

MAINEDOT's BRIDGE COLLEGE

Bridge Maintenance 101



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Topic: Reinforcing Steel



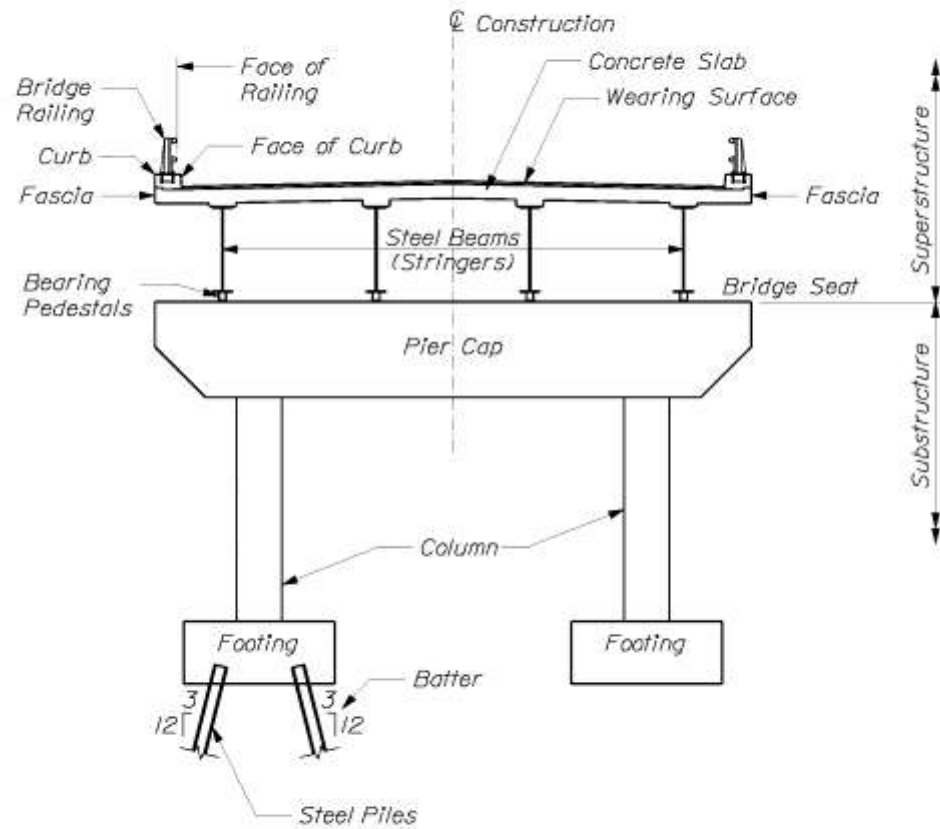


Reinforcing Steel

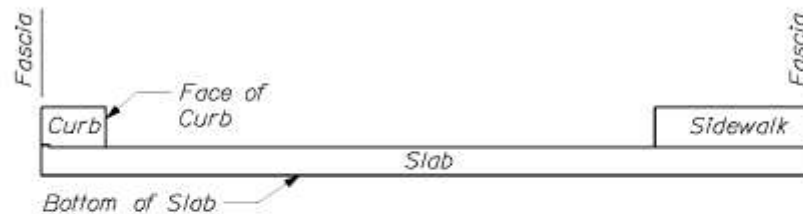
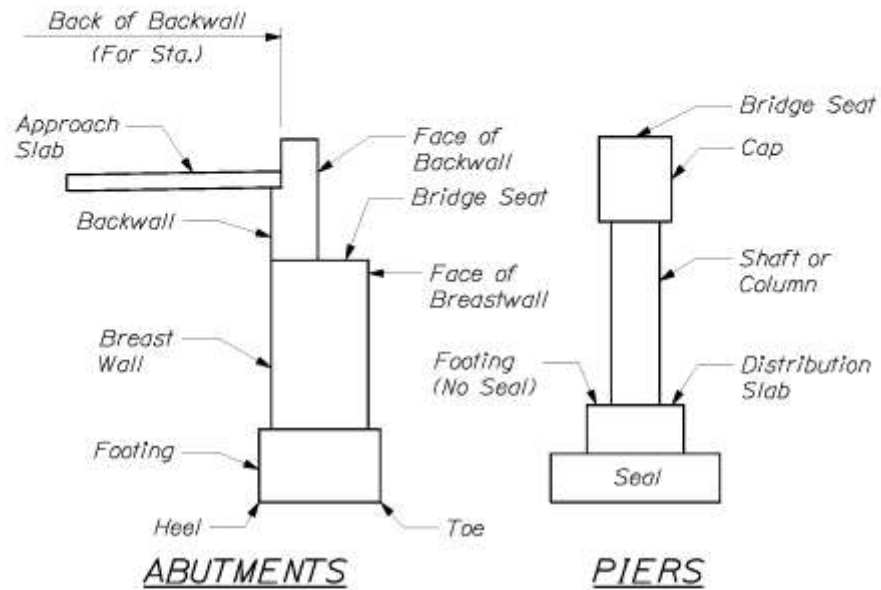
Class Outline

1. Purpose of Rebar
2. Rebar -- Sizes and Types
3. Coating and Prep
4. Cutting and Bending
5. Drilling and Anchoring
6. Rebar Placement
7. Tying Methods
8. PPE and Hazards

SECTION THRU STRUCTURE



TYPICAL STRUCTURE



SUPERSTRUCTURE

1. Purpose of Rebar

- Strengthens concrete
- Acts as a skeleton
- Rebar increases the tensile strength of concrete
- Concrete is strong in compression but weak in tension

2. Rebar -- Sizes and Types

Bar Size Designation	Area (in ²)	Weight (lb/ft)	Diameter (in)
#3	0.11	0.376	0.375
#4	0.20	0.668	0.500
#5	0.31	1.043	0.625
#6	0.44	1.502	0.750
#7	0.60	2.044	0.875
#8	0.79	2.670	1.000
#9	1.00	3.400	1.128
#10	1.27	4.303	1.270
#11	1.56	5.313	1.410
#14	2.25	7.650	1.693
#18	4.00	13.60	2.257

2. Rebar -- Sizes and Types

(Continued)

Key thing to remember – the size of the bar refers to the number of eighths of an inch in diameter.

Example: #5 Bar is $5/8$ inches in diameter

2. Rebar -- Sizes and Types

(Continued)

Grade of rebar refers to the yield strength of the steel.

Grade 40 -- 40,000 lbs. yield strength

Grade 60 -- 60,000 lbs. yield strength

2. Rebar -- Sizes and Types

(Continued)

- We use Grade 60
- Markings stamped on bar
- Different marking systems
- Typically marked with label indicating manufacturer, bar size, material and grade

3. Coating and Prep

a. Coatings

- Epoxy Coated

3. Coating and Prep

(Continued)

b. Prep

- Unsound concrete and badly rusted steel must be removed
- Prepare the steel by removing rust (on new and old rebar)
- Old rebar will need to be sandblasted



3. Coating and Prep

(Continued)

- Preparation starts with proper storage of rebar – up off the ground










4. Cutting and Bending

a. Cutting

- Cold cutting
- Typical Tools
 1. Manual
 2. Power

 VANFO



 VANFO





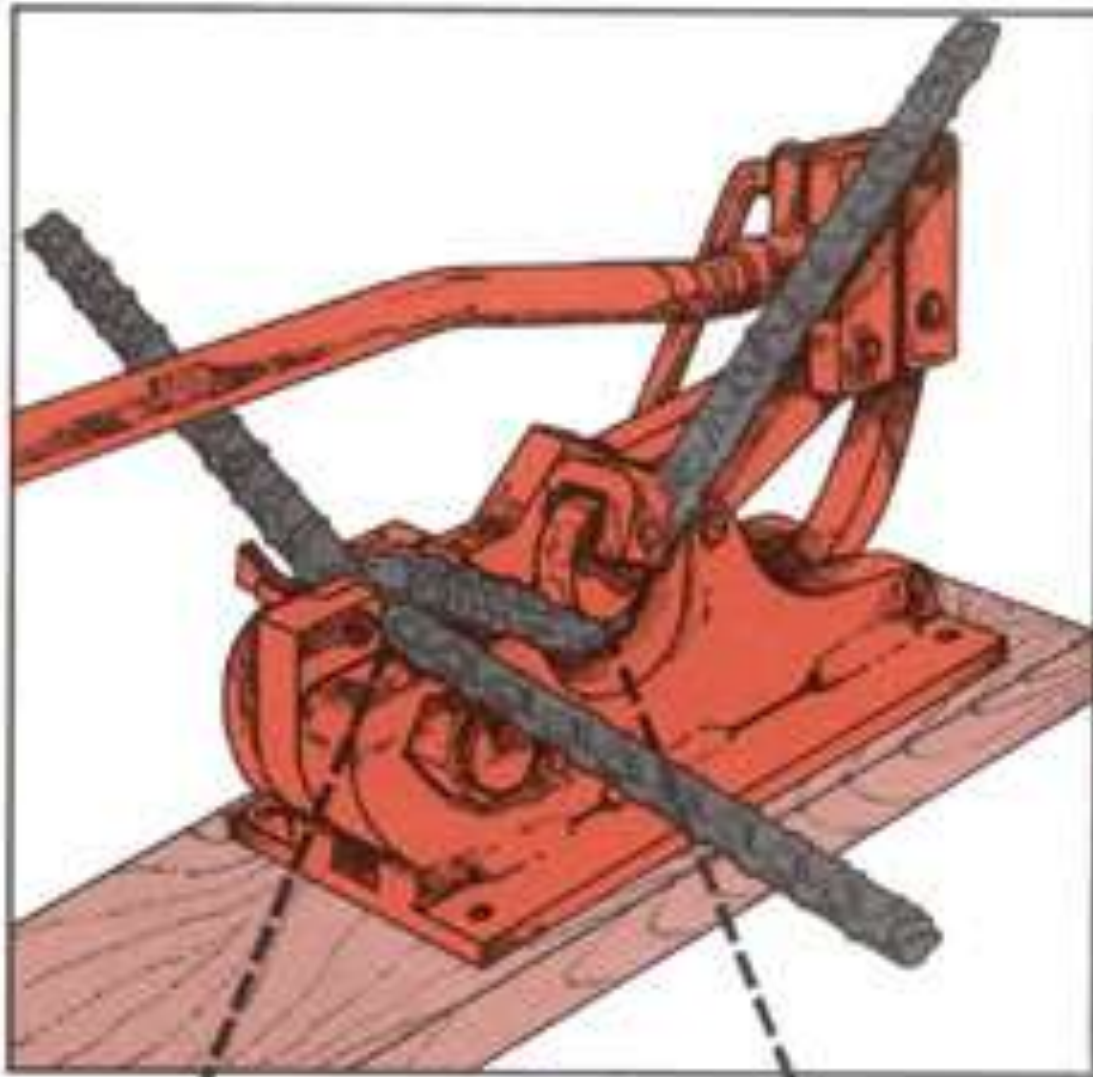
4. Cutting and Bending

(Continued)

b. Bending

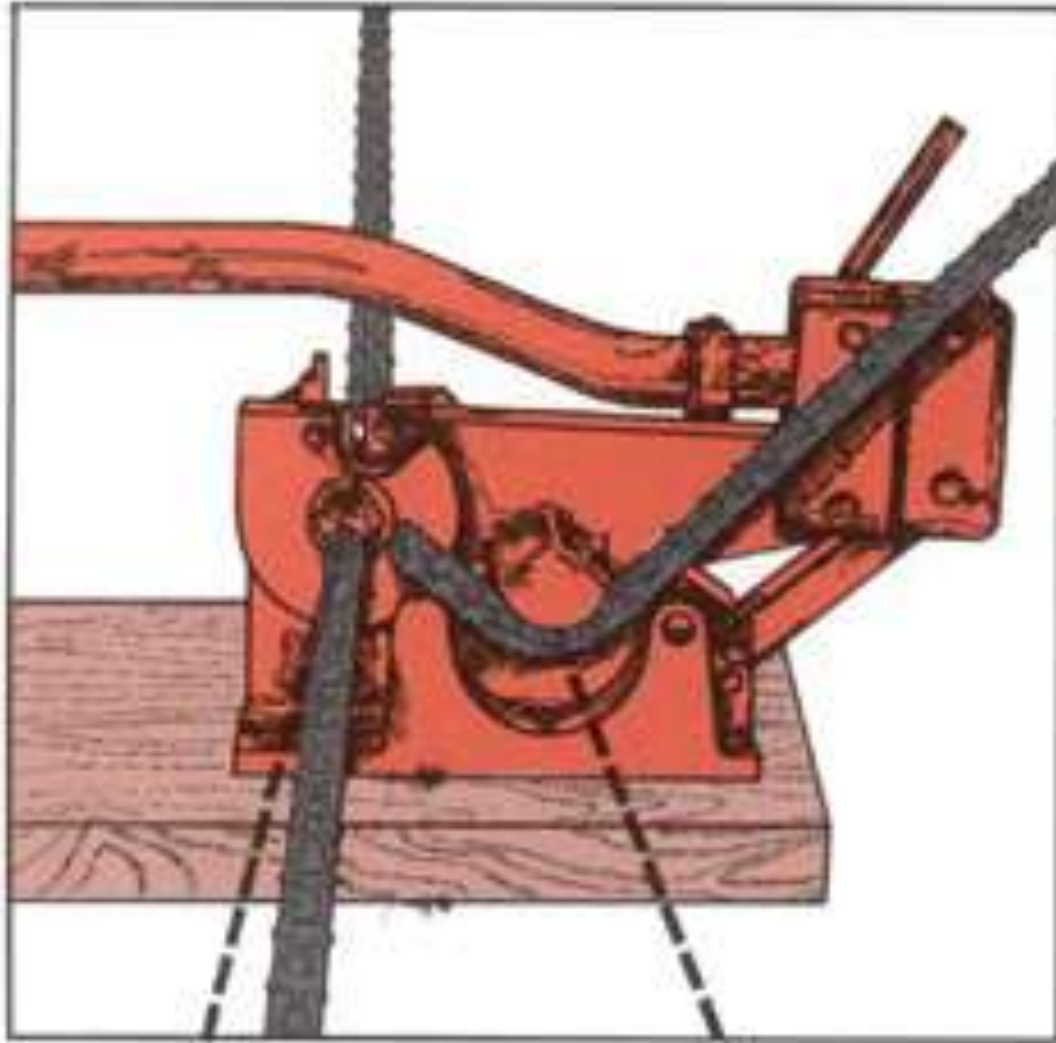
- Typical Tools
 1. Manual
 2. Power





CUTTER

BENDER



CUTTER

BENDER



5. Drilling and Anchoring

- Forms must be attached and anchored
- Oversize holes are drilled and anchors secured with grout or epoxy



5. Drilling and Anchoring

(continued)

- Rebar and coil attached
- Bolt or rebar, with nuts and washers, used to hold plywood form in place through hole drilled in the plywood











6. Rebar Placement

- Size and spacing of bars and stirrups are based on an engineered design
- Blocking required for some members







6. Rebar Placement

(Continued)

- Blocking can be either concrete blocks, or plastic or metal devices called chairs



7. Tying Methods

- Figure 8 ties
- Saddle ties
- Combination of Figure 8 and saddle ties
- Double tie



Tying Tools

1. Battery powered rebar tying gun
2. Two different types of yo-yo's.
3. Pliers
4. Bag ties























8. PPE and Hazards

- Hard hat
- Safety vest
- Gloves
- Eye protection
- Hearing protection
- Protective apron/chaps

8. PPE and Hazards

(Continued)

- Sharp objects (wire, rebar, metal fragments, etc.)
- Plastic caps on ends of rebar to protect workers from being impaled
- Moving parts -- keep fingers away





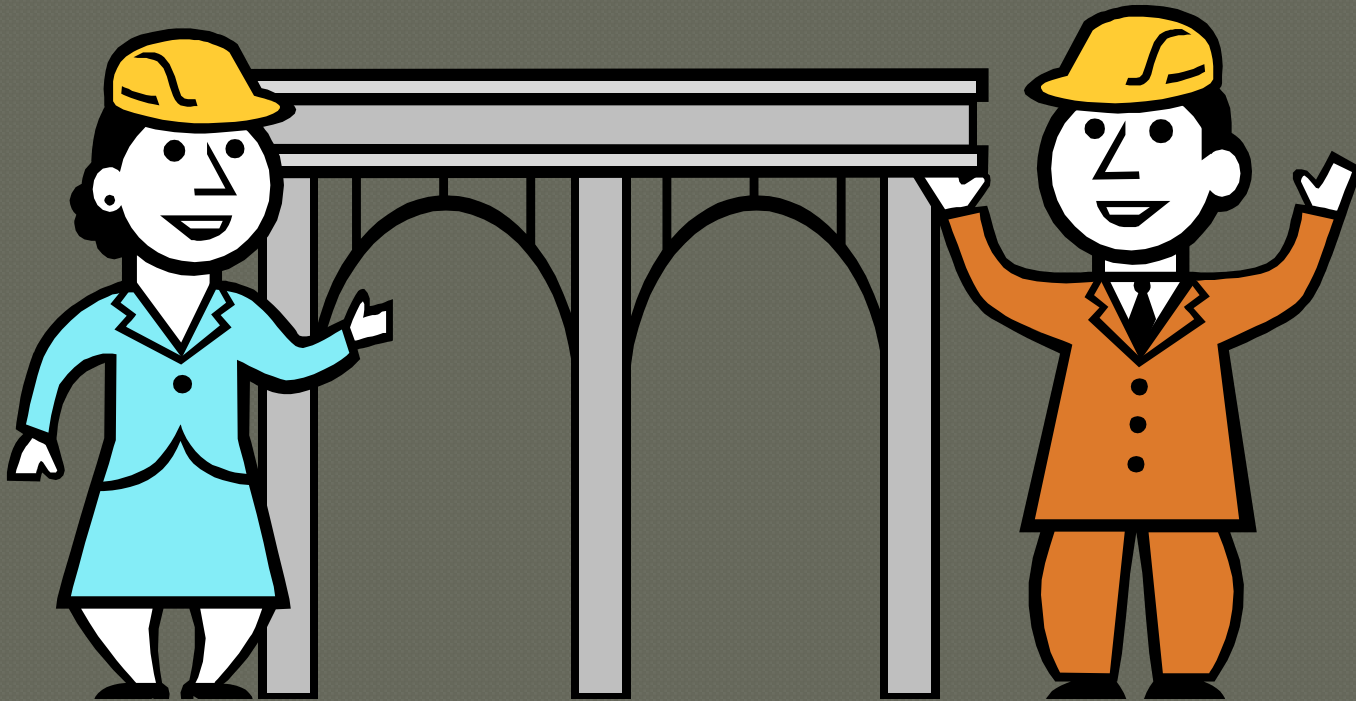






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THE END



HANDS-ON CLASS EXERCISE

1. Class to view rebar chart and look at rebar samples
2. Class to try cutting and bending rebar.
3. Class to learn how and practice tying rebar on bridge rail rebar cage

TEST