

22.0 ACCESS, SAFETY, AND SECURITY PROVISIONS

22.1 Site Access

Site access roads are provided to facilitate operation, inspection, and maintenance activities. The driving width of the road should be determined based on its location (e.g. top of dam or canal), frequency of use, size of vehicle, and traffic direction (one-way or two-way).

At locations where vehicle access is restricted, a control gate as shown on Figure 22-1 is normally provided.

22.2 Safety and Security Provisions

22.2.1 General

In general, the three-pronged approach outlined below should be considered in addressing potential safety hazards:

- Where feasible, design the structure/facility to eliminate the hazard.
- If the above is not feasible, provide a barrier/shield to protect personnel from the hazard.
- If neither of the above is feasible, provide safe operational procedures to minimize the risk of injury.

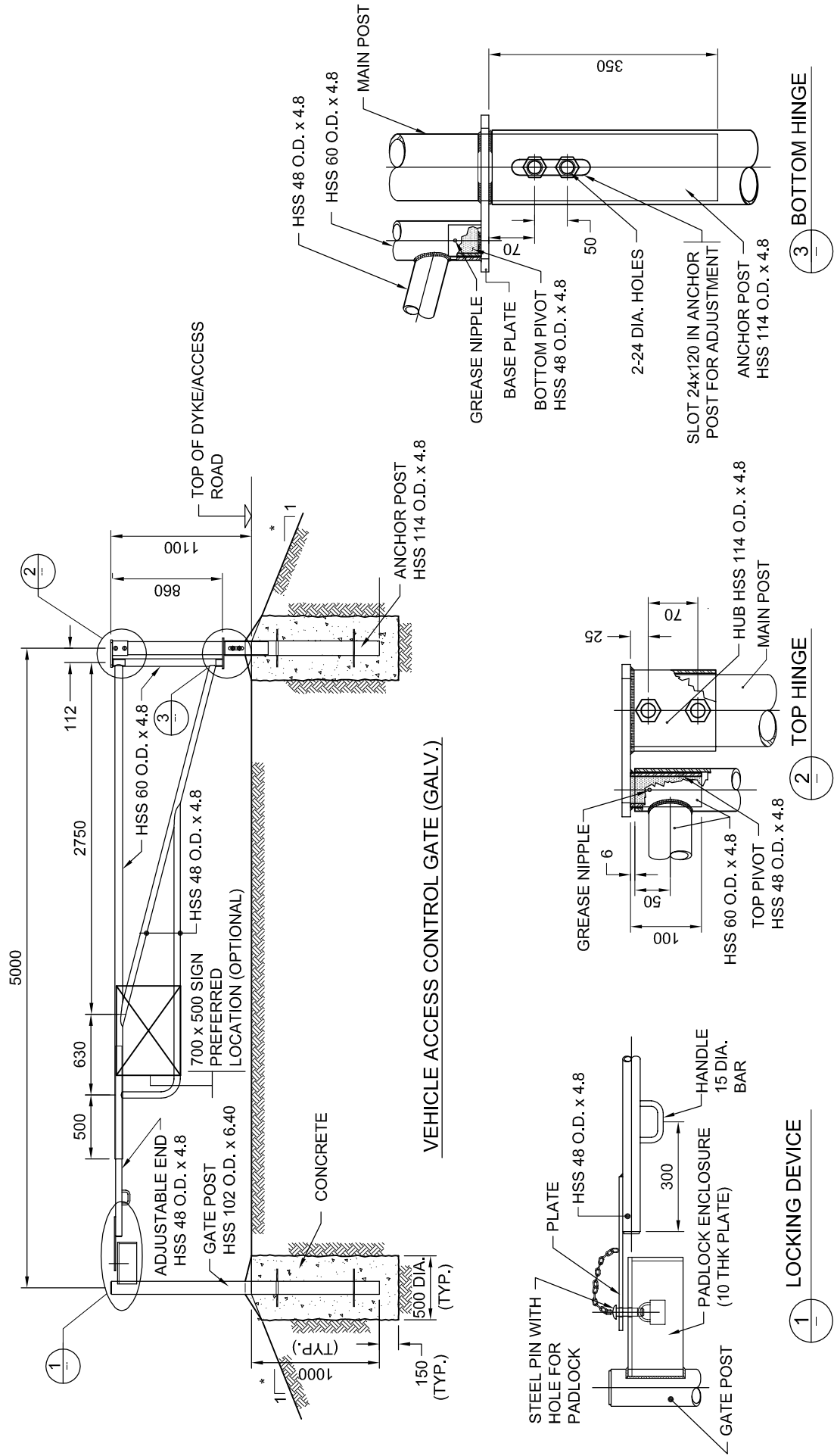
22.2.2 Ladders

Ladders and steps (rungs) fabricated from galvanized solid steel bar or extruded thin-walled aluminium pipe have been used. The robustness and longevity of the galvanized solid steel bar is preferred. A width of 400 mm is preferred with the minimum being 300 mm. Steps (rungs) are typically spaced at 300 mm.

Where practical, the installation of an access handle or grab bar at the top of the ladder or steps should be considered to facilitate ingress and egress.

Requirements for safety cages, landings, or fall arrest safety systems are outlined in the Alberta Occupational Health and Safety Act. The current preference particularly for confined space situations (e.g. deep gatewells and manholes) is to use a fall arresting and safety winch system rather than safety cages because it provides the following main advantages:

- There are no safety cages or platforms that can impede ingress and egress.
- The fall arresting system permits rescue of injured personnel from the top of the structure.



NOTE:
1. ALL DIMENSION ARE IN MILLIMETERS UNLESS NOTED OTHERWISE.

SOURCE: ALBERTA ENVIRONMENT, 2000.

Fall arrest system requirements for a particular application will depend on the functional and operational requirements of the system, the configuration at the point of entry, the depth of entry, the frequency of use, and environmental and site specific considerations.

For affixing ladders to concrete structures, an injection adhesive anchor system (galvanized or stainless steel threaded rod and adhesive) is preferred over an expansion type anchor system, because the former is easier to install, requires less edge distance, and prevents moisture from entering the holes which can cause concrete deterioration through freezing and expansion.

For a structure where dissimilar metals (i.e. galvanized or stainless steel and aluminium) that will be in contact with water or soil are used, the possibility for galvanic corrosion to occur should be reviewed.

22.2.3 Handrails

Handrails normally fabricated using steel pipe as illustrated on Figure 22-2 may be used at structure locations where only a small number of people are expected (e.g. isolated site, restricted equipment access deck) at any given time. For other situations, a specific design may be required.

After fabrication, the handrail should be galvanized. Vent holes required for galvanizing should be located so that they are out of sight (e.g. underside of rails, through the base plates for posts, etc.).

For affixing handrails to concrete structures, the use of an injection adhesive anchor system as noted in Section 22.2.2 is preferred.

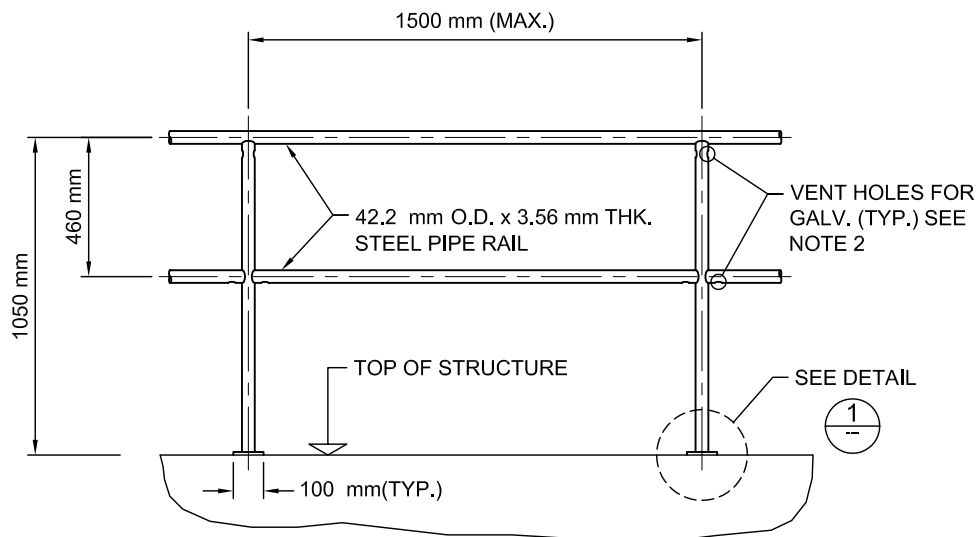
22.2.4 Fencing

Galvanized chain link fencing is used where required to prevent unauthorized access or as a safety measure. A 1.8 m high chain link fence with barbed wire is ordinarily used to restrict access, whereas a 1.2 m high fence is used where safety is a concern and handrails are not considered appropriate. At some locations, an overhang may be required to prevent persons from walking around the fence along the top of the wall. Typical chain link fence details are illustrated on Figure 22-3. For affixing fencing to concrete structures, the use of an injection adhesive anchor system as noted in Section 22.2.2 is preferred.

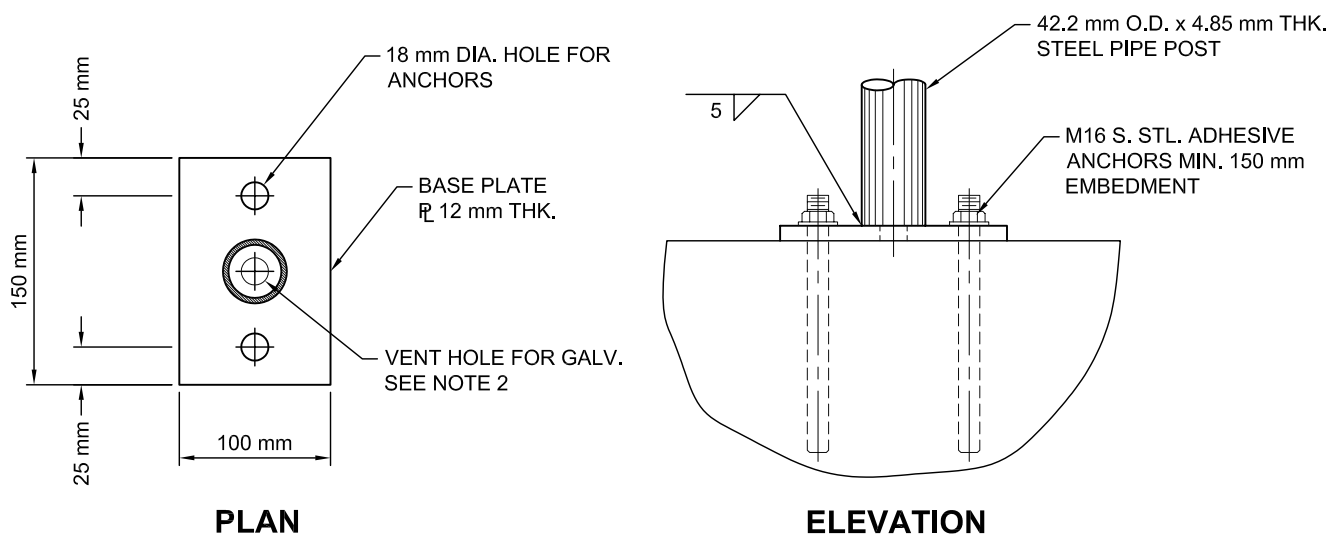
Barbed wire fencing is typically used as perimeter fencing to keep livestock out or at locations where unauthorized access is not a primary concern. Typical barbed wire fence details are shown on Figure 22-4.

22.2.5 Texas Gates

Texas gates are used to permit vehicle access while preventing livestock from entering the site area. Typical details are shown on Figure 22-5.



DETAIL-HANDRAIL (GALV. AFTER FABRICATION)



1 DETAIL-HANDRAIL POST (GALV.)

NOTES:

- HANDRAIL SHOWN SHOULD BE USED ONLY FOR OPERATOR SAFETY PURPOSES, WHERE PUBLIC ACCESS IS RESTRICTED. TO PROTECT PEOPLE FROM HARM, THE USE OF CHAIN LINK FENCE IS PREFERRED. WHERE PUBLIC ACCESS IS RESTRICTED TO PROTECT EQUIPMENT, CHAIN LINK FENCE WITH BARBED WIRE IS USED.
- LOCATE VENT HOLES SUCH THAT THEY ARE OUT OF SIGHT.

ALBERTA TRANSPORTATION
CIVIL PROJECTS BRANCH

ALBERTA ENVIRONMENT
WATER MANAGEMENT OPERATIONS

WATER CONTROL STRUCTURES - SELECTED DESIGN GUIDELINES

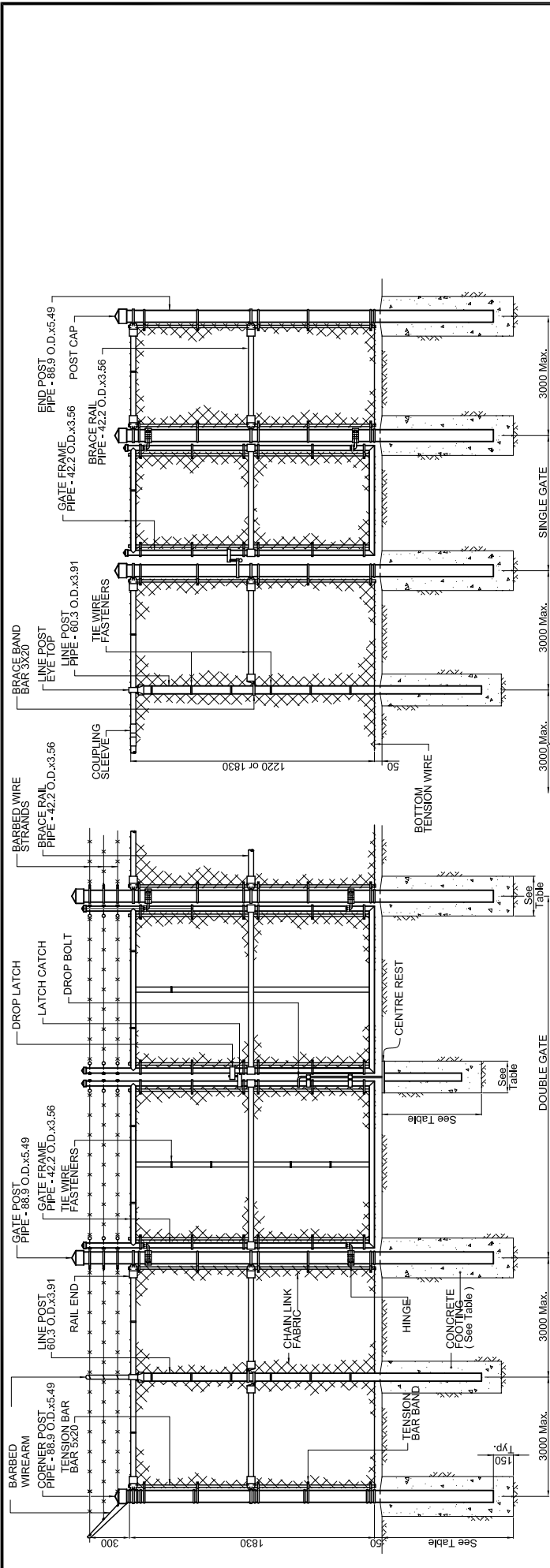
TYPICAL HANDRAIL

DATE: November 2004

CAD FILE: 99008A22-2.dwg

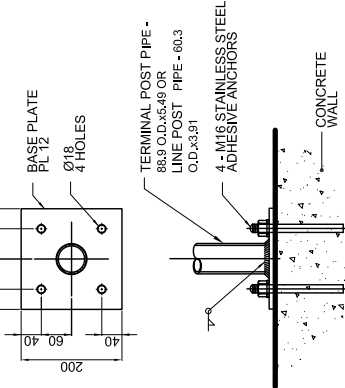
FIGURE No.:

22-2

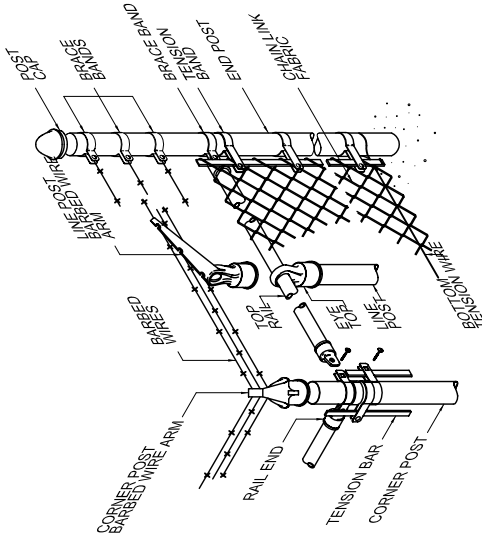


FENCE WITH SINGLE GATE

FENCE WITH BARBED WIRE AND DOUBLE GATE



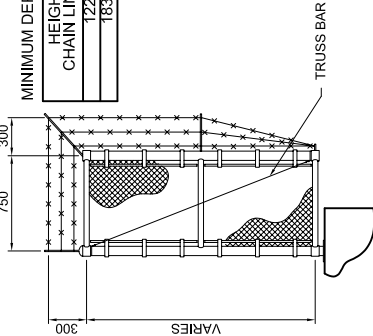
TYPICAL BASE PLATE CONNECTION TO A CONCRETE STRUCTURE



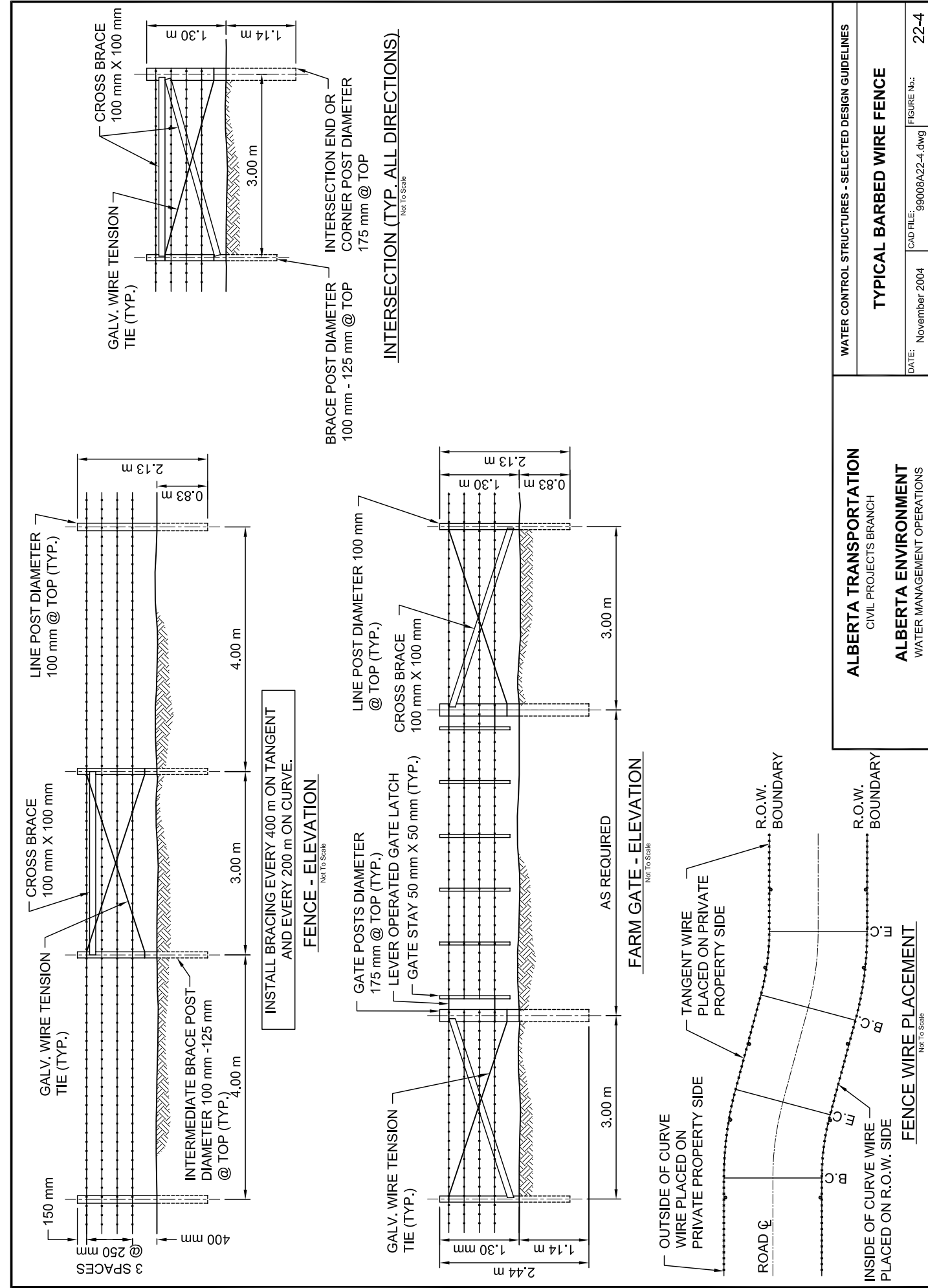
CHAIN LINK FENCE COMPONENTS

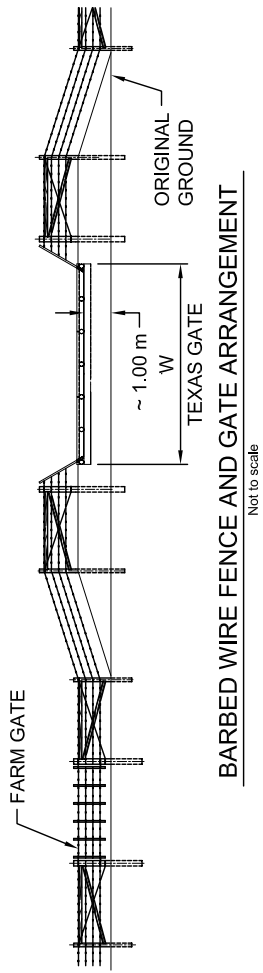
MINIMUM DEPTH AND DIAMETER OF POST HOLES

CHAIN LINK FABRIC	DEPTH OF HOLE DIA. OF HOLE	TERMINAL LINE	TERMINAL LINE
1220	1000	900	300
1830	1200	1000	300
		1200	250

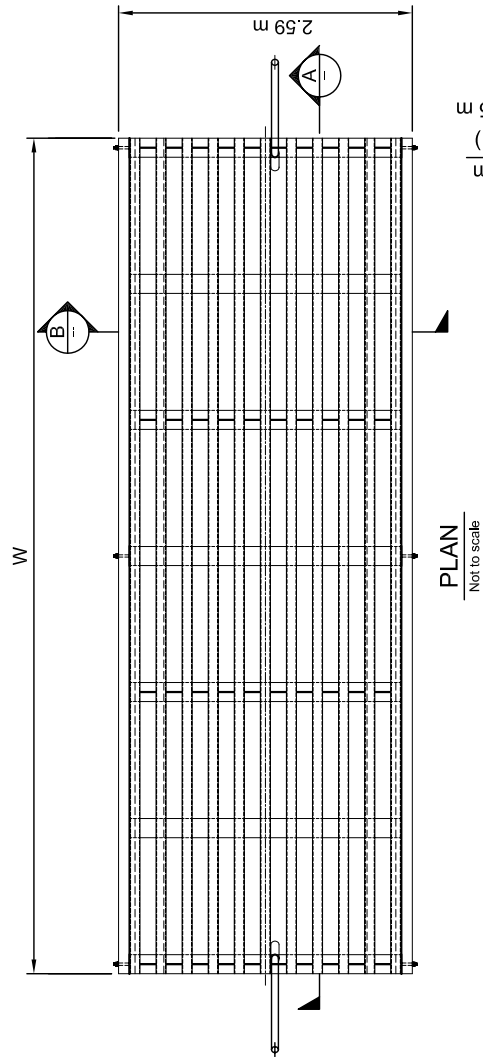


TYPICAL FENCE OVERHANG DETAIL





BARBED WIRE FENCE AND GATE ARRANGEMENT

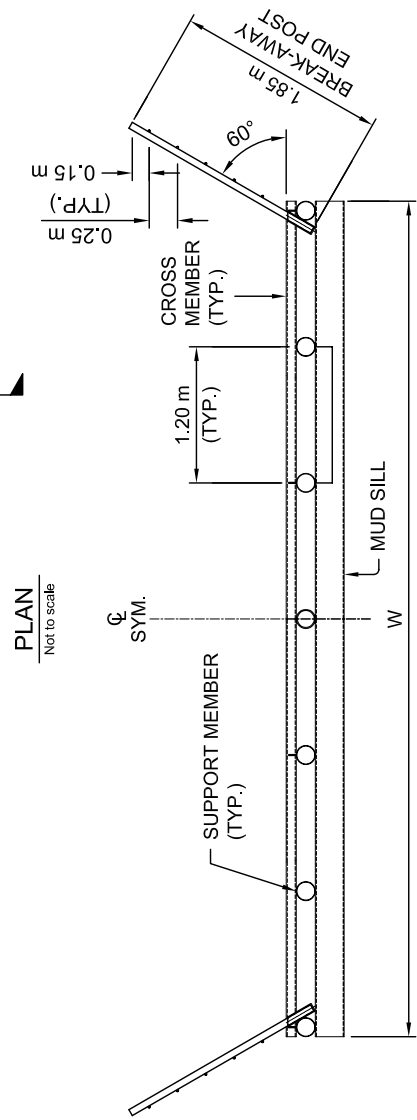
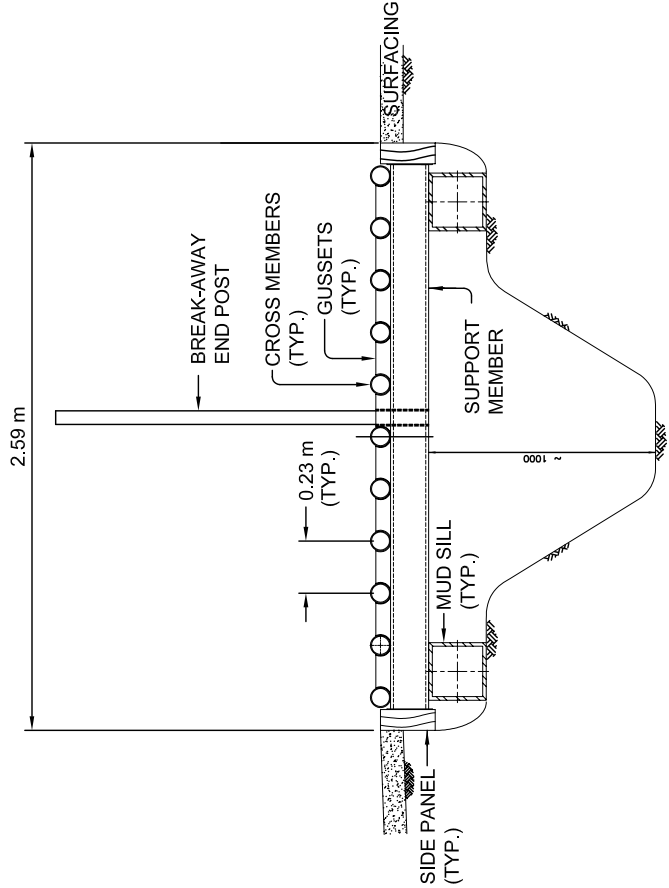


PLAN

Not to scale

SECTION B

Not to scale



SECTION A

Not to scale

ALBERTA TRANSPORTATION
CIVIL PROJECTS BRANCH
ALBERTA ENVIRONMENT
WATER MANAGEMENT OPERATIONS

WATER CONTROL STRUCTURES - SELECTED DESIGN GUIDELINES

TYPICAL TEXAS GATE

SOURCE: ALBERTA ENVIRONMENT, 2000.

DATE: November 2004

CAD FILE: 99008A22-5.dwg

FIGURE No.:

22-5

22.2.6 Signs

Guidelines for the use and production of signs on water resource projects can be obtained from AENV (1996) and AENV (2000). In general, AENV has divided the sign types into the following four categories:

- Hazard: primarily intended to alert the public and/or staff to a danger;
- Restrictive: primarily intended to stop a particular activity by the public and/or staff;
- Advisory: primarily intended to provide advance warning of potential danger; and
- Other: primarily intended to provide instructional messages.

Examples of warning and safety signs are illustrated on Figure 22-6.



LETTER SIZE (X) (mm)	TYPICAL SIGN SIZE (mm)	VIEWING DISTANCE (m)	LETTER & BORDER COLOUR	BACKGROUND COLOUR
50	600 x 325	25	BLACK	YELLOW
75	900 x 490	38	BLACK	YELLOW
100	1200 x 650	50	BLACK	YELLOW

RESTRICTIVE SIGN



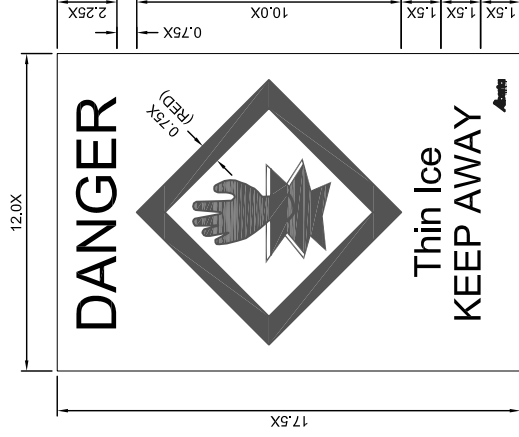
LETTER SIZE (X) (mm)	TYPICAL SIGN SIZE (mm)	VIEWING DISTANCE (m)	LETTER & BORDER COLOUR	BACKGROUND COLOUR
DANGER	150	25	BLACK	YELLOW
OTHER	100			
DANGER	300	50	BLACK	YELLOW
OTHER	200			

HAZARD SIGN



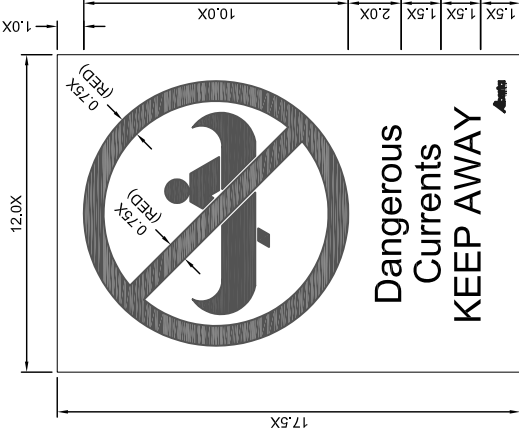
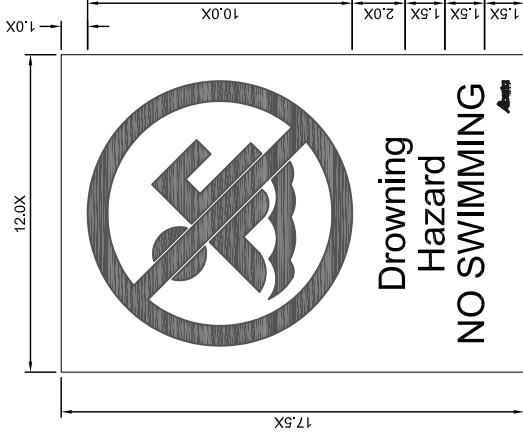
LETTER SIZE (X) (mm)	TYPICAL SIGN SIZE (mm)	VIEWING DISTANCE (m)	LETTER & BORDER COLOUR	BACKGROUND COLOUR
DANGER	75	25	BLACK	YELLOW
OTHER	50			
DANGER	150	50	BLACK	YELLOW
OTHER	100			

HAZARD SIGN



LETTER SIZE (X) (mm)	TYPICAL SIGN SIZE (mm)	VIEWING DISTANCE (m)	LETTER & BORDER COLOUR	BACKGROUND COLOUR
DANGER	75	25	BLACK	WHITE
OTHER	50			
DANGER	150	50	BLACK	WHITE
OTHER	100			

HAZARD SIGN



LETTER SIZE (X) (mm)	TYPICAL SIGN SIZE (mm)	VIEWING DISTANCE (m)	LETTER & BORDER COLOUR	BACKGROUND COLOUR
50	600 x 875	25	BLACK	WHITE
100	1200 x 1750	38	BLACK	WHITE

RESTRICTIVE SIGNS