WHIRLYGIG®
MANHOLE RISER COLLAR SYSTEMS

Observations & Recommendations

A quick reference guide to Whirlygig practices & lessons learned from more than 200,000 Whirlygig installations

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The Whirlygig Process

After excavation, clean off the top of the cone

Place the Whirlygig Form on the top of the cone

Cut the Whirlygig Form to the correct height with the RAT (Radial Arm Trimmer)

Place frame & lid back onto the form

Measure for accuracy

Ready to pour!

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Selection and Attachment of the Whirlygig Form

Determining the depth of the hole → **Determines the height of the Whirlygig Form**

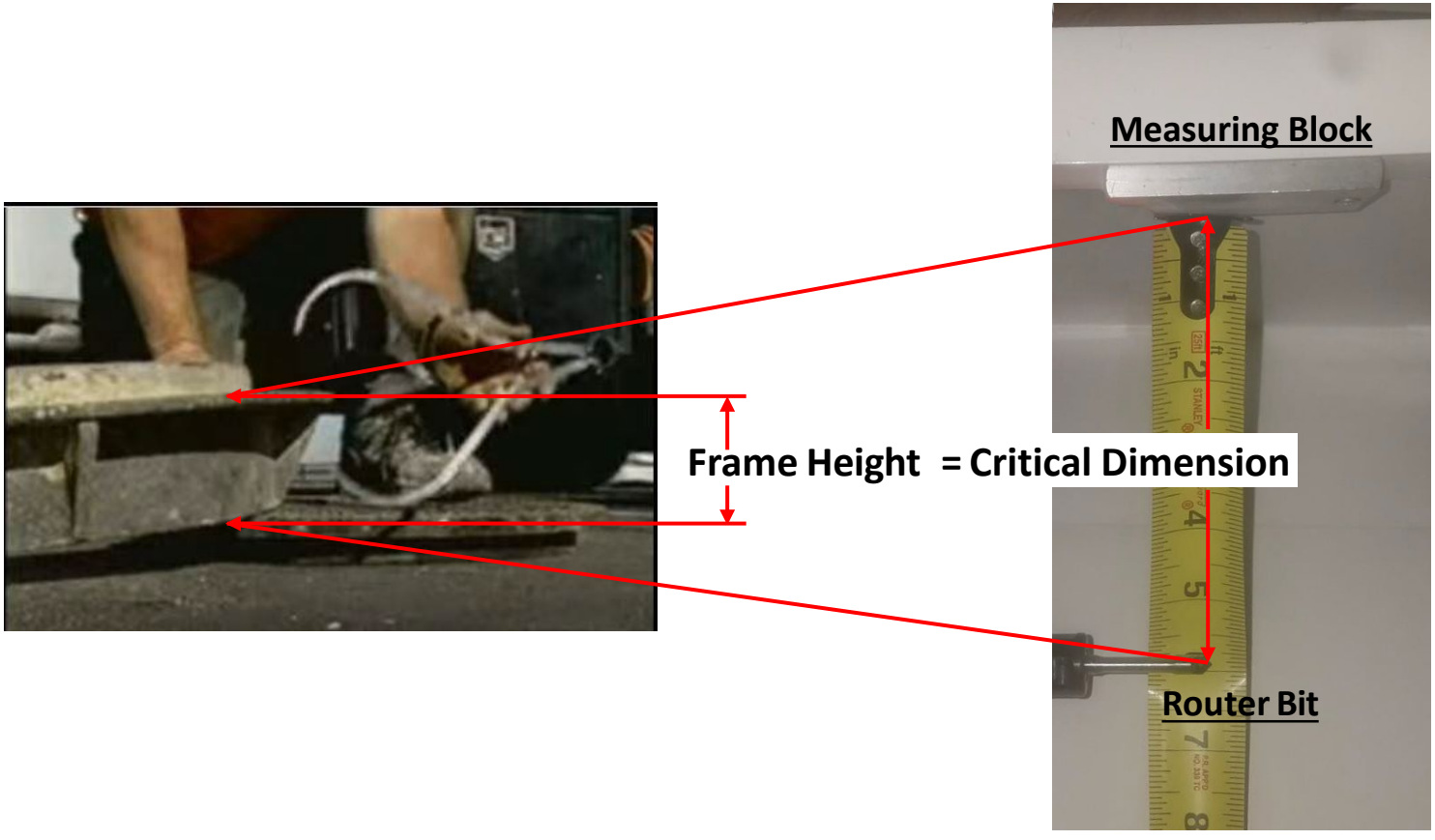
Selection and Attachment of the Whirlygig Form

- After excavation has been completed and the manhole frame/ring and cover/lid have been exposed and set aside, take a rough measurement from the top of the manhole cone to the top of the adjacent surface.
- Select a Whirlygig Form which will not be higher than the adjacent surface[1]. Place the Form centered on the manhole cone and secure the Form via the Form's flange to hold it in place[2].
  - The Form is designed to be left in place to give added protection to the concrete riser/collar from corrosive gasses as well as mitigating inflow and infiltration concerns.

Field Feedback:

- A taller Form can be used if you do not have the proper shorter Form by making a shortening cut[1].
  - To do so set the (RAT) Radial Arm Trimmer over the taller Form and make a vertical cut down to the desired height. Proceed by making one full revolution with the RAT and discard the excess material. You can then make the final cut per standard practice.
- The Form must be held in place during trimming and pouring of the concrete collar[2].
  - Securing the Form via washered concrete nails is one method however experienced crews may choose to hold the Form in place via a temporary downward pressure (e.g., standing on the Form flange, etc). Please consult your own local codes for expected standards.

Setting the Critical Dimension



Setting the Critical Dimension

Critical Dimension: The height from the bottom of the flange to the top of the manhole frame

- The RAT feet and the Measuring Pad located on one of the arms are at the same elevation so after determining the Critical Dimension adjust the trimming height to match via setting the distance from the top of the router bit to the bottom of the measuring pad.
    - Note: While many manhole frames have the same Critical Dimension, we have seen this dimension range from 4" to 6" or more with different manufacturers. Additionally, we have seen many agencies require the frame be set from flush to 1/4" lower than the adjacent pavement. Measuring to the top of the router bit automatically adds this 1/4" to the Critical Dimension.

- The assumption that the adjacent surface the RAT feet are indexing off of is a true plane usually applies in the field. The RAT will establish the average elevation and attitude for the router bit provided you rotate the RAT, if needed, until all four feet are contacting the adjacent surface. This is easily demonstrated by placing two opposing arms of the RAT parallel to the crown of the road at the centerline. Since the road surface slopes away from the crown the two feet on the other two arms of the RAT may be teetering in air. Rotate the RAT 45 degrees and now all four feet are firmly resting on the adjacent surface providing for an average with the manhole frame being slightly lower than the crown and slightly higher than the edges of the excavation. The transition from the manhole frame to the edges of the excavation is made by blending with redi-mix in the case of a full collar or with asphalt in the case of a cast-in-place riser only.

Trimming the Whirlygig Form

Trimming the Whirlygig Form

- After adjusting the RAT to account for the Critical Dimension center the RAT over the Form (eyeballing is good enough) and trim the Form using consistent slight downward pressure on the Die Grinder.
  - Counter-Clockwise cutting works best to “feed” the Form into the router bit thus eliminating the tendency for the bit to float.

- It is important to keep the Die Grinder from rotating. To ensure this the set screw in the guide tube must always be in the groove of the telescoping tube. If the Die Grinder is allowed to rotate freely in the guide tube, trimming may be unacceptable.
  - We have had the best experience using Bosch ¼” high speed steel single flute router bits since it cuts smoother than carbide (part no. BOSCH-85146B50). Other ¼” pilot panel router bits with a 1” cutting surface and a shank which is short enough that the cutter portion of the bit recesses slightly into the die grinder collet will also work. Having the shank recessed into the Die Grinder collet enables you to press the collet outward against the Form using it as a steadying guide while trimming.
  - These bits are commonly found in hardware stores, online or by contacting Whirlygig.

Oversized Manhole Frame Mud Ring/Lip Protrusions

There are many different manufacturers of manhole frames and on those with a mud ring it may occasionally interfere with the top of the Whirlygig Form.

Field Feedback:

- One method to remedy the situation should it occur is to cut a vertical slit between each rib after the Form is trimmed to the proper height. After doing so place the frame on the Form tapping each slitted segment outward until the mud ring "drops" into the Form.
  - The vertical slits can be made with a circular saw, pipe, reciprocating, or jigsaw. Experienced crews report using the Die Grinder on the RAT to make the vertical cuts.

Watertightness & Sealing

In most cases a sealant is not recommended between the bottom of the Form's flange and the top of the manhole cone because a cementitious seal occurs automatically by neat cement from the redi-mix seeping into any voids at that interface.

- However, where wetness is almost always present, (high water table, etc.), and /or where corrosive sewer gases are especially virulent, a bead of sealant such as Sikaflex polyurethane can be applied at the Form / manhole cone interface. This sealant is commonly available at Home Depot, Lowe's and other hardware stores.

- Please consult your local codes for expectations regarding sealants.

Inspection and Quality Control

Inspection

- Manhole frame height/orientation can be the source of acrimonious conflict between the installer and the inspector. Understanding the elements of this measurement will hopefully mitigate some of these conflicts. Manhole frames from the same manufacturer have a Critical Dimension which is well within repeatable tolerances. Also, the RAT is manufactured to produce reliable and repeatable results. The wild card which causes conflict is the adjacent surface you are trying to match. In the case of asphalt, a problem can be caused by the volcanic effect at the perimeter of the excavation. This mushrooming, in addition to being higher than the actual plane of the surface, is inconsistent. Other factors such as aggregate size and the finishing smoothness can be an issue as well but play a relative minor role.

- To check for accuracy after installation of a Whirlygig Form when the adjacent surface shows the volcanic effect, flatten the raised lip to match the adjacent surface on each side of the installation in the direction of travel and use a straight edge that bridges the excavation.
  - Note: The Whirlygig RAT feet are designed to bridge this volcanic effect to ensure the trimmed height of the Form is matched to the adjacent surface.

- In the rare cases where fine-tuning is required, the Whirlygig method allows for such at a minimal cost via additional trimming (shaving), or by placing spacers between the manhole frame flange and the top of the trimmed Form.

Quality Control

- In a perfect world concrete grade/adjustment rings or masonry set in grout as shown in standard drawings may be a marginally acceptable practice. However, field observations do not engender good feelings about the quality of installation because of compromises in height and slope with these methods which results in unnecessary point loading. Add to that the exposed grout and concrete in the manhole, and that grout does not in fact occupy major voids (there is an awful lot of “plastering” that takes place), and the stage is set for a sub-standard installation.
- The Whirlygig method uses a monolithic concrete pour that totally fills and seals the entire cavity, and the Form is left in place to protect the riser/collar from corrosive gasses as well as mitigating inflow and infiltration concerns.

The Whirlygig method lessens the conflict between the inspector and installer and inspection time is cut dramatically

To ensure quality when using the old grade/adjustment ring or masonry methods the inspector would have to be present the entire time it takes to install the manhole riser. With the Whirlygig method inspection for quality control pretty much is confined to checking with a straight edge and then a drive-by; either the excavated cavity is filled with concrete, or it is not.

General Observations

Cold Joints

In some instances where there is a known or likely future need to remove or lower the height of the manhole frame where a partial or full collar is used the engineer may choose to incorporate a cold joint for ease of removal. A Visquine barrier at a depth of 6” to 8” is an option.

“H” Loadings

Although the Whirlygig Form is not a load bearing member the capacity of the concrete riser/collar exceeds the “H” loadings of the street where it is installed.

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Please call or email us with any questions.

Thank You!

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