Best Practice – Speed and Quality of Linear System Repairs

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The Perfect Gander Storm

Speed and Quality of Linear System Repairs

This Presentation will introduce you to:

- Reasons for Speed & Quality of Repairs;
- Strategies for improving the awareness, location, and repair response times to linear system failures (the speed part);
- Strategies for improving the quality of repairs;
- Sample watermain repair flow chart; &
- Sample watermain repair field data collection sheet

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Speed and Quality of Linear System Repairs – Working Group Team

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Speed and Quality of Linear System Repairs

Important Definition:

- In the context of this BP, the term «**speed**» does not mean «how fast a watermain failure can be repaired» but rather «**how quickly a watermain failure can be detected, located and repaired** using the highest standards for safety, quality and efficiency.»

Speed and Quality of Linear System Repairs

Reasons for Speed and Quality of Repairs:

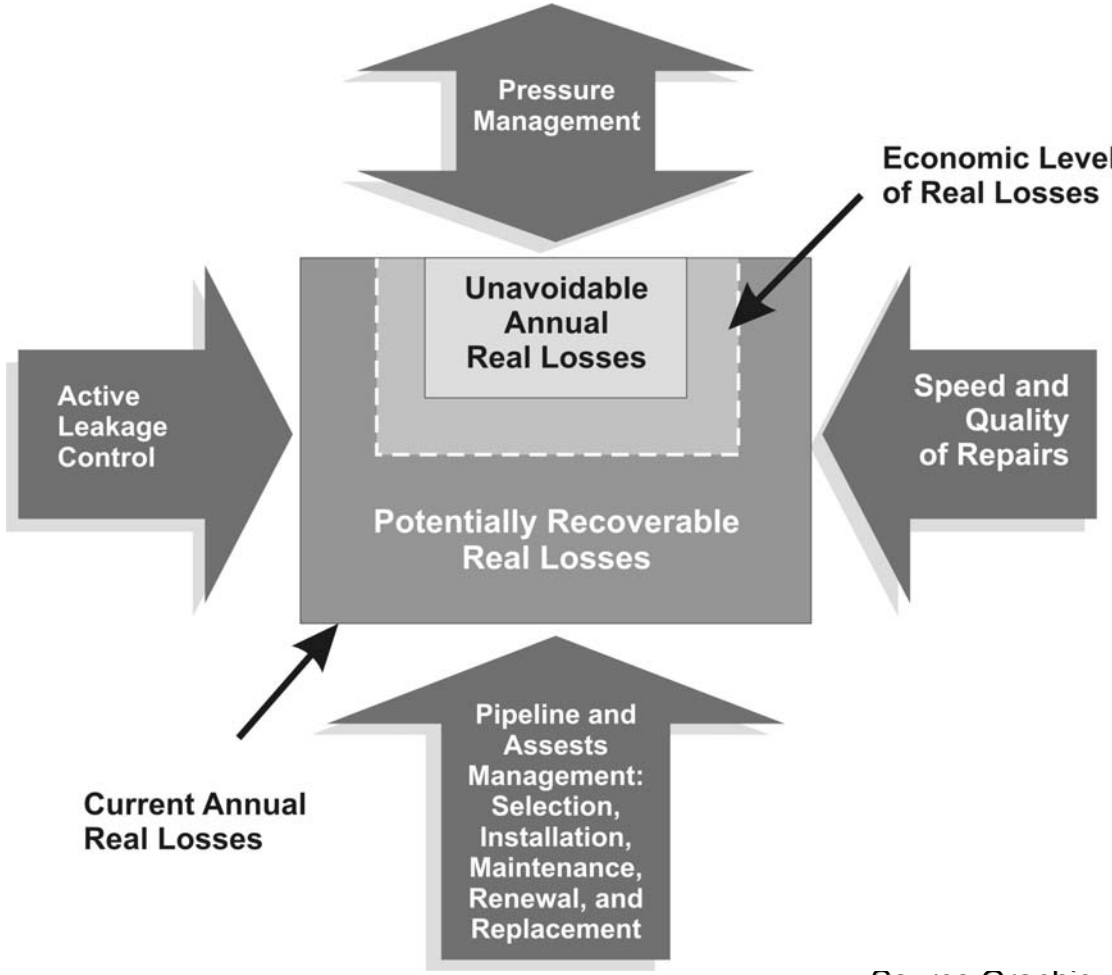
- Water accountability
- Reliability of supply
- Customer service
- Infrastructure renewal
- Water quality
- Public and staff safety
- Increased awareness
- Quality of locates
- Protection of property and the environment

Speed and Quality of Linear System Repairs

Factors causing failure include:

- pipe and fitting material;
- pipe and fitting manufacturing and quality control;
- pipe and fitting handling and storage;
- design and installation practices;
- traffic loading and vibration;
- soil and groundwater environment and corrosion;
- system pressures and transients;
- operational practices and maintenance;
- water quality and chemical characteristics; and
- proximity to and activities associated with construction, operation, or repair of other utilities

Water Loss Control Strategies



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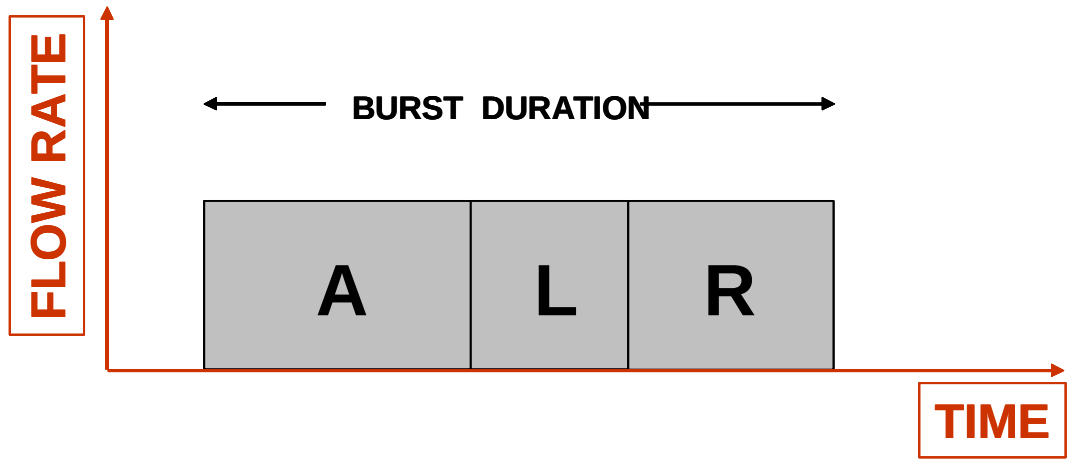
Speed and Quality of Linear System Repairs

Three important components affect the speed or responsiveness of linear system repairs:

- **Awareness**
- **Location**
- **Repair**



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Awareness….

- How quickly one is made aware of a watermain failure
- Often overlooked
- Is the most critical aspect in reducing leakage run times, water loss and associated social and damage costs

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Location ...

- How quickly and accurately a watermain failure is pinpointed and identified for repair once it has been reported

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Repair…

- How quickly and effectively the repair crew is dispatched to repair the failure once it has been pinpointed

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Improving Awareness Response Time

Two types of failures:

- **Reported failures**
- **Unreported failures**

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Improving Awareness Response Time

Reported failures:

- Engage the general public
- Engage municipal and other utility staff
- Engage other groups

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Improving Awareness Response Time

Unreported Failure:

- Water balance
- Acoustic leak detection surveys
- Distribution system metering
- District metered area (DMA)

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Example Run Time Water Loss:

- **Reported Failure**: Failure on 300-mm-diam main, surfaces on road shoulder, flow rate 500 l/m, observed and reported by residents, crew dispatched quickly, awareness time 18hrs. Water loss to leakage 540,000 l.
- **Unreported Failure**: Failure on 150-mm-diam main, water escapes into sanitary sewer, flow rate 150 l/m, no sign of leakage, found at next sounding of hydrant 3 months later, awareness time 90 days. Water loss to leakage 19,440,000 l.
- **Difference**: 36 times water loss, extra damage to road/sewer/other utilities etc, extra costs for sewage treatment.

Speed and Quality of Linear System Repairs

Improving Location Response Time

- Track and prioritize each reported failure;
- Assign staff to pin-point the failure;
- Use latest leak detection techniques and pin-pointing equipment (noise correlators);
- Train staff to use leak detection equipment;
- Ensure staff have field access to latest map and asset information;
- Request and record other utility locates;
- Prepare a detailed report for repair crew

Active Leak Detection

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Improving Location Response Time

- Rate the level of failure severity for repair crew prioritizing;
- Assess the probable type of failure for repair crew use in equipment and material selection;
- Identify critical customers within repair area that may be impacted;
- Communicate and co-ordinate repair with critical customers;
- Identify required line valves needed to isolate failure.

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Improving Repair Response Time Factors

- Watermain use (trunk or arterial);
- Affected customers (residential or ICI);
- Requirement for provisional supply;
- Ability to obtain other utilities' locates and clearance forms;
- Impact of failure on adjacent properties;
- Crew availability and overtime costs; and
- Other community disruption considerations, such as traffic flow impediments.

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Strategies for Improving the Quality of Linear System Repairs

Key Factors:

- Public and worker safety;
- Water quality and public health;
- Proper equipment and material selection;
- Quality assurance and quality control practices;
- Customer service and sustainability.

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Strategies for Improving the Quality of Linear System Repairs.

Key Factors (cont'd):

- Community disruption and associated costs;
- Proper training and procedures;
- Proper data collection and management; and
- Cost and environmental impact minimization.

Speed and Quality of Linear System Repairs

General Repair Methodology.

Attention!!

- The general repair methodology that follows is presented as a response to a reported failure. However, most of the material provided can be easily applied to any failure situation.

Speed and Quality of Linear System Repairs

General Repair Methodology.

1. Dispatching Repair Crew:

- Repair crew should be dispatched within one hour of a reported failure.
- Crews and supervisors need unimpeded communication (portable radios).
- Evaluation of local site conditions.

Speed and Quality of Linear System Repairs

General Repair Methodology

2. Repair Site Preparation:

- Assess location of repair and set up the proper site traffic control system and safety.
- Call for utility locates and trenching permits as soon as possible.
- Control site flooding.
- Ensure sediment control measures are put into effect.
- If working in freezing conditions contact road authority to lay sand and salt down.

Speed and Quality of Linear System Repairs

General Repair Methodology

3. Notification of Customers:

- As soon as possible upon arrival on site determine watermain sections to be isolated.
- Knock on every door within the shut area to inform of water shut-off and or leave an emergency repair pamphlet.
- Be aware of sensitive and critical customers and delay final isolation of water supply as required.

Speed and Quality of Linear System Repairs

General Repair Methodology.

4. Notification of Essential Services:

- Fire Department (plus tag effected hydrants).
- Ambulance, police and transit (traffic flow restrictions).
- Traffic Department (questions about delays and rerouting of traffic if req'd).
- Water Dept dispatcher or customer service section requires details for customer enquiries.
- Senior management for significant failures to prepare for political and media questions.

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General Repair Methodology.

5. Isolating the Repair Section:

- Carefully document valves involved.
- If possible have potable water containers available for distribution.
- Attempt to throttle vs. full shut – « work wet ».
- Circumferential failures typically can be repaired with reduced flow.
- Severe failures with road and flooding damage typically require quick isolation.

Speed and Quality of Linear System Repairs

General Repair Methodology.

6. Excavation Over the Watermain:

- Saw cut roads, sidewalks or curbs.
- Dig initially on side of main to within one meter.
- When close locate by hand.
- Once exposed proceed with care.
- Size excavation for trench boxes.
- If contaminated soil encountered supervisor should contact appropriate representatives from provincial ministries and cease all activity.

Speed and Quality of Linear System Repairs

General Repair Methodology.

7. Shoring:

- OHSA guidelines must be followed.
- Ensure shoring weight not borne by the watermain.
- Must rest fully on bottom of excavation.
- No contact between shoring device and water pipe.
- Worker safety is paramount at all times.
- Utilize appropriate equipment to lift and maneuver shoring.

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General Repair Methodology.

8. Watermain Repair Observations:

- Have trained repair crews (know and adhere to applicable OHSA).
- Always Wear protective equipment .
- Follow ANSI / AWWA Standards C600-C606.
- Follow appropriate regulated repair site disinfection recommendations.
- Follow and adhere to all part manufactures recommended uses for their repair parts.
- Follow appropriate measures when discharging chlorinated water.

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General Repair Methodology.

9. Testing the Repair:

- Follow established main filling, flushing and disinfection procedures.
- Check that repair is dry and watertight.
- Sound the pipe to ensure that no other leakage is present in repair area.
- Re-contact impacted customers once service is restored.

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General Repair Methodology.

10. Documentation:

- Before backfilling crew should ensure that all notes and descriptive information is noted.
- Record valves operated for repair.
- Time main back into service.
- Damage to other utilities.
- Malfunctioning valves and hydrants
- Keep damaged pipe for materials testing.
- Keep soil samples for corrosive characteristic testing etc.

Halifax Regional Water Commission

WATERMAIN AND SERVICE LATERAL REPAIRS

BREAK TYPE: MAIN ☐ SERVICE ☐

LOCATION INFORMATION

STREET _____ OPPOSITE HOUSE NUMBER _____

INTERSECTING STREETS 1 _____ 2 _____

TIE 1 _____

TIE 2 _____

REGION: CENTRAL ☐ EAST ☐ WEST ☐ COMMUNITY _____

WATERMAIN INFORMATION

TRENCH INFORMATION: CLAY ☐ GRAVEL ☐ ROCK/SHALE ☐ TILL ☐

EXTERIOR PIPE CONDITION: FAIRLY NEW ☐ SLIGHTLY CORRODED ☐ MODERATELY CORRODED ☐ BADLY CORRODED ☐

INTERIOR SEDIMENT LIME DEPOSIT ☐

INTERIOR TUBERCULATION: HARD ☐ SOFT ☐

INTERIOR PIPE WALL: FAIRLY NEW ☐ PARTLY CORRODED ☐ CORRODED AROUND ☐ BADLY CORRODED ☐

INTERIOR WALL LINING INTACT ☐ DATE PIPE INSTALLED _____ PIPE SIZE _____

PIPE MATERIAL: ASBESTOS CEMENT ☐ BRASS ☐ CAST IRON ☐ CI CONCRETE LINED ☐ COPPER ☐ DUCTILE IRON ☐ DUCTILE IRON HYPROTEC ☐ GALVANIZED STEEL ☐ HYPRESCON C-301 ☐ HYPRESCON C-303 ☐ HYPRESCON ☐ PVC ☐ STAINLESS STEEL ☐ OTHER _____ PIPE DEPTH _____

SERVICE REPAIR INFORMATION:

PIPE ☐ SERVICE BOX OR BUFFALO BOX: SB ☐ BB ☐ STAINLESS STEEL ROD ☐ SODS _____

ADJUSTED TO GRADE: RAISED ☐ LOWERED ☐ OTHER _____

LEAK INFORMATION

DETECTION DATE _____ REPORTER _____

LEAK AWARENESS: CUSTOMER/REPORTED ☐ LEAK DETECTION UNREPORTED ☐

LEAK TYPE: CIRCULAR ☐ BLOW OUT ☐ SPLIT PIPE ☐ HOLE IN PIPE ☐ PIPE JOINT ☐ OTHER ☐

APPARENT REASON: PITTING ☐ GRAPHITIZATION ☐ BEAM ACTING ☐ SIDE MOVEMENT ☐ WATER HAMMER OR SURGING ☐ THIN WALL CAUSED BY CORROSION ☐ UNDERMINED ☐ ACCIDENTAL DAMAGES ☐ COLLAPSE BY VACUUM ☐ LOOSE JOINT ☐ OTHER ☐

WATER LOSS GALLONS _____ TOTAL REPAIR COST _____

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LIABILITY INFORMATION

PRIVATE INSURANCE CLAIM ☐ NUMBER OF AFFECTED CUSTOMERS ____ WATER ESCAPE CATCH BASIN ☐ TRENCH ☐ STREET ☐ BASEMENTS ☐ YARDS ☐

TYPE OF CUSTOMER AFFECTED (CHECK ALL THAT APPLY) RESIDENTIAL ☐ COMMERCIAL ☐ INSTITUTIONAL ☐

DAMAGE TO STRUCTURES PUBLIC/PRIVATE ____

REMARKS ____

MAINTENANCE INFORMATION

WORK ORDER NUMBER ____ REPAIR DATE ____

TIME: CREW ON SITE ____ WATER OFF ____ WATER ON ____

FINAL GRADE SURFACE PAVED ☐ GRAVEL ☐ CONCRETE ☐ CHIPSEAL ☐ BRICK ☐ THICKNESS OF ASPHALT ____

EXCAVATION SIZE ____ DEPTH ____

LENGTH OF REPAIRED PIPE ____ NUMBER OF CLAMPS ____ CLAMP SIZE ____

NUMBER OF REPAIR COUPLINGS ____ NUMBER OF ANODES ____

HYDRANTS USED ____

VALVES USED ____

VALVES CLEANED ____

VALVES BROKEN ____

VALVES THAT LEAKED ____

EMPLOYEES AT THE BREAK ____

EQUIPMENT USED ____

OTHER MATERIAL USED ____

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General Repair Methodology.

11. Restoration of Excavation:

- Backfill, compact and restore excavation to standards of local road authority.
- Use appropriate backfill materials.
- Utilize dry, loose, non-frozen aggregate.
- No voids in the support beneath pipe.
- Ensure proper restoration and support of other utility services that cross excavation.

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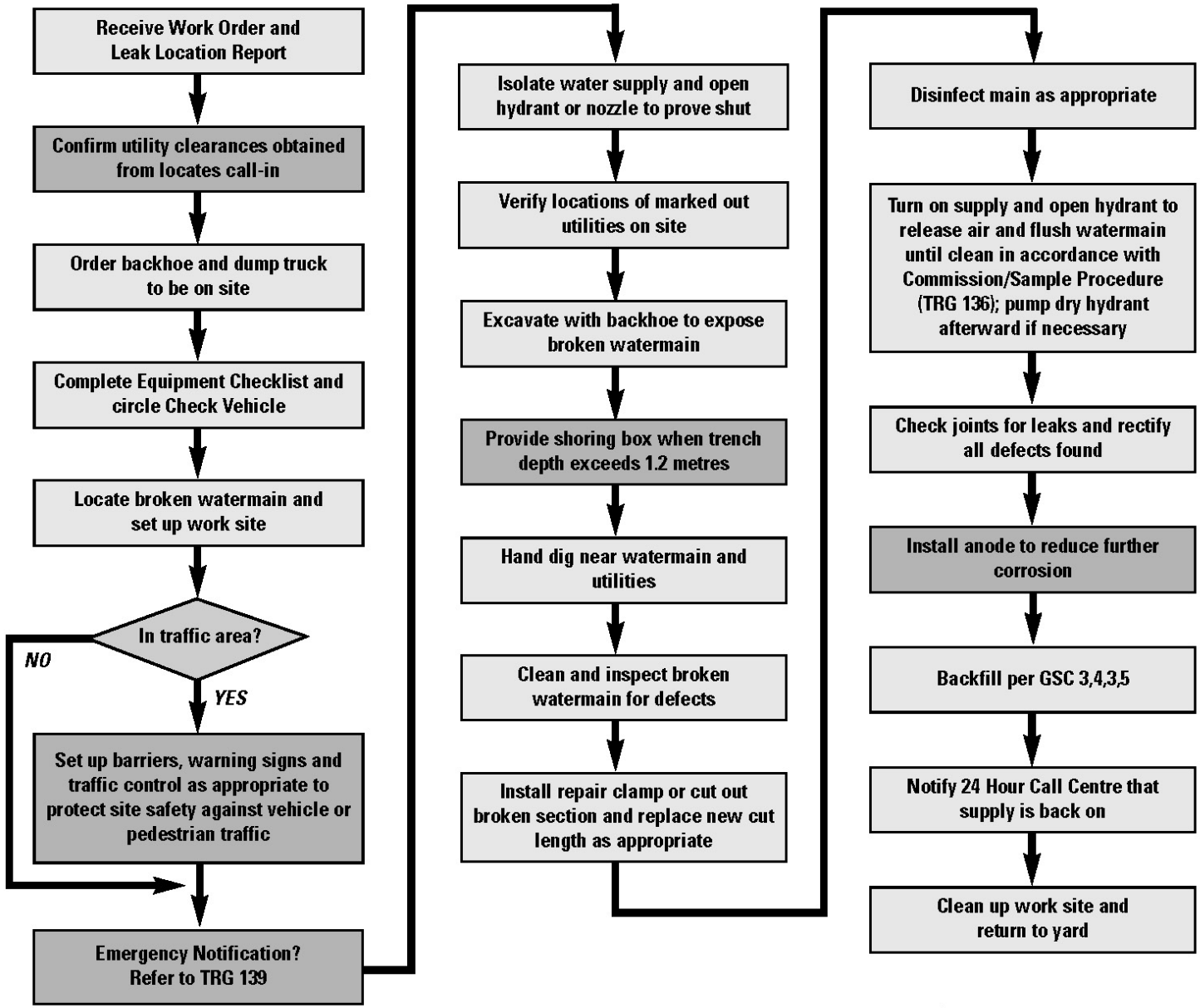
General Repair Methodology.

12. Re-commissioning of Watermain:

- Reopen all valves that were utilized to isolate the damaged main.
- A check list closed / open valves is highly recommended.
- Once all valves opened check at nearby hydrants to ensure system free of air and that water is clear.
- Report system back to normal.
- Re-notify all those local authorities originally contacted that system back in service.

Figure A–1: Sample Watermain Failure Repair Activity Flow Chart



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So …… to avoid this leak situation

turning into this situation

utilize BP's

THANK YOU FOR YOUR TIME!

Questions!

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