUIDE

YOUTH APPRENTICE INFORMATION

TOOTH ALT REITHEE IN ORMATION	
Youth Apprentice Name	
YA Coordinator	
YA Consortium	
School District	
SIGNATURES	
The On-the-Job Learning Performance Standards	Guide includes a list of competencies youth
apprentices learn through mentoring and training	·
should be reviewed with the employer/mentor,	s and School-Based or YA coordinators: This document school-based or YA coordinator on a regular basis with n future steps to ensure completion of the required nator, and the apprentice sign below.
Emplo 1 st Evaluation (Required)	oyer/Mentor 2 nd Evaluation (Required)
Employer/Mentor Signature	Employer/Mentor Signature
Employer/Mentor	Employer/Mentor
Business/Company	Business/Company
Date Signed	Date Signed
3 rd Evaluation (Optional)	4th Evaluation (Optional)
Employer/Mentor Signature	Employer/Mentor Signature
Employer/Mentor	Employer/Mentor
Business/Company	Business/Company
Date Signed	Date Signed

School-Based and/or YA Coordinator

1st Evaluation (Required)

2nd Evaluation (Required)

School-Based and/or YA Coordinator Signature	School-Based and/or YA Coordinator Signature
School-Based and/or YA Coordinator	School-Based and/or YA Coordinator
School District or Organization	School District or Organization
Date Signed	Date Signed

3rd Evaluation (Optional)

4th Evaluation (Optional)

School-Based and/or YA Coordinator Signature	School-Based and/or YA Coordinator Signature
School-Based and/or YA Coordinator	School-Based and/or YA Coordinator
School District or Organization	School District or Organization
Date Signed	Date Signed

Youth Apprentice

1st Evaluation (Required)

2nd Evaluation (Required)

Youth Apprentice Signature	Youth Apprentice Signature
Youth Apprentice	Youth Apprentice
School District / High School	School District / High School
Date Signed	Date Signed

3rd Evaluation (Optional)

4th Evaluation (Optional)

Youth Apprentice Signature	Youth Apprentice Signature
Youth Apprentice	Youth Apprentice
School District / High School	School District / High School
Date Signed	Date Signed

EMPLOYABILITY SKILLS (TO BE COMPLETED BY YA EMPLOYER/MENTOR)

All youth apprentices must demonstrate the key employability skills listed below in order to complete the YA program. They do so by earning at least a "Meets Expectation" rating in each. **At least two evaluations are required each year of a youth apprenticeship.** More columns are included below for those who choose to conduct more frequent reviews.

1	Working to Meet Expectations: Needs improvement; requires much assistance and supervision;
	rarely displays this behavior
2	Meets Expectations: Meets entry-level criteria; requires some supervision; often displays this
	behavior
3	Exceeds Expectations: Exceeds entry-level criteria; requires minimal supervision; consistently
	displays this behavior

Employability Skills		Rat	ing	
	Year	One Eval	uation Ra	iting
Competency and Rating Criteria	Initial	Mid	Mid	Final
		Year 1	Year 2	
 Develops positive work relationships with others. Examples of qualities and habits that the employee might exhibit include Interacts with others with respect and in a non-judgmental manner Responds to others in an appropriate and non-offensive manner Helps co-workers and peers accomplish tasks or goals Applies problem-solving strategies to improve relations with others When managing others, shows traits such as compassion, listening, coaching, team development, and appreciation 	☐ 1 ☐ 2 ☐ 3			
 Communicates effectively with others Examples of qualities and habits that the employee might exhibit include Adjusts the communication approach for the target audience, purpose, and situation to maximize impact Organizes messages/information in a logical and helpful manner Speaks clearly and writes legibly Models behaviors to show active listening Applies what was read to actual practice Asks appropriate questions for clarity 	☐ 1 ☐ 2 ☐ 3	☐ 1 ☐ 2 ☐ 3	☐ 1 ☐ 2 ☐ 3	□1 □2 □3
 Collaborates with others Examples of qualities and habits that the employee might exhibit include Works effectively in teams with people of diverse backgrounds regardless of sex, race, ethnicity, nationality, sexuality, religion, political views, and abilities Shares responsibility for collaborative work and decision making Uses the problem-solving process to work through differences of opinion in a constructive manner to achieve a reasonable compromise Avoids contributing to an unproductive group conflict Shares information and carries out responsibilities in a timely manner 	□ 1 □ 2 □ 3	☐ 1 ☐ 2 ☐ 3	☐ 1 ☐ 2 ☐ 3	☐ 1 ☐ 2 ☐ 3

	Employability Skills		Rat	ing	
	• • •	Year		uation Ra	iting
	Competency and Rating Criteria	Initial	Mid	Mid	Final
			Year 1	Year 2	
4. Ma	intains composure under pressure	□1	□ 1	□1	□1
Exa	mples of qualities and habits that the employee might exhibit include		☐ <u>-</u>	☐	
•	Uses critical thinking to determine the best options or outcomes when			☐ 3	□ 2
	faced with a challenging situation	L 3	🗀 🍮		3
•	Carries out assigned duties while under pressure				
•	Acts in a respectful, professional, and non-offensive manner while under				
	pressure				
•	Applies stress management techniques to cope under pressure				
5. Der	monstrates integrity	□1	□1	□1	1
	mples of qualities and habits that the employee might exhibit include	☐ -	☐ _	☐ -	□ -
•	Carries out responsibilities in an ethical, legal and confidential manner				
•	Responds to situations in a timely manner	3	∐3	3	∐ 3
•	Takes personal responsibility to correct problems				
•	Models behaviors that demonstrate self-discipline, reliability, and				
	dependability				
6 Da-	forms quality work				
	forms quality work mples of qualities and habits that the employee might exhibit include	<u></u>	<u> </u> 1	□ 1	
LXUI	Carries out written and verbal directions accurately	□ 2	□ □ 2	□ 2	□ 2
•	Completes work efficiently and effectively	☐ 3	□ 3	☐ 3	☐ 3
•	Performs calculations accurately				
•	Conserves resources, supplies, and materials to minimize costs and				
	environmental impact				
•	Uses equipment, technology, and work strategies to improve workflow				
•	Applies problem-solving strategies to improve productivity				
•	Adheres to worksite regulations and practices				
•	Maintains an organized work area				
7. Pro	vides quality goods or services (internal and external)	□ 1	□1	□1	□ 1
	mples of qualities and habits that the employee might exhibit include	□ <u>-</u> 2	☐ _	☐ 2	□ -
•	Shows support for the organizational goals and principles by own personal				
	actions	3	∐3		∐3
•	Displays a respectful and professional image to customers				
•	Displays an enthusiastic attitude and desire to take care of customer needs				
•	Seeks out ways to increase customer satisfaction				
0 Ch -	Produces goods to workplace specifications				
	ows initiative and self-direction mples of qualities and habits that the employee might exhibit include	□ 1	<u> </u> 1	∐1	
EXU!	Prioritizes and carries out responsibilities without being told	□ 2	□ 2	□ 2	□ 2
	Responds with enthusiasm and flexibility to handle tasks that need	☐ 3	□ 3	□ 3	□ 3
	immediate attention				
•	Reflects on any unsatisfactory outcome as an opportunity to learn				
•	Improves personal performance by doing something different or differently				
•	Analyzes how own actions impact the overall organization				
•	Supports own action with sound reasoning and principles				
•	Balances personal activities to minimize interference with work				
	responsibilities				

Employability Skills		Rati	ing	
	Year One Evaluation Rating			iting
Competency and Rating Criteria	Initial	Mid	Mid	Final
		Year 1	Year 2	
9. Adapts to change	□1	□1	□1	□1
Examples of qualities and habits that the employee might exhibit include			 2	 2
 Shows flexibility and willingness to learn new skills for various job roles 				
 Uses problem-solving and critical-thinking skills to cope with changing 		3	∐ 3	∐3
circumstances				
 Modifies own work behavior based on feedback, unsatisfactory outcomes, 				
efficiency, and effectiveness				
Displays a "can do" attitude				
10. Demonstrates safety and security regulations and practices				
Examples of qualities and habits that the employee might exhibit include			☐ 1	
Follows personal safety requirements	2	<u></u>	<u></u> 2	∐ 2
Maintains a safe work environment	□ 3	□ 3	3	3
Demonstrates professional role in an emergency				
Follows security procedures				
Maintains confidentiality				
,				
11. Applies job-related technology, information, and media	□ 1	□ 1	□ 1	□ 1
Examples of qualities and habits that the employee might exhibit include	2	□ 2	□ 2	_ 2
Applies technology effectively in the workplace			□ -	□ 3
 Assesses and evaluates information on the job 	🗆 🤊			
Assesses training manuals, website, and other media related to the job				
12. Fulfills training or certification requirements for employment	□ 1	□ 1	1	
Examples of this requirement may include		☐ 2		
Participation in required career-related training and/or educational			<u></u>	
programs			∐ 3	∐ 3
 Passing certification tests to qualify for licensure and/or certification 				
Participation in company training or orientation				
13. Sets personal goals for improvement				
Examples of this requirement may include		<u> </u>	□ 1	
Setting goals that are specific and measurable	□ 2	□ 2	2	2
Setting work-related goals that align with the organization's mission	☐ 3	□ 3	☐ 3	☐ 3
Identifying strategies to reach goals				
Reflecting on goal progress to regularly evaluate and modify goals				
, and the first of				

OCCUPATIONAL COMPETENCIES (TO BE COMPLETED BY YA EMPLOYER/MENTOR)

Youth apprentices must earn a rating of at least "MEETS EXPECTATIONS" in each competency by the conclusion of the apprenticeship. A total of 13 competencies, 11 must be from the list below. If necessary, employers can substitute two competencies with other occupationally appropriate skills. Those skills should be added to the competency list for assessment. At least two evaluations are required each year of a youth apprenticeship. More columns are included below for those who choose to conduct more frequent reviews.

1	Working to Meet Expectations: Needs improvement; requires much assistance and supervision;
	rarely displays this behavior
2	Meets Expectations: Meets entry-level criteria; requires some supervision; often displays this
	behavior
3	Exceeds Expectations: Exceeds entry-level criteria; requires minimal supervision; consistently
	displays this behavior

Occupational Competencies		Rati	ngs	
Competency and Rating Criteria	Evaluation Minimum Rating of 2 EACH Check Rating		ACH –	
	Initial	Mid Year 1	Mid Year 2	Final
1. Interpret technical drawings use technical terminology identify basic elements of technical drawings identify lines, views, symbols, and representations on the drawings interpret auxiliary drawing information identify tolerancing symbols in a technical drawing interpret dimensions and scale on the drawings use metric scale to properly read a drawing	□1 □2 □3	☐ 1 ☐ 2 ☐ 3	☐ 1 ☐ 2 ☐ 3	□1 □2 □3
2. Use measuring devices • choose appropriate instrument or aid for measuring task • verify instrument is accurate for calibration • read measuring instrument accurately • scale proportions accurately • convert standard English measurement to metric and vice versa • apply formula and units for measurements • record measurements using symbols • clean and maintain instruments • store instrument(s) properly	□ 1 □ 2 □ 3	□ 1 □ 2 □ 3	□ 1 □ 2 □ 3	□ 1 □ 2 □ 3

	Occupational Competencies		Rati	ngs	
			Evalua	ation	
		Minin	num Rati	ng of 2 E	ACH –
	Competency and Rating Criteria		Check		
	, , ,		Mid	Mid	
		Initial	Year 1	Year 2	Final
3.	Organize databases, files, and drawings	□1	□1	□1	□1
	select appropriate documents		<u> </u>		
	code documents as required				
	save and store drawings and files to database	3	∐3	□ 3	3
	sort and retrieve drawings and data from databases				
	enter data and edit fields and documents				
	 query to extract information from files and documents 				
	 create reports from queries 				
	·				
	use appropriate computer codes, formatting, macros, charts,				
	spreadsheets, etc.				
	verify data prior to entry/storage				
4.	Reproduce documents and plans	□ 1	□ 1		□1
	save copies to computer storage devices				
	operate copy machines	<u></u>	<u> </u> 2	2	
	 operate copy machines operate printers, plotters, and scanners 	3	□ 3	3	□ 3
	 number copies as required 				
	document copies made				
	uocument copies made				
5.	Use engineering drafting software	□ 1	□ 1	□ 1	□ 1
	 use file management to search, create, copy, edit, and save drawing 				
	files	<u></u>	<u> </u> 2	<u></u>	<u> </u> 2
	 import/export drawings from/to various graphic formats 	3	∐3	∐ 3	3
	 convert existing hard copy drawing to electronic format 				
	draw or modify drawings				
	utilize drawing management standards				
	set up plot parameter				
	select appropriate scale				
	use coordinate systems				
	 apply naming conventions, line types, and symbol/object management 				
	to drawing				
	apply notes and/or leaders to drawing				
	apply lettering, fonts, line thickness and type				
	• check drawing				
	maintain drawings in the file management system				
6.	Develop 2D (orthographic) view drawings	□1	□1	□1	□1
	select proper views				
	identify types of lines for drawing	"="			
	use line precedence	3	∐3	∐ 3	3
	construct an orthographic drawing				
	show hidden features and centerlines				
	complete title block by selecting lettering style and size				
	apply proper thickness lines				
	check drawing				
	label and save to appropriate project				

Occupational Competencies		Ratings		
		Evaluation Minimum Rating of 2 EACH – Check Rating		
	Minin			
Competency and Rating Criteria				
, , ,		Mid	Mid	
	Initial	Year 1	Year 2	Final
7. Develop 3D view models	□ 1	□1	□1	1
select proper view		☐ _	□ <u>-</u> □ 2	□ - □ 2
lay out view corner				
identify lines to be used	∐ 3	3	<u> </u>	∐ 3
determine and utilize line precedence				
draw 3D view models				
 show hidden features and centerlines as required 				
· ·				
complete title block by selecting lettering style and size				
apply proper thickness to lines				
check drawing				
label and save to appropriate project				
8. Prepare auxiliary views		□ 1	□1	□ 1
select proper auxiliary plane				
prepare auxiliary drawing	<u></u>	<u></u>	<u></u>	<u></u>
 complete title block by selecting lettering style and size 	□ 3	□ 3	3	□ 3
apply proper thickness to lines				
check drawing				
label and save to appropriate project				
9. Prepare section views	∐1	□ 1	∐1	∐ 1
select proper section view	2	□ 2	2	□ 2
prepare section drawing		□3	□ 3	□3
complete title block by selecting lettering style and size				
apply proper thickness to lines				
check drawing				
label and save to appropriate project				
10. Complete drawing dimensions	□ 1	□ 1	□ 1	□ 1
 select views to be dimensioned 		□2	□2	□2
 dimension views to standard 			 □ 3	
 create/draw dimension lines 				
 dimension views using appropriate style of dimensioning (coordinated 	d,			
linear)				
 dimension complex shapes when appropriate (e.g., spheres, cylinders 	,			
tapers, pyramids)				
 apply appropriate line thickness and type to dimension, extension, an 	d			
center lines				
check drawing				
 perform GDT (Geometric Dimensioning and Tolerancing) 				
11. Apply lettering and basic annotation to drawings		□ 1	□ 1	□1
add lettering				
 create/draw dimension and extension lines 	<u></u> 2	<u></u>	2	<u> </u>
 apply adequate drawing notations 	□ 3	□ 3	□ 3	3
 use appropriate abbreviations 				
apply finish marks about drawing				
check drawing				

Occupational Competencies		Rati	ngs	
	Evaluation			
	Minimum Rating of 2 EACH – Check Rating			
Competency and Rating Criteria				
	Mid		Mid	
	Initial	Year 1	Year 2	Final
12. Revise draft drawings	□ 1	□1	□1	□1
obtain all material (catalogs, calculations, references) pertaining to	☐		☐ 2	
drawn item				
 check dimensioning, tolerances, and references to other drawings 		∐3	3	
check for complete calculations and dimensioning on all required				
documents				
check material specifications are given in detail				
check that all necessary drawing views are included				
check clearances and interference between moving and adjacent parts				
 check the parts list on assembly drawings for sizes, catalog information, 				
material, etc.				
check appropriate unit of scale is indicated				
 review drawing revision (change) procedures 				
 identify drawing to be modified 				
 use engineering drafting software or draw manually 				
make modifications to drawing				
 construct a revision table on drawing 				
 record changes properly on revision table 				
apply appropriate line thickness and type				
check revised drawing				
record to appropriate project family				
 number all view drawings and supporting documents as required 				
document checks and revisions				
13. Participate on an engineering project	□ 1	□ 1	□1	□1
review the scope and phases of the design project with worksite		=	-	
professional	<u> </u> 2	<u> </u>	2	
identify customer requirements	□ 3	□ 3	3	∐3
identify design specifications				
research design constraints and criteria				
identify possible design solutions with team				
finalize design criteria and parameters				
plan development process				
evaluate project requirements				
estimate required resources and budget				
estimate time requirements				
identify interdependencies				
identify critical milestones				
create model/prototype				
test prototype				
 coordinate project steps with other project/departments 				
track critical milestones				
 track changes to engineering plans and costs 				
track progress of project				
 review plan activities completed and their results 				

Occupational Competencies	Ratings			
	Evaluation Minimum Rating of 2 EACH – Check Rating			
Competency and Rating Criteria				
	Initial	Mid	Mid	Final
		Year 1	Year 2	
Competency Substitute (if you replaced a competency above, note the	□ 1	<u></u> 1	<u>1</u>	
competency and rating)	□ 2	☐ 2 —	☐ 2	<u> </u>
	□ 3	□ 3	□ 3	□ 3
Competency Substitute (if you replaced a competency above, note the	□ 1	□ 1	□ 1	□ 1
competency and rating)	□ 2	□ 2	□ 2	□ 2
	□ 3	□ 3	□ 3	☐ 3
Comments:				
Comments.				

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