



WHIRLYGIG Observations & Recommendations



Where it is the practice of using precast grade/adjustment rings or masonry with redimix backfill without pouring redi-mix above the flange of the frame use the Whirlygig form but only pour redi-mix to the bottom of the frame flange. Neither of these methods encapsulates the frame. The frame in either case is resting on a prefabricated concrete seat or a cast-in-place riser seat making removal equally easy.

A) Selecting and Attachment of Thermoplastic Form:



After all excavation has been completed and the steel manhole frame/ring and cover/lid have been exposed and set aside, take a rough measurement from the top of the concrete manhole cone to the top surface of the adjacent asphalt. Subtract the "critical dimension", (defined in section B), then select one of the four 7" to 19" high plastic forms,* (in 4" increments), which will not be higher than the asphalt surface but not lower than the "critical dimension".

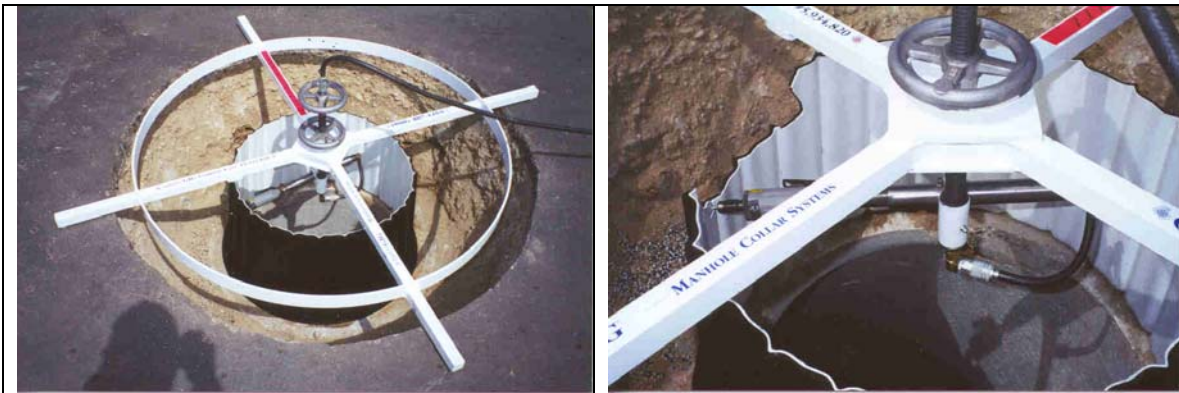
Place this form centered on the concrete manhole cone and shoot washed concrete nails through the plastic form's flange tabs to hold the form in place

during subsequent operations. The form is designed to be left in place to give added protection to the concrete riser from corrosive gasses. (Note: Although “standard” concrete manhole cones are supposed to have a ($\pm 1/2$ ”) throat, often this dimension grows through normal handling resulting in the fragile lip being damaged. The plastic form has a flange on the bottom which accommodates this situation.

The plastic form must be held in place until the concrete riser/collar is poured. Shooting washered concrete nails is the preferred method and in a few cases you can just physically hold the form in place until the concrete is poured.

*A taller plastic form can be used if you do not have the proper shorter form by simply making a shortening cut letting the radial arm trimmer sit on top of the tall form, discard the excess and then make the final cut as usual.

B) Setting the “Critical Dimension” and Trimming: (See assembly instructions.)



Feet and the pad on one of the arms are at the same elevation so after determining the “critical dimension”, (the height from the bottom of the flange to the top of the steel manhole frame), adjust the top of the router bit to the bottom of the arm with the pad to this “critical dimension”. Note that while many steel manhole frames have the same “critical dimension” we have seen this dimension range from 4" to 6" plus with different manufactures. Also 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”. However, if 12" outside calipers are used to find the “critical dimension” it can be transferred to the depth gage, (part # 91J), so no actual measurement needs to be taken and the 1/4" lower than flush is automatically included since the bottom of the router bit makes the final cut.

Field Feedback: Experienced crews use a tape measure only.

After adjusting the radial arm trimmer to accommodate the “critical dimension”, place the Whirlygig trimmer frame post centered over the plastic form, (eyeballing is good enough), and make the cut using consistent slight down pressure on the die grinder. (Counter clockwise cutting seems to work best).

The assumption that the asphalt surface the trimmer feet are indexing off is a true plane usually does apply in the field. The trimmer will establish the average elevation and attitude for the router bit provided you rotate the trimmer, if needed, until its four feet are all contacting the pavement surface. This is easily demonstrated by placing one arm of the trimmer 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 arm of the frame are teetering in air. Rotate the trimmer 450 and now all four feet are firmly resting on the asphalt surface. Now you have an average with the steel ring being lower than the crown and higher than the edges of the excavation. The transition from the steel ring 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. No matter where the manhole is located be sure to rotate the trimmer, if needed, until it is steady.



C) Router Bits:

We have had the best experience using a 1/4" high speed steel, (cuts smoother than carbide), single flute bit, part no. 84J, (BSCH-85146B50 or any 1/4" pilot panel bit), with 1" cutting surface and a shank which is short enough that the cutter portion of the bit recesses slightly into the die grinder collet. This enables you to press the collet outward against the plastic form using it as a steadying guide while trimming. (*These bits are commonly found in hardware stores, Home Depot, Lowes, etc.)

D) Keeping the Die Grinder from Rotating:

It is very important to insure that the set screw in the guide tube always is in the groove of the telescoping tube. If the die grinder is allowed to rotate in the guide tube, trimming will be completely unacceptable.

E) Oversized Manhole Frame Mud Ring/Lip Protrusions:

There are so many manufactures of steel manhole frames that the mud ring extending down into the top of the thermoplastic form varies to the extent that occasionally interference, aggravated by cold temperature, is encountered.

When this mud ring diameter is greater than the plastic form I.D., after the form is cut to the proper height, make a vertical slit * between each rib, place the steel frame on the plastic form tapping each slitted segment outward until the mud ring drops into the form.

For steel frames which have no mud ring protruding below the flange, cut the form as usual, place the the frame on the form and stabilize it by having a crew member stand on the cover until the concrete pour is complete. (Mud rings are commonly found on frames in the western United States and are less commonly found in the East).

* A circular saw i-e., (Skill), pipe saw or reciprocating, (jig), saw works well.

F) Measurement of Manhole Frame Height/Orientation:

This can be the source of acrimonious conflict. Understanding the elements of this measurement hopefully will mitigate some of this rancor.

Steel manhole frames from the same manufacturer have a "critical dimension" which is well within repeatable tolerances. Also the radial arm trimmer is manufactured to produce reliable results. The wild card which causes conflict is the adjacent asphalt surface you are trying to match (\pm)

The biggest problem is caused by the volcanic effect of jackhammering the perimeter of the excavation. This mushrooming is, in addition to being higher than the actual plane of the surface, inconsistent i.e., take with a straight edge then repeat rotating the straight edge 12" either way. You may or may not get the same reading. * Other factors such as aggregate size and the finishing smoothness are there but play a minor role.

* To check for accuracy use straight edge in direction of travel only.

The feet are designed to bridge this volcanic effect but this is negated when using a straight edge referencing off the raised lip when measuring. This effect can be mitigated by pounding down the raised lip before the straight edge is used.

The next best approach is a system which allows fine-tuning at a minimal cost. WHIRLyGIG does this by allowing additional trimming, (shaving), or by placing spacers between the manhole ring flange and the top of the trimmed thermoplastic form.

G) Watertightness & Sealing:

In most cases a sealant is not recommended because a cementitious seal occurs automatically by neat cement from the redi-mix seeping into any voids between the bottom flange of the plastic form and the concrete cone.

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 GE / SIKA polyurethane should be applied to the bottom of the plastic flange. This sealant is commonly available at Home Depot, Lowe's and other hardware stores.

H) Inspection and Quality Control:

In a perfect world the precast grade/adjustment rings or masonry set in grout as shown in standard drawings may be a marginally acceptable practice even with the exposed grout and concrete, however, field observations do not engender good feelings about the quality of installation. In addition to problems of achieving compromises of height and slope that result in point loading, grout does not in fact occupy major voids, (there is an awful lot of "plastering" that takes place).

The Whirlygig system uses a monolithic concrete pour that totally fills and seals the entire cavity, (**gravel backfilling is not allowed**), and the plastic form is left in place to protect the riser/collar.

Inspection time is cut dramatically. Using the old method, to insure quality, the inspector would have to be present the entire time it takes to install the manhole. With the new method inspection for quality control pretty much is confined to checking with a straight edge and then a drive-by and either the excavated cavity is filled with concrete or it is not.

I) Conflict Resolution:

It lessens the conflict between the inspector and installer. Having to alter placement of a manhole ring set in grout on grade rings, especially when the redi-mix truck is waiting, sets the stage for a display of highly charged emotions. Disputes regarding the final steel manhole ring height and orientation using Whirlygig are easily resolved by shaving down, (re-trim), or tuning-up, (spacers).

J) Cold Joints:

In some instances where there is a known or likely future need to remove or lower the height of the steel 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" should work well.

K) "H" Loadings:

Recognize that the thermoplastic form is not a load bearing member and that the capacity of the concrete riser/collar exceeds the "H" loadings of the street where it is installed.



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