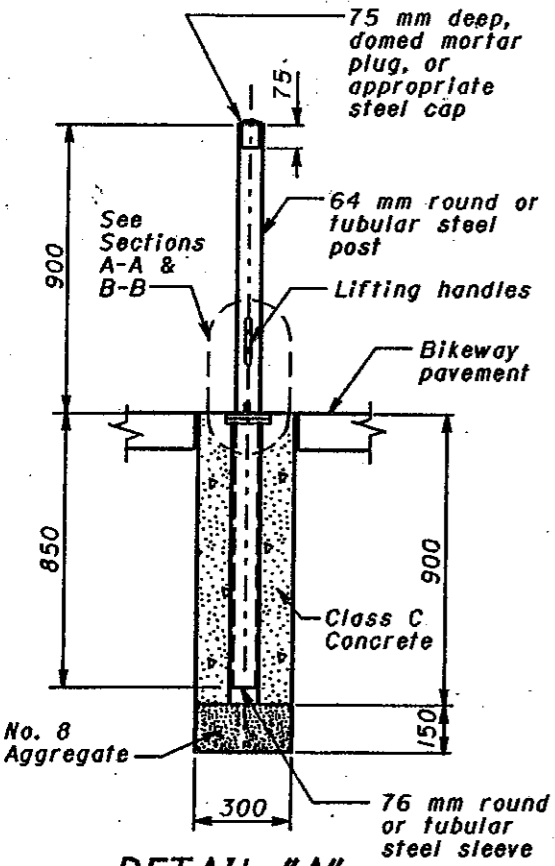


Note: Place padlock on the side facing away from intersection.

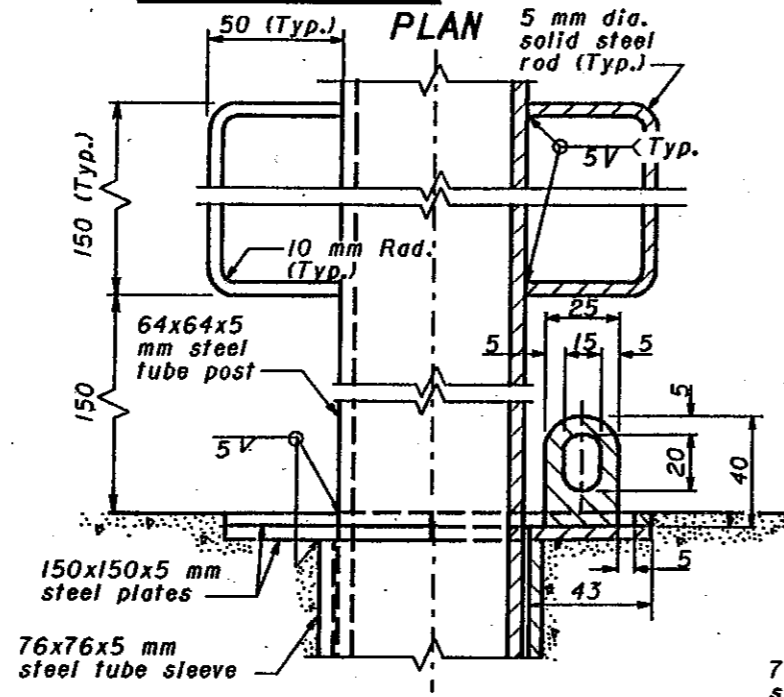
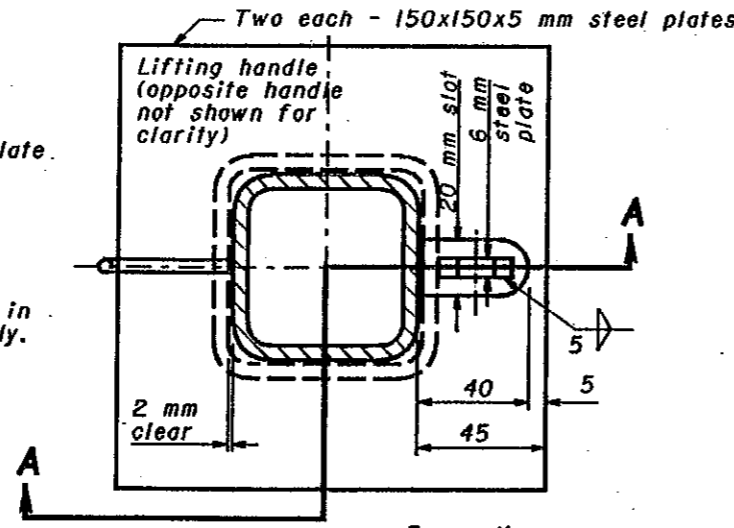
Expansion joint material (all four sides). Required in rigid pavement only.

Lifting handles not shown for clarity

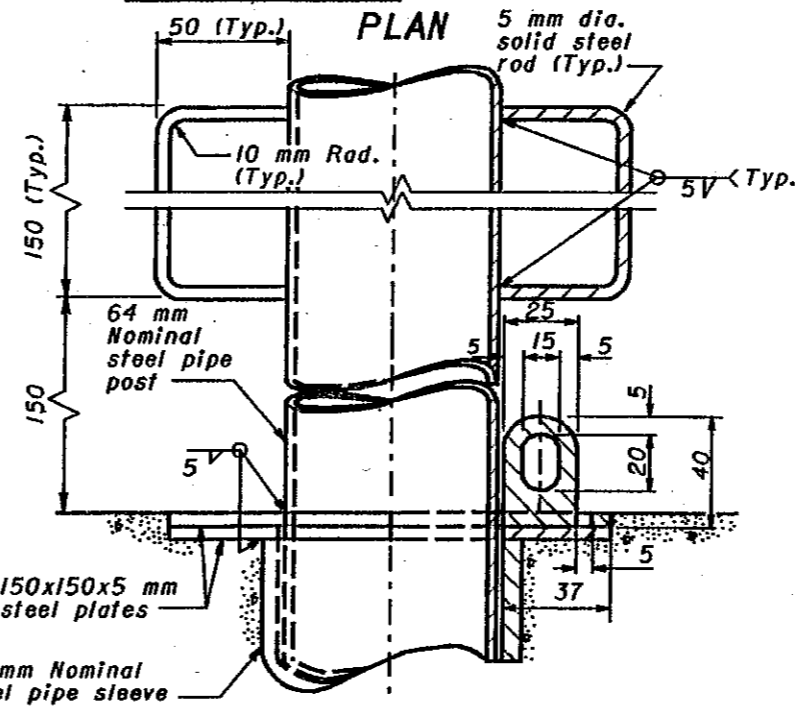
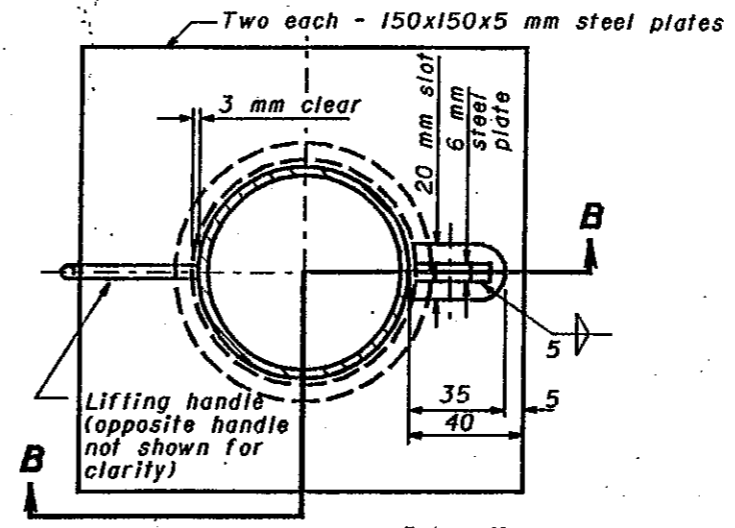
**DETAIL "A" PLAN VIEW**



**DETAIL "A" ELEVATION VIEW REMOVABLE BOLLARD**



**SECTION A-A REMOVABLE SQUARE BOLLARD**



**SECTION B-B REMOVABLE ROUND BOLLARD**

**NOTES**

**GENERAL:** All bollard sleeves shall be mounted flush with the bikeway pavement.

**CONCRETE ENCASEMENT:** Sleeve encasement shall be square, as shown, in concrete pavement, but may be square or round in flexible pavement. Round encasement should be 300 mm diameter.

**PREFORMED EXPANSION JOINT FILLER:** Shall meet the provisions of CMS 705.11, and is required when bollards are set in concrete pavement.

**STEEL PIPE:** Shall be ASTM A 53 Schedule 40, hot-dipped galvanized after fabrication in accordance with ASTM A 123.

**CONCRETE:** All concrete shall be Class C and shall conform to CMS 499 and CMS 511.

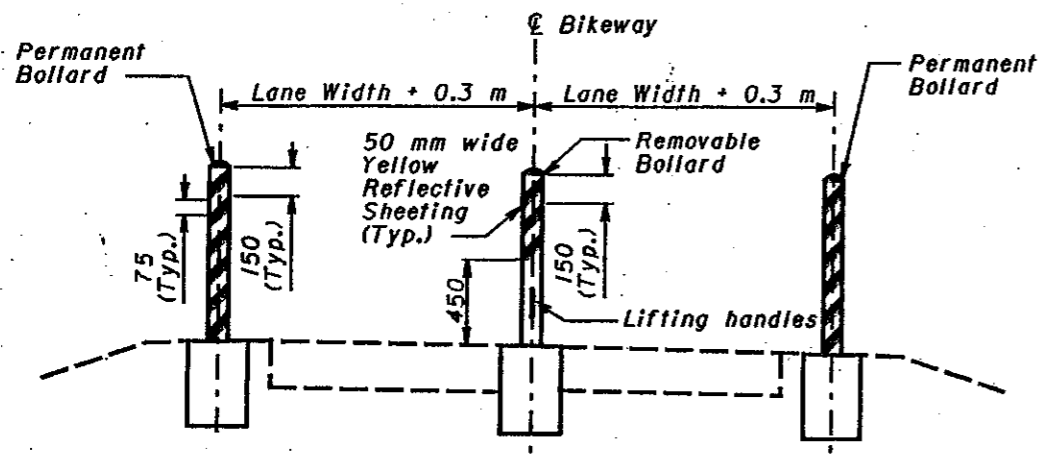
**REFLECTIVE SHEETING:** Shall meet the provisions of CMS 730.19.

**GALVANIZING:** All steel parts shall be hot-dipped galvanized after fabrication in accordance with ASTM A 123.

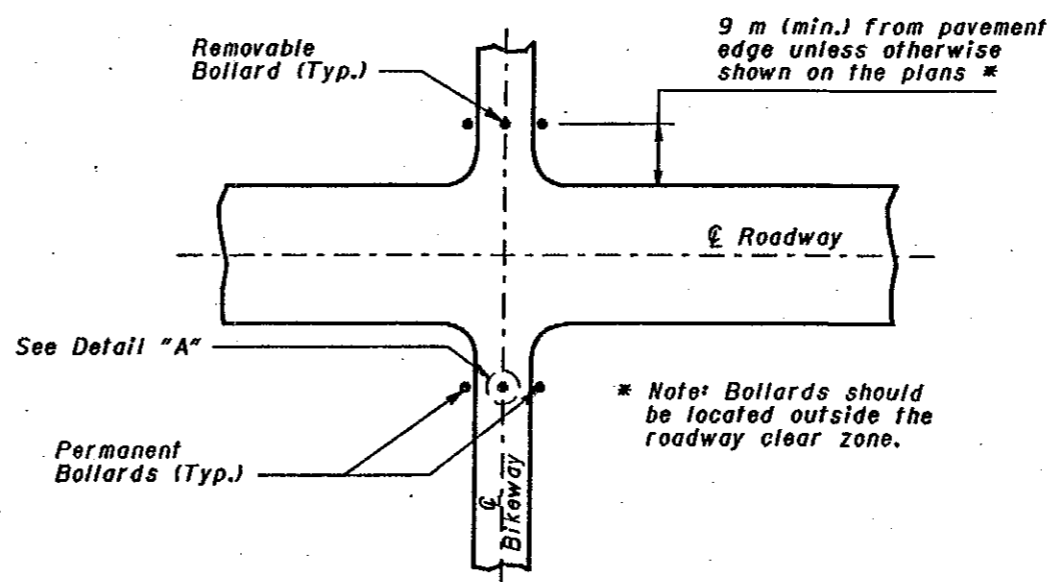
**ALUMINUM:** All steel components may be replaced by aluminum components meeting the following ASTM Specifications: B 209M (plate), B210M or B241/B 241M (drawn seamless tubes & plates), B 211M (rods), and F 901 (bolts).

**PERMANENT BOLLARDS:** Permanent Bollards shall be the same as Removable Bollards, except that the steel plates, sleeves and lifting handles shall be omitted. The post shall be encased directly in concrete.

All dimensions are in millimeters unless otherwise noted.



**BOLLARD PLACEMENT - ELEVATION VIEW**



**BOLLARD PLACEMENT - PLAN VIEW**

OFFICE OF ROADWAY ENGINEERING  
OHIO DEPARTMENT OF TRANSPORTATION

**STEEL BOLLARDS**

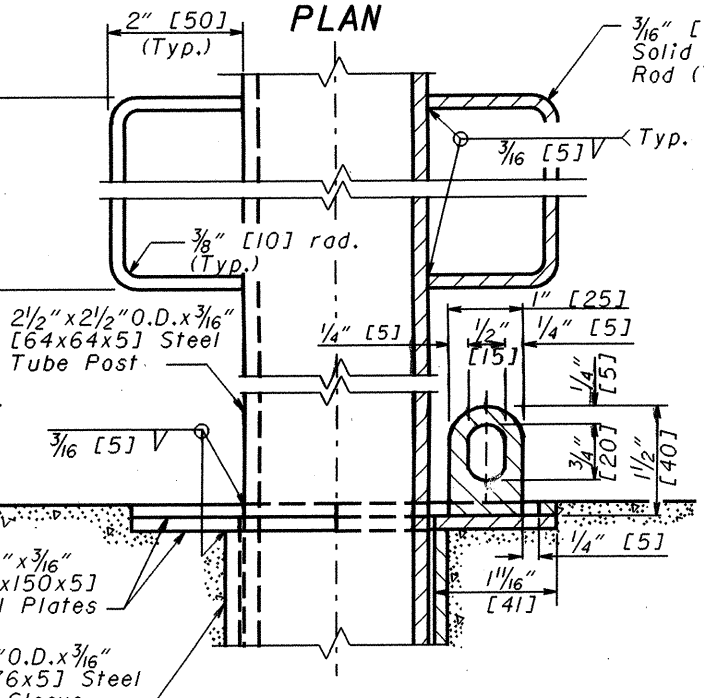
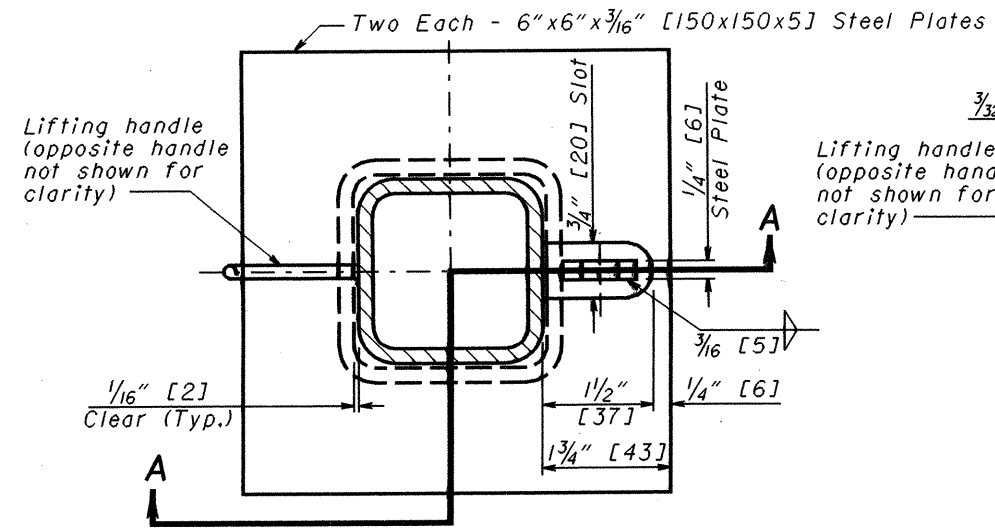
DATE  
1-3-96

STANDARD CONSTRUCTION DRAWING  
**RM-5.1M**

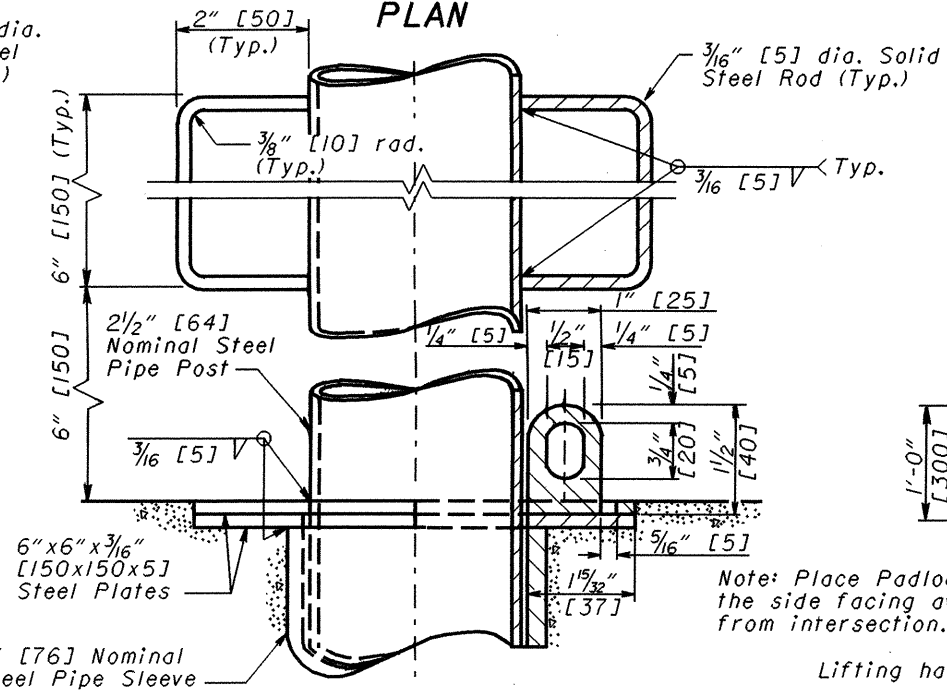
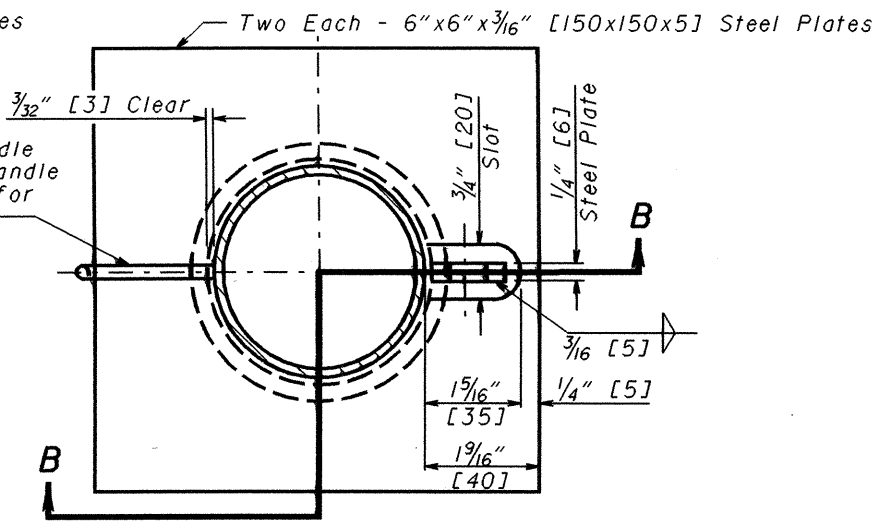
APPROVED *D.K. Hubman, P.E.*  
ADMINISTRATOR

# NOTES

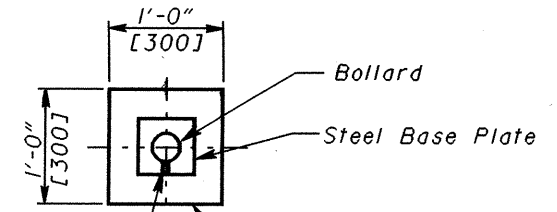
- GENERAL:** Mount all bollard sleeves flush with the bikeway pavement.
- CONCRETE ENCASEMENT:** Sleeve encasement shall be square as shown, in concrete pavement, but may be square or round in flexible pavement. Round encasement should be 1'-0" [300] diameter.
- PREFORMED EXPANSION JOINT FILLER:** Shall meet the provisions of CMS 705.11, and is required when bollards are set in concrete pavement.
- STEEL PIPE:** ASTM A 53 Schedule 40.,
- CONCRETE:** Use Class C concrete as specified in CMS 499 and CMS 511.
- REFLECTIVE SHEETING:** Shall meet the provisions of CMS 730.19.
- GALVANIZING:** After fabricating, hot-dip galvanize all steel parts, including steel pipe, as specified in ASTM A 123.
- ALUMINUM:** All steel components may be replaced by aluminum components meeting the following ASTM Specifications: B 209 (plate), B 210 or B 241 (drawn seamless tubes & plates), B 211 (rods), and F 901 (bolts).
- PERMANENT BOLLARDS:** Permanent Bollards shall be the same as Removable Bollards, except that the steel plates, sleeves and lifting handles shall be omitted. Encase posts directly in concrete.



**SECTION A-A  
REMOVABLE SQUARE BOLLARD**

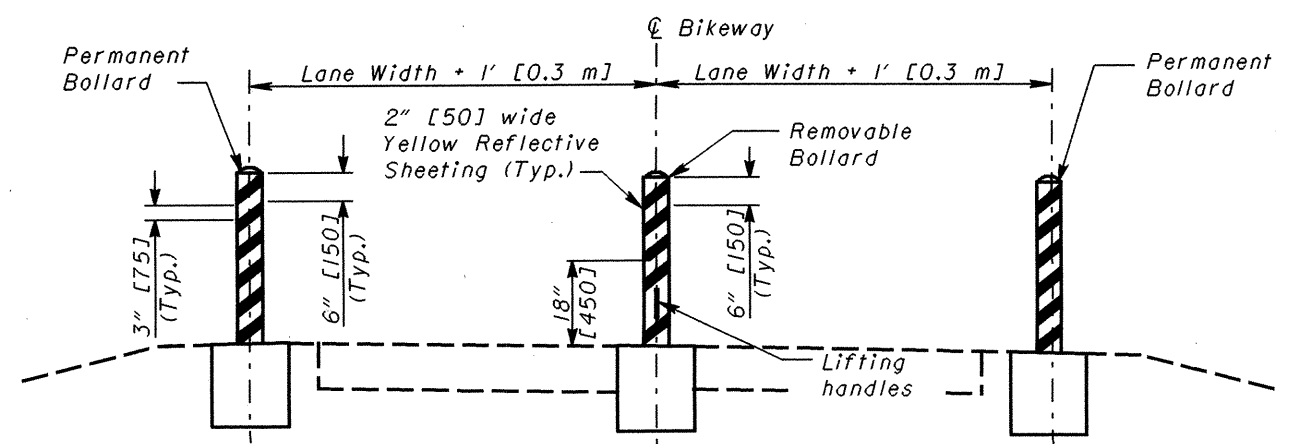


**SECTION B-B  
REMOVABLE ROUND BOLLARD**

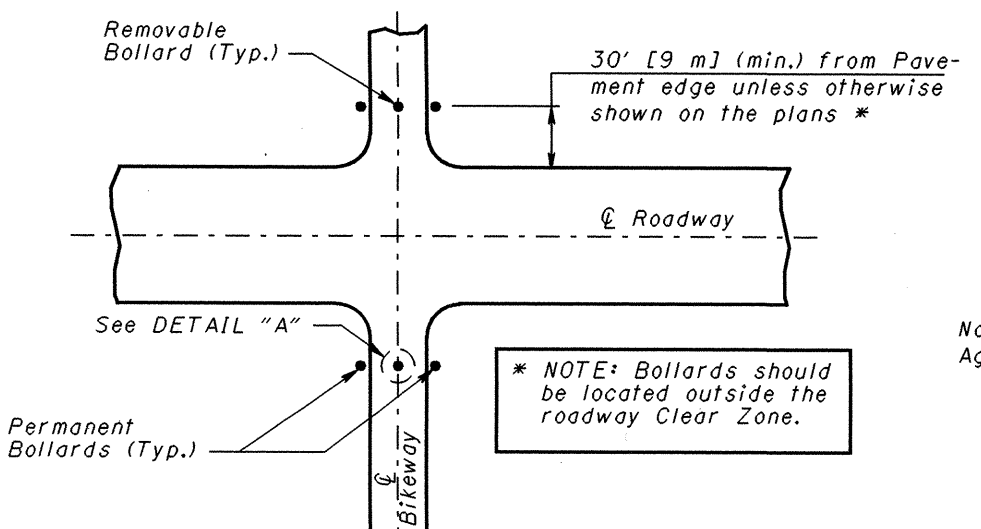


Note: Place Padlock on the side facing away from intersection.  
Expansion Joint material (all four sides). Required in Rigid Pavement only.  
Lifting handles not shown for clarity

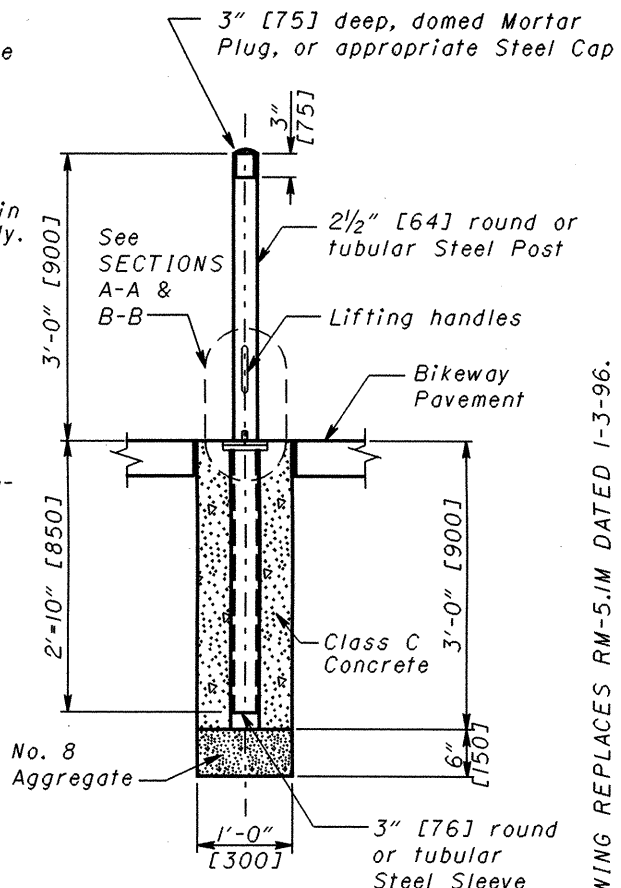
**DETAIL "A"  
PLAN VIEW**



**BOLLARD PLACEMENT - ELEVATION VIEW**



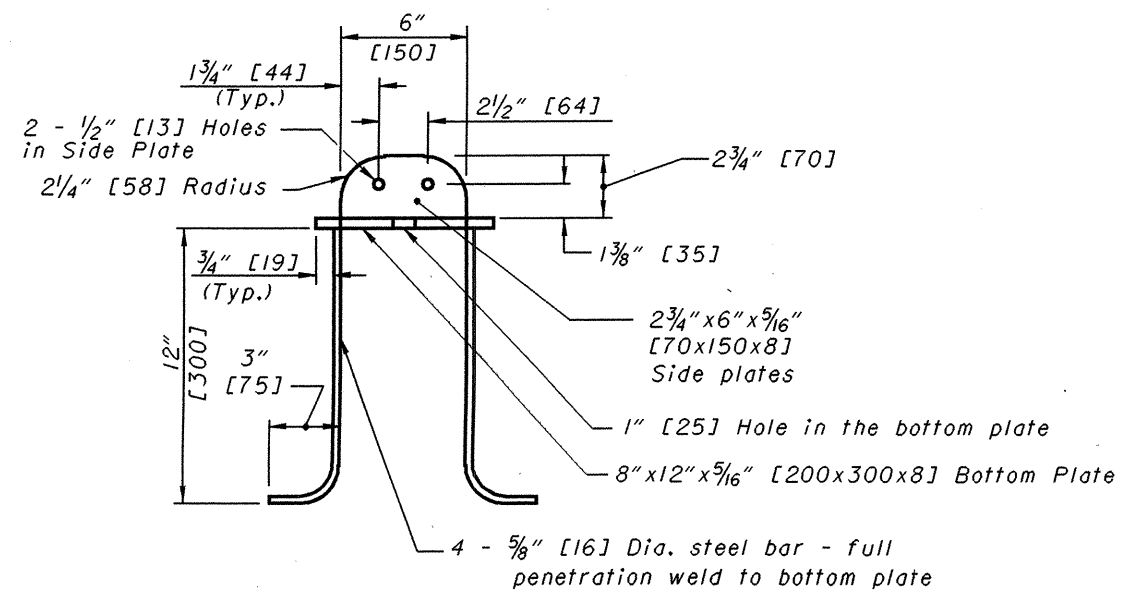
**BOLLARD PLACEMENT - PLAN VIEW**



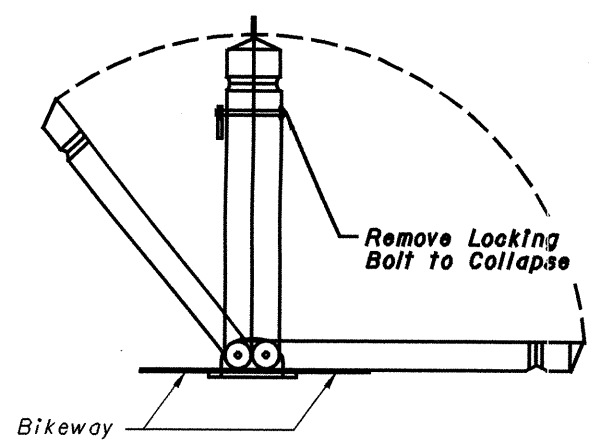
**DETAIL "A"  
ELEVATION VIEW  
REMOVABLE BOLLARD**

THIS DRAWING REPLACES RM-5.1M DATED 1-3-96.

OHIO DEPARTMENT OF TRANSPORTATION  
 ROADWAY DESIGN ENGINEER  
 D. Focke  
 STANDARDS ENGR.  
 ROADWAY ENGINEERING SERVICES  
 ALL metric dimensions (in brackets [ ]) are in millimeters unless otherwise noted.  
 STANDARD ROADWAY CONSTRUCTION DRAWING  
**STEEL BOLLARDS**  
 NUMBER RM-5.1  
 4-18-03 DATE  
 1/2



**SECTION**

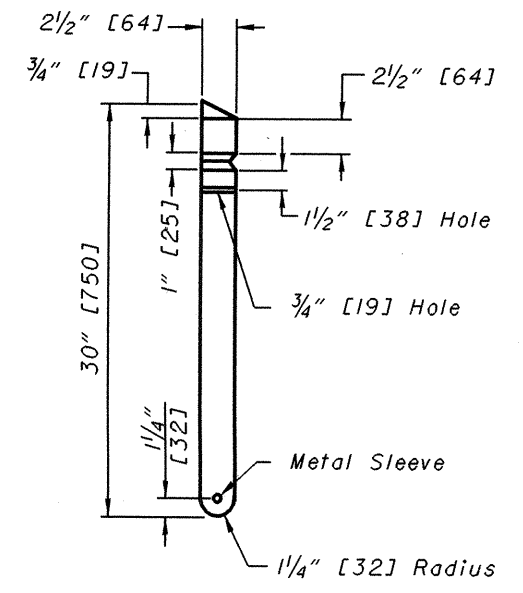


**BOLLARD DETAIL**

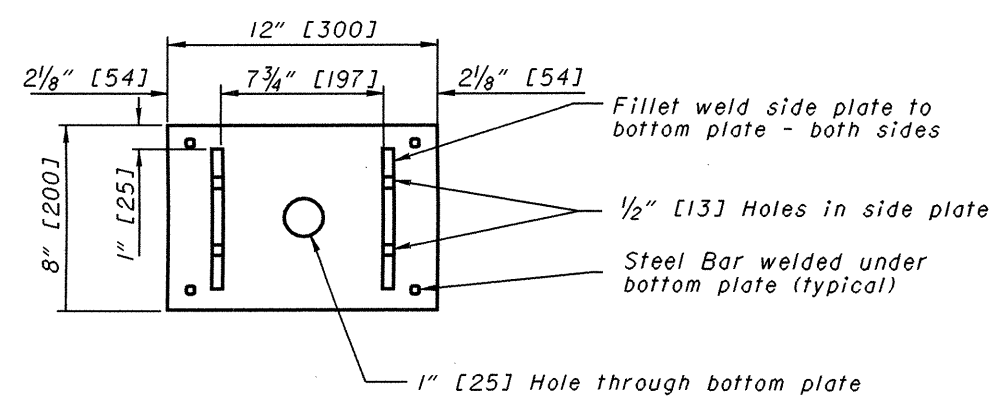
**NOTES**

**MATERIALS:** In order to ensure that the bollard stays plumb and in place, make the fittings as tight as possible. If made of wood, construct the bollard using CCA pressure treated Southern Yellow Pine. Pressure treat as specified in CMS 712.06. Hot-dip galvanize any hardware and steel used for the bollard.

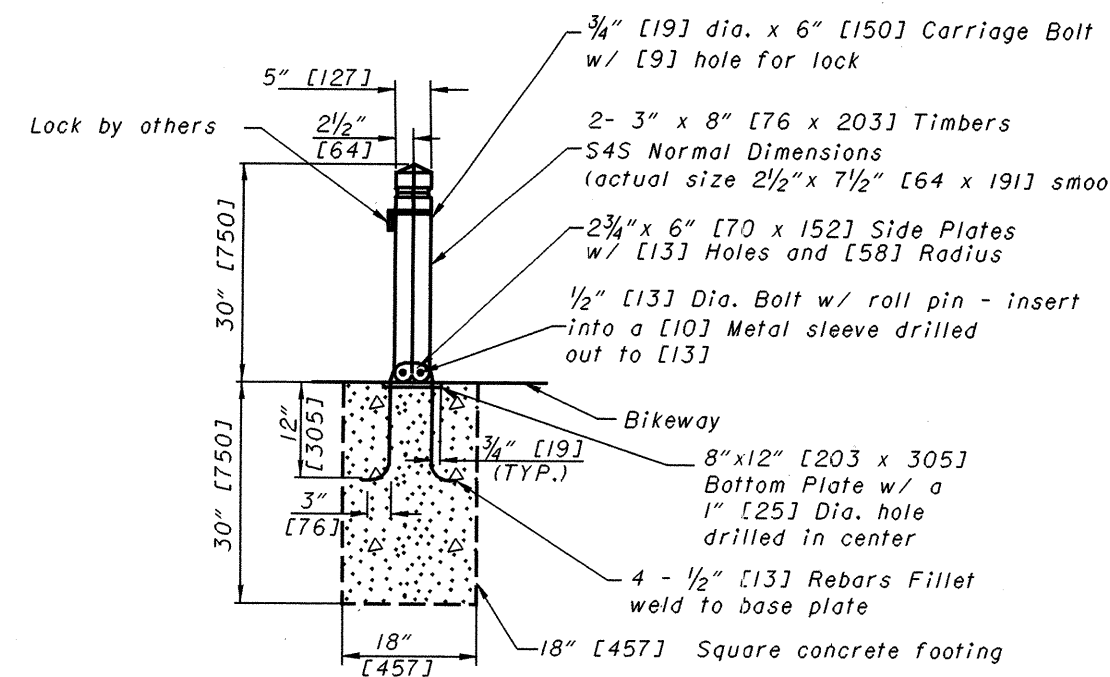
**PAYMENT** Payment for the bollard shall be **Item Special - Bollard, Misc., Hinged**



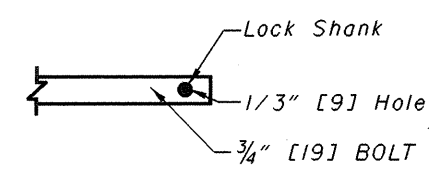
**DETAIL OF TIMBER**



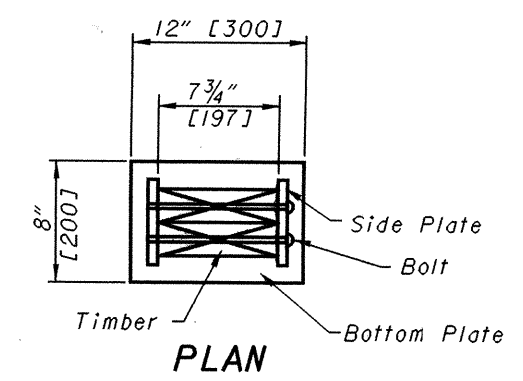
**PLAN**



**SECTION**



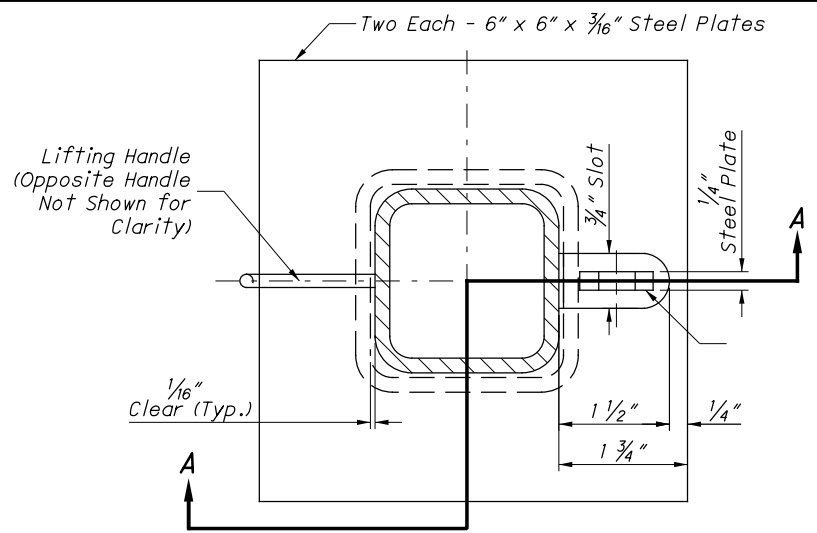
**DETAIL OF HOLE FOR LOCK**



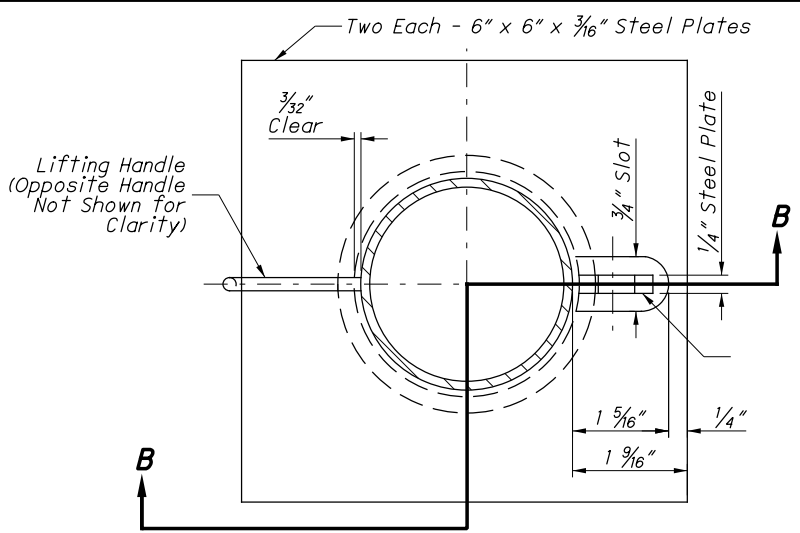
**PLAN**

THIS DRAWING REPLACES RM-5.1M DATED 1-3-96.

STDS. ENGR. D. Focke	OHIO DEPARTMENT OF TRANSPORTATION ROADWAY DESIGN ENGINEER	4-18-03	DATE
		RM-5.1	NUMBER
ROADWAY ENGINEERING SERVICES		STANDARD ROADWAY CONSTRUCTION DRAWING	
STEEL BOLLARDS		2 / 2	



PLAN



PLAN

**NOTES:**

**GENERAL:** Mount all bollard sleeves flush with the bikeway pavement.

**CONCRETE ENCASEMENT:** Sleeve encasement shall be square as shown, in concrete pavement, but may be square or round in flexible pavement. Round encasement should be 1'-0" diameter.

**PREFORMED EXPANSION JOINT FILLER:** Shall meet the provisions of CMS 705.11, and is required when bollards are set in concrete pavement.

**STEEL PIPE:** ASTM A 53 Schedule 40.

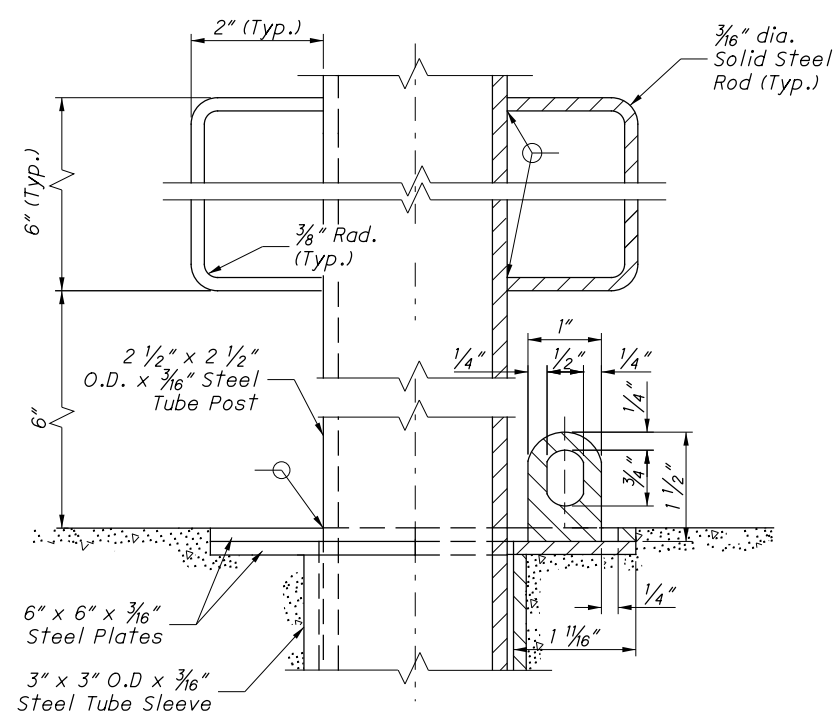
**CONCRETE:** Use Class C concrete as specified in CMS 499 and CMS 511.

**REFLECTIVE SHEETING:** Shall meet the provisions of CMS 730.19.

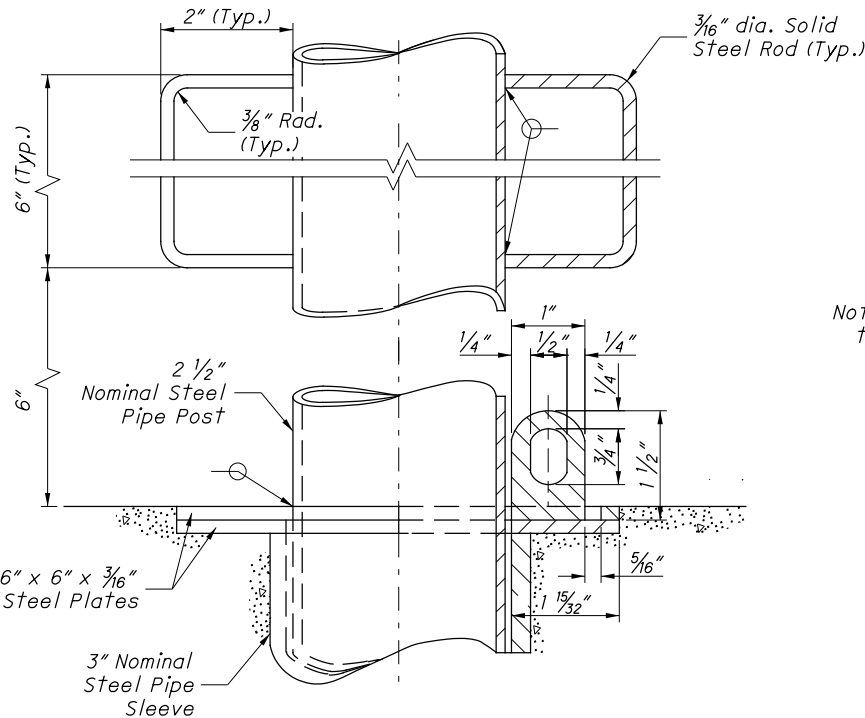
**GALVANIZING:** After fabricating, hot-dip galvanize all steel parts, including steel pipe, as specified in ASTM A 123.

**ALUMINUM:** All steel components may be replaced by aluminum components meeting the following ASTM Specifications: B 209 (plate), B 210 or B 241 (drawn seamless tubes & plates), B 211 (rods), and F 901 (bolts).

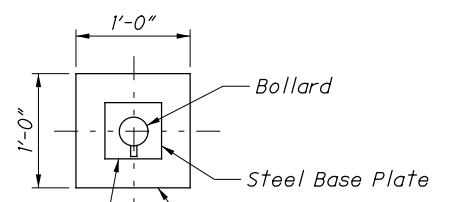
**PERMANENT BOLLARDS:** Permanent Bollards shall be the same as Removable Bollards, except that the steel plates, sleeves and lifting handles shall be omitted. Encase posts directly in concrete.



SECTION A-A  
REMOVABLE SQUARE BOLLARD



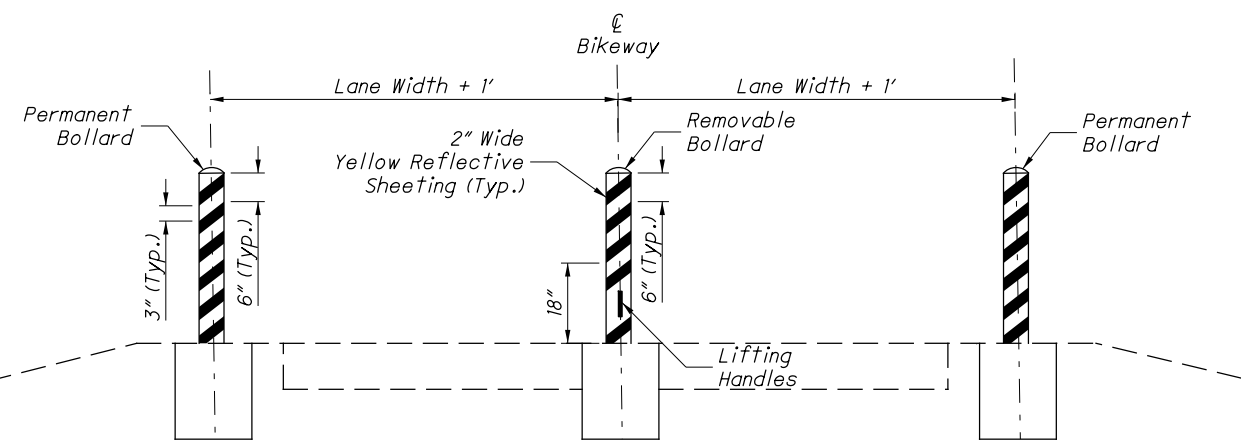
SECTION B-B  
REMOVABLE ROUND BOLLARD



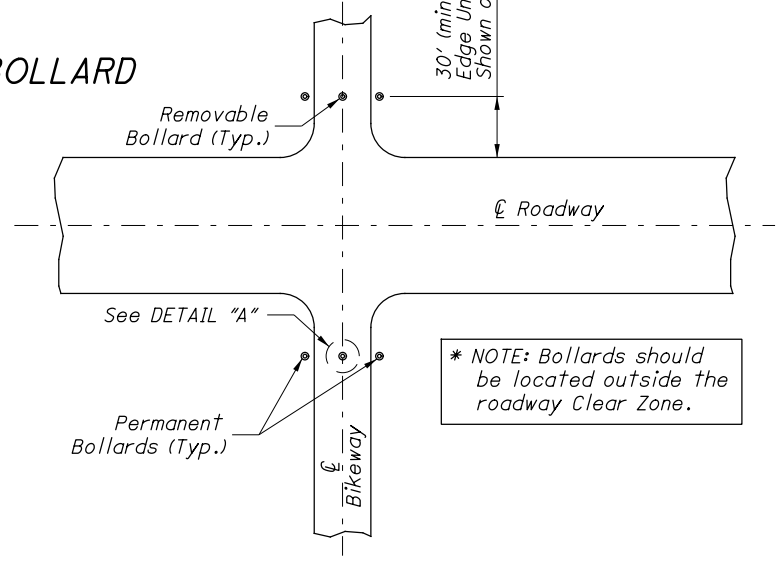
Note: Place Padlock on the Side Facing Away From Intersection.

Lifting Handles Not Shown for Clarity

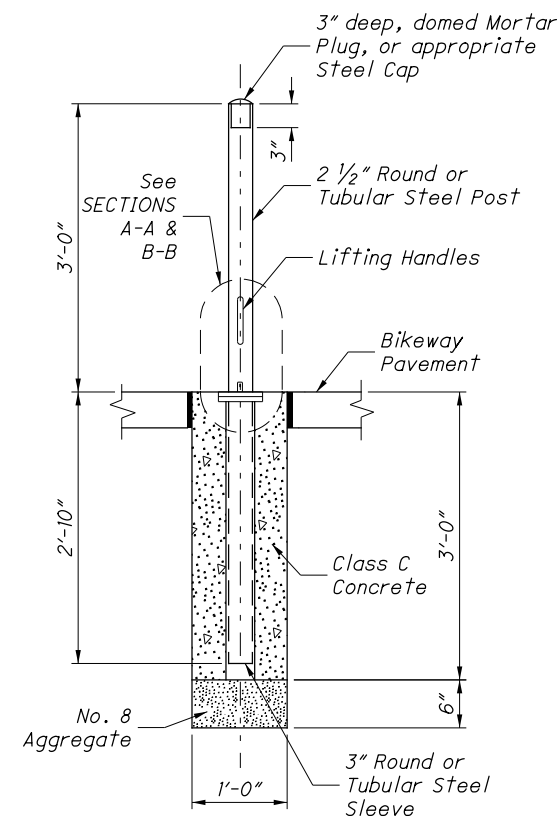
DETAIL "A"  
PLAN VIEW



ELEVATION VIEW  
BOLLARD PLACEMENT

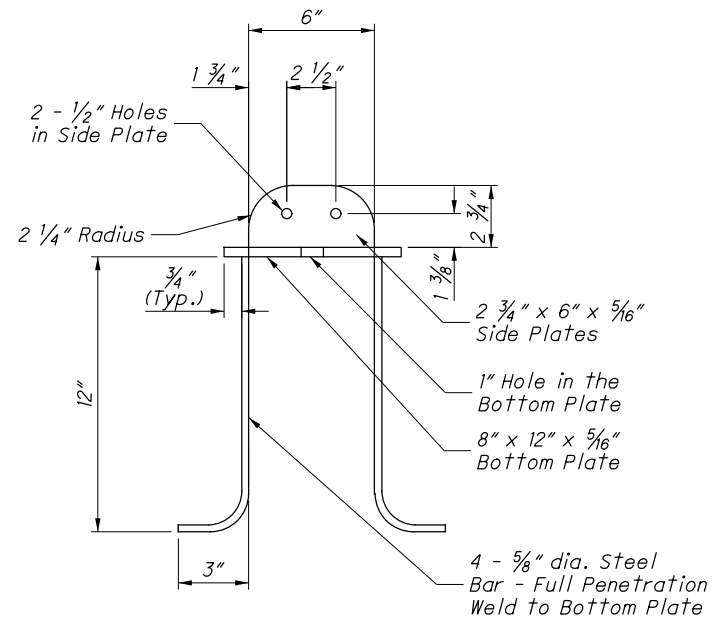


PLAN VIEW  
BOLLARD PLACEMENT

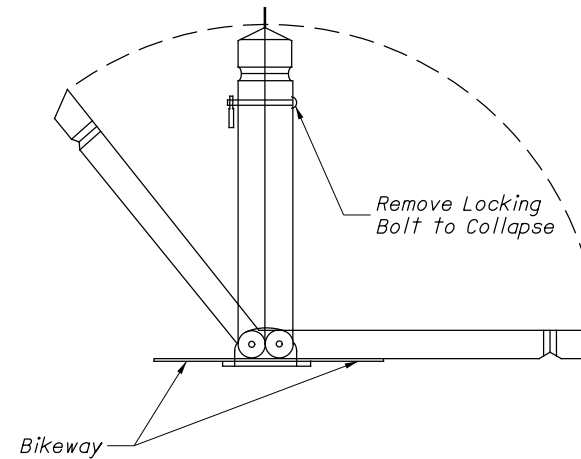


DETAIL "A"  
ELEVATION VIEW  
REMOVABLE BOLLARD

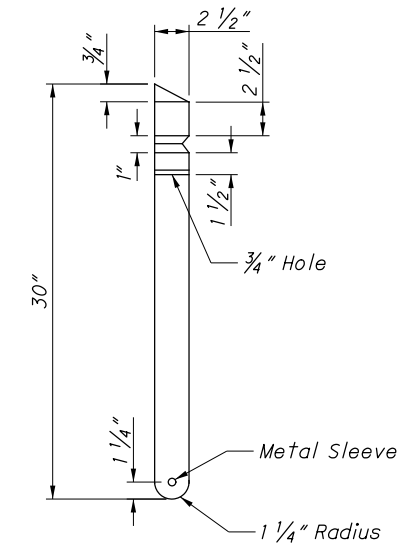
\* NOTE: Bollards should be located outside the roadway Clear Zone.



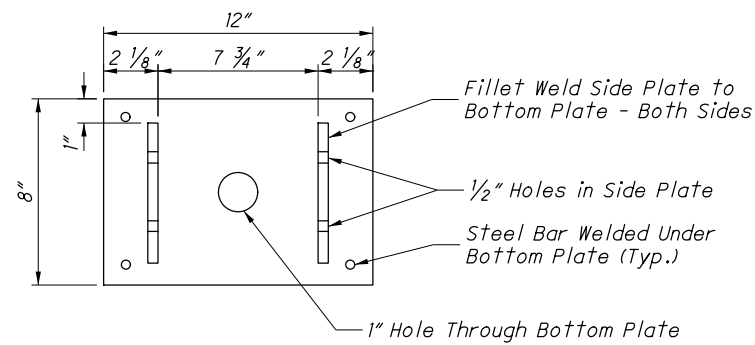
SECTION



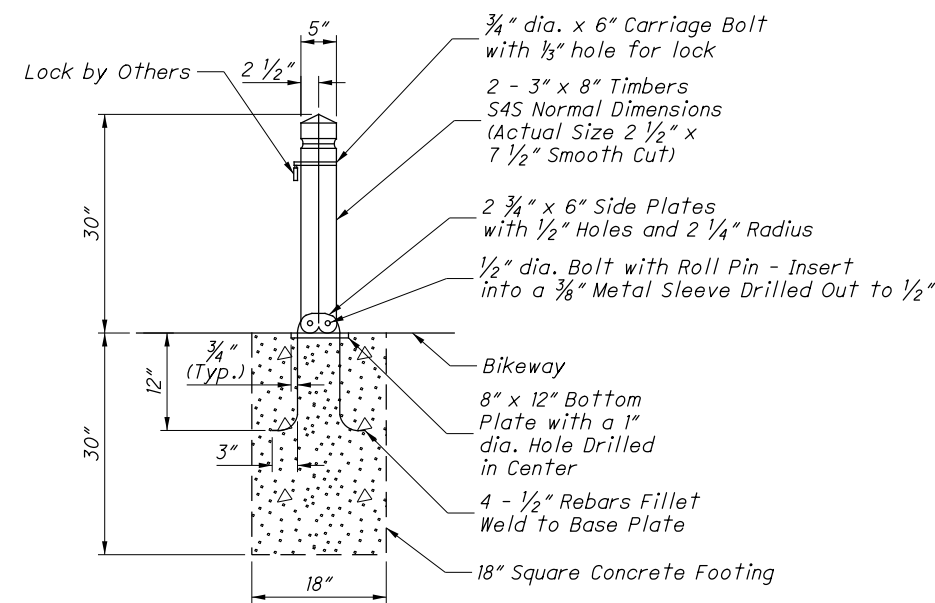
BOLLARD DETAIL



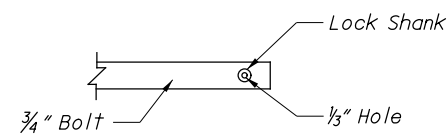
DETAIL OF TIMBER



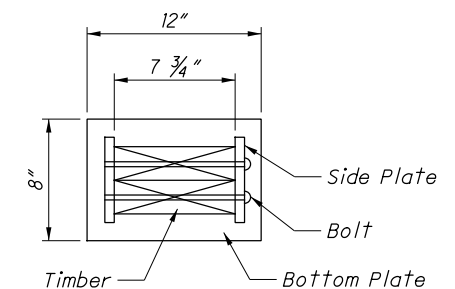
PLAN



SECTION



DETAIL OF HOLE FOR LOCK



PLAN

**NOTES:**

**MATERIALS:** In order to ensure that the bollard stays plumb and in place, make the fittings as tight as possible. If made of wood, construct the bollard using CCA pressure treated Southern Yellow Pine. Pressure treat as specified in CMS 712.06. Hot-dip galvanize any hardware and steel used for the bollard.

**PAYMENT:** Payment for the bollard shall be **Item Special - Bollard, Misc., Hinged.**