BADGER DAYLIGHTING™

Unearthing Solutions for

LAKE COUNTY STORMWATER MANAGEMENT COMMISSION

PRESENTATION OVERVIEW

1. Company Overview
2. Hydrovac Rationale – A Safety Tool
3. Water vs Air – Pros & Cons
4. Examples of Vacuum Applications
5. Q&A

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SAFETY COMMITTMENT

1. I make SAFETY personal.
2. I make SAFETY part of every decision.
3. I have the COURAGE to intervene.

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BADGER DAYLIGHTING OVERVIEW

- Established 1992 Publicly traded
- 1320 Hydrovac Trucks - North America
- 120 Offices
- Badger Straight-Vacs
- Jetter /WaterTrucks
- Badger Hi-Rail Trucks
- Roll-off Trucks
- Coring Machines
- www.badgerinc.com

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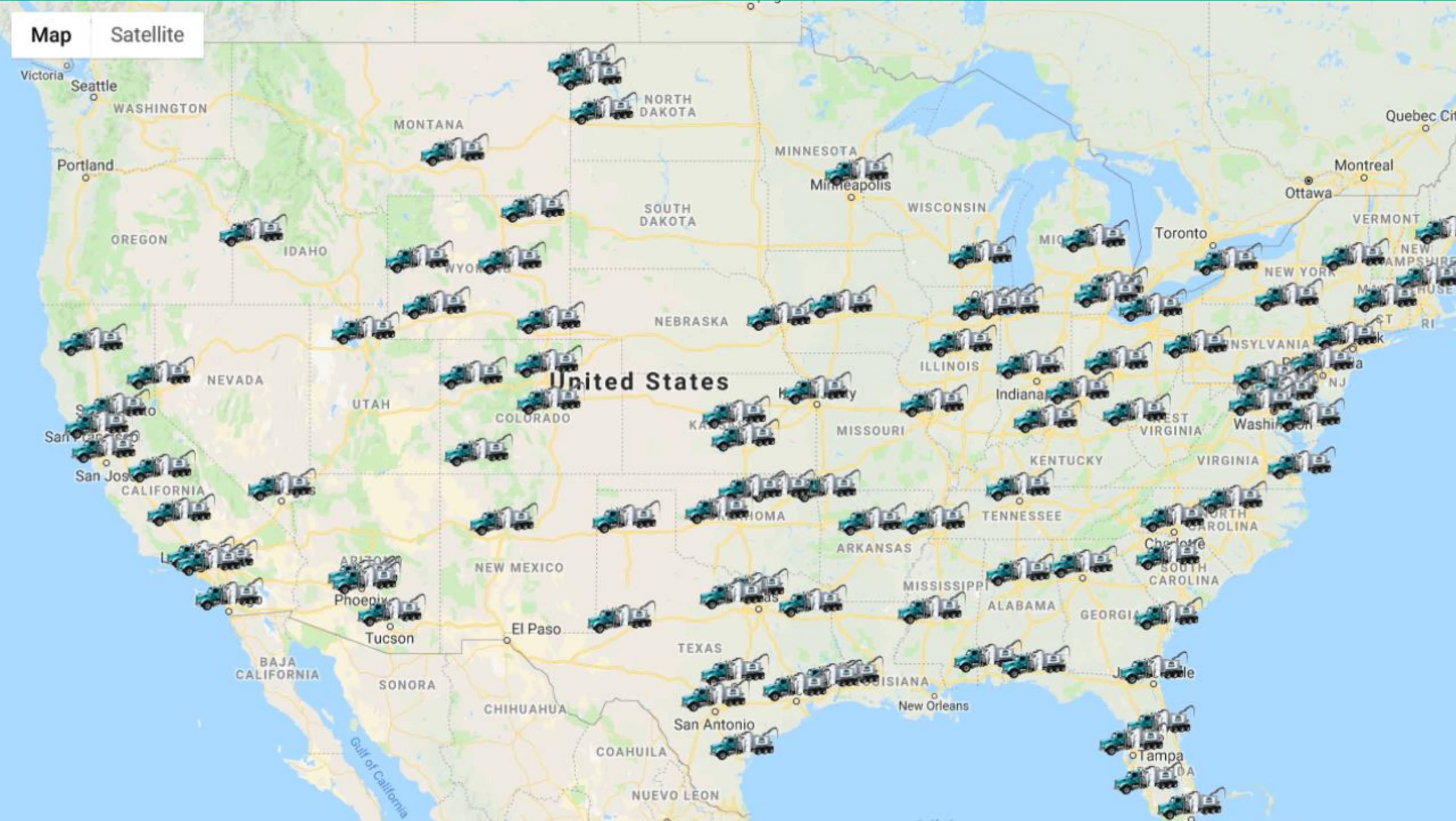
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Victoria
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WASHINGTON
Portland
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IDAHO
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NORTH DAKOTA
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MINNESOTA
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WISCONSIN
Quebec City
Montreal
Ottawa
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El Paso
TEXAS
BAJA CALIFORNIA
SONORA
CHIHUAHUA
COAHUILA
NUEVO LEON
San Antonio
New Orleans
Tampa
Gulf of California

The Power Behind the Badger Daylighting Solution

The Purpose Built Badger Daylighting Truck

Badger Daylighting is the only Hydrovac service provider that designs, engineers and builds it's own fleet. As such, they are the safest and most capable units in the industry.

- 6,200 CFM Positive Displacement Blower
  - Capable of lifting a 150 lb. boulder and dig over 400ft from truck!
- 12 Cu. Yd. Debris Capacity
  - "Shaker" off-load system to speed turn around time
- 1,800 Gallon On-board Water Supply
  - Variable PSI – 800 – 2.500 lbs.
- 1,000,000 BTU Burner
  - Delivers an uninterrupted supply of 150° water
- Redundant Safety Features
- One or two person crews depending on scope

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Vacuum Excavation Rationale

- Vacuum excavation is the process of digging using high-pressure water or air to loosen soil utilizing a vacuum to remove soil and debris.
- Vacuum excavation is a safer choice over hand-digging near the Tolerance Zone around underground utilities.
- Vacuum excavation increases safety for workers on the surface and helps reduce accidental line damage.

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Hydrovac =Non Destructive

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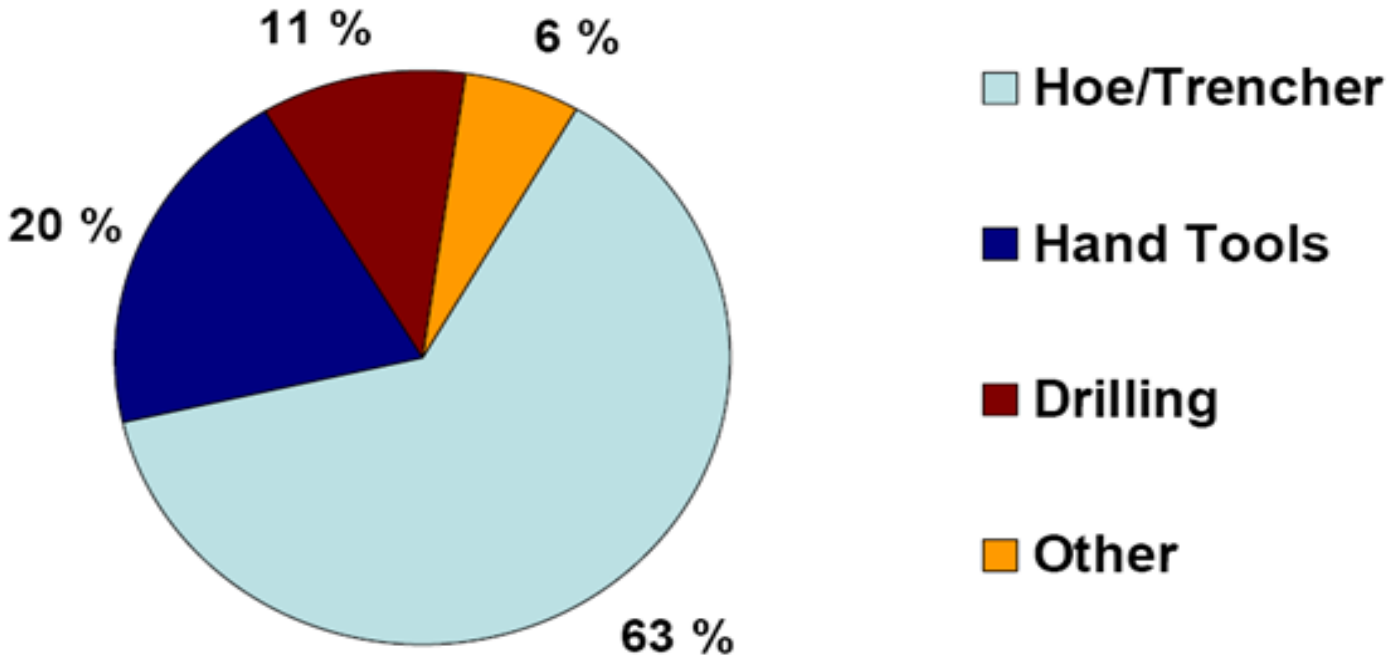
Where do damages come from?



THE COST OF DAMAGE

- Injuries - minor to fatal
- Disruption to service
- Delay to job completion
- Repair to line and property
- Emergency Services
- Claims investigation & processing
- Reputation and public concerns

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WATER MAIN BREAKS

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Hydrovac Excavation Pros and Cons

PROS:

1. Able to operate truck & dig with one operator.
2. 5-10x faster than hand excavation.
3. 3-5x faster than air vacs (trailer mounted units).
4. Able to dig more than 400ft away from truck.
5. Able to dig over 40-50'Deep.
6. Versatile-Able to dig in a variety of applications (i.e. debris removal, cleaning culverts, etc.).
7. Able to dig in frozen ground (water can be heated) or harder Soil Types.
8. Variety of nozzles are used depending on application & soil type.

CONS:

1. Disposition of spoils offsite comes at a cost.
2. Operators need to be trained. If not utility damage may occur.
3. Trend is to use Combo units (flusher trucks designed to clean sewer pipes at 3.000psi) are being used to excavate. Can potentially cause damage to utilities.

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Pneumatic (Air Knife)Excavation Pros and Cons

PROS:

1. Can reuse the spoils (depending on application) potentially saving on disposal costs .
2. Save costs traveling to/from disposition site.
3. Able to dig potholes, bell holes, pole holes, etc. in good soil.
4. Smaller equipment is typically a plus when working in tight or congested areas.

CONS:

1. Needs two operators to perform the work.
2. Creates a “sandblasting” effect causing potential safety hazard (i.e. airborne dust/silica sand) and damage to underground utilities.
3. Very difficult to dig with air in hard clay, rock and frost.
4. Typically operators need to use another tool (i.e. spade shovel or frost bar) to loosen the “harder” ground and tools (i.e. small club) to loosen material from sticking and catching inside of the hose.

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CAPABILITY COMPARISON

- Daylighting sewer main 13’ 10” deep.
- Air Vac = Couldn’t do it. Too deep.
- Badger was used to complete job.

Typical Client Applications

Types of Applications:

- Subsurface Utility Engineering
- Utility & Fiber Optic verification and relocation – Daylighting test holes and potholes
- Utility & Fence Pole Holes & Piling Holes
- Cable & Conduit installation – Trenching
- Pits and “slot trenching” to locate mismarked utilities
- Directional Drilling/Boring – Drill Mud Removal
- Manhole/Culvert & Storm Sewer Cleanouts/Debris Removal
- Locate water main leaks

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AIR vs. WATER CASE STUDY

- Gas service repair pits.
- Dig pit and slot trench to expose gas service.
- Pit sizes vary (0.5 to 2.5 yd^3).
- Digging up to 6/day by air.

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• Pits excavated for gas service repair.
• Each pit approx. 1.25yd³ in size.
• Total time for two pits = 11 min.

AIR vs. WATER COMPARISON

AIR PRODUCTION RESULTS:
- Completed up to 6 pits/day
- Maximum production estimated 66 pits in 11 days

BADGER PRODUCTION RESULTS:
- Completed 198 pits in 11 days
- Averaged 18 pits/day
- Completed up to 24 pits/day
- Maximum Productivity Impact: +300%

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AIR vs. WATER COMPARISON

PRODUCTIVITY IMPACT FORECAST:

AIR PRODUCTION

Crew Cost/Day	Pits/Day	Total Pits	Days to Complete Work	Total Project Cost
$5,000	6	450	75	$375,000

WITH BADGER PRODUCTION

Crew Cost/Day	Pits/Day	Total Pits	Days to Complete Work	Total Project Cost
$8,000 *	18	450	25	$200,000

* Includes $3,000 Badger hydrovac costs, not including backfill

WATERMAIN BREAK

WATERMAIN BREAK RESULTS

- A 9’ deep watermain break in a busy intersection.
- Minimized the size of the road cut (16 ft^2 vs. 256 ft^2).
- Maintained two-way traffic.
- Didn’t damage underground traffic sensors.

- 4 hours to complete vs.10 hours by backhoe
- Cost to complete by hydrovac = $2,000
- Est. cost to complete by backhoe = $20,000
- Damage to Existing Utilities = 0

AIRKNIFE POTHOLES

Badger crews performing “turnkey” pothole services. Backfill with flowable fill.

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AIRKNIFE AROUND TREE ROOTS

City of Union Project using AirKnife. Took almost 3 hrs. complete.

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HYDROVAC AROUND TREE ROOTS

36’ DIAMETER EXCAVATION AROUND EXISTING TREE. TOOK 6 HOURS TO COMPLETE.

NOTE: WATER CAN BE MORE ABRASIVE THAN AIR SO CORRECT WATER PRESSURE AND NOZZLES NEED TO BE USED.

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AIRKNIFE UTILITY POLE HOLE

2 POLE HOLES 24” x 7’D. Excavated with Air Compressor and Badger Vac Truck. Avg. 40 minutes (each) to complete with 2 Operators. Took 15 minutes to unload spoils. Some of the dirt was used for backfill the rest needed to be hauled off with client crews.

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HYDROVAC UTILITY POLE HOLES

Typical 24”W x 6.5’D Hole with slot trench and ground plate pit takes 12 min. to dig

Note: Soil conditions may affect dig time productivity

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AIRKNIFE SPLICE PITS

- First pit 12’L x 5’W x 3’D Soil was very hard with clay at the bottom.
- Large clumps of dirt got stuck in the vacuum tube.
- Needed to clean out tubes several times during the dig.
- Took 2 hours to complete excavation.

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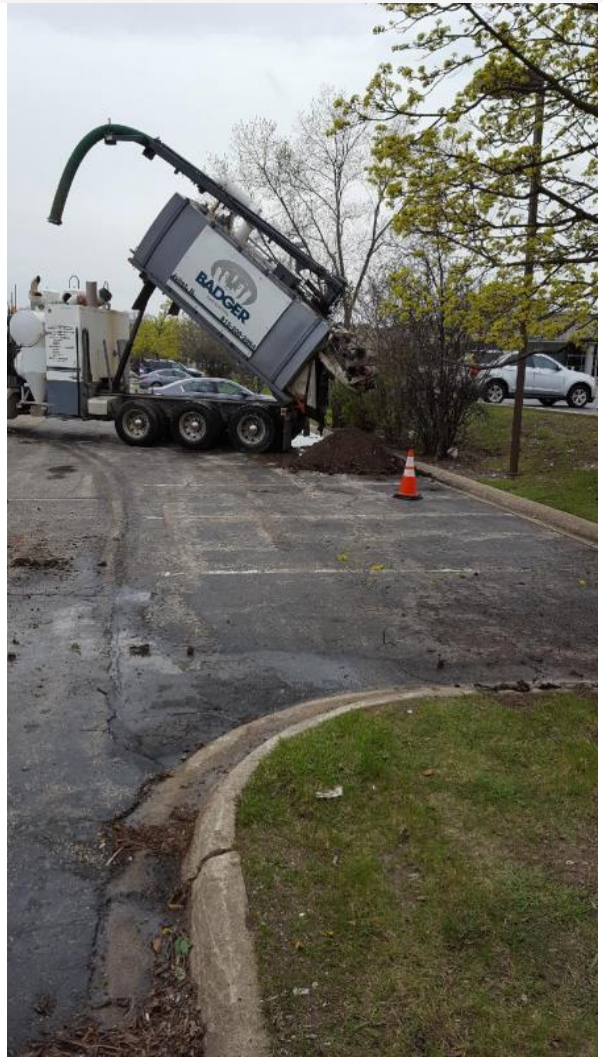
AIRKNIFE SPLICE PITS



- **Size depended on when we found the utilities.**
- **Digging stopped several times to clear roots and dirt from vac tube.**
- **Due to soil type flying debris was evident. Supervisor was hit standing over 150ft from work zone.**

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EXCAVATE BELL HOLES TO LOCATE UTILITIES

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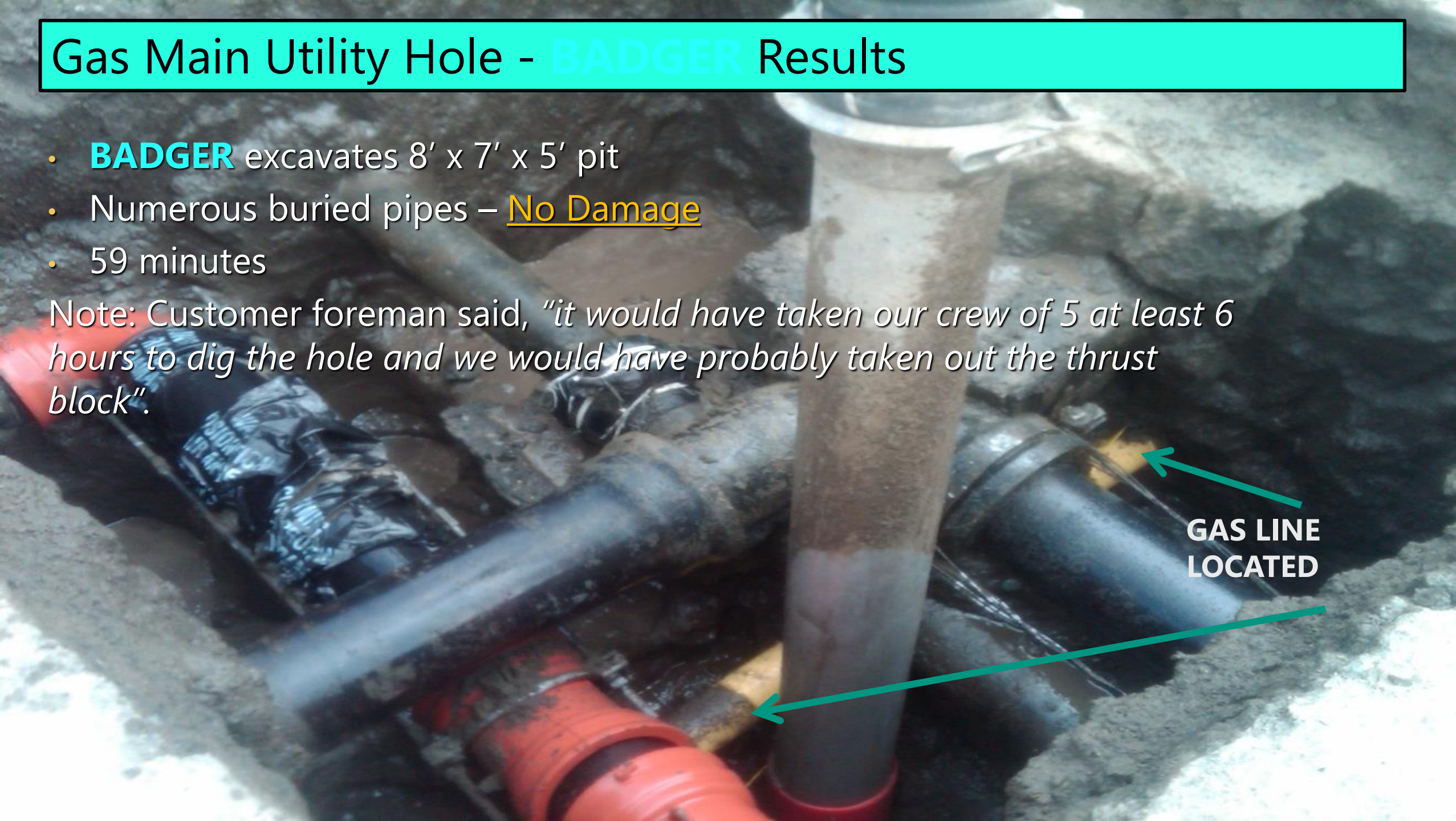
Gas Main Utility Hole - BADGER Results

- **BADGER** excavates 8′ x 7′ x 5′ pit
- Numerous buried pipes – No Damage
- 59 minutes

Note: Customer foreman said, *"it would have taken our crew of 5 at least 6 hours to dig the hole and we would have probably taken out the thrust block".*



SLOT TRENCHING

To locate existing or install new electrical conduits

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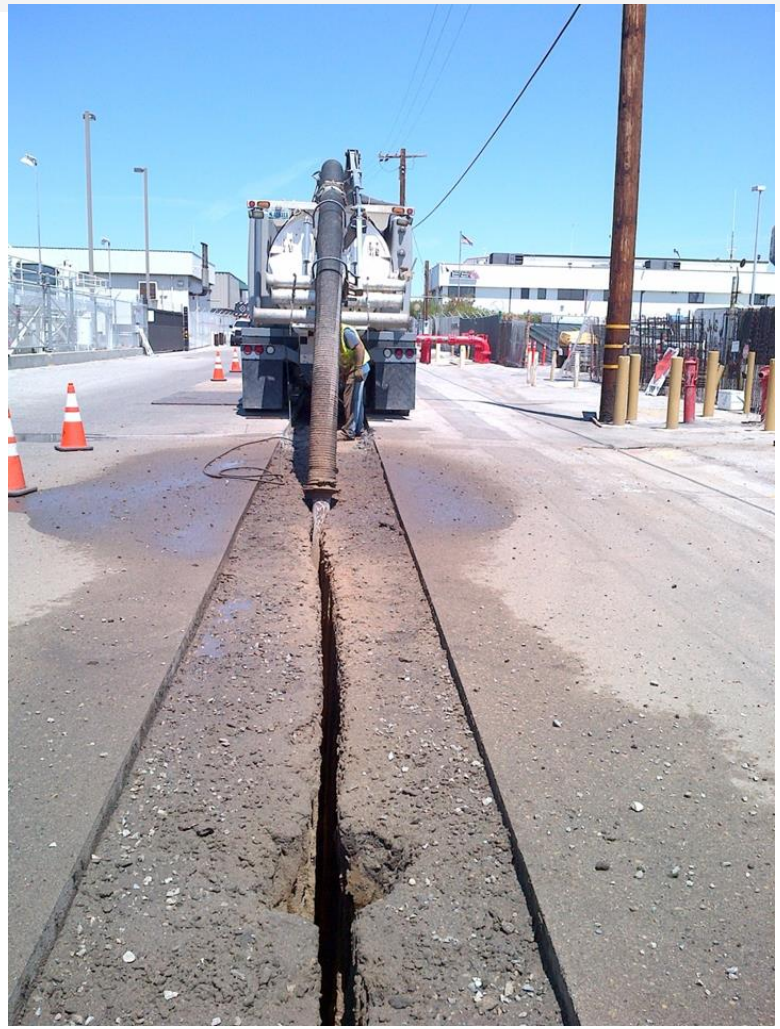
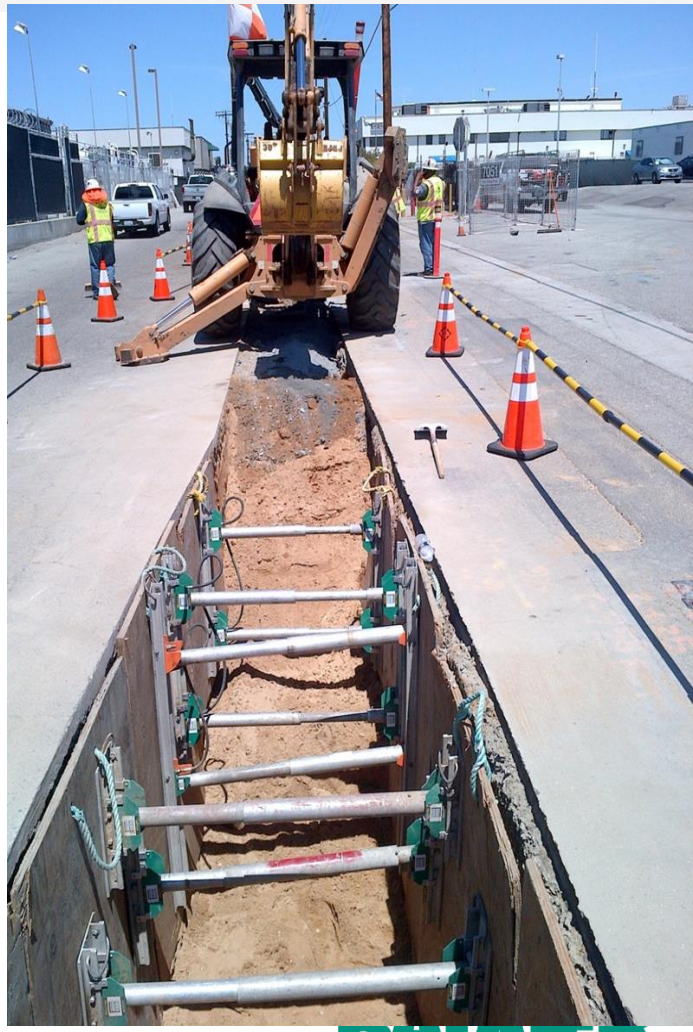
AIRPORT ELECTRICAL DUCT BANK PROJECT

Project scope consists of hydro excavating several thousand feet of slot trench to locate all utility crossings. Typical slot size is 6”Wide x 6’ Deep.

Badger truck and operator averaged 80ft per/day.

“Made Backhoe Operator 300% more Productive!! Finished 2 months ahead of schedule”.





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GAS REPLACEMENT PROJECT FOR PEOPLES GAS

TIME SENSITIVE PROJECT REQUIRED BADGER TO SUPPLY 5 TRUCKS TO EXCAVATE TRENCH FOR NEW GAS MAIN REPLACEMENT PROJECT NEAR WRIGLEY FIELD.

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AT&T I-4 Crossing

Badger was able to hydroexcavate to expose and lower this 24-4" AT&T conduit to clear dual 54" drainage REINFORCED CONCRETE PIPE (RCP).

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AT&T I-4 Crossing

- **CONSTRUCTION START: 4/05/2016**
- **CONSTRUCTION FINISH: 4/07/2016**
- **RELOCATED 24 WAY AT&T CONDUIT RUN WITH FIBER COPPERS CABLES**
- **SPLICES = 0**
- **SERVICE OUTAGE = 0**
- **18 MONTHS PRIOR TO NEW OVERPASS**
- **TOTAL COST OF RELOCATION BY EACH UTILITY AGENCY OWNER APPROX. $1.0 MILLION**
- **COST TO RELOCATE WITH HYDRO-EXCAVATION AND LOWERING IN PLACE APPROX. $10,000**

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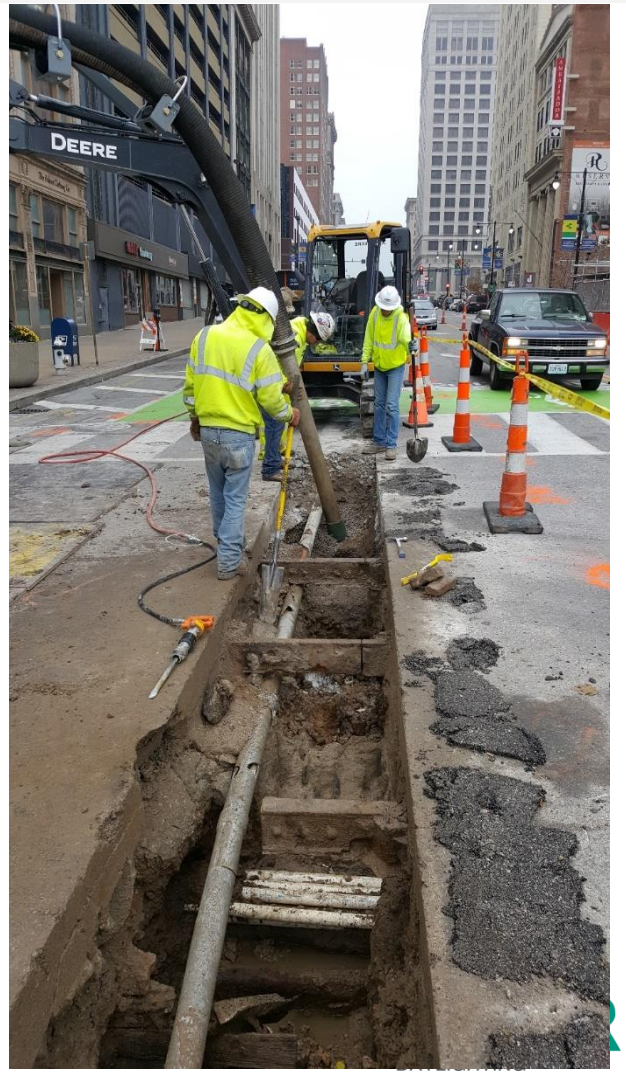
FEDERAL BUILDING ST. LOUIS TRENCHING PROJECT TO REPAIR WATER MAIN BREAK



DEEP EXCAVATION FOR HIGHWAY SIGN POLES

5’ WIDE X 33’ DEEP HOLE EXCAVATED IN 8 HOURS. NOTE: CLIENT LIKED THE FACT THAT MATERIAL WENT DIRECTLY INTO THE VACUUM TRUCK AND DID NOT TOUCH FINISHED SURFACE

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DEEP EXCAVATION BRIDGE FOOTINGS

DEWATERING A PILING HOLE IN ADVANCE OF CONCRETE FRAMING.
NOTE: BADGER HAS EXCAVATED PILING HOLES UP TO 55FT DEEP.

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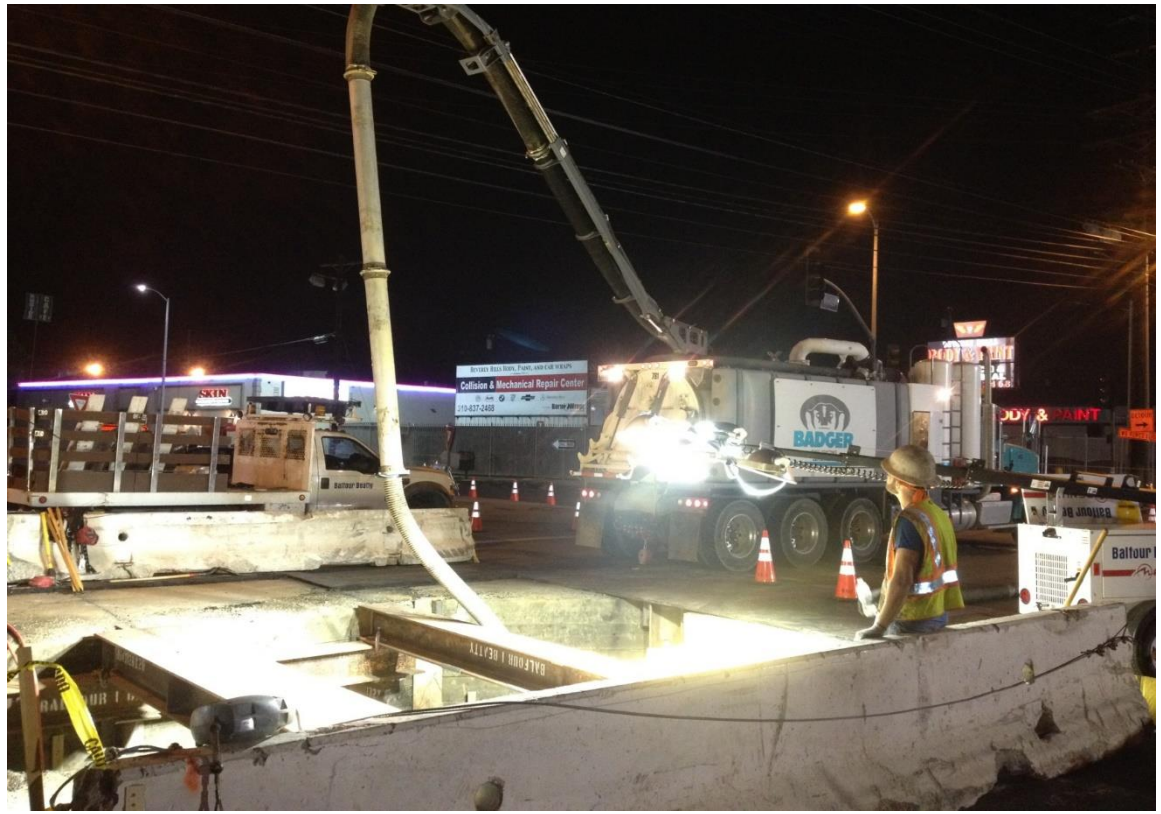
EXCAVATING UNDER A 70" SEWER MAIN



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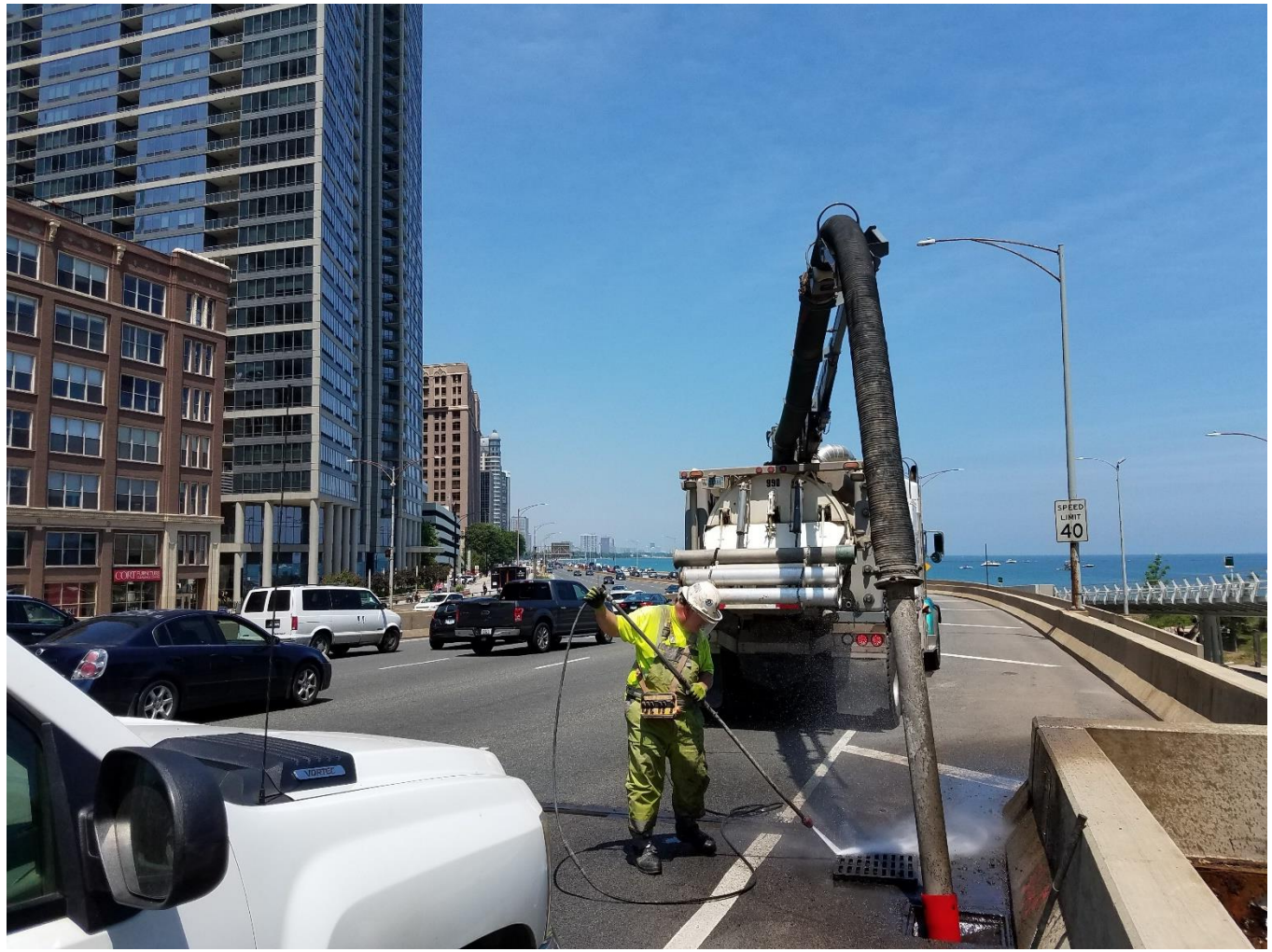
CULVERT & STORM DRAIN CLEANOUT



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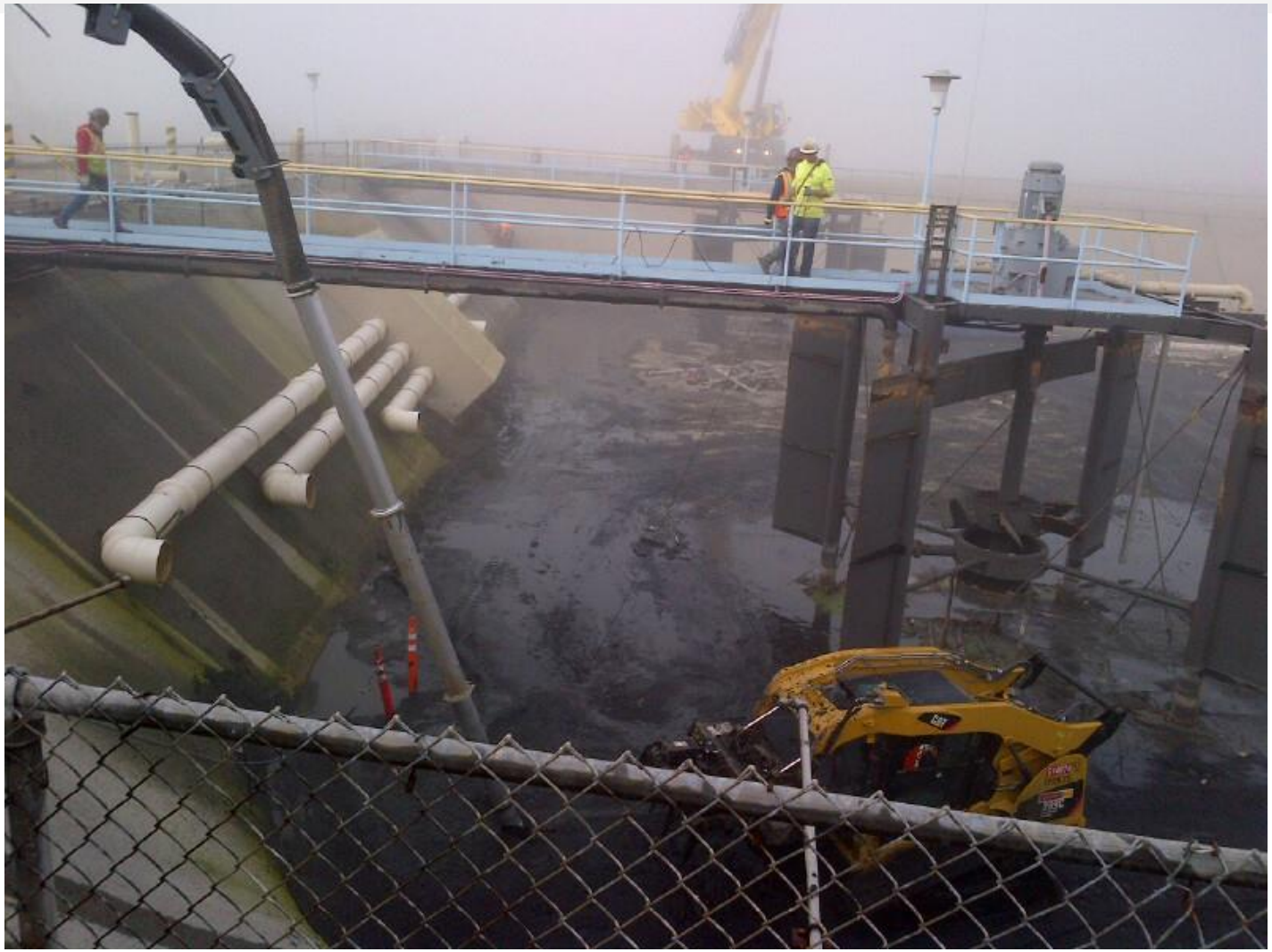
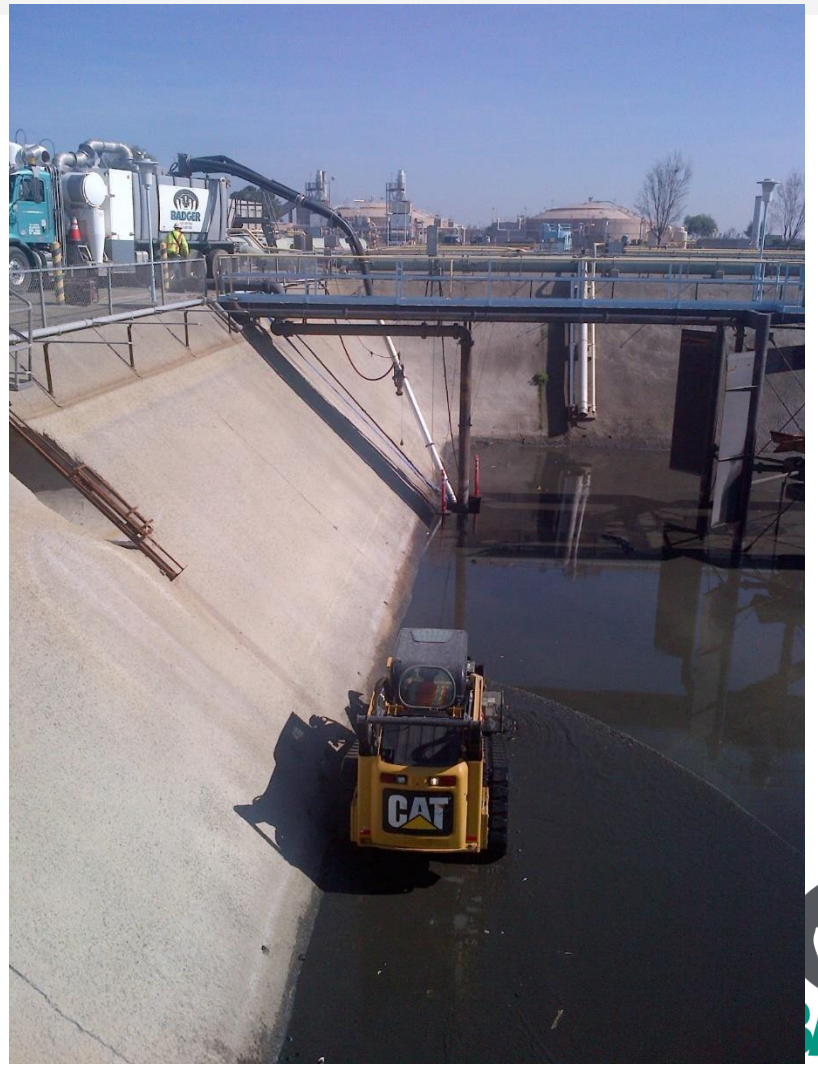
SURFACE WATER TREATMENT FACILITY
"REUSE" EXISTING PRETREATMENT BASIN





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SURFACE WATER TREATMENT FACILITY "REUSE" EXISTING PRETREATMENT BASIN

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CLARIFIER CLEANOUT PROJECT

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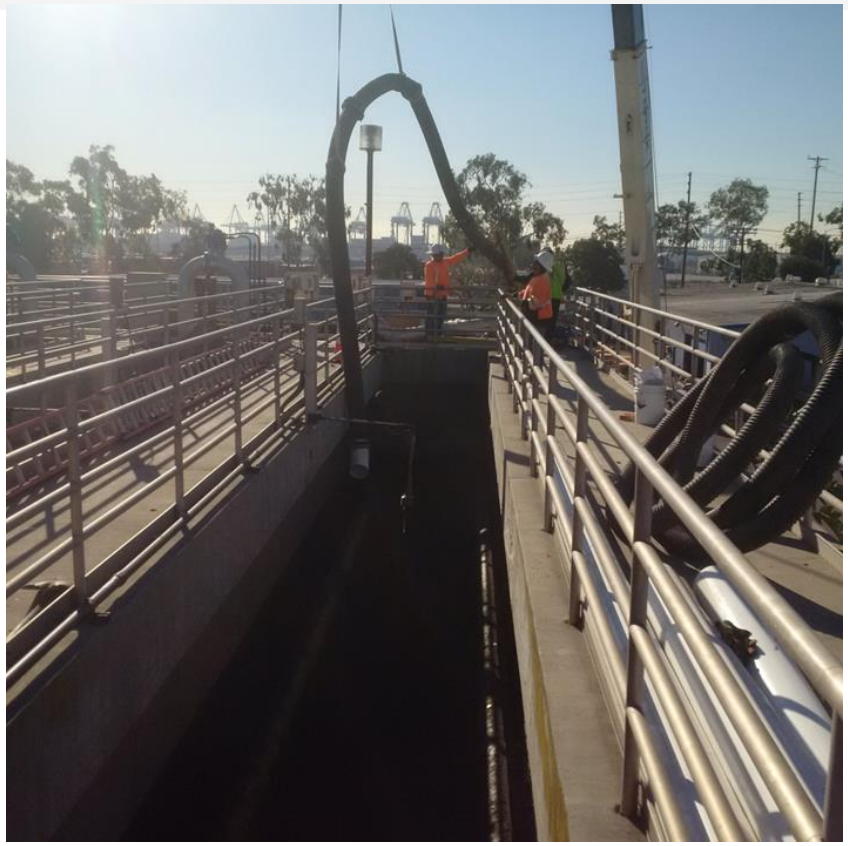
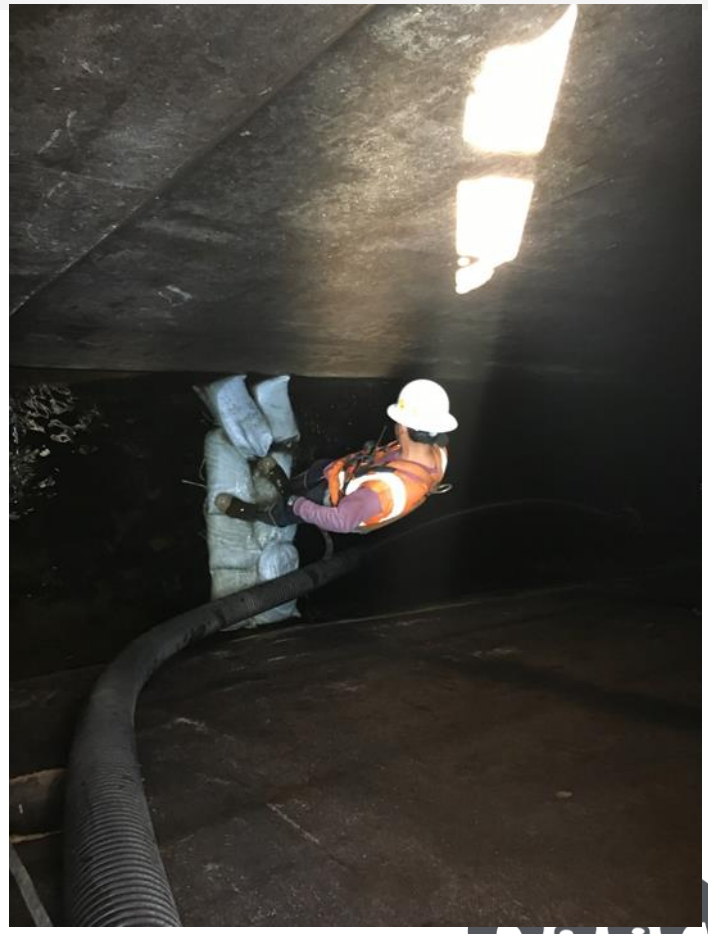
FILTER MEDIA REMOVAL





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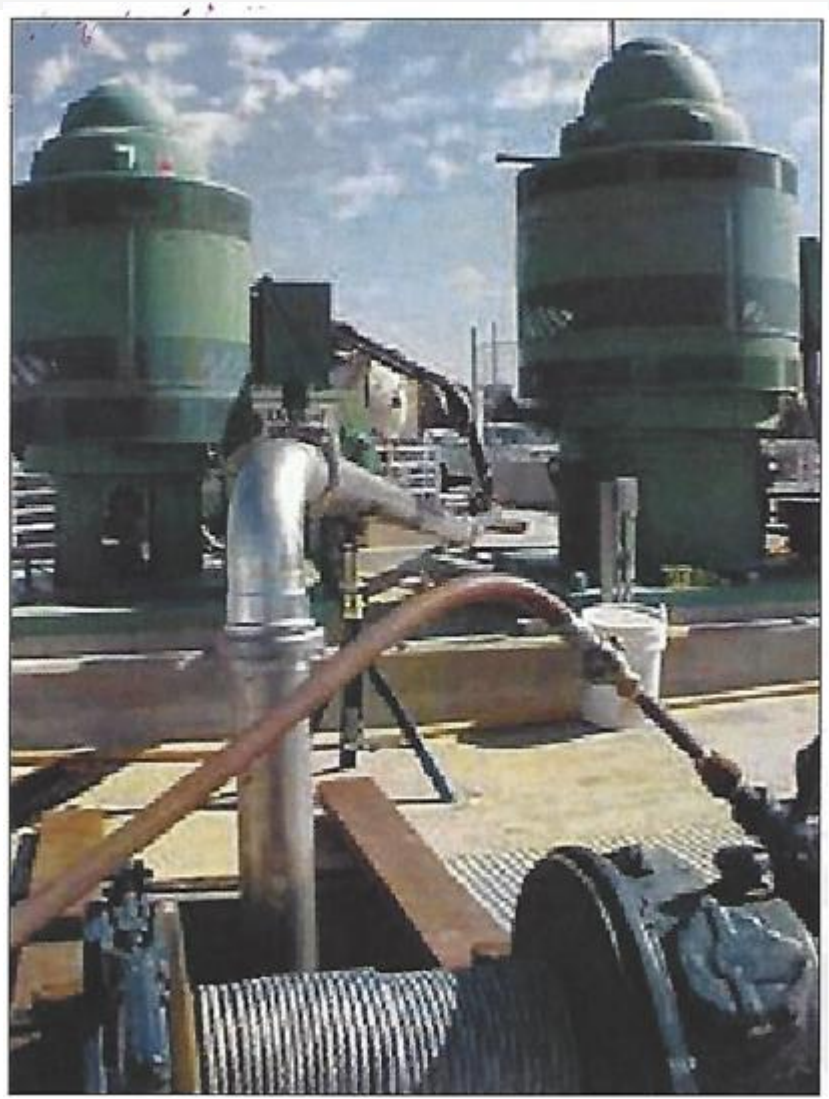
WWT PLANT PROJECT

Task: Remove 12,000 gallons of water and 10yds^3 of sludge and gravel from a catch basin at a waste water treatment facility.

The catch basin was situated 70′ away from the Badger unit.

The material had to be pulled from a depth of 70′ below grade.



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WWT PLANT PROJECT

WWT Project requiring Badger to remove mud, rocks and silt around foundation pit and footings after extreme rainfall

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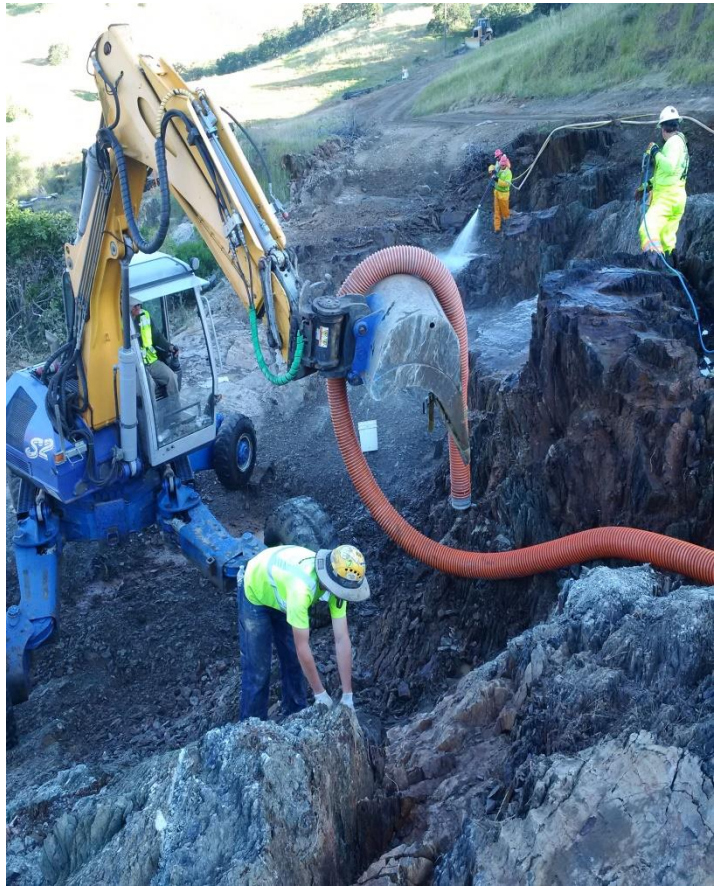
INNOVATIVE “DENTAL CLEANING”
Dam Project



SCOPE INCLUDED THE NEED TO REINFORCE EXISTING SPILLWAY. BADGER WAS HIRED TO REMOVE LOOSE ROCKS AND SEDIMENT PRIOR TO POURING NEW CONCRETE. WORKED WITH CLIENT’S SPIDER “WALKING” EXCAVATOR.

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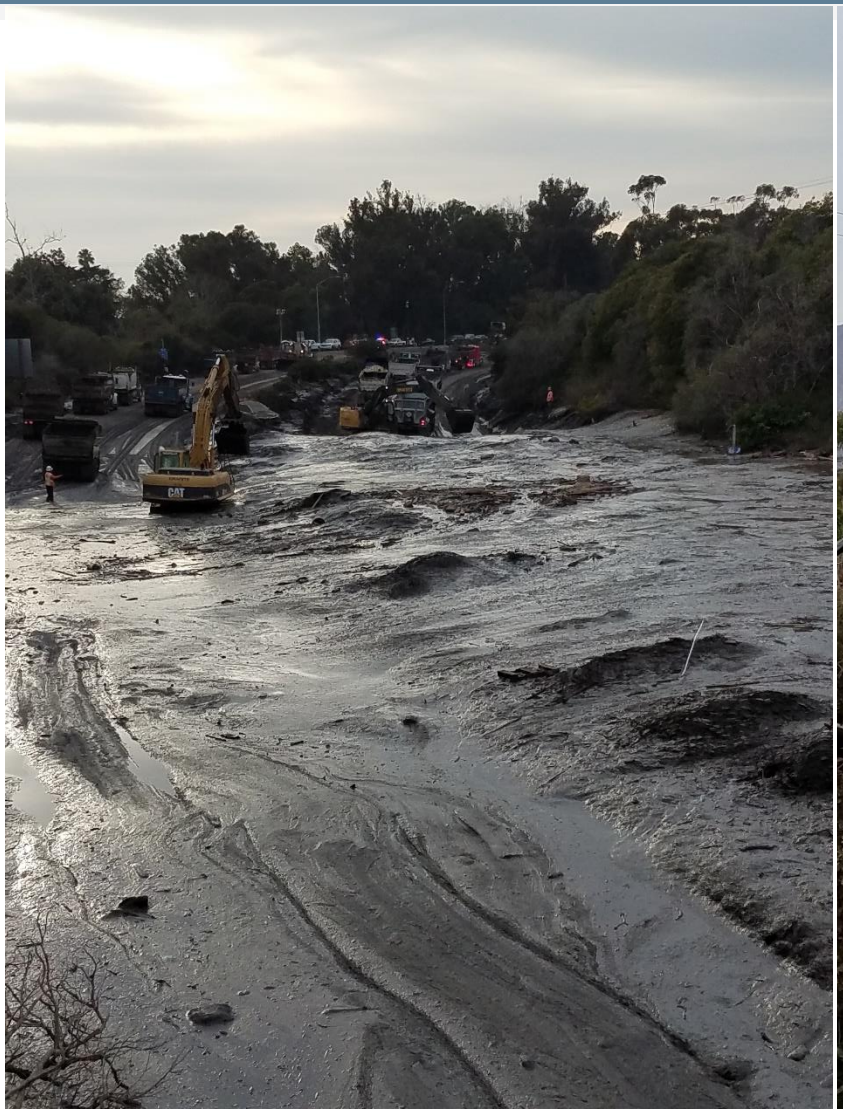
2018 MONTECITO MUDSLIDE – BADGER DISPATCHED EMERGENCY RESPONSE TEAM WORKING 24/7 FOR 6 WEEKS



QUESTIONS ?

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