

Blueprint Reading & Commercial Estimating

2021
FALL TECHNICAL CONFERENCE

SEPTEMBER 16-18, 2021
HOLIDAY RESORT, ORBITAL

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Presenter


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ASCS, CVI

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Disclaimer


This presentation is not intended to be a comprehensive program covering all aspects of this topic. All technicians are encouraged to read and follow all applicable standards, codes and regulations related to this topic.

- ✓ It is the responsibility of each individual contractor to follow local building codes and licensing requirements and to work safely in accordance with OSHA guidelines.
- ✓ It is the contractor's responsibility to take proper precautions on each project to prevent cross contamination. Always take the health and safety of the building occupants into consideration before you conduct any cleaning procedures.
- ✓ All of the following tips are only general tips. They do not cover every situation and it is your responsibility to adapt these tips to the individual system you are working on.
- ✓ The Instructor is not responsible in any way for the work you perform after viewing this slide show. You are responsible for your own work.
- ✓ The views and opinions following are the instructors opinions and not necessarily the official position of the National Air Duct Cleaners Association.



What We'll Learn

- BLUE PRINT READING
- Learn Basic Symbology
- Symbols & Cost Projections



What We'll Learn

- PROJECT ESTIMATING
- Compose Spreadsheets
- Assign Metric Costs



Blue Print Reading



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Blue Print Reading

Understanding Mechanical Drawings

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Blue Print Reading

Understanding Mechanical Drawings

The main sections of a blueprint are:

- Title Sheets, and Site Plans.
- Title Block
- Floor Plans.
- Elevations and Sections.
- Details and Schedules
- Notes
- Structural Drawings.
- Mechanical, Electrical, and Plumbing

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Blue Print Reading


Understanding Mechanical Drawings

NOTES THIS SHEET:

1. FOR LEGEND AND GENERAL NOTES SEE SHEET M-1.
2. FOR ABBREVIATIONS SEE SHEET M-1.
3. RELOCATE EXISTING FIRE HANDERS AS NECESSARY FOR NEW HANDERS.
4. NOT USED.
5. EXISTING WIRE C AND WIRE D SHALL BE RELOCATED TO CENTER OF ROOM AND RE-TERMINATED.
6. NEW 1/2" RIGID POLYETHYLENE GLASS FIBER INSULATED COPPER WIRE SHALL BE INSTALLED AT 18" ON CENTER FROM CENTERLINE OF WALL TO CENTERLINE OF WIRE.
7. CONDUIT NEW COPPER TO BOTTOM OF EXISTING WIRE TRAY FOR NEW EXISTING WIRE.
8. INSTALL DUCTWORK AS HIGH AS POSSIBLE.
9. FLOOR PENETS AS NECESSARY TO ALLOW EXISTING PIPING, CONDUITS AND WIRE TRAYS TO PASS THROUGH FLOOR.
10. FLOOR PENETS SHALL NOT HAVE TURNING HANDS ACCESS FROM LEADING BELOW.
11. PROVIDE 2 HOUR FIRE RATED ACCESS DOOR, RELOCATED TO THIRD FLOOR.
12. COORDINATE REPAIRS TO EXISTING CONDUITS, WIRE TRAYS, AND FLOOR PENETS FOR CONDUITS, WIRE TRAYS, AND FLOOR PENETS.

AS BUILT

STANBACH & BOESCHNER ARCHITECTURAL, ENGINEERING AND INTERIOR DESIGN	JENNIFER W. ANDERSON REGISTERED PROFESSIONAL ENGINEER ELECTRICAL ENGINEERING	CHEMISTRY BUILDING UNIVERSITY OF VA MICHIGAN HALL CHARLOTTESVILLE, VIRGINIA	MECH. EQUIP. ROOM PENTHOUSE UNIVERSITY OF VA MICHIGAN HALL CHARLOTTESVILLE, VIRGINIA	DATE: 08/20/2020 SCALE: AS SHOWN SHEET NO.: 6333 PROJECT NO.: M25
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Blue Print
Reading

Understanding Mechanical Drawings

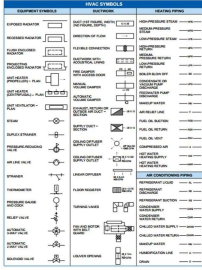
AS BUILT
4-15-68


MECH. EQUIP. ROOM PENT HOUSE		JOB NO. 6333
SCALE: $\frac{1}{4} = 1' - 0"$	CH'K'D. H.C.Y.	DRAWN H.A.M.
DATE 10/10/68	ISSUED M-25	



Blue Print
Reading

HVAC Symbols List - Legend





Blue Print
Reading




HVAC Symbols List - Legend

(WALL)	Ⓜ	HUMIDISTAT
(CEILING)	Ⓢ	SUPPLY AIR
		RETURN AIR
		EXHAUST AIR
		DUCT WIDTH (OR VISIBLE SIDE) AND DEPTH
		DUCT DIAMETER

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HVAC Symbols List - Legend

	SUPPLY AIR DUCT SECTION
	RETURN OR EXHAUST AIR DUCT SECTION
	OUTSIDE AIR DUCT SECTION

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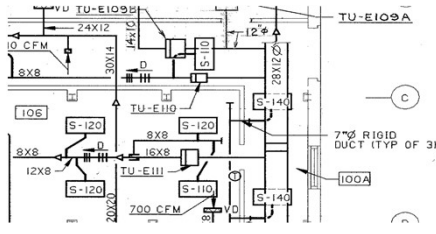
HVAC Symbols List - Legend



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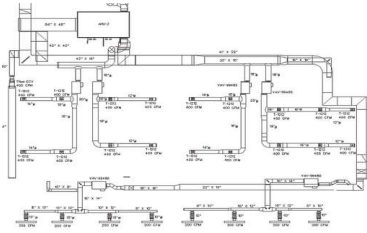
Understanding Mechanical Drawings



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Understanding Mechanical Drawings



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TAKE OFFS





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TAKE OFFS

1. Review specifications to help understand scope of project.
2. Confirm you have all mechanical pages.
3. Identify AHU's or other systems of concern
4. Review equipment schedules (if available).
5. Review General notes on drawings






Blue Print Reading

TAKE OFFS

Specifications


Where do we find the HVAC Cleaning?


1. Division 15 (New Format Coming)
2. HVAC Section
3. Keyed Notes
4. General notes
5. Addendums



General Notes

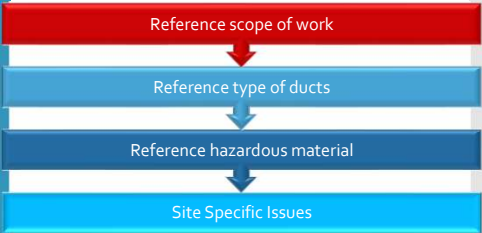
Where do we find them?





Blue Print Reading

General Notes





Blue Print Reading





Blue Print Reading


Tools Needed

- ✓ Highlighters
- ✓ Scale Ruler
- ✓ Scale master






Scale Ruler




Blueprints and Plans for HVAC
Joseph Moravsek Frank Miller
BARNES & NOBLE
www.bn.com
• \$120 approximate price

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The World's Finest Measuring Tools
SCALEX Corporation



The Plan Wheel XLU2 is the perfect tool for taking scaled measurements from blueprints, maps and plans. Just select the built-in scale factor to match the plan and roll the PlanWheel. The measurement is displayed instantly. Portable, uses two AAA batteries (included). Connects to your computer with optional Interface Kit.



Cost around: \$50 Amazon

Takeoff Sheet

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Project Name: _____

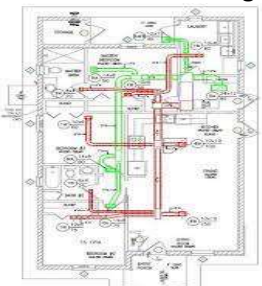
Print #	AHU	Supply	Return	Ex	VAV's	Re-heats			

16

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Blue Print Reading

Color Coding

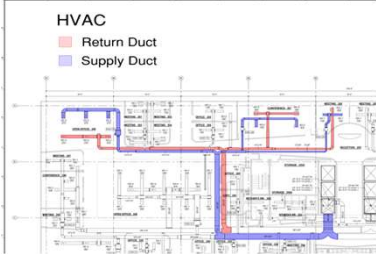


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Blue Print Reading

Color Coding

HVAC
Return Duct
Supply Duct

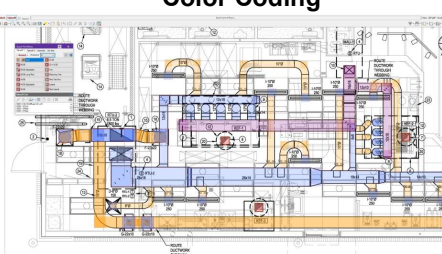


The diagram shows a complex network of HVAC ducts. Red lines represent return ducts, and blue lines represent supply ducts. The ducts are shown in a top-down view, with various branches and connections. The background is a technical drawing with grid lines and annotations.

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Blue Print Reading

Color Coding




The diagram shows a complex network of HVAC ducts. Red lines represent return ducts, and blue lines represent supply ducts. The ducts are shown in a top-down view, with various branches and connections. The background is a technical drawing with grid lines and annotations.

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Converting Duct Size to Sq. Ft.



Example: Duct is 16"x18"x 150'

What is the Square Footage?
 $16+16+18+18$ divided by $12 \times 150 = 850$ Sq. Ft

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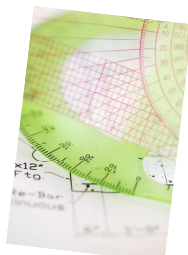
Take Offs

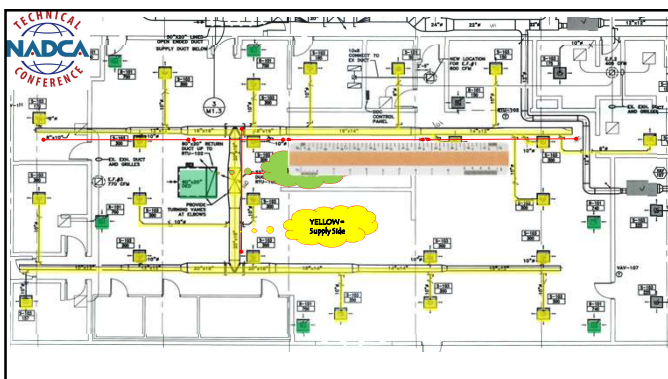
- ✓ Gather Information
 - ✓ Type of ductwork
 - ✓ Length of ductwork
 - ✓ Height & Width
 - ✓ # of AHU's
 - ✓ Components
 - ✓ VAV, Diffusers, turning vanes

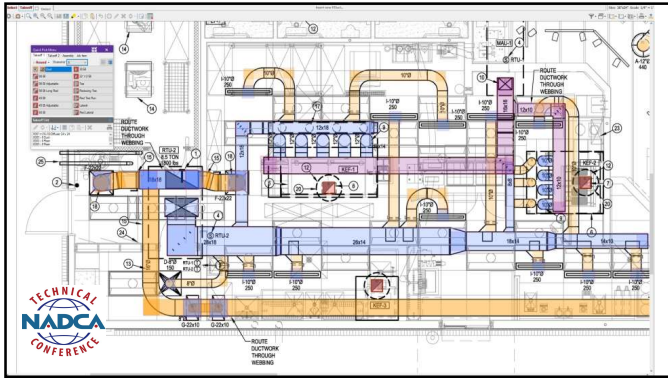
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Blue Print Reading

Take Offs Exercise










Project Estimating





Project Estimating

ASK Questions if unsure!


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Project Estimating

Project Estimating

Mixing It ALL Together

- Take your measurements
- Take your components
- Take your materials list
- Take your man hours
- Take your specifications
- Take your general notes



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Project Estimating

COMPONENTS

Definition of **Component**

Component (HVAC System Component) –

A **Component**, or HVAC system component, is any individual item that's part of delivering air within an HVAC system.

Examples of **Components** are VAV Boxes, Lined Ducts, Metal Ducts and Air Handling Units.

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Project Estimating

TASKS

Definition of **Task** from the Bid Estimator Manual:

Task - A **Task** is a specific job or service that is performed to an HVAC system **Component**.

Examples of **Tasks** include cleaning a duct surface, reconditioning an AHU or applying a coating product to a fiberglass duct system. The specific **Task(s)** being performed on a HVAC system **Component**, regulate labor, materials and equipment required to complete the work on that **Component**.

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TASKS + Components
 Multiplying both Items Produces Man Hours

Project Estimating

Component
 x Task

 = Man Hours

6 VAV Boxes
 x 3 Man/Hours

 = 18 Man/Hours



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Task Clean 16 Man Hours

Task Coat 2 Man Hours

Component
 7.5 -10 Ton

Task Clean: Materials
 Caul Cleaner 3 gallons
 Rubber Gloves

Task Coat: Materials
 Fungicidal Coating 77 sq. ft. per gallon
 Tyvek Suits
 Painters Hoods

Task Clean: Equipment
 Negative Air Machine
 Contact HEPA Vacuum

Task Coat: Equipment
 Negative Air Machine
 Paint Sprayer
 Paint Mixing tools
 Paint Strainer

Material Equipment Usage Selection Process

What is the difference?

Components
↓
Tasks
↓
Both Words = Money

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Estimating Labor
Converting take-off's to man hours

Quantity ÷ Production Rate = Man Hours


Man Hours × Labor Rate = COST

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Current Pricing Methods

- Price by Linear Footage
- Price by Man/Hour
- Price by Point
- Flat Rate Pricing
- Materials plus Mark-Up
- Materials with no Mark-Up
- Price by Building Square Footage

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Factors Affecting Pricing Criteria

Set-Up Time

Contamination Level of the Duct System

Accessibility of Items to be Serviced



Factors Affecting Pricing

Age of Ductwork

Type of Materials Used for Fabrication


Accuracy in Take Off

Operating Overhead


Production of Work Crews

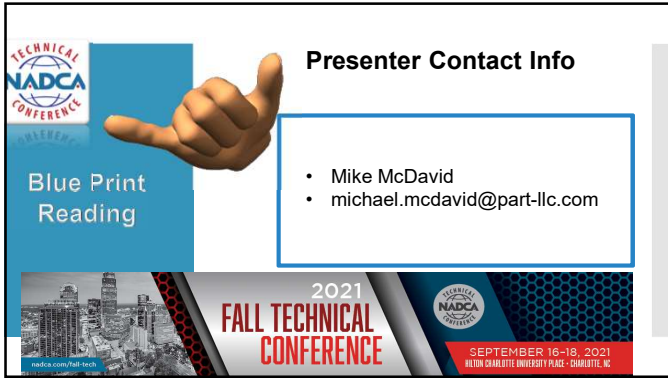
Type of Tools and Equipment in Use

Material Costs - Material Percentage



Blueprint Reading & Estimating for Commercial Projects





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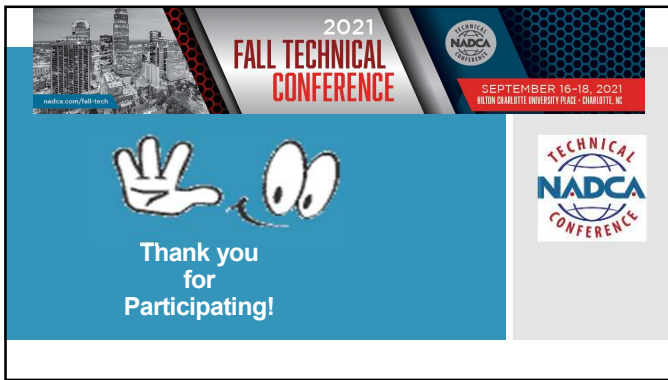
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Thank you
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