

**ALBERTA TRANSPORTATION
GEOHAZARD ASSESSMENT PROGRAM
PEACE REGION – PEACE RIVER DISTRICT
2024 CALL OUT INSPECTION**



Site Number	Location	Name	Hwy	km
SH037	S of High Prairie	Nicholls Creek Slide	747:02	35.2
Legal Description		UTM Co-ordinates (NAD 83)		
SW09-74-19-W5		11U N 6,138,622	E 508,118	

	Date	PF	CF	Total
Previous Inspection:	August 9, 2022	12	4	48
Current Inspection:	July 12, 2024	12	4	48
Road AADT:	600	Year:	2023	
Inspected By:	Don Proudfoot, Nicole Wilder (Thurber)			
Report Attachments:	<input checked="" type="checkbox"/> Photographs <input checked="" type="checkbox"/> Plans <input type="checkbox"/> Maintenance Items			

Primary Site Issue:	Landslide in a 3.5 m high embankment above a culvert on the west side of the highway with a backscarp 2 m into pavement.	
Dimensions:	The landslide is about 15 m wide (on highway) and has about 110 mm drop in the asphalt along the backscarp.	
Date of any remediation:	The site had a subgrade replacement completed in 2023 along with a pavement overlay.	
Maintenance:		
Observations:	Description	Worse?
<input checked="" type="checkbox"/> Pavement Distress	The main scarp extends into the highway and a portion of the southbound lane has about a 110 mm drop, has been closed off to traffic by barricades and traffic lights are being used to alternate traffic through the one open lane. There are also cracks open to 280 mm wide on the southbound lane shoulder and about 800 mm deep within the open crack.	<input checked="" type="checkbox"/>
<input checked="" type="checkbox"/> Slope Movement	The landslide occurred within the west embankment fill adjacent to the meandering Nicholls Creek. On the west side of the highway the creek bank has eroded and has sloughed into the river causing it to retrogress towards the highway. The flank of the slide continues into the tree line, but no toe roll was observed.	<input checked="" type="checkbox"/>
<input checked="" type="checkbox"/> Erosion	There is some bank erosion at the toe of the west side of the highway along Nicholls Creek and on either side of the culvert outlet	<input type="checkbox"/>
<input type="checkbox"/> Seepage		<input type="checkbox"/>
<input checked="" type="checkbox"/> Bridge/Culvert Distress	The culvert outlet had about 800 mm of scour below it, this was not visible during the 2024 inspection due to a higher water level in the creek. The shotcrete on the outlet also has extensive cracks and perforations.	<input type="checkbox"/>
<input type="checkbox"/> Other		<input type="checkbox"/>
Instrumentation: None		
Assessment: In June 2022 the MCI reported the slide and in early August the slide had dropped significantly requiring closing of the southbound lane. The slide was approximately 27 m wide by 20 m long and the landslide scarp had retrogressed into the southbound lane requiring it to be closed off with barricades on either		

side. The flank of the scarp extended into the tree line and appeared to be somewhat grown over and no exposed soil was visible during that initial inspection. The banks of Nicholls Creek were eroded and slumping into the creek on both sides of the creek.

Thurber prepared a detailed design and special provisions package and submitted to TEC in June 2023 to repair the landslide through upcoming the paving contract. It is understood that TEC decided to do a deep subgrade repair at this site instead of the proposed landslide repairs, during the paving overlay project, in hopes that the landslide movement would subside. However shortly after the pavement was placed, cracks reappeared in the asphalt surface and eventually grew to the point where the lane had to be closed again this summer.

During the 2024 inspection, the pavement in the southbound lane had dropped approximately 110 mm over about 15 m length, hence why it was blocked off from traffic. There is also a substantially large crack in the shoulder up to 280 mm wide and about 800 mm deep within the open crack. The recent landslide crack was tracked using a hand-held GPS unit which is typically accurate to approximately 3 to 5 m. The scarp crack generally follows the same outline as the previous backscarp in 2023.

It is anticipated that the landslide was triggered by creek erosion and continues with moderate but increasing rate of movement. Weak embankment materials and a steep embankment slope (approximately 20 degrees) have likely contributed to causing the slide. The main scarp extends into the highway and could eventually retrogress further and affect both lanes of the highway.

The creek appears to be eroding/undercutting the bank which causes overhang to slough into the creek and this process continues to retrogress towards the highway, the erosion is now behind the culvert outlet and there was also a scour hole below the culvert outlet noted previously.

Recommendations:

Short Term:

In the short term, the slide should be regularly monitored for regression of the slide scarp, which could require jersey barriers and widening of the highway on the east side for a detour, if it retrogresses.

Medium to Long Term:

We recommend proceeding with the detailed design for this landslide repair which consists of sub-excavating the failed slide mass down to intact foundation soil and rebuilding the slope with a compacted clay fill toe berm to a slightly flatter 4.5H:1V inclination. The new fill material should be placed and compacted in thin horizontal lifts, benched into the intact slope surface. The more suitable excavated clay material could be used as backfill, with any excess removed from site. The existing culvert will also be rehabilitated, extended and surrounded with Des. 2 Class 25 gravel with a compacted clay seal on the end. The creek channel will require some channel excavation and be armoured with Class 3 riprap and two Class 1 riprap swales will be constructed on either side of the toe berm that lead to the newly armoured creek channel. A water act permit might be required to perform in-stream work. Thurber can provide a proposal to provide an updated detailed design, tender and C-estimate, which will likely require an additional site survey.

Cost ~\$675,000, excl. Engineering

CLOSURE

It is a condition of this letter report that Thurber's performance of its professional services will be subject to the attached Statement of Limitations and Conditions.

Don Proudfoot, M.Eng., P.Eng.
Principal | Senior Geotechnical Engineer

Nicole Wilder, M.Eng., P.Eng.
Geotechnical Engineer



STATEMENT OF LIMITATIONS AND CONDITIONS

1. STANDARD OF CARE

This Report has been prepared in accordance with generally accepted engineering or environmental consulting practices in the applicable jurisdiction. No other warranty, expressed or implied, is intended or made.

2. COMPLETE REPORT

All documents, records, data and files, whether electronic or otherwise, generated as part of this assignment are a part of the Report, which is of a summary nature and is not intended to stand alone without reference to the instructions given to Thurber by the Client, communications between Thurber and the Client, and any other reports, proposals or documents prepared by Thurber for the Client relative to the specific site described herein, all of which together constitute the Report.

IN ORDER TO PROPERLY UNDERSTAND THE SUGGESTIONS, RECOMMENDATIONS AND OPINIONS EXPRESSED HEREIN, REFERENCE MUST BE MADE TO THE WHOLE OF THE REPORT. THURBER IS NOT RESPONSIBLE FOR USE BY ANY PARTY OF PORTIONS OF THE REPORT WITHOUT REFERENCE TO THE WHOLE REPORT.

3. BASIS OF REPORT

The Report has been prepared for the specific site, development, design objectives and purposes that were described to Thurber by the Client. The applicability and reliability of any of the findings, recommendations, suggestions, or opinions expressed in the Report, subject to the limitations provided herein, are only valid to the extent that the Report expressly addresses proposed development, design objectives and purposes, and then only to the extent that there has been no material alteration to or variation from any of the said descriptions provided to Thurber, unless Thurber is specifically requested by the Client to review and revise the Report in light of such alteration or variation.

4. USE OF THE REPORT

The information and opinions expressed in the Report, or any document forming part of the Report, are for the sole benefit of the Client. NO OTHER PARTY MAY USE OR RELY UPON THE REPORT OR ANY PORTION THEREOF WITHOUT THURBER'S WRITTEN CONSENT AND SUCH USE SHALL BE ON SUCH TERMS AND CONDITIONS AS THURBER MAY EXPRESSLY APPROVE. Ownership in and copyright for the contents of the Report belong to Thurber. Any use which a third party makes of the Report, is the sole responsibility of such third party. Thurber accepts no responsibility whatsoever for damages suffered by any third party resulting from use of the Report without Thurber's express written permission.

5. INTERPRETATION OF THE REPORT

- a) Nature and Exactness of Soil and Contaminant Description: Classification and identification of soils, rocks, geological units, contaminant materials and quantities have been based on investigations performed in accordance with the standards set out in Paragraph 1. Classification and identification of these factors are judgmental in nature. Comprehensive sampling and testing programs implemented with the appropriate equipment by experienced personnel may fail to locate some conditions. All investigations utilizing the standards of Paragraph 1 will involve an inherent risk that some conditions will not be detected and all documents or records summarizing such investigations will be based on assumptions of what exists between the actual points sampled. Actual conditions may vary significantly between the points investigated and the Client and all other persons making use of such documents or records with our express written consent should be aware of this risk and the Report is delivered subject to the express condition that such risk is accepted by the Client and such other persons. Some conditions are subject to change over time and those making use of the Report should be aware of this possibility and understand that the Report only presents the conditions at the sampled points at the time of sampling. If special concerns exist, or the Client has special considerations or requirements, the Client should disclose them so that additional or special investigations may be undertaken which would not otherwise be within the scope of investigations made for the purposes of the Report.
- b) Reliance on Provided Information: The evaluation and conclusions contained in the Report have been prepared on the basis of conditions in evidence at the time of site inspections and on the basis of information provided to Thurber. Thurber has relied in good faith upon representations, information and instructions provided by the Client and others concerning the site. Accordingly, Thurber does not accept responsibility for any deficiency, misstatement or inaccuracy contained in the Report as a result of misstatements, omissions, misrepresentations, or fraudulent acts of the Client or other persons providing information relied on by Thurber. Thurber is entitled to rely on such representations, information and instructions and is not required to carry out investigations to determine the truth or accuracy of such representations, information and instructions.
- c) Design Services: The Report may form part of design and construction documents for information purposes even though it may have been issued prior to final design being completed. Thurber should be retained to review final design, project plans and related documents prior to construction to confirm that they are consistent with the intent of the Report. Any differences that may exist between the Report's recommendations and the final design detailed in the contract documents should be reported to Thurber immediately so that Thurber can address potential conflicts.
- d) Construction Services: During construction Thurber should be retained to provide field reviews. Field reviews consist of performing sufficient and timely observations of encountered conditions in order to confirm and document that the site conditions do not materially differ from those interpreted conditions considered in the preparation of the report. Adequate field reviews are necessary for Thurber to provide letters of assurance, in accordance with the requirements of many regulatory authorities.

6. RELEASE OF POLLUTANTS OR HAZARDOUS SUBSTANCES

Geotechnical engineering and environmental consulting projects often have the potential to encounter pollutants or hazardous substances and the potential to cause the escape, release or dispersal of those substances. Thurber shall have no liability to the Client under any circumstances, for the escape, release or dispersal of pollutants or hazardous substances, unless such pollutants or hazardous substances have been specifically and accurately identified to Thurber by the Client prior to the commencement of Thurber's professional services.

7. INDEPENDENT JUDGEMENTS OF CLIENT

The information, interpretations and conclusions in the Report are based on Thurber's interpretation of conditions revealed through limited investigation conducted within a defined scope of services. Thurber does not accept responsibility for independent conclusions, interpretations, interpolations and/or decisions of the Client, or others who may come into possession of the Report, or any part thereof, which may be based on information contained in the Report. This restriction of liability includes but is not limited to decisions made to develop, purchase or sell land.



Photo 1. Looking south at traffic lights set up for the one lane closure. Photo credit: Don Proudfoot.



Photo 2. Looking south at crack open to 280 mm wide in the southbound lane shoulder. Photo credit: Don Proudfoot.



Photo 3. Looking south closer at the crack in the highway shoulder. Photo credit: Nicole Wilder.



Photo 4. Looking east at the scarp crack that continues in the highway embankment. Photo credit: Nicole Wilder.



Photo 5. Looking north at the scarp crack arch in the southbound driving lane. Photo Credit: Don Proudfoot.



Photo 6. Looking north at the scarp crack leading into the shoulder and embankment. Photo Credit: Nicole Wilder.

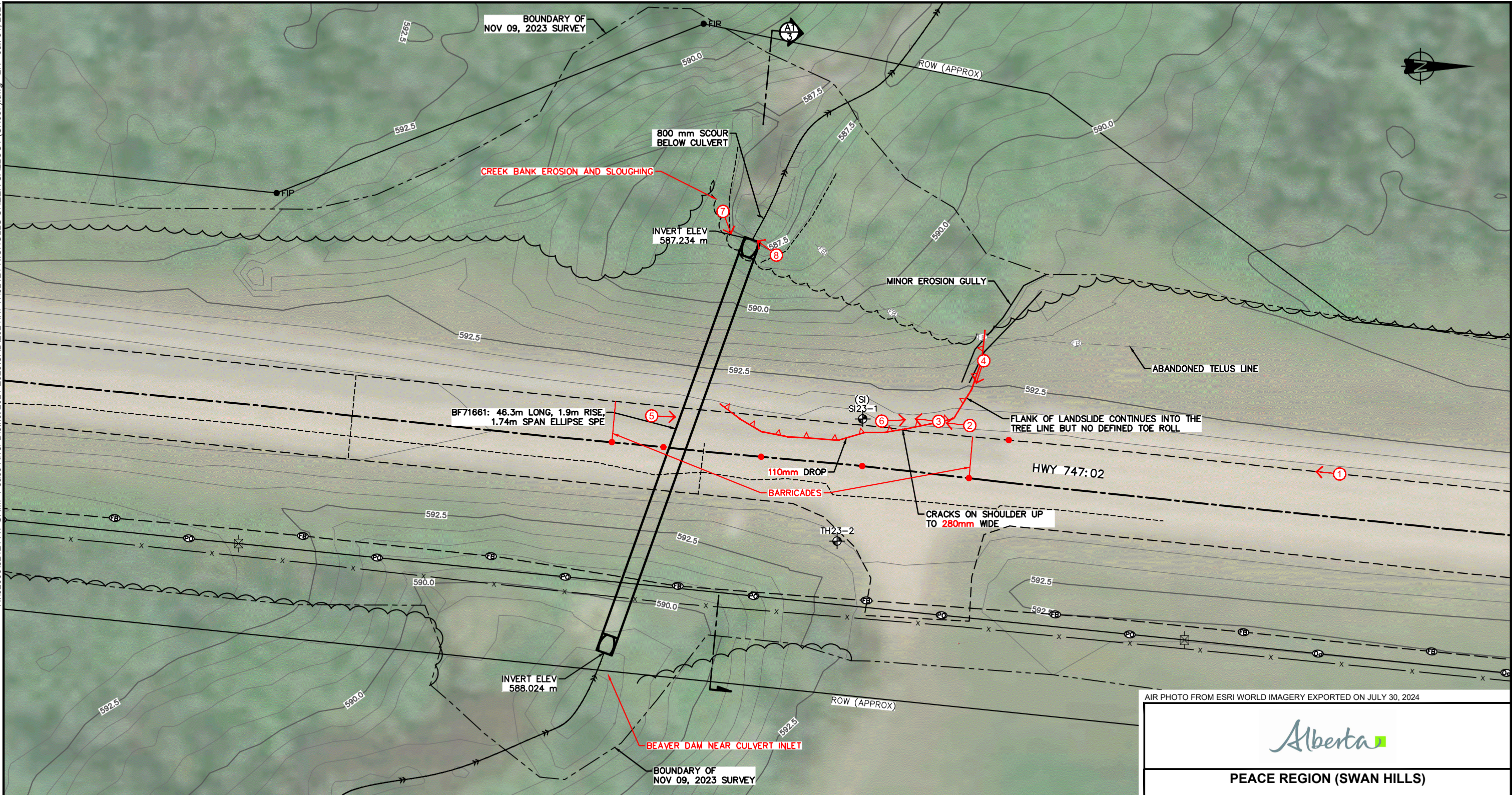


Photo 7. Looking east at the culvert outlet. Photo Credit: Nicole Wilder.



Photo 8. Looking south at the culvert outlet and higher water in the creek. Photo Credit: Nicole Wilder.

H:\32000\32121 AT GRMP Peace River District 2021-2025\CAD\2024\NIPW\32121 NICHOLLS CREEK CALLOUT (SH037).dwg - 2N - Jul. 31, 2024



AIR PHOTO FROM ESRI WORLD IMAGERY EXPORTED ON JULY 30, 2024



PEACE REGION (SWAN HILLS)

**HWY 747:02 NICHOLLS CREEK LANDSLIDE (SH037)
2024 CALLOUT PLAN**

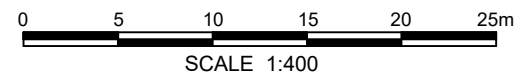
DWG No. 32121-SH037-CALLOUT

LEGEND

- CRACK (2023)
- ACTIVE LANDSLIDE CRACK (2024)
- ACTIVE LANDSLIDE CRACK (2023)
- TREE LINE
- TREE LINE (APPROX)
- DRAINAGE FLOW DIRECTION
- TEST HOLE LOCATION
- SLOPE INCLINOMETER
- POWER POLE
- OVERHEAD POWER LINE
- BURIED FIBRE OPTIC CABLE
- FOUND IRON PIN
- FENCE LINE
- HIGHWAY RIGHT OF WAY (APPROXIMATE)
- DIRECTION AND NUMBER OF PHOTO
- TRAFFIC CONE

NOTES:

1. ORIGINAL GROUND SURVEYED BY MCINTOSH PERRY NOVEMBER 9, 2023. GROUND SURFACE CONTOURS OUTSIDE OF SURVEY LIMITS FROM 2008 LIDAR AND MAY VARY AT THE TIME OF TENDERING THE PROJECT.
2. THE SCARP CRACK OUTLINE IS FROM A HAND-HELD GPS UNIT.
3. **JULY 12, 2024 OBSERVATIONS SHOWN IN RED.**



DRAWN BY	ML
DESIGNED BY	NWP
APPROVED BY	TSA
SCALE	1:400
DATE	JULY 2024
FILE No.	32121

