STUDY AND RIGGING PLAN
REPORT
CONVEYOR CV-02
STRUCTURAL UPGRADE

Prepared for
Mine/Plant Site
GOLDCORP PROYECTO PEÑASQUITO
MAZAPIL, ZACATECAS, MEXICO

&

Owner/Developer
GOLDCORP INC.
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By
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<table>
<thead>
<tr>
<th>Section</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Introduction &amp; Background, Purpose of Study &amp; Report</td>
</tr>
<tr>
<td>2</td>
<td>Preliminary Study Concepts, Advantages &amp; Disadvantages for the Concepts &amp; Conclusion</td>
</tr>
<tr>
<td>3</td>
<td>Photo Exhibit with Annotations</td>
</tr>
<tr>
<td>4</td>
<td>Concept B &amp; Detailed Undercarriage Removal Procedures</td>
</tr>
<tr>
<td>5</td>
<td>Concept B &amp; Detailed Undercarriage Replacement Procedures</td>
</tr>
<tr>
<td>6</td>
<td>Concept B, Study &amp; Rigging Plans &amp; Reference Drawing</td>
</tr>
<tr>
<td>7</td>
<td>New Undercarriage Structural Fabrication Drawings and Weights</td>
</tr>
<tr>
<td>8</td>
<td>Proposed Major Equipment Required</td>
</tr>
<tr>
<td>9</td>
<td>Solid Works Modeling Results and Target Lifting Loads</td>
</tr>
<tr>
<td>10</td>
<td>Specifications, Design &amp; Construction Notes to be Applied to the Work</td>
</tr>
</tbody>
</table>
SECTION 1
INTRODUCTION & BACKGROUND, PURPOSE OF STUDY & REPORT
1.0 INTRODUCTION AND BACKGROUND

Engineered Conveyor Systems (ECS) work over the years, includes the design furnish and construction, as well as the planning, evaluation and upgrade of damaged material handling system of most kinds. ECS has been retained by Goldcorp to study, evaluate and report on the implications within Zones 1, 2, 3 and 4 (See ECS Drawing PEN 100-20-02-001 Rev C) of the impact of damage on the Existing Structure on Conveyor CV-02. It is essential to note that the CV-02, has sustained significant damage, during its use, and that a temporary repair has been installed, on the bottom forward strut in Zones 1 and 2.

A survey of the existing structure has provided elevations and alignment co-ordinates of the CV-02 structure as it presently exists.

This temporary repair has allowed the mine to operate for some period of time, until a scheduled down-time, when the structure could be repaired and a more detailed study and rigging plan could be developed. In anticipation of the repair, the operations and maintenance group at the mine site, has ordered and has on hand at the mine site the anticipated primary new steel fabricated structural members for replacement into the structure.

Skilled study and planning of the repair activities is vital to the safety and success of this retrofit project. These activities are, by nature potentially high risk. The damaged condition of the CV-02 structure and the heights of the repairs and the unloading and loading of the structure, and the insertion of the new components, all combine to make this operation a **very high risk operation**.

Competent supervision, personnel of all types and equipment and materials of all types is essential. The degree of planning and care involved and applied should be applied according to the complexity of the task. The timing is estimated to take a relatively short time (1 to 3 weeks), but for a somewhat complex operation, it will need to include at a minimum the following:

- An assessment of the risks involved in the operations
- A methods statement to ensure that a system of work is in place to make sure that all lift operations are carried out safely.
- Drawings illustrating the engineers intent is relayed in sufficient detail to all those who will conduct and complete the work.
- Special procedures in the form of written instructions.
- Reference data, manufacturer’s assembly instructions, shop fabrication details, Weights, capacity charts, model results and such calculations as required.
• Review and approval of intent, by equipment operators, riggers, ironworkers, and all site and safety personnel.

1.1 PURPOSE OF STUDY AND REPORT

A rigging plan for this project commenced with a study, of which the drawings are a very critical part. Reasons for the preparation of the drawings.

• Investigation
• Information

The drawings are intended to investigate the practicality of the concepts of which may be the most important, the implications of the proposed methods and to verify details and interfaces. Technical data such as capacity charts, loads and weights, centers of gravity as placed on the drawings, allow all personnel to arrive at an informed conclusion. These are the primary working tools, and will demonstrate practicality or impracticality of the approaches and be revised. The drawings included in the report, have been revised several times and are issued, as somewhere between Category 2— (Detailed Feasibility study) and Category 3 — (Detailed Working Drawing) which would be issued for construction. What is required to complete the Study and Rigging Report, is for the Mine job site to review and redline any information that would be necessary to relay to any workers or subcontractors in the field ALL information to properly execute the planned lifts.
SECTION 3
PHOTO EXHIBIT WITH ANNOTATIONS
Client: MINERA PEÑASQUITO
Project: STACKER CONVEYOR 100-CV-002
Date of Report: January 14 2016

MOVE NEW STRUTS AND HARDWARE TO STAGING AREA

CHECK ALL BOLTED CONNECTIONS FOR COMPLETENESS AND DIMENSIONALLY

NEW PINS REQUIRED AT ALL CONNECTION POINTS

MOVE ALL STRUTS AND HARDWARE TO STAGING AREA

CHECK ALL BOLTED CONNECTIONS STRUCTURALLY AND DIMENSIONALLY

NEW PINS REQUIRED

SPlice PLATES AND BOLTS REQUIRED
Client: MINERA PEÑASQUITO
Project: STACKER CONVEYOR 100-CV-002
Date of Report: January 14 2016

REMOVE CROSSOVER, WALKWAYS, HANDRAIL AND LIGHT STANDARDS. INSTALL LIFTING BRACKETS TO HEAD TRUSS (ITEMS 13, 14 AND 15)

PILE REMOVED IN WORK AREA
SEE DRAWING PEN100-40-01-001&002

REMOVE DEBRIS FROM TOP OF BENT FOOTING AND ALL STRUTS AND TRUSSES IN ZONES 1, 2 AND 3
REMOVE DEBRIS BY HAND AND AIR BLAST STRUCTURE FROM TOP OF BENT FOOTING AND ALL STRUTS AND TRUSSES IN ZONES 1, 2, AND 3
COMPLETE DEBRIS REMOVAL BY HAND FROM TOP OF BENT FOOTING, ALL STRUTS AND TRUSSES IN ZONES 1, 2 AND 3 AND AIR BLAST STRUCTURE

REMOVE CROSSEOVER WALKWAY, WALKWAY, LIGHTS AND HANDRAIL FROM HEAD SECTION

REMOVE DEBRIS BY HAND AND AIR BLAST STRUCTURE
INSTALL CHAIN HOIST
SEE ITEM 23 OF
REMOVAL PROCEDURE
REMOVE DEBRIS BY HAND
FROM TOP OF BENT FOOTING AND
ALL STRUTS AND TRUSSES IN
ZONES 1, 2 AND 3 AND AIR BLAST
STRUCTURES

REMOVE FIX
KIT CABLES
NS & FS
SECTION 4
CONCEPT B & DETAILED UNDERCARRIAGE REMOVAL PROCEDURES
CONVEYOR CV-02 REPAIR

Preparations for Structural under carriage removal

1. GENERAL ITEMS

1.1. Fabricate all lifting frames brackets and pins.

1.2. Purchase cable slings and clevises.

1.3. Have all of the cranes and man lifts delivered to the job site.

1.4. Confirm that all new bolts and pins required have been delivered. Check the new struts dimensionally and make sure all ears and pins will mate up to the existing truss and bents.

1.5. Empty the belt and shut down the conveyor system (lock out tag out) lift and secure GTU counter weight to relieve tension from belt. See Superior Drawing. H450-0600.

1.5.1. Clean the truss, support struts, redundants and Pilings of all built up material.

1.5.2. Inspect truss (by qualified personnel) for any damage, stress cracks, deformed members, etc. zone 1, 2, 3 & 4. Inspect main vertical support bents as well.

1.6. Remove ore stock pile in designated work area to a level (elevation 1918.073 to be confirmed) and stable work surface. (See drawing PEN100-40-01-002.)

1.6.1. Compact with vibratory roller CAT CS CP64 (or equal) – min 12 passes over entire work area. (2’ overlap)

1.7. Establish where the cranes will be positioned; check ground compaction and install support mats as required for the crane out riggers.

1.7.1. Suggest use of Dynamic Cone Penetrometer Humbolt H-4218D (See Attached Humbolt spec.)
1.7.2. For support mats, ECS Suggests use of Mirafi RS580i for support mats. (See Attached Mirafi spec.)

1.8. Set up lay down area for the old struts to be placed as they are removed.

1.9. Position the new struts in an area close to the work area for easy access as needed. Check lifting center of gravity and install lifting eyes and or spreader beams for proper balance of each piece being installed.

1.10. Check that all tools to finish the task are available. HD service truck complete with hand tools, welders, air compressors, grinders, fall protection equipment, safety tape, barriers, torches, lighting, etc.
CONVEYOR CV-02 REPAIR

Detailed Procedure for Structural under carriage removal – Concept “B”

2. DETAILED PROCEDURE

2.1. Position primary crane (Grove GMK 7550) at approx. 70’ from the center line of the conveyor and about 28’ back from the head pulley. (See drawing PEN100-40-01-002)  
(Need fuel for 8 days)

2.2. Install wind lateral stability cables on each side of the conveyor at the head frame to stabilize the head side to side. Attach cables from head section to an anchor (D8 cat or similar) on each side of the conveyor, approx. 200’ min. of ¾” cable required for each side. (See drawing PEN100-40-01-005)

2.3. Remove cross over walkway that is located near the head pulley from conveyor.

2.3.1. For safety, but could be optional.

2.4. Install the new lifting brackets that are to be welded to the head truss. See Drawing ECS PEN 100-40-01-004.

2.5. Remove walkway, handrail and light standards from both sides of the conveyor at the head section that is located overhead of the pins holding the front strut to the truss.

2.6. Install lifting spreader beams to underside of front strut using the lift points established on the new struts for balance positioning. See drawing PEN100-40-01-001

2.7. Install lifting spreader beams on the vertical strut and the horizontal strut in the same manner as the front strut. See drawing PEN100-40-01-001

2.8. Attach main lifting frame to the primary crane and attach to the head frame of the truss. This crane will remain in place holding the load while removing the damaged supports
and replacing all of the damaged parts with the new support parts. See drawing PEN100-40-01-002

2.9. Attach secondary cranes (Grove RT 880E) to spreader beams on each side of the upper front strut (picking Point 2) that is to be removed. Position cranes as shown on ECS Drawing PEN100-40-01-004 for pick point 2.

2.10. Position man lifts (JLG 1850SJ) one each side to access the pins at the top of the front strut.

2.11. Apply lift to the head of the truss (Picking Point 1) with the primary crane until the pins at the truss and the front strut can be removed. (Reference drawing PEN100-40-01-001)

2.11.1. See section 9 for comments on target lift force and precautions.

2.12. Unbolt the splice plates on the front strut and remove the upper portion of the strut. (Use JLG 1850SJ for access) See drawing ECS PEN 100-40-01-001 for splice plate location.

2.13. Prepare to remove the lower half of the front strut by installing a chain hoist near the head of the horizontal strut in order to hold the horizontal strut in place while removing the pins to release the lower half of the front strut. Remove all of the pins as well as the existing temporary “fix kit” cable support system making sure the secondary cranes have the complete load of the front strut and lower the strut to the ground. Use two JLG 1850 SJ to access pins. See drawing ECS PEN 100-40-01-001 for horizontal strut location.

2.14. Attach the secondary cranes to the horizontal strut spreader beams, then remove the pins and the chain hoists and lower the strut to the ground. Use two JLG 1850 SJ to access pins and chain hoists.

2.15. Attach the secondary cranes to the vertical strut spreader beam, remove the pins and lower to the ground. Use two JLG 1850 SJ to access pins.
CONVEYOR CV-02 REPAIR

Alternate Procedures & Concepts for Structural under carriage removal

3. ALTERNATE PROCEDURES & CONCEPTS – SPECIALIZED CONTRACTORS APPROACH

3.1. Alternate 1 - Consideration of lowering the complete front strut was analyzed as a possibility.

3.1.1. Load wise it was a possibility but due to size and safety concerns it was deemed a better option to do in two stages.

3.2. –

3.3. –

3.4. –

3.5. –
SECTION 5
CONCEPT B & DETAILED UNDERCARRIAGE REPLACEMENT PROCEDURES
CONVEYOR CV-02 REPAIR

Erection sequence - Erection sequence for replacing existing steel for stacker under carriage

4. Erection sequence

4.1. Primary Crane still in holding sequence – Operator on Board.

4.2. Attach both secondary cranes to spreader beams on each side of the conveyor, lift and install the new vertical strut using new pins to attach to the truss. Release the secondary cranes after pins have been installed.

4.3. Attach both secondary cranes to spreader beams on each side of the horizontal strut, lift into place and install pins. Balance the strut to be in the horizontal position. Lift into position and install new pins at the main support bent. Lift the head end of the strut and support with two chain hoist attached to the truss above. Release the secondary cranes.

4.4. Rig and lift the lower half of the front strut. Balance at the approximate installed angle. Lift into position and install new pins at the main support bent and at the vertical strut. Lower the horizontal strut with the chain hoist until the pins can be installed into the front strut. Release the secondary cranes.

4.5. Rig and lift the upper half of the front strut. Splice plates to be loosely attached to front strut for ease of connections. Balance at the approximate installed angle. Lift into position and install all new bolts at the splice between the upper and lower front strut sections and tighten. Install new pins at the head end of the front strut. Release secondary cranes.

4.6. Carefully ease stacker into new Bent support system and remove primary crane and rigging. Reinstall walkways both sides of conveyor and cross over walkway.

4.7. Inspect all connections by qualified personnel.
CONVEYOR CV-02 REPAIR

Pre Start-up - Erection sequence for replacing existing steel for stacker under carriage

5. PRE START-UP CHECK LIST

5.1. Remove all damaged structural steel to designated bone yard.

5.2. Replace crossover and walkways.

5.3. Leave head frame lifting steel installed on truss.

5.3.1. Clean prime and paint all welds.

5.4. Check off all items on ECS Drawing PEN100-40-70-002 Specifications 1.0 thru 10.6

5.5. Remove counter weight from elevated position in drive tower and place counter weight on belt at the G.T.U.

5.6. Remove cranes from work area. Keep man lifts in work area for start-up and keep on stand by for 4-6 hours after start-up.

5.7. Use Goldcorp operations personnel to do standard start-up procedures.

5.7.1. Recommend empty Run-in on conveyor belt of 12 – 24 hours before applying material.
SECTION 9
SOLID WORKS MODELING RESULTS AND TARGET LIFTING LOADS
Solid works modeling results & Target Lifting Loads

The objective of this section is to provide motion studies of the eight key points as shown on our drawing PEN100-20-02-001 REVC & to prove target lift loads for pick points 1 & 2.

See the following Key and Descriptions of Pin Boundary conditions & loading sequence.

Note: You will need the latest adobe flash player to view the videos in this section.

We will be sending an addendum to this section.

Index to the information from solid works:

MOTION ABOUT POINT 1

Video file name = p1 s5
- Force start * (4) = 7500
- Force graduated * 4 = 3000
- Number of graduations = 10
- Total lifting force = 90 kips
- Pin 1 is removed

Charts shown in motion study are:
- Plot 60 (motion about plot on strut)
- Plot 59 (motion about plot on truss)
5" PIN REMOVED

SOME OSCILLATION OF BOTH MEMBERS

TRACE PATTERN

LOAD TRANSFER

20 K HOLDON
MAIN CRANE
5 K AT 4 LOCATIONS

SCALE 4" = 1'0"
STUDY AND RIGGING PLAN

REPORT

CONVEYOR CV-02 REPAIR

ADDENDUM 2 - ADDITIONAL DRAWINGS FOR USE WITH ORIGINAL REPORT AND ADDENDUM 1

Prepared for

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&

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