



DENVER
THE MILE HIGH CITY

Department of Public Works

Survey Department

Right-of-Way Services - Dept. 507

201 W. Colfax Avenue

Denver, CO 80202

www.denvergov.org/PublicWorks

Range Point Monuments

If in asphalt - #6 rebar, 30” long, with a durable cap marked “Range Point” and bearing the PLS number of the Surveyor in responsible charge. Monument should be set in a range box per current City standards.

If in concrete – set monument and range box as described above. In some limited circumstances, a 2 1/2 inch metal rock cap drilled and recessed so that the top of the cap is flush or just below the concrete surface so as not to be destroyed by snow plows, marked as above may be allowed. Contact the Area Surveyor for direction.

If as part of the development or other known construction activities it is known that major work will be performed on the streets where the range points are to be set, then temporary range points (standard pin and cap set flush with the pavement) may be set and are to be replaced by the developer prior to a TCO or CO being approved or acceptance of the roadway for warranty purposes.

All range points, temporary or permanent, will have tie points set and a tie book record completed and submitted to the City Surveyor for the survey records.

In areas of a potential conflict between the location of the Range Point and buried utilities, it may be acceptable for monuments to be set to reference the true location of the Range Point. Reference monuments shall be of a substantial material such as pin or rock cap properly marked. In all cases, the contractor is required to contact the City Surveyor office and the area surveyor for direction on all location conflicts.

Monument Ties

Objective:

To establish identifiable and durable ties so that the position of the range point may be recreated. Additionally, these ties are to be documented allowing their usage by the general public.

Specifications:

1. A minimum of three (3) ties are to be set for each of the range points rehabilitated. It is preferred that if conditions allow, four (4) ties should be set.
 - 1.1. A cut “X” must be used as a tie. Items such as PK or mag nails are not allowed.
2. Existing monuments (for example, chiseled crosses) should be used as ties if they meet the conditions set forth for a new tie.
3. A new tie must be identifiable as an “X” and not a “+”.

- 3.1. This procedure will avoid confusing the tie with a property marker.
 4. A new tie must not be set on a direct offset to the range point.
 - 4.1. This procedure will avoid confusing the tie as being a direct offset.
 5. The geometry of the ties in relation to the range point should be taken into consideration.
 - 5.1. For example, in a typical intersection, ties placed on the sidewalk at each of the intersection's four quadrants would be an ideal figure.
 - 5.2. Linear, or close to linear, configurations should be avoided.
 6. It is recommended the new ties be cut with a diamond tipped blade.
 - 6.1. 3.5" diameter circular blade on a battery powered saw is recommended.
 7. Unless traffic safety is a concern, all tie distances are to be determined using a survey chain.
 - 7.1. At the discretion of the field crew, a total station may be used in areas where traffic is a concern.
 8. All monument tie distances shall be measured and recorded to the nearest one-hundredth of a foot.
 9. All ties should be identified as being found or set.
 10. Each monument record should show ties for only one range point.
 11. The "X" should be approximately 2" x 2" long and a minimum of 1/16" deep.
- Ramp locations should be avoided for ties as they are frequently replaced.

Box/Riser Assembly - Rehabilitation

Objective:

To install a box/riser assembly that protects and allows access to the range point. The assembly also allows for accommodation of the city's annual paving programs.

Specifications:

1. A new box and 3" riser are required for each monument.
2. The top of the box/riser assembly shall be set at a height that is no less than 1/4" and no greater than 1/2" below the existing roadway grade.
3. Deep monuments may require an 8" diameter PVC pipe as a spacer. This PVC spacer is placed below the assembly.
4. If necessary, lower the monument so that it is a minimum of 3 1/2" below the existing roadway grade.
 - 4.1. The monument should be straddled prior to lowering the monument.
5. Depending upon the stability of the monument, it may be required to straddle the monument prior to excavation of the area.
6. The excavation area should be a 2' x 2' hole.
7. The contractor is responsible for determining if utility locates are needed prior to excavation.
8. The contractor is responsible to obtain a street occupancy permit for all excavations.

Box/Riser Assembly – New Streets

Objective:

To install a box/riser assembly that protects and allows access to the range point. The assembly also allows for accommodation of the city's annual paving programs.

Specifications:

1. A new box and 3" riser are required for each monument.
2. The top of the box/riser assembly shall be set at a height that is no less than ¼" and no greater than ½" below the existing roadway surface.
3. Use a 12" core bit to remove the material.
4. After placing the range box and the 3" riser in the core hole, use a 50% mix of sand and 50% fast setting cement to pour around the range box casing, leaving at least 8" for asphalt.
5. Then use an asphalt bonding adhesive to coat the existing asphalt.
6. Then fill a minimum of 8" of hot mix asphalt, matching the existing asphalt, and pneumatically tamp the surface. Here is how the finished product should look.
7. The contractor is responsible for determining if utility locates are needed prior to excavation.
8. The contractor is responsible for obtaining a street occupancy permit for all excavations.

Failure to install per this method will result in reinstallation being required. Public Works inspectors will dictate the required repairs up to and including full lane width repaving 50' either side of the point.

Below is an example of an acceptable installation.



Monument Tie Record

Objective:

The monument record is used to document actions taken by the field crews during the rehabilitation process. The record will also show the locations and distances of the range point ties. The records are made available to the general public.

Specifications:

1. All information pertaining to the date and crew should be completed.
2. Street names should be identified, with at least 1 east-west avenue and 1 north-south street included. If the range point is not located at an intersection, the nearest cross streets should be identified.
3. Identify range lines on the tie record (i.e. 20' RL, 30' RL, etc.), with the offset on the correct side of the range line.
4. Label all available platted range line dimensions that relate to the point. After the distance, identify how the distance was obtained (i.e. subdivision plat (or P), resurvey, tiebook, etc.)
5. If there are multiple range points at an intersection, the record should depict them all relative to each other.
6. When appropriate, curve data should be included, with the inclusion of curve length, delta and radius being optimum, and 2 of the previous pieces of data being acceptable.
7. Land lines depicted should be labeled.
8. If the range point is found, then the record should include descriptive notations of the found monument.
9. If the range point is not found, describe the methods used to search for the point and note if any digging took place. Describe the extent of the search location, including how far down in depth the search was.
10. A diligent search shall be made for all called for stone monuments.
11. City and County of Denver tie out sheet will require a cover letter by PLS as reviewed and approved. Initials by PLS on each record.
12. A box/riser assembly shall be placed on Land Corners within project limits per state statutes.

CITY AND COUNTY OF DENVER

MONUMENT TIE OUT SHEET



1) IF MONUMENT IS NOT AT AN INTERSECTION, INCLUDE NEAREST CROSS STREET(S)
 2) NEED AT LEAST ONE N-S STREET & ONE E-W STREET FOR DATABASE

MINIMUM 3 TIES, 4 PREFERRED
 GOOD GEOMETRY TO RE-SET
 (NOT ALL ON SAME SIDE OF MONUMENT)

SHOW RELATIONSHIP OF ALL RANGE POINTS IN VICINITY
 SEPARATE RECORD FOR EACH POINT

INCLUDE ORIGIN OF RANGELINE DISTANCE
 - SUB. PLAT
 - RESURVEY
 - TIEBOOK
 - MEASURED

INCLUDE CURVE DATA
 CURVE LENGTH, DELTA & RADIUS PREFERRED
 BUT AT LEAST 2 PIECES OF INFO ACCEPTABLE

RANGE LINE INFO SHOULD BE ON CORRECT SIDE OF RANGE LINE

TIE DISTANCES MEASURED TO NEAREST 0.01', BY STEEL CHAIN OR TOTAL STATION IF TRAFFIC IS AN ISSUE

TIES SHOULD BE SET SO THAT THEY CANNOT BE CONFUSED WITH PROPERTY OFFSET CROSSES
 1. NOT AT TYPICAL LOCATION OF CROSSES
 2. ROTATION SHOULD BE DIFFERENT
 3. SHOULD NOT BE CUT NEAR RADIUS OF CURVE IF IT APPEARS LIKELY CONCRETE WILL BE REMOVED TO ADD A RAMP

RANGE POINT OR LAND CORNER FOUND OR NOT FOUND
 IF FOUND, DESCRIPTION OF MONUMENT, IN BOX?
 IF NOT FOUND, DESCRIBE EXTENT OF SEARCH

RANGE POINT NOT FOUND
 DUG 2'X2' HOLE 3' DEEP NO TONE

INFORMATION TO BE SHOWN

1. Range Points (monument desc.) & Range Lines
2. Section Corners & Land Lines
3. Range Point Ties (found or set)
4. Street Names
5. Platted rangeline dimensions to identify Range Points not at an intersection
6. If monument is not found, describe the extent of the search

DATE

FIRM/CREW

(TO 5TH AVE.)

LABEL LAND LINE AND DISTANCE IF AVAILABLE

20' R.L. 60.6' (PL)

FOUND BRASS TAG
 LS 12345

20' R.L. 250' (TIEBOOK)

22' (PL)

RANGE LINE - OFFSET AND DISTANCE

1320' (PL)

1320.28' (PL)

L.L.

FOUND AXLE
 (MONUMENT DESCRIPTION)

4TH AVE.

SET CUT "X"
 TOP OF CURB

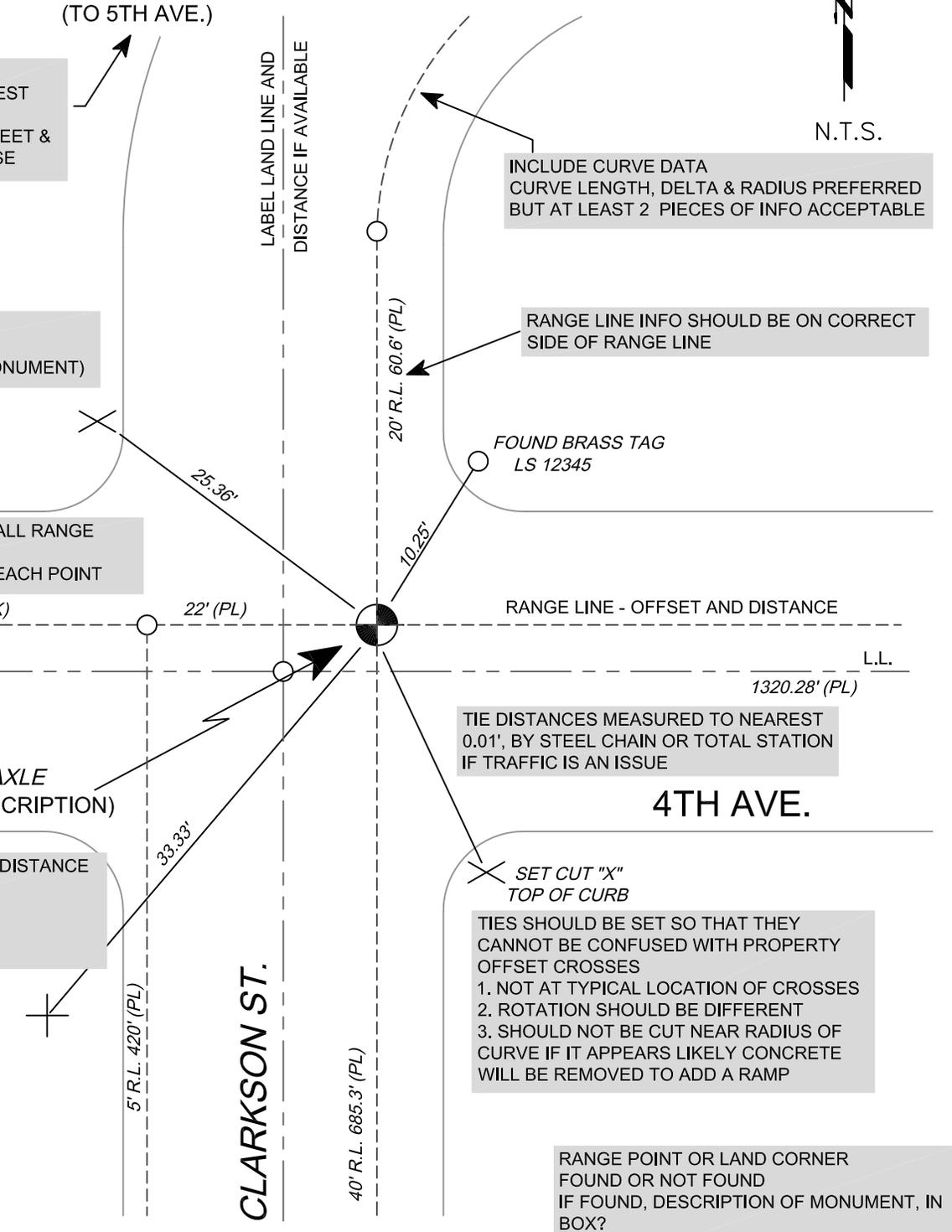
FOUND CUT "+"
 IN WALK

5' R.L. 420' (PL)

33.33'

CLARKSON ST.

40' R.L. 685.3' (PL)

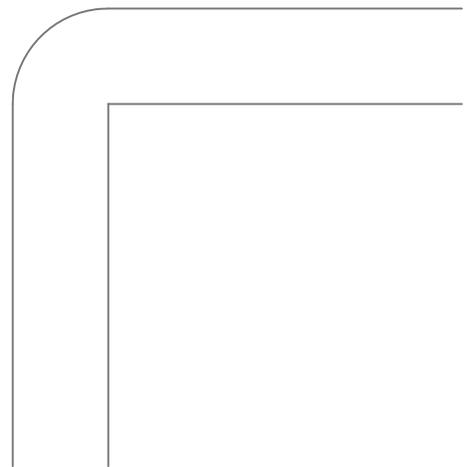
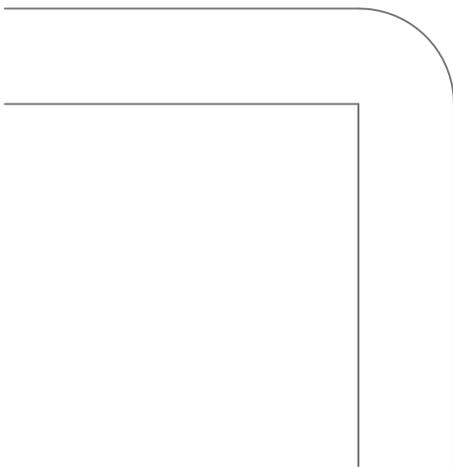
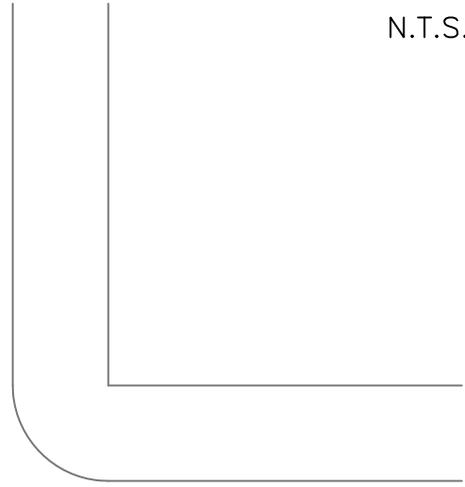
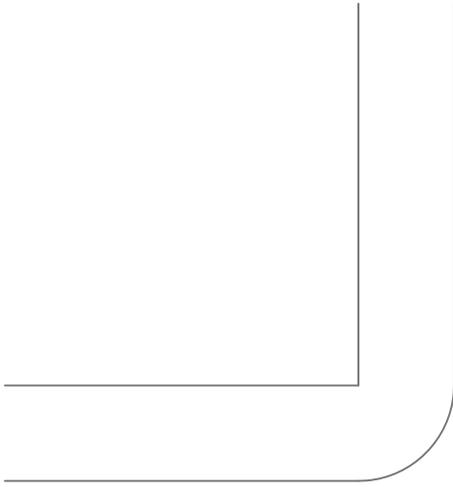


CITY AND COUNTY OF DENVER

MONUMENT TIE OUT SHEET



N.T.S.

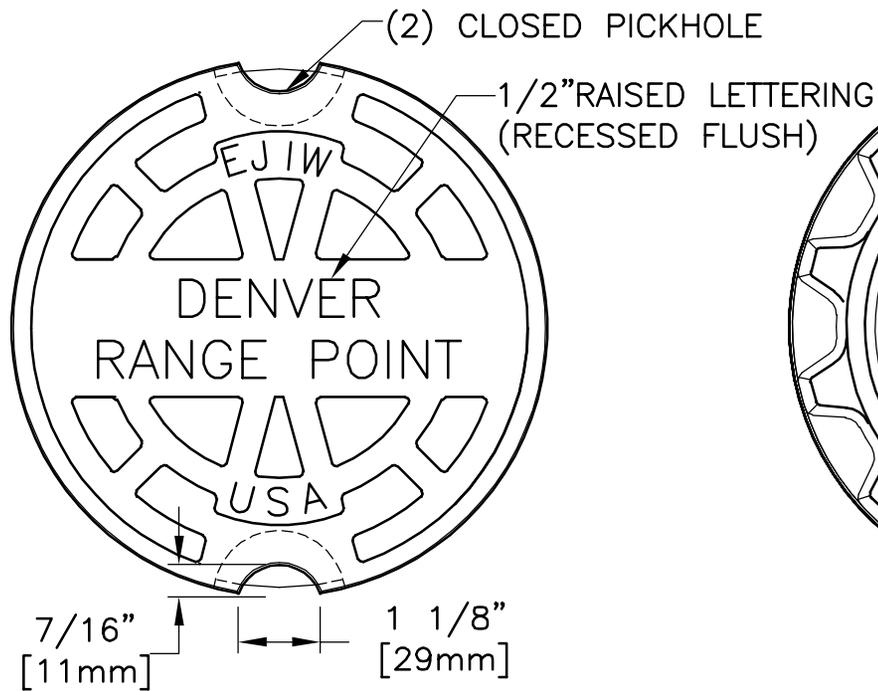


INFORMATION TO BE SHOWN

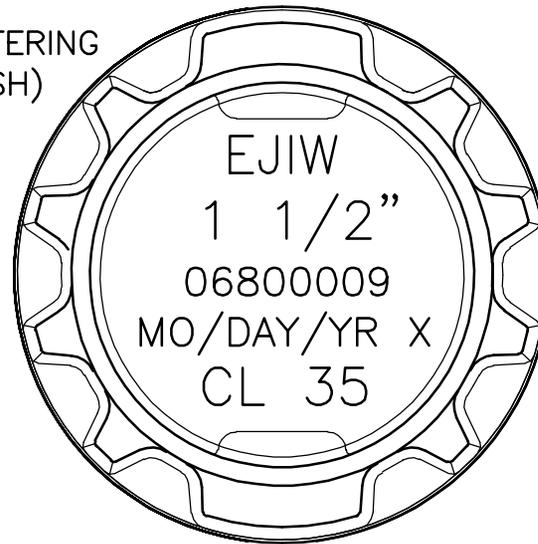
1. Range Points (monument desc.) & Range Lines
2. Section Corners & Land Lines
3. Range Point Ties (found or set)
4. Street Names
5. Platted rangeline dimensions to identify Range Points not at an intersection
6. If monument is not found, describe the extent of the search

DATE

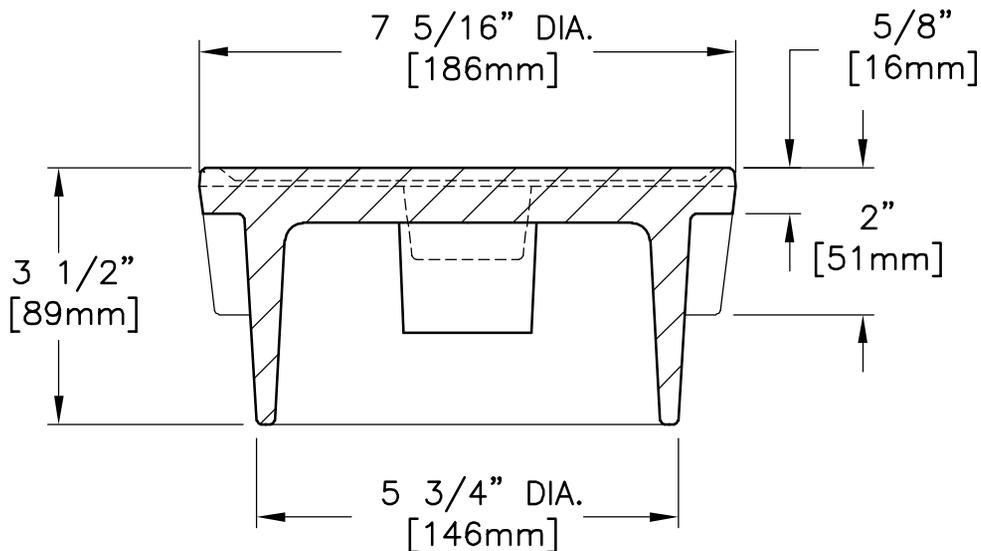
FIRM/CREW



PLAN VIEW



BOTTOM VIEW



SECTION VIEW

EAST JORDAN
IRON WORKS, INC.
P.O. BOX 439
EAST JORDAN, MI. 49727
1-800-874-4100
FAX 231-536-4458

DRAWN TCL	DATE 02/25/05
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APPROVED	DATE
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5 1/4" DROP LID
1 1/2" SKIRT
(DENVER RANGE POINT)

PRODUCT NO.

06800009

CATALOG NO.

6800

REF. PRODUCT DRAWING

06800001

EST. WT.

COVER: 14 LBS 6kg

OPEN AREA

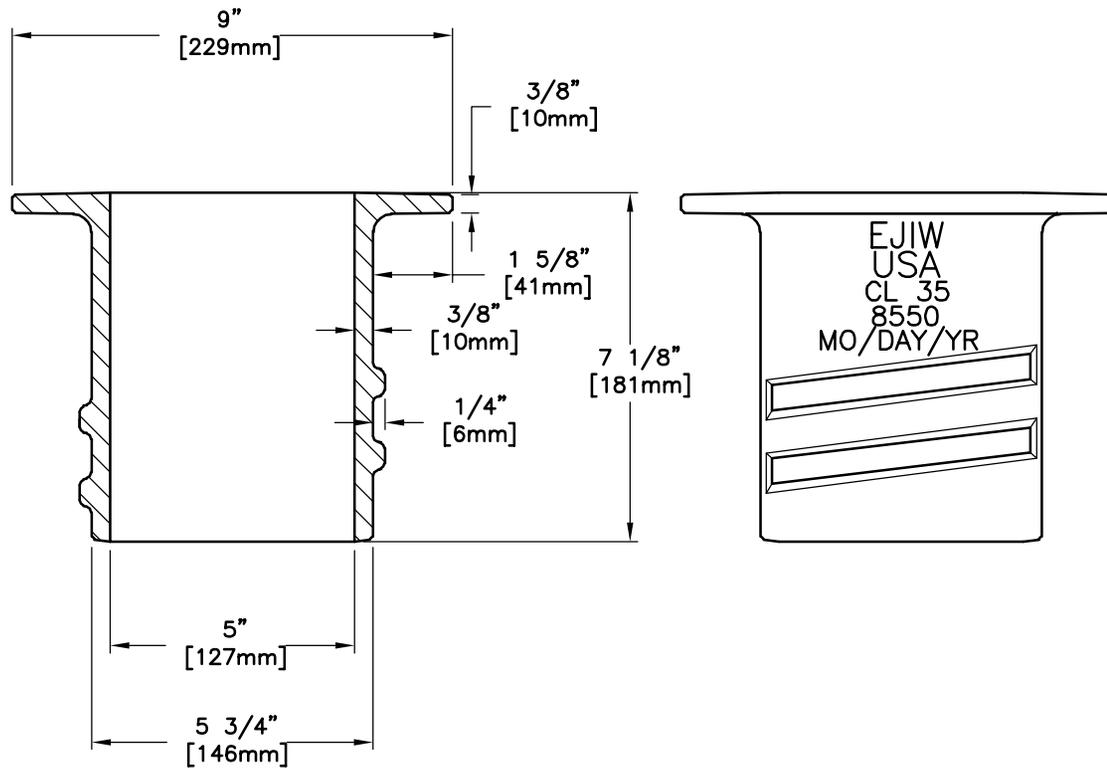
N/A

MAT'L SPEC.

COVER - GRAY IRON
ASTM A48 CL35B

LOAD RATING

HEAVY DUTY



EAST JORDAN
IRON WORKS, INC.
P.O. BOX 439
EAST JORDAN, MI. 49727
1-800-874-4100
FAX 231-536-4458

DRAWN TCL	DATE 05/04/01
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APPROVED	DATE
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8550 BOTTOM SCREW BASE

PRODUCT NO.

85506007

CATALOG NO.

8550

REF. PRODUCT DRAWING

85506007

EST. WT.

BASE: 17 LBS 8 kg

OPEN AREA

N/A

MAT'L SPEC.

BASE - GRAY IRON
ASTM A48 CL35

LOAD RATING

NON-TRAFFIC

EAST JORDAN
 IRON WORKS, INC.
 P.O. BOX 439
 EAST JORDAN, MI. 49727
 1-800-874-4100
 FAX 231-536-4458

DRAWN TCL	DATE 04/01/04
APPROVED	DATE

1" VALVE BOX RISER

PRODUCT NO.
85008010

CATALOG NO.
 8500

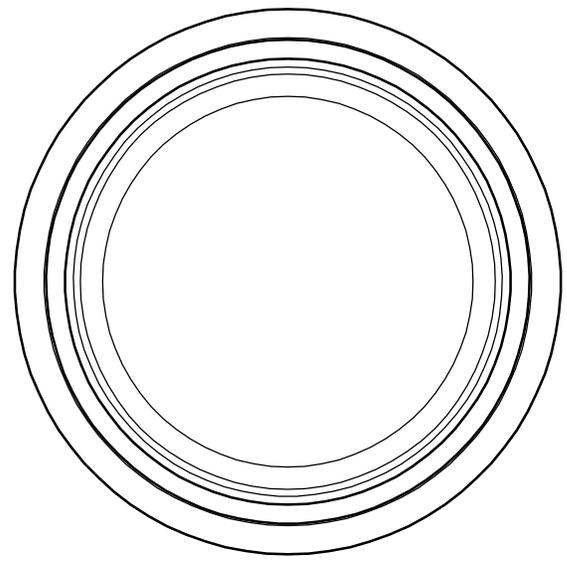
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 85008010

EST. WT.
 RISER: 6 LBS 3kg

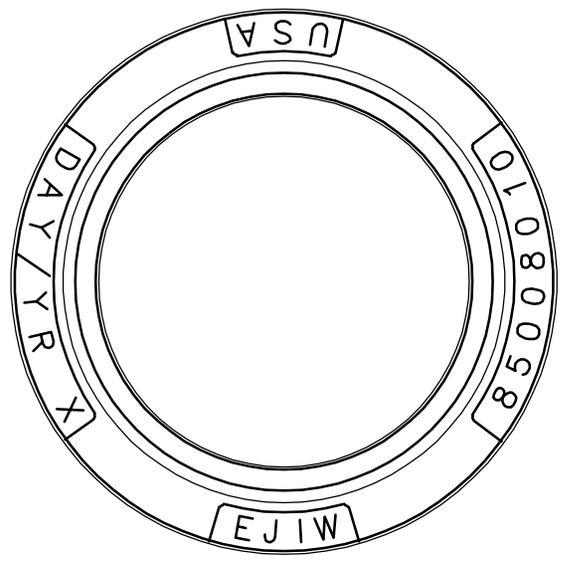
OPEN AREA
 N/A

MAT'L SPEC.
 RISER - GRAY IRON
 ASTM A48 CL35B

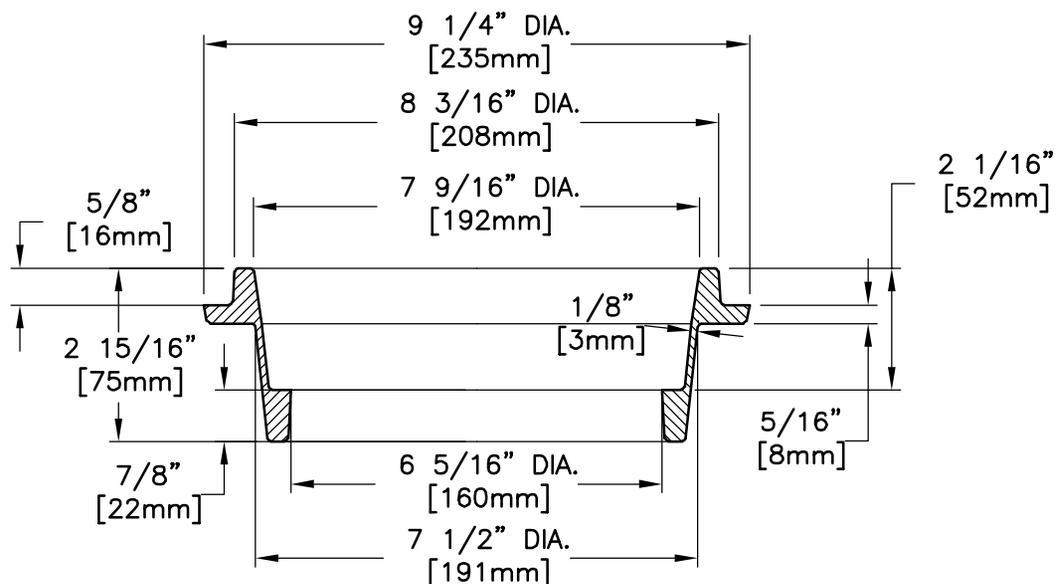
LOAD RATING
 HEAVY DUTY



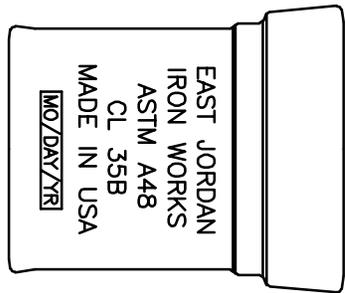
TOP VIEW



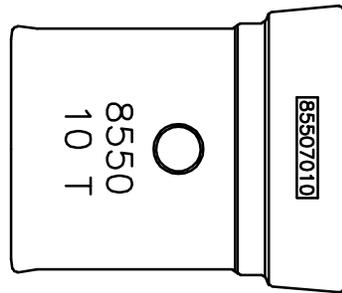
BOTTOM VIEW



SECTION VIEW

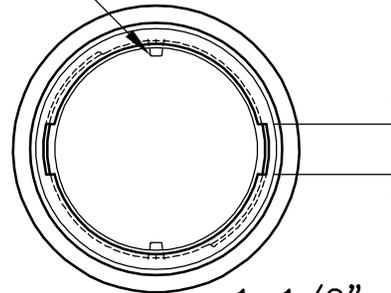


VIEW OF BACK SIDE LETTERING

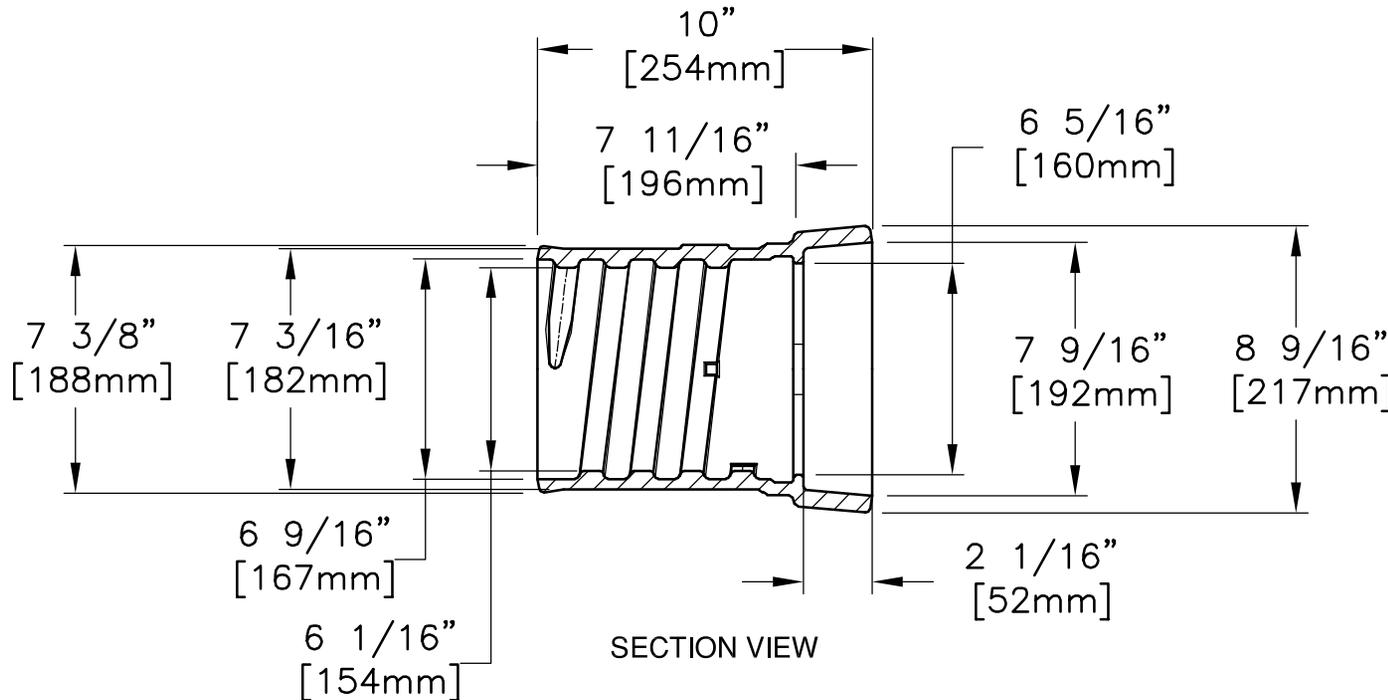


PLAN VIEW

(2) STOP LUGS



TOP VIEW



SECTION VIEW

EAST JORDAN
IRON WORKS, INC.
P.O. BOX 439
EAST JORDAN, MI. 49727
1-800-874-4100
FAX 231-536-4458

DRAWN TCL	DATE 09/29/05
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APPROVED	DATE
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**8550 10T
VALVE BOX TOP**

PRODUCT NO.

85507010

CATALOG NO.

8550

REF. PRODUCT DRAWING

85507010

EST. WT.

VALVE T: 25 LBS 11kg

OPEN AREA

N/A

MAT'L SPEC.
VALVET - GRAY IRON
ASTM A48 CL35

LOAD RATING

HEAVY DUTY