



# City of Wheatland

111 C Street Wheatland, California 95692

TELEPHONE (530) 633-2761

FAX (530) 633-9102

October 2024

## Invitation to Bid Wheatland Corporation Yard Sinkhole Repair Project

The City of Wheatland, California is informally seeking bids for this emergency repair project to repair damage due to an abandon well under a City maintenance building located at 208 Fourth Street in Wheatland.

Proposals will be received electronically by the City Engineer at [dschilling@wheatland.ca.gov](mailto:dschilling@wheatland.ca.gov) until a sufficient response is received. In General, the Project consists of demolition, shoring, excavating loose soils, CLSM backfill, injection grouting, minor grading and asphalt paving. The anticipates a Notice to Proceed on November 13, 2024, and work shall be performed within 30 calendar days.

This is an informal bidding process. There will be no pre-bid conference for this project. Each bid must be submitted on the prescribed forms. The successful bidder will be required to furnish a payment bond and faithful performance bond each in the full amount of the contract price, and insurance with certificates and endorsements of insurance, as provided in the Contract Documents.

The successful bidder must possess the following classification or type of contractor's license issued by the California Contractors State License Board: **Class A OR Class B.** To be qualified to bid on this Project, bidders must be registered and qualified to perform public work with the Department of Industrial Relations pursuant section 1725.5 of the Labor Code. All subcontractors listed in a qualified bidder's bid as performing any portion of the work also must be registered and qualified with the Department of Industrial Relations.

Bidders are directed to the requirements and conditions of employment to be observed and prevailing wage rates to be paid to all workers employed under the Contract in accordance with Labor Code sections 1770 and following.

The City reserves the right to reject all bids. Any bid not conforming to the intent and purpose of the Contract Documents may be rejected.

A handwritten signature in black ink, appearing to read "D. Schilling", with a long horizontal line extending to the right.

Dane Schilling, PE  
City Engineer

# City of Wheatland - Corp Yard Sinkhole Repair

## DESCRIPTION OF WORK ITEMS

ITEM	DESCRIPTION
1	<p><b>MOBILIZATION AND DEMOBILIZATION</b></p> <p>5% max. allowance based on the sum of all other costs. Also includes site security, house keeping and final clean-up.</p>
2	<p><b>TRENCH SHORING AND BRACING</b></p> <p>Contractor to provide as-needed to meet OSHA requirements.</p>
3	<p><b>SHORE EXISTING BUILDING FOUNDATIONS</b></p> <p>The southeasterly corner of the building foundation is unsupported/hanging (approximately 10- to 12-linear feet, see photos in report). Work includes placing jacks, shoring and/or cribbing to safely support edge of building during construction. Solid concrete and steel shoring materials may be abandoned in-place at the discretion of the City Engineer.</p>
4	<p><b>LOCATE EXISTING ABANDONED WELL</b></p> <p>Mark the location of the well on the ground using remote field measurements taken from the opening in the largest void to the visible portion of the brick well structure. Measurements can be electronic or direct physical measurements using tools to reach into the void. Once located, core hole(s) in slab or asphalt pavement over the well, auger through subgrade soils (if any). The City will document the conditions with photos and ascertain the depth.</p>
5	<p><b>EXTRACT LOOSE MATERIAL IN VOIDS</b></p> <p>Work involves removing any loose soils from voids that are accessible from the ground surface without entering the voids. It is assumed that a crew and equipment will perform soil extraction over the period of one 8-hr work day. Additional work days may be added at the discretion of the City. The City's expected work sequence and equipment includes:</p> <p><u>Method:</u> Reach into the void from the surface level (no excavations over the void) by inserting a vacuum hose/pipe with a floor attachment from a vactor truck down the invert of the void, insert air lance with circular diffuser to dislodge loose soils from the walls of the void, send the tube back down retrieve loose soil; repeat as necessary.</p> <p><u>Equipment:</u></p> <ul style="list-style-type: none"> <li>- Vacuum truck with positive displacement of 18" Hg @ 3,500-cfm, 8" diameter pick-up hose and articulated boom with minimum 20-ft reach; 8" diameter pipe extensions and 8" flat floor attachment; and misc. rigging.</li> <li>- Compressor and air lance operating with 100- to 249-psi range with 360-degree dispersion nozzle, and ridged extensions as needed.</li> </ul>
6	<p><b>SLURRY BACKFILL WELL &amp; VOIDS</b></p> <p>Work involves placing controlled low strength material (CLSM) in voids from the ground level. Deliver CLSM by tremie methods to fill well and voids from the bottom up. CLSM should have a minimum 28-day unconfined compressive strength between 200 and 500 pounds per square inch (psi).</p>

## City of Wheatland - Corp Yard Sinkhole Repair

7a **INJECTION GROUT CONC. BLDG. SLAB**

Work involves injection grouting below the floor slab and along edge of CLSM by drilling injection locations throughout the eastern 600-sf of the existing floor slabs and along the eastern edge of the void . The grout should have a minimum 28-day unconfined compressive strength of at least 100 psi but not greater than 500 psi.

Contractor to determine the number, location, and layout of the injection points. Grout should be injected into each port until grout return is observed from adjacent injection holes, slab cracks, or ground surface, and/or the slab/foundation lifts more than acceptable. Multiple stages of injection grouting may be required to adequately fill the void below the floor slab and foundations. See attachment for injection grouting material specifications.

or 7b **REMOVE AND REPLACE CONC. BLDG. SLAB**

Work involves saw cutting and removal of 600-sf of existing reinforced concrete slab (excluding perimeter foundations); backfilling any voids under the slab; doweling reinforcing bar into remaining concrete; and pouring an in-kind reinforced concrete replacement slab.

8 **REMOVE EXISTING PAVEMENT**

After the voids have been filled and CLSM has achieved 14-day strength, saw cut and remove a 20'x70' section of asphalt paving beginning at the back of the public sidewalk/driveway and continuing alongside the building.

9 **PREPARE SUBGRADE & REGRADE TO DRAIN**

Work includes adjusting grades to slope pavement away from building to form a slight V-gutter in the re-paved area.

10 **ASPHALT PAVEMENT (4" THICK, 1/2" TYPE A)**

Work includes minor adjustments to existing utility boxes and covers (3 estimated). The paved area is 20' x 70' extending from the existing back of sidewalk/driveway and continues southeasterly alongside the buildings.

## City of Wheatland - Corp Yard Sinkhole Repair

### BID FORM

ITEM	CONSTRUCTION	QTY	UNITS	UNIT COST	TOTAL
1	MOBILIZATION AND DEMOBILIZATION	5	%	-	
2	TRENCH SHORING AND BRACING	1	LS		
3	SHORE EXISTING BUILDING FOUNDATIONS	1	LS		
4	LOCATE EXISTING ABANDONED WELL	1	LS		
5	EXTRACT LOOSE MATERIAL IN VOIDS	1	DAY		
6	SLURRY BACKFILL WELL & VOIDS	42	CY		
7a	INJECTION GROUT CONC. BLDG. SLAB	15	CY		
or 7b	REMOVE AND REPLACE CONC. BLDG. SLAB	600	SF		
8	REMOVE EXISTING PAVEMENT	1,400	SF		
9	PREPARE SUBGRADE & REGRADE TO DRAIN	1,400	SF		
10	ASPHALT PAVEMENT (4" THICK, 1/2" TYPE A)	34	TON		

**TOTAL**

\$ \_\_\_\_\_

Written Amount: \_\_\_\_\_

Submission Date: \_\_\_\_\_ Bidder Signature: \_\_\_\_\_

Company Name: \_\_\_\_\_

Address: \_\_\_\_\_

Phone No.: \_\_\_\_\_

Email: \_\_\_\_\_

CSLB License No(s): \_\_\_\_\_

**Auburn Office:**  
11521 Blocker Drive, Ste 110  
Auburn, CA 95603  
(530) 887-1494



West Sacramento (916) 375-8706  
Fresno (559) 438-8411

File No. 4782.X  
October 23, 2024

City of Wheatland  
Mr. Bill Zenoni  
City Manager  
111 C street  
Wheatland, CA 95692

**Subject:           GEOTECHNICAL CONSULTATION – REVISION 1**  
**208 4<sup>th</sup> Street**  
                          Wheatland, California

Dear Mr. Zenoni,

Blackburn Consulting (Blackburn) appreciates the opportunity to provide geotechnical consultation services for the void that has formed below the City of Wheatland (City) Water Department Operations Building at 208 4<sup>th</sup> Street in Wheatland, California. Blackburn prepared a letter dated April 17, 2024, presenting preliminary conclusions, and recommendations. Below is a summary of site observations, review of available information, conclusions, recommendations for filling the void, and limitations. The recommendations in this updated letter supersede recommendations presented previously.

## **SITE DESCRIPTION AND PURPOSE**

The site is occupied by the City's Water Department and Public Works operations building and shop/warehouse. Site improvements include:

- Single-story concrete masonry unit (CMU) operations building supported on shallow concrete spread footings.
- A Single-story steel framed shop/warehouse supported on shallow concrete spread footings.
- Asphalt pavements.
- Water pumps and pipelines.
- Water tanks (elevated and at grade), and
- Emergency backup generators.

Photo 1 shows the conditions near the shop/warehouse.



We understand City employees found a hole in the pavement near the southeast corner of the shop/warehouse building (coned area in Photo 1) on Thursday April 11, 2024, while moving a fuel storage cabinet (yellow cabinet on east side of shop/warehouse in Photo 1). The City contacted Coastland Engineering who requested Blackburn visit the site to observe the conditions, provide a professional opinion regarding likely cause(s) of the void, and preliminary recommendations to mitigate/ fill the void. We prepared this memo to summarize our observations, conclusions, and preliminary recommendations.

## SUMMARY OF SITE OBSERVATIONS

Blackburn's engineer Haze Rodgers visited the site on April 12, 2024. Photos 2 through 4 show some of the void conditions observed during the site visit. Haze observed:

- A hole approximately 4 feet in diameter in the asphalt pavement near the southeast corner of the shop/warehouse building.
- Approximately 1 foot of the pavement laterally around the hole was depressed and undermined.
- The southeastern corner, eastern perimeter footing, and floor slab of the shop/warehouse building was undermined (Photo 3 and 4).
- The void extended to the north (Photo 3), and to the south and southwest (Photo 4).
- A brick structure was observed at the northern end of the void (Photo 3).
- The base of the void is covered with loose soil, Aggregate Base, and debris (AC pieces, leaves, etc.).
- The depth and horizontal extents of the void are unknown but estimated to extend to a depth of at least 20 feet below the ground surface at the northern end.
- Significant distress was not observed inside the shop/warehouse building at the southeastern corner; however, some cracks were observed in the floor slab near the northeast corner.

Photo 2: 208 4<sup>th</sup> Street



Undermined asphalt pavement at east edge of void. Bottom of AC is observed at top of photo.

Photo 3: 208 4<sup>th</sup> Street



Looking North down void toward 4<sup>th</sup> Street. Eastern perimeter footing is visible at top left corner of photo, and Brick structure is observed at end of void.

Photo 4: 208 4<sup>th</sup> Street



Looking Southwest below southeast corner of shop/warehouse building. Corner and eastern perimeter footing are visible.

Blackburn’s engineer Luke Morrell visited the site on July 10, 2024, with Subtronic corporation to survey the area around the existing buildings for underground utilities. Subtronic marked the locations of the detected underground utilities with paint in the field. Subtronic’s report is included as Attachment A and includes pictures of the underground utilities detected and marked by Subtronic.

## REVIEW OF AVAILABLE INFORMATION

Blackburn reviewed:

- Publicly available geological, topographic, and historic aerial photos,
- Contacted the Yolo County Environmental Health Department, and
- Reviewed the City of Wheatland Letter titled: *Sink hole at Wheatland Corporation Yard, 208, 4<sup>th</sup> Street, Wheatland, California*, dated 22 April 2024.

The publicly available geologic and topographic maps do not identify former mine works, quarries, or other past uses or geologic formation that would be conducive to the formation of the void.



The historic aerial photos show the site has been occupied by the City of Wheatland Water Company/Department since before 1900. Excerpts of the 1899 Sanborn map (Figure 1 and Exhibit C of Attachment B) show a well below the northern portion of the existing shop building approximately above the brick observed at the base of the void (Photo 3). Yuba County Environmental Health does not have any records or information about the presence or abandonment of the well shown on the 1899 Sanborn map. The City concluded (Attachment B):

- The brick observed in the void could be the casing of the former well.
- The former well would be at least 30 feet deep, and
- Have a diameter of approximately 4 to 6 feet.

Coastland Engineering attempted to map the extents of the void and location of the brick structure. Exhibits A and B of the City’s letter (Attachment B) show the results of Coastland’s mapping.

## **CONCLUSIONS**

Based on our observations, review of available historical information, we conclude the void is likely caused by backward erosion piping of soil into the improperly abandoned well. The soil is likely being transported by surface water (from storm water, irrigation, etc.) that seeps into the soil and flows to the historic well. On-site stormwater could also enter the ground at the cold joint between the pavement and perimeter building foundations.

## **RECOMMENDATIONS**

Based on our observations, available information, and experience with similar projects we recommend:

- Remove the loose soil and debris from the void to expose firm native soil.
- Backfill the void and well in at least two stages:
  - o Stage 1: Place controlled Low Strength material (CLSM) in the well and void by tremie methods to fill the void and well from the bottom up. CLSM should have a minimum 28-day unconfined compressive strength between 200 and 500 pounds per square inch (psi).
  - o Stage 2: Injection grout below the floor slab and along edge of CLSM. The grout should have a minimum 28-day unconfined compressive strength of at least 100 psi but not greater than 500 psi.

The contractor might need to drill through the floor slab within the existing building to extend the tremie pipe to bottom of the well and completely fill the well.

Injection grouting uses a fluid like (low viscosity) cementitious or polymer grout placed under pressure using a probe/nozzle to fill voids in confined areas, small voids/fissures, and can be used to re-level floor slabs and foundations of light structures. The contractor should determine the number, location, and layout of the injection points; however, we recommend injections locations be placed throughout the eastern half of the existing floor slabs and along the eastern edge of the void. Grout should be injected into each port until grout return is observed from adjacent injection holes, slab cracks, or ground surface, and/or the slab/foundation lifts more than acceptable. Multiple stages of injection grouting may be required to adequately fill the void below the floor slab and foundations. Attachment C includes a draft specification for injection grouting.

## SERVICES DURING CONSTRUCTION

Blackburn should provide the following services during Repair:

- Review design specifications and plans prepared by others.
- Review contractor submittals, RFI's, and workplans.
- Full-time observation and documentation during placement of CLSM and injection grouting. Specifically, observe and record the following:
  - Batch tickets/Mix Proportions
  - Injection/ placement locations
  - Material volumes (take)
  - Injection pressures
  - Grout specific gravity
- Collect CLSM and grout samples for compression testing.
- Perform compression tests on CLSM and grout samples.

## LIMITATIONS

Do not use the information in this memorandum for design or construction on this site. We prepared this memo based on our site observations, information provided by others, and published data. Do not use or rely on the information for different locations or repairs/improvements without Blackburn's written consent.

Our scope does not include subsurface exploration or laboratory testing. Blackburn has not reviewed or performed a geotechnical investigation, laboratory testing, or engineering calculations for the project. Our conclusions and recommendations are based on the results of our review, a brief site visit, and information provided. A geotechnical exploration, laboratory testing, and engineering analyses must be performed to properly design and construct the repair.

Thank you for contacting us to help. Please call if you have questions or require additional information.

Sincerely,

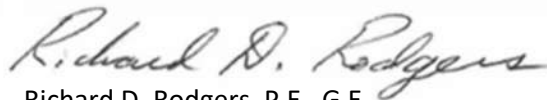
**BLACKBURN CONSULTING**



Haze m. Rodgers, P.E., G.E.  
Geotechnical Director



Reviewed by:



Richard D. Rodgers, P.E., G.E.  
Senior Consultant

Attachments: A – Subtronic Utility Survey report  
B – City of Wheatland Letter  
C – Injection Grout Sample Specification

**GEOTECHNICAL CONSULTATION  
MEMORANDUM  
208 4th Street, Wheatland, CA**

**Attachment A:**

Subtronic Utility Survey report

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### Personal Pre-Work Check

Locator has Correct/Special Equipment

Meeting client

Correctly defined area of work

-Map Below-

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### Job Safety Analysis

Client:Blackburn Consulting
Job / Estimate #:39441
Date / Time:7/10 @ 930
Client Representative:Luke
Completed by:ryan
Lead Person:Ryan
<b>Type of Job</b>
<input checked="" type="checkbox"/> Locating <input checked="" type="checkbox"/> Surveying <input type="checkbox"/> CCTV

Potholing

Leak Detection

Geophysical Survey

**Description of Work**

(2) 20'x20' areas

Upon arrival Luke has increased size of scope to one 30'x75' area and one 15'x30' area. He has ok'd any extra time this increase in scope will cause

**Roster:** (By signing, employees acknowledge they reviewed all hazards and controls identified)

1	
2	
3	
4	
5	
6	

Emergency Action Plan

Emergency phone No.: **911**

First Aid Station:in truck

Location of Phone:on person

Equipment Shut Down Procedure:na

### General Hazard Assessment

#### **Potential Hazard(s) & Methods to control / eliminate hazards identified**

**[x]Hand Injury:** Wear correct gloves, use proper tools, identify pinch points

**[x]Fall / Trip:** Manholes are out of harm's way / protect open holes, uneven surfaces.

**[x]Eye Injury:** Wear safety glasses, upgrade to face shield when needed

**[ ]Lifting Hazards:** Know your limits, use buddy system, use lifting / carrying devices

**[ ]Falling Objects:** Rope off areas if needed, wear hard hat

**[ ]Head Injury:** Wear hard hat, beware of surroundings

**[ ]Excessive Noise:** Wear appropriate hearing protection, (ear plugs / muffs or both)

**[x]Foot Injury:** Wear steel toed boots, identify uneven surfaces, take measures to eliminate hazards

**[ ]Slippery Surfaces:** Wet areas, asphalt, grass, concrete, rocks, gravel, warn others

**[x]Heat Stress:** Drink plenty of water, utilize work-rest cycle, limit exposure to sun, use sunscreen, use buddy system

**[ ]Cold Stress:** Ensure adequate clothing, construct wind / rain barriers, wear proper rain gear

**[ ]Hot / Cold Surfaces:** Wear proper gloves, apply proper barriers, avoid line of fire

**[ ]Respiratory Protection:** Determine IDLH atmosphere, monitor air quality, determine proper respiratory protection. Ventilate areas

**[ ] Confined Space:** Identify ALL hazards of space per confined space entry form and follow.

**[ ] Traffic Road Control:** Follow permit instructions, be aware of vehicles, correct road signs.

**[x] Pedestrian Control:** Be Aware of people at all times,

**[x] Electrical Hazard:** Use GFCI, ensure proper grounding

**[ ] Stored Energy (LO/TO):** Verify isolation of energy sources with authorized personnel before beginning work, ensure affected personnel are notified

**[x] Hazwopper:** Training and valid certifications

### COVID-19 Hazard Assessment

**[ ] Hands:** Wear correct protective gloves. Latex. Use disinfected wipes and sanitizer. Wash frequently at least 20 seconds with soap and water. Avoid touching common areas with bare hands

**[ ] Face:** Avoid touching face, nose, mouth, or head area until proper cleaning is done

**[ ] Social Distancing:** Maintain at least 6 feet distance, do not group, do not carpool.

**[ ] Eye Protection:** Wear safety glasses always, disinfect before and after each use.

**[ ] Disinfecting Equipment:** Use disinfected wipes, disinfecting spray on equipment after use.

**[ ] Cleaning Vehicle:** Use disinfecting wipes on steering wheel, inside vehicle, handles inside and out, etc.

**[ ] Cough/Sneeze:** Do not cough or sneeze into hands, cough or sneeze into cloth or tissue, arm of elbow

**[ ] Phones:** Do Not share, disinfect regularly.

**[ ] Respiratory Protection:** Wear cotton masks, Bandana's, etc, N-95 masks when needed for inside work.

**[x] Symptoms:** Any employees with symptoms (Fever, Cough, Shortness of breath) are directed to stay home if recognized before arriving, or will be sent home if symptoms come up after their arrival.

<b>Additional Hazards</b>		
<b><u>TASK</u></b>	<b><u>HAZARD</u></b>	<b><u>CONTROL METHOD</u></b>

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CONFINED SPACE ENTRY PERMIT (If Required):

**LOCATING - JOB SITE LOG & PROGRESS REPORT**

Job / Estimate #:

<b>Time</b>	<b>Notes</b>
930-	Locate utilities





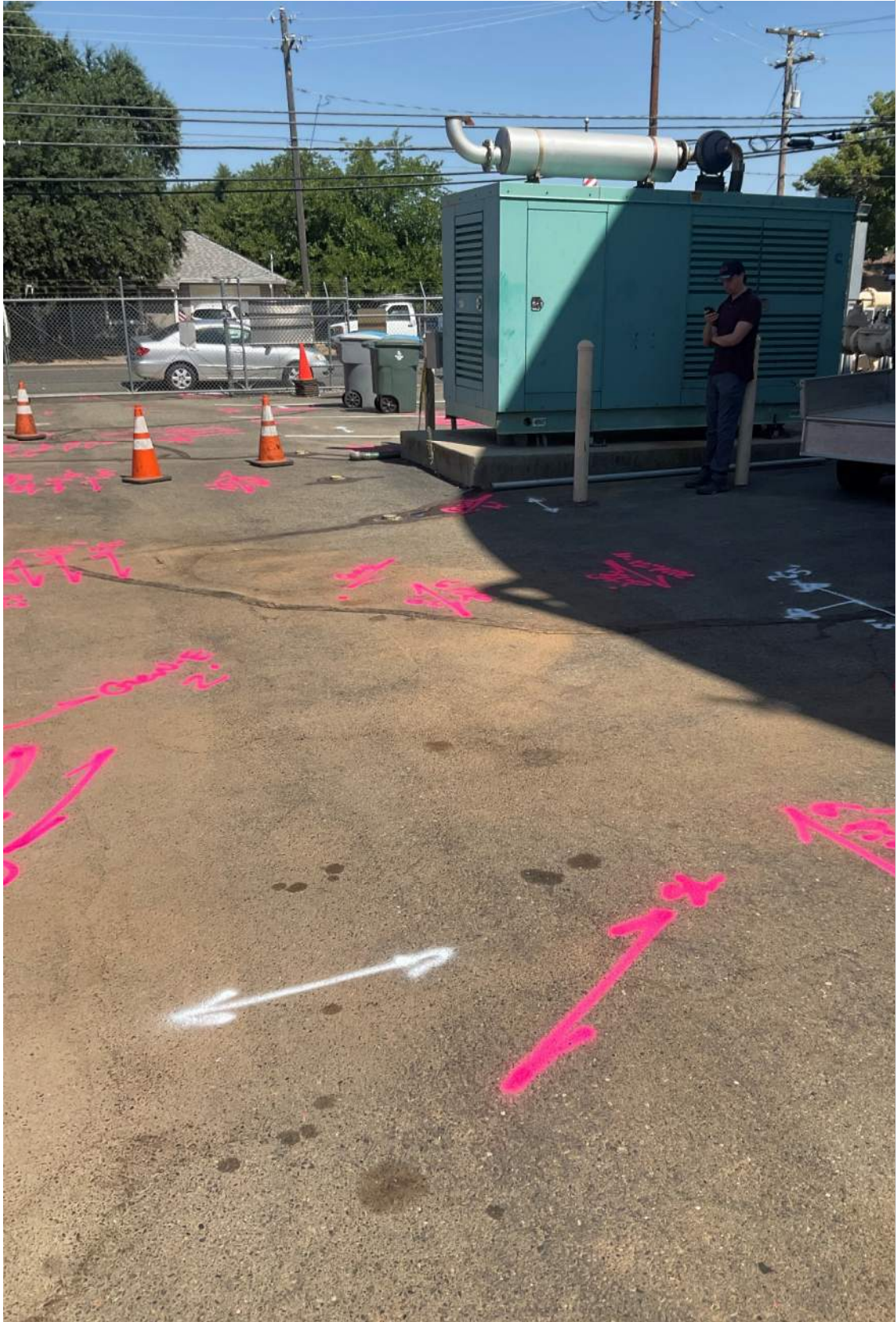






















































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**Utilities Not Located/Not Locatable**

<b>Utility</b>	<b>Notes</b>
[ ]Electrical	
[ ]Communications	
[x]Water	Parts of water are PVC, and cannot be located electronically
[x]Gas	Poor trace on private side gas at meter, no trace on gas at generator separate from com and electric runs. Either gas is non conductive and signal is bleeding onto other utilities, or it is joint trenched with the Electric and Communication lines to the generator
[ ]Storm Drain	
[x]Sanitary Sewer	Unable to locate cleanout to confirm sewer location
[x]Other	Site is heavily congested with plant, piping, electric communication, etc., requested print to help sort out which utility is which was told that that is not available. Clamp to all nearby piping and conduits and marked pathways. It is unable to be determined the number or type of utility in each pathway, or if all pathways have been accounted for as they all share common bonds.



## Post-Locate Checklist

### Active Locating

Measure Valves to Top of Nut if Required

Measure Clean-Out Inverts

Pictures of Work Completed in Notes

### Passive Scanning

Power

Radio

GPR

Twinbox

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## SITE WORK COMPLETION

Job / Estimate #:

All Equipment Accounted For

### Customer Feedback Survey

	<b>Strongly Disagree</b>	<b>Disagree</b>	<b>Agree</b>	<b>Strongly Agree</b>	<b>I do not know</b>
All safety measures were in place prior to start of Job.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
The technician was knowledgeable in the service provided.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

The technician was professional and courteous	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
The equipment provided was clean and in excellent working order	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
The job was completed within scope/estimate/contract.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
I received final reports in a timely matter.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
I feel the office personnel was helpful and answered all my questions.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Would you recommend Subtonic for your next project?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Additional Comments:					

-On-Site Signature of Client Representative-

**GEOTECHNICAL CONSULTATION  
MEMORANDUM  
208 4th Street, Wheatland, CA**

**Attachment B:**

City of Wheatland Letter



# City of Wheatland

111 C Street Wheatland, California 95692

TELEPHONE (530) 633-2761

FAX (530) 633-9102

April 22, 2024

Erike Young - Deputy General Manager

CIRA

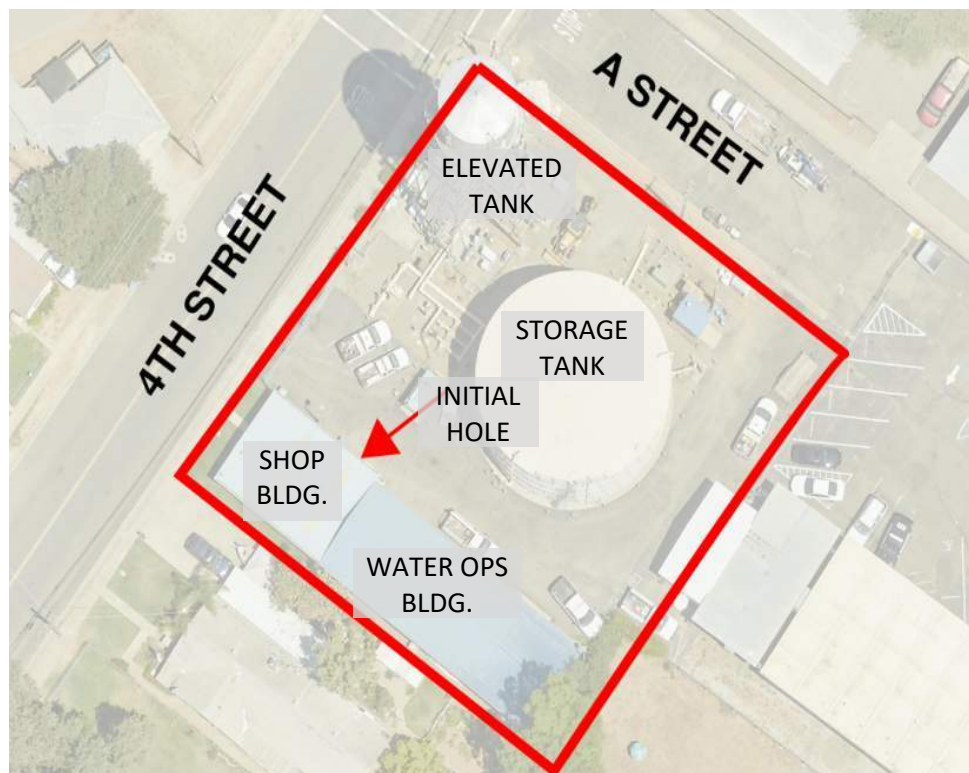
2330 E. Bidwell Street

Folsom, CA 95630

Subject: Sink Hole at Wheatland Corporation Yard; 208 4<sup>th</sup> Street, Wheatland, CA

Dear Mr. Young:

On the afternoon of April 11, 2024, the City's Public Works staff was working at the City's Corporation Yard ("Site") and discovered a hole in the pavement just outside of a shop building located at the northwest corner of the Site (see Photo 1) that revealed a large underground void.



*Photo 1: Aerial View of Wheatland's Corp Yard*

Structures at the Site include a water operations control building, shop building, parking area, a 660,000-gallon water storage tank, a 70,000-gallon elevated tank, a diesel generator, water pumps, piping and a municipal well (Well #3) at the northeast corner of the site. The City also stores vehicles and equipment at the Site. The steel-framed shop building was constructed circa 1950's with a concrete slab-on-grade, concrete foundation, and concrete spread footings at each of its structural columns. The water operations building, consisting of masonry walls and metal roof, was constructed circa 2002 as part of the City's USDA water system modernization project.

After discovering the hole and void, Staff carefully removed a 3-ft x 5-ft area asphalt paving around the original hole which revealed a very large and deep void with tunnels extending in two directions: beneath the shop building foundation and slab; and extending under the asphalt road into the yard. Photo 2 shows the location of the hole in the asphalt. The white line on the pavement in Photo 2 shows the approximate limit of the void beyond the building.



*Photo 2: Location of Hole in Pavement (facing northwest towards 4<sup>th</sup> Street)*

Initial estimates indicate that building foundation has been undercut by the void leaving at much as 25-ft of the east side of the building foundation and slab unsupported. Photo 3 shows the exposed void and the unsupported spread footing.

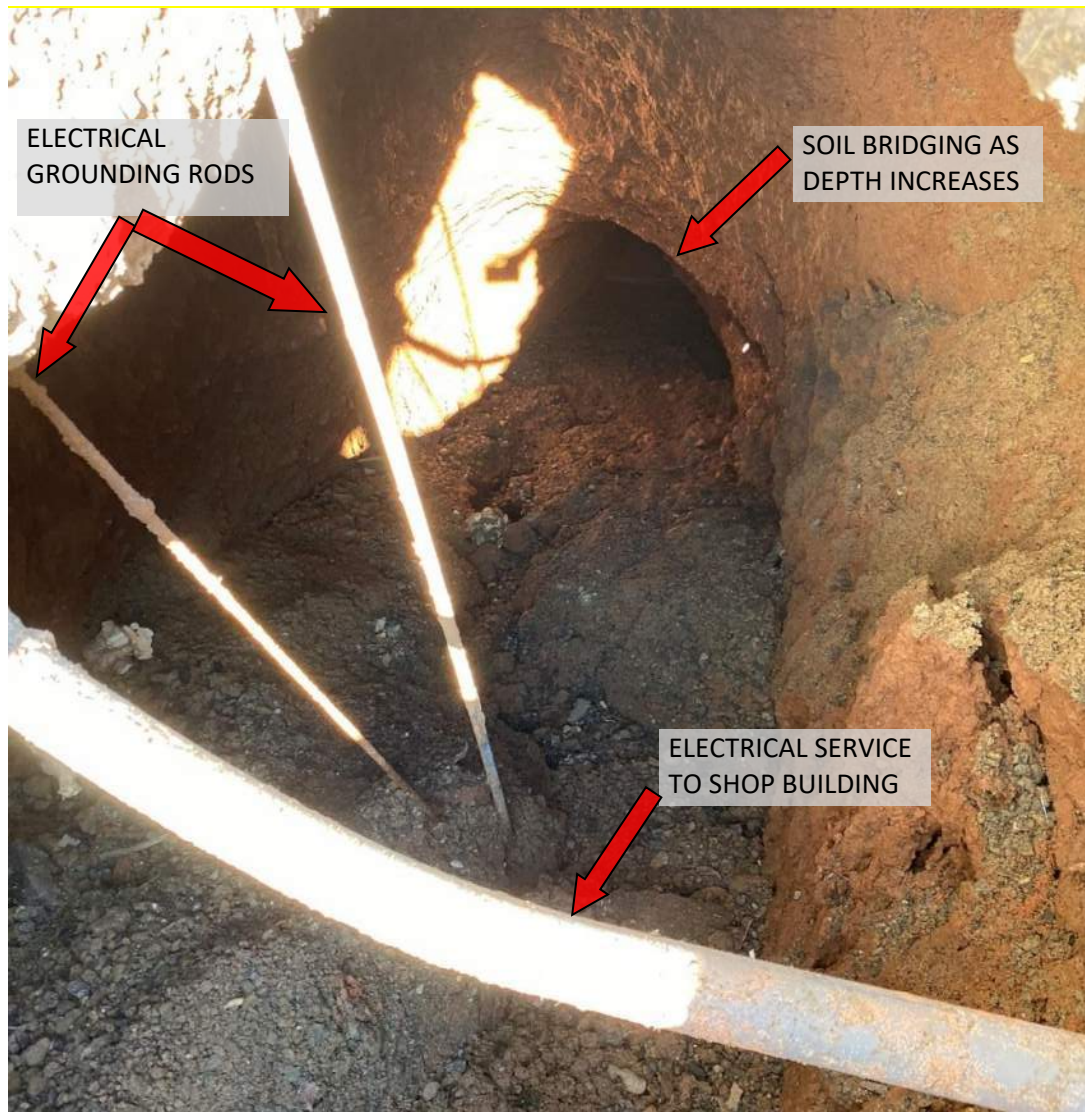


*Photo 3: Exposed Foundation and Spread Footing, Tunnel to the Southeast of the Hole*

On the following day City Manager Bill Zenoni, City Engineer Dane Schilling with Coastland Engineering and consulting engineering geologist Haze Rodgers with Blackburn Consulting visited the site to examine and document the damage.

In the following week, Public Works Staff further explored the void using underground utility cameras which revealed the smaller void is a tunnel that extends to the southeast of the surface hole and is 1- to 3-ft in diameter and approximately 20-ft in length (see Exhibits A and B). The larger void extends along the easterly edge of the shop building and angles to the northwest for approximately 25-feet to a depth of approximately 25-ft and ranges from 3- to 6-ft in diameter. Approximately 15-feet from the opening in the asphalt, the void turns into a tunnel with approximately 6'-8' of material bridging over the void (see Photo 4).





*Photo 4: Tunnel Facing Northwest of the Hole*

At the farthest/deepest part of the large void a brick structure is barely visible and appears to be arranged in a convex configuration such as the outside edge of a cylindrical structure (see Photo 5).



*Photo 5: Brick Exposed at End of Tunnel*

A 1899 Sandborn Map (Figure 1 and Exhibit C) indicates that a well was present near the turn of the century along with two storage tanks. Apparently, the well was abandoned in-place but the means and extent of the abandonment cannot be ascertained at this time. It is known from recent work in the area that ground water that would be available for municipal use is available at depths of 30- to 40-feet below ground surface. Therefore, it is estimated that the abandoned well is at least 30-feet in depth.

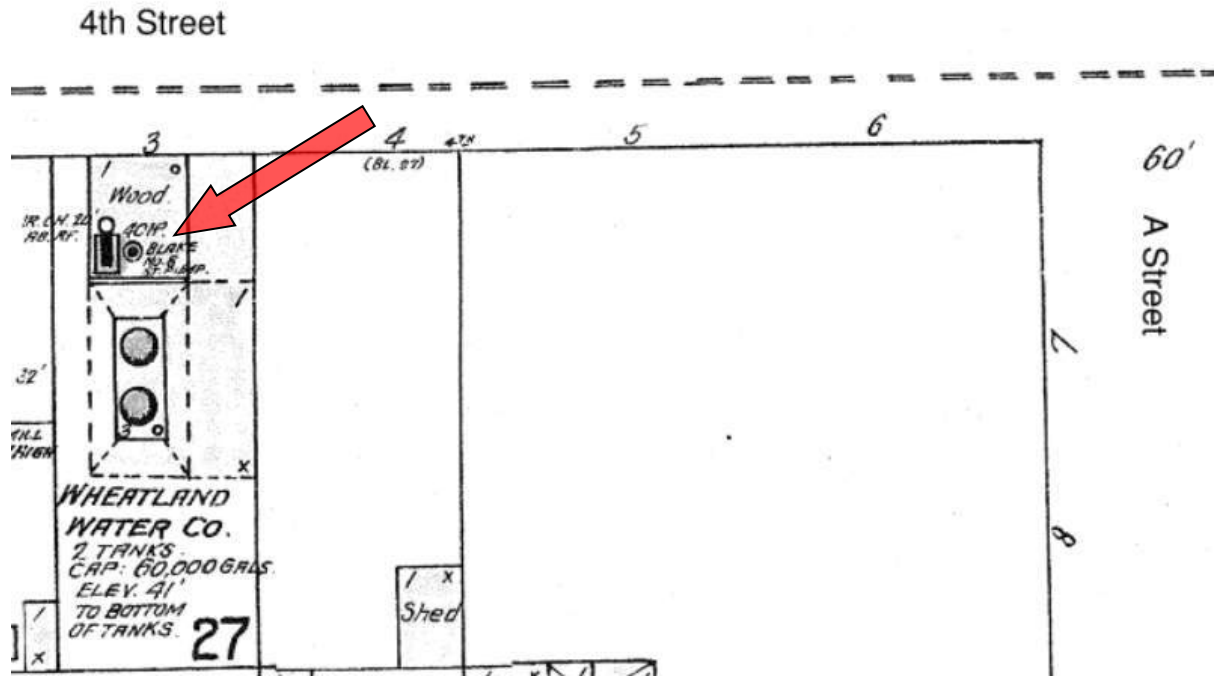


Figure 1: Portion of 1899 Sandborn Map at Corp Yard site with well indicated by arrow

The Shop Building appears to have been built over of a portion of the historic well. The brick that is visible from looking into the void is expected to be the outside of the well casing. If the brick structure is indeed the old well, it would likely be approximately 4-6 feet in diameter and it is expected that it would have been at least 30-feet in depth to reach groundwater and supply the 40-horse power pump shown on the map.

On April 19, 2024, the City and Coastland attempted to map the limits and depth of the void based on what can be safely seen from the opening in the pavement. The resulting map and profile views of the approximate limits of damage are included as Exhibits A and B.

#### Preliminary Assessment and Causation

Preliminary information indicates that surface storm water from the improvements at the Corp Yard site, including roof downspouts and pavement draining to the easterly side of the Shop Building, have found a pathway to the abandoned historic well which was able to receive and drain the water. In the process of the stormwater draining to the well, soil was eroded and transported toward the well – a condition in geotechnical engineering known as “piping”. Soils are “piped” when saturated soils under hydrostatic pressure flow to areas of lower pressure. Although the initial flows begin as water moving through the soil matrix, the situation can progress to include the erosion of soils in the areas of highest hydrostatic pressure and lower soil strength which eventually leads to acute soil erosion in the form of “pipes” that lead to an outlet for the hydrostatic pressure and soil. The size of the pipes can increase as

water flows more freely and more soil is transported away. Also, recent storms in the Sacramento region have been notably more intense in terms of inches of rainfall per hour which would likely cause sustained periods of runoff and, therefore, caused more and possibly accelerated erosion at the Site due to piping.

In addition, based on the volume of lost or displaced soil material that is large enough to create the size and depth of the void that is visible, it is likely that soil has been displaced or transported away via bottom the well. At this point in time, the apparent cause of the soil loss and resulting void is due to the occurrence heavy rains resulting in erosion and transportation of soil material. The pavement where the original hole developed is in a low-lying spot relative to the surrounding pavement and buildings, so any runoff from the paved area collects near the low spot. The Water Operations and Shop Buildings collect runoff in downspouts that outlet on to the pavement along the easterly sides of both buildings and runoff is directed toward the sink hole and initial hole in the asphalt.

#### Action Items

The following are suggested next steps and considerations in response to the situation:

1. Protect the area from any sources of storm water by covering and diverting water away from the immediate area prior to future rain events. This may be accomplished with plastic sheeting, supporting plywood, sandbags and diversion pipes from the building downspouts to 4<sup>th</sup> Street.
2. Suspend use of the main entry driveway, portions of the yard area, the Shop Building and possibly the use of the public sidewalk on 4<sup>th</sup> Street as needed and establish a safety zone to protect City staff and the public from hazards associated with the void.
3. As more information becomes available, re-evaluate and adjust the safety-zone and cordon off any unsafe areas outside and inside the buildings.
4. De energize and lock-out/tag-out the electrical service to the Shop Building.
5. Prevent any loads or vibrations in the immediate area including vehicles, equipment, motors and the large generator adjacent to the void.
6. Ascertain the depth and measures originally used to abandon the well (if any) by exploring the well with a video camera.
7. Search County records for any additional information on the well.
8. To the extent safely possible, remove existing racks, equipment, tools, hardware, flammables and supplies in and around the shop building. This should be accomplished without additional loads to the ground within the hazard areas.

9. Establish a scope of work, plans and specifications for:
  - a. Securing the Shop Building from further damage by temporarily supporting/shoring the exposed foundations;
  - b. Abandoning the well to modern standards;
  - c. Removing loose soils and properly filling the void to provide adequate support for the buildings, large water mains, vehicles and activities at the yard;
  - d. Restore damaged/altered/removed facilities, buildings, pavement, concrete slabs, electrical, etc.;
  - e. Ensure that drainage pathways from the buildings and yard are properly and safely draining to existing storm drain systems.

The City anticipates that the expenses for securing the site, further investigations and engineering work, and remediation and repair of damages will exceed the City's \$25,000 deductible. Therefore, this letter serves as the City's notice of potential claim to CIRA for this incident. Please let me know if you have any further informational needs or questions on this matter.

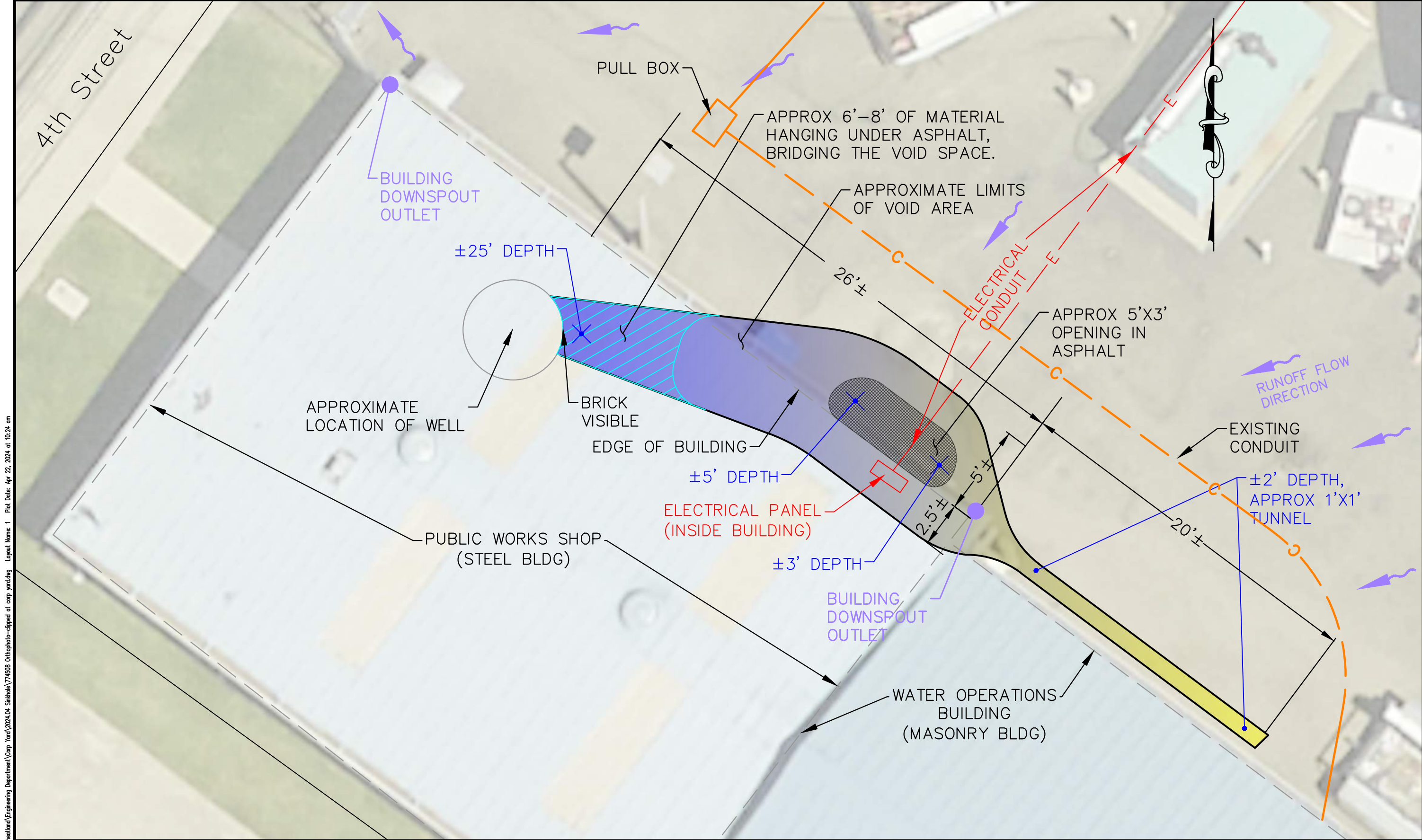
Sincerely,

Bil Zenoni  
City Manager

Attachments:

- Exhibit A – Plan of Corp Yard Sink Hole Limits
- Exhibit B – Profile of Corp Yard Sink Hole Limits
- Exhibit C – Overlay of 1899 Sandborn Map on Corp Yard Site
- Letter from Blackburn Consulting to Dane Schilling, April 17, 2024

Copy: Jennifer Buckman – City Attorney  
Dale Klever – Public Works Director  
Dane H. Schilling – City Engineer



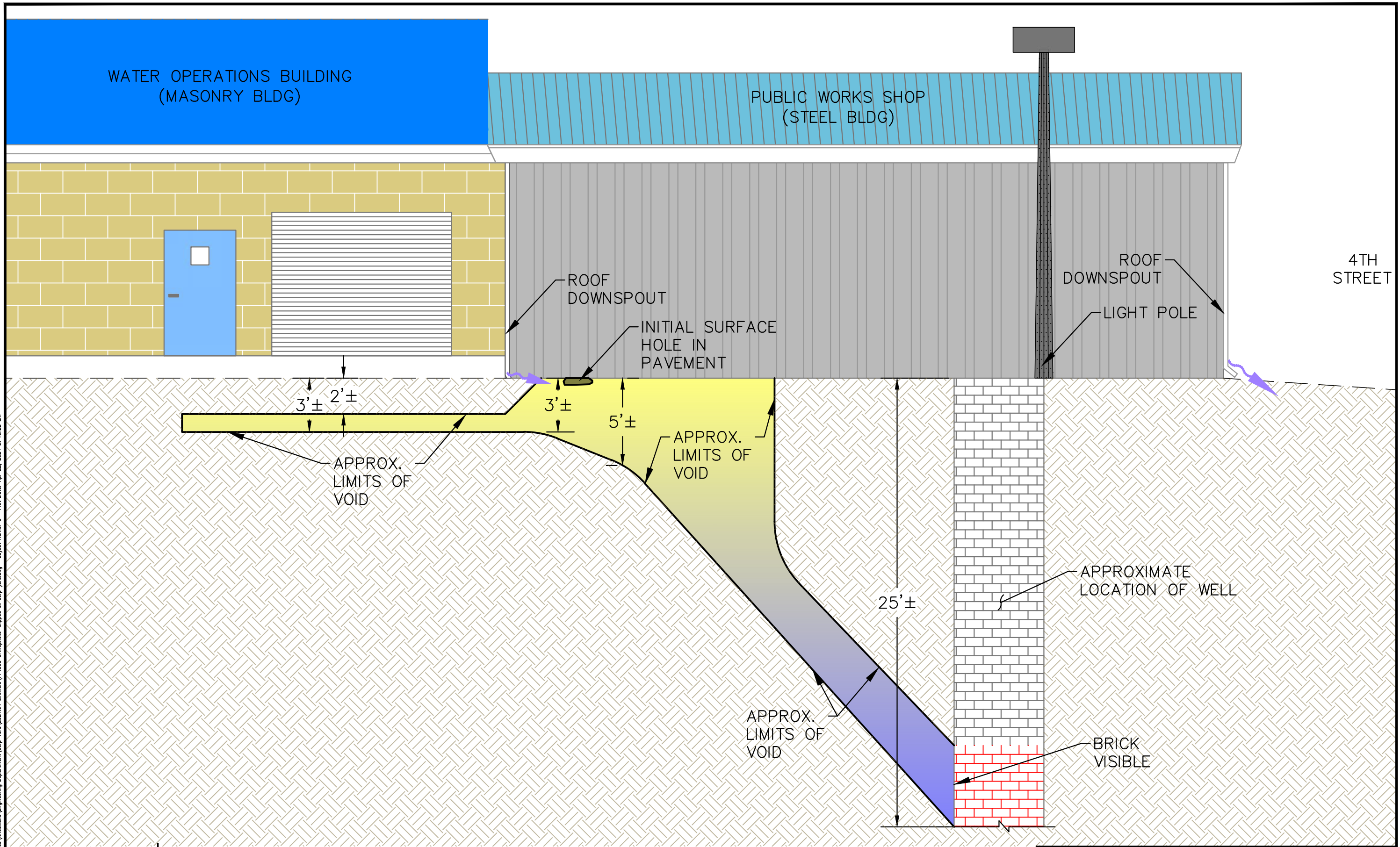
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**COASTLAND | DCCM**

COASTLAND | DCCM  
 11641 Blocker Dr, Ste 170  
 Auburn, CA 95603  
 530.888.9929 | coastlandcivil.com

# EXHIBIT A

CITY OF WHEATLAND CORP YARD SINKHOLE LIMITS APRIL 22, 2024 REVISION 1
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Path: I:\004\_Municipal Services\Wheatland\Engineering Department\Corp Yard\2024\04 Sinkhole\74508 Orthophoto-clipped at corp\_yard.dwg Layout Name: 3 Plot Date: Apr 22, 2024 at 10:22 am

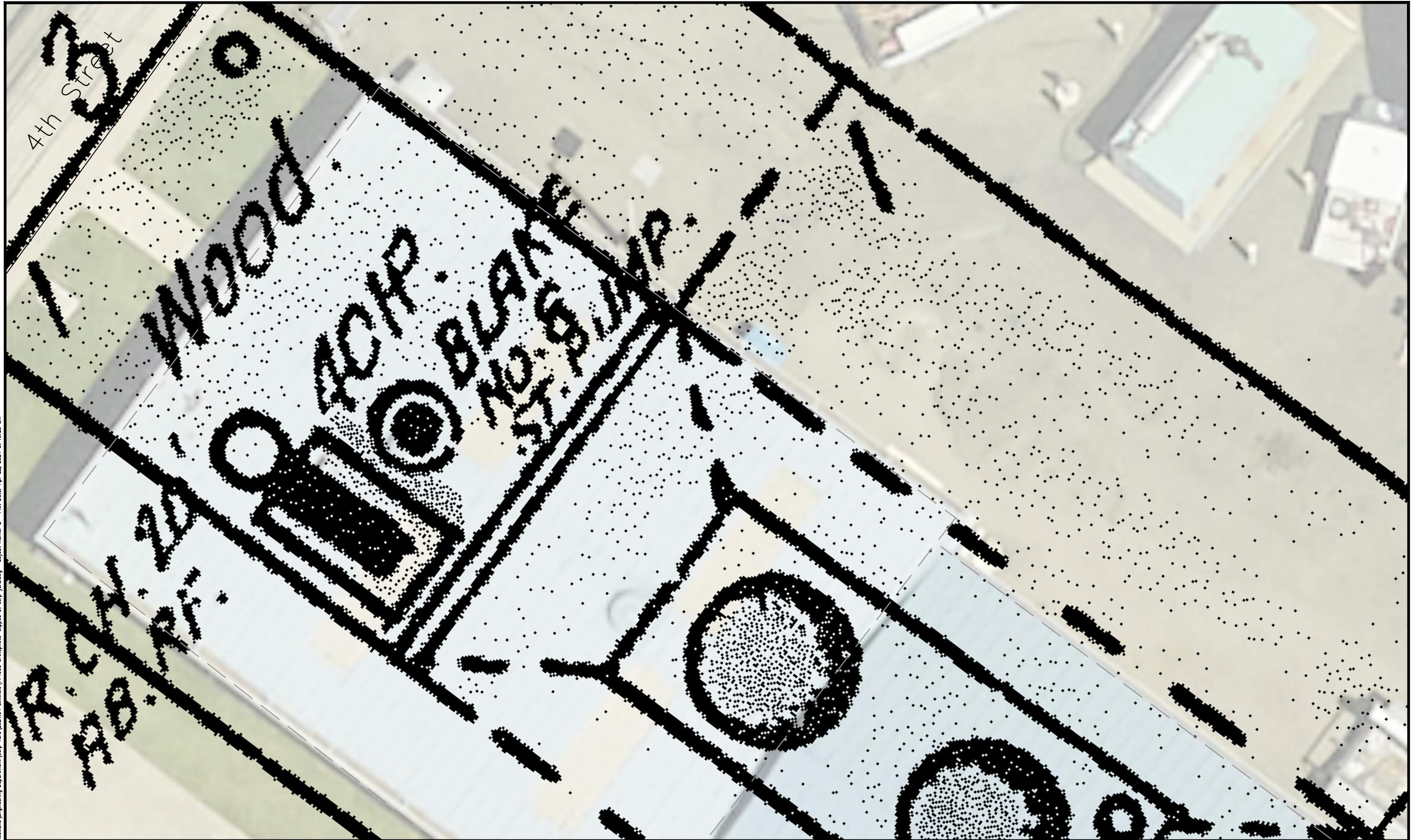
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# EXHIBIT B

CITY OF WHEATLAND CORP YARD  
 SINKHOLE PROFILE VIEW - APPROX. LIMITS  
 APRIL 22, 2024  
 REVISION 1

Path: I:\004\_Municipal Services\Wheatland\Engineering Department\Corp\_Yard\2024\04\_Sinkhole\74508\_Orthophoto-clipped at corp\_yard.dwg Layout Name: 2 Plot Date: Apr 22, 2024 at 10:23 am



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# EXHIBIT C

CITY OF WHEATLAND CORP YARD  
SANDBORN MAP OVERLAY

APRIL 22, 2024  
REVISION 1



File No. 2871.X 007  
April 17, 2024

Coastland Engineering  
Mr. Dane Schilling  
11641 Blocker Dr. Suite 170  
Auburn, CA 95603

**Subject: GEOTECHNICAL CONSULTATION**  
**208 4<sup>th</sup> Street**  
Wheatland, California

Dear Mr. Schilling,

Blackburn Consulting (Blackburn) appreciates the opportunity to provide geotechnical consultation services for the void that has formed below the City of Wheatland Water Department Operations Building at 208 4<sup>th</sup> Street in Wheatland, California. Below is a summary of site observations, conclusions, preliminary recommendations, and limitations.

## **SITE DESCRIPTION AND PURPOSE**

The site is occupied by the City of Wheatland Water Department and Public Works operations building and shop/warehouse. Site improvements include:

- Single-story concrete masonry unit (CMU) operations building supported on shallow concrete spread footings.
- A Single-story steel framed shop/warehouse supported on shallow concrete spread footings.
- Asphalt pavements.
- Water pumps and pipelines.
- Water tanks (elevated and at grade), and
- Emergency backup generators.

Photo 1 shows the conditions near the shop/warehouse.



We understand City of Wheatland employees found a hole in the pavement near the southeast corner of the shop/warehouse building (coned area in Photo 1) on Thursday April 11, 2024, while moving a fuel storage cabinet (yellow cabinet on east side of shop/warehouse in Photo 1). The City contacted Coastland Engineering who requested Blackburn visit the site to observe the conditions, provide a professional opinion regarding likely cause(s) of the void, and preliminary recommendations to mitigate/ fill the void. We prepared this memo to summarize our observations, conclusions, and preliminary recommendations.

## **SUMMARY OF SITE OBSERVATIONS**

Blackburn's engineer Haze Rodgers visited the site on April 12, 2024. Photos 2 through 4 show some of the void conditions observed during the site visit. Haze observed:

- A hole approximately 4 feet in diameter in the asphalt pavement near the southeast corner of the shop/warehouse building.
- Approximately 1 foot of the pavement around the hole was depressed and undermined.
- The southeastern corner, eastern perimeter footing, and floor slab of the shop/warehouse building was undermined (Photo 2).
- The void extended to the north (Photo 3), and to the south and southwest (Photo 4).
- A brick structure was observed at the northern end of the void (Photo 3).
- The base of the void is covered with loose soil, Aggregate Base and debris (AC pieces, leaves, etc.).
- The depth and horizontal extents of the void are unknown but estimated to extend to a depth of at least 20 feet below the ground surface at the northern end.
- Significant distress was not observed inside the shop/warehouse building at the southeastern corner; however, some cracks were observed in the floor slab near the northeast corner.

Photo 2: 208 4<sup>th</sup> Street



Undermined asphalt pavement at east edge of void. Bottom of AC is observed at top of photo.

Photo 3: 208 4<sup>th</sup> Street



Looking North down void toward 4<sup>th</sup> Street. Eastern perimeter footing is visible at top left corner of photo, and Brick structure is observed at end of void.

Photo 4: 208 4<sup>th</sup> Street



Looking Southwest below southeast corner of shop/warehouse building. Corner and eastern perimeter footing are visible.

Mr. Dane Schilling (Coastland) was present and had access to historical Sanborn maps. According to Dane, one of the Sanborn maps shows water tanks and a well near the location of current shop/warehouse building. The depth and size of the well were not reported on the map.

## CONCLUSIONS

Based on our observations, available historical information, we conclude the void is likely caused by backward erosion piping of soil into an improperly abandoned well. The soil is likely being transported by surface water (from storm water, irrigation, etc.) that seeps into the soil and flows to the historic well. On-site stormwater could also enter the ground at the cold joint between the pavement and perimeter building foundations.

### Preliminary Recommendations

Based on our observations, available information, and experience with similar projects we provide the following preliminary repair recommendations:

- A “No-access”/exclusion zone (for both the interior and exterior) within 20 feet of the eastern edge of the shop/warehouse building should be established. No equipment or material storage should be allowed within the exclusion zone. Equipment, vehicles and materials stored within the exclusion area should be relocated outside the exclusion zone.
- Determine and map the depth and horizontal extents of the void, and location of the suspected well.
- Expose the suspected well and observe and measure the depth and size of the well (or other feature if different).

## GEOTECHNICAL CONSULTATION MEMORANDUM

208 4<sup>th</sup> Street, Wheatland, CA

April 17, 2024



- Remove the loose soil and debris from the base of the mapped void and well/feature to expose firm native soil.
- Backfill the void and well with CLSM. CLSM should have a minimum 28-day unconfined compressive strength between 200 and 500 pounds per square inch (psi).

Due to the depth and extent of undermining below the building foundations we anticipate shoring and underpinning will be required. The type and design of the underpinning and shoring depend on the subsurface conditions, contractor means and methods, and actual extent and depth of the void. To provide the geotechnical information necessary to provide recommendations for a contractor to determine and design the shoring and underpinning we recommend a geotechnical subsurface investigation be performed. The subsurface investigation should include:

- Review of available subsurface information
- Drilling, sampling, and logging two borings near the void. The borings should be advanced at least 10 feet below the bottom of the void.
- Geotechnical laboratory testing to provide engineering properties of the in-situ native soil, and recommendations for use in the design of shoring and underpinning.
- Engineering evaluations and recommendations for:
  - Void excavation and backfill, including clean out, appropriate materials, and criteria.
  - Lateral earth pressures (active, at rest, and passive) for design of shoring.
  - Allowable bearing pressures for underpinning elements.
  - Temporary slopes.
  - Floor slab repair.
  - Additional services during construction.
- A summary letter presenting the results of the geotechnical investigation and evaluations.

## LIMITATIONS

Do not use the information in this memorandum for design or construction on this site. We prepared this memo based on our site observations, information provided by others, and published data. Do not use or rely on the information for different locations or repairs/improvements without Blackburn's written consent.

Our scope does not include subsurface exploration or laboratory testing. Blackburn has not reviewed or performed a geotechnical investigation, laboratory testing, or engineering calculations for the project. Our conclusions and recommendations are based on the results of our review, a brief site visit, and information provided. A geotechnical exploration, laboratory testing, and engineering analyses must be performed to properly design and construct the repair.

**GEOTECHNICAL CONSULTATION MEMORANDUM**

**208 4<sup>th</sup> Street, Wheatland, CA**

April 17, 2024



Thank you for contacting us to help. Please call if you have questions or require additional information.

Sincerely,

**BLACKBURN CONSULTING**

Haze Rodgers, P.E., G.E.  
Geotechnical Director

Reviewed by:

Rob Pickard, P.G., C.E.G  
Senior Engineering Geologist

**GEOTECHNICAL CONSULTATION  
MEMORANDUM  
208 4th Street, Wheatland, CA**

**Attachment C:**

Injection Grout Sample Specification

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**SECTION 02800**  
**INJECTION GROUTING**

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**PART 1: GENERAL**

**1.01 SUMMARY**

A. Furnish all labor, material, equipment, transportation, and services necessary for the completion of all injection grouting work indicated in the project documents.

B. The contractor shall review the available project and site information.

**1.02 INJECTION GROUT**

A. Definition: "Injection Grout," as referred to herein, is a relatively non-viscous grout that is injected into the ground or a void. The grout can consist of cementitious and chemical (polymer) materials that undergo a reaction that results in solidification of the injected for the purpose of filling voids in the soil and below surface improvements, and reestablishing support if the surface improvements.

B. The materials used shall be so proportioned and mixed as to produce a grout that contains no solids, may be pumped without difficulty, will penetrate and fill the voids in the soil mass, and will result in a stable solid material of the required strength and stability.

C. The Contractor shall submit, for approval by the Geotechnical Engineer, detailed sketches of the intended injection techniques and patterns and shall submit, for approval by the Geotechnical Engineer, necessary data to prove that the grout mixture contemplated will meet in all respects the requirements as to properties and qualities required by these Specifications.

D. Authorization of use under license must be filed with Engineer for the use of any chemical system that is covered with a current patent.



### **1.03 DETERMINATION OF ACTUAL WORK LIMITS**

A. Voids beneath the existing floor slab and designated areas surrounding CSLM (to be placed under this contract prior to injection grouting) shall be grouted. Depth of grouting shall be determined based on field conditions. For estimation purposes, an average depth of 10 feet should be assumed and unit prices shall be provided on a cost-per-unit volume basis.

B. Grouting beneath existing foundations shall be thorough and complete and shall extend to the boundary between the soil and the bottom of existing foundation.

## **PART 2: PRODUCTS**

### **2.01 MATERIALS**

A. Grout shall be composed of a uniform mixture of polymer, cement, or other proprietary material. The grout mix proportions are to be determined by the contractor and submitted for review and approval to the City.

B. Grout mix can include cement, polymers, or other chemical binders.

C. Water used shall be compatible with the binder/cement used.

D. Considering the chemistry of the grout and the conditions known at the site, the chemical system shall produce a stable grout. The chemical system used shall be permanent and shall have a proven record of stability.

E. Chemicals mixed into primary solutions, before final batching, may be held only in accordance with the manufacturer's recommendations and must not be injected or held beyond the specified time, exposed to critical temperatures, exposed to sunlight, or other limiting factors imposed by the manufacturer. Any solutions deemed unsuitable to be used for the injection shall be immediately disposed of to the satisfaction of the Engineer.

F. The unconfined compressive strength of grout shall be at least 100 pounds per square inch (psi) at 28 days but not greater than 500 psi.

### **2.02 EQUIPMENT**

A. The grout plant shall be capable of supplying, mixing, stirring, and pumping the grout. Mixing and pumping equipment used in the preparation and handling the grout shall be maintained in first-class operating condition at all times.

B. Mixing equipment shall be capable of thoroughly mixing the primary constituents to the proper solution strength and shall be capable of thoroughly mixing these constituents in the final batching. In the event that temperatures fall to a critical temperature for the required solution strengths, provision shall be made to heat solutions, in accordance with the material manufacturer's recommendations, or grouting shall be suspended until proper temperatures and re-mix occur. Under no conditions will compressed air "bubble mixing" be allowed.

C. Drilling Equipment: Injection points shall be installed by either rotary drilling methods or by percussion. If rotary drilling methods are used, the injection pipes shall be installed in the hole in such a way as to form a tight seal around the pipe and confine the grout to the required injection depth. The injection ports shall be of sufficient clear inside diameter and strength to accommodate the maximum grout pressure and flow rates.

D. Pumping equipment shall be reciprocating pumps, preferably of the air-operated type, capable of developing at least 200 psi. Pumping rates and pressures shall be readily controlled. Under no conditions will "static head" type pumps be allowed.

E. Metals used for the construction of the mixers and pumps shall be compatible with the chemical system used in accordance with the chemical manufacturer's recommendations.

F. All equipment shall be cleaned of oil or other rust inhibitors prior to its contact with the grout constituents.

### **PART 3: EXECUTION**

#### **3.01 PREPARATION**

A. Core or drill through existing interior slab-on-grade where required for placement of injection points.

#### **3.02 MIXING AND PUMPING**

A. All material shall be accurately measured by weight or volume for mixing. If a proportioning pump system is used, positive controls shall be incorporated to ensure accurate proportioning.

B. Care shall be taken not to contaminate mixing vessels with reactive chemicals by spillage, splash, etc.

C. A fast check reaction shall be made by the Contractor with each new primary batch. A test sample shall be made of every injection batch. If a proportioning system is used, a test sample shall be made periodically as required by the City or Engineer. The contractor shall keep records to establish the point of injection for each sample.

D. If any sample fails to show the proper stabilization, the potential area of failure shall be reinjected as directed by the Engineer.

E. Care shall be taken in the placing of injection points to secure accurate injection and the proper overlapping of injection cylinders.

F. Grouting Method: Injection grouting shall be done by the split-spaced, descending stage method. Grout injection points will be installed at the angles, depths, and spacing required to achieve permeation within the lines and grades shown on the drawings. Primary injection points shall be installed midway between the primary points. Injection points shall be grouted in stages at intervals and depths selected by the contractor. Grouting will not be permitted in a secondary point until the adjacent primary points are completed.

If the contractor elects to grout using the sleeve pipe method, the injection tubes shall be installed and grouted first. After the grout around the pipe gains sufficient strength, chemical grouting may proceed.

G. Injection rates and pressures shall be closely controlled to prevent blowout, localized "quick" conditions, movement of immediately adjacent structures, and to ensure proper filling of voids to attain the desired stabilized section.

H. Quantities of grout injected at each point shall be governed by calculated volume, back pressure, or a combination of these two factors. If it appears at any point that a large void exists, proper steps shall be taken to assure penetration of the desired soil section.

I. If any injection batches begin to show signs of gelation, increased viscosity before injection, they shall immediately be discarded and equipment cleaned before proceeding further.

### **3.03 PATCHING**

A. Replace floor slab to match existing dimensions.

### **3.04 QUALITY CONTROL AND MONITORING**

A. One sample injection shall be made at a location designated by the engineer, and after suitable curing time, the sample shall be cored to collect samples for confirmation strength tests.

The contractor shall keep a daily log of grouting operations which shall contain the point number, location, grouting pressure, depth, grout mix proportions, and grout quantity.

B. Contractor shall monitor the existing building foundation and slab for excessive vertical movement. If excessive movement is observed the contractor shall stop injection at that location.

### **3.05 SUBMITALS**

Contractor shall submit to the City and Engineer for review and approval the following submittals at least 7 days prior to start of injection grouting:

A) Grout mix design. Includes material data sheets, and laboratory compression tests on samples demonstrating the proposed mix will results in the required unconfined compressive strength.

B) Grouting plan. Plan should include as a minimum:

- Description of the mixing and proportioning methods and equipment.
- Layout of grouting locations.
- Description of monitoring and quality control.
- Grouting procedure.

### **3.06 MEASUREMENT AND PAYMENT**

A. Provide lump sum base bid based on total volume of grout below half the existing building and along the exterior edge of CLSM to an average depth of 10 feet below the floor slab. A unit price on a per-volume basis shall be provided for grouting for more than 10 feet.