# Part 2 — Technical Requirements

NRCB Natural Resources Conservation Board

Application under the *Agricultural Operation Practices Act* for a confined feeding operation, manure collection area, and/or manure storage facility(ies)

| NRCB USE ONLY | Application number | Legal land description |
|---|---|---|
| ☐ Approval ☐ Registration ☒ Authorization ☐ Amendment | LA25042 | NE 32-1-14 W4M |

## APPLICATION DISCLOSURE

This information is collected under the authority of the *Agricultural Operation Practices Act* (AOPA), and is subject to the provisions of the *Freedom of Information and Protection of Privacy Act*. This information is public unless the NRCB grants a written request that certain sections remain private.

**Any construction prior to obtaining an NRCB permit is an offence and is subject to enforcement action, including prosecution.**

I, the applicant, or applicant's agent, have read and understand the statements above, and I acknowledge that the information provided in this application is true to the best of my knowledge.

July 14 2025
Date of signing

[redacted]
Signature

River Road Farming
Corporate name (if applicable)

Stephen Entz
Print name

## GENERAL INFORMATION REQUIREMENTS

**Proposed facilities:** list all proposed confined feeding operation facilities and their dimensions. Indicate whether any of the proposed facilities are additions to existing facilities. (attach additional pages if needed)

| Proposed facilities | Dimensions (m) (length, width, and depth) |
|---|---|
| Dairy Barn 334 x 177 ft | (101.8 m x 53.9 m) |
| Milk Room 68 x 58 ft (attached) | (20.7 m x 17.7 m) |
| In barn pit 15' wide 38' long 12' Deep | (4.6 m x 11.6 m x 3.7 m deep) |
| | |
| AO Comment: The milk room to be attached to the dairy barn is considered an ancillary structure. | |

**Existing facilities:** list **ALL** existing confined feeding operation facilities and their dimensions

| Existing facilities | Dimensions (m) (length, width, and depth) | NRCB USE ONLY |
|---|---|---|
| AO Comment: See next page for list of existing facilities. | | |
| | | |
| | | |

**NRCB USE ONLY**

AO Comment: CFO is currently permitted under NRCB Approval LA21062.

# Part 2 — Technical Requirements

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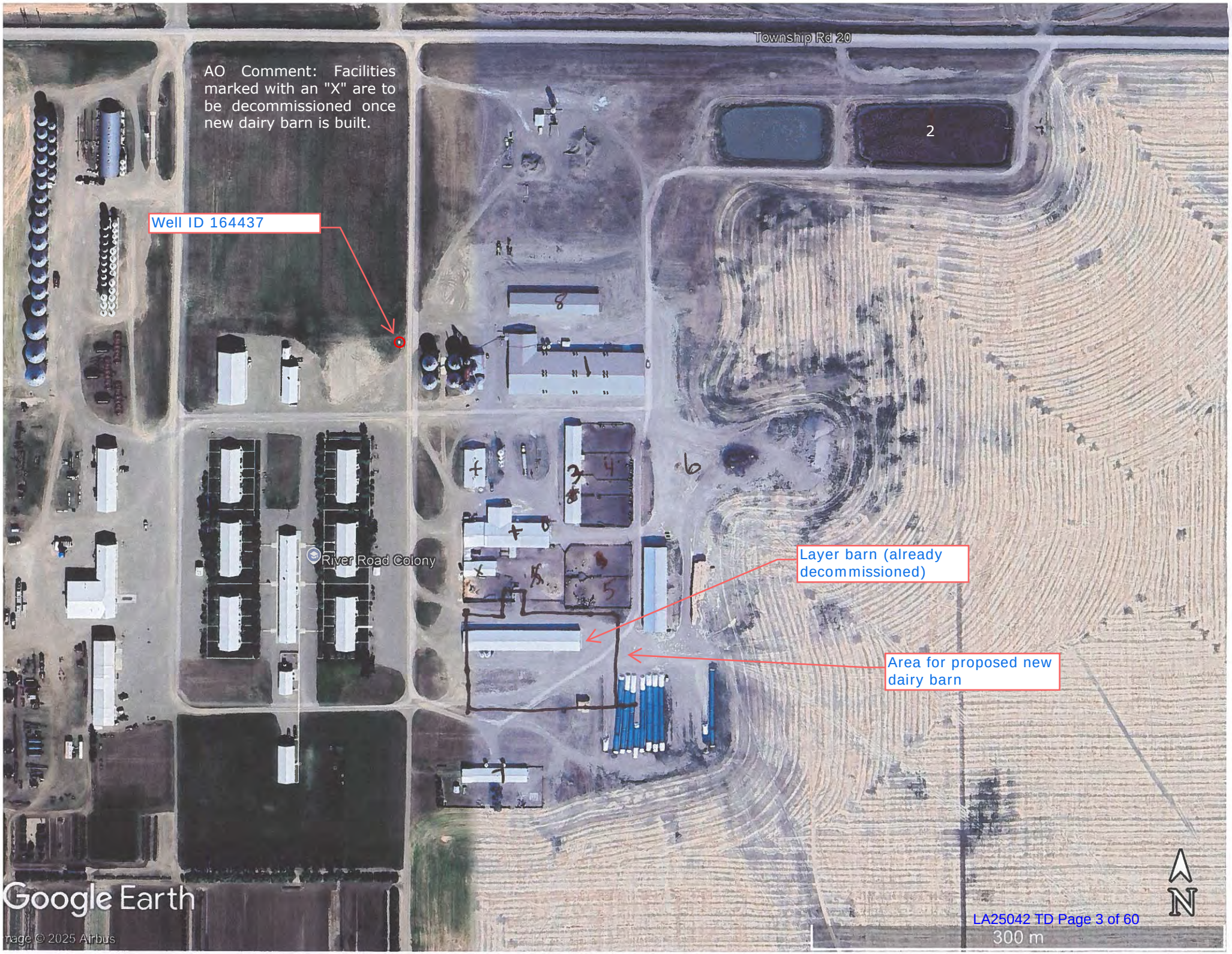
| Existing facilities continued | | Dimensions (m) (length, width, and depth) | NRCB USE ONLY |
|---|---|---|---|
| LA19040 & LA19040A | 1 | • Chicken layer barn (97.5 m x 29.3 m) | |
| Deemed | 2 | • Hog Lagoon (160' x 400' x 16') | |
| | | Dairy facilities | |
| | | • Calf Barn (42' x 90') (to be decommissioned) | |
| | 3 | • Dry Cow Shed (36' x 160') | |
| | 4 | • Dry Cow Barn Corrals (120' x 74') | |
| | | • Dairy Barn (56' x 194') (to be decommissioned) | |
| | | • Dairy Barn Manure Storage (10' x 56' x 8' (inground cement storage – steel lid) (to be decommissioned) | |
| | | • Dairy Barn Corrals (130' x 136') (to be decommissioned) | |
| | 5 | Feedlot (144' x 154') | |
| | 6 | Manure Storage Pad (40 m x 40 m) | |
| | | Poultry facilities | |
| | | • Layer Barn (46' x 220') (decommissioned) | |
| | | • Layer Manure Storage (46' x 53' x 14' – 4' cement retaining (enclose building attached to chicken barn)) (decommissioned) | |
| | 7 | • Broiler/Duck/Turkey Barn (30' x 150') | |
| 8 Pullet Barn | | 14.0 m x 63.4 m (46 ft x 208 ft) | |
| | | | |
| | | | |
| AO Comment: Numbers next to facilities correspond with numbers on map on next page. | | | |
| | | | |
| AO Comment: All existing facilities confirmed. | | | |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |


Township Rd 20
AO Comment: Facilities marked with an "X" are to be decommissioned once new dairy barn is built.
Well ID 164437
River Road Colony
Layer barn (already decommissioned)
Area for proposed new dairy barn
Google Earth
LA25042 TD Page 3 of 60
300 m
N

# Part 2 — Technical Requirements

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**If a new facility is replacing an old facility, please explain what will happen to the old facility and when.** ☐ N/A

Remove

AO Comment: The existing dairy barn, dairy barn manure storage, dairy barn corrals, and calf barn will be decommissioned once the new dairy barn is built.

**Construction completion date for proposed facilities** End of 2028

**Additional information**

**Livestock numbers:** Complete only if livestock numbers are different from what was identified in the Part 1 application. Note: if livestock numbers increase in your Part 2 application, a new Part 1 application must be submitted which may result in a loss of priority for minimum distance separation (MDS).

| Livestock category and type (Available in the Schedule 2 of the Part 2 Matters Regulation) | Permitted number | Proposed increase or decrease in number (if applicable) | Total |
|---|---|---|---|
| Dairy | 125 | 0 | 125 |
| Layers | 30,000 | 0 | 30,000 |
| Pullets | 15,000 | 0 | 15,000 |
| Broilers | 2000 | 0 | 2000 |
| Ducks | 1,000 | 0 | 1,000 |
| Turkey | 300 | 0 | 300 |
| Swine Feeders | 200 | 0 | 200 |
| Beef Finishers | 200 | 0 | 200 |

AO Comment: Animal numbers pulled from Part 1 application, no change in livestock numbers.

## DECLARATION AND ACKNOWLEDGMENT OF APPLICANT CONCERNING *WATER ACT* LICENCE

issued by Alberta Environment and Parks (AEP) for a confined feeding operation (CFO)

*Date and sign one of the following four options*

**OPTION 1: Applying through the NRCB for both the AOPA permit and the *Water Act* licence**

I **DO** want my water licence application coupled to my AOPA permit application.

Signed this ____day of _____, 20____. _____

*Signature of Applicant or Agent*

**OPTION 2: Processing the AOPA permit and *Water Act* licence separately**

1. I (we) acknowledge that the CFO will need a new water licence from AEP under the *Water Act* for the development or activity proposed in this AOPA application.
2. I (we) request that the NRCB process the AOPA application **independently of** AEP's processing of the CFO's application for a water licence.
3. In making this request, I (we) recognize that, if this AOPA application is granted by the NRCB, the NRCB's decision will not be considered by AEP as improving or enhancing the CFO's eligibility for a water licence under the *Water Act*.
4. I (we) acknowledge that any construction or actions to populate the CFO with livestock pursuant to an AOPA permit in the absence of a *Water Act* licence will **not** be relevant to AEP's consideration of whether to grant the *Water Act* licence application.
5. I (we) acknowledge that any such construction or livestock populating will be at the CFO's sole risk if the *Water Act* licence application is denied or if the operation of the CFO is otherwise deemed to be in violation of the *Water Act*. This risk includes being required to depopulate the CFO and/or to cease further construction, or to remove "works" or "undertakings" (as defined in the *Water Act*).
6. **AS RELEVANT:** I (we) acknowledge that the CFO is located in the South Saskatchewan River Basin and that, pursuant to the *Bow, Oldman and South Saskatchewan River Basin Water Allocation Order* [Alta. Reg. 171/2007], this basin is currently closed to new surface water allocations.

Signed this ____ day of _____, 20____. _____

*Signature of Applicant or Agent*

**OPTION 3: Additional water licence not required**

1. I (we) declare that the CFO will not need a new licence from AEP under the *Water Act* for the development or activity proposed in this AOPA application.

Signed this 14 day of July, 2025. [redacted]

*Signature of Applicant or Agent*

**OPTION 4: Uncertain if *Water Act* licence is needed: acknowledgement of risk (for existing CFOs only)**

1. At this time, I (we) do not know whether a new water licence is needed from AEP under the *Water Act* for the development or activity proposed in this AOPA application.
2. If a new *Water Act* licence is needed, I (we) request that the NRCB process the AOPA application **independently of** AEP's processing of the CFO's application for a water licence.
3. In making this request, I (we) recognize that, if this AOPA application is granted by the NRCB, the NRCB's decision will not be considered by AEP as improving or enhancing the CFO's eligibility for a water licence under the *Water Act*.
4. I (we) acknowledge that any construction or actions to populate the CFO with additional livestock pursuant to an AOPA permit in the absence of a *Water Act* licence will **not** be relevant to AEP's consideration of whether to grant my *Water Act* licence application, if a new water licence is needed.
5. I (we) acknowledge that any such construction or livestock increase will be at the CFO's sole risk if the *Water Act* licence application is denied or if the operation of the CFO is otherwise deemed to be in violation of the *Water Act*. This risk includes being required to depopulate the CFO and/or to cease further construction, or to remove "works" or "undertakings" (as defined in the *Water Act*).
6. **AS RELEVANT:** I (we) acknowledge that the CFO is located in the South Saskatchewan River Basin and that, pursuant to the *Bow, Oldman and South Saskatchewan River Basin Water Allocation Order* [Alta. Reg. 171/2007], this basin is currently closed to new surface water allocations.

Signed this ____ day of _____, 20____. _____

*Signature of Applicant or Agent*

# Water Well Drilling Report

View in Metric | Export to Excel

The driller supplies the data contained in this report. The Province disclaims responsibility for its accuracy. The information on this report will be retained in a public database.

GIC Well ID 164437
GoA Well Tag No.
Drilling Company Well ID
Date Report Received 1983/02/14

GOWN ID

## Well Identification and Location

Measurement in Imperial

| Owner Name | Address | Town | Province | Country | Postal Code |
|---|---|---|---|---|---|
| ROCK LAKE COLONY | MILK RIVER | | | | |

| Location | 1/4 or LSD | SEC | TWP | RGE | W of MER | Lot | Block | Plan | Additional Description |
|---|---|---|---|---|---|---|---|---|---|
| | NE | 32 | 1 | 14 | 4 | | | | |

Measured from Boundary of
ft from
ft from

GPS Coordinates in Decimal Degrees (NAD 83)
Latitude 49.082714 Longitude -111.836918
How Location Obtained: Not Verified

Elevation 3300.00 ft
How Elevation Obtained: Estimated

## Drilling Information

**Method of Drilling**: Rotary

**Proposed Well Use**: Domestic & Stock

**Type of Work**: New Well

## Formation Log

Measurement in Imperial

| Depth from ground level (ft) | Water Bearing | Lithology Description |
|---|---|---|
| 10.00 | | Yellow Clay |
| 20.00 | | Brown Clay |
| 55.00 | | Blue Clay |
| 65.00 | | Gray Hard Rocks |
| 105.00 | | Blue Shale |
| 165.00 | | Blue Hard Shale |
| 205.00 | | White Sandstone |

## Yield Test Summary

Measurement in Imperial

Recommended Pump Rate 0.00 igpm

| Test Date | Water Removal Rate (igpm) | Static Water Level (ft) |
|---|---|---|
| 1982/11/24 | 15.00 | 125.00 |

## Well Completion

Measurement in Imperial

| Total Depth Drilled | Finished Well Depth | Start Date | End Date |
|---|---|---|---|
| 205.00 ft | | 1982/11/15 | 1982/11/24 |

**Borehole**

| Diameter (in) | From (ft) | To (ft) |
|---|---|---|
| 0.00 | 0.00 | 205.00 |

**Surface Casing (if applicable)**
Steel
Size OD: 5.56 in
Wall Thickness: 0.156 in
Bottom at: 105.00 ft

**Well Casing/Liner**
Steel
Size OD: 4.50 in
Wall Thickness: 0.141 in
Top at: 0.00 ft
Bottom at: 205.00 ft

**Perforations**

| From (ft) | To (ft) | Diameter or Slot Width(in) | Slot Length (in) | Hole or Slot Interval(in) |
|---|---|---|---|---|
| 170.00 | 205.00 | 0.125 | | 24.00 |

Perforated by: Torch

**Annular Seal**: Cement/Grout
Placed from 0.00 ft to 105.00 ft
Amount

Other Seals

| Type | At (ft) |
|---|---|
| | |

**Screen Type**
Size OD: 0.00 in

| From (ft) | To (ft) | Slot Size (in) |
|---|---|---|
| | | |

Attachment
Top Fittings
Bottom Fittings

**Pack**
Type
Grain Size
Amount 0.00

## Contractor Certification

Name of Journeyman responsible for drilling/construction of well: UNKNOWN NA DRILLER
Certification No: 1
Company Name: C.H. NELSON DRILLING LTD.
Copy of Well report provided to owner
Date approval holder signed

# Water Well Drilling Report

View in Metric | Export to Excel

The driller supplies the data contained in this report. The Province disclaims responsibility for its accuracy. The information on this report will be retained in a public database.

GIC Well ID 164437
GoA Well Tag No.
Drilling Company Well ID
Date Report Received 1983/02/14

GOWN ID

## Well Identification and Location

Measurement in Imperial

| Owner Name | Address | Town | Province | Country | Postal Code |
|---|---|---|---|---|---|
| ROCK LAKE COLONY | MILK RIVER | | | | |

| Location | 1/4 or LSD | SEC | TWP | RGE | W of MER | Lot | Block | Plan | Additional Description |
|---|---|---|---|---|---|---|---|---|---|
| | NE | 32 | 1 | 14 | 4 | | | | |

Measured from Boundary of
ft from
ft from

GPS Coordinates in Decimal Degrees (NAD 83)
Latitude 49.082714 Longitude -111.836918
How Location Obtained
Not Verified

Elevation 3300.00 ft
How Elevation Obtained
Estimated

## Additional Information

Measurement in Imperial

Distance From Top of Casing to Ground Level in
Is Artesian Flow
Rate igpm

Is Flow Control Installed
Describe

Recommended Pump Rate 0.00 igpm
Recommended Pump Intake Depth (From TOC) 0.00 ft

Pump Installed
Type
Depth ft
Make
H.P.
Model (Output Rating)

Did you Encounter Saline Water (>4000 ppm TDS)
Depth ft
Gas
Depth ft
Remedial Action Taken

Well Disinfected Upon Completion
Geophysical Log Taken
Submitted to ESRD

Sample Collected for Potability
Submitted to ESRD

Additional Comments on Well

## Yield Test

Taken From Ground Level
Measurement in Imperial

| Test Date | Start Time | Static Water Level |
|---|---|---|
| 1982/11/24 | 12:00 AM | 125.00 ft |

Depth to water level

| Pumping (ft) | Elapsed Time Minutes:Sec | Recovery (ft) |
|---|---|---|
| | | |

**Method of Water Removal**

Type Pump
Removal Rate 15.00 igpm
Depth Withdrawn From 0.00 ft

If water removal period was < 2 hours, explain why

## Water Diverted for Drilling

| Water Source | Amount Taken | Diversion Date & Time |
|---|---|---|
| | ig | |

## Contractor Certification

Name of Journeyman responsible for drilling/construction of well
UNKNOWN NA DRILLER

Certification No
1

Company Name
C.H. NELSON DRILLING LTD.

Copy of Well report provided to owner
Date approval holder signed

Printed on 7/14/2025 2:29:42 PM

# Part 2 — Technical Requirements

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## GENERAL ENVIRONMENTAL INFORMATION

*(complete this section for the worst case of the existing facility which is the closest to water bodies or water wells and for each of the proposed facilities)*

**Facility description / name** *(as indicated on site plan)*

**Existing:** Existing Dairy Barn **Proposed 1:** New Dairy Barn

**Proposed 2:** _____ **Proposed 3:** _____

| Facility and environmental risk information | | Facilities | | | | NRCB USE ONLY | |
|---|---|---|---|---|---|---|---|
| | | Existing | Proposed 1 | Proposed 2 | Proposed 3 | Meets requirements | Comments |
| Flood plain information | What is the height of the floor of the lowest manure storage or collection facility above the 1:25 year flood plain or the highest known flood level? | ☒ >1 m ☐ ≤ 1 m | ☒ >1 m ☐ ≤ 1 m | ☐ >1 m ☐ ≤ 1 m | ☐ > 1 m ☐ ≤ 1 m | ☑ YES ☐ NO ☐ YES with exemption | Not located in a known flood plain |
| Surface water information | How many springs are within 100 m of the manure storage facility or manure collection area? | 0 | 0 | | | ☑ YES ☐ NO ☐ YES with exemption | None observed on site |
| | How many water wells are within 100 m of the manure storage facility or manure collection area? | 0 | 0 | | | ☑ YES ☐ NO ☐ YES with exemption | Proposed dairy barn to be located 195 m from water well ID# 164437 |
| | What is the shortest distance from the manure collection or storage facility to a surface water body? (e.g., lake, creek, slough, seasonal) | 630 | 630 | | | ☑ YES ☐ NO ☐ YES with exemption | 600 m from proposed dairy barn to unnamed tributary to Milk River |
| Groundwater information | What is the depth to the water table? | | greater than 6.5 | | | ☑ YES ☐ NO ☐ YES with exemption | No water encountered during drilling; drilled to depth of 6.55 m |
| | What is the depth to the groundwater resource/aquifer you draw water from? | 51.8 | 51.8 | | | ☑ YES ☐ NO ☐ YES with exemption | 51.8 m in water well ID# 164437 |

**Additional information (attach supporting information, e.g. borehole logs, records, etc. you consider relevant to your application)**

# Part 2 — Technical Requirements

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**NRCB USE ONLY**

## ENVIRONMENTAL RISK SCREENING INFORMATION

**ERST** for **proposed** facilities

| Facility | Groundwater score | Surface water score | File number |
|---|---|---|---|
| Dairy barn with in-barn pit | Low | Low | LA25042 |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |

**ERST** for **existing** facilities

| Facility | Groundwater score | Surface water score | File number |
|---|---|---|---|
| Pullet barn | Low | Low | LA21062 |
| Chicken layer barn | Low | Low | LA21062 |
| Hog lagoon | Low | Low | LA21062 |
| Dry cow shed | Low | Low | LA21062 |
| Dry cow barn corrals | Low | Low | LA21062 |
| Feedlot | Low | Low | LA21062 |
| Manure storage pad | Low | Low | LA21062 |
| Broiler/Duck/Turkey barn | Low | Low | LA21062 |

**ERST related comments**:

# Part 2 — Technical Requirements

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**NRCB USE ONLY**

## WATER WELL AND SURFACE WATER INFORMATION

Well IDs: 164437 _____ _____ _____

_____ _____ _____

Surface water related concerns from directly affected parties or referral agencies: ☐ YES ☑ NO

Groundwater related concerns from directly affected parties or referral agencies: ☐ YES ☑ NO

**Water wells** ☑ N/A

If applicable, exemption for 100 m distance requirements applied: ☐ YES ☐ NO Condition required: ☐ YES ☐ NO

**Surface water** ☑ N/A

If applicable, exemption for 30 m distance requirements applied: ☐ YES ☐ NO Condition required: ☐ YES ☐ NO

**Water Well Exemption Screening Tool** ☑ N/A

| Water Well ID | Preliminary Screening Score | Secondary Screening Score | Facility |
|---|---|---|---|
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |

**Groundwater or surface water related comments**:

AO Comment: Exemptions to the 100 m water well setback were granted for the chicken layer barn in LA19040A and for the pullet barn in LA21062. The new dairy barn will be located more than 100 m from well ID# 164437. Therefore, the previously granted exemptions still apply.

# Part 2 — Technical Requirements

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## DISTANCE OF ANY MANURE STORAGE FACILITY (EXISTING OR PROPOSED) TO NEIGHBOURING RESIDENCES

| | | | NRCB USE ONLY | | | | |
|---|---|---|---|---|---|---|---|
| **Neighbour name(s)** | **Legal land description** | **Distance (m)** | **Zoning (LUB) category** | **MDS category (1-4)** | **Distance (m)** | **Waiver attached (if required)** | **Meets regulations** |
| Williams | SE 28-01-14 W4 | 2700 m | Ag | 1 | 3,256 | N/A | Yes |
| Residence | NE 28-01-14 W4 | 2700 m | Ag | 1 | 2,676 | N/A | Yes |
| | | | | | | | |
| | | | | | | | |
| | | | | | | | |

## LAND BASE FOR MANURE AND COMPOST APPLICATION (complete only if an increase in livestock or manure production will occur)

| | | | | NRCB USE ONLY | |
|---|---|---|---|---|---|
| **Name of land owner(s)*** | **Legal land description** | **Usable area** (ha)** | **Soil zone *** ** | **Usable area (ha)** | **Agreement attached (if required)** |
| N/A for authorizations | | | | | |
| | | | | | |
| | | | | | |
| | | | | | |
| | | | | | |
| | | | Total | | |

* If you are **not** the registered landowner, you must attach copies of land use agreements signed by all landowners.

** Available manure spreading area (excluding setback areas from residences, common bodies of water, water wells, etc. as identified in Agdex 096-5 Manure Spreading Regulations)

*** Brown, dark brown, black, grey wooded, or irrigated

**Additional information (attach any additional information as required)**

# Part 2 — Technical Requirements

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**NRCB USE ONLY**

## MINIMUM DISTANCE SEPARATION

Methods used to determine distance (if applicable): Google Earth

Margin of error (if applicable): +/- 5 m

Requirements (m): Category 1: 464 Category 2: 619 Category 3: 773 Category 4: 1,237

Technology factor: ☐ YES ☑ NO

Expansion factor: ☐ YES ☑ NO

MDS related concerns from directly affected parties or referral agencies: ☐ YES ☑ NO

## LAND BASE FOR MANURE AND COMPOST APPLICATION

Land base required: _____ N/A for authorizations

Land base listed: _____

Area not suitable: _____

Available area _____ Requirement met: ☐ YES ☐ NO

Land spreading agreements required: ☐ YES ☐ NO

Manure management plan: ☐ YES ☐ NO If yes, plan is attached: ☐

## PLANS

Submitted and attached construction plans: ☑ YES ☐ NO

Submitted aerial photos: ☑ YES ☐ NO

Submitted photos: ☐ YES ☑ NO

## GRANDFATHERING

Already completed: ☑ YES ☐ NO ☐ N/A

If already completed, see LA05044 and LA19040

# Part 2 — Technical Requirements

Application under the *Agricultural Operation Practices Act* for a confined feeding operation, manure collection area, and/or manure storage facility(ies)

**NRCB USE ONLY**

**ALL SIGNATURES IN FILE** ☑ YES ☐ NO

**DATES OF APPROVAL OFFICER SITE VISITS**

| | |
|---|---|
| July 14, 2025 | |
| | |
| | |

**CORRESPONDENCE WITH MUNICIPALITIES AND REFERRAL AGENCIES**

Date deeming letters sent: July 15, 2025

**Municipality:** County of Warner

☑ letter sent ☑ response received ☑ written/email ☐ verbal ☐ no comments received

**Alberta Health Services:** ☑ N/A

☐ letter sent ☐ response received ☐ written/email ☐ verbal ☐ no comments received

**Alberta Environment and Parks:** ☐ N/A

☑ letter sent ☑ response received ☑ written/email ☐ verbal ☐ no comments received

**Alberta Transportation:** ☑ N/A

☐ letter sent ☐ response received ☐ written/email ☐ verbal ☐ no comments received

**Alberta Regulatory Services:** ☐ N/A

☑ letter sent ☑ response received ☑ written/email ☐ verbal ☐ no comments received

**Other:** Chinook Gas Co-op Ltd. ☐ N/A

☑ letter sent ☐ response received ☐ written/email ☐ verbal ☑ no comments received

**Other:** _____ ☐ N/A

☐ letter sent ☐ response received ☐ written/email ☐ verbal ☐ no comments received

## LIQUID MANURE COLLECTION AND/OR STORAGE: In-barn - Concrete liner

*(complete a copy of this section for **EACH** proposed in-barn liquid manure storage facility with a concrete liner)*

**Facility description / name** *(as indicated on site plan)*

1. Dairy Barn
2. In-barn pit
3.

**Manure storage capacity** *(use one row in the table for **EACH** in-barn storage. Attach additional pages if you require more rows)*

| | Length (m) | Width (m) | Total depth (m) | Depth below ground level (m) | NRCB USE ONLY Calculated storage capacity ($m^3$) |
|---|---|---|---|---|---|
| 1. | 334 (101.8 m) | 177 (53.9 m) | ~~12'~~ | ~~12'~~ | |
| 2. | 11.6 | 4.6 | 3.7 | 3.7 | 197.4 $m^3$ |
| 3. | | | | | |
| | | | | TOTAL CAPACITY | 197.4 $m^3$ |

**Concrete liner details**

| | | | |
|---|---|---|---|
| Scrape alleys or unslatted portions of barn floors (if applicable) | Concrete thickness: 6" | Method of sulphate protection: Type 50 | |
| | Concrete strength: 32 mpA | Concrete reinforcement size and spacing: 15m l Rebar 12" centre | |
| In-barn manure pit floors | Concrete thickness: 10" | Method of sulphate protection: Type 50 | |
| | Concrete strength: 32 mpa | Concrete reinforcement size and spacing: 10 m l 12" centre | |
| In-barn manure pit walls | Concrete thickness: 8" | Method of sulphate protection: Type 50 | |
| | Concrete strength: 32 mpa | Horizontal reinforcement size and spacing: 10 m l 16" centre | Vertical reinforcement size and spacing: 15 m l 12" centre |



AO Comment: Applicant listed dimensions of dairy barn in feet and provided depth of the in-barn pit. Only the in-barn pit to be constructed below grade. The rest of the barn to be constructed at grade.

## LIQUID MANURE COLLECTION AND/OR STORAGE: In-barn - Concrete liner (cont.)

Describe how the joints at the junction of the pit walls, pit floors and any other joints will be sealed

caulking

Describe sealing practices for piping, etc. that penetrates the liner

caulking

**Concrete requirements can be found in Technical Guideline Agdex 096-93**
*Guideline minimums:*
*Solid manure (wet): 30MPa (C)*
*Liquid manure: 32MPa (B)*
*Category A is required to be engineered*
*Method of sulphate protection:*
*Type 50 or Type 10 with fly ash or equivalent*

**NRCB USE ONLY**

Requirements met: ☑ YES ☐ NO

Condition required: ☑ YES ☐ NO

**Additional information**

**NRCB USE ONLY**

Liquid manure storage volume calculator attached: ☑ YES ☐ NO

Depth to water table: Greater than 6.5 m below grade — Requirements met: ☑ YES ☐ NO

Depth to uppermost groundwater resource: 51.8 m below grade — Requirements met: ☑ YES ☐ NO

ERST completed: ☑ see ERST page for details

**Concrete liner requirements**

Leakage detection system required: ☐ YES ☑ NO If yes, please explain why

AO Comment: Applicant is proposing to have an area inside the dairy barn for dry cows/close-ups that uses a naturally occurring protective layer. This will be within the dairy barn dimensions. This area is identified as the "straw pack" in the blue print plans for the dairy barn.

# Part 2 — Technical Requirements

NRCB Natural Resources Conservation Board

Application under the *Agricultural Operation Practices Act* for a confined feeding operation, manure collection area and/or manure storage facility(ies)

## SOLID MANURE, COMPOST, & COMPOSTING MATERIALS: Barns, feedlots, & storage facilities - Naturally occurring protective layer

*(complete a copy of this section for **EACH** barn, feedlot, and storage facility for solid manure, composting materials, or compost with a naturally occurring protective layer for the liner)*

**Facility description / name** *(as indicated on site plan)*

1. Straw Pack
2. _____

**Manure storage capacity**

| | Length (m) | Width (m) | Depth below ground level (m) | NRCB USE ONLY Estimated storage capacity ($m^3$) |
|---|---|---|---|---|
| 1. | 70' (21.3 m) | 39' (11.9 m) | 0 | |
| 2. | | | | |
| | | | TOTAL CAPACITY | Sufficient storage with manure storage pad |

☐ I plan to use a short-term solid manure storage (STMS) as part of my manure storage and handling plan for this CFO. (The AOPA requirements for STMS are set out in the NRCB Short-Term Solid Manure Storage Requirements Fact Sheet.

**Surface water control systems**

Describe the run-on and runoff control system

Within Barn Under Roof

**Naturally occurring protective layer details**

| | | | |
|---|---|---|---|
| Thickness of naturally occurring protective layer | 3 (m) | Provide details (as required) | |
| Soil texture | 28 % sand | 33 % silt | 39 % clay |
| Hydraulic conductivity - naturally occurring protective layer | Depth and type of soil tested: 1.7 m clay | Hydraulic conductivity (cm/s): $1.2 \times 10^{-8}$ cm/s | Describe test standard used: in situ |

**Additional information** *(attach copies of soil test reports)*

**NRCB USE ONLY**

Requirements met: ☑ YES ☐ NO

Condition required: ☐ YES ☑ NO

Report attached: ☑ YES ☐ NO

## SOLID MANURE, COMPOST, & COMPOSTING MATERIALS: Barns, feedlots, & storage facilities - Naturally occurring protective layer (cont.)

**NRCB USE ONLY**

Nine month manure storage volume requirements met: ☑ YES ☐ YES With STMS ☐ NO

Depth to water table: Greater than 6.5 m below grade Requirements met: ☑ YES ☐ NO

Depth to uppermost groundwater resource: 51.8 m below grade Requirements met: ☑ YES ☐ NO

ERST completed: ☑ see ERST page for details

**Surface water control systems**

Requirements met: ☑ YES ☐ NO Details/comments:

AO Comment: Area is within a barn, no run-on or run-off.

**Naturally occurring protective layer details**

Layer specification comments (e.g. sand lenses; layering uniform or irregular; number and location of boreholes):

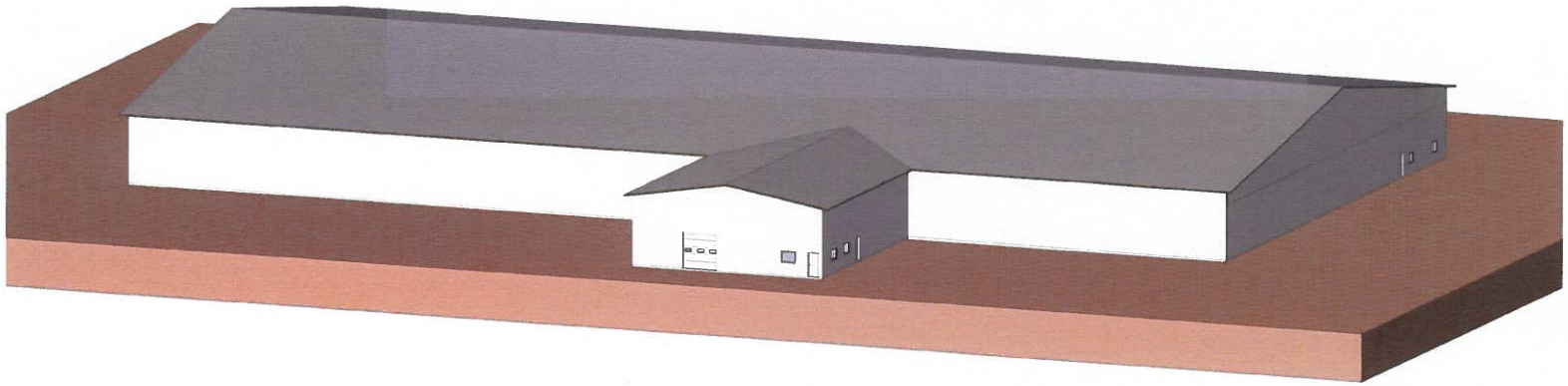
AO Comment: June 24, 2025, JLECS report shows an approximately 3 m thick naturally occurring protective layer with a hydraulic conductivity of 4.0 x $10^{-8}$ cm/s.

# DAIRY BARN

## MILK RIVER, AB

## ISSUED FOR REVIEW - 2025-07-10

| SHEET LIST | | | | |
|---|---|---|---|---|
| PG # | SHEET NO. | SHEET NAME | ISSUE DESCRIPTION | ISSUE DATE |
| ARCHITECTURAL | | | | |
| 1 | A001 | COVER SHEET | ISSUED FOR REVIEW | 2025-07-10 |
| 2 | A003 | NOTES & SCHEDULES | ISSUED FOR REVIEW | 2025-07-10 |
| 3 | A110 | MAIN FLOOR PLAN | ISSUED FOR REVIEW | 2025-07-10 |
| 4 | A111 | MAIN FLOOR PLAN - NORTH CALLOUT | ISSUED FOR REVIEW | 2025-07-10 |
| 5 | A112 | MAIN FLOOR PLAN - SOUTH CALLOUTS | ISSUED FOR REVIEW | 2025-07-10 |
| 6 | A120 | ROOF PLAN | ISSUED FOR REVIEW | 2025-07-10 |
| 7 | A200 | ELEVATIONS | ISSUED FOR REVIEW | 2025-07-10 |
| 8 | A300 | BUILDING SECTIONS | ISSUED FOR REVIEW | 2025-07-10 |
| 9 | A301 | BUILDING SECTIONS | ISSUED FOR REVIEW | 2025-07-10 |
| 10 | A400 | PEN LAYOUT | ISSUED FOR REVIEW | 2025-07-10 |
| STRUCTURAL | | | | |
| 11 | S100 | FOUNDATION PLAN | ISSUED FOR REVIEW | 2025-07-10 |
| 12 | S111 | STRUCTURAL FRAMING LAYOUT | ISSUED FOR REVIEW | 2025-07-10 |
| 13 | S300 | STRUCTURAL DETAILS | ISSUED FOR REVIEW | 2025-07-10 |



1 / A001 CONCEPTUAL



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PROFESSIONAL SEAL

CLIENT: RIVER ROAD FARMING CO. LTD

PROJECT: DAIRY BARN
MILK RIVER, AB

DRAWING TITLE: COVER SHEET

JOB NO: AB010.32001
GT JOB NO: GT25-0214

DRAWN BY: LDH
CHECKED: KAH

DWG NO.: A001
SCALE: AS SHOWN
RA DATE: 2025-07-10
REV: 1
PAGE: 1 / 13

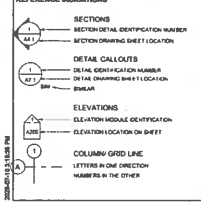
IFR - 07.10.2025

## ABBREVIATIONS

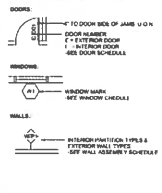
| | |
|---|---|
| AB | ANCHOR BOLT |
| ABC | ALBERTA BUILDING CODE |
| AC | AIR CONDITIONER |
| ACOUS | ACOUSTIC |
| AFF | AFTER FINISHED FLOOR |
| ALT | ALTERNATE |
| ANOD | ANODIZED |
| APPROX | APPROXIMATE |
| ARCH | ARCHITECTURAL |
| B.F. | BARRIER-FREE |
| B.F. WR | BARRIER-FREE WASHROOM |
| BOT | BOTTOM |
| BLDG | BUILDING |
| BM | BEAM |
| BP | BASE PLATE |
| BR | BEDROOM |
| BRG | BEARING |
| BSMT | BASEMENT |
| C/C | CENTRE TO CENTRE |
| C/W | COMPLETE/CONNECT WITH |
| CANT | CANTILEVER |
| CIP | CAST IN PLACE |
| CL | CLEAR/CLOSET |
| ℄ | CENTRE LINE |
| COMB | COMBUSTIBLE |
| COMP | COMPOSITE |
| COL | COLUMN |
| CONC | CONCRETE |
| CONT | CONTINUOUS |
| CORR | CORRIDOR |
| CTR | CENTER |
| D. | DRYER |
| DBL | DOUBLE |
| DEMO | DEMOLITION |
| DET | DETAIL |
| DIA, | Ø DIAMETER |
| DIFF | DIFFUSER |
| DIM | DIMENSION |
| DIAG | DIAGONAL |
| DL | DEAD LOAD |
| DP | DEEP |
| DR | DOOR |
| DS | DOWNSPOUT |
| DWG | DRAWING |
| DN | DOWN |
| E | EAST |
| EA | EACH |
| EF | EXHUAST FAN |
| EL. | ELEV ELEVATION |
| ELEV | ELEVATOR |
| ELEC | ELECTRICAL |
| EMBED | EMBEDMENT |
| EOS | EDGE OF SLAB |
| EQ | EQUAL |
| EW | EACH WAY |
| EX, EXIST | EXISTING |
| EXP | EXPANSION |
| EXPO | EXPOSED |
| EXST | EXISTING |
| EXT | EXTERIOR |
| FD | FLOOR DRAIN |
| FE | FIRE EXTINGUISHER |
| FIN | FINISHED |
| FIXT | FIXTURE |
| FLR | FLOOR |
| FND | FOUNDATION |
| FP | FIRE PLACE |
| FTG | FOOTING |
| F/R | FIRE RATING |
| FRR | FIRE RESISTANCE RATING |
| FUT | FUTURE |
| GB | GYPSUM BOARD |
| GALV | GALVANIZED |
| GA | GAUGE |
| GL | GRIDLINE |
| GLZ | GLAZING |
| GYP | GYPSUM |
| GYP. BD | GYPSUM BOARD |
| H.B. | HOSE BIBB |
| HT | HEIGHT |
| HORIZ | HORIZONTAL |
| HVAC | HEATING, VENTILATION & AIR CONDITIONIN |
| HW | HOT WATER |
| HWT | HOT WATER TANK |
| IN. | INCH |
| INSUL | INSULATION |
| INT | INTERIOR |
| I.D. | INSIDE DIAMETER/IDENTIFICATION |
| k | KILO |
| kN | KILONEWTON |
| kPa | KILOPASCAL |
| LAU | LAUNDRY |
| LAV | LAVATORY |
| LD. BRG | LOAD BEARING |
| LDG | LANDING |
| LG | LONG/LENGTH |
| LONG | LONGITUDINAL |

| | |
|---|---|
| MAX | MAXIMUM |
| MH | MAN HOLE |
| MECH | MECHANICAL |
| MEMB | MEMBRANE |
| MEZZ | MEZZANINE |
| MID | MIDDLE |
| MISC | MISCELLANEOUS |
| MIN | MINIMUM |
| MFG | MANUFACTURING |
| MFR | MANUFACTURER |
| MOD | MODIFIED/MODULAR |
| m | METRE |
| mm | MILLIMETRE |
| MPa | MEGAPASCAL |
| N | NORTH |
| N/A | NOT APPLICABLE |
| NBC | NATIONAL BUILDING CODE OF CANADA |
| NBC(AE) | NATIONAL BUILDING CODE (ALBERTA EDITION) |
| NIC | NOT IN CONTRACT |
| NO | NUMBER |
| NOM | NOMINAL |
| NTS | NOT TO SCALE |
| O/C | ON CENTRE |
| O/O | OUT TO OUT |
| O/H | OVERHEAD |
| OHD | OVER HEAD DOOR |
| OPNG | OPENING |
| OWSJ | OPEN WEB STEEL JOIST |
| PERF | PERFORATED |
| PERIM | PERIMETER |
| PLBG | PLUMBING |
| PL | PLATE |
| POLY | POLYETHYLENE |
| PROJ | PROJECTION |
| PT | PAINTED / PRESSURE TREATED |
| PVC | POLYVINYL CHLORIDE |
| R | RISER / RADIUS |
| RD | ROOF DRAIN |
| REF | REFERENCE |
| REM | REMAINDER |
| REQ'D | REQUIRED |
| REV | REVISION |
| REINF | REINFORCEMENT |
| RM | ROOM |
| RO | ROUGH OPENING |
| S | SOUTH |
| SA | SMOKE ALARM |
| SAN | SANITARY |
| SDF | STEP DOWN FOOTING |
| SD | SMOKE DETECTOR |
| SECT | SECTION |
| SF | SQUARE FEET |
| SHWR | SHOWER |
| SIM | SIMILAR |
| SL | SLAB |
| SOG | SLAB ON GRADE |
| SK | SINK |
| SPEC | SPECIFICATION |
| SPF | SPRUCE-PINE-FIR |
| STD | STANDARD |
| STOR | STORAGE |
| STRC | STRUCTURAL |
| SQ | SQUARE |
| ST | STRAIGHT |
| SYMM | SYMMETRICAL |
| SWC | SOLID WOOD CORE |
| T | TOP |
| T&B | TOP AND BOTTOM |
| TD | TRENCH DRAIN |
| TEMP | TEMPERATURE |
| THK | THICKNESS |
| THRU | THROUGH |
| T/O | TOP OF |
| TOB | TOP OF BEAM |
| TOC | TOP OF CONCRETE |
| TOF | TOP OF FOOTING |
| TOS | TOP OF SLAB |
| TOW | TOF OF WALL |
| TYP | TYPICAL |
| U/S | UNDERSIDE |
| U/N | UNLESS NOTED |
| UNO | UNLESS NOTED OTHERWISE |
| VERT | VERTICAL |
| W/ | WITH |
| W | WIDE FLANGE BEAM |
| W. | WASHER |
| WD | WOOD |
| WG | WIRED GLASS |
| WP | WALL PLATE, WORKING POINT |
| WR | WASHROOM |
| WR | WATER RESISTANCE |
| WT | STRUCTURAL TEE |
| WS | WEATHERSTRIPPING |
| WWF | WELDED WIRE FABRIC |
| WWF | WELDED WIDE FLANGE |

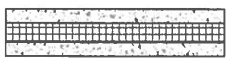
### REFERENCE INDICATIONS




### WALL & OPENING INDICATIONS




### EXTERIOR WALLS

| I.D. | WALL ASSEMBLY | FIRE RATING |
|---|---|---|
| W1 |  **10" PANEL WALL ASSEMBLY:** - 3" CONCRETE - 4" INSULATED CORE - 3" CONCRETE | |

### INTERIOR PARTITION WALLS

| I.D. | WALL ASSEMBLY | FIRE RATING |
|---|---|---|
| NOT LABELLED |  **2X8 WOOD STUD WALL:** - 1/2" TRUSSCORE - 1/2" PLYWOOD SHEATHING - 2X8 #2/BTR WOOD STUDS @ 16" O/C - 1/2" PLYWOOD SHEATHING - 1/2" TRUSSCORE | |
| P1 |  **8" PRECAST CONCRETE WALL:** - 8" PRECAST CONCRETE | |

### DOOR SCHEDULE

| I.D. | DOOR WIDTH | DOOR HEIGHT | COUNT | TYPE |
|---|---|---|---|---|
| E01 | 3' - 0" | 6' - 8" | 7 | EXTERIOR - SINGLE PASSAGE |
| I01 | 3' - 0" | 6' - 8" | 19 | INTERIOR - SINGLE PASSAGE |
| OHD01 | 14' - 0" | 14' - 0" | 2 | OH DOOR |
| OHD02 | 10' - 0" | 10' - 0" | 1 | OH DOOR |
| OHD03 | 8' - 0" | 7' - 0" | 1 | OH DOOR |

Grand total: 30

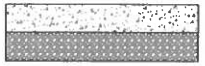
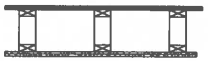
### WINDOW SCHEDULE

| I.D. | WIDTH | HEIGHT | COUNT |
|---|---|---|---|
| 4836 | 4' - 0" | 3' - 0" | 6 |
| 6080 | 5' - 0" | 5' - 0" | 1 |

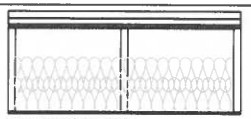
Grand total: 7

NOTES:
CONTRACTOR TO REFER TO MANUFACTURER'S INSTALLATION PROCEDURES AND FLASING DETAILS FOR DOORS AND WINDOWS

### FLOOR SCHEDULE

| I.D. | FLOOR ASSEMBLY | FIRE RATING |
|---|---|---|
| FLR1 |  **SLAB ON GRADE :** - 6" CONCRETE SLAB - 6mil VAPOUR BARRIER - MIN. 5" OF 3/4" WASHED ROCK, SEE STRC. DWGS | |
| FLR2 |  **MEZZANINE FLOOR ASSEMBLY:** - 3/4" T&G PLYWOOD SHEATHING - 9" OWW BY SUPPLIER @ 16" O/C - 2 LAYERS 1/2" TYPE 'X' GYPSUM BOARD | 45 MIN NBC 2023 ASSEMBLY F23a |

### ROOF SCHEDULE

| I.D. | ROOF ASSEMBLY | FIRE RATING |
|---|---|---|
| R1 |  **BUILDING ROOF ASSEMBLY:** - 26ga RIBBED METAL FINISH - 2X4 #2/BTR WOOD STRAPPING @ 24" O/C - ROOFING MEMBRANE - 7/16" OSB SHEATHING - ENGINEERED WOOD TRUSSES @ 24" O/C - R50 INSULATION - 7/16" OSB SHEATHING | |

NOTES:
1. **ENGINEERED ROOF TRUSSES DESIGN AND SUPPLIED BY TRUSS MANUFACTURER.**
2. TRUSS HOLD DOWNS AND BRACING DESIGNED BY MANUFACTURER.



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PROFESSIONAL SEAL

CLIENT: RIVER ROAD FARMING CO. LTD

PROJECT: DAIRY BARN
MILK RIVER, AB

DRAWING TITLE: NOTES & SCHEDULES

JOB NO: AB010.32001
GT JOB NO: GT25-0214

| DRAWN BY: | CHECKED: |
|---|---|
| LDH | KAH |

DWG NO. A003 | SCALE: AS SHOWN | ISSUE DATE: 2025-07-10 | REV: 1 | PAGE: 2/13

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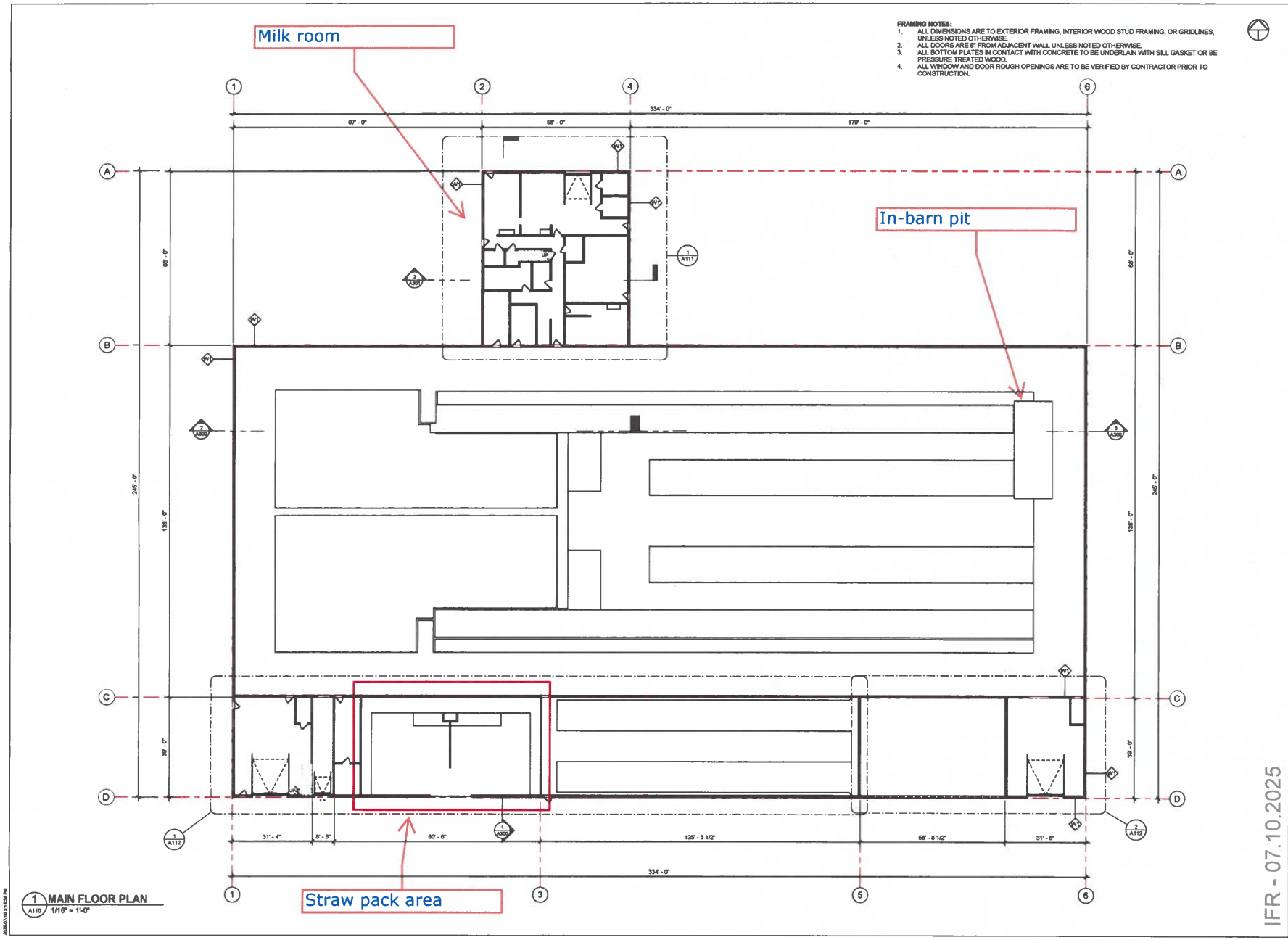
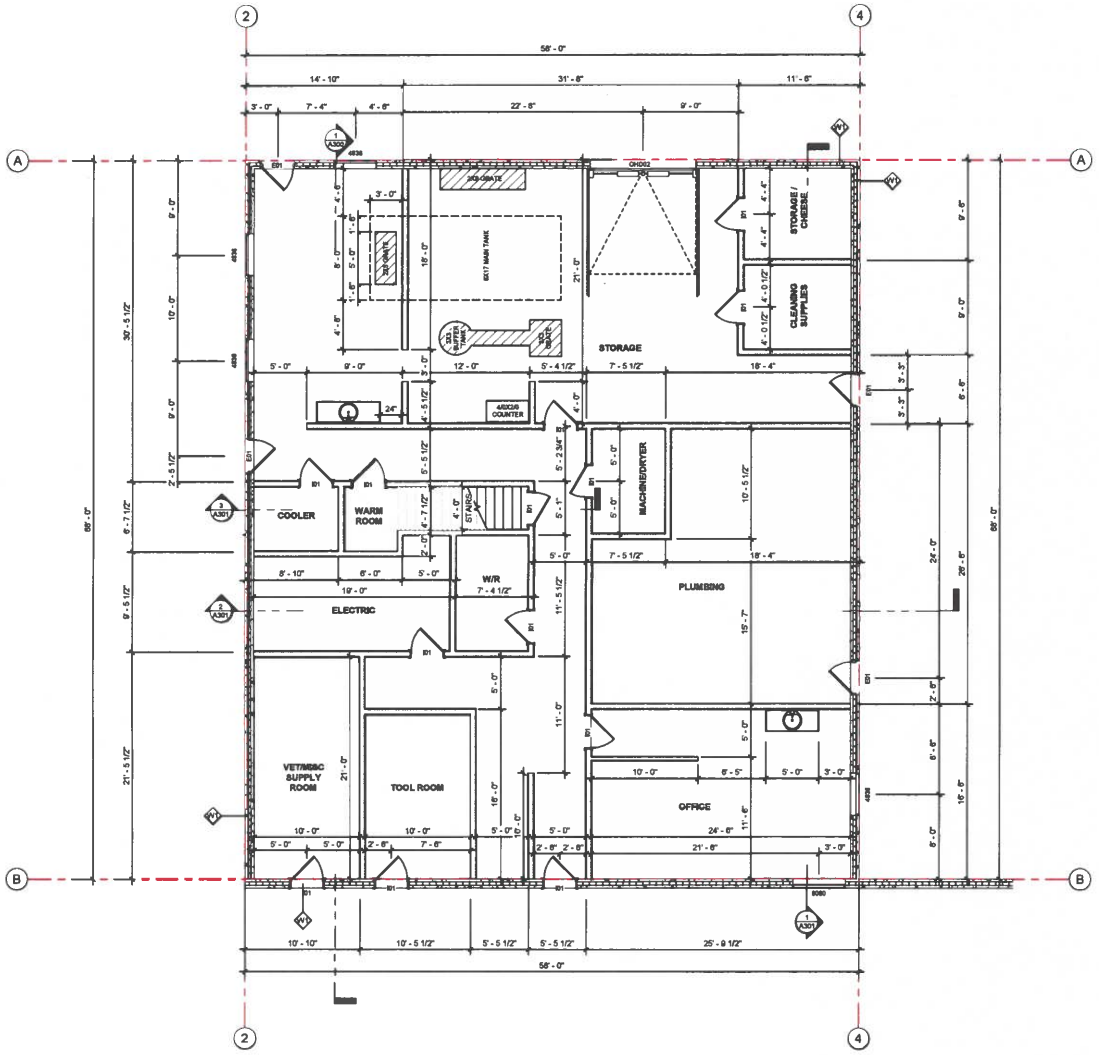



AO Comment: Straw pack area proposed to have a naturally occurring protective layer.




1 MAIN FLOOR PLAN - NORTH CALLOUT
A111 3/16" = 1'-0"

| DOOR SCHEDULE | | | | |
|---|---|---|---|---|
| | DOOR | | | |
| I.D. | WIDTH | HEIGHT | COUNT | TYPE |
| E01 | 3' - 0" | 6' - 8" | 7 | EXTERIOR - SINGLE PASSAGE |
| I01 | 3' - 0" | 6' - 8" | 19 | INTERIOR - SINGLE PASSAGE |
| OHD01 | 14' - 0" | 14' - 0" | 2 | OH DOOR |
| OHD02 | 10' - 0" | 10' - 0" | 1 | OH DOOR |
| OHD03 | 8' - 0" | 7' - 0" | 1 | OH DOOR |
| ~~Grand total: 30~~ | | | | |

| WINDOW SCHEDULE | | | |
|---|---|---|---|
| I.D. | WIDTH | HEIGHT | COUNT |
| 4636 | 4' - 0" | 3' - 0" | 6 |
| 6060 | 5' - 0" | 5' - 0" | 1 |
| Grand total: 7 | | | |



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PROFESSIONAL SEAL

CLIENT: RIVER ROAD FARMING CO. LTD

PROJECT: DAIRY BARN
MILK RIVER, AB

DRAWING TITLE: MAIN FLOOR PLAN - NORTH CALLOUT

JOB NO: AB010.32001
GT JOB NO: GT25-0214

DRAWN BY: LDH
CHECKED: KAH

DWG NO: A111
SCALE: AS SHOWN
ISSUE DATE: 2025-07-10
REV: 1
PAGE: 4/13

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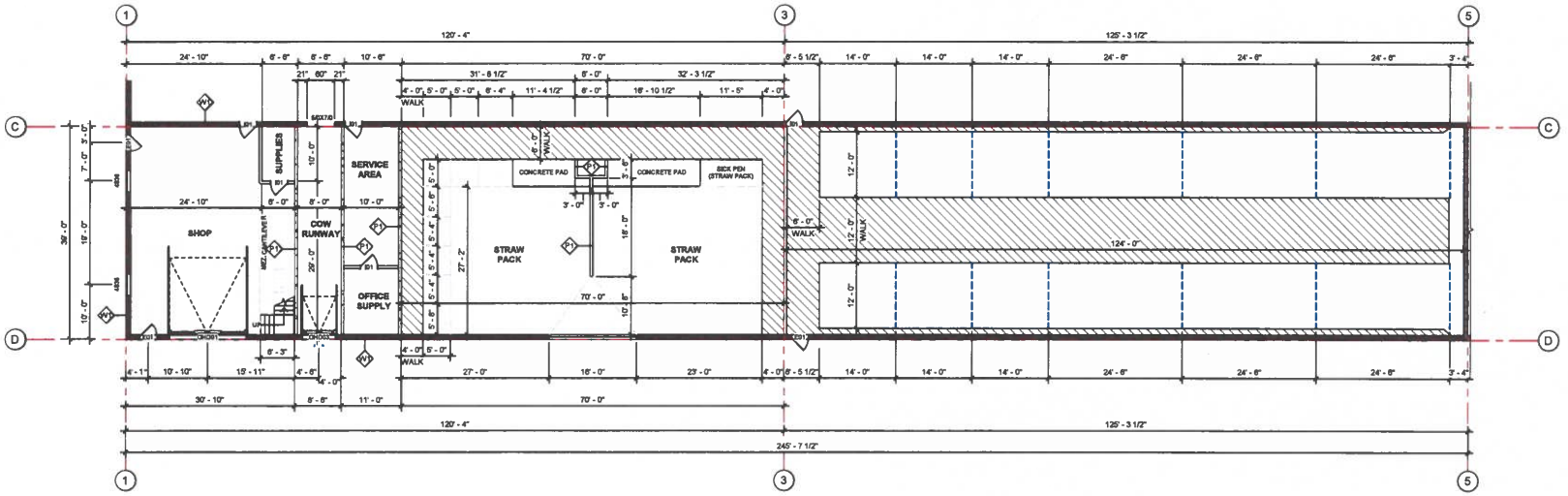


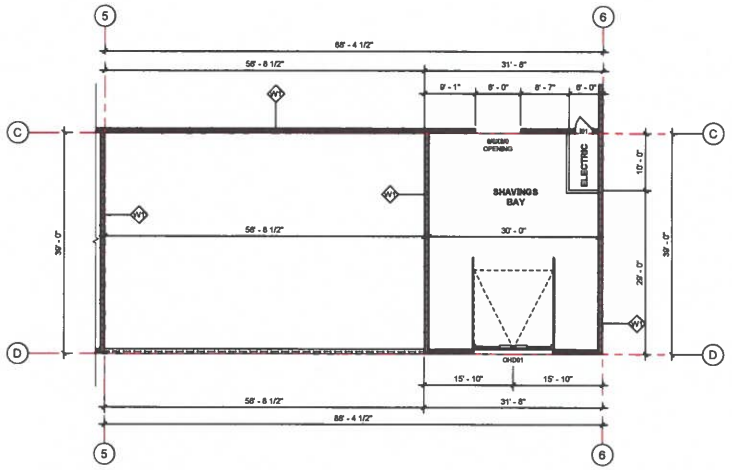

1 A112 **MAIN FLOOR PLAN - SOUTH WEST**
1" = 10'-0"

| DOOR SCHEDULE | | | | |
|---|---|---|---|---|
| | DOOR | | | |
| I.D. | WIDTH | HEIGHT | COUNT | TYPE |
| ED1 | 3' - 0" | 6' - 8" | 7 | EXTERIOR - SINGLE PASSAGE |
| ID1 | 3' - 0" | 6' - 8" | 19 | INTERIOR - SINGLE PASSAGE |
| OHD01 | 14' - 0" | 14' - 0" | 2 | OH DOOR |
| OHD02 | 10' - 0" | 10' - 0" | 1 | OH DOOR |
| OHD03 | 8' - 0" | 7' - 0" | 1 | OH DOOR |

Grand total: 30

| WINDOW SCHEDULE | | | |
|---|---|---|---|
| I.D. | WIDTH | HEIGHT | COUNT |
| 4836 | 4' - 0" | 3' - 0" | 6 |
| 6060 | 5' - 0" | 5' - 0" | 1 |

Grand total: 7




2 A112 **MAIN FLOOR PLAN - SOUTH EAST**
1" = 10'-0"



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PROFESSIONAL SEAL

CLIENT: RIVER ROAD FARMING CO. LTD

PROJECT: DAIRY BARN
MILK RIVER, AB

DRAWING TITLE: MAIN FLOOR PLAN - SOUTH CALLOUTS

JOB NO: AB010.32001
GT JOB NO: GT25-0214

| DRAWN BY | CHECKED |
|---|---|
| LDH | KAH |

DWG NO. A112 | SCALE: AS SHOWN | ISSUE DATE: 2025-07-10 | REV: 1 | PAGE: 5/13

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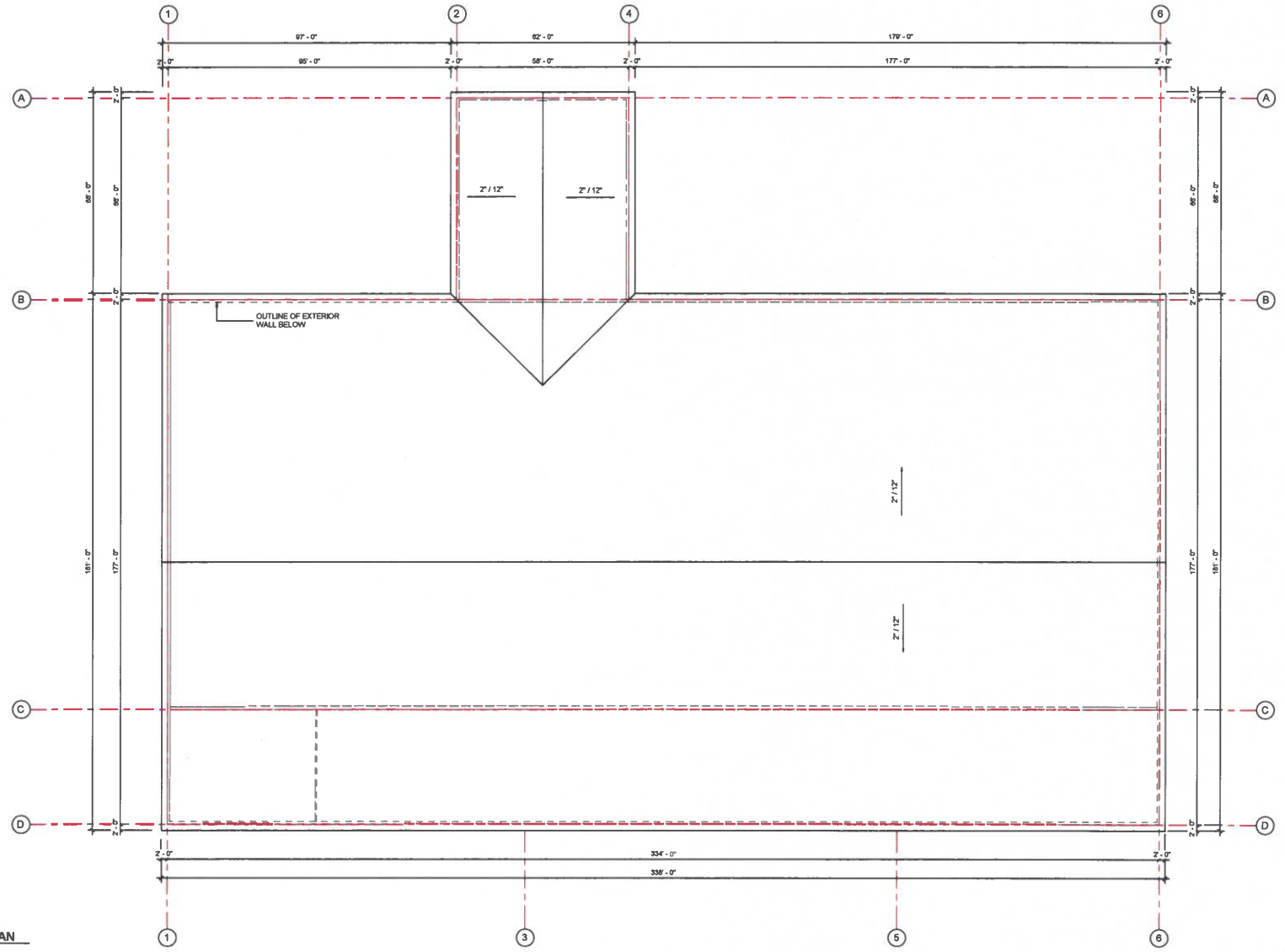
NOTES:
1. ENGINEERED ROOF TRUSSES DESIGNED AND SUPPLIED BY OTHERS.
2. ALL REQUIRED ROOF HANGERS, CLIPS, ETC. ARE TO BE SUPPLIED BY THE ROOF TRUSS MANUFACTURER.
3. ALL OVERHANGS 2'-0" UNLESS NOTED OTHERWISE.




1 ROOF PLAN
A120 1/16" = 1'-0"



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CLIENT
RIVER ROAD FARMING CO. LTD

PROJECT
DAIRY BARN
MILK RIVER, AB

DRAWING TITLE:
ROOF PLAN

JOB NO: AB010.32001
GT JOB NO: GT25-0214
DRAWN BY: LDH
CHECKED: KAH
DWG NO. A120
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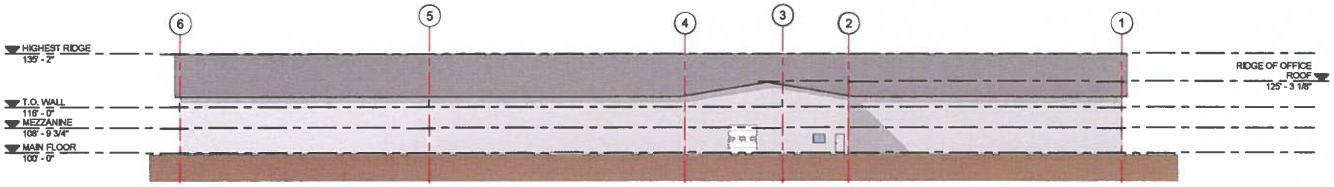
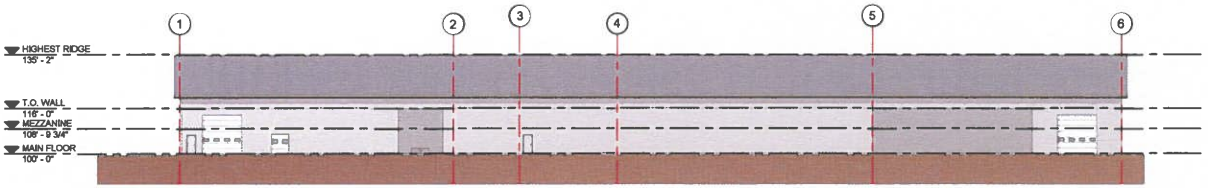
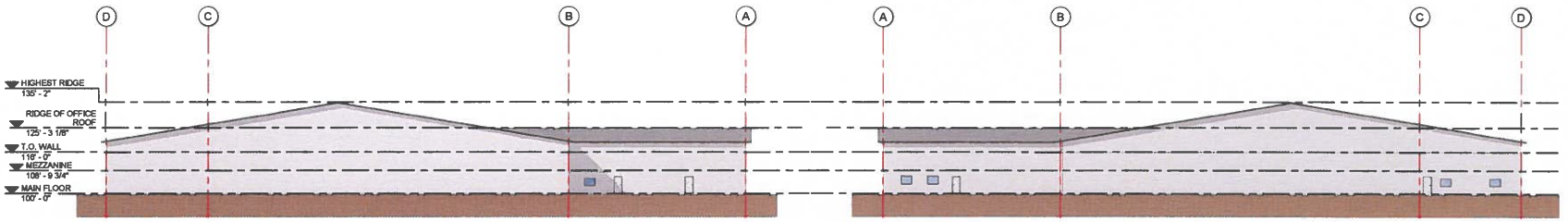



2 NORTH ELEVATION
A200 1" = 20'-0"




1 SOUTH ELEVATION
A200 1" = 20'-0"




3 EAST ELEVATION
A200 1" = 20'-0"

4 WEST ELEVATION
A200 1" = 20'-0"

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Ph. 403.972.0074
www.cfiengineering.ca

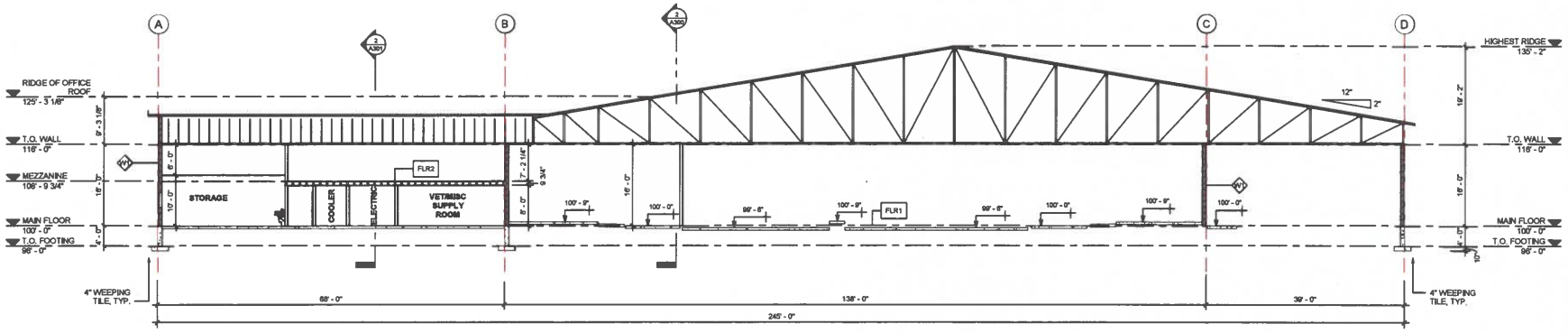
PROFESSIONAL SEAL

CLIENT:
RIVER ROAD FARMING CO. LTD

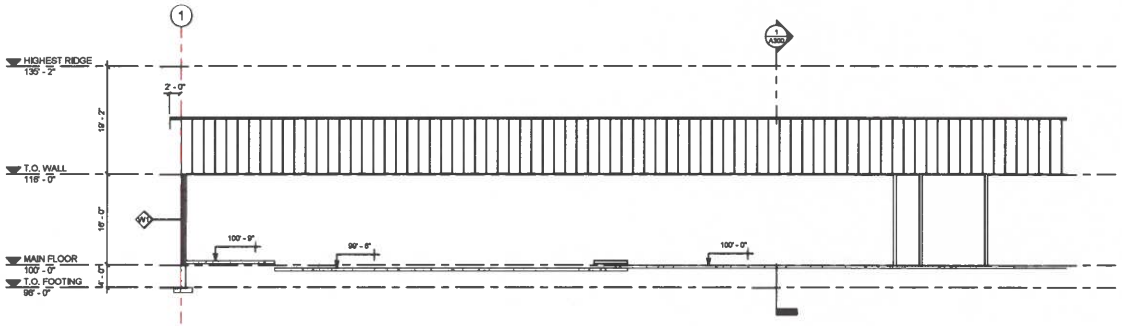
PROJECT:
DAIRY BARN
MILK RIVER, AB

DRAWING TITLE:
ELEVATIONS

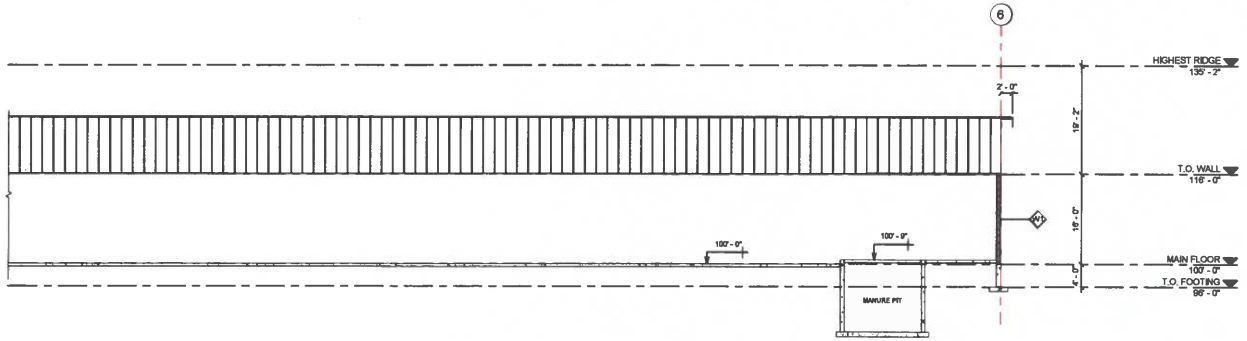
JOB NO: AB010.32001
GT JOB NO: GT25-0214
DRAWN BY: LDH
CHECKED: KAH
DWG NO: A200
SCALE: AS SHOWN
ISSUE DATE: 2025-07-10
REV: 1
PAGE: 7/13




1 A300 CROSS SECTION
1" = 10'-0"




2 A300 LONGITUDINAL SECTION 1-3
1" = 10'-0"




3 A300 LONGITUDINAL SECTION 3-4
1" = 10'-0"



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CLIENT: RIVER ROAD FARMING CO. LTD

PROJECT: DAIRY BARN
MILK RIVER, AB

DRAWING TITLE: BUILDING SECTIONS

JOB NO: AB010.32001
GT JOB NO: GT25-0214

DRAWN BY: LDH
CHECKED: KAH

DWG NO: A300
SCALE: AS SHOWN
IM DATE: 2025-07-10
REV: 1
PAGE: 8/13

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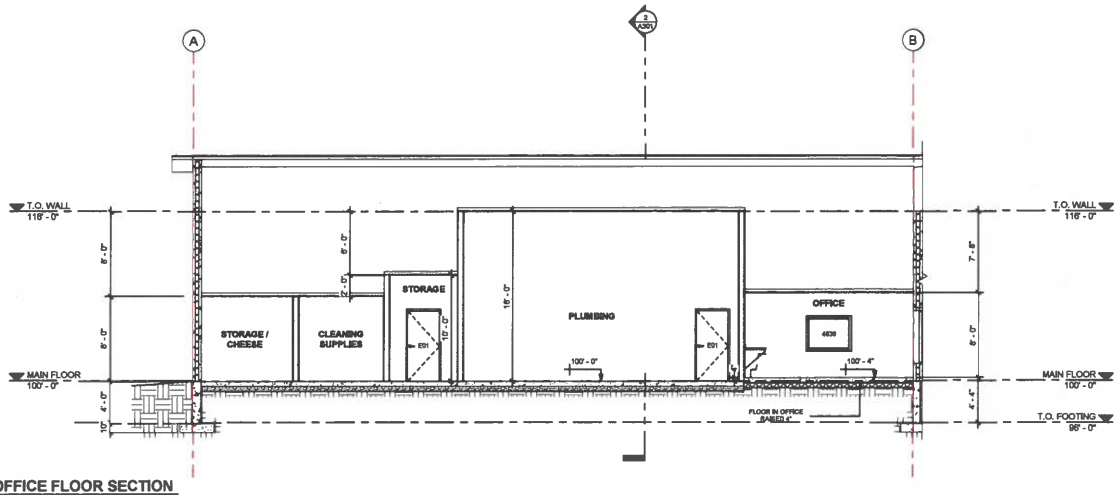
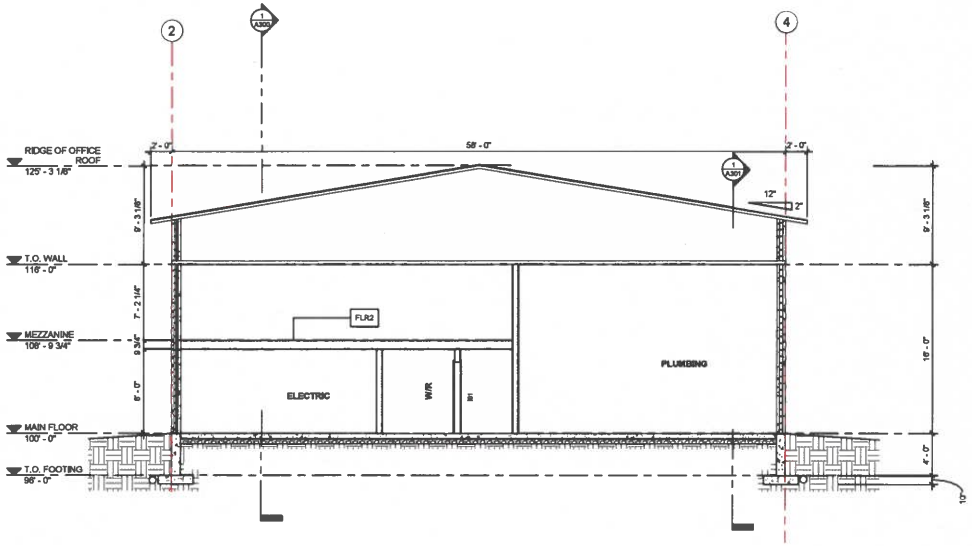
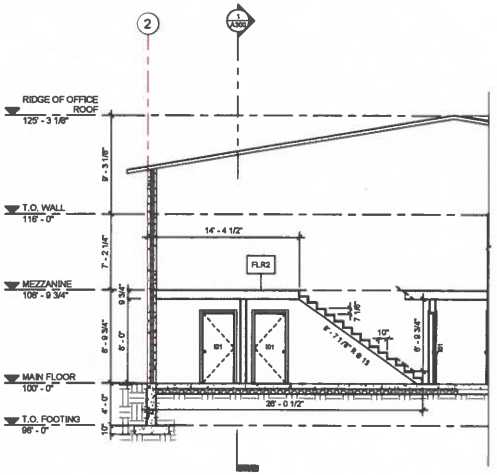



1 A301 **OFFICE FLOOR SECTION**
3/16" = 1'-0"




2 A301 **PARLOUR SECTION**
3/16" = 1'-0"




3 A301 **STAIR SECTION**
3/16" = 1'-0"



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PROJECT: DAIRY BARN
MILK RIVER, AB

DRAWING TITLE: BUILDING SECTIONS

JOB NO: AB010.32001
GT JOB NO: GT25-0214
DRAWN BY: LDH
CHECKED: KAH
DWG NO: A301
SCALE: AS SHOWN
ISSUE DATE: 2025-07-10
REV: 1
PAGE: 9/13

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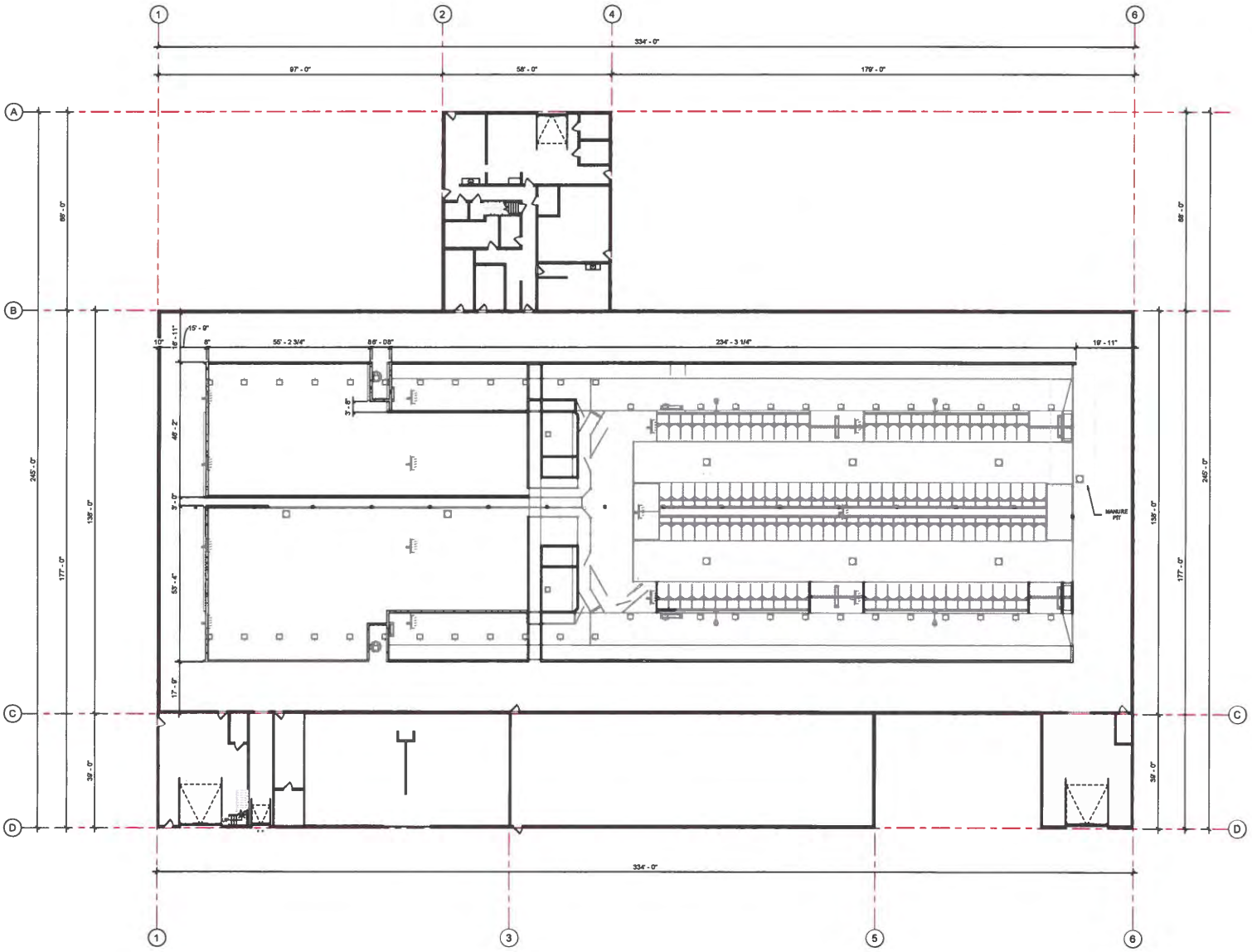


1 PEN LAYOUT
A400 1/16" = 1'-0"

NOTE: PEN LAYOUT IS DIAGRAMMATIC ONLY. CONSULT WITH OWNER



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CLIENT
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PROJECT
DAIRY BARN
MILK RIVER, AB

DRAWING TITLE
PEN LAYOUT

JOB NO. AB010.32001
GT JOB NO. GT25-0214
DRAWN BY LDH
CHECKED KAH
DWG NO. A400
SCALE: AS SHOWN
ISS DATE: 2025-07-10
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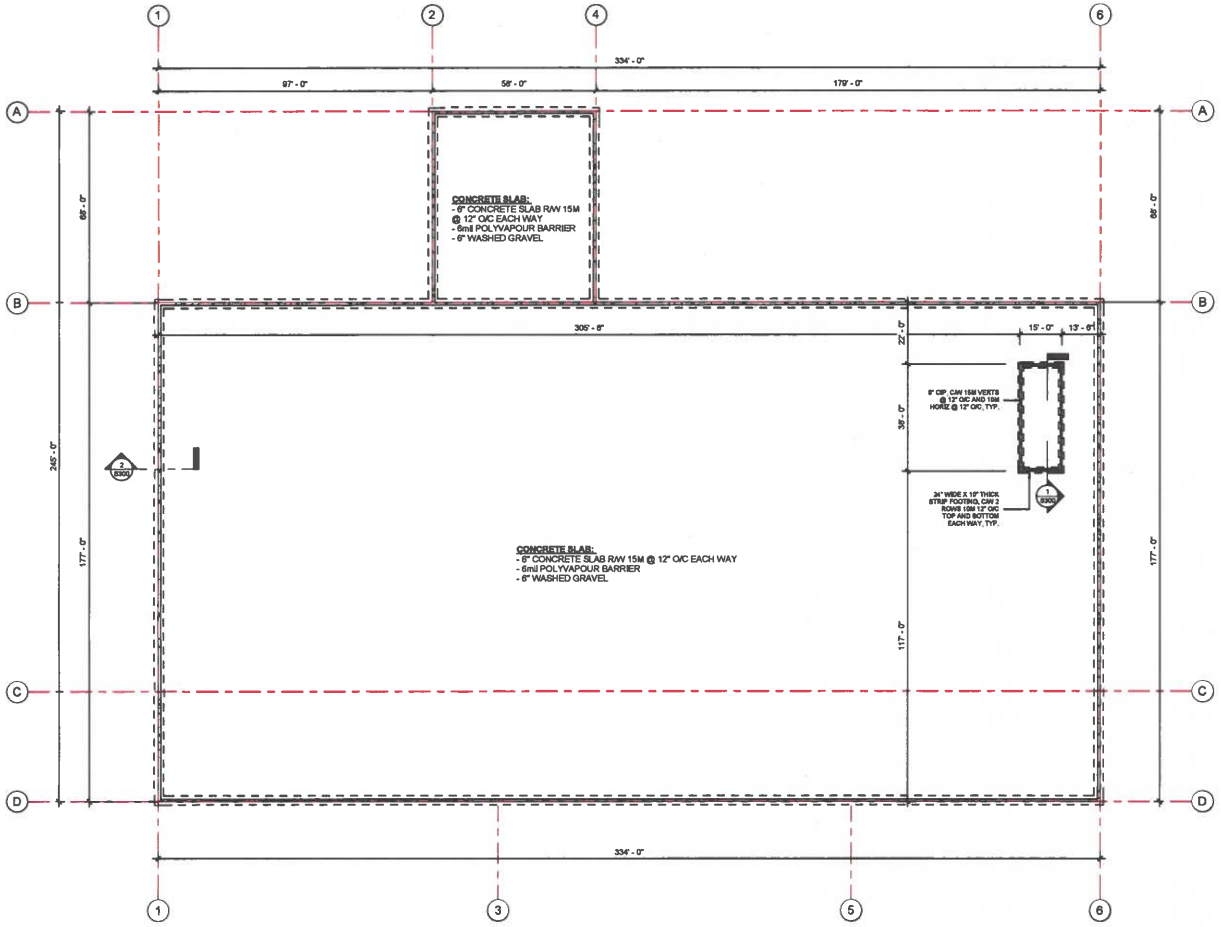
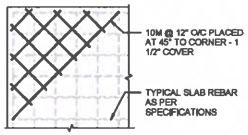
PAGE 10/13

IFR - 07.10.2025

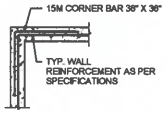
**FOUNDATION NOTES:**
1. ALL DIMENSIONS ARE TO EXTERIOR FOUNDATION OR GRIDLINES, UNLESS NOTED OTHERWISE.
2. CONTRACTOR TO VERIFY ALL ROUGH OPENINGS PRIOR TO POURING CONCRETE FOR DOOR BUCKS.




1 S100 **FOUNDATION PLAN**
1" = 20'-0"




2 S100 **TYP. SLAB CORNER DETAIL**
3/8" = 1'-0"




3 S100 **TYP. CORNER REINFORCEMENT**
3/8" = 1'-0"

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CLIENT: RIVER ROAD FARMING CO. LTD

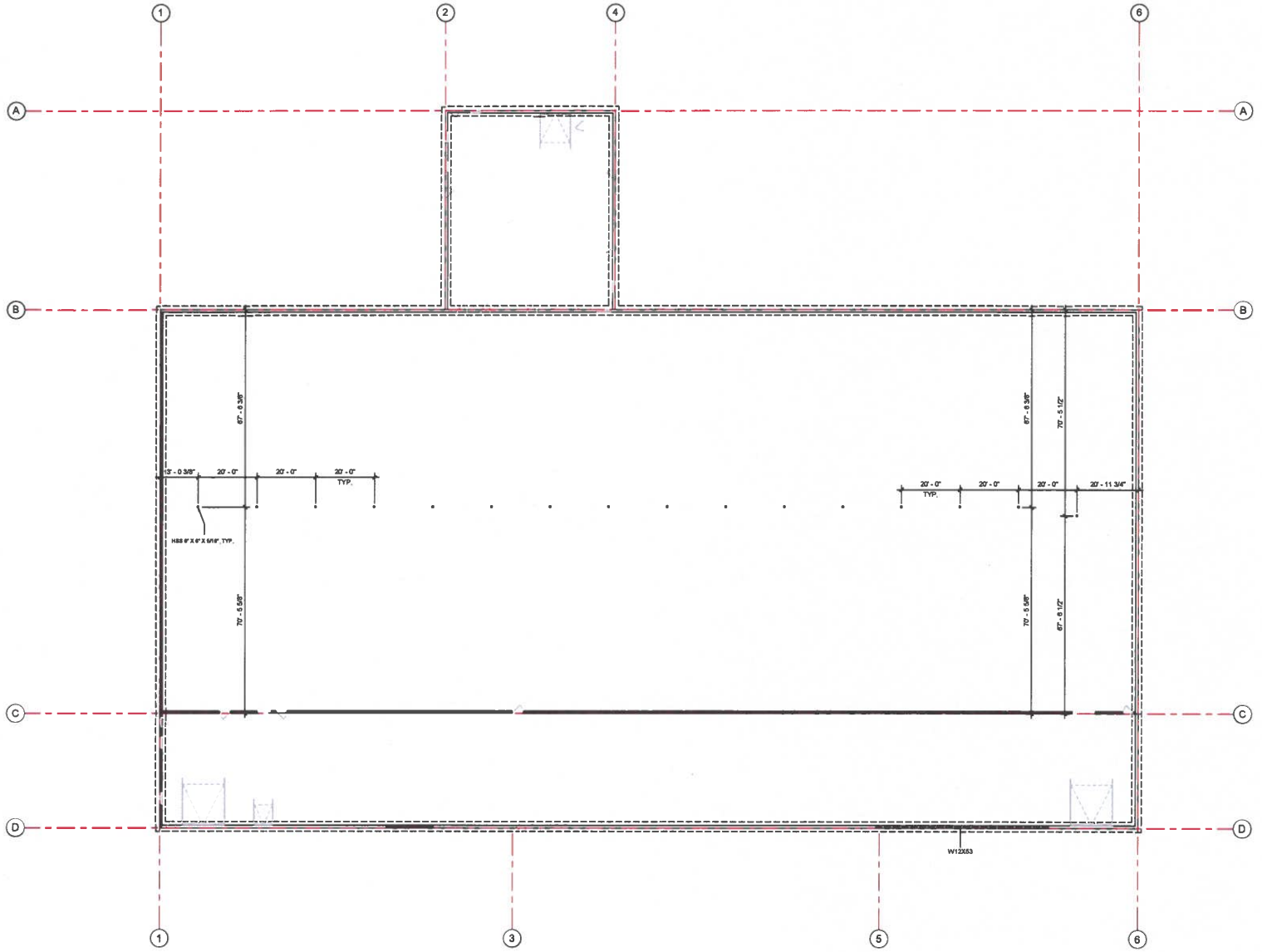
PROJECT: DAIRY BARN
MILK RIVER, AB

DRAWING TITLE: FOUNDATION PLAN

JOB NO: AB010.32001
GT JOB NO: GT25-0214

| DRAWN BY: | CHECKED: |
|---|---|
| LDH | KAH |

DWG NO. S100 | SCALE: AS SHOWN | ISSUE DATE: 2025-07-10 | REV: 1 | PAGE: 11/13




1 MECHANICAL PLAN
S111 1/16" = 1'-0"



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CLIENT:
RIVER ROAD FARMING CO. LTD

PROJECT:
DAIRY BARN
MILK RIVER, AB

DRAWING TITLE:
STRUCTURAL FRAMING LAYOUT

JOB NO: AB010.32001
GT JOB NO: GT25-0214

| DRAWN BY: | CHECKED: |
|---|---|
| LDH | KAH |

DWG NO. S111
SCALE: AS SHOWN
ISSUE DATE: 2025-07-10
REV: 1
PAGE: 12/13

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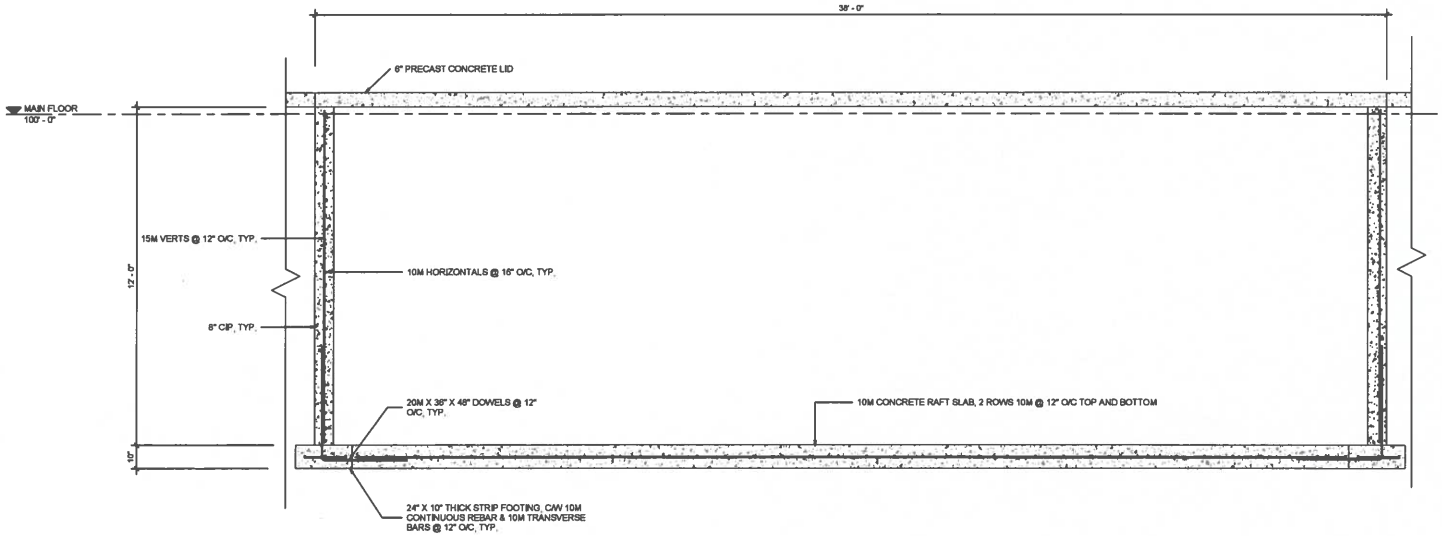
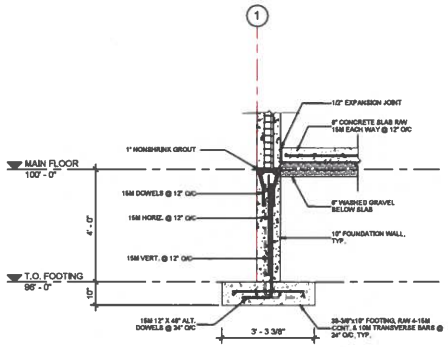



1 S300 **PIT SECTION**
1/2" = 1'-0"




2 S300 **TYP. FOUNDATION SECTION**
1/2" = 1'-0"



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PROFESSIONAL SEAL

CLIENT:
RIVER ROAD FARMING CO. LTD

PROJECT:
DAIRY BARN
MILK RIVER, AB

DRAWING TITLE:
STRUCTURAL DETAILS

JOB NO: AB010.32001
GT JOB NO: GT25-0214
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CHECKED: KAH
DWG NO: S300
SCALE: AS SHOWN
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2025-07-10 2:56:04 PM

AO Comment: The applicant is not proposing to construct the "animal shelter and catch basin" that is referenced in the following JLECS reports at this time.

JLECS

J Lobbezoo Engineering & Consulting Services Ltd.
PO Box 96, Monarch, AB T0L1M0

24 June 2025

JLECS File: P25052

**GT Projects Inc.**
16 Cobblestone Lane
Raymond, AB T0K2S0

Attention: Mr. Greg Holt

**Re: Geotechnical Investigation**
**Proposed River Road Colony Dairy Barn, Corrals, Catch Basin**
**NE-32-01-14-W4, near Coutts, AB**

## 1.0 INTRODUCTION

At the request of the GT Projects Inc., J Lobbezoo Engineering & Consulting Services Ltd. (JLECS) has carried out a geotechnical investigation to support the design and construction of the above-captioned project.

Based on information provided, it is understood that the proposed dairy barn will be located southeast of the colony residential buildings, and that the new barn will have a general footprint of about 216 ft by 334 ft. The approximate location of the proposed building is illustrated on Figure 1, attached. In addition, it is understood that a new animal corral area is proposed for the area southeast of the dairy barn, which will be complete with an animal shelter and catch basin.

This report summarizes the results of the current geotechnical investigation and provides geotechnical discussion and recommendations to support the proposed development. This report is subject to the limitations outlined in the attached document. Discussion and recommendations pertaining to the proposed animal corral and catch basin, including permeability test measurements, are provided under separate cover to support the NRCB permitting of those facilities.

## 2.0 GEOTECHNICAL INVESTIGATION – METHODOLOGY AND RESULTS

### 2.1 Methodology

To assess the subsurface soil and groundwater conditions at the subject site, JLECS visited the site on May 28, 2025, and monitored the drilling of eight boreholes at the locations denoted on Figure 1 as BH25-01 to BH25-08. As illustrated on Figure 1, boreholes BH25-01 to BH25-05 were advanced in the area of the proposed dairy barn, while boreholes BH25-06 to BH25-08 were advanced in the area of the proposed animal shelter, corrals, and catch basin.

The boreholes were advanced using a truck-mounted drill equipped with continuous flight solid stem augers and soil testing equipment and were terminated at depths of approximately 4.6 m to 6.5 m below the existing grade. During the drilling, disturbed soil samples were collected from the auger flights. In addition, Standard Penetration Tests (SPTs) were also carried out at regular intervals to assess the soil consistency/compactness, and to obtain representative samples for identification.

Upon completion of the drilling, 25 mm diameter hand-slotted standpipes were installed in boreholes BH25-02 and BH25-03 to facilitate measurement of the depth to the groundwater table. The annular space was backfilled with drill cuttings with a bentonite cap at the surface. The remaining boreholes were backfilled with the drill cuttings.

The drilling was carried out under the supervision of JLECS who also collected the soil samples and logged the subsurface conditions. The recovered soil samples were transported to JLECS's laboratory for further review, and for selected laboratory classification testing. Laboratory testing for this project consisted of routine moisture content determinations and Atterberg Limit determinations with results presented on the appended borehole logs, Figure 2, and summarized in the following paragraphs.

### 2.2 Soil and Groundwater Conditions

The subsurface conditions encountered are detailed on the attached borehole logs and summarized in the following paragraphs. It must be noted that boundaries of soil indicated on the borehole logs are inferred from non-contiguous sampling and observations during drilling. These boundaries are intended to reflect transition zones for the purposes of geotechnical design and should not be interpreted as exact planes of geological change.

Boreholes BH25-07 and BH25-08 were surfaced with a 200 mm thick layer of topsoil, while the remaining borehole locations had all previously been stripped of topsoil.

The predominant natural mineral soil encountered in the boreholes was clay till. The clay till was generally described as medium plastic with trace sand, trace gravel, coal and oxide inclusions, brown, and stiff to hard (based on observed drill resistance and SPT N-values ranging between about 10 and 37 blows). It is noted that a zone of soft to firm, very moist and sandy clay till was encountered in borehole BH25-07 (proposed animal shelter) at a depth of about 1.5 m below grade. Based on laboratory testing, the *in situ* water content of the clay till ranged between 10 and 22 percent, generally indicative of damp to moist soil conditions.

Two representative samples of the clay till were subjected to Atterberg Limits testing, the results of which are presented on the borehole logs, Figure 2, and summarized in Table 1. The results of the Atterberg Limits testing indicated that the clay till is of medium plasticity.

**Table 1: Atterberg Limits**

| Borehole / Sample No. | Liquid Limit, $w_L$ | Plasticity Index, *Ip* | Moisture Content, *w* |
|---|---|---|---|
| BH25-01/S1 | 33 | 21 | 14.1% |
| BH25-03/S3 | 35 | 22 | 14.3% |

In borehole BH25-05, a layer of silty sand was encountered at 4 m to 5 m depth. The silty sand was generally described as light brown, dense, and moist.

Below depths of about 3 m to 5 m below the existing grade, a transition to mudstone and/or siltstone was observed in all of the boreholes, and all of the boreholes were terminated in the upper bedrock.

Details of groundwater seepage are provided on the borehole logs. As noted on the logs, minor groundwater seepage was observed in borehole BH25-03 below 5 m depth while the remaining boreholes were all open and dry during the drilling. As indicated previously, 25 mm diameter hand-slotted standpipes were installed in boreholes BH25-02 and BH25-03 to facilitate measurement of the depth to groundwater. The standpipes were monitored on June 12, 2025 (about a week following the drilling), at which time the standpipe at borehole BH25-02 was dry, and a groundwater depth of 3.66 m was measured at borehole BH25-03. It is noted that the groundwater conditions are expected to fluctuate seasonally in response to spring thaw and periods of heavy precipitation, and may differ at the time of construction.

## 3.0 GEOTECHNICAL DISCUSSION AND RECOMMENDATIONS

As indicated in Section 1, it is understood that the proposed dairy barn will be located southeast of the colony residential buildings, and that the new barn will have a general footprint of about 216 ft by 334 ft. The approximate location of the proposed building is illustrated on Figure 1, attached. In addition, it is understood that a new animal corral area is proposed for the area southeast of the dairy barn, which will be complete with an animal shelter and catch basin.

The clay till encountered at the dairy barn site is considered suitable to support the proposed barn on conventional strip and spread footings. As discussed in Section 2.2, a layer of soft to firm clay till was encountered at the proposed animal shelter at typical footing depth. For spread footings, a reduced bearing pressure would be required for the animal shelter footings, or the structure can be constructed as a pole barn with the poles extending through the marginal layer.

Based on our understanding of the proposed development as discussed above, in conjunction with the results of the current field investigation, the following paragraphs provide geotechnical discussion and recommendations pertaining to site preparation, excavations, shallow foundations, slab construction, lateral earth pressures, backfill, drainage considerations, concrete mix considerations, and seismic site classification.

### 3.1 Site Preparation, Excavations and Dewatering

All excavations should conform to Part 32 of the current Alberta Occupational Health and Safety Code.

Prior to placement of fill or concrete at the site, all existing topsoil, foundations, fill, and/or otherwise deleterious materials should be removed from the footprint of the proposed building. It is noted that an old barn had been removed from the site, and that an excavation crew was onsite cleaning up the excavation at the time of the geotechnical drilling. Following the site stripping, the exposed subgrade should be carefully reviewed, and any loose or soft zones noted during the inspection should be remediated as necessary, or further assessed by the geotechnical engineer for appropriate remedial action.

The material used for structural fill that will support slabs and/or footings (including foundation wall backfill) should comprise of approved fine-grained material or imported granular material. All candidate fill materials should be approved by a geotechnical engineer prior to being brought to the site, be moisture conditioned to within three percent of optimum, be placed in maximum 200 mm thick lifts, and be uniformly compacted to a minimum of 98 percent of Standard Proctor Maximum Dry Density

(SPMDD). For all structural fill beneath footings (if required), the compaction effort should be increased to a minimum of 100 percent of SPMDD.

The structural fill must also extend laterally beyond the edges of foundation elements a minimum distance equal to the thickness of fill beneath the footings or foundation elements. *In situ* compaction testing should be carried out during the fill placement to ensure that the specified compaction is being achieved.

As indicated in Section 2, groundwater seepage was encountered in just one of the boreholes during the drilling, and groundwater recovered to about 3.66 m depth in the two weeks following the drilling in that same borehole. Accordingly, substantial groundwater seepage is not anticipated for conventional foundation and buried service excavations at this site. If groundwater accumulations do occur, it is expected that these can be removed with conventional sump pumping techniques.

### 3.2 Strip and Spread Footing Foundations

Recommendations for footing base preparation have been provided in Section 3.1. For the dairy barn foundations set on structural fill or competent (approved) naturally occurring mineral soils, the footings can be designed based on a Serviceability Limit States (SLS) bearing resistance of 120 kPa for spread footings with maximum dimensions of 2.4 m square, or for strip footings with a maximum width of 1.0 m. For foundations designed in accordance with these recommendations and with careful attention to construction detail, the maximum total and differential settlements for the SLS bearing pressure are expected to be less than 25 mm and 20 mm, respectively.

The corresponding unfactored Ultimate Limit States (ULS) bearing pressure can be taken as 360 kPa. A geotechnical resistance factor of 0.5 should be applied to the ULS bearing pressure, in accordance with the National Building Code - Alberta Edition (2023).

For protection against frost action, perimeter footings in heated areas should be deep enough to provide at least 1.35 m of soil cover. For any unheated portions of the building, the depth of soil cover should be increased to 2.1 m. Alternatively, insulation can be used to reduce the required soil cover.

The footing excavations should be reviewed by a qualified geotechnical engineer to confirm that the bearing soils exposed are as anticipated in design. Loose or disturbed materials should be removed from the footing excavation prior to placement of concrete, and hand cleaning may be required to prepare an acceptable bearing surface. The footing subgrade should be protected at all times from: excessive drying, rain, snow, freezing temperatures, and the ingress of free water. Concrete should not be placed on frozen soil, nor should the soil beneath the footing be allowed to freeze after construction of the footing.

*Animal Shelter Footings*

For the animal shelter (i.e., loafing barn) foundations set on the naturally occurring (approved) clay till, the footings should be designed based on a reduced Serviceability Limit States (SLS) bearing resistance of 65 kPa for spread footings with maximum dimensions of 2.4 m square, or for strip footings with a maximum width of 1.0 m, given the firm soil conditions encountered at this location. For foundations designed in accordance with these recommendations and with careful attention to construction detail, the maximum total and differential settlements for the SLS bearing pressure are expected to be less than

25 mm and 20 mm, respectively. The corresponding unfactored Ultimate Limit States (ULS) bearing pressure can be taken as 200 kPa. Alternatively, the loafing barn can be constructed as a pole barn, with the wood posts extending to bear on more competent clay till encountered below about 2.7 m depth. JLECS can provide additional discussion and recommendations in this regard, upon request.

### 3.3 Grade-Supported Slabs

It is anticipated that the floor of the proposed dairy barn will be constructed using conventional slab-on-grade techniques. Recommendations pertaining to subgrade preparation have been provided in Section 3.1.

A minimum of 200 mm thickness of granular fill should be provided beneath the floor slab. The gravel should have a maximum particle size of 25 mm and meet the Alberta Transportation specifications (or similar) for Designation 2 Class 20 or 25 base course aggregate. The granular fill should be compacted in maximum 200 mm thick lifts to 100 percent of SPMDD.

The water-to-cement ratio and slump of concrete used in the floor slab should be strictly controlled to minimize shrinkage of the slabs. Adequate joints should be provided in the floor slabs to further control cracking. During placement of concrete at the construction site, testing should be performed on the concrete.

### 3.4 Lateral Earth Pressures – Pit Walls

It is understood that the proposed dairy barn will also include the manure storage/transfer pits below the barn. All non-uniformly loaded below-grade walls should be designed to resist a horizontal earth pressure 'p' at any depth 'h' below the surface as given by the following equation:

$$p = k_0 (\gamma h + q)$$

where:
- $p$ = lateral earth pressure in kPa acting at a depth $h$
- $k_0$ = lateral at-rest earth pressure coefficient (use $k_0$ = 0.50 for compacted clay),
- $\gamma$ = unit weight of backfill (use $\gamma$ = 18.5 kN/m$^3$ for compacted clay)
- $h$ = depth to point of interest in m (ft)
- $q$ = equivalent value of any surcharge on the ground surface.

The above expression assumes a fully drained condition along the base of the pit wall. Typical requirements for weeping tile are provided in Section 9.14 of the 2023 National Building Code – Alberta Edition. It will be necessary to have the weeping tile discharge to a sump with a pumped discharge if a gravity outlet for the weeping tile is not available.

### 3.5 Foundation Backfill

In general, native soils excavated from the foundation areas should be suitable for reuse as foundation wall backfill, provided they are free of organics or otherwise deleterious materials. Any excavated soils proposed for re-use as backfill should be examined by a geotechnical engineer. The materials to be re-used should be within about three percent of the optimum moisture (as determined by standard Proctor testing) for best compaction results.

The backfill must be brought up evenly on both sides of walls not designed to resist lateral earth pressures.

The fill surface around the perimeter of the proposed building should be sloped in such a way that surface runoff water does not accumulate around the structure. It is recommended that a relatively impermeable seal such as clay, asphalt or concrete be provided at the ground surface around the perimeter of the building to minimize water infiltration.

It is recommended that the interior floor slab be set at a minimum of 150 mm above current exterior or finished grades (whichever is higher). Where the interior floor slab cannot be set higher than the surrounding grade it is recommended that weeping tile be provided around the perimeter of the new building to minimize the potential for water accumulation under the slab. It will be necessary to have the weeping tile discharge to a sump with a pumped discharge if a gravity outlet for the weeping tile is not available. It is important to note that if weeping tile is provided around the perimeter of the building, rigid perforated drain pipe should be used for weeping tile, and a minimum 0.5 percent slope should be maintained on all drain pipes. JLECS can provide additional recommendations in this regard, upon request.

### 3.6 Concrete Mix Considerations

In general, the natural mineral soil deposits in the Coutts area contain high levels of water-soluble sulphates, indicating severe potential for sulphate attack on concrete in contact with native mineral soil deposits. Accordingly, sulphate resisting cement (Type HS, HSL, HSe or HSb) should be used in the manufacture of concrete in contact with soil at this site, and concrete should meet the CSA specifications for S-2 exposure.

An air entrainment agent is recommended for concrete exposed to cyclic freeze-thaw action. In addition to the improved durability, the air entraining will provide improved workability of the plastic concrete.

### 3.7 Seismic Design Considerations

The earthquake/seismic design parameters should be reviewed by a Structural Engineer and incorporated into the design as required. Based on soil conditions observed during the geotechnical investigation and published information for the area, the subgrade soils are generally characterized as stiff soils over bedrock. In this regard, the site is classified as Class D, as shown in Table 4.1.8.4.A in the National Building Code – Alberta Edition (2023).

### 3.8 Testing and Inspection

All engineering design recommendations presented in this report assume that an adequate level of inspection and review will be provided during construction, and that all construction will be carried out by a suitably qualified contractor experienced in foundation and earthworks construction. An adequate level of inspection is considered to be:

- For earthworks: subgrade review, representative compaction testing
- For foundations: geotechnical review of bearing surfaces
- For concrete construction: testing of concrete supplier mixes for conformance with prescribed and/or performance concrete specifications

JLECS

## 4.0 CLOSING COMMENT

The recommendations given in the above sections are based JLECS's understanding of the soil conditions at the site as summarized herein. Soil conditions, by their nature, can be highly variable across a site. Should subsurface conditions other than those presented in this report be encountered during construction, the Client should notify JLECS so that these recommendations can be reviewed.

This report is subject to the limitations outlined on the attached "Limitations of Geotechnical Reports".

We trust that this report satisfies your present requirements, and we look forward to assisting you in the completion of this project. Should you have any questions, please contact the undersigned at your convenience.

Yours truly,

**J Lobbezoo Engineering & Consulting Services Ltd.**

PROFESSIONAL ENGINEER ALBERTA JOHN A. LOBBEZOO 110450

24 June 2025

John Lobbezoo, P.Eng.
Principal Geotechnical Engineer

PERMIT TO PRACTICE
J LOBBEZOO ENGINEERING & CONSULTING SERVICES LTD.
RM SIGNATURE:
RM APEGA ID #: 110450
DATE: 24 June 2025
PERMIT NUMBER: P016456
The Association of Professional Engineers and Geoscientists of Alberta (APEGA)

Attachments
- Figure 1 Site Layout & Borehole Locations
- Figure 2 Atterberg Limits Test Results
- Borehole Logs
- Explanation of Symbols & Terms
- Limitations of Geotechnical Reports

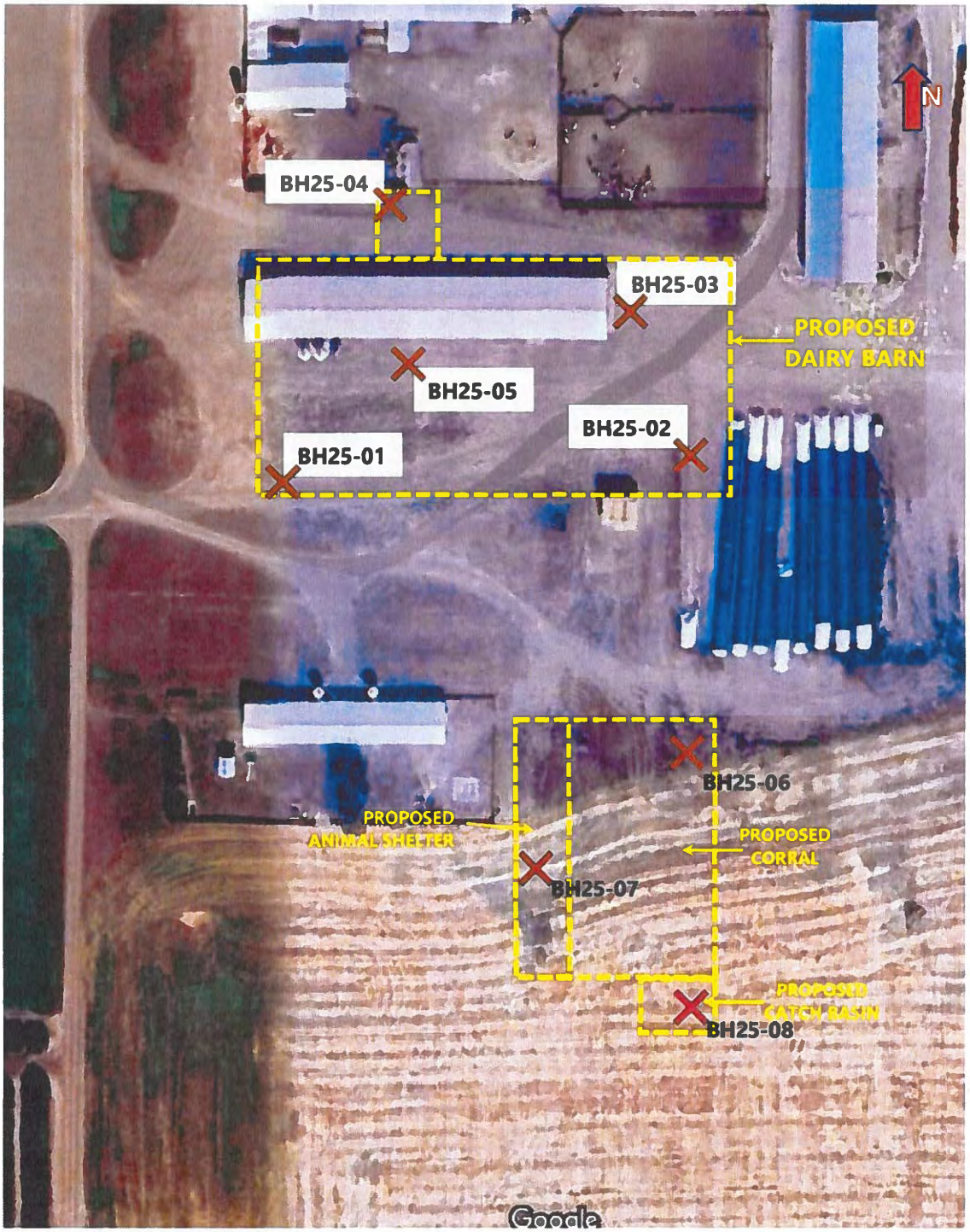


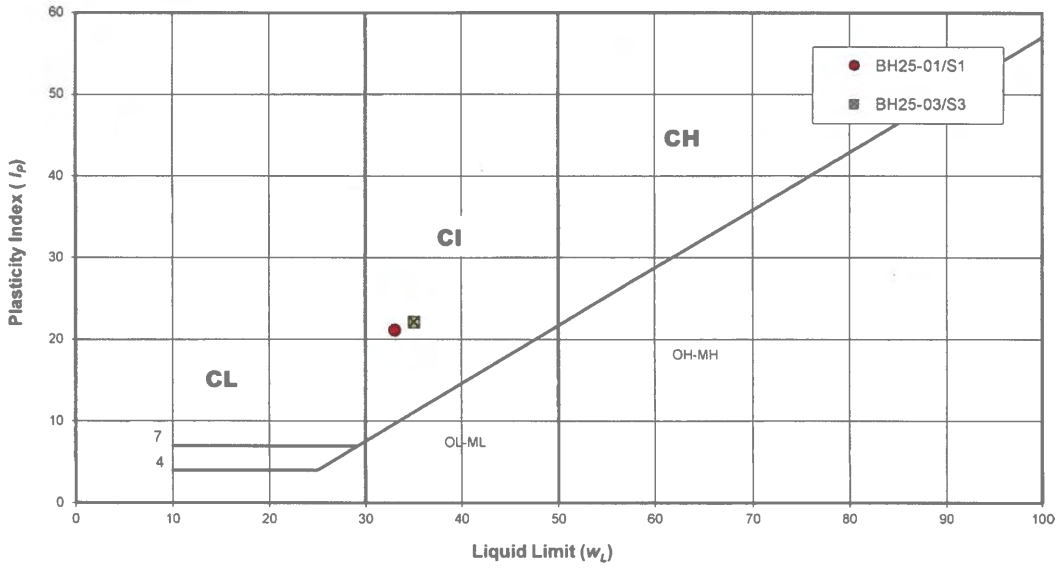

**Figure 1: Site Layout & Borehole Locations**

J Lobbezoo Engineering & Consulting Services Ltd.
P.O. Box 96
Monarch, AB T0L 1M0

## ATTERBERG LIMITS TEST RESULTS

**GT Projects Inc.**
**Proposed River Road Colony Dairy Barn**
**Near Milk River, AB**

**Project No:** P25052
**Date:** 22-May-25




| Borehole/ Sample No. | Sample Depth (m) | Plasticity Index, *Ip* | Liquid Limit, *wL* | Moisture Content, *w* |
|---|---|---|---|---|
| BH25-01/S1 | 0.7 | 21 | 33 | 14.1% |
| BH25-03/S3 | 2.3 | 22 | 35 | 14.3% |

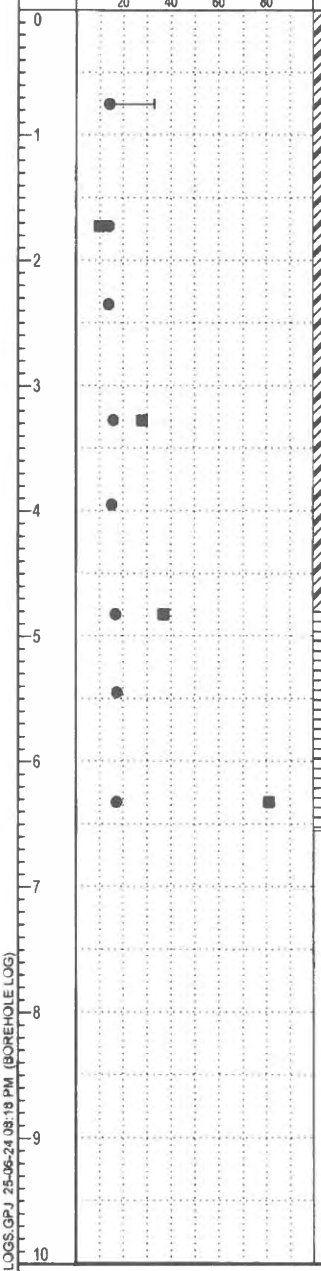
Note: This figure to be read in conjunction with JLECS Report P25052.

Figure 2

| | | |
|---|---|---|
| PROJECT: Proposed River Road Colony Dairy Barn | DRILLER: Chilako Drilling Services Ltd. | BOREHOLE NO: **BH25-01** |
| CLIENT: GT Projects Inc. | DRILL/METHOD: Truck Mounted C1150 Drill/SSA | PROJECT NO: P25052 |
| LOCATION: Near SW corner of proposed dairy barn; refer to Figure 1 | | ELEVATION: – |

SAMPLE TYPE: Shelby Tube; No Recovery; SPT Test (N); Grab Sample; Split-Pen; Core

BACKFILL TYPE: Bentonite; Pea Gravel; Slough; Grout; Drill Cuttings; Sand




| Depth (m) | SOIL SYMBOL | SOIL DESCRIPTION | SPT (N) | SAMPLE TYPE | SAMPLE NO | OTHER TESTS COMMENTS | Depth (m) |
|---|---|---|---|---|---|---|---|
| 0 | | **CLAY TILL**, medium plastic, trace sand, trace gravel, coal & oxide inclusions, brown, stiff to very stiff, moist | | | S1 | PP = 2.5 kg/cm² | 0 |
| 1 | | | | | | | 1 |
| 2 | | ...200mm thick sand layer at 1.7m depth | 10 | | S2 | | 2 |
| | | | | | S3 | PP = 3.0 kg/cm² | |
| 3 | | | 28 | | S4 | | 3 |
| 4 | | | | | S5 | PP = 3.5 kg/cm² | 4 |
| | | ...reddish sand layer at 4.3m depth | | | | | |
| 5 | | **MUDSTONE**, dark grey | 37 | | S6 | | 5 |
| | | | | | S7 | PP = 4.0 kg/cm² | |
| 6 | | | 81 | | S8 | | 6 |
| | | **End of Borehole at 6.55 m depth** | | | | | |
| 7 | | Notes:<br>1. Borehole log to be read in conjunction with JLECS report P25052. For definitions of terms and symbols used on log refer to sheets following logs.<br>2. Borehole open and dry at completion of the drilling.<br>3. Borehole backfilled with cuttings upon completion.<br>4. Other tests PP = Pocket Penetrometer in kg/cm². | | | | | 7 |
| 8 | | | | | | | 8 |
| 9 | | | | | | | 9 |
| 10 | | | | | | | |

P25052 BHLOGS.GPJ 25-06-24 08:19 PM (BOREHOLE LOG)

J Lobbezoo
Engineering & Consulting Services Ltd.

| | |
|---|---|
| LOGGED BY: JL | COMPLETION DEPTH: 6.55 m |
| REVIEWED BY: JL | COMPLETION DATE: 25-5-28 |
| | Page 1 of 1 |

| | | |
|---|---|---|
| PROJECT: Proposed River Road Colony Dairy Barn | DRILLER: Chilako Drilling Services Ltd. | BOREHOLE NO: **BH25-02** |
| CLIENT: GT Projects Inc. | DRILL/METHOD: Truck Mounted C1150 Drill/SSA | PROJECT NO: P25052 |
| LOCATION: Near SE corner of proposed dairy barn; refer to Figure 1 | | ELEVATION: – |

SAMPLE TYPE: Shelby Tube; No Recovery; SPT Test (N); Grab Sample; Split-Pen; Core

BACKFILL TYPE: Bentonite; Pea Gravel; Slough; Grout; Drill Cuttings; Sand

STANDARD PEN (N) 20 40 60 80

PLASTIC M.C. LIQUID 20 40 60 80

| Depth (m) | SOIL DESCRIPTION | SPT (N) | SAMPLE TYPE | SAMPLE NO | SLOTTED PIEZOMETER | OTHER TESTS COMMENTS |
|---|---|---|---|---|---|---|
| 0 | **CLAY TILL**, medium plastic, trace sand, trace gravel, coal & oxide inclusions, brown, stiff to hard, moist | | | S1 | | PP = 2.5 kg/cm² |
| 1 | | | | | | |
| 2 | ...traces of shale/rock at 1.8m depth | 37 | | S2 | | |
| 3 | | | | S3 | | PP = 2.5 kg/cm² |
| 4 | | 16 | | S4 | | |
| 5 | **MUDSTONE**, dark grey | | | S5 | | PP = 4.0 kg/cm² |
| 6 | | 33 | | S6 | | |
| 7 | | | | S7 | | PP = 4.5 kg/cm² |
| 8 | | 45 | | S8 | | |
| 9 | **End of Borehole at 6.55 m depth** | | | | | |
| 10 | | | | | | |

Notes:
1. Borehole log to be read in conjunction with JLECS report P25052. For definitions of terms and symbols used on log refer to sheets following logs.
2. Borehole open and dry at completion of the drilling.
3. 25 mm PVC standpipe installed upon completion of drilling, hand slotted from 3.0 m to 6.3 m depth. Annular space backfilled with drill cuttings and a bentonite cap at the surface.
4. Standpipe dry on June 12, 2025.
5. Other tests PP = Pocket Penetrometer in kg/cm².

P25052 BHLOGS.GPJ 25-05-24 08:19 PM (BOREHOLE LOG)

J Lobbezoo
Engineering & Consulting Services Ltd.

| | |
|---|---|
| LOGGED BY: JL | COMPLETION DEPTH: 6.55 m |
| REVIEWED BY: JL | COMPLETION DATE: 25-5-28 |
| | Page 1 of 1 |

| | | |
|---|---|---|
| PROJECT: Proposed River Road Colony Dairy Barn | DRILLER: Chilako Drilling Services Ltd. | BOREHOLE NO: **BH25-03** |
| CLIENT: GT Projects Inc. | DRILL/METHOD: Truck Mounted C1150 Drill/SSA | PROJECT NO: P25052 |
| LOCATION: Near NE corner of proposed dairy barn; refer to Figure 1 | | ELEVATION: -- |

SAMPLE TYPE: Shelby Tube; No Recovery; SPT Test (N); Grab Sample; Split-Pen; Core

BACKFILL TYPE: Bentonite; Pea Gravel; Slough; Grout; Drill Cuttings; Sand

| Depth (m) | STANDARD PEN (N) 20 40 60 80 / PLASTIC M.C. LIQUID 20 40 60 80 | SOIL SYMBOL | SOIL DESCRIPTION | SPT (N) | SAMPLE TYPE | SAMPLE NO | SLOTTED PIEZOMETER | OTHER TESTS COMMENTS | Depth (m) |
|---|---|---|---|---|---|---|---|---|---|
| 0 | | | **CLAY TILL**, medium plastic, trace sand, trace gravel, coal & oxide inclusions, brown, stiff to very stiff, damp to moist | | | S1 | | PP = 4.0 kg/cm² | 0 |
| 1 | | | | | | | | | 1 |
| 2 | | | | 12 | | S2 | | | 2 |
| | | | | | | S3 | | PP = 4.0 kg/cm² | |
| 3 | | | | 24 | | S4 | | | 3 |
| 4 | | | ...dark grey below 3.9m depth | | | S5 | | PP = 4.5 kg/cm² | 4 |
| | | | ...reddish sand from 4.3m to 4.5m depth | | | | | | |
| 5 | | | **SILTSTONE** ...weak silt/sandstone below 5m depth, moist to very moist | 40 | | S6 | | | 5 |
| | | | | | | S7 | | | |
| 6 | | | | 36 | | S8 | | | 6 |
| 7 | | | **End of Borehole at 6.55 m depth** | | | | | | 7 |
| 8 | | | Notes: 1. Borehole log to be read in conjunction with JLECS report P25052. For definitions of terms and symbols used on log refer to sheets following logs. 2. Minor groundwater seepage below 5m depth during drilling. 3. 25 mm PVC standpipe installed upon completion of drilling, hand slotted from 3.0 m to 6.3 m depth. Annular space backfilled with drill cuttings and a bentonite cap at the surface. 4. Groundwater measured at 3.66m depth on June 12, 2025. 5. Other tests PP = Pocket Penetrometer in kg/cm². | | | | | | 8 |
| 9 | | | | | | | | | 9 |
| 10 | | | | | | | | | |

P25052 BHLOGS.GPJ 25-08-24 08:18 PM (BOREHOLE LOG)

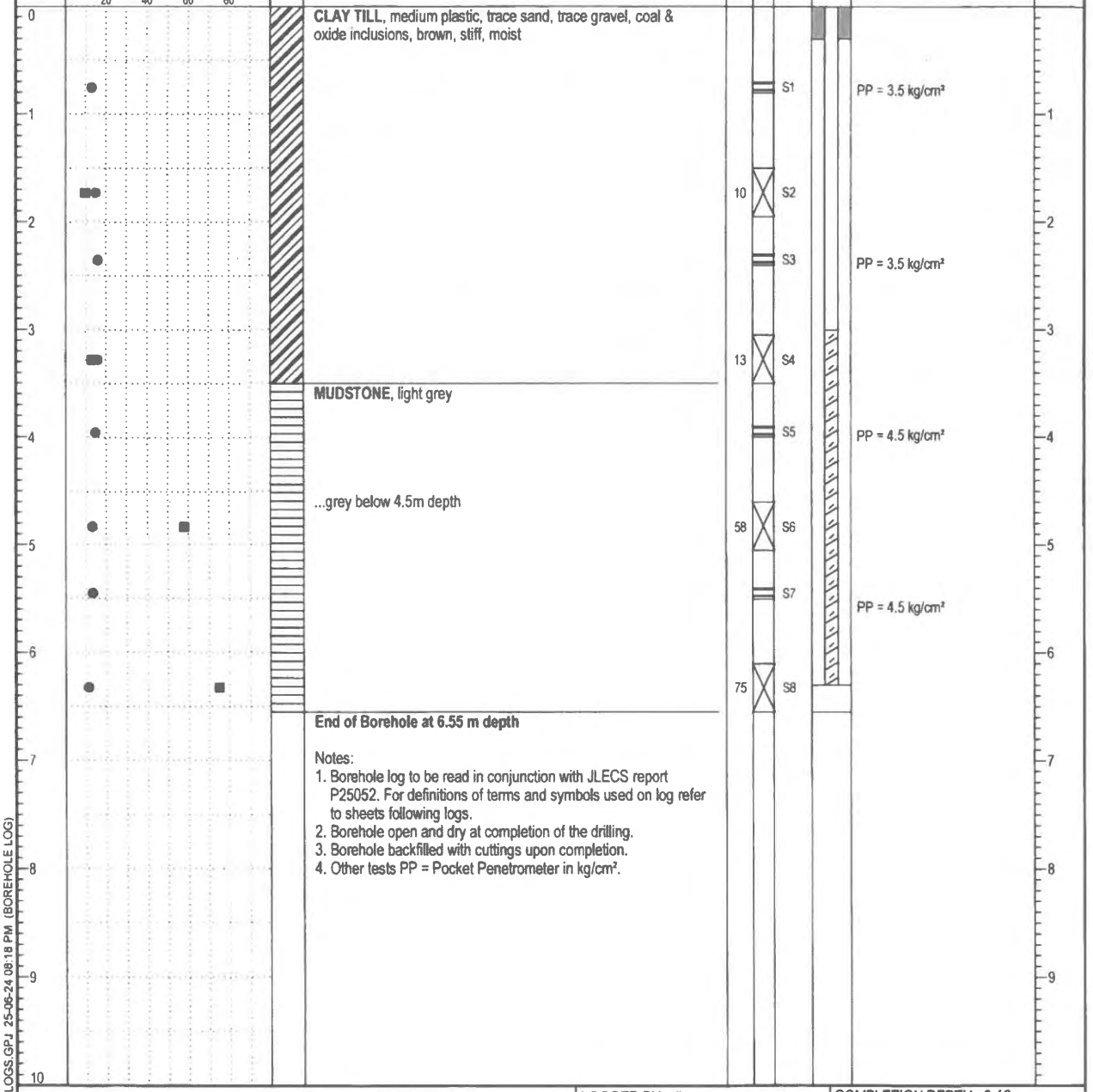
J Lobbezoo
Engineering & Consulting Services Ltd.

| | |
|---|---|
| LOGGED BY: JL | COMPLETION DEPTH: 6.55 m |
| REVIEWED BY: JL | COMPLETION DATE: 25-5-28 |
| | Page 1 of 1 |

| | | |
|---|---|---|
| PROJECT: Proposed River Road Colony Dairy Barn | DRILLER: Chilako Drilling Services Ltd. | BOREHOLE NO: **BH25-04** |
| CLIENT: GT Projects Inc. | DRILL/METHOD: Truck Mounted C1150 Drill/SSA | PROJECT NO: P25052 |
| LOCATION: N side of proposed dairy barn; refer to Figure 1 | | ELEVATION: -- |

SAMPLE TYPE: Shelby Tube | No Recovery | SPT Test (N) | Grab Sample | Split-Pen | Core

BACKFILL TYPE: Bentonite | Pea Gravel | Slough | Grout | Drill Cuttings | Sand




P25052 BHLOGS.GPJ 25-06-24 08:18 PM (BOREHOLE LOG)

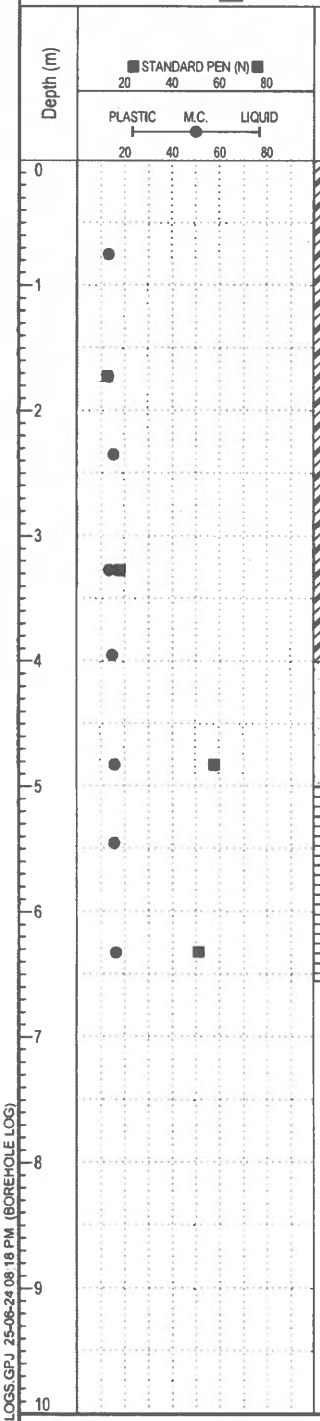
J Lobbezoo
Engineering & Consulting Services Ltd.

| | |
|---|---|
| LOGGED BY: JL | COMPLETION DEPTH: 6.40 m |
| REVIEWED BY: JL | COMPLETION DATE: 25-5-28 |
| | Page 1 of 1 |

| | | |
|---|---|---|
| PROJECT: Proposed River Road Colony Dairy Barn | DRILLER: Chilako Drilling Services Ltd. | BOREHOLE NO: **BH25-05** |
| CLIENT: GT Projects Inc. | DRILL/METHOD: Truck Mounted C1150 Drill/SSA | PROJECT NO: P25052 |
| LOCATION: Near centre of proposed dairy barn; refer to Figure 1 | | ELEVATION: – |

SAMPLE TYPE: Shelby Tube; No Recovery; SPT Test (N); Grab Sample; Split-Pen; Core

BACKFILL TYPE: Bentonite; Pea Gravel; Slough; Grout; Drill Cuttings; Sand




| SOIL SYMBOL | SOIL DESCRIPTION | SPT (N) | SAMPLE TYPE | SAMPLE NO | OTHER TESTS COMMENTS | Depth (m) |
|---|---|---|---|---|---|---|
| | **CLAY TILL**, medium plastic, trace sand, trace gravel, coal & oxide inclusions, brown, stiff to very stiff, moist | | | S1 | PP = 2.5 kg/cm² | 0 |
| | | 13 | | S2 | | 1 |
| | | | | S3 | PP = 3.5 kg/cm² | 2 |
| | | 18 | | S4 | | 3 |
| | **SILTY SAND**, light brown, dense, moist | | | S5 | | 4 |
| | | 58 | | S6 | | 5 |
| | **MUDSTONE**, grey | | | S7 | PP = 4.5 kg/cm² | 6 |
| | | 51 | | S8 | | 7 |
| | **End of Borehole at 6.55 m depth** | | | | | 8 |
| | Notes:<br>1. Borehole log to be read in conjunction with JLECS report P25052. For definitions of terms and symbols used on log refer to sheets following logs.<br>2. Borehole open and dry at completion of the drilling.<br>3. Borehole backfilled with cuttings upon completion.<br>4. Other tests PP = Pocket Penetrometer in kg/cm². | | | | | 9 |

P25052 BHLOGS.GPJ 25-06-24 08:18 PM (BOREHOLE LOG)

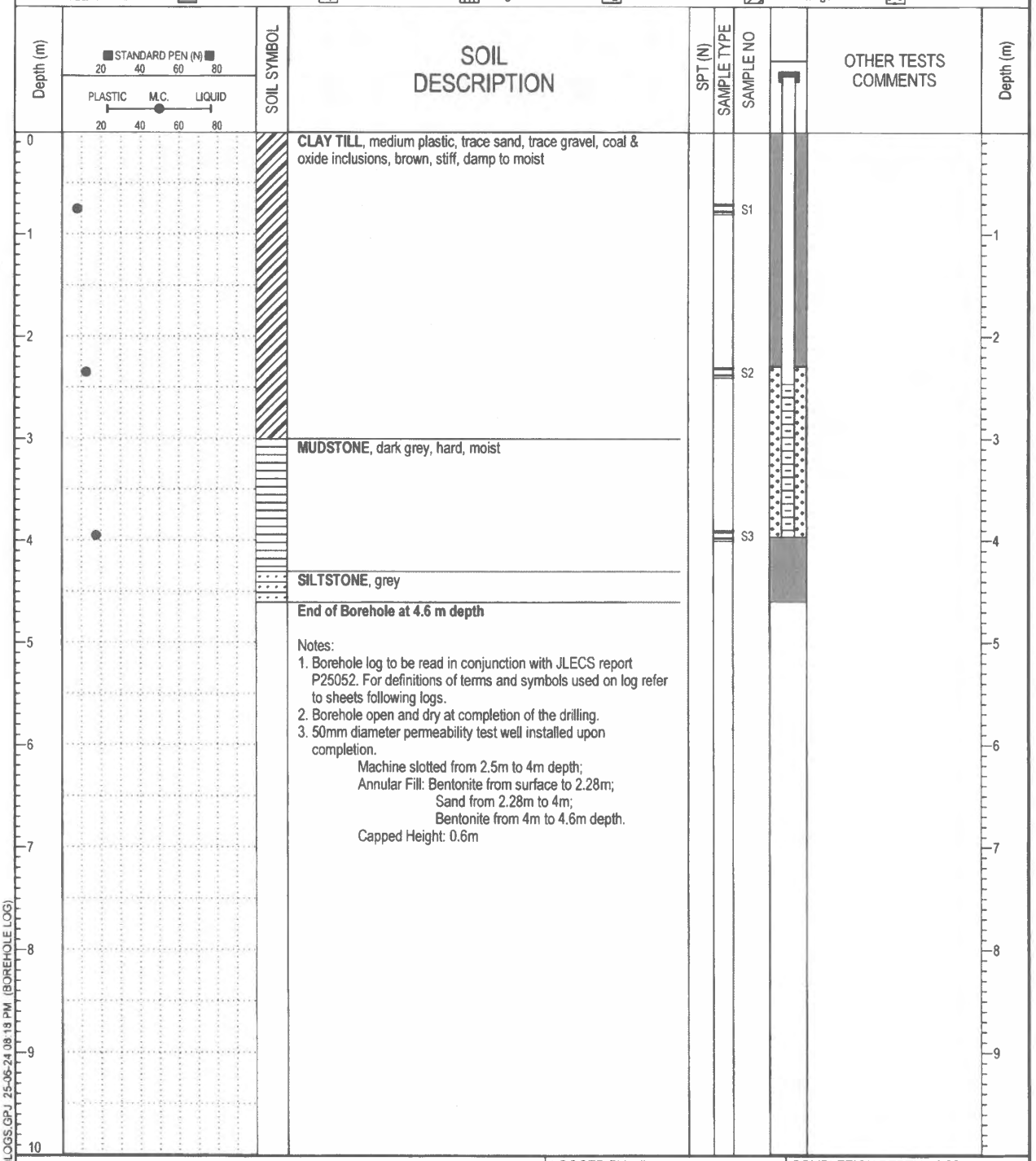
J Lobbezoo
Engineering & Consulting Services Ltd.

| | |
|---|---|
| LOGGED BY: JL | COMPLETION DEPTH: 6.55 m |
| REVIEWED BY: JL | COMPLETION DATE: 25-5-28 |
| | Page 1 of 1 |

| | | |
|---|---|---|
| PROJECT: Proposed River Road Colony Dairy Barn | DRILLER: Chilako Drilling Services Ltd. | BOREHOLE NO: **BH25-06** |
| CLIENT: GT Projects Inc. | DRILL/METHOD: Truck Mounted C1150 Drill/SSA | PROJECT NO: P25052 |
| LOCATION: Near NE corner of proposed corral; refer to Figure 1 | | ELEVATION: -- |

SAMPLE TYPE: Shelby Tube; No Recovery; SPT Test (N); Grab Sample; Split-Pen; Core

BACKFILL TYPE: Bentonite; Pea Gravel; Slough; Grout; Drill Cuttings; Sand




**CLAY TILL**, medium plastic, trace sand, trace gravel, coal & oxide inclusions, brown, stiff, damp to moist

**MUDSTONE**, dark grey, hard, moist

**SILTSTONE**, grey

**End of Borehole at 4.6 m depth**

Notes:
1. Borehole log to be read in conjunction with JLECS report P25052. For definitions of terms and symbols used on log refer to sheets following logs.
2. Borehole open and dry at completion of the drilling.
3. 50mm diameter permeability test well installed upon completion.
   Machine slotted from 2.5m to 4m depth;
   Annular Fill: Bentonite from surface to 2.28m;
   Sand from 2.28m to 4m;
   Bentonite from 4m to 4.6m depth.
   Capped Height: 0.6m

P25052 BHLOGS.GPJ 25-06-24 08:18 PM (BOREHOLE LOG)

J Lobbezoo
Engineering & Consulting Services Ltd.

| | |
|---|---|
| LOGGED BY: JL | COMPLETION DEPTH: 4.60 m |
| REVIEWED BY: JL | COMPLETION DATE: 25-5-28 |
| | Page 1 of 1 |

| | | |
|---|---|---|
| PROJECT: Proposed River Road Colony Dairy Barn | DRILLER: Chilako Drilling Services Ltd. | BOREHOLE NO: **BH25-07** |
| CLIENT: GT Projects Inc. | DRILL/METHOD: Truck Mounted C1150 Drill/SSA | PROJECT NO: P25052 |
| LOCATION: Near W side of proposed corral; refer to Figure 1 | | ELEVATION: – |

SAMPLE TYPE: Shelby Tube; No Recovery; SPT Test (N); Grab Sample; Split-Pen; Core

BACKFILL TYPE: Bentonite; Pea Gravel; Slough; Grout; Drill Cuttings; Sand

STANDARD PEN (N) 20 40 60 80

PLASTIC M.C. LIQUID 20 40 60 80

| Depth (m) | SOIL DESCRIPTION | SPT (N) | SAMPLE NO | OTHER TESTS COMMENTS |
|---|---|---|---|---|
| 0 | **TOPSOIL** (200mm) | | | |
| | **CLAY TILL**, medium plastic, trace sand, trace gravel, coal & oxide inclusions, brown, firm to stiff, damp | | S1 | PP = 3.5 kg/cm² |
| | ...sandy, very moist, soft to firm from 1.5m to 1.7m depth<br>...some sand from 1.7m to 2.7m depth | 7 | S2 | |
| | | | S3 | PP = 2.0 kg/cm² |
| | ...very stiff below 2.7m depth | 27 | S4 | |
| | **MUDSTONE**, dark grey, hard, moist | | S5 | PP = 3.5 kg/cm² |
| | **SILTSTONE**, light grey | 18 | S6 | |
| | | | S7 | PP = 4.5 kg/cm² |
| | | 75 | S8 | |
| 6.4 | **End of Borehole at 6.4 m depth** | | | |

Notes:
1. Borehole log to be read in conjunction with JLECS report P25052. For definitions of terms and symbols used on log refer to sheets following logs.
2. Borehole open and dry at completion of the drilling.
3. Borehole backfilled with cuttings upon completion.
4. Other tests PP = Pocket Penetrometer in kg/cm².

P25052 BHLOGS.GPJ 25-06-24 08:18 PM (BOREHOLE LOG)

J Lobbezoo
Engineering & Consulting Services Ltd.

| | |
|---|---|
| LOGGED BY: JL | COMPLETION DEPTH: 6.40 m |
| REVIEWED BY: JL | COMPLETION DATE: 25-5-28 |
| | Page 1 of 1 |

| | | |
|---|---|---|
| PROJECT: Proposed River Road Colony Dairy Barn | DRILLER: Chilako Drilling Services Ltd. | BOREHOLE NO: **BH25-08** |
| CLIENT: GT Projects Inc. | DRILL/METHOD: Truck Mounted C1150 Drill/SSA | PROJECT NO: P25052 |
| LOCATION: Proposed catch basin, SE corner of corral; refer to Figure 1 | | ELEVATION: – |

SAMPLE TYPE: Shelby Tube; No Recovery; SPT Test (N); Grab Sample; Split-Pen; Core

BACKFILL TYPE: Bentonite; Pea Gravel; Slough; Grout; Drill Cuttings; Sand

STANDARD PEN (N) 20 40 60 80

PLASTIC M.C. LIQUID 20 40 60 80

| Depth (m) | SOIL SYMBOL | SOIL DESCRIPTION | SPT (N) | SAMPLE TYPE | SAMPLE NO | OTHER TESTS COMMENTS |
|---|---|---|---|---|---|---|
| 0 | | **TOPSOIL** (200mm) | | | | |
| | | **CLAY TILL**, low to medium plastic, silty, some sand, coal & oxide inclusions, brown, stiff, moist | | | S1 | |
| 1 | | | | | | |
| 2 | | ...medium plastic, trace sand below 2.1m depth | | | S2 | |
| 3 | | | | | | |
| | | **MUDSTONE**, dark grey, hard, moist | | | S3 | |
| 4 | | | | | | |
| 5 | | ...sandy below 5.5m depth | | | S4 | |
| 6 | | **End of Borehole at 6.1 m depth** | | | | |
| 7 | | Notes:<br>1. Borehole log to be read in conjunction with JLECS report P25052. For definitions of terms and symbols used on log refer to sheets following logs.<br>2. Borehole open and dry at completion of the drilling.<br>3. 50mm diameter permeability test well installed upon completion.<br>Machine slotted from 3.7m to 5.2m depth;<br>Annular Fill: Bentonite from surface to 3.5m;<br>Sand from 3.5m to 5.2m;<br>Bentonite from 5.2m to 6.1m depth.<br>Capped Height: 0.6m | | | | |
| 8 | | | | | | |
| 9 | | | | | | |
| 10 | | | | | | |

P25052 BHLOGS.GPJ 25-06-24 08:18 PM (BOREHOLE LOG)

J Lobbezoo
Engineering & Consulting Services Ltd.

| | |
|---|---|
| LOGGED BY: | COMPLETION DEPTH: 6.10 m |
| REVIEWED BY: | COMPLETION DATE: |
| | Page 1 of 1 |

# EXPLANATION OF TERMS AND SYMBOLS

The terms and symbols used on the borehole logs to summarize the results of field investigation and subsequent laboratory testing are described in these pages.

It should be noted that materials, boundaries and conditions have been established only at the borehole locations at the time of investigation and are not necessarily representative of subsurface conditions elsewhere across the site.

**TEST DATA**

Data obtained during the field investigation and from laboratory testing are shown at the appropriate depth interval.

Abbreviations, graphic symbols, and relevant test method designations are as follows:

| | | | |
|---|---|---|---|
| *C | Consolidation test | *ST | Swelling test |
| $D_R$ | Relative density | TV | Torvane shear strength |
| *k | Permeability coefficient | VS | Vane shear strength |
| *MA | Mechanical grain size analysis | w | Natural Moisture Content (ASTM D2216) |
| | and hydrometer test | $w_l$ | Liquid limit (ASTM D 423) |
| N | Standard Penetration Test (CSA A119.1-60) | $w_p$ | Plastic Limit (ASTM D 424) |
| $N_d$ | Dynamic cone penetration test | $E_f$ | Unit strain at failure |
| NP | Non plastic soil | $\gamma$ | Unit weight of soil or rock |
| pp | Pocket penetrometer strength (kg/cm²) | $\gamma_d$ | Dry unit weight of soil or rock |
| *q | Triaxial compression test | $\rho$ | Density of soil or rock |
| $q_u$ | Unconfined compressive strength | $\rho_d$ | Dry Density of soil or rock |
| *SB | Shearbox test | $C_u$ | Undrained shear strength |
| $SO_4$ | Concentration of water-soluble sulphate | → | Seepage |
| | | ▼ | Observed water level |

* The results of these tests are usually reported separately

Soils are classified and described according to their engineering properties and behaviour.

The soil of each stratum is described using the Unified Soil Classification System[1] modified slightly so that an inorganic clay of "medium plasticity" is recognized.

The modifying adjectives used to define the actual or estimated percentage range by weight of minor components are consistent with the Canadian Foundation Engineering Manual[2].

Relative Density and Consistency:

| Cohesionless Soils | | Cohesive Soils | | |
|---|---|---|---|---|
| Relative Density | SPT (N) Value | Consistency | Undrained Shear Strength $c_u$ (kPa) | Approximate SPT (N) Value |
| Very Loose | 0-4 | Very Soft | 0-12 | 0-2 |
| Loose | 4-10 | Soft | 12-25 | 2-4 |
| Compact | 10-30 | Firm | 25-50 | 4-8 |
| Dense | 30-50 | Stiff | 50-100 | 8-15 |
| Very Dense | >50 | Very Stiff | 100-200 | 15-30 |
| | | Hard | >200 | >30 |

Standard Penetration Resistance ("N" value)
The number of blows by a 63.6kg hammer dropped 760 mm to drive a 50 mm diameter open sampler attached to "A" drill rods for a distance of 300 mm.

1 "Unified Soil Classification System", Technical Memorandum 36-357 prepared by Waterways Experiment Station, Vicksburg, Mississippi, Corps of Engineers, U.S. Army. Vol. 1 March 1953.
2 "Canadian Foundation Engineering Manual", 4th Edition, Canadian Geotechnical Society, 2006.

## MODIFIED UNIFIED CLASSIFICATION SYSTEM FOR SOILS

| MAJOR DIVISION | | | GROUP SYMBOL | GRAPH SYMBOL | COLOUR CODE | TYPICAL DESCRIPTION | LABORATORY CLASSIFICATION CRITERIA | |
|---|---|---|---|---|---|---|---|---|
| COARSE GRAINED SOILS (MORE THAN HALF BY WEIGHT LARGER THAN 75µm) | GRAVELS MORE THAN HALF THE COARSE FRACTION LARGER THAN 4.75mm | CLEAN GRAVELS (LITTLE OR NO FINES) | GW | | RED | WELL GRADED GRAVELS, GRAVEL-SAND MIXTURES, LITTLE OR NO FINES | $C_U = \frac{D_{60}}{D_{10}} > 4$; $C_C = \frac{(D_{30})^2}{D_{10} \times D_{60}} = 1$ to 3 | |
| | | | GP | | RED | POORLY GRADED GRAVELS, GRAVEL-SAND MIXTURES, LITTLE OR NO FINES | NOT MEETING ABOVE REQUIREMENTS | |
| | | DIRTY GRAVELS (WITH SOME FINES) | GM | | YELLOW | SILTY GRAVELS, GRAVEL-SAND-SILT MIXTURES | CONTENT OF FINES EXCEEDS 12 % | ATTERBERG LIMITS BELOW "A" LINE OR P.I. LESS THAN 4 |
| | | | GC | | YELLOW | CLAYEY GRAVELS, GRAVEL-SAND-CLAY MIXTURES | CONTENT OF FINES EXCEEDS 12 % | ATTERBERG LIMITS ABOVE "A" LINE P.I. MORE THAN 7 |
| | SANDS MORE THAN HALF THE COARSE FRACTION SMALLER THAN 4.75mm | CLEAN SANDS (LITTLE OR NO FINES) | SW | | RED | WELL GRADED SANDS, GRAVELLY SANDS, LITTLE OR NO FINES | $C_U = \frac{D_{60}}{D_{10}} > 6$; $C_C = \frac{(D_{60})^2}{D_{10} \times D_{60}} = 1$ to 3 | |
| | | | SP | | RED | POORLY GRADED SANDS, GRAVELLY SANDS, LITTLE OR NO FINES | NOT MEETING ABOVE REQUIREMENTS | |
| | | DIRTY SANDS (WITH SOME FINES) | SM | | YELLOW | SILTY SANDS, SAND-SILT MIXTURES | CONTENT OF FINES EXCEEDS 12 % | ATTERBERG LIMITS BELOW "A" LINE OR P.I. LESS THAN 4 |
| | | | SC | | YELLOW | CLAYEY SANDS, SAND-CLAY MIXTURES | CONTENT OF FINES EXCEEDS 12 % | ATTERBERG LIMITS ABOVE "A" LINE P.I. MORE THAN 7 |
| FINE-GRAINED SOILS (MORE THAN HALF BY WEIGHT SMALLER THAN 75µm) | SILTS BELOW "A" LINE NEGLIGIBLE ORGANIC CONTENT | $W_L$ < 50% | ML | | GREEN | INORGANIC SILTS AND VERY FINE SANDS, ROCK FLOUR, SILTY SANDS OF SLIGHT PLASTICITY | CLASSIFICATION IS BASED UPON PLASTICITY CHART (SEE BELOW) | |
| | | $W_L$ < 50% | MH | | BLUE | INORGANIC SILTS, MICACEOUS OR DIATOMACEOUS, FINE SANDS OR SILTY SOILS | | |
| | CLAYS ABOVE "A" LINE NEGLIGIBLE ORGANIC CONTENT | $W_L$ < 30% | CL | | GREEN | INORGANIC CLAYS OF LOW PLASTICITY, GRAVELLY, SANDY OR SILTY CLAYS, LEAN CLAYS | | |
| | | 30% < $W_L$ < 50% | CI | | GREEN-BLUE | INORGANIC CLAYS OF MEDIUM PLASTICITY, SILTY CLAYS | | |
| | | $W_L$ > 50% | CH | | BLUE | INORGANIC CLAYS OF HIGH PLASTICITY, FAT CLAYS | | |
| | ORGANIC SILTS & CLAYS BELOW "A" LINE | $W_L$ < 50% | OL | | GREEN | ORGANIC SILTS AND ORGANIC SILTY CLAYS OF LOW PLASTICITY | WHENEVER THE NATURE OF THE FINES CONTENT HAS NOT BEEN DETERMINED, IT IS DESIGNATED BY THE LETTER "F", E.G. SF IS A MIXTURE OF SAND WITH SILT OR CLAY | |
| | | $W_L$ > 50% | OH | | BLUE | ORGANIC CLAYS OF HIGH PLASTICITY | | |
| HIGHLY ORGANIC SOILS | | | Pt | | ORANGE | PEAT AND OTHER HIGHLY ORGANIC SOILS | STRONG COLOUR OR ODOUR AND OFTEN FIBEROUS TEXTURE | |

### SPECIAL SYMBOLS

| | | | |
|---|---|---|---|
| LIMESTONE | | OILSAND | |
| SANDSTONE | | SHALE | |
| SILTSTONE | | FILL (UNDIFFERENTIATED) | |

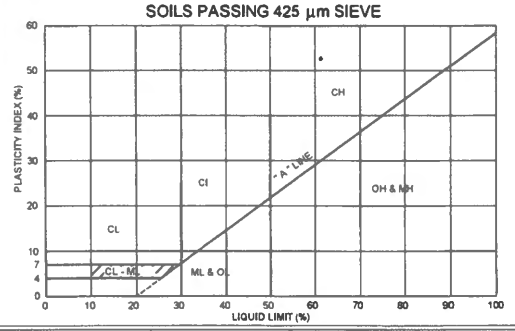
### SOIL COMPONENTS

| FRACTION | U.S. STANDARD SIEVE SIZE | | DEFINING RANGES OF PERCENTAGE BY WEIGHT OF MINOR COMPONENTS | |
|---|---|---|---|---|
| GRAVEL | PASSING | RETAINED | PERCENT | DESCRIPTOR |
| COARSE | 76mm | 19mm | 35-50 | AND |
| FINE | 19mm | 4.75mm | | |
| SAND | | | 20-35 | Y/EY |
| COARSE | 4.75mm | 2.00mm | | |
| MEDIUM | 2.00mm | 425µm | 10-20 | SOME |
| FINE | 425µm | 75µm | | |
| FINES (SILT OR CLAY BASED ON PLASTICITY) | 75µm | | 1-10 | TRACE |

### OVERSIZED MATERIAL

| ROUNDED OR SUBROUNDED: | NOT ROUNDED |
|---|---|
| COBBLES 76mm TO 200mm | ROCK FRAGMENTS > 76mm |
| BOULDERS > 200mm | ROCKS > 0.76 CUBIC METRE IN VOLUME |

### PLASTICITY CHART FOR SOILS PASSING 425 µm SIEVE




NOTES:

1. ALL SIEVE SIZES MENTIONED ON THIS CHART ARE U.S. STANDARD A.S.T.M. E.11
2. COARSE GRAIN SOILS WITH 5 TO 12% FINES GIVEN COMBINED GROUP SYMBOLS. E.G. GW-GC IS A WELL GRADED GRAVEL SAND MIXTURE WITH CLAY BINDER BETWEEN 5 AND 12% FINES.

JLECS

J Lobbezoo Engineering & Consulting Services Ltd.
PO Box 96, Monarch, AB T0L1M0

24 June 2025

JLECS File: P25052

**Hutterian Brethren of River Road**
c/o GT Projects Inc.
16 Cobblestone Lane
Raymond, AB T0K 2S0

Attention: Mr. Greg Holt

**Re: Geotechnical Review and Evaluation**
**NRCB Permitting of Pens & Catch Basin**
**NE-32-001-14-W4M, near Coutts, Alberta**

As requested, J Lobbezoo Engineering & Consulting Services Ltd. (JLECS) has carried out a geotechnical review and evaluation of the above-captioned site relative to the required protection of the groundwater resource, as required by the Agricultural Operation Practices Act, AB Reg. 267/2001 (hereinafter referred to as "AOPA"). This letter describes the site soil conditions to support a permit application related to a series of proposed pens and a catch basin at the above captioned site (refer to Figure 1, attached).

In order to demonstrate the suitability of the naturally existing soils for consideration as a naturally occurring protective layer to the groundwater resource, three boreholes were advanced at the site on May 28, 2025. The boreholes were advanced at the approximate locations denoted as BH25-06 to BH25-08 on Figure 1, attached.

The boreholes were advanced by a truck-mounted drill rig owned and operated by Chilako Drilling Services and extended to depths of 4.6 m to 6.1 m below the existing grade. The boreholes were logged by JLECS.

In general, the natural mineral soils encountered in the boreholes consisted of stiff, medium plastic clay till to depths of about 3 m, below which a transition to mudstone was encountered. At depths of about 4.5 m below grade, the mudstone transitioned to siltstone. Neither groundwater nor a groundwater resource (as defined by the AOPA) was encountered within the 6.1 m investigation depth at this site.

Samples of soil collected from the screened zones of boreholes BH25-06 and BH25-08 as well as a sample from a similar depth at borehole BH25-07 were all subjected to grain size analyses, which was carried out by Down to Earth Laboratories in Lethbridge, Alberta. The lab report is attached, for reference. The results indicate a soil texture breakdown of:

**Table 1: Soil Texture Analyses**

| Borehole/Depth | % Sand | % Silt | % Clay |
|---|---|---|---|
| BH25-06 / 3.9 m | 20 | 30 | 50 |
| BH25-07 / 3.9 m | 28 | 34 | 38 |
| BH25-08 / 5.5 m | 36 | 36 | 28 |
| *Average:* | *28* | *33* | *39* |

To measure the *in situ* permeability of the subsurface soils, 50 mm diameter PVC monitoring wells were constructed in boreholes BH25-06 and BH25-08. Test well BH25-06 (proposed pen area) was screened from 2.3 m to 4.0 m depth while test well BH25-08 (proposed catch basin area) was screened from 3.5 m to 5.2 m depth. Well saturation of the 50 mm diameter monitoring wells was carried out by filling the monitoring well to the top for several consecutive days. After several days of testing, a 24-hour water drop of 0.36 m was determined at BH25-06, and a 24-hour water drop of 0.15 m was determined at BH25-08.

To calculate the permeability of the screened portion of the clay strata at the test well location, a modified falling head test (as outlined in the USBR Engineering Geology Field Manual Volume 2 [2001]) was used. The input variables and output data are outlined on the attached In Situ Permeability Test reports. The results of the permeability testing indicated an *in situ* hydraulic conductivity ($k_s$) of $4.0 \times 10^{-8}$ cm/s at BH25-06, and an *in situ* hydraulic conductivity ($k_s$) of $1.2 \times 10^{-8}$ cm/s at BH25-08.

Using the measured permeability of the clay at this site, the 1.7 m of material screened at test hole BH25-06 is estimated to represent the equivalent of about 42 m of naturally occurring materials having a hydraulic conductivity of $1 \times 10^{-6}$ cm/s (the reference standard in AOPA). At test hole BH25-08, the 1.7 m of material screened is estimated to represent the equivalent of more than 100 m of naturally occurring materials having a hydraulic conductivity of $1 \times 10^{-6}$ cm/s. This represents natural material protection in excess of the minimum requirements outlined by the AOPA for catch basins (minimum 5 m, Section 9.5-b) and solid manure storage (minimum 2 m, Section 9.5-c).

**Conclusion**

Based on the results of the current investigation, permeability testing, and our understanding of the site and development at the site, it is JLECS's opinion that the naturally occurring materials at the site satisfy the AOPA requirements for permitting the proposed pens and catch basin at this location.

We trust that this report satisfies your present requirements. Should you have any questions, please contact the undersigned at your convenience.

Yours truly,

**J Lobbezoo Engineering & Consulting Services Ltd.**

PROFESSIONAL ENGINEER ALBERTA
JOHN P. LOBBEZOO
ID 110450
24 June 2025

John Lobbezoo, P.Eng.
Principal Geotechnical Engineer

PERMIT TO PRACTICE
J LOBBEZOO ENGINEERING & CONSULTING SERVICES LTD.
RM SIGNATURE:
RM APEGA ID #: 110450
DATE: 24 June 2025
PERMIT NUMBER: P016456
The Association of Professional Engineers and Geoscientists of Alberta (APEGA)

Attachments
- Figure 1 Borehole Locations
- In Situ Permeability Test Calculations
- Down to Earth Soil Texture Results
- Borehole Logs
- Explanation of Symbols and Terms

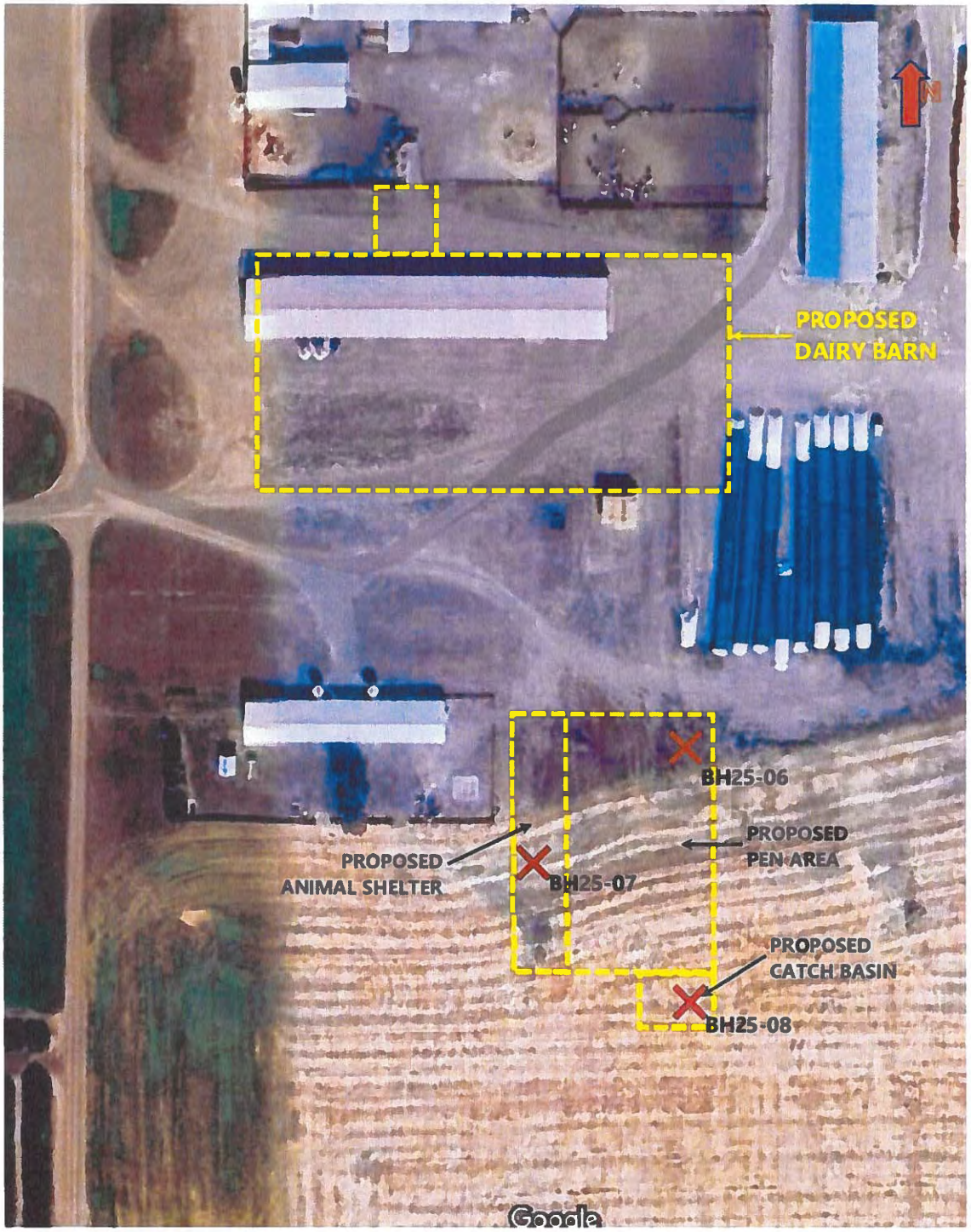



**Figure 1: Site Layout & Borehole Locations**

JLECS

## BH25-06

# In Situ Permeability Test

Modified Falling Head Permeability Equation

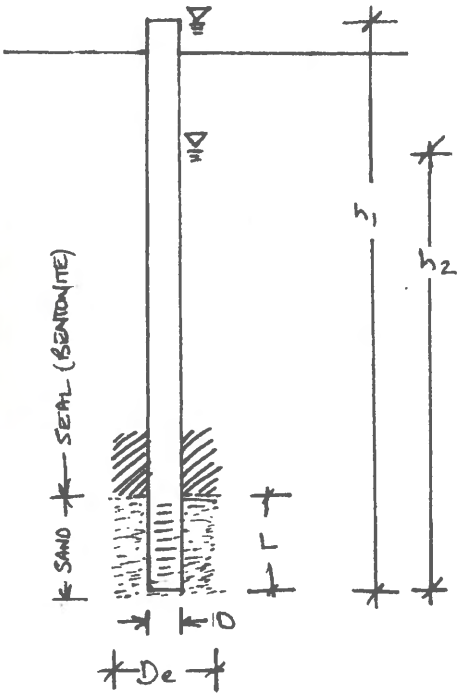
$$K_s = \frac{r^2}{2\ell\Delta t}\left[\frac{\sinh^{-1}\frac{\ell}{r_e}}{2}\ln\left[\frac{2H_1-\ell}{2H_2-\ell}\right]-\ln\left[\frac{2H_1H_2-\ell H_2}{2H_1H_2-\ell H_1}\right]\right]$$

taken from USBR Engineering Geology Field Manual Volume 2 (2001)

**BH25-06 - River Road Colony**

**JLECS File: P25052**

| INPUT VARIABLES | Terms | Value | Definition |
|---|---|---|---|
| | D | 0.0520 | diameter of standpipe (m) |
| | De | 0.1500 | diameter of borehole (m) |
| | L | 1.72 | length of sand section (m) |
| | h1 | 4.60 | initial height of water above base of hole (m) |
| | h2 | 4.24 | final height of water above base of hole (m) |
| | t | 24.0 | time of test (h) |




| | |
|---|---|
| $k_s$ = | 4.0E-08 cm/sec |

JLECS

## BH25-08

# In Situ Permeability Test

Modified Falling Head Permeability Equation

$$K_s = \frac{r^2}{2\ell\Delta t}\left[\frac{\sinh^{-1}\frac{\ell}{r_e}}{2}\ln\left[\frac{2H_1-\ell}{2H_2-\ell}\right]-\ln\left[\frac{2H_1H_2-\ell H_2}{2H_1H_2-\ell H_1}\right]\right]$$

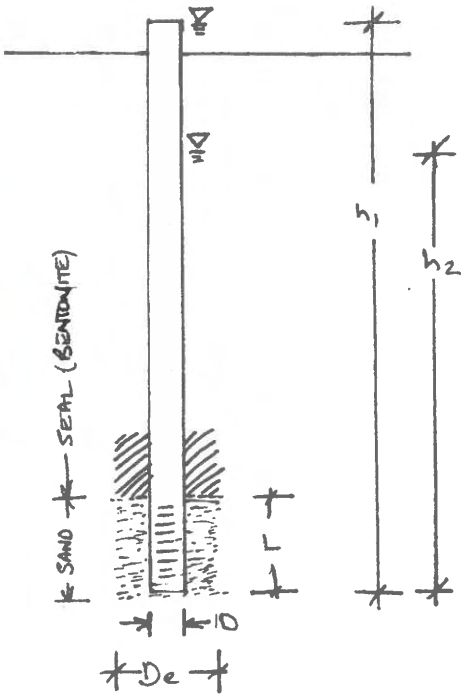
taken from USBR Engineering Geology Field Manual Volume 2 (2001)

**BH25-08 - River Road Colony**

**JLECS File: P25052**

| INPUT VARIABLES | Terms | Value | Definition |
|---|---|---|---|
| | D | 0.0520 | diameter of standpipe (m) |
| | De | 0.1500 | diameter of borehole (m) |
| | L | 1.70 | length of sand section (m) |
| | h1 | 5.80 | initial height of water above base of hole (m) |
| | h2 | 5.65 | final height of water above base of hole (m) |
| | t | 24.0 | time of test (h) |

| | |
|---|---|
| $k_s$ = | 1.2E-08 cm/sec |



# Down To Earth Labs Inc.

The Science of Higher Yields

J. Lobbezoo Engineering + Consulting Services
Box 96
Monarch, Alberta T0L 1M0

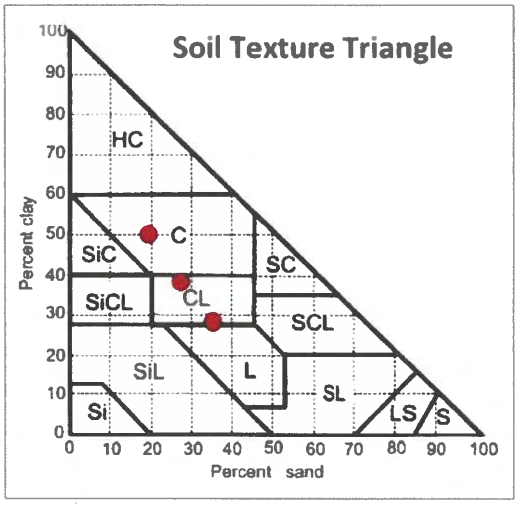
**Report #:** 206802
**Report Date:** 2025-06-04
**Received:** 2025-06-02
**Completed:** 2025-06-04
**Test Done:** ST

**Project :** River Road Colony

**PO:**

3510 6th Ave North
Lethbridge, AB T1H 5C3
403-328-1133
www.downtoearthlabs.com
info@downtoearthlabs.com

| | | | | |
|---|---|---|---|---|
| **Sample ID:** | | 250602L011 | 250602L012 | 250602L013 |
| **Cust. Sample ID:** | | BH25-06 | BH25-07 | BH25-08 |
| **Analyte** | **Units** | 3.9 | 3.9 | 5.5 |
| Sand | % | 19.8 | 27.8 | 35.7 |
| Silt | % | 30.2 | 34.2 | 36.3 |
| Clay | % | 50.0 | 38.0 | 28.0 |
| Soil Texture | - | Clay | Clay Loam | Clay Loam |

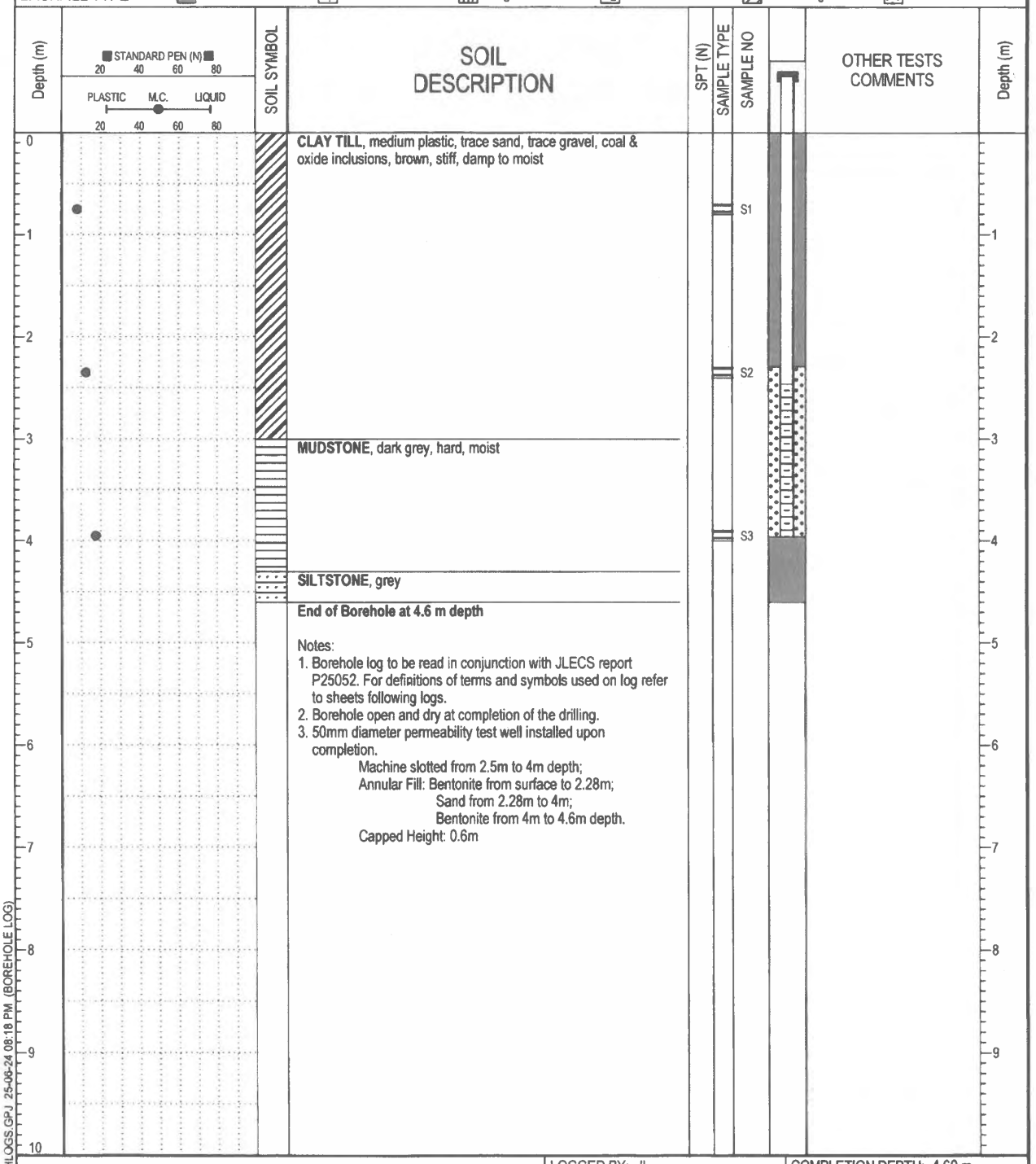



**Raygan Boyce - Chemist**

| | | |
|---|---|---|
| PROJECT: Proposed River Road Colony Dairy Barn | DRILLER: Chilako Drilling Services Ltd. | BOREHOLE NO: **BH25-06** |
| CLIENT: GT Projects Inc. | DRILL/METHOD: Truck Mounted C1150 Drill/SSA | PROJECT NO: P25052 |
| LOCATION: Near NE corner of proposed corral; refer to Figure 1 | | ELEVATION: – |

SAMPLE TYPE: Shelby Tube; No Recovery; SPT Test (N); Grab Sample; Split-Pen; Core

BACKFILL TYPE: Bentonite; Pea Gravel; Slough; Grout; Drill Cuttings; Sand




**CLAY TILL**, medium plastic, trace sand, trace gravel, coal & oxide inclusions, brown, stiff, damp to moist

**MUDSTONE**, dark grey, hard, moist

**SILTSTONE**, grey

**End of Borehole at 4.6 m depth**

Notes:
1. Borehole log to be read in conjunction with JLECS report P25052. For definitions of terms and symbols used on log refer to sheets following logs.
2. Borehole open and dry at completion of the drilling.
3. 50mm diameter permeability test well installed upon completion.
   Machine slotted from 2.5m to 4m depth;
   Annular Fill: Bentonite from surface to 2.28m;
   Sand from 2.28m to 4m;
   Bentonite from 4m to 4.6m depth.
   Capped Height: 0.6m

P25052 BHLOGS.GPJ 25-06-24 08:18 PM (BOREHOLE LOG)

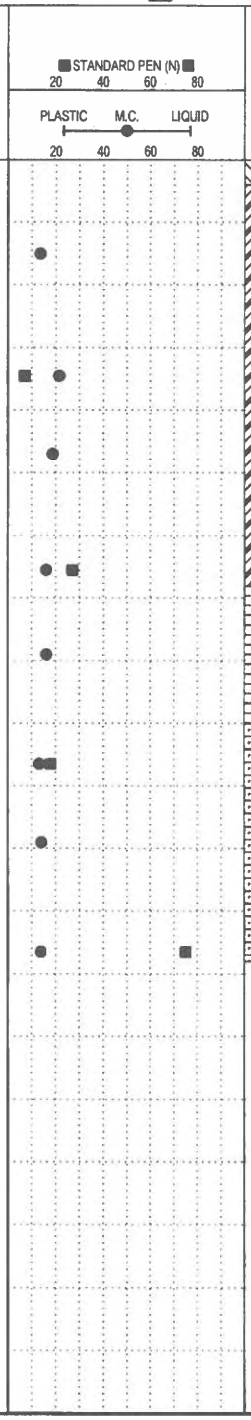
J Lobbezoo
Engineering & Consulting Services Ltd.

| | |
|---|---|
| LOGGED BY: JL | COMPLETION DEPTH: 4.60 m |
| REVIEWED BY: JL | COMPLETION DATE: 25-5-28 |
| | Page 1 of 1 |

| | | |
|---|---|---|
| PROJECT: Proposed River Road Colony Dairy Barn | DRILLER: Chilako Drilling Services Ltd. | BOREHOLE NO: **BH25-07** |
| CLIENT: GT Projects Inc. | DRILL/METHOD: Truck Mounted C1150 Drill/SSA | PROJECT NO: P25052 |
| LOCATION: Near W side of proposed corral; refer to Figure 1 | | ELEVATION: -- |

SAMPLE TYPE: Shelby Tube; No Recovery; SPT Test (N); Grab Sample; Split-Pen; Core

BACKFILL TYPE: Bentonite; Pea Gravel; Slough; Grout; Drill Cuttings; Sand




| SOIL SYMBOL | SOIL DESCRIPTION | SPT (N) | SAMPLE TYPE | SAMPLE NO | OTHER TESTS COMMENTS |
|---|---|---|---|---|---|
| | **TOPSOIL** (200mm) | | | | |
| | **CLAY TILL**, medium plastic, trace sand, trace gravel, coal & oxide inclusions, brown, firm to stiff, damp | | | S1 | PP = 3.5 kg/cm² |
| | ...sandy, very moist, soft to firm from 1.5m to 1.7m depth<br>...some sand from 1.7m to 2.7m depth | 7 | | S2 | |
| | ...very stiff below 2.7m depth | | | S3 | PP = 2.0 kg/cm² |
| | **MUDSTONE**, dark grey, hard, moist | 27 | | S4 | |
| | | | | S5 | PP = 3.5 kg/cm² |
| | **SILTSTONE**, light grey | 18 | | S6 | |
| | | | | S7 | PP = 4.5 kg/cm² |
| | **End of Borehole at 6.4 m depth** | 75 | | S8 | |

Notes:
1. Borehole log to be read in conjunction with JLECS report P25052. For definitions of terms and symbols used on log refer to sheets following logs.
2. Borehole open and dry at completion of the drilling.
3. Borehole backfilled with cuttings upon completion.
4. Other tests PP = Pocket Penetrometer in kg/cm².

P25052 BHLOGS.GPJ 25-06-24 08:18 PM (BOREHOLE LOG)

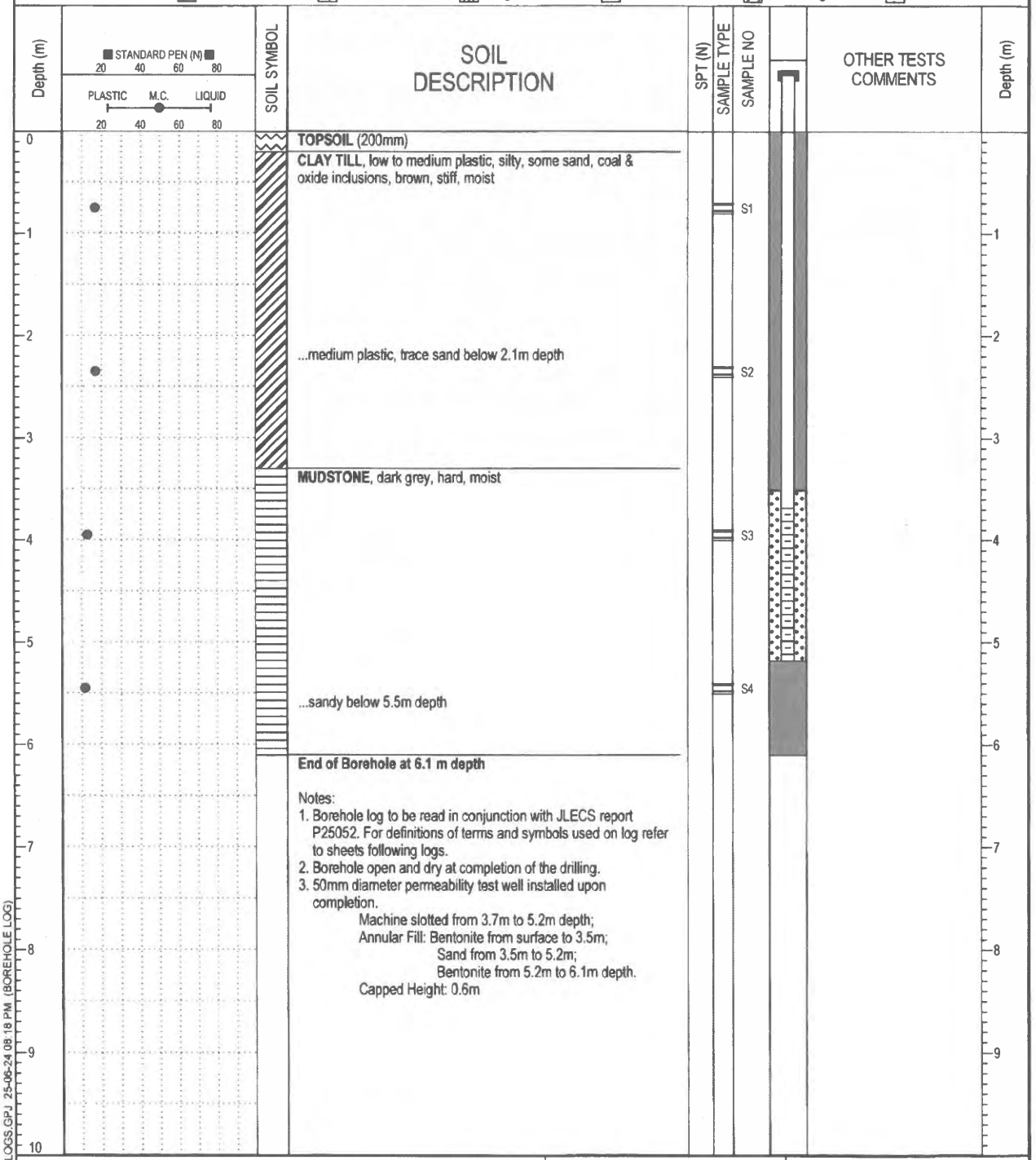
J Lobbezoo
Engineering & Consulting Services Ltd.

| | |
|---|---|
| LOGGED BY: JL | COMPLETION DEPTH: 6.40 m |
| REVIEWED BY: JL | COMPLETION DATE: 25-5-28 |
| | Page 1 of 1 |

| | | |
|---|---|---|
| PROJECT: Proposed River Road Colony Dairy Barn | DRILLER: Chilako Drilling Services Ltd. | BOREHOLE NO: **BH25-08** |
| CLIENT: GT Projects Inc. | DRILL/METHOD: Truck Mounted C1150 Drill/SSA | PROJECT NO: P25052 |
| LOCATION: Proposed catch basin, SE corner of corral; refer to Figure 1 | | ELEVATION: -- |

SAMPLE TYPE: Shelby Tube; No Recovery; SPT Test (N); Grab Sample; Split-Pen; Core

BACKFILL TYPE: Bentonite; Pea Gravel; Slough; Grout; Drill Cuttings; Sand




**End of Borehole at 6.1 m depth**

Notes:
1. Borehole log to be read in conjunction with JLECS report P25052. For definitions of terms and symbols used on log refer to sheets following logs.
2. Borehole open and dry at completion of the drilling.
3. 50mm diameter permeability test well installed upon completion.
   Machine slotted from 3.7m to 5.2m depth;
   Annular Fill: Bentonite from surface to 3.5m;
   Sand from 3.5m to 5.2m;
   Bentonite from 5.2m to 6.1m depth.
   Capped Height: 0.6m

P25052 BHLOGS.GPJ 25-06-24 08:18 PM (BOREHOLE LOG)

J Lobbezoo
Engineering & Consulting Services Ltd.

| | |
|---|---|
| LOGGED BY: | COMPLETION DEPTH: 6.10 m |
| REVIEWED BY: | COMPLETION DATE: |
| | Page 1 of 1 |

# EXPLANATION OF TERMS AND SYMBOLS

The terms and symbols used on the borehole logs to summarize the results of field investigation and subsequent laboratory testing are described in these pages.

It should be noted that materials, boundaries and conditions have been established only at the borehole locations at the time of investigation and are not necessarily representative of subsurface conditions elsewhere across the site.

**TEST DATA**

Data obtained during the field investigation and from laboratory testing are shown at the appropriate depth interval.

Abbreviations, graphic symbols, and relevant test method designations are as follows:

| | | | |
|---|---|---|---|
| *C | Consolidation test | *ST | Swelling test |
| $D_R$ | Relative density | TV | Torvane shear strength |
| *k | Permeability coefficient | VS | Vane shear strength |
| *MA | Mechanical grain size analysis and hydrometer test | w | Natural Moisture Content (ASTM D2216) |
| | | $w_l$ | Liquid limit (ASTM D 423) |
| N | Standard Penetration Test (CSA A119.1-60) | $w_p$ | Plastic Limit (ASTM D 424) |
| $N_d$ | Dynamic cone penetration test | $E_f$ | Unit strain at failure |
| NP | Non plastic soil | $\gamma$ | Unit weight of soil or rock |
| pp | Pocket penetrometer strength (kg/cm²) | $\gamma_d$ | Dry unit weight of soil or rock |
| *q | Triaxial compression test | $\rho$ | Density of soil or rock |
| $q_u$ | Unconfined compressive strength | $\rho_d$ | Dry Density of soil or rock |
| *SB | Shearbox test | $C_u$ | Undrained shear strength |
| $SO_4$ | Concentration of water-soluble sulphate | → | Seepage |
| | | ▼ | Observed water level |

* The results of these tests are usually reported separately

Soils are classified and described according to their engineering properties and behaviour.

The soil of each stratum is described using the Unified Soil Classification System[1] modified slightly so that an inorganic clay of "medium plasticity" is recognized.

The modifying adjectives used to define the actual or estimated percentage range by weight of minor components are consistent with the Canadian Foundation Engineering Manual[2].

Relative Density and Consistency:

| Cohesionless Soils | | Cohesive Soils | | |
|---|---|---|---|---|
| Relative Density | SPT (N) Value | Consistency | Undrained Shear Strength $c_u$ (kPa) | Approximate SPT (N) Value |
| Very Loose | 0-4 | Very Soft | 0-12 | 0-2 |
| Loose | 4-10 | Soft | 12-25 | 2-4 |
| Compact | 10-30 | Firm | 25-50 | 4-8 |
| Dense | 30-50 | Stiff | 50-100 | 8-15 |
| Very Dense | >50 | Very Stiff | 100-200 | 15-30 |
| | | Hard | >200 | >30 |

Standard Penetration Resistance ("N" value)
The number of blows by a 63.6kg hammer dropped 760 mm to drive a 50 mm diameter open sampler attached to "A" drill rods for a distance of 300 mm.

1 "Unified Soil Classification System", Technical Memorandum 36-357 prepared by Waterways Experiment Station, Vicksburg, Mississippi, Corps of Engineers, U.S. Army. Vol. 1 March 1953.
2 "Canadian Foundation Engineering Manual", 4th Edition, Canadian Geotechnical Society, 2006.

## MODIFIED UNIFIED CLASSIFICATION SYSTEM FOR SOILS

| MAJOR DIVISION | | | GROUP SYMBOL | GRAPH SYMBOL | COLOUR CODE | TYPICAL DESCRIPTION | LABORATORY CLASSIFICATION CRITERIA | |
|---|---|---|---|---|---|---|---|---|
| COARSE GRAINED SOILS (MORE THAN HALF BY WEIGHT LARGER THAN 75µm) | GRAVELS MORE THAN HALF THE COARSE FRACTION LARGER THAN 4.75mm | CLEAN GRAVELS (LITTLE OR NO FINES) | GW | | RED | WELL GRADED GRAVELS, GRAVEL-SAND MIXTURES, LITTLE OR NO FINES | $C_U = \frac{D_{60}}{D_{10}} > 4$; $C_C = \frac{(D_{30})^2}{D_{10} \times D_{60}} = 1$ to 3 | |
| | | | GP | | RED | POORLY GRADED GRAVELS, GRAVEL-SAND MIXTURES, LITTLE OR NO FINES | NOT MEETING ABOVE REQUIREMENTS | |
| | | DIRTY GRAVELS (WITH SOME FINES) | GM | | YELLOW | SILTY GRAVELS, GRAVEL-SAND-SILT MIXTURES | CONTENT OF FINES EXCEEDS 12 % | ATTERBERG LIMITS BELOW "A" LINE OR P.I. LESS THAN 4 |
| | | | GC | | YELLOW | CLAYEY GRAVELS, GRAVEL-SAND-CLAY MIXTURES | CONTENT OF FINES EXCEEDS 12 % | ATTERBERG LIMITS ABOVE "A" LINE P.I. MORE THAN 7 |
| | SANDS MORE THAN HALF THE COARSE FRACTION SMALLER THAN 4.75mm | CLEAN SANDS (LITTLE OR NO FINES) | SW | | RED | WELL GRADED SANDS, GRAVELLY SANDS, LITTLE OR NO FINES | $C_U = \frac{D_{60}}{D_{10}} > 6$; $C_C = \frac{(D_{60})^2}{D_{10} \times D_{60}} = 1$ to 3 | |
| | | | SP | | RED | POORLY GRADED SANDS, GRAVELLY SANDS, LITTLE OR NO FINES | NOT MEETING ABOVE REQUIREMENTS | |
| | | DIRTY SANDS (WITH SOME FINES) | SM | | YELLOW | SILTY SANDS, SAND-SILT MIXTURES | CONTENT OF FINES EXCEEDS 12 % | ATTERBERG LIMITS BELOW "A" LINE OR P.I. LESS THAN 4 |
| | | | SC | | YELLOW | CLAYEY SANDS, SAND-CLAY MIXTURES | CONTENT OF FINES EXCEEDS 12 % | ATTERBERG LIMITS ABOVE "A" LINE P.I. MORE THAN 7 |
| FINE-GRAINED SOILS (MORE THAN HALF BY WEIGHT SMALLER THAN 75µm) | SILTS BELOW "A" LINE NEGLIGIBLE ORGANIC CONTENT | $W_L$< 50% | ML | | GREEN | INORGANIC SILTS AND VERY FINE SANDS, ROCK FLOUR, SILTY SANDS OF SLIGHT PLASTICITY | CLASSIFICATION IS BASED UPON PLASTICITY CHART (SEE BELOW) | |
| | | $W_L$< 50% | MH | | BLUE | INORGANIC SILTS, MICACEOUS OR DIATOMACEOUS, FINE SANDS OR SILTY SOILS | | |
| | CLAYS ABOVE "A" LINE NEGLIGIBLE ORGANIC CONTENT | $W_L$< 30% | CL | | GREEN | INORGANIC CLAYS OF LOW PLASTICITY, GRAVELLY, SANDY OR SILTY CLAYS, LEAN CLAYS | | |
| | | 30% <$W_L$< 50% | CI | | GREEN-BLUE | INORGANIC CLAYS OF MEDIUM PLASTICITY, SILTY CLAYS | | |
| | | $W_L$> 50% | CH | | BLUE | INORGANIC CLAYS OF HIGH PLASTICITY, FAT CLAYS | | |
| | ORGANIC SILTS & CLAYS BELOW "A" LINE | $W_L$< 50% | OL | | GREEN | ORGANIC SILTS AND ORGANIC SILTY CLAYS OF LOW PLASTICITY | WHENEVER THE NATURE OF THE FINES CONTENT HAS NOT BEEN DETERMINED, IT IS DESIGNATED BY THE LETTER "F", E.G. SF IS A MIXTURE OF SAND WITH SILT OR CLAY | |
| | | $W_L$> 50% | OH | | BLUE | ORGANIC CLAYS OF HIGH PLASTICITY | | |
| HIGHLY ORGANIC SOILS | | | Pt | | ORANGE | PEAT AND OTHER HIGHLY ORGANIC SOILS | STRONG COLOUR OR ODOUR, AND OFTEN FIBEROUS TEXTURE | |

### SPECIAL SYMBOLS

| | | | |
|---|---|---|---|
| LIMESTONE | | OILSAND | |
| SANDSTONE | | SHALE | |
| SILTSTONE | | FILL (UNDIFFERENTIATED) | |

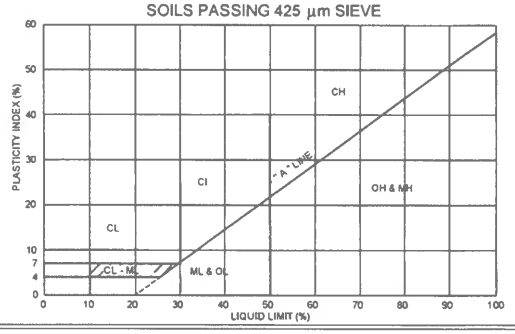
### SOIL COMPONENTS

| FRACTION | U.S. STANDARD SIEVE SIZE | | DEFINING RANGES OF PERCENTAGE BY WEIGHT OF MINOR COMPONENTS | |
|---|---|---|---|---|
| GRAVEL | PASSING | RETAINED | PERCENT | DESCRIPTOR |
| COARSE | 76mm | 19mm | 35-50 | AND |
| FINE | 19mm | 4.75mm | | |
| SAND | | | 20-35 | Y/EY |
| COARSE | 4.75mm | 2.00mm | | |
| MEDIUM | 2.00mm | 425µm | 10-20 | SOME |
| FINE | 425µm | 75µm | | |
| FINES (SILT OR CLAY BASED ON PLASTICITY) | 75µm | | 1-10 | TRACE |

### OVERSIZED MATERIAL

| | |
|---|---|
| ROUNDED OR SUBROUNDED: | NOT ROUNDED |
| COBBLES 76mm TO 200mm | ROCK FRAGMENTS > 76mm |
| BOULDERS > 200mm | ROCKS > 0.76 CUBIC METRE IN VOLUME |

### PLASTICITY CHART FOR SOILS PASSING 425 µm SIEVE




NOTES:

1. ALL SIEVE SIZES MENTIONED ON THIS CHART ARE U.S. STANDARD A.S.T.M. E.11
2. COARSE GRAIN SOILS WITH 5 TO 12% FINES GIVEN COMBINED GROUP SYMBOLS, E.G. GW-GC IS A WELL GRADED GRAVEL SAND MIXTURE WITH CLAY BINDER BETWEEN 5 AND 12% FINES.

JLECS