

Cover Letter

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Gina Haynes, PE
City of Pittsburg
65 Civic Avenue
Pittsburg, CA 94565

155191

Subject: Pittsburg WTP Filter Piping Rehabilitation and Valve Replacement Project, Design Submittal

Dear Ms. Haynes:

Brown and Caldwell (BC) has prepared the attached 90% deliverable for the rehabilitation of filter gallery piping and valve replacement project. For clarity, this letter summarizes the proposed scope of work, equipment replacement options and estimated costs, and presents supporting information on piping repair and patching methods.

BC inspected portions of the filter gallery piping in 2014 and summarized the results in a Technical Memorandum dated June 18, 2015. At that time, the piping was approximately 40 years old. The original 1975 plans specified cement-mortar-lined (CML), minimum 12-gauge (0.109-inch wall thickness) welded steel. Ultrasonic thickness measurements showed that some of the steel was thicker than specified (up to about 0.18-inch), and we postulated that some 7-gauge or Schedule 10 pipe may have been used in lieu of 12-gauge. Inspection data revealed numerous leaks and locations of extreme wall loss, surrounded by other locations with reasonably competent walls. This finding indicates pitting and pinhole corrosion, with CML failure and general pipe wall degradation.

Today, six years later, the piping has continued to degrade, existing leaks have worsened, and new leaks have appeared. In addition to degrading piping, the existing valves and actuators in the filter gallery are aged and showing signs of wear.

Valves and Actuators Replacements

It is the understanding of BC that the City recently replaced valves 702, 703, 704, 802 and 803 on filters 7 and 8. The City has indicated its desire to replace the remaining valves and actuators on filters 5, 6, 7 and 8. The list of valves and actuators to be replaced is given in Table 1, below.

| Table 1. Filter Valves and Actuators to be Replaced | | | | | |
|---|---------|-----------------|---------------|----------------------|-------------------------|
| Filter | Valve # | Valve Size (in) | Actuator Type | Valve to be Replaced | Actuator to be Replaced |
| 5 | 502 | 16 | Pneumatic | Yes | Yes |
| 5 | 503 | 16 | Pneumatic | Yes | Yes |
| 5 | 504 | 16 | Pneumatic | Yes | Yes |
| 5 | 505 | 12 | Electric | Yes | Yes |

Table 1. Filter Valves and Actuators to be Replaced

| Filter | Valve # | Valve Size (in) | Actuator Type | Valve to be Replaced | Actuator to be Replaced |
|--------|---------|-----------------|---------------|----------------------|-------------------------|
| 6 | 602 | 16 | Pneumatic | Yes | Yes |
| 6 | 603 | 16 | Pneumatic | Yes | Yes |
| 6 | 604 | 16 | Pneumatic | Yes | Yes |
| 6 | 605 | 12 | Electric | Yes | Yes |
| 7 | 702 | 16 | Pneumatic | No | No |
| 7 | 703 | 16 | Pneumatic | No | No |
| 7 | 704 | 16 | Pneumatic | No | No |
| 7 | 705 | 12 | Electric | Yes | No |
| 8 | 802 | 16 | Pneumatic | No | No |
| 8 | 803 | 16 | Pneumatic | No | No |
| 8 | 804 | 16 | Pneumatic | Yes | Yes |
| 8 | 805 | 12 | Electric | Yes | Yes |

For compatibility between the existing, new and replacement components of the valves and actuators, BC recommends a representative of Frank Olsen Company visit the site to review the existing valves and actuators by serial number. This level of coordination is required to allow for replacement of an actuator on an existing valve that is to remain and replacement of a valve when an existing actuator is to remain.

With this constraint in mind, specifications for the valves and actuators have been marked as “Draft Pending Site Visit by Vendor” and have not been finalized. It is anticipated this site visit will take place at or near the time of the 90% review meeting. The vendor will be accompanied by a BC Engineer to document the information gathered.

Piping Spot Repair

Most components are in severely deteriorated condition, and at a minimum, temporary spot repairs of pin-hole leaks is recommended. BC recommends that the City consider performing exterior, temporary spot repairs as required to maintain the pipes in service. Such temporary spot repairs shall last until pipe replacement can be accomplished and not be considered a long-term solution. The repairs, although difficult to fully scope on the design drawings due to their uncertain nature, are relatively straightforward to execute. WTP staff could potentially make these repairs in-house to reduce construction costs and potential change orders due to unknown conditions.

If the City elects to self-perform spot repair on existing piping to prevent some of the worst minor leaks from becoming major leaks, BC recommends that the City consider patching using an epoxy adhesive product, such as Belzona 1111. It is NSF 61 compliant. Belzona manufactures various metal rebuilding compounds, but Belzona 1111 has been recommended for the proposed piping rehabilitation. See Attachment 1 for product literature. A training technician from Belzona could guide plant staff through the application process while also patching one of the existing leaks.

Construction Costs

BC has developed a project construction cost estimate which includes both filter gallery piping spot treatment and valve and actuator replacements. Recent quotes from major materials suppliers, typical local labor and equipment rates, and miscellaneous other data were used. This project construction estimate, included as Attachment 2, is summarized as follows:

| Item | Cost |
|---|-------------------|
| Filter gallery spot treatments and painting | \$310,000 |
| Valve and actuator replacement | \$270,000 |
| TOTAL | =\$580,000 |

Note that two floor penetrations (outlet tees) and four wall penetrations could likely be replaced but at a substantial cost. This work has NOT been included in this cost estimate due to construction cost concerns. This will warrant further discussion with the City to confirm deferment of these repairs to a later date.

Construction Access and Timing

At this time, the entire construction project is assumed to be completed early in 2021. This assumes that two paired filters (5 and 7 and 6 and 8) will be taken out of service together. Removing and replacing the valves on the filter discharge and backwash piping will require interruptions in flow for the entire filter system. These interruptions will be limited to two, less than 8-hour events where the piping, but not the filters themselves, are drained as shown on the drawings.

Valve replacements could be paced over two years should budgetary constraint require. The valves on the filter effluent and backwash piping require the pipes themselves to be drained to allow the valve to be replaced. Therefore, the valve replacements should be paired such that a maximum of two pipe draining tasks are ultimately required.

Conclusion

We hope that this submittal meets with your expectation and look forward to discussing the above topics as well as additional minor details, such as surface preparations for painting, at the coming design review meeting.

Sincerely,

Bernadette Visitacion-Sumida, P.E.
Project Manager

James Jetton P.E.
Project Engineer

Attachments (2):

Attachment 1: Belzona Product Brochures

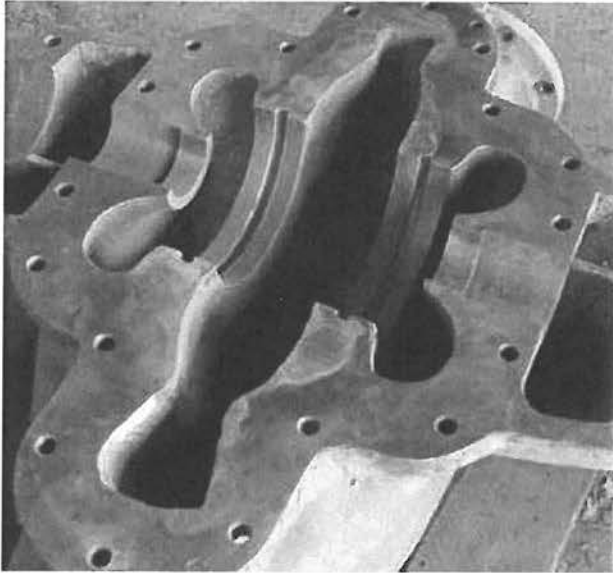
Attachment 2: Cost Estimate

Attachment 1: Belzona Product Brochures

Multi-Purpose Composite for Bonding, Sealing and Rebuilding Applications



1111



Belzona 1111 (Super Metal) is a cold-curing 100% solids epoxy composite reinforced with silicon steel alloy.

This material can be used for various applications including bonding, shimming, forming, rebuilding, wrapping, patching, sealing and filling.

It will not shrink while curing in service, allowing for exact dimensions and geometry to be achieved. Belzona 1111 ensures lasting in-service performance, accounting for temperature and pressure fluctuations, loading and stresses, impact and abrasion.

Five-year shelf life makes Belzona 1111 an invaluable stock item for many maintenance professionals.



| | | | |
|----------------|----------------------------------|---|--|
| TECHNICAL DATA | Mixing ratio (Base : Solidifier) | 3:1 by volume | 5:1 by weight |
| | Working life | 15 minutes at 25°C (77°F) | |
| | Shelf life | 5 years | |
| | Dry heat resistance | 200°C (392°F) | |
| | Adhesion (tensile shear) | Mild steel - 2,790 psi (19.2 Mpa) | Stainless steel - 2,960 psi (20.4 Mpa) |
| | Compressive strength | 9620 psi (66.3 Mpa) at 20°C (68°F) | |
| | Volume capacity | 24.3in ³ (398cm ³) /kg | |
| | Heat distortion temperature | 53°C (127°F) at 20°C (68°F) | 91°C (195°F) at 100°C (212°F) |
| | Abrasion resistance | H10 Wheels (Wet) 852mm ³ | CS17 - 24 mm ³ dry |

| | | | | | |
|------------|------------------------------------|-------------|-------------|-------------|-------------|
| CURE TIMES | Temperature | 10°C (50°F) | 15°C (59°F) | 20°C (68°F) | 25°C (77°F) |
| | No loading or immersion | 3 hours | 2½ hours | 1¾ hours | 1 hour |
| | Machining and/or light loading | 4 hours | 3 hours | 2 hours | 1½ hours |
| | Full mechanical or thermal loading | 2 days | 1½ days | 1 day | 20 hours |
| | Immersion in chemicals | 4 days | 3 days | 2 days | 1½ days |

*Please consult the Product Specification Sheet (PSS) and Instructions for Use (IFU) for the latest technical data.



MULTI-PURPOSE



HIGH PERFORMANCE

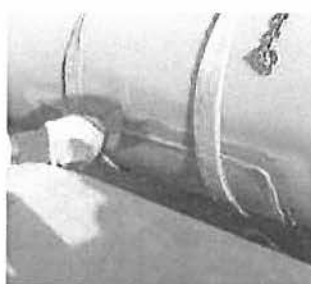
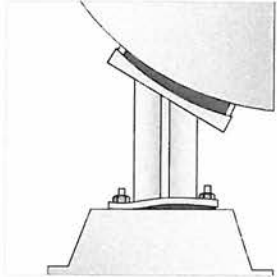


SIMPLE APPLICATION



100% SOLIDS

Application Areas:



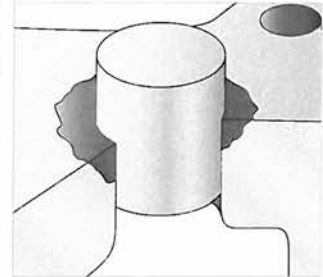
Bonding and shimming



Forming and rebuilding



Wrapping and patching



Sealing and filling

Key Benefits:

- Multi-purpose

Can be used for bonding, irregular shimming, forming, rebuilding, wrapping and patching.

- Durable

High compressive strength, impact and abrasion resistance.

- High precision

Moulds to precise contours and can be machined with conventional tools.

- Simple application

Easy to mix and apply with no specialist tools.

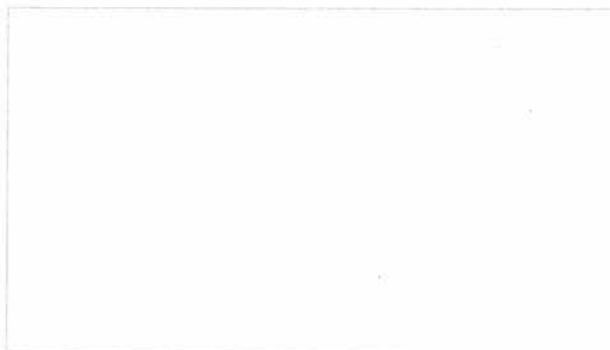
- Versatile

Adheres well to almost any substrate and can be applied in thin or thick sections in one operation.

- 100% Solids

No shrinkage, expansion or contraction during cure.

For more information, please contact your local Belzona representative:



QUALITY PRODUCTS - TECHNICAL SUPPORT

Belzona products are manufactured under an ISO 9001 Registered Quality Management System.

Belzona has a global distribution network of over 140 Distributors operating in 120 countries. Local support is provided by a trained Technical Consultant who will diagnose the problem, recommend the solution and provide 24-hour, on-site application supervision and advice.

PRODUCT SPECIFICATION SHEET

BELZONA 1111

FN10132



GENERAL INFORMATION

Product Description:

A two component paste grade system for repairing and rebuilding machinery and equipment. Based on a silicon steel alloy blended with high molecular weight reactive polymers and oligomers. When cured, the material is durable yet fully machinable. Also used as a high strength structural adhesive for bonding or for creation of irregular load bearing shims with good electrical insulation characteristics. For use in Original Equipment Manufacture or repair situations.

Application Areas:

When mixed and applied as detailed in the Belzona Instructions for Use (IFU), the system is ideally suited for application to the following:

- Shafts
- Hydraulic rams
- Bearing housings
- Keyways
- Engine blocks
- Casings
- Pipes
- Tanks
- Flange faces

APPLICATION INFORMATION

Working Life

Will vary according to temperature. At 77°F (25°C) the usable life of mixed material is 15 minutes.

Cure Time

Cure times will vary depending on the ambient conditions and will be reduced for thicker sections and extended for thinner applications. Consult the Belzona IFU for specific details.

Volume Capacity

24.3 in³ (398 cm³)/kg.

Base Component

| | |
|-----------------------------|-------------------------------|
| Appearance | Paste |
| Color | Dark gray |
| Gel strength at 77°F (25°C) | >150 g/cm HF |
| Density | 2.70 - 2.90 g/cm ³ |

Solidifier Component

| | |
|-----------------------------|-------------------------------|
| Appearance | Paste |
| Color | Light gray |
| Gel strength at 77°F (25°C) | 40 - 150 g/cm QV |
| Density | 1.64 - 1.70 g/cm ³ |

Mixed Properties

| | |
|--|-----------------------------|
| Mixing Ratio by Weight (Base : Solidifier) | 5 : 1 |
| Mixing Ratio by Volume (Base : Solidifier) | 3 : 1 |
| Mixed Form | Paste |
| Peak Exotherm Temperature | 203 - 232°F (95 - 111°C) |
| Time to Peak Exotherm | 33 - 41 mins. |
| Slump Resistance | nil at 0.5 inch (1.27 cm) |
| Mixed Density | 2.41-2.61 g/cm ³ |

The above application information serves as introductory guide only. For full application details including the recommended application procedure/technique, refer to the Belzona IFU which is enclosed with each packaged product.

PRODUCT SPECIFICATION SHEET

BELZONA 1111

FN10132



| ABRASION | |
|---|--|
| Taber | |
| The Taber abrasion resistance determined in accordance with ASTM D4060 with 1 kg load is typically: | |
| H10 Wheels (Wet) | 852 mm ³ loss per 1000 cycles |
| CS17 Wheels (Dry) | 24 mm ³ loss per 1000 cycles |

| ADHESION | |
|---|----------------------|
| Tensile Shear | |
| When tested in accordance with ASTM D1002, using degreased strips, grit blasted to a 3-4 mil profile, typical values will be: | |
| Mild steel | 2,790 psi (19.2 MPa) |
| Brass | 1,650 psi (11.4 MPa) |
| Copper | 2,060 psi (14.2 MPa) |
| Stainless steel | 2,960 psi (20.4 MPa) |
| Aluminium | 1,950 psi (13.4 MPa) |
| Tensile fatigue | |
| The Tensile fatigue in accordance with ASTM D3166 at ambient temperature and 653 psi (4.5MPa) applied static tensile stress is >1,000,000 cycles. | |
| Pull Off Adhesion | |
| When tested in accordance with ASTM D 4541/ ISO 4624, the pull off strength from grit blasted steel will be typically: | |
| 3240 psi (22.3 MPa) | 68°F (20°C) cure |
| 2980 psi (20.5 MPa) | 212°F (100°C) cure |
| Cleavage strength | |
| When tested in accordance with ASTM D 1062, the cleavage strength to grit blasted steel will be typically: | |
| 1199 pli | 68°F (20°C) cure |

| CHEMICAL ANALYSIS | |
|---|----------------------------------|
| The mixed Belzona 1111 has been independently analyzed for halogens, heavy metals, and other corrosion-causing impurities in accordance with ASTM E165, ASTM D4327 and ASTM E1479. Typical results are displayed as follows: | |
| Analyte | Total Concentration (ppm) |
| Fluoride | 224 |
| Chloride | 398 |
| Bromide | ND (<12) |
| Sulfur | 1019 |
| Nitrite | ND (<6) |
| Nitrate | 4 |
| Zinc | 3.4 |
| Antimony, Arsenic, Bismuth, Cadmium, Lead, Tin, Silver, Mercury, Gallium and Indium | ND (<3.0) |
| ND : Not Detected | |

| CHEMICAL RESISTANCE |
|---|
| Once fully cured, the material will demonstrate excellent resistance to most commonly found inorganic acids and alkalis at concentrations up to 20%. The material is also resistant to hydro-carbons, mineral oils, lubricating oils and many other commonly found chemicals. |
| * For a more detailed description of chemical resistance properties, refer to relevant Chemical Resistance chart. |

| COMPRESSIVE PROPERTIES | | |
|--|--|------------------------------|
| When determined in accordance with ASTM D695 (1.0in/25.4mm thick test pieces), typical values will be: | | |
| Compressive Strength (Maximum) | Cure temperature | |
| 12525 psi (86.4 MPa) | 68°F (20°C) | |
| 16645 psi (114.8 MPa) | 212°F (100°C) | |
| Compressive Strength (Yield) | | |
| 9620 psi (66.3 MPa) | 68°F (20°C) | |
| 10955 psi (75.6 MPa) | 212°F (100°C) | |
| Compressive Modulus | | |
| 1.77 x 10 ⁵ psi (1217 MPa) | 68°F (20°C) | |
| 1.75 x 10 ⁵ psi (1205 MPa) | 212°F (100°C) | |
| When determined using a modified version of ASTM D695, at thickness more representative of in service application, typical values will be: | | |
| Thickness | Compressive Strength (Yield) | Cure Temperature |
| 0.24 in (6.0 mm) | 13095 psi (90.3 MPa) 16450 psi (113.4 MPa) | 68°F (20°C) 212°F (100°C) |
| 0.12 in (3.0 mm) | 14855 psi (102.5 MPa) 18980 psi (130.9 MPa) | 68°F (20°C) 212°F (100°C) |
| Bonded to grit blasted mild steel (single side) | | |
| Thickness | Compressive Strength (Yield) | Cure Temperature |
| 0.12 in (3.0 mm) | 19910 psi (137.3 MPa) 23840 psi (164.4 MPa) | 68°F (20°C) 212°F (100°C) |

| CORROSION PROTECTION |
|---|
| Corrosion Resistance |
| Will show no visible signs of corrosion after 5,000 hours exposure in the ASTM B117 salt spray cabinet. |

PRODUCT SPECIFICATION SHEET

BELZONA 1111

FN10132



| ELECTRICAL PROPERTIES | |
|---|--|
| Dielectric Constant (Relative Permittivity) Tested to ASTM D150 is typically 8.0 when tested at 1V & 10 kHz. | |
| Dielectric Strength Tested to ASTM D149 is typically 2.2 kV/mm when tested at 2000V/s. | |
| Dissipation Factor (Tan Delta/Dielectric Loss) Tested to ASTM D150 is typically 0.09 when tested at 1V & 10 kHz. | |
| Surface Resistivity Tested to ASTM D257 is typically 2.28×10^{10} Mohm when tested at 500V for 1 minute. | |
| Volume Resistivity Tested to ASTM D257 is typically 2.6×10^9 Mohm mm when tested at 500V for 1 minute. | |

| ELONGATION & TENSILE PROPERTIES | |
|--|---|
| When determined in accordance with ASTM D638, typical values will be: | |
| Tensile Strength 4975 psi / 34.3 MPa 6686 psi / 46.1 MPa | Cure temperature 68°F (20°C) 212°F (100°C) |
| Elongation 0.49 % 0.58 % | 68°F (20°C) 212°F (100°C) |
| Young's Modulus 12.6 x 10 ⁵ psi / 8681 MPa 12.3 x 10 ⁵ psi / 8468 MPa | 68°F (20°C) 212°F (100°C) |

| FLEXURAL PROPERTIES | |
|---|---|
| When determined in accordance with ASTM D790, typical values will be: | |
| Flexural Strength 9,140 psi (63.0 MPa) 11,820 psi (81.5 MPa) | Cure temperature 68°F (20°C) 212°F (100°C) |
| Flexural Modulus 10.44 x 10 ⁵ psi (7199 MPa) 10.15 x 10 ⁵ psi (6995 MPa) | Cure temperature 68°F (20°C) 212°F (100°C) |

| FOOD CONTACT |
|--|
| Incidental Food Contact (USDA) USDA compliant as an incidental food contact surface. |
| Direct Food Contact (FDA) Meets extraction requirements as set out in 21 CFR 175.300 (paragraph c) for a broad range of food types in Conditions of Use D, E and F (paragraph d). Please contact Belzona for more comprehensive data. |

| HARDNESS | |
|---|--|
| Shore D When determined in accordance with ASTM D2240, typical value will be: 84 | |
| Barcol When determined in accordance with ASTM D2583, using Model No.935, typical values will be: | |
| 85 | Cure temperature 68°F (20°C) |
| 92 | 212°F (100°C) |

| HEAT RESISTANCE | |
|--|---|
| Heat Distortion Temperature (HDT) Tested to ASTM D648 (264 psi fiber stress), typical values obtained will be: | |
| 127°F (53°C) 195°F (91°C) | Cure temperature 68°F (20°C) 212°F (100°C) |
| Dry Heat Resistance The indicated degradation temperature in air based on Differential Scanning Calorimetry (DSC) operated in accordance with ISO11357 is typically 392°F (200°C). For many applications the product is suitable down to -40°F (-40°C). | |

| IMPACT RESISTANCE | |
|--|---|
| Impact Strength The impact strength (reverse notched) when tested to ASTM D256 is typically: | |
| 0.69 ft.lb./in., 37 J/m 0.73 ft.lb./in., 39 J/m | Cure temperature 68°F (20°C) 212°F (100°C) |

PRODUCT SPECIFICATION SHEET

BELZONA 1111

FN10132






POTABLE WATER APPROVAL

KC
Listed in Barrier Materials as epoxy resin-based waterproof and anticorrosion material, which has passed full test of sanitation and safety.

WRAS
Listed in the UK Water Fittings Directory under "Materials which have passed full tests of effect on water quality".

NSF/ANSI 61
Tested and certified by WQA against NSF/ANSI 61. For product use restrictions visit www.wqa.org

SHELF LIFE

Separate base and solidifier components shall have a shelf life of 5 years from date of manufacture when stored in their original unopened containers between 32°F (0°C) and 86°F (30°C).

APPROVALS/ACCEPTANCES

The material has received recognition from organizations worldwide including:

- AMERICAN BUREAU OF SHIPPING U.S.A.
- RUSSIAN REGISTER OF SHIPPING
- KOREAN REGISTER OF SHIPPING
- CHINA CLASSIFICATION SOCIETY
- LLOYDS REGISTER
- UK WRAS
- BUREAU VERITAS
- NSF/ANSI 61
- KOREAN WATER AND WASTEWATER WORKS ASSOCIATION

WARRANTY

This product will meet the performance claims stated herein when material is stored and used as instructed in the Belzona Information For Use leaflet. Belzona ensures that all its products are carefully manufactured to ensure the highest quality possible and are tested strictly in accordance with universally recognized standards (ASTM, ANSI, BS, DIN, ISO, etc.). Since Belzona has no control over the use of the product described herein, no warranty for any application can be given.

AVAILABILITY AND COST

Belzona 1111 is available from a network of Belzona Distributors throughout the world for prompt delivery to the application site. For information, consult the Belzona Distributor in your area.

MANUFACTURER / SUPPLIER

| | |
|---|---|
| Belzona Polymeric Ltd. Claro Road, Harrogate, HG1 4DS, UK | Belzona Inc. 14300 NW 60th Ave, Miami Lakes, FL, 33014, USA |
|---|---|

HEALTH AND SAFETY

Prior to using this material, please consult the relevant Safety Data Sheets.

TECHNICAL SERVICE

Complete technical assistance is available and includes fully trained Technical Consultants, technical service personnel and fully staffed research, development and quality control laboratories.

The technical data contained herein is based on the results of long term tests carried out in our laboratories and to the best of our knowledge is true and accurate on the date of publication. It is however subject to change without prior notice and the user should contact Belzona to verify the technical data is correct before specifying or ordering. No guarantee of accuracy is given or implied. We assume no responsibility for rates of coverage, performance or injury resulting from use. Liability, if any, is limited to the replacement of products. No other warranty or guarantee of any kind is made by Belzona, express or implied, whether statutory, by operation of law or otherwise, including merchantability or fitness for a particular purpose.

Nothing in the foregoing statement shall exclude or limit any liability of Belzona to the extent such liability cannot by law be excluded or limited.

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Belzona products are manufactured under an ISO 9001 Registered Quality Management System



Belzona 1111

FN10132 (SUPER METAL)



INSTRUCTIONS FOR USE

1. TO ENSURE AN EFFECTIVE MOLECULAR WELD

APPLY ONLY TO CLEAN, FIRM, DRY AND WELL ROUGHENED SURFACES

- Brush away loose contamination and degrease with a rag soaked in **Belzona® 9111** (Cleaner/degreaser) or any other effective cleaner which does not leave a residue e.g. methyl ethyl ketone (MEK). Use a flame to sweat out oil from deeply impregnated surfaces.
- Roughen surfaces by blast cleaning, deeply scoring or grinding.
- Stabilize cracks by drilling the extremities. Long cracks should be drilled, tapped and bolted every 3-4 inches (77-103 mm).
- Vee-out all cracks using a rotary file.
- Finally degrease again. Use clean rags to avoid spreading contamination.

WHERE BELZONA® 1111 SHOULD NOT ADHERE

Brush on a thin layer of **Belzona® 9411** (Release Agent) and allow to dry for 15-20 minutes before proceeding to step 2.

2. COMBINING THE REACTIVE COMPONENTS

Transfer the entire contents of the Base and Solidifier modules on to the **Belzona® Working Surface**. Mix thoroughly together to achieve a uniform material free of any streakiness.

1. MIXING AT LOW TEMPERATURES

To ease mixing when the material temperature is below 41°F (5°C), warm the Base and Solidifier modules until the contents attain a temperature of 68-77°F (20-25°C).

2. WORKING LIFE

From the commencement of mixing, **Belzona® 1111** must be used within the times shown below.

| Temperature | 41°F (5°C) | 59°F (15°C) | 77°F (25°C) |
|-------------------------|------------|-------------|-------------|
| Use all material within | 35 min. | 25 min. | 15 min. |

3. MIXING SMALL QUANTITIES

For mixing small quantities of **Belzona® 1111** use:

3 parts Base to 1 part Solidifier by volume

5 parts Base to 1 part Solidifier by weight

4. VOLUME CAPACITY OF MIXED BELZONA® 1111

24.3 cu.in. (398 cm³) per kg.

3. APPLYING BELZONA® 1111

FOR BEST RESULTS

Do not apply when:

- The temperature is below 41°F (5°C) or the relative humidity is above 90%.
- Rain, snow, fog or mist is present.
- There is moisture on the metal surface or is likely to be deposited by subsequent condensation.
- The working environment is likely to be contaminated by oil/grease from adjacent equipment or smoke from kerosene heaters or tobacco smoking.

- Apply the **Belzona® 1111** directly on to the prepared surface with the plastic applicator or spatula provided.
- Press down firmly to fill all cracks, remove entrapped air, and ensure maximum contact with the surface.
- Over cracks, gaps and holes, stipple in **Belzona® 9341** (Reinforcement Tape).
- Contour the **Belzona® 1111** to the correct profile with the plastic applicator or alternatively allow to cure and then machine down.

CLEANING

Mixing tools should be cleaned immediately after use with **Belzona® 9111** or any other effective solvent e.g. Methyl ethyl ketone (MEK). Application tools should be cleaned using a suitable solvent such as **Belzona® 9121**, MEK, acetone or cellulose thinners.

4. COMPLETION OF THE MOLECULAR REACTION

Allow **Belzona® 1111** to solidify as below subjecting it to the conditions indicated.

| Temperature | Movement or use involving no loading or immersion | Machining and/or light loading | Full mechanical or thermal loading | Immersion in chemicals |
|-------------|---|--------------------------------|------------------------------------|------------------------|
| 41°F/ 5°C | 4 hours | 6 hours | 4 days | 5 days |
| 50°F/10°C | 3 hours | 4 hours | 2 days | 4 days |
| 59°F/15°C | 2¼ hours | 3 hours | 1½ days | 3 days |
| 68°F/20°C | 1¾ hours | 2 hours | 1 day | 2 days |
| 77°F/25°C | 1 hour | 1½ hours | 20 hours | 1½ days |
| 86°F/30°C | ¾ hour | 1 hour | 16 hours | 1 day |

These times are for a thickness of approximately 0.25 inch (6 mm); they will be reduced for thicker sections and extended for thinner sections.

5. EFFECTING THE SECONDARY MOLECULAR REACTION

The mechanical properties, heat resistance and chemical resistance of **Belzona® 1111** will be improved by post curing.

After 2 - 4 hours of applying **Belzona® 1111**, post cure the material using forced air heaters, heat lamps, etc. for a minimum of 4 hours at 140-212°F (60-100°C).

Generally, the higher the post cure temperature adopted, the higher the properties attained.

6. APPLICATION OF A FURTHER LAYER OF BELZONA® 1111

Whenever possible the **Belzona® 1111** should be applied in a single layer to achieve the required thickness. When applying additional layers is unavoidable, additional material should be applied **as soon as possible** whilst first layer is still soft and ideally within 60 minutes.

If the **Belzona® 1111** is no longer soft the surface must be roughened by abrading or flash blasting before applying further **Belzona® 1111**.

HEALTH & SAFETY INFORMATION

Please read and make sure you understand the relevant Safety Data Sheets.

The technical data contained herein is based on the results of long term tests carried out in our laboratories and to the best of our knowledge is true and accurate on the date of publication. It is however subject to change without prior notice and the user should contact Belzona to verify the technical data is correct before specifying or ordering. No guarantee of accuracy is given or implied. We assume no responsibility for rates of coverage, performance or injury resulting from use. Liability, if any, is limited to the replacement of products. No other warranty or guarantee of any kind is made by Belzona, express or implied, whether statutory, by operation of law or otherwise, including merchantability or fitness for a particular purpose.

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*Belzona products are
manufactured under an
ISO 9001 Registered
Quality Management System*



Belzona Know-How

FOR REPAIRING LEAKS IN PIPES

VPF-11

Common Problems

Fluid leakage caused by:-

- Mechanical damage.
- Wear due to fretting.
- Erosion-corrosion.
- Frost damage.
- Porosity.

Set-up

All work should be carried out in strict accordance with the relevant Belzona® Instructions For Use.

Belzona® product selection and application technique should be made based upon the time available for the work to be carried out, the system pressure, temperature and consideration of any chemicals present.

a) Low pressure pipe repairs (below 100 psi)

In this case, repairs are possible using a combination of a selected Belzona® material and **Belzona® 9341**.

Isolate and drain the damaged pipe. Where complete drainage is not possible and liquids are flowing from the damaged areas, stem the flow by caulking or peening. Where there is a definite hole, then wooden or metallic bungs should be used.

Alternatively, stem the flow by mixing a fast curing grade of Belzona® and, when semi-cured, force it into the damaged area and hold until the product becomes dimensionally stable. **Belzona® 9611** is specifically designed for this purpose.

Having stopped the flow, prepare the substrate surrounding the damage.

b) High pressure pipe repairs (above 100 psi)

In this case, a Belzona® material is used in conjunction with a suitable reinforcement patch, which should be fabricated from similar material to the damaged substrate.

Preparation

All Substrates

Wash down the area to be repaired with **Belzona® 9111** in order to remove all dirt, grease and surface contaminants.

Roughen the area in the best manner possible, bearing in mind the pipe contents and any restrictions with regard to the use of mechanical tools. As a general rule, the less effective the preparation, the larger the prepared area should be, thus increasing the bond area in order to compensate for lack of prepared surface profile. Following all mechanical preparation, rewash the substrate with **Belzona® 9111**.

Application

Mix the selected Belzona® material in accordance with the Belzona® Instructions For Use.

a) Belzona® Reinforced Repair

Apply a thin layer of Belzona® material to all prepared areas pushing it well into the prepared profile. Wet out a length of **Belzona® 9341** with Belzona® material. The length of the **Belzona® 9341** must be at least twice the pipe circumference. Apply the tape, coated side down, to the repair and wrap firmly around the pipe until the Belzona® product is forced through to the outer surface (fig.1). Apply a further layer of Belzona® product to completely seal the surface.

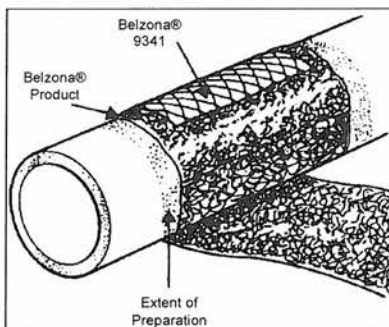


Fig.1

b) Preformed Patch Repair

Apply a thin layer of Belzona® material to all prepared areas including the preformed patch, forming a peak towards the centre (fig. 2). Push the patch into position ensuring minimal air entrapment. Remove excess material immediately (fig.3).

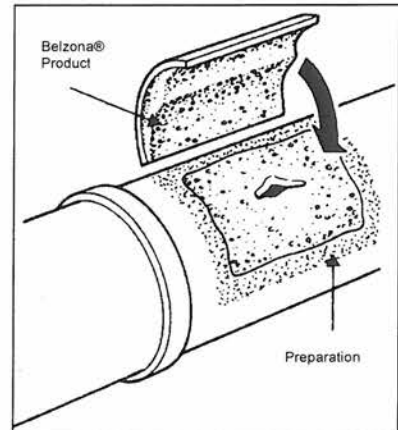


Fig.2

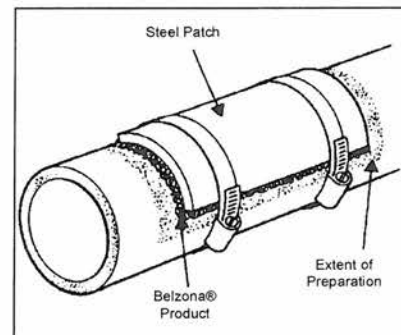


Fig.3

NOTE

Repairs compliant with ASME PCC2 Article 4.1, ISO/TS 24817 and to US DOT requirements can be completed with the **Belzona® SuperWrap** system. For more information contact your Belzona Distributor or visit <http://www.belzona.com/superwrap/>

Belzona® Technical Comparison:

| Product | Consistency | Heat Resistance | Chemical Resistance | Working Life at 60°F (15°C) | Full Mechanical Cure at 60°F (15°C) |
|---------------|-------------|-----------------|---------------------|-----------------------------|-------------------------------------|
| Belzona® 1111 | Paste | High | V.Good | 25 minutes | 30 hours |
| Belzona® 1161 | Paste | Medium | Good | 25 minutes | 36 hours |
| Belzona® 1212 | Paste | Medium | Good | 12 minutes | 10 hours |
| Belzona® 1221 | Paste | Medium | Good | 4 minutes | 90 minutes |
| Belzona® 1251 | Paste | High | Good | N/A | Heat activated 70-150°C |
| Belzona® 4111 | Paste | Medium | V.Good | 45 minutes | 24 hours |
| Belzona® 4301 | Paste | High | Excellent | 35 minutes | 48 hours |

Belzona® System Selector:

| Main System Requirement | Belzona® 1111 | Belzona® 1161 | Belzona® 1212 | Belzona® 1221 | Belzona® 1251 | Belzona® 4111 | Belzona® 4301 |
|---|---------------|---------------|---------------|---------------|---------------|---------------|---------------|
| General repairs | • | | | | | • | |
| Emergency repairs | | | • | • | • | | |
| Repairs requiring maximum chemical resistance | | | | | | | • |
| Surface tolerant repairs | | • | • | | • | | |
| Metallic substrates | • | • | • | • | • | | • |
| Cement substrates | | • | | | | • | • |
| Application to hot surfaces (70-150°C) | | | | | • | | |

Recommended Equipment:

| | | |
|---|--|--|
| Mixing and application tools are included in each pack of Belzona®. Prior to carrying out the repair, however, it is important that all other necessary tools and equipment are available on site. Every situation will be somewhat different, but the basic requirements could include those shown to the right. | <ul style="list-style-type: none"> • Bungs/Plugs • Caulking Materials • Peening Tools • Hammers • Emery Paper • Heat Source • Rigid Patches | <ul style="list-style-type: none"> • Belzona® 9111 • Suitable Protective Clothing/ Equipment • Belzona® 9341 • Files • Grinding Equipment • Belzona 9611 |
|---|--|--|

For more complete technical information, please refer to the appropriate Belzona Product Specification Sheet.
 For detailed instructions on surface preparation, mixing and curing, please refer to the appropriate Belzona Instructions For Use.
 Comprehensive Health and Safety information is provided with the product. For more information, please contact your local Belzona representative.

The technical data contained herein is based on the results of long term tests carried out in our laboratories and to the best of our knowledge is true and accurate on the date of publication. It is however subject to change without prior notice and the user should contact Belzona to verify the technical data is correct before specifying or ordering. No guarantee of accuracy is given or implied. We assume no responsibility for rates of coverage, performance or injury resulting from use. Liability, if any, is limited to the replacement of products. No other warranty or guarantee of any kind is made by Belzona, express or implied, whether statutory, by operation of law or otherwise, including merchantability or fitness for a particular purpose.

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Belzona products are manufactured under an ISO 9001 Registered Quality Management System



Attachment 2: Cost Estimate

Basis of Estimate Report

Pittsburg WTP Piping Rehab and Valve Replacement Project

Introduction

Brown and Caldwell (BC) is pleased to present this opinion of probable construction cost (estimate) prepared for the Pittsburg WTP Piping Rehab and Valve Replacement Project, City of Pittsburg, CA.

Estimated Project Costs

Based on the typical accuracy of a Class 1 estimate, the expected range of costs is:

| Upper Range | Estimated Cost | Lower Range |
|-------------|----------------|-------------|
| + 15 % | | - 10 % |
| \$ 667,000 | \$ 580,000 | \$ 522,000 |

Summary

This Basis of Estimate contains the following information:

- Scope of work
- Background of this estimate
- Class of estimate
- Estimating methodology
- Direct cost development
- Indirect cost development
- Bidding assumptions
- Estimating assumptions
- Estimating exclusions
- Allowances for known but undefined work
- Contractor and other estimate markups

Scope of Work

The scope of work for the project includes:

1. Replace 7 each 16" butterfly valves with pneumatic actuators
2. Replace 4 each 12" butterfly valves
3. 3 each of the 12" butterfly valves have electrical actuators
4. Clean the piping

5. Patch the piping with a Belzona system
6. Coat pipe at patch locations, pipe supports, and flanges
7. Allowance for electrical and instrumentation wiring

Background of this Estimate

The attached estimate of probable construction cost is based on documents dated 7/28/2020, received by the Estimating and Scheduling Group (ESG). These documents are described as 90 percent complete based on the current project progression, additional or updated scope and/or quantities, and ongoing discussions with the project team. Further information can be found in the detailed estimate reports.

Class of Estimate

Design Completion

In accordance with the Association for the Advancement of Cost Engineering International (AACE) criteria, this is a Class 1 estimate. A Class 1 estimate is defined as a Baseline Check Estimate or Final Control Estimate. Typically, engineering is from 50 to 100 percent complete. Class 1 Estimates are used to compare against received bids, evaluate change order requests and for construction claim evaluations and dispute resolution.

Expected accuracy for Class 1 estimates typically range from -10 to +15 percent, depending on the technological complexity of the project, appropriate reference information and the inclusion of an appropriate contingency determination. In unusual circumstances, ranges could exceed those shown.

Estimating Methodology

This estimate was prepared using quantity take-offs, vendor quotes and equipment pricing furnished either by the project team or by the estimator. The estimate includes direct labor costs and anticipated productivity adjustments to labor and equipment. Where possible, estimates for work anticipated to be performed by specialty subcontractors have been identified.

Construction labor crew and equipment hours were calculated from production rates contained in documents and electronic databases published by R.S. Means, Mechanical Contractors Association (MCA), National Electrical Contractors Association (NECA), and Rental Rate Blue Book for Construction Equipment (Blue Book).

This estimate was prepared using BC's estimating system, which consists of Sage Construction and Real Estate 300 estimating software engine (formerly Timberline) using RS Means database, historical project data, the latest vendor and material cost information, and other costs specific to the project location.

Direct Cost Development

Costs associated with the General Provisions and the Special Provisions of the construction documents, which are collectively referred to as Contractor General Conditions (CGC), were based on the estimator's interpretation of the contract documents. The estimates for CGCs are divided into two groups: a time-related group (e.g., field personnel) and non-time-related group (e.g., bonds and insurance). Labor burdens such as health and welfare, vacation, union benefits, payroll taxes, and worker's compensation insurance are included in the labor rates. No trade discounts were considered.

Indirect Cost Development

Local sales tax has been applied to material and equipment rentals. A percentage allowance for contractor's home office expense has been included in the overall rate markups. The rate is standard for this type of heavy construction and is based on typical percentages outlined in Means Heavy Construction Cost Data.

The contractor's cost for builder's risk, general liability and vehicle insurance has been included in this estimate. Based on historical data, this is typically two to four percent of the overall construction contract amount. These indirect costs have been included in this estimate as a percentage of the gross cost and are added after the net markups have been applied to the appropriate items.

Bidding Assumptions

The following bidding assumptions were considered in the development of this estimate.

1. Bidders must hold a valid, current Contractor's credentials, applicable to the type of project.
2. Bidders will develop estimates with a competitive approach to material pricing and labor productivity, and will not include allowances for changes, extra work, unforeseen conditions, or any other unplanned costs.
3. Estimated costs are based on a minimum of four bidders. Actual bid prices may increase for fewer bidders or decrease for a greater number of bidders.
4. Bidders will account for General Provisions and Special Provisions of the contract documents and will perform all work except that which will be performed by traditional specialty subcontractors as identified here:
 - Electrical
 - Pipe Coating
 - Pipe Patching

Estimating Assumptions

As the design progresses through different completion stages, it is customary for the estimator to make assumptions to account for details that may not be evident from the documents. The following assumptions were used in the development of this estimate.

1. Contractor performs the work during normal daylight hours, nominally 7 a.m. to 5 p.m., Monday through Friday, in an 8-hour shift. No allowance has been made for additional shift work or weekend work.
2. Contractor has complete access for lay-down areas and mobile equipment.
3. Equipment rental rates are based on verifiable pricing from the local project area rental yards, Blue Book rates, and/or rates contained in the estimating database.
4. Contractor markup is based on conventionally accepted values that have been adjusted for project-area economic factors.
5. Major equipment costs are based on vendor supplied price quotes obtained by the project design team and/or estimators and on historical pricing of like equipment.
6. Process equipment vendor training using vendors' standard Operations and Maintenance (O&M) material is included in the purchase price of major equipment items where so stated in that quotation.
7. Bulk material quantities are based on manual quantity take-offs.
8. There is enough electrical power to feed the specified equipment. The local power company will supply power and transformers suitable for this facility.

9. The new valves are replace in kind
10. The pipe does not need any additional pipe supports

Estimating Exclusions

The following estimating exclusions were assumed in the development of this estimate.

1. Hazardous materials remediation and/or disposal.
2. O&M costs for the project except for the vendor supplied O&M manuals.
3. Utility agency costs for incoming power modifications.
4. Permits beyond those normally needed for the type of project and project conditions.
5. Impacts from COVID-19 including additional labor and management hours required to meet social distancing, personal protection, and cleaning routines, additional costs of protective equipment, supply chain impacts, and material shortages.

Allowances for Known but Undefined Work

The following allowances were made in the development of this estimate.

1. Electrical and Instrumentation
2. Pipe painting
3. Patching requirements based on photos

Contractor and Other Estimate Markups

Contractor markup is based on conventionally accepted values which have been adjusted for project-area economic factors. Estimate markups are shown in Table 1.

| Table 1. Estimate Markups | |
|---|-----------------|
| Item | Rate (%) |
| Net Cost Markups | |
| Labor (employer payroll burden) | 15 |
| Materials and process equipment | 10 |
| Equipment (construction-related) | 10 |
| Subcontractor | 10 |
| Other - Process Equipment | 8 |
| Sales Tax (State and local for materials, process equipment and construction equipment rentals, etc.) | 8.75 |
| Material Shipping and Handling | 2 |
| Gross Cost Markups | |
| Contractor General Conditions | 15 |
| Start-up, Training and O&M | 2 |
| Construction Contingency | 15 |
| Builders Risk, Liability and Auto Insurance | 2 |
| Performance and Payment Bonds | 1.5 |
| Escalation to Midpoint of Construction | 2.07 |

Labor Markup

The labor rates used in the estimate were derived from RS Means latest national average wage rate tables and city cost indexes. These include base rate paid to the laborer plus fringes. A labor burden factor is applied to these such that the final rates include all employer paid taxes. These taxes are FICA (which covers social security plus Medicare), Workers Comp (which varies based on state, employer experience and history) and unemployment insurance. The result is fully loaded labor rates. In addition to the fully loaded labor rate, an overhead and profit markup is applied at the back end of the estimate. This covers payroll and accounting, estimator's wages, home office rent, advertising and owner profit.

Materials and Process Equipment Markup

This markup consists of the additional cost to the contractor beyond the raw dollar amount for material and process equipment. This includes shop drawing preparation, submittal and/or re-submittal cost, purchasing and scheduling materials and equipment, accounting charges including invoicing and payment, inspection of received goods, receiving, storage, overhead and profit.

Equipment (Construction) Markup

This markup consists of the costs associated with operating the construction equipment used in the project. Most GCs will rent rather than own the equipment and then charge each project for its equipment cost. The equipment rental cost does not include fuel, delivery and pick-up charges, additional insurance requirements on rental equipment, accounting costs related to home office receiving invoices and payment. However, the crew rates used in the estimate do account for the equipment rental cost. Occasionally, larger contractors will have some or all the equipment needed for the job, but to recoup their initial purchasing cost they will charge the project an internal rate for equipment use which is like the rental cost of equipment.

The GC will apply an overhead and profit percentage to each individual piece of equipment whether rented or owned.

Subcontractor Markup

This markup consists of the GC's costs for subcontractors who perform work on the site. This includes costs associated with shop drawings, review of subcontractor's submittals, scheduling of subcontractor work, inspections, processing of payment requests, home office accounting, and overhead and profit on subcontracts.

Sales Tax (Materials, Process Equipment and Construction Equipment)

This is the tax that the contractor must pay according to state and local tax laws. The percentage is applied to both the material and equipment the GC purchases as well as the cost for rental equipment. The percentage is based on the local rates in place at the time the estimate was prepared.

Contractor Startup, Training, and O&M Manuals

This cost markup is often confused with either vendor startup or owner startup. It is the cost the GC incurs on the project beyond the vendor startup and owner startup costs. The GC generally will have project personnel assigned to facilitate the installation, testing, startup and O&M manual preparation for equipment that is put into operation by either the vendor or owner. These project personnel often include an electrician, pipe fitter or millwright, and/or I&E technician. These personnel are not included in the basic crew makeup to install the equipment but are there to assist and troubleshoot the startup and proper running of the equipment. The GC also incurs a cost for startup for such things as consumables (oil, fuel, filters, etc.), startup drawings and schedules, startup meetings and coordination with the plant personnel in other areas of the plant operation.

Builders Risk, Liability, and Vehicle Insurance

This percentage comprises all three items. There are many factors which make up this percentage, including the contractor's track record for claims in each of the categories. Another factor affecting insurance rates has been a dramatic price increase across the country over the past several years due to domestic and foreign influences. Consequently, in the construction industry we have observed a range of 0.5 to 1 percent for Builders Risk Insurance, 1 to 1.25 percent for General Liability Insurance, and 0.85 to 1 percent for Vehicle Insurance. Many factors affect each area of insurance, including project complexity and contractor's requirements and history. Instead of using numbers from a select few contractors, we believe it is more prudent to use a combined 2 percent to better reflect the general costs across the country. Consequently, the actual cost could be higher or lower based on the bidder, region, insurance climate, and the contractor's insurability at the time the project is bid.

Material Shipping and Handling

This can range from 2 to 6 percent, and is based on the type of project, material makeup of the project, and the region and location of the project. Material shipping and handling covers delivery costs from vendors, unloading costs (and in some instances loading and shipment back to vendors for rebuilt equipment), site paperwork, and inspection of materials prior to unloading at the project site. BC typically adjusts this percentage by the amount of materials and whether vendors have included shipping costs in the quotes that were used to prepare the estimate. This cost also includes the GC's cost to obtain local supplies, e.g., oil, gaskets and bolts that may be missing from the equipment or materials shipped.

Escalation to Midpoint for Labor, Materials and Subcontractors

In addition to contingency, it is customary for projects that will be built over several years to include an escalation to midpoint of anticipated construction to account for the future escalation of labor, material and equipment costs beyond values at the time the estimate is prepared. For this project, the anticipated rate of escalation is 4 percent per annum.

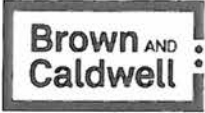
The estimated construction time for this project is 3.9 months, exclusive of unusual weather or site conditions delays. Construction is anticipated to start December 3, 2020 and be completed by April 2021. The escalation factors used in this estimate are calculated from the date of this estimate to the anticipated midpoint of construction which is approximately 6.2 months from the date of this estimate.

Undesigned/Undeveloped Contingency

The contingency factor covers unforeseen conditions, area economic factors, and general project complexity. This contingency is used to account for those factors that cannot be addressed in each of the labor and/or material installation costs. Based on industry standards, completeness of the project documents, project complexity, the current design stage and area factors, construction contingency can range from 10 to 50 percent.

Performance and Payment Bonds

Based on historical and industry data, this can range from 0.75 to 3 percent of the project total. There are several contributing factors including such items as size of the project, regional costs, contractor's historical record on similar projects, complexity, and current bonding limits. BC uses 1.5 percent for bonds, which we have determined to be reasonable for most heavy construction projects.



Estimate Summary Report

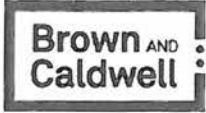
7/30/2020 6:08 AM

Project Number: 155191-002-201
Estimate Issue Number: 1
Estimate Date: 03Jul2020
Lead Estimator: Breeze Walter

Filter Gallery Piping

City of Pittsburg CA
Filter Gallery Piping
90% Design

| | |
|--------------------|-----------------------|
| Estimator | Breeze Walter |
| BC Project Manager | Bernadette Visitation |
| BC Office | Walnut Creek |
| Est Version Number | 1 |
| QA/QC Reviewer | William Agster |
| BC Project Number | 155191-002-201 |

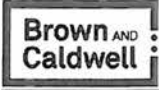


Estimate Summary Report

7/30/2020 6:08 AM
Project Number: 155191-002-201
Estimate Issue Number: 1
Estimate Date: 03Jul2020
Lead Estimator: Breeze Walter

Filter Gallery Piping

| Description | Gross Total Cost with Markups |
|---|----------------------------------|
| 01 Total | |
| 04 Rehab WWTP | |
| 01 Valve Replcement for Filter 5, 6, 7, 8 | |
| 02228 Selective Demolition - Valves | 23,477 |
| 26001 Electrical and Instrumentation (FACTORED) | 44,361 |
| 40160 New Valves | 201,280 |
| 01 Valve Replcement for Filter 5, 6, 7, 8 | 269,118 |
| 02 Pipe Spot Repair for Filters 1 though 8 | |
| 04999 Pipe Cleaning | 12,349 |
| 05999 Pipe Patching by Belzona | 289,930 |
| 09912 Pipe Coatings | 8,584 |
| 02 Pipe Spot Repair for Filters 1 though 8 | 310,863 |
| 04 Rehab WWTP | 579,981 |
| 01 Total | 579,981 |



Estimate Detail Report

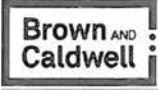
7/30/2020 6:09 AM

Project Number: 155191-002-201
Estimate Issue: 1
Due Date: 03 Jul 2020
Estimator: Breeze Walter

Filter Gallery Piping

**City of Pittsburg CA
Filter Gallery Piping
90% Design**

| | |
|--------------------|-----------------------|
| Estimator | Breeze Walter |
| BC Project Manager | Bernadette Visitacion |
| BC Office | Walnut Creek |
| Est Version Number | 1 |
| QA/QC Reviewer | William Agster |



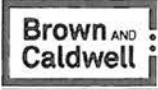
Estimate Detail Report

7/30/2020 6:09 AM

Project Number: 155191-002-201
 Estimate Issue: 1
 Due Date: 03Jul2020
 Estimator: Breeze Walter

Filter Gallery Piping

| Phase | Item | Description | Quantity | Labor Amount | Material Amount | Equip Amount | Sub Amount | Other Amount | Total Cost/Unit | Total Net Amount |
|---|-------------------|---|---------------|---------------|-----------------|--------------|---------------|--------------|-----------------------|------------------|
| 01 Total | | | | | | | | | | |
| 04 Rehab WWTP | | | | | | | | | | |
| 01 Valve Replacement for Filter 5, 6, 7, 8 | | | | | | | | | | |
| 02228 Selective Demolition - Valves | | | | | | | | | | |
| 02-41-19.20 | 0100 | Selective demolition, dump charges, typical urban city, building construction materials, includes tipping fees only | 1.0 ton | - | 86 | - | - | - | 85.62 /ton | 86 |
| 02-42-10.10 | 0310 | Steel pipe disposal savings, unit cost credit, excludes handling, packaging, or disposal costs | 2,000.0 lb | - | - | - | 60 | - | 0.03 /lb | 60 |
| 22-05-05.10 | 9130 | Valves, strainers and similar, metal, 8" thru 14" diameter, selective demolition | 4.0 ea | 1,777 | - | - | - | - | 444.33 /ea | 1,777 |
| 22-05-05.10 | 9140 | Valves, strainers and similar, metal, 16" thru 20" diameter, selective demolition | 7.0 ea | 12,441 | - | - | - | - | 1,777.31 /ea | 12,441 |
| | | Selective Demolition - Valves | 1.0 LS | 14,218 | 86 | | 60 | | 14,364.08 /LS | 14,364 |
| 26001 Electrical and Instrumentation (FACTORED) | | | | | | | | | | |
| 26-00-00.02 | FACTOR ED | Electrical (This is based on a percentage of the Total Project Costs) | 1.0 LS | - | - | - | 20,000 | - | 20,000.00 /LS | 20,000 |
| 27-20-00.01 | FACTOR ED | Instrumentation (This is based on a percentage of the Total Project Costs) | 1.0 LS | - | - | - | 8,000 | - | 8,000.00 /LS | 8,000 |
| | | Electrical and Instrumentation (FACTORED) | 1.0 LS | | | | 28,000 | | 28,000.00 /LS | 28,000 |
| 40160 New Valves | | | | | | | | | | |
| 40-05-64.00 | A206434 016200 | Valve Flanged & Bolted-Cast Steel-Butterfly-Cls 150 (PN20) 16 Inch (400mm) | 7.0 ea | - | 61,470 | - | 0 | - | 8,781.42 /ea | 61,470 |
| 40-05-64.00 | A186434 016200 | Valve Flanged & Bolted-Cast Steel-Butterfly-Cls 150 (PN20) 12 Inch (300mm) | 3.0 ea | - | 43,344 | - | 0 | - | 14,448.10 /ea | 43,344 |
| 40-05-51.00 | L204062 006200 | Pipe Erection-Handle Valves-Metal-Cls 150 (PN20) 16 Inch (400mm) Pnumatic | 7.0 ea | 3,413 | - | 2,333 | - | - | 820.89 /ea | 5,746 |
| 40-05-51.00 | L184062 006200 | Pipe Erection-Handle Valves-Metal-Cls 150 (PN20) 12 Inch (300mm) Electric | 1.0 ea | 465 | - | 1,000 | - | - | 1,465.43 /ea | 1,465 |
| 40-05-05.00 | A183400 006200 | Make Up Bolted Joint incl B-7 Nuts, Bolts, 1/16 Inch Rubber Gasket-Cls 150 (PN20) 12 Inch (300mm) | 14.0 ea | 1,243 | 1,697 | - | - | - | 210.01 /ea | 2,940 |
| 40-05-05.00 | A203400 006200 | Make Up Bolted Joint incl B-7 Nuts, Bolts, 1/16 Inch Rubber Gasket-Cls 150 (PN20) 16 Inch (400mm) | 8.0 ea | 1,093 | 1,835 | - | - | - | 365.92 /ea | 2,927 |
| 40-05-05.00 | L189048 000000 | Field Testing-Hydotest-Non-Specific 12 Inch (300mm) | 8.0 lf | 170 | - | - | - | - | 21.31 /lf | 170 |
| 40-05-05.00 | L209048 000000 | Field Testing-Hydotest-Non-Specific 16 Inch (400mm) | 8.0 lf | 262 | - | - | - | - | 32.78 /lf | 262 |
| 40-05-64.00 | A186434 016200 | Valve Flanged & Bolted-Cast Steel-Butterfly-Cls 150 (PN20) 12 Inch (300mm) No Acuator | 1.0 ea | - | 1,084 | - | - | - | 1,084.30 /ea | 1,084 |
| | | New Valves | 1.0 lf | 6,646 | 109,431 | 3,333 | | | 119,410.40 /lf | 119,410 |
| | | 01 Valve Replacement for Filter 5, 6, 7, 8 | | 20,865 | 109,516 | 3,333 | 28,060 | | | 161,774 |
| 02 Pipe Spot Repair for Filters 1 through 8 | | | | | | | | | | |
| 04999 Pipe Cleaning | | | | | | | | | | |



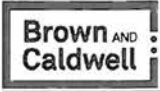
Estimate Detail Report

7/30/2020 6:09 AM

Project Number: 155191-002-201
 Estimate Issue: 1
 Due Date: 03 Jul 2020
 Estimator: Breeze Walter

Filter Gallery Piping

| Phase | Item | Description | Quantity | Labor Amount | Material Amount | Equip Amount | Sub Amount | Other Amount | Total Cost/Unit | Total Net Amount |
|---------------------------------------|---------|--|-------------------|--------------|-----------------|--------------|----------------|--------------|-----------------------|------------------|
| 04999 Pipe Cleaning | | | | | | | | | | |
| 04-01-30.20 | 0320 | Cleaning,heavy restoration,heavy soil,biological and mineral staining,paint,chemical,high pressure wash,brush and rinse,excludes scaffolding | 1,000.0 sf | 7,298 | 249 | - | - | - | 7.55 /sf | 7,547 |
| | | Pipe Cleaning | 1,000.0 sf | 7,298 | 249 | | | | 7.55 /sf | 7,547 |
| 05999 Pipe Patching by Belzona | | | | | | | | | | |
| 05-01-00.00 | ---- | Pipe Patching by Belzona | 3,660.0 sq in | | | | 183,000 | | 50.00 /sq in | 183,000 |
| | | Pipe Patching by Belzona | 1.0 LS | | | | 183,000 | | 183,000.00 /LS | 183,000 |
| 09912 Pipe Coatings | | | | | | | | | | |
| 09-91-06.41 | BC-0041 | Coatings & paints, B & C coating system E-6 (Epoxy, tanks, reservoirs, NSF-61) | 1,000.0 sqft | 1,241 | 3,875 | - | - | - | 5.12 /sqft | 5,116 |
| | | Pipe Coatings | 1,000.0 sf | 1,241 | 3,875 | | | | 5.12 /sf | 5,116 |
| | | 02 Pipe Spot Repair for Filters 1 through 8 | | 8,540 | 4,124 | | 183,000 | | | 195,664 |
| | | 04 Rehab WWTP | | 29,404 | 113,640 | 3,333 | 211,060 | | | 357,438 |
| | | 01 Total | | 29,404 | 113,640 | 3,333 | 211,060 | | | 357,438 |



Estimate Detail Report

7/30/2020 6:09 AM

Project Number: 155191-002-201
 Estimate Issue: 1
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 Estimator: Breeze Walter

Filter Gallery Piping

Estimate Totals

| Description | Rate | Hours | Amount | Totals |
|--------------------------------|---------|---------|---------|----------------|
| Labor | | 220 hrs | 29,404 | |
| Material | | | 113,640 | |
| Subcontract | | | 211,060 | |
| Equipment | | 50 hrs | 3,333 | |
| Other | | | | |
| | | | 357,437 | 357,437 |
| Labor Mark-up | 15.00 % | | 4,411 | |
| Material Mark-up | 10.00 % | | 11,364 | |
| Subcontractor Mark-up | 10.00 % | | 21,106 | |
| Construction Equipment Mark-up | 10.00 % | | 333 | |
| Other - Process Equip Mark-up | 8.00 % | | | |
| | | | 37,214 | 394,651 |
| Material Shipping & Handling | 2.00 % | | 2,273 | |
| Material Sales Tax | 8.75 % | | 9,944 | |
| Other - Process Eqp Sales Tax | 8.75 % | | | |
| Net Markups | | | 12,217 | 406,868 |
| Contractor General Conditions | 15.00 % | | 61,030 | |
| | | | 61,030 | 467,898 |
| Start-Up, Training, O&M | 2.00 % | | 9,358 | |
| | | | 9,358 | 477,256 |
| Undesign/Undevelop Contingency | 15.00 % | | 71,588 | |
| | | | 71,588 | 548,844 |
| Bldg Risk, Liability Auto Ins | 2.00 % | | 10,977 | |
| | | | 10,977 | 559,821 |
| Payment and Performance Bonds | 1.50 % | | 8,397 | |
| | | | 8,397 | 568,218 |
| Escalation to Midpoint (ALL) | 2.07 % | | 11,762 | |
| Gross Markups | | | 11,762 | 579,980 |
| Total | | | | 579,980 |