

**A CONSTRUCTION PHASE**

# **Digital Twin of the OTML Crusher Replacement Project Construction**

**A Photographic Presentation of Survey Works by  
Arman Larmer Surveys Limited, 2019 - 2020**



Presented by:

**Raymond Bure**

Strident7 Mapping

57th Annual ASPNG Congress

Lamana Hotel, Port Moresby

15-17 October 2025

# INTRODUCTION

1. Overview
2. Before Construction Works
3. Design and Digital Twin
4. Construction Works
5. Full Operations

# 1. Overview

- ALSL engaged by OTML Special Projects – 14 June 2019
- Max of 12 personnel on site (back-to-back roster)
- Covid-19 lockdown for 3 months
- New Crusher commissioned – 10 December 2020

## 2. Before Construction Works



# Topographic Surveys

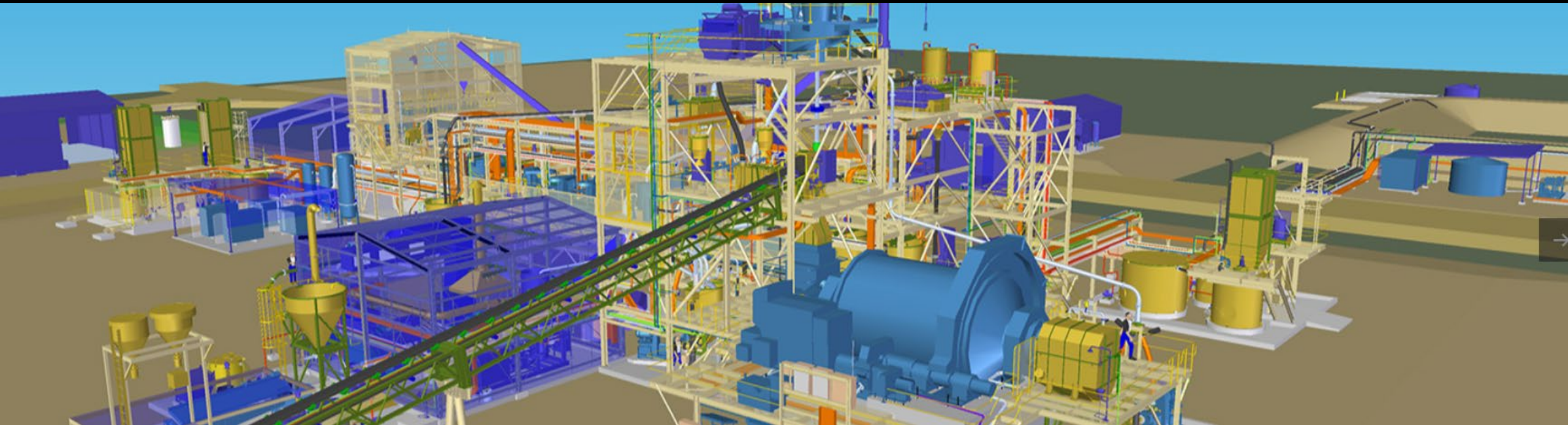
Aerial Photogrammetry



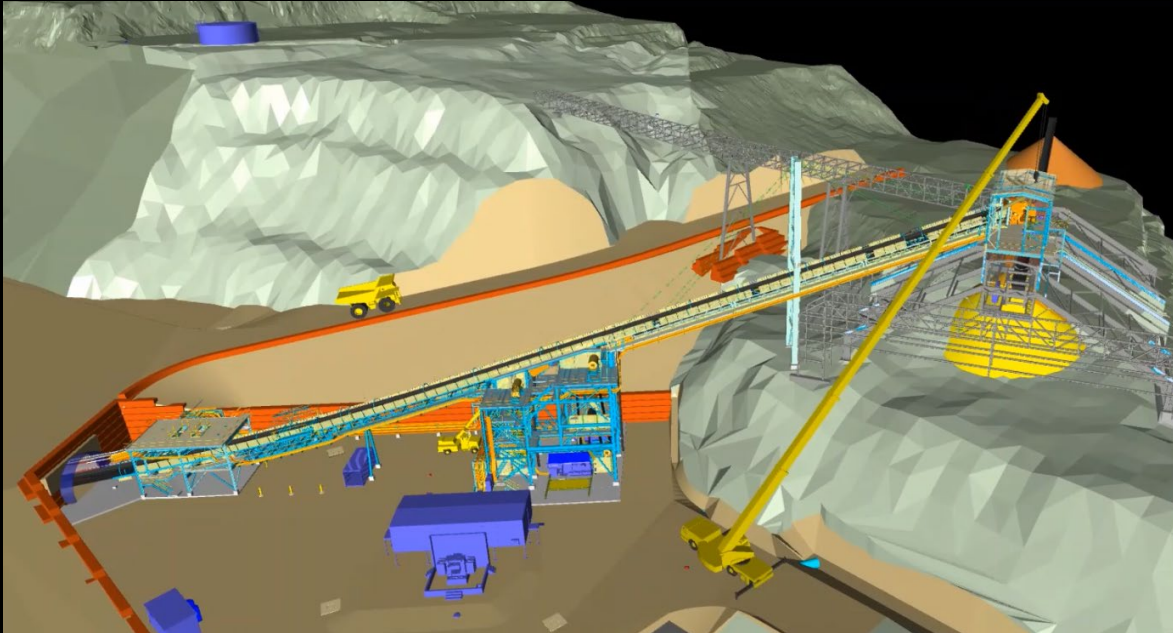
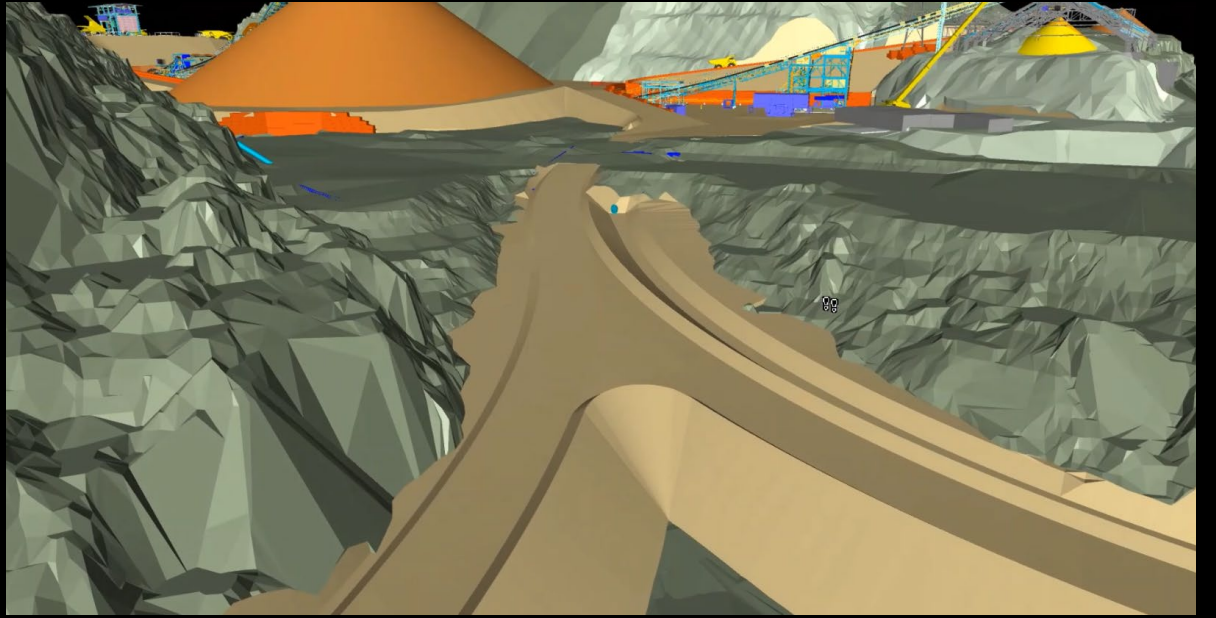
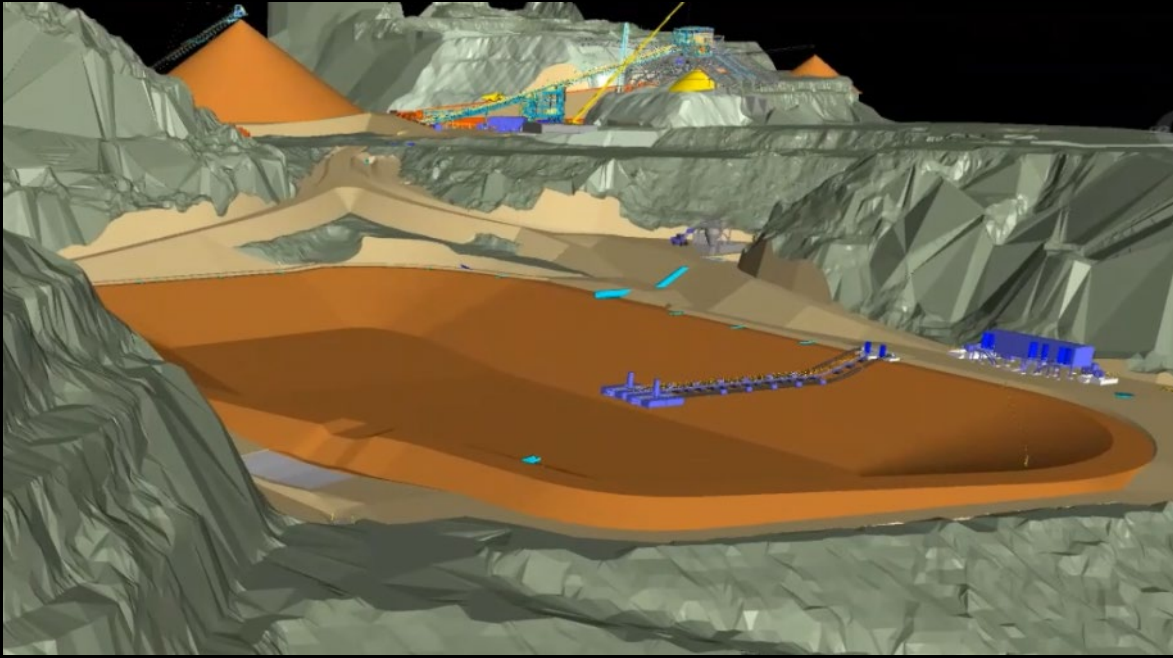


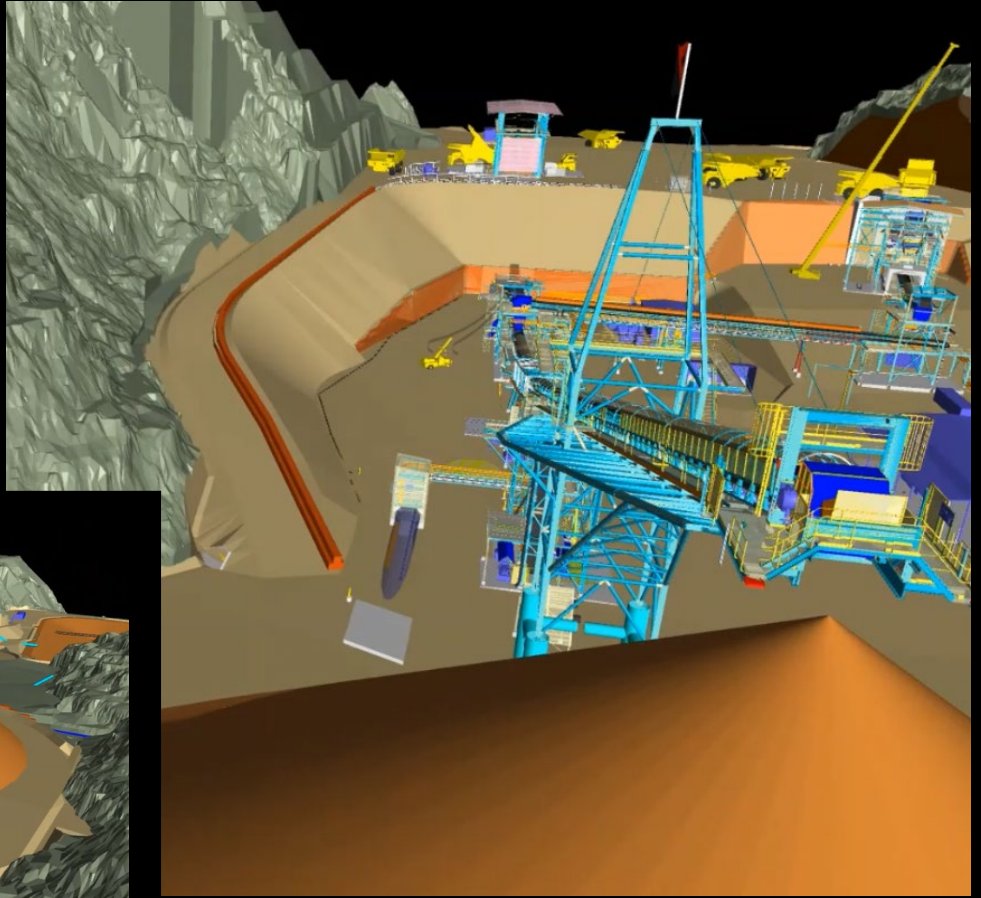
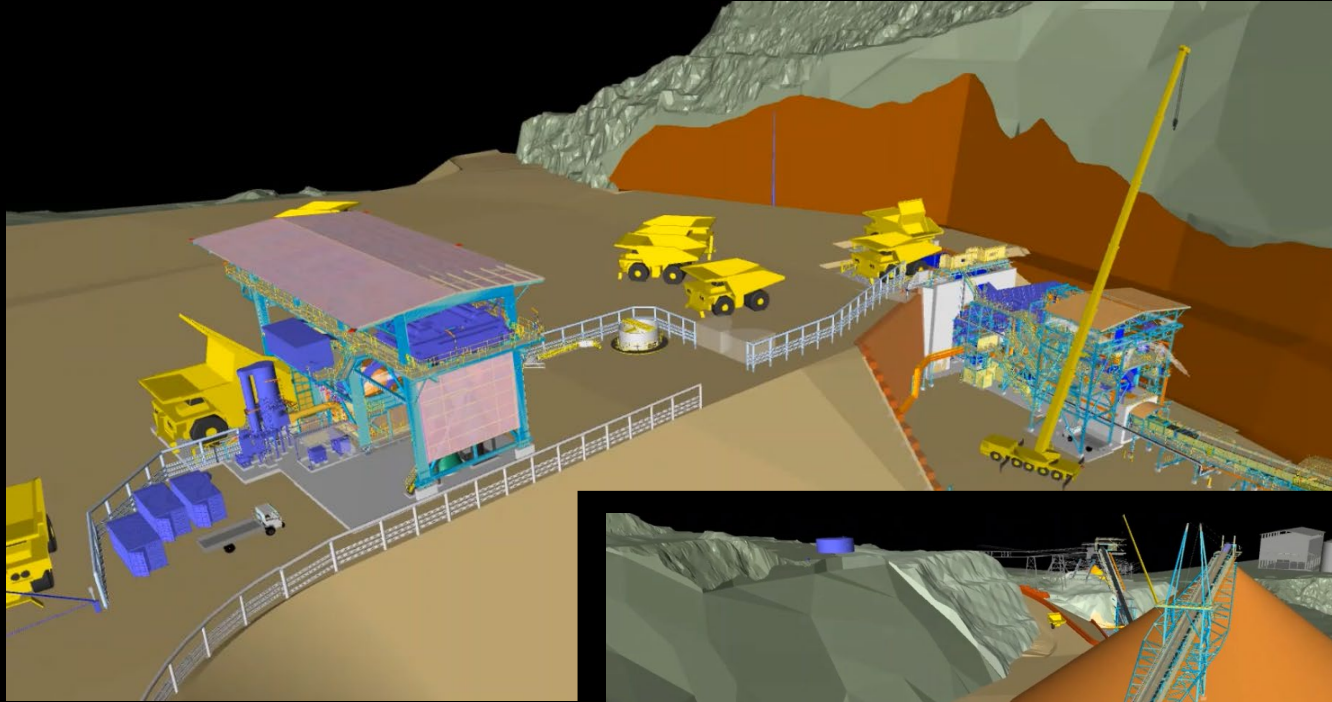
# 3. Design and Digital Twin

## BIM Asset Design



Mipac Australia – operational technology and control systems  
AVEVA Group (UK) – information technology consultant





# Site Preparation - Clearing and Earthworks



# 4. Construction Works





**Tunnel**

**Cantilever**

**Truss**

**Screening**

**Plant**

**Dump**

**Hopper**

**Reclaim Chamber**

**Takeup & Drive**

**Belt Reel Station**

**Transfer Station**

**Tunnel**

**Crusher**



GR Engineering Services  
& other Contractors

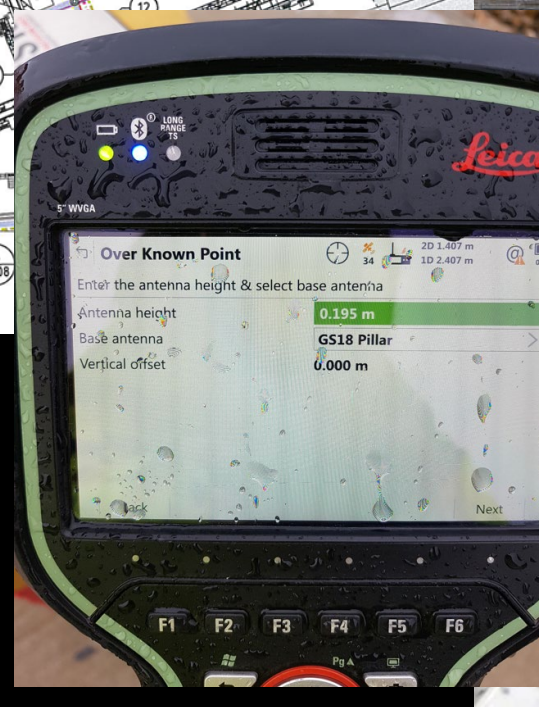






# As-built Surveys for QA/QC





• GC18 GNSS

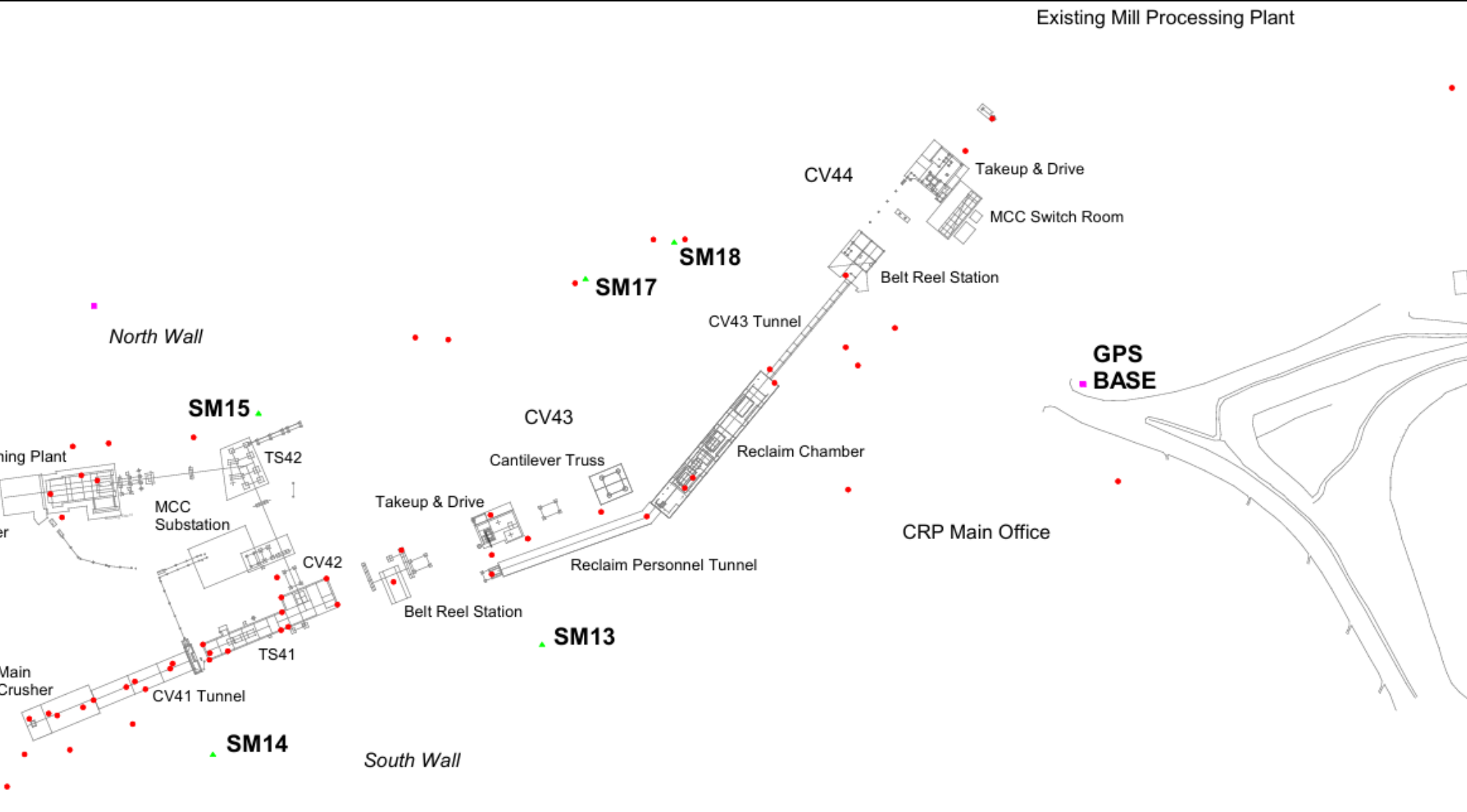
submit your markups to [omr@redy.com.au](mailto:omr@redy.com.au)

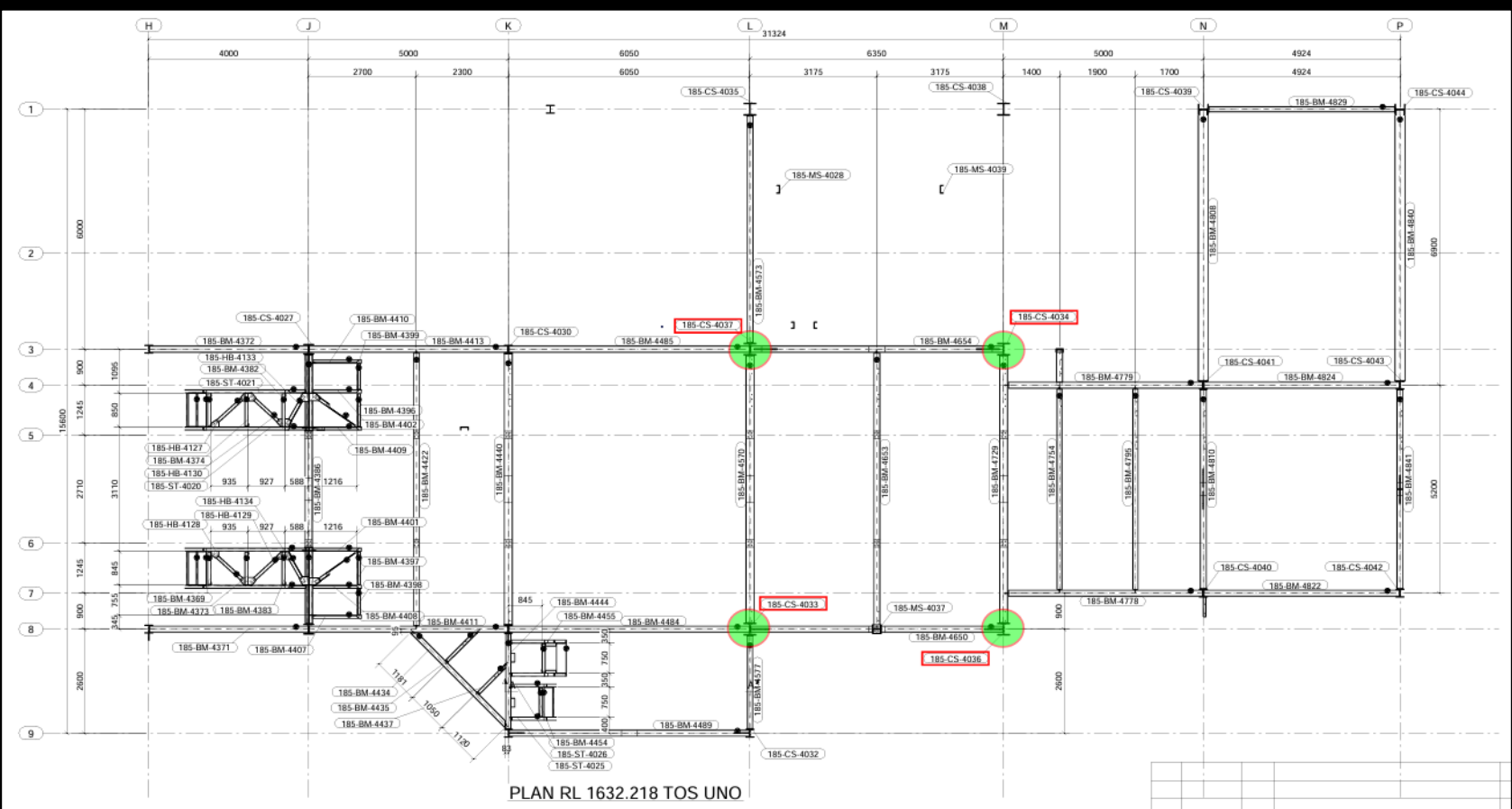
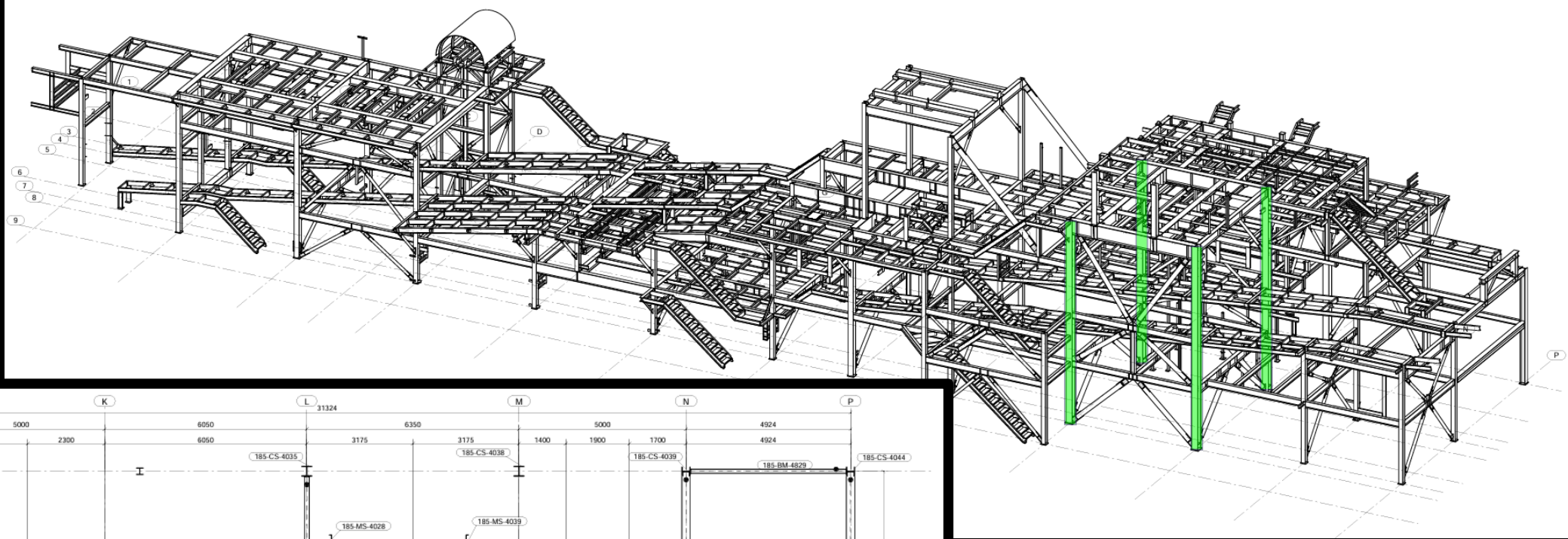


- MS60 Multistation
- Automatic Level

# Project Survey Control

## Azimuth / Position fix by Resection





Stockpile Feed Conveying Transfer Station (TS 41)

# As-built Surveys (QA/QC)

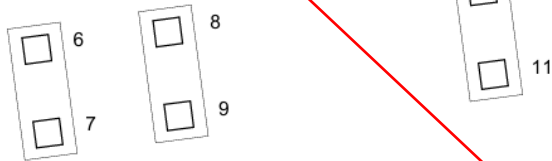
DESIGN DRAWING REFERENCE  
0180-C-2-0007\_Rev 1

PEDESTALS			
ID	ΔE	ΔN	ΔRL
1A	-0.015	0.000	0.020
1B	-0.013	0.006	0.005
1C	-0.007	0.006	0.023
1D	-0.016	-0.002	0.008
2A	-0.052	0.045	0.017
2B	0.043	0.057	-0.005
2C	0.063	-0.047	0.022
2D	-0.037	-0.058	-0.001
3A	-0.053	0.049	0.017
3B	0.050	0.050	-0.005
3C	0.053	-0.053	0.014
3D	-0.049	-0.056	-0.007
4A	-0.058	0.047	0.003
4B	0.046	0.057	0.029
4C	0.063	-0.048	-0.001
4D	-0.036	-0.063	0.023
5A	-0.056	0.040	0.000
5B	0.041	0.056	0.019
5C	0.059	-0.050	-0.004
5D	-0.047	-0.064	0.018

PEDESTALS			
ID	ΔE	ΔN	ΔRL
6A	-0.060	0.034	0.000
6B	0.043	0.052	0.023
6C	0.059	-0.047	-0.001
6D	-0.044	-0.064	0.028
7A	-0.058	0.052	0.000
7B	0.044	0.071	0.021
7C	0.061	-0.040	-0.004
7D	-0.043	-0.057	0.019
8A	-0.057	0.054	0.001
8B	0.042	0.070	0.020
8C	0.058	-0.035	0.004
8D	-0.043	-0.051	0.022
9A	-0.053	0.040	0.007
9B	0.046	0.052	0.022
9C	0.058	-0.053	0.006
9D	-0.048	-0.070	0.025
10A	-0.065	0.048	0.002
10B	0.040	0.060	0.018
10C	0.059	-0.048	0.002
10D	-0.046	-0.053	0.023
11A	-0.055	0.043	0.012
11B	0.046	0.050	0.028
11C	0.066	-0.052	0.012
11D	-0.042	-0.059	0.028

BOLTS			
ID	ΔE	ΔN	ΔRL
1A	0.000	0.005	-0.007
1B	-0.001	0.005	-0.006
1C	-0.001	0.004	-0.006
1D	-0.004	0.004	-0.007
2A	-0.002	0.003	-0.005
2B	-0.002	0.003	-0.006
2C	0.000	0.003	-0.007
2D	-0.002	0.007	-0.006
3A	-0.002	0.001	-0.004
3B	0.001	0.001	-0.005
3C	-0.001	0.000	-0.006
3D	-0.002	0.002	-0.004
4A	0.000	-0.001	-0.003
4B	0.000	-0.001	-0.005
4C	0.001	0.001	-0.006
4D	0.000	-0.002	-0.004
5A	0.000	0.000	-0.005
5B	0.004	-0.001	-0.007
5C	-0.001	0.000	-0.006
5D	0.000	0.000	-0.005
6A	0.005	-0.005	-0.004
6B	0.002	0.001	-0.007
6C	0.003	0.001	-0.007
6D	0.001	-0.001	-0.006

BOLTS			
ID	ΔE	ΔN	ΔRL
7A	0.003	0.002	-0.005
7B	0.002	0.003	-0.004
7C	0.005	0.005	-0.008
7D	0.001	0.000	-0.005
8A	0.003	0.002	-0.006
8B	0.001	-0.001	-0.006
8C	0.001	-0.003	-0.005
8D	-0.001	-0.001	-0.005
9A	-0.001	0.003	-0.006
9B	0.000	0.001	-0.006
9C	0.002	0.001	-0.003
9D	0.002	-0.001	-0.004
10A	0.000	0.003	-0.006
10B	0.002	0.002	-0.006
10C	0.003	0.005	-0.005
10D	0.002	0.004	-0.006
11A	0.003	0.002	-0.006
11B	0.001	-0.001	-0.006
11C	0.003	0.000	-0.004
11D	0.004	-0.001	-0.005



NOTE:  
Labelling of pedestal corners and bolts as shown below:



PEDESTALS				BOLTS			
ID	ΔE	ΔN	ΔRL	ID	ΔE	ΔN	ΔRL
6A	-0.060	0.034	0.000	1A	0.000	0.005	-0.007
6B	0.043	0.052	0.023	1B	-0.001	0.005	-0.006
6C	0.059	-0.047	-0.001	1C	-0.001	0.004	-0.006
6D	-0.044	-0.064	0.028	1D	-0.004	0.004	-0.007
7A	-0.058	0.052	0.000	2A	-0.002	0.003	-0.005
7B	0.044	0.071	0.021	2B	-0.002	0.003	-0.006
7C	0.061	-0.040	-0.004	2C	0.000	0.003	-0.007
7D	-0.043	-0.057	0.019	2D	-0.002	0.007	-0.006
8A	-0.057	0.054	0.001	3A	-0.002	0.001	-0.004
8B	0.042	0.070	0.020	3B	0.001	0.001	-0.005

Surveyor: NG  
Field Book: NG002  
Date of Survey Check: 29/10/2019  
Date Drawn: 30/10/2019  
Drawn By: RB  
Infield Survey Checks No: S1-S01-0124

AS-BUILT SIGN OFF & DATE  
SURVEYOR:  
CONSTRUCTION MANAGER:  
SUPERINTENDANT:  
QUALITY ASSURANCE:

NOTES:  
As-built position survey of 11x pedestal footings & bolts.  
Scale 1:75 (A3)



CV42 CONVEYOR FOOTINGS  
AS-BUILT SURVEY OF PEDESTAL FOOTINGS & BOLTS  
Drawing No: 0186-SKT-SUR39-0164\_0

Leica Nova MS60 MultiStation (3D scanning)

# Actual Construction Works - QAQC

**Project Name:** Crusher Replacement Project  
**Client:** Ok Tedi Mining  
**Contract No:** 8K11  
**Infield SCHK:** S1-S01-00##  
**Area:** Screening- Raft Slab  
**Description:** Pedestals - Post Pour  
**Surveyed By:** #####  
**Date:** 08-Jul-19

## As Constructed Survey Report

A negative number indicates an As Constructed position North or East or higher than Design

Grid Reference	Item	Design			Asbuilt			Difference			Horizontal
		Easting (m)	Northing (m)	RL (m)	Easting (m)	Northing (m)	RL (m)	Easting (m)	Northing (m)	RL (m)	Misclose
1	A							0.000	0.006	0.002	0.006
1	B							0.001	0.014	0.003	0.014
1	C							0.019	0.014	0.004	0.024
1	D							0.000	0.000	0.000	0.000
2	A							-0.010	-0.017	0.005	0.020
2	B							-0.005	-0.004	0.005	0.006
2	C							0.014	0.007	0.003	0.016
2	D							0.008	-0.011	0.001	0.014
3	A							-0.014	-0.020	-0.002	0.024
3	B							-0.017	0.010	0.003	0.020
3	C							0.024	0.010	0.000	0.026
3	D							0.000	0.000	0.000	0.000

# 5. Full Operations - Completed Nurumi Crusher

“Nurumi” means “Our” in the local Min language of the Star Mountains



# ALSL Survey Teams (2019 – 2020), OTML CRP



***“Thank You!”***