

Dig Alert Intelligence Paves Off

Introduction

To many contractors Dig Alert is synonymous with the slogan “call before you dig.” And as a utility owner, we respond by marking, with green paint, the location of our underground utilities within the construction zone. The Dig Alert statues were written to help prevent the loss of life and avoid damage to underground utilities during excavation – a true win-win. We have learned to leverage this Dig Alert or “construction intelligence” even further for our own benefit which is the topic of this white paper.

But first a little background on Dig Alert

California state law requires utility owners, like OCSD, to field mark the location of underground utilities when they are in conflict with excavation.

Under state law excavators will:

- Call us and give at least two working days notice prior to excavating.
- Delineate (outline) their job in white paint.
- Hand expose to the point of no conflict within the tolerance zone.

To help mitigate damage caused by excavation, utilities owners will:

- Mark or locate their lines (stake-out) within two working days of the start of construction.
- Use the APWA Color Code to mark their facilities.
- Be accurate within 24 inches either side of the buried utility (tolerance zone).

Under the law, excavators notify Dig Alert of all ground breaking activities ranging from light landscaping to major construction. Dig Alert gathers the details from the excavators then submits the information or “tickets” to their impacted members - the utility owners. Thanks to GIS and other off the shelf software, the “tickets” that we receive daily are automatically converted into something more meaningful and easier to interpret. We next review the tickets and separate the ones that directly impact or conflict with OCSD utilities. These conflicting tickets are given to the field crew to mark in compliance with the law.

So what is a Street-Overlay?

Over time, wear and tare takes its toll on our roads and highways. As part of regular road way maintenance, the responsible agency, normally a city, hires a contractor to remove

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and replace the top most asphalt or topcoat. To make way for the grinding and repaving operations, surface obstructions like manhole frames and covers are removed and replaced with flat steel plates. The plates protect the manhole openings and allow the street-overlay contractor to pave over them with the heavy overlay equipment. Paving over the existing utilities reduces manual hand work and improves the new road's ride, but as a consequence; the buried utilities must be uncovered and raised to the new road's surface. This job is usually performed by a subcontractor that specializes in utility raise to grade work.

The upside is the public gets a freshly repaved roadway; the downside is OCSD usually has to pay the bill. Not the entire resurfacing bill but rather the cost to raise our manhole frames and covers to grade. This cost ranges from as low as \$325 to as high as \$1,050 per manhole depending on how the contractor bid the job. To my knowledge, OCSD has done little to set a reasonable unit cost and is often at the mercy of the contracting agency.

A new approach

Our new motto is: if we're going to pay for it, we better get quality work.

To make our motto come true we must be involved in the street-overlay process. When a Dig Alert ticket identifies street-overlay work, we follow a new work flow to insure quality. The field tested steps we now take are identified below:

1. **Alert Team** - Notify team via email of potential street-overlay project. Team includes members outside of O&M.
2. **Initial Inspection** - Complete inspection form and take many photos. Photos show the condition of our assets prior to construction.
3. **Go or No Go Decision** - Decide replacement action: raise existing frames and covers or remove and replace with new provided by OCSD.
4. **Discover Overlay Details** - Forward contact information for contractor, inspector and/or responsible engineer to team. Determine the project timeline, material delivery date and arrange delivery location with the contractor.
5. **Discover Payment Details** - Discover the contract terms (bid items) and negotiate new terms if no agreement is present. Forward terms to team.
6. **Create Materials Requisition** - Schedule the delivery of frames and covers with Plant 2 Planners. Forward requisition details to appropriate team members.
7. **Procure Materials** - Call foundry to order and schedule the delivery of materials.
8. **Mark Manholes** - Field mark manhole with RR-#. The RR stands for "remove and replace" and the number uniquely identifies the manhole per the inspection

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- sheet. Frames and covers that are to be raised and not replaced will not be marked or numbered.
9. **Provide Specs** - Provide contractor with manhole raise to grade “Standard Specs” of OCSD.
 10. **Confirm Material Delivery** - Call the delivery yard to confirm that they received the ordered frames and covers.
 11. **Validate Material Quality** - Spot inspect installed materials delivered to contractor by foundry. This inspection may take place during acceptance testing.
 12. **Raise Frame and Cover to Grade** - Contractor performs work per OCSD specifications. They will not apply spray coating to lined manholes. Utility raise to grade subcontractors are not certified to apply spray coating.
 13. **Authorize Manhole Repair** - This step is only required on lined or coated manholes that have been disturbed by the street-overlay construction. The overlay contractor will only be responsible for raising lined manholes to grade. The coating contractor will be authorized to spray coat freshly raised frames and covers. The coating contractor will be required to spark test and provide testing documentation per OCSD specifications.
 14. **Acceptance Testing** - Provide final inspection and acceptance testing. Look for buried manhole structures. Alert contractor and contracting agency that corrective work must be done prior to acceptance and reimbursement by OCSD.
 15. **Traffic Control** - Provide traffic control during inspection.
 16. **Pay Invoice** - Reimburse cities for the cost of raising OCSD manhole frames and covers to grade.
 17. **Close Work Order** - Document and forward CMMS work order for close out.

I list the actions we take to show the effort that is involved in coordinating street-overlay work. In the next section, I explain why we think it is important to take these steps, and in the subsequent sections, I show what can go wrong if we are not involved.

City of Fullerton example – why we do what we do

This street-overlay project impacted 4 OCSD manholes and took place in April of 2004 along Highland Avenue. After the ticket was received from Dig Alert, the entire team, which includes members from engineering construction and planning, was notified of the work. The Dig Alert crew inspected the impacted manholes and prepared an inspection report identifying which frames and covers should be replaced. After reviewing the inspection report, we decided to replace all 4 worn frames and covers. Figure 1 shows a worn OCSD frame and cover to be raised to grade as part of the City of Fullerton’s street-overlay project.



Figure 1 – Worn OCSD frame and cover

Figure 2 shows the ensuing work of grinding Highland Avenue while Figure 3 shows a covered OCSD manhole structure. The covered manhole structure is located at the bottom of the photo marked by a green “RR.” A contractor provided steel plate covers the buried manhole structure to keep construction debris out of the sewer during paving. The contractor will pave right over the steel plate and after paving is complete, a utility raise to grade subcontractor will cut a hole in the fresh pavement to remove the steel plate. He will then install a new frame and cover (or raise the existing in the case of the City of Fullerton) and adjust the cover so that it is flush with the new street grade. Sometimes the subcontractor will add pre-cast concrete grade rings and / or mortar to build up the height of the frame and cover.



Figure 2 – Street Overlay in progress along Highland Ave.



Figure 3 – Buried steel plate marked by “RR”

Figure 4 was taken before the existing manhole frame and cover was removed by the contractor. The contractor painted the existing frame and cover pink to make it stand out prior to removal. Per our agreed upon convention with street-overlay contractors, the Dig

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Alert crew paints “RR” for Remove and Replace on all OCSD frames and covers to be junked. The frame and cover at the top of the photo belongs to the City of Fullerton.



Figure 4 – Frames and covers ready to be removed (OCSD shown at bottom)

The Dig Alert crew orders new frames and covers to replace the old. The foundry delivers the new frames and covers to the contractor’s yard which avoids handling and storage by OCSD crews.

Figure 5 shows the City of Fullerton’s frame and cover after the street-overlay is complete. The frame and cover is still red (middle of photo) and well worn (the lid sags below the frame). The City of Fullerton chose not to have the contractor replace their worn frames and covers. OCSD’s frame and cover (top of photo in Figure 5) is brand new and flush with street.

Figure 6 is a close up of the City of Fullerton’s worn frame and cover. As you can see, the cover sits well below the frame.

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Figure 5 – Street-overlay complete (OCSD new frame and cover shown at top)



Figure 6 – Worn City of Fullerton frame and cover



Figure 7 – New OCSD frame and cover after street-overlay is complete

Figure 7 shows OCSD’s new frame and cover close up. The old generic cover was replaced with one bearing OCSD.

We all benefit when a worn cover is replaced with a new. Contractors prefer to raise new rather than old and worn material because it is easier to do and there is less risk of material failure. In fact, contractors do not charge OCSD for the handling and storage of the new frame and cover or the disposal of the old. OCSD benefits because our construction crew does not have to replace the worn frame and cover. The public benefits because traffic is disrupted at one time, during the street-overlay, and not afterwards by OCSD. Plus the public gets a smooth and safer ride.

The Chapman 5 – even contractors make mistakes

This was the very first street-overlay project that we began to track. Needless to say, Chapman opened our eyes to the benefits of accountability and showed us what can and will go wrong.

As explained in the previous section, street-overlay contractors remove our frame and cover and protect the manhole opening with a steel plate. They then proceed to pave over the steel plate and resurface the street. Unfortunately, contractors are human and make mistakes. One typical mistake is they leave their steel plate buried and forget to reinstall the manhole frame and cover. If you think this is rare, think again. Or better yet, speak with the District’s construction crew responsible for raising buried manholes to grade. It is difficult work and requires extensive traffic control and in some cities a permit. And to make matters worse, a buried manhole is often discovered during a line cleaning operation when the crew is expecting access to the manhole. If the crew cannot gain access, cleaning is sometimes disrupted or delayed until access can be gained.

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Since we provided the Chapman subcontractor with 16 new frames and covers, he felt obligated to return the ones he did not use. He told me he had 5 left over and asked me when I could come and pick them up. I instead proceeded to Chapman to discover what had gone wrong with our manhole count. Fortunately, we were armed with mobile GIS that showed the location of all our utilities, including manholes, relative to our current position. After a short drive, we discovered that five consecutive manhole structures along our 12-inch sewer line were still buried (two of the five buried manholes are shown in Figures 8 and 9). After identifying their location with mobile GIS and a metal detector, we marked the spot with a green circle and “S” for sewer (see bottom of photos).



Figure 8 – Buried manhole structure at Chapman and Esplanade



Figure 9 – Buried manhole structure at Chapman and James



Figure 10 – Structure raised at Chapman and James after the contractor was notified

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We now routinely check for buried manhole structures after street-overlay work. All five buried manhole structures were raised to grade by the subcontractor. Figure 10 shows the subcontractor standing next to the raised manhole structure at the intersection of Chapman and James. If this had not been caught, our construction crew would have spent two days raising the five buried manhole structures along a very busy Chapman street.

Hill Street – why accountability is good thing

The second thing that can go wrong is bad workmanship or work that is not on par with our standards. Figure 11 shows a frame supported by miscellaneous construction materials including wood (its no surprise cracks are forming on the surface). Figure 12 shows a similar deal except it looks like the contractor did not have an intact grade ring so he used pieces of a broken grade ring to support our frame. He didn't even bother to fill the joints or provide a clean finished concrete surface. Figure 13 shows the same manhole in Figure 12 after the contractor completed his repair work. We kindly confronted the contractor, and he apologized and made a speedy repair. Again our goal is to get quality work but to do this we have to partner with the contractors. Our hope is as we develop relationships that include accountability, the contractors will work per our specifications and not try to cut corners.



Figure 11 – Wood used to support frame; settling and surface cracks are visible



Figure 12 – broken grade ring and joints not filled with mortar



Figure 13 – Figure 12 manhole after contractor repair

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Dyer Road – sounds to close to dire to be a coincidence

Manholes with protective wall coatings complicate matters during street-overlay work because care must be taken to minimize damage to the coating when the frame and cover is removed. Figure 14 shows a polyurethane coated manhole structure; the true structure is made out of brick. Without going into too much chemistry, coatings are there to protect the manhole concrete structure from corrosion. Yes, under the right septic conditions, concrete will corrode and turn into a weak paste. The coating acts as a barrier between the concrete and the chemicals that attack the concrete. If the coating or barrier is damaged (i.e., pin hole puncture, crack, tear, etc.) the underlying concrete is left without protection and its condition will deteriorate over time.

If the frame and cover of a coated manhole is removed, the coating will be disturbed leaving the concrete susceptible to corrosion. Figure 15 shows another polyurethane coated manhole on Dyer Road that has been in service for many years. Figure 16 shows the same manhole after the frame and cover was raised to the new grade of the street. The contractor was overly aggressive in peeling back the protective coating so he could remove the frame and cover. In fact, the coating is in such disrepair it is in danger of collapse and could fall into the channel and cause a blockage. This manhole was flagged for immediate repair and the contractor was confronted. Thanks to the before photo we know the damage was not a preexisting condition. The after photos even show fresh concrete clinging to the peeled back coating proving that the coating failure happened during and not after the contractor completed his work.



Figure 14 – Polyurethane coated manhole structure

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Figure 15 - Polyurethane coated manhole structure in Dyer Rd.



Figure 16 – Same manhole in Figure 15 after street-overlay work is complete

Other benefits we have discovered or uncovered

Other benefits, unrelated to street-overlay work, arise because the Dig Alert crew is opening lids and performing a cursory manhole inspection. While they are looking for worn frames and covers, they are also seeing and responding to the following:

- FOG (Figure 17)
- Roaches (Figure 18)
- Debris (Figures 19 and 20)
- Coating Problems from past and untracked street-overlay projects (Figure 21)
- Cracked lids (Figure 22)



Figure 17 – Crew breaks solid grease into small pieces



Figure 18 – Roaches and grease



Figure 19 – Debris restricting flow



Figure 20 – Debris from Figure 19 removed



Figure 21 – Failed PVC coating as the result of prior street-overlay



Figure 22 – Cracked cover replaced by crew

What does the future hold?

During the past 7 months of 2004, we have and are in the process of tracking 35 street-overlay projects in various cities that impact OCSD manholes. So far we have provided street-overlay contractors with almost 100 new frames and covers. Yet we are still looking at only a very small subset of our 8,000 manholes. When we embark upon our full manhole inspection program we expect to find and resolve many more problems. This work has taught me that the field is a messy environment that needs our attention. It is always less costly to correct problems in the early stages rather than when we have little or no choice.