CALGARY PARKS 2022

DEVELOPMENT GUIDELINES AND STANDARD SPECIFICATIONS: LANDSCAPE CONSTRUCTION

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TERMS OF USE

The 2022 *Development Guidelines and Standard Specifications: Landscape Construction* is presented as accurate and complete, and is made available for use in The City of Calgary effective as of the date below:

June 15, 2022

The guidelines and specifications provided in the *Development Guidelines and Standard Specifications for Landscape Construction* are considered to be normal practice for the construction of landscape elements.

Use of these guidelines and specifications does not absolve any user from the obligation to exercise their professional judgement and follow good practice. Should any user have questions as to the intent or accuracy of any specification or drawing herein, or be concerned that conflict might exist between the manufacturers' or suppliers' recommended installation procedures and these specifications, the user is advised to seek clarification from the Calgary Parks Development Coordinator.

Calgary Parks, at their discretion, may consider alternatives to or relaxations of the guidelines and/or specifications when the Developer (or their agent) or Contractor (or their agent) provides a written submission identifying the reasons for requesting special consideration to the Calgary Parks Development Coordinator. It is the Developer's responsibility to ensure that the proposed development complies with all applicable City Bylaws and provincial building codes. Calgary Parks approval of the landscape construction drawings does not supersede this requirement.

DOCUMENT NAVIGATION

Use the hyperlinks in the 2022 *Development Guidelines and Standard Specifications: Landscape Construction* to easily navigate between sections or to an outside source document.

- A ***black hyperlinked reference*** takes you to the specified section.
- A ***green hyperlinked reference*** takes you to the Glossary of Terms (Appendix A), where the specified word, phrase, or acronym is defined.
- Click a ***brown hyperlinked reference*** takes you to the Contacts section (Appendix B), where the specified company, department, or staff position's contact information is listed.
- Click a *blue hyperlinked reference* takes you to a document's web source. Full source information for each document is located in the References section (Appendix C). *Italicized* document titles are print sources only - their source information is also listed in the References section.

MANUAL REVISION NOTICE

Formatting changes do not affect the purpose or intent of any part of this document. Only the technical changes listed below are considered to be substantive changes to the specifications since the 2021 version of the manual. Within the text, revisions are noted with a “New” or “Revised” arrow and are shaded for additional clarification. Detail Sheet revisions are noted with a “New” or “Revised” arrow only.

SECTION	STARTING ON PAGE	CONTENT REVISION
7.3.5 Installation	***130***	Items 4 through 9 removed and replaced with new section 7.3.7.
7.3.7 Pour-in-Place Rubber Fall Surface	***130***	New section.
8.1.6 Inspections and Forms	***151***	Items 4a and 4b revised.
8.2.4 Swing Joints and Risers	***159***	New content added to item 1.
8.2.5.3 Short Range Rotors	***161***	Item 3 revised.
8.2.8 Gate Valves	***171***	Item 3 revised.
Detail Sheet IR-68: Drain Pit for High Density Pipe	***372***	Detail sheet IR-68 has been updated.

ACKNOWLEDGEMENTS

In September 1993, Calgary Parks committed to a full-scale review of their *Development Guidelines and Standard Specifications for Landscape Construction*. In January 1994, a workshop series was conducted that included participants from:

- The Urban Development Institute - Calgary.
- The Alberta Association of Landscape Architects.;
- The Landscape Alberta Nursery Trades Association.;
- The Alberta Irrigation Association.
- Calgary Parks.

Workshop participants reviewed and updated, by consensus, specific sections of the 1993 Guidelines and Specifications.

In 2004, a second full-scale review was conducted. It involved a series of negotiations between representatives of the Urban Development Institute and Calgary Parks to obtain a collaboratively developed set of guidelines and standards for the construction of the City's Open Space system.

Calgary Parks would like to take this opportunity to cordially thank the 65 individuals who donated their time and effort toward the 1993 workshop series. As well, our sincere thanks go out to the representatives of the Urban Development Institute - Calgary's Urban Landscape Committee and the members of Calgary Parks' Negotiating Team who devoted their time in 2004. The dedication and effective communication skills of the members of the negotiation teams are what made this manual possible.

Calgary Parks would also like to sincerely thank BILD Calgary Region (formerly the Urban Development Institute) for their ongoing contribution to this document. Their annual collaboration with Calgary Parks ensures that *Development Guidelines and Standard Specifications: Landscape Construction* always reflect current regulations and industry best practices.

INTRODUCTION

The *Development Guidelines and Standard Specifications for Landscape Construction* (hereafter referred to as “this manual”) was created by Calgary Parks to provide the following:

- A list of appropriate development activities for each park type.
- Concept Planning Requirements at the Land Use/Outline Plan stage.
- Construction approval requirements.
- Construction plan requirements.
- Requirements for inspections during construction.
- Construction Completion Certificate requirements.

- Final Acceptance Certificate requirements.
- Detailed specifications for landscape construction.

Concept plans and construction plans must reflect the policies and conditions approved at the Community Planning and Land Use/Outline Planning stages. Community Plans and Land Use/Outline Plans must conform to Federal/Provincial legislation and Council-approved policies, such as *The Calgary Plan*, the *Open Space Plan*, the *Calgary Urban Park Master Plan*, the *Natural Area Management Plan*, the *Calgary Wetland Conservation Plan*, the *Stormwater Management Strategic Plan*, and the *Calgary Transportation Plan*. The following table illustrates these relationships:

<table>
<tr><td></td><td colspan="6">Municipal Government Act and other Provincial and Federal legislation.</td></tr>
<tr><td>City wide/larger in scope; multiple functions; partnerships</td><td colspan="2">Inter-Municipal Development Plans.</td><td colspan="2">The Calgary Plan

Other Council-approved policies (i.e. Go Plan).</td><td colspan="2">Joint Use Agreements</td></tr>
<tr><td>City wide; all open space</td><td colspan="6">Open Space Plan.</td></tr>
<tr><td>City wide; specific to an issue or aspect of open space. Examples include:</td><td>Urban Park Master Plan.

River Valleys Plan.</td><td>Natural Areas Mgmt.Plan.

Wetland Conservation Plan.</td><td>Stormwater Mgmt. Plan.

Water Mgmt. Strategic Plan.</td><td>Transportation Plan</td><td>Sports Fields Mgmt. Plan.</td><td>Urban Forestry Mgmt. Plan.</td></tr>
<tr><td>Policy for a broad geographic area</td><td colspan="2">Area redevelopment plans.</td><td colspan="2">Community Plans.

Area structure Plans.</td><td colspan="2">Special Studies (i.e. Bow Valley Centre, CFB).</td></tr>
<tr><td>Plans for location/ configuration of open space in a specific area (Implementation)</td><td colspan="6">Land Use Amendments.
Outline Plans.
Tentative (Subdivision) Plans.</td></tr>
<tr><td>Implementation of policy through development of a specific site or project</td><td colspan="4">Development Permits.

Review of Developer-built/Partnership projects.

Development Agreements.</td><td colspan="2">Design Development Plans for City park projects.

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CHAPTER 1: DEVELOPMENT ACTIVITIES

1.1 PARKS

1.1.1 Development Activities and Responsibilities

Table 1-1 illustrates responsibility for park development activities for parks and open space. It summarizes the various types of parks (refer to ***APPENDIX A: GLOSSARY OF TERMS*** for definitions) and their appropriate level of development.

Table 1-1: Current Responsibility for Park Development Activities

Legend:

MR	Municipal Reserve
MSR	Municipal School Reserve.
SR	School Reserve.
D	Developer is responsible for appropriate development activity.
C	City/Community is responsible for appropriate development activity.
N/A	Development activity is not appropriate for the park type.
NR	Development activity is not required for the park type, however the Developer, The City, or a community association may apply for its implementation.

Appropriate Development Activities	*Sub-Neighbourhood Park*	*Neighbourhood Park*	*Community Park*		*District Park*		*Linear Park*
	MR	MR	MR	MSR	MR	MSR	
Grade	D	D	D	D	D	D	D
Loam	D	D	D	D	D	D	D
Seed to Grass	D	D	D	D	D	D	D
Fully-Automatic Irrigation (50 mm P.W.S.)	D	N/A	N/A	N/A	N/A	N/A	D
Fully-Automatic Irrigation (150 mm P.W.S.)	N/A	D	D	D	D	D	D
1.2 m Chain Link Fence	D	D	D	D	D	D	D
Post and Cable Fence	D	D	D	D	D	D	D
Optional Amenities	NR	NR	NR	NR	NR	NR	NR
Local Pathway	D	D	D	D	D	D	D
Trees	D	D	D	D	D	D	D
Regional Pathway	NR	NR	NR	D	NR	D	D
Trails	NR	NR	NR	NR	NR	NR	NR
Shrubs	D	D	D	D	D	D	D
Benches	D	D	D	D	D	D	D
Garbage Receptacles	D	D	D	D	D	D	D
Supply Dog By-law Signs	C	C	C	C	C	C	C
Install Dog By-law Signs	D	D	D	D	D	D	D
Play Equipment	NR	NR	NR	NR	NR	NR	NR
Exercise Equipment	NR	NR	NR	NR	NR	NR	NR
Game Tables	NR	NR	NR	NR	NR	NR	NR

Appropriate Development Activities	Sub-Neighbourhood Park	Neighbourhood Park	Community Park		District Park		Linear Park
	MR	MR	MR	MSR	MR	MSR	
Picnic Tables	NR	NR	NR	NR	NR	NR	NR
Basketball/Volleyball	NR	NR	NR	NR	NR	NR	NR
Ball Diamond	N/A	D	NR	D	NR	D	N/A
Soccer Field	N/A	D	D	D	D	D	N/A
Ice Rinks	N/A	N/A	C	C	NR	NR	N/A
Tennis Courts	N/A	NR	C	C	NR	NR	N/A
Bleachers	N/A	N/A	NR	C	NR	C	N/A
Portable Washrooms	N/A	N/A	NR	C	NR	C	N/A
Parking	N/A	N/A	NR	D	NR	D	N/A
Football Field	N/A	N/A	N/A	N/A	N/A	C	N/A
400 m Track	N/A	N/A	N/A	N/A	N/A	C	N/A
Lighting	NR	NR	NR	NR	NR	NR	D

1.1.2 Minimum and Maximum Landscape Development Activities

A Developer is responsible to construct in accordance with the minimum and maximum landscape development standards indicated for all ***Local Parks*** in ***Table 1-2***, ***Table 1-3***, ***Table 1-4***, and ***Table 1-5***, and to the satisfaction of the Manager of Calgary Parks. If a Developer or homeowners'/residents'/community association wishes to develop parks beyond the “maximum” standards, they must follow the corporate policy and procedures as approved by Council for *Enhanced Maintenance Agreement and Infrastructure Agreements* (also refer to ***1.2.4 Irrigation of Boulevards and Medians*** and ***7.9 Optional Amenities*** for additional information). Emphasis should be placed on universal design for all open spaces to address accessibility/inclusivity issues.

Table 1-2: Sub-Neighbourhood Parks - MR

Item	Quantity		Type/Comment
	Minimum	Maximum	
Grading/Loaming	Entire site	Entire site	As per spec
Turf	Entire site	Entire site	As per spec
Trees	20 trees/.405 ha (1 acre)	40 trees/.405 ha (1 acre)	Approved species
Irrigation	Entire site	Entire site	Automatic as per spec
Benches	1 per site	5 per site	
Walkways	As required	As required	Specifications as per approved policy
Fencing	As required	3 sides of site if requested	Only post cable and chain link

Item	Quantity		Type/Comment
	Minimum	Maximum	
Play Equipment or Other Recreational Equipment	If suited	If suited	To community needs or preference if desired
Game Tables	0 per site	2 per site	
Picnic Tables	0 per site	1 per site	
Sports Fields/Parking	Not suitable	Not suitable	
Basketball/Volleyball	If suitable	If suitable	
Garbage Receptacles	1 per site	1 per site	Near walkways not benches
Shrubs	50 m^2/ha	150 m^2/ha	
Retaining Walls	As required	1.0 m or Development Permit required as per ***7.12 Retaining Walls and Structures***.	

Table 1-3: Neighbourhood Parks - MR

Item	Quantity		Type/Comment
	Minimum	Maximum	
Grading/Loaming	Entire site	Entire site	As per spec
Turf	Entire site	Entire site	As per spec
Trees	20 trees/.405 ha (1 acre)	40 trees/.405 ha (1 acre)	Approved species
Irrigation	Entire site	Entire site	Automatic as per spec
Benches	1 per site	5 per site	
Walkways	As required	As required	Specifications as per approved policy
Fencing	As required	3 sides of site if requested	Only post cable and chain link
Play Equipment or Other Recreational Equipment	If suited	If suited	To community needs or preference if desired
Game Tables	0 per site	2 per site	
Picnic Tables	0 per site	1 per site	
Sports Fields/Parking	Not suitable	Not suitable	
Basketball/Volleyball	If suitable	If suitable	
Garbage Receptacles	1 per site	1 per site	Near walkways not benches
Shrubs	50 m^2/ha	150 m^2/ha	
Retaining Walls	As required	1.0 m or Development Permit required as per ***7.12 Retaining Walls and Structures***.	

Table 1-4: Community Parks - MSR, SR, and MR

Item	Quantity		Type/Comment
	Minimum	Maximum	
Grading/Loaming	Entire site	Entire site	As per spec
Turf	Entire site	Entire site	As per spec
Trees	10 trees/.405 ha (1 acre)	15 trees/.405 ha (1 acre)	Approved species
Irrigation	Entire manicured area except for SR and community centre site	Entire manicured area except for SR site	Automatic, as per spec
Walkways	As required	Regional pathway 3.0 m wide	As per spec
Fencing	As required	2 sides of site if requested	Only post cable and chain link
Play Equipment or Other Recreational Equipment	The provision of space only as per ***3.1 SITE PLANNING TEAM'S JOINT USE SITE GUIDELINES***	1 per school	To school needs or preference if desired
Ball Diamonds/ Parking	As per ***3.1 SITE PLANNING TEAM'S JOINT USE SITE GUIDELINES***	As per ***3.1 SITE PLANNING TEAM'S JOINT USE SITE GUIDELINES***	-15 parking stalls/76 m softball - As per spec
Benches	2 per ball diamond	2 per ball diamond	Players benches
Portable Washrooms	0 per ball diamond	1 per ball diamond	
Bleachers	0 per ball diamond	2 per ball diamond	
Soccer Fields/Parking	As per ***3.1 SITE PLANNING TEAM'S JOINT USE SITE GUIDELINES***	As per ***3.1 SITE PLANNING TEAM'S JOINT USE SITE GUIDELINES***	- 20 parking stalls per major/minor soccer - As per spec
Ice Rink	The provision of space only for one rink within community lease	1 per community lease site	
Tennis Courts	The provision of space only for two courts within community lease	4 per community lease site (boards, lights, hard surfaced, nets)	
Field Event Area	The provision of space only as per ***3.1 SITE PLANNING TEAM'S JOINT USE SITE GUIDELINES***	The provision of space only as per ***3.1 SITE PLANNING TEAM'S JOINT USE SITE GUIDELINES***	
Garbage Receptacles	1 per site	2 Haul All per site	Near walkway
Shrubs	50 m^2/ha	70 m^2/ha	
Retaining Walls	As required	1.0 m or Development Permit required as per ***7.12 Retaining Walls and Structures***.	

Table 1-5: District Parks - MSR, SR, and MR

Item	Quantity		Type/Comment
	Minimum	Maximum	
Grading/Loaming	Entire site	Entire site	As per spec
Turf	Entire site	Entire site	As per spec
Trees	10 trees/.405 ha (1 acre)	15 trees/.405 ha (1 acre)	Approved species
Irrigation	Entire manicured area except for SR and community centre site	Entire manicured area except for SR site	Automatic, as per spec
Walkways	As required	Regional pathway 3.0 m wide	As per spec
Fencing	As required	2 sides of site if requested	Only post cable and chain link
Play Equipment or Other Recreational Equipment	The provision of space only as per ***3.1 SITE PLANNING TEAM'S JOINT USE SITE GUIDELINES***	1 per site	To community needs or preference if desired
Ball Diamonds/Parking	As per ***3.1 SITE PLANNING TEAM'S JOINT USE SITE GUIDELINES***	As per ***3.1 SITE PLANNING TEAM'S JOINT USE SITE GUIDELINES***	-15 parking stalls/76 m softball - As per spec
Benches	2 per ball diamond	2 per ball diamond	Players benches
Portable Washrooms	0 per ball diamond	1 per ball diamond	
Bleachers	0 per ball diamond	2 per ball diamond	
Soccer Fields/Parking	As per ***3.1 SITE PLANNING TEAM'S JOINT USE SITE GUIDELINES***	As per ***3.1 SITE PLANNING TEAM'S JOINT USE SITE GUIDELINES***	- 20 parking stalls per major/minor soccer - As per spec
Football Field	As per ***3.1 SITE PLANNING TEAM'S JOINT USE SITE GUIDELINES***	As per ***3.1 SITE PLANNING TEAM'S JOINT USE SITE GUIDELINES***	
Ice Rink	The provision of space only for one rink within community lease	1 per community lease site	
Tennis Courts	The provision of space only for two courts within community lease	4 per community lease site (boards, lights, hard surfaced, nets)	
Field Event Area	The provision of space only as per ***3.1 SITE PLANNING TEAM'S JOINT USE SITE GUIDELINES***	1400 m track per athletic field	
Garbage Receptacles	1 per site	2 Haul All per site	Near walkway
Shrubs	50 m^2/ha	70 m^2/ha	
Retaining Walls	As required	1.0 m or Development Permit required as per ***7.12 Retaining Walls and Structures***.	

1.1.3 Local Parks Development Charge

BILD Calgary Region and Calgary Parks agree to the implementation of a development charge for local parks subject to the following conditions:

1) All ***Sub-Neighbourhood Parks*** and ***Neighbourhood Parks*** will be dedicated and developed at the expense of the dedicating Developer with no recovery.
2) All pathways, whether regional, local or a connection to the carriageway of a major adjacent road, will be provided at the sole expense of the dedicating Developer with no recovery.
3) All ***Community Parks*** and ***District Parks*** are to be dedicated and developed by the dedicating Developer and may be subject to cost recovery as provided for below.
    a) If one Developer owns the entire community and is also responsible for the dedication and development of the community and district parks, there will be no acreage assessment for community and district parks in the said community. The Developer will make arrangements at the Outline Plan stage for the dedication and development of the community and district park, according to the timing determined by the Director of Calgary Parks.
    b) If there is more than one Developer within the community, then all lands within the community shall pay acreage assessments to The City. These community and district park development charges shall be recovered by the dedicating Developers of community and district parks in accordance with the ratio of the ownership of the joint use sites on a proportionate share basis.
    c) If there is more than one Developer within a community and all of the community and district parks are to be provided at the expense of a single Developer, then all lands within the community (other than the lands owned or controlled by the district and community park dedicating Developer) must be used to calculate the development charges owing to The City.

1.2 BOULEVARDS, MEDIANS and TRAFFIC ISLANDS

1.2.1 Boulevard

Grade, loam and seed or sod to grass. All trees planted in a boulevard must be approved by Calgary Parks and Roads.

All modified cross-sections shall have typical boulevard space for locating shallow utilities above and below ground, as well as standard sidewalks/multiuse pathways with minimum required standard setback for street/boulevard trees. Reserve land shall not be used for any utility or related infrastructure functions unless approved by Calgary Parks. The boulevard and median trees shall be planted as per ***Detail Sheet 27b: Tree Planting - Protection Fencing*** at a minimum of one tree per every10 linear meters of boulevard (or as approved by Parks), with adequate soil volumes for each tree.

1.2.2 Median

Grade, loam and seed or sod to grass. All trees planted in grassed median must be approved by Calgary Parks and Roads.

1.2.3 Traffic Island

1) If the traffic island is:
   a) Less than 500 m^2 in area, then hard surface low maintenance material must be used as approved by Calgary Parks and Roads.
   b) Greater than 500 m^2 in area, then grade, loam and seed or sod to grass.
2) All trees planted in a traffic island must be approved by Calgary Parks and Roads.
3) All traffic islands will have a 0.50 m concrete maintenance strip installed directly behind the curb.
4) Boulders, signs and other obstacles must be:
   a) At least 0.75 m back from the curb.
   b) A minimum of 4.5 m from the bullnose or back of walk extended through the island, whichever is greater, adjacent to the primary streets.
   c) A minimum of 4.5 m from 'any' bullnose adjacent to primary streets on irregular shaped islands.
   d) A minimum of 3.0 m from the bullnose inside the cul-de-sac.
5) The minimum width of traffic islands containing coniferous trees shall be 7.0 m.

1.2.4 Irrigation of Boulevards and Medians

The following is The City of Calgary's criteria for private irrigation systems proposed within boulevards and medians.

Note: Irrigating boulevards and medians is a non-standard practice, and is not encouraged by The City of Calgary for safety and water conservation reasons.

1) If a Developer or homeowners'/residents/community association wishes to irrigate boulevards or medians within a community, they must receive approval from The City of Calgary Roads and enter into a Landscape Maintenance Agreement with The City as per corporate policy and procedures as approved by Council for *Enhanced Maintenance Agreement and Infrastructure Agreements*.

   Note: The intent to enter into a Landscape Maintenance Agreement must be identified at the Tentative Plan Stage via a letter of intent or other suitable mechanism.

2) Design and construction of irrigation systems within boulevards and medians shall be in accordance this manual, The City of Calgary's *Land Use Bylaw*, *Roads Construction Standard Specifications*, and *Parks Water Management Strategic Plan*.

3) Private Water Service - This service must be independent of any other park irrigation. It must be for irrigation in the road Right-of-Way only. Double check valve and meter must be to City standard (both Calgary Parks and Water Services). Irrigation Controller must not be tied to The City's Centralized Irrigation Control System or that of any park.

4) Sleeving shall be C900 PVC (bell and spigot) pipe bedded as per ***8.3.6.1 Backfill Material*** The City of Calgary's *Standard Specifications: Sewer Construction*, and installed below the bed for a pathway, sidewalk, driveways.

5) An amenity removal and landscape rehabilitation fund, in an amount determined by Calgary Parks, shall be provided for the removal and landscape rehabilitation of any irrigation component visible at the surface (e.g. valve boxes, irrigation heads, etc.), and for the killing of the Calgary Parks Water Service from the mainline.

1.3 PUBLIC UTILITY LOTS and RIGHTS-OF-WAY

Grade, loam and seed or sod to grass.

Chain link, wood screen or other type of fencing as approved by Calgary Parks on the flankage and rear of lots that abut ***Right-of-Way (RoW)***. Post and cable barrier where ***Public Utility Lot (PUL)*** or RoW abuts lane.

1.4 DRY PONDS

The dual use of ***Municipal Reserve (MR)*** and ***Municipal and School Reserve (MSR)*** lands for dry ponds should be supported, provided that their location, size and recreation, education, and/or conservation functions are not prejudiced in an effort to accommodate the ponds. The following are appropriate development guidelines and activities for MR and MSR sites containing dry ponds.

1.4.1 Development Guidelines

1) Dry ponds shall not be located on lands that are determined by an approved Biophysical Impact Assessment to be an environmentally significant area.
2) Stormwater dry pond facilities should be designed and operated so as to be fully integrated into the neighbourhood setting.
3) Stormwater dry pond facilities may receive 100 percent credit where located on reserve lands, provided that the reserve lands meet all City planning criteria for location, size and purpose and the reserve function is not prejudiced.
4) In the event that the location of a stormwater dry pond facility on reserve land results in an over-dedication of reserve, compensation for said over-dedication will be deemed to be one dollar ($1.00). Stormwater dry ponds will be limited to 1/3 of approved reserve land.
5) In the event that a stormwater dry pond facility is located on a Public Utility Lot (PUL) and results in the 30 percent road/utility dedication being surpassed, compensation for the dry pond PUL will be deemed to be one dollar. Site development shall be similar to standards for reserve lands as noted herein.
6) All overland storm routes and dry pond areas shall be signed (at the Developer's expense) as dual-function areas to the satisfaction of The City Engineer and the Director of Calgary Parks.
7) Stormwater dry pond facilities and overland drainage routes to dry ponds are not to be located on school or community building envelopes. However, in retrofit situations, this restriction may be reviewed on a site-by-site basis.
8) Where dry ponds are included in MR or MSR sites, it is intended that these sites (including the school building envelope of the MSR site) shall be developed as a “turn key” operation and that all sodding, seeding, landscaping, and user amenities be installed as soon as possible.
9) The Developer (at their expense) will be required to excavate and grade the dry pond areas in accordance with The City of Calgary’s *Stormwater Management & Design Manual*. The area of inundation must be sodded to establish grass cover for erosion control and water quality. Areas above the level of inundation may be seeded. These seeded and sodded areas shall be maintained as per ***2.8 MAINTENANCE PERIOD***.
10) Notwithstanding item 9, the Developer shall maintain MSR or MR sites less than four acres in area for three (3) years. On sites larger than four acres, the limits of the three year maintenance period will be determined through negotiations between the Developer and the Director of Calgary Parks. The maintenance cost during the negotiated maintenance period of the MSR or MR sites shall be at the sole expense of the Developer.

11) The Developer will be encouraged to develop the lots adjacent to the dry pond areas and to establish grass in the rear yards at the earliest possible date.

1.4.2 Development Activities

1) The Developer (at their cost) shall install service connections (sanitary, storm, water) from the mains to the property line of affected SR sites, unless otherwise directed by the City Engineer.
2) The Developer (at their cost) shall install pathways as required in accordance with the *Open Space Plan* on all parks that have stormwater retention ponds.
3) Irrigation shall be provided as required under the terms of the *Standard Development Agreement*. In active sport areas irrigation is required.
4) The following benches will be provided (at the Developer's cost):
   a) 4 benches per km of lineal pathway.
   b) 2 benches per play structure.
5) The following trash receptacles will be provided (at the Developer's cost):
   a) 2 per ball diamond or soccer pitch,
   b) 1 per playground structure, and
   c) 2 per kilometer of lineal pathway.
6) As per The City of Calgary's *Waste and Recycling Bylaw*, recycling receptacle(s) will be required in some park parcels (e.g., ***MRs***). Their need will be determined through landscape construction drawing submission.
7) Dry ponds should not be located within areas designed to accommodate playground equipment.
8) Goal posts and backstops shall be provided and installed (at the Developer's cost) where deemed appropriate by Calgary Parks.
9) Shrubs provided should be in accordance with the Minimum and Maximum Landscape Development Activities tables (***Table 1-2***, ***Table 1-3***, ***Table 1-4***, and ***Table 1-5***)
10) Trees shall be provided on public lands in accordance with The City of Calgary's *Parks Urban Forest Strategic Plan* as negotiated in the *Standard Development Agreement*.
11) Subsurface drainage systems are required for all sports field areas within a dry pond.
12) A hard surface 3.0 m ramp to all levels of a dry pond must be provided.
13) Soccer fields and ball diamonds located within dry ponds shall meet the performance criteria specified in item 6 of ***3.3 SOCCER FIELDS AND BALL DIAMONDS***.
14) Hockey Rinks, Lacrosse Fields and Tennis Courts, located within dry ponds, shall be placed above the 1:50 year flood level.
15) Dry Pond walls should undulate in order to provide visual relief.

1.5 WATER MANAGMENT STRATEGIC PLAN (WMSP)

In June of 2000, City Council approved the *Parks Water Management Strategic Plan*. This document outlines policies, strategies, and practices that guide the maintenance, growth and development of The City of Calgary's landscape water delivery systems.

The purpose of the Water Management Strategic Plan (WMSP) is to provide a framework for City staff, community partners and the development industry to move towards an overall management system that balances water conservation and financial sustainability while supporting healthy plant material.

The WMSP uses two terms in the identification of the policy statements contained within the document. These terms are “Policy” (new or existing) and “Practice” (new or existing). Through the use of these terms, The City differentiates how the policy statement is to be implemented. A statement that has the term “Policy” in its heading is expected to be implemented without exception unless previously defined within the policy statement. A statement that has the term “Practice” in its heading allows the development industry to evaluate the practicality and cost benefit on a project-by-project basis prior to implementing the policy. “Practices” might also relate to statements that refer to educational and partnership opportunities, which may not require mandatory participation from the development industry or the community partners.

1.6 NATURAL ENVIRONMENT PARKS

Appropriate development in a planned Natural Environment Park will be determined by Calgary Parks on a case-by-case basis to ensure the protection of undisturbed or relatively undisturbed ***Environmentally Significant Areas*** within planned Environmental Reserves (***ERs***) or Municipal Reserves (***MRs***).

1.6.1 Development Guidelines

Assessment of Natural Environment Parks will be based on potential impact to an Environmentally Significant Area, as determined by an approved Biophysical Impact Assessment (BIA), and on habitat restoration, as determined by a Habitat Restoration Project (HRP).

1) **Biophysical impact Assessment (BIA) Framework**

   The purpose of a Calgary Parks *Biophysical Impact (BIA) Framework* is to provide a consistent process for review and approval of BIA reports, ensuring equitability and transparency throughout Calgary Parks planning regions and for other regulatory procedures. In addition, the BIA Framework is established as a straightforward decision-making process to assist project proponents and environmental consultants in determining the appropriate level of BIA required.

2) **Habitat Restoration Project (HRP) Framework**

   The purpose of a Calgary Parks *Habitat Restoration Project (HRP) Framework* is to provide guidance on the preparation of a restoration report and a

restoration landscape plan. The framework guides the development of measurable project goals and the performance-based criteria that will help meet Final Acceptance Certificate (FAC) requirements.

1.6.2 Development Activities

See the *Open Space Plan* (2003), Appendix C: Environmental Assessments for appropriate development activities in the three classifications of Natural Environment Parks. Development activities are normally approved through the BIA report approval and/or HRP report approval, and shall be coordinated through Landscape Construction Drawings approval. All matting and erosion control products within an ***ER*** shall be of 100% biodegradable materials.

Inspections, maintenance period, CCC and FAC criteria and processes will accord with the requirements found within this manual.

Table 1-6: Development Activities for ER/Natural Environment Parks (MR)

Criteria	Preservation	Restoration	Disturbed
Development Encroachment	None	Agreement between parties (site by site basis)	Agreement between parties (site by site basis)
Utilities Encroachment	None	Agreement between parties (site by site basis)	Where required
Park Amenity Construction	For preservation purposes only	Where required	Where required
Fencing	Always	Always	Optional
Native Seed/Sod Planting (Species to be submitted and approved)	N/A	Always	Optional (Type)
Non-Native Seed/Sod Planting (Species to be submitted and approved)	N/A	No	Optional (Type)
Restoration/ Reclamation Signage	N/A	Yes	Yes
Irrigation	N/A	Overland	Overland
Maintenance Period	None	Until established to the satisfaction of Calgary Parks	Until established to the satisfaction of Calgary Parks
Restoration Plans (refer to page 29)	N/A	Yes	Yes
Weed/Pest Management/ Control	Yes for maintenance time period	Yes for maintenance time period	Yes for maintenance time period
Departmental Checks	Regular	Yearly	Regular
Native Tree/Shrub Planting (Species to be submitted and approved)	N/A	As Required	Optional (Type)
Non-Native Tree/Shrub Planting (Species to be submitted and approved)	N/A	No	Optional (Type)

1.6.3 Environmental Reserve Setback Guidelines

Environmental Reserve Setback Guidelines were adopted by City Council in 2007. In accordance with the *Municipal Government Amendment Act*, Part 17, section 664(1)(c), Environmental Reserve setback zones will be determined by water body type and setback modifiers, as described below.

Note: This section is provided for information purposes only.

1.6.3.1 Water Body Type

A site-specific variable setback width shall be applied to water bodies qualifying as Environmental Reserve based on the following water body types:

1) **Stream Order**
   a) 1st order: 6 m setback - typically a vegetated 'draw' that conveys flow primarily during periods of moderate to heavy rainfall and may not convey flow during other periods.
   b) 2nd order: 30 m setback - Formed when two first order streams meet.
   c) 3rd order: 50 m setback - Tributary of two 2nd order streams.
   d) 4th order: 50 m setback - Tributary of two 3rd order streams.
2) **Wetland Class**

   Stewart and Kantrud Class 3-6 wetlands, considered to be Environmental Reserve Wetlands under the Wetland Conservation Plan, will have a 30 m base setback applied to them.

   Wetlands that are engineered to serve as stormwater management facilities ('stormwater wetlands'), may (at the discretion of the Administration) have an ER setback width of less than 30 m applied to them if the primary function of the wetland is for the provision of stormwater treatment rather than functioning as a natural wetland.

   Appropriate design elements (such as buffer strips, treatment swales or site grading) are required to demonstrate that the water body would not be subject to surface or subsurface pollutant loading.

   Setback widths should be determined as early as possible in the planning process. An initial review of water bodies and recommended setback widths should be done by the Area Structure Plan stage of planning and confirmed later in the development approvals process.

1.6.3.2 Setback Modifiers

The base setback width will be modified on a site-specific basis according to the following factors:

1) **Slope**

   The setback distance will increase on sloped lands adjacent to a water body by a factor of 1.5 m for every percentage of slope increase above 5%. There will be no adjustment factor for slopes between 0% and 5%.

2) **Cover Type**
Where the lands adjacent to the water body are disturbed, or have a non-native riparian zone that is determined to have lower ability to prevent non-point pollutants from entering the water body, the base setback width should be doubled **or** the base setback zone should be restored to a condition that will allow it to effectively buffer the water body from pollutants.

3) **Hydraulic Connectivity**
Applies to areas of land adjacent to a water body with shallow groundwater deemed to be 'under the influence of a surface water'; namely there is hydraulic connectivity between groundwater and surface water, such as the alluvial aquifer of streams. If it is demonstrated that pollution of shallow groundwater would reasonably lead to the pollution of a directly adjacent surface water body, then that land should be included within the ER setback zone.

Table 1-7: Setback Summary Table

Setback Type	Base Setback	Adjustment Factors		
		Slope Adjustment	Hydraulic Connectivity to Groundwater*	Cover Type
1st order stream	6 m	+1.5 m/ % slope over 5%	N/A	N/A
2nd order stream	30 m		Areas of land adjacent to water bodies that have shallow groundwater connectivity to surface water are taken as ER.	Double base setback width to provide for better buffering of water body or restoration of riparian lands to provide for proper riparian function.
3rd-4th order stream	50 m			
1st order stream	30 m			
Note: This process is intended for use after the ER boundaries are identified and not as a method of determining ER definition. Refer to ***APPENDIX A: GLOSSARY OF TERMS*** for ER definition.				

1.6.4 Criteria for ER/Natural Environment Parks (MR)

Table 1-8: Criteria for ER/Natural Environment Parks (MR)

Criteria	Preservation	Restoration	Disturbed
Native Condition (evaluated by % of expected native plant communities)	Near Native	Portion of Habitat Area that is disturbed in a natural area	Area that is in introduced condition and will likely harm nearby natural area
Habitat Type (Viable condition)	Aspen Forest, Balsam Poplar, White Spruce, Upland Tall Shrub, Riverine Tall Shrub, Low Shrub, Native Grassland, Wetland	Non Native Grassland, Disturbed vegetation communities	Non Native Grassland, Disturbed vegetation communities
Archaeological/Historical	Present/No Evidence	Present/No Evidence	No Evidence

1.7 DIRECT CONTROL SITES

Since Direct Control (DC) sites are not property under the ownership of The City of Calgary, they should not share an irrigation water service with a park property. Calgary Parks will not inspect CCC or FAC DC sites because they are private property.

CHAPTER 2: GENERAL GUIDELINES

2.1 CONCEPT PLAN REQUIREMENTS

Concurrent with the submission of the Outline Plan, the Developer is responsible for the submission and receipt of approval of Concept Plans for all ***Municipal Reserve (MR)*** parks and other Open Space areas. A Concept Plan is a written and visual representation of the intended function of the MR and other Open Space areas within an Outline Plan.

Since Concept Plans are precursors to the development of Layout Plans (refer to ***2.3.3 Layout Plan***) and Grading Plans (refer to ***2.3.6 Grading Plan***), detailed information will be presented as deemed appropriate. Further, it is understood by both the Developer and Calgary Parks that construction details (for irrigation, planting, structures, playgrounds, etc.) are not known at the time of submission of Concept Plan, but that best efforts will be made to represent the future intended use of the MR and other Open Spaces.

The Concept Plan should indicate the type of Municipal Park and/or Open Space area and its associated theme/function. For example, a Sub-Neighbourhood Park's theme/function might be a child-oriented, active recreation area, while a Linear park's theme/function might be pathway linkage within a natural area. Appropriate types of MRs and other Open Space areas are:

a) ***Sub-Neighbourhood Park***
b) ***Neighbourhood Park***
c) ***Community Park***
d) ***District Park***
e) ***Linear Park***
f) ***Wet Pond***
g) ***Wetland***
h) ***Dry Pond***
i) ***Natural Environment Park***

Notes: a) Definitions and/or appropriate levels of development for each of the above can be found in ***1.1.1 Development Activities and Responsibilities***.

b) If a Natural Environment Park is not developed and/or disturbed through the development of the subdivision, then a concept plan simply stating so will be acceptable.

Landscape Concepts at the Outline Plan stage shall consist of (but not be limited to) the following:

- Rendered plans showing the relationships of the major functions/spaces/ constructed features with respect to the site and to each other.
- Preliminary grading info with minimum and maximum slopes, and conceptual contours.

- Playfield dimensions with required buffers.
- Coordination with the Staged Master Drainage Plan (SMDP) and overlay of all storm-related infrastructure above and below ground, including but not limited to access roads, inlets, outlets, etc.
- Existing and proposed utility right-of-way locations.
- Conceptual planting locations.

Landscape Concepts at the Tentative Plan submission stage shall be refined to add:

- A site plan showing general conformance to Outline Plan landscape concepts, intended park program, site layout, and preliminary planting.
- Grading plans that are coordinated with engineering to show updated perimeter grades to confirm slope percentage and details of any other features, including (but not limited to) retaining structures, utility rights-of way, green infrastructure, trap lows, drainage from private lots, etc.
- Storm-related infrastructure details above and below ground, including (but not limited to) access roads with required vehicle turning radii, inlets, outlets, retaining walls, control structures, oil grit separators, etc.

2.2 CONSTRUCTION APPROVAL REQUIREMENTS

Prior to commencing landscape work on any park or public land within City boundaries, the Developer's representative can confirm the appropriate approval process with Calgary Parks' ***Development Coordinator*** appropriate for the development area (refer to ***Figure 2-1***).

Calgary Parks' ***Capital Development*** will copy the Developer on all correspondence resulting from landscape construction drawing submissions. To facilitate this, all landscape construction drawings submitted for Calgary Parks' approval must include the Developer's company name and address, as well as the appropriate contact information for the Developer's Project Manager.

All construction drawings must be submitted to Calgary Parks Capital Development for review and approval. The following requirements generally apply to the various forms of development:

Table 2-1: Construction Approval Requirements

Construction Type	Requirements for Approval	Time for Review and Comments
Utility and Road Work	Submit 2 sets of drawings (folded and collated into sets) to Calgary Parks' ***Capital Development***.	10 working days
Landscape Construction (Grading, loaming, seeding, irrigation, planting, hard surface treatments, play structures, site structures, etc.)	For new Subdivisions, submit 7 sets of drawings (folded and collated into sets) to Calgary Parks' ***Capital Development***.	15 working days
Landscape Construction on Roadways, Public Utility Lots, and Easements.	For new Subdivisions, submit 7 sets of drawings (folded and collated into sets) to Calgary Parks' ***Capital Development***.	15 working days
	For non-standard tree planting proposals in existing areas, or where utility lines are involved, submit 7 sets of drawings (folded and collated into sets) to The City of Calgary Right of Way Management Services' ***Corporate Analytics and Innovation***.	15 working days
Note: Time quoted for review and comment is assuming that all submissions are complete.		

Within 30 days of the date stamped on the review set of drawings, submit two (2) sets of rolled final drawings to Calgary Parks Capital Development for approval. Rolled final drawings must be un-stapled paper copies, unless the Consultant desires a Mylar copy. One (1) set will be returned to the Consultant for their records.

All construction plans should show the development agreement phase boundary on the key plans. This will be used by the Calgary Parks ***Development Inspector*** to ensure that all components within the phase are complete as per the specific groupings identified in ***2.7 CONSTRUCTION COMPLETION CERTIFICATE (CCC)*** (Item 2).

Note: For information on Utility Line Assignment submissions, contact The City of Calgary Right of Way Management Services' ***Corporate Analytics and Innovation***.

2.3 CONSTRUCTION PLAN REQUIREMENTS

The following information must be provided with any drawings submitted to Calgary Parks' ***Capital Development*** for construction approval. Landscape construction drawings are to be submitted only by Registered Landscape Architects.

Note: The title block for landscape drawing layout, as made available by Calgary Parks, accommodates the Landscape Architect's stamp and a Calgary Parks approval stamp. All plans are to be prepared in ink using an accepted drafting standard.

2.3.1 General Requirements

1) All landscape construction plans must be sealed and signed by a Registered Landscape Architect with current membership in the Canadian Society of Landscape Architects.
2) All drawings and supplemental material(s) for irrigation systems that will be turned over to The City, must be stamped and signed by a Certified Irrigation Designer (CID) - Commercial. This certification must be issued by the ***Irrigation Association (IA)***. The certified designer must be in good standing with the association.
3) All drawings are to be submitted on Calgary Parks' title block. The title block template is available from Calgary Parks Capital Development. Contact Calgary Parks' ***Development Coordinator*** appropriate for the development area (refer to ***Figure 2-1***).
4) Scale must be in metric (preferred scales: 1:200, 1:250, 1:500).
5) North arrow must be included.
6) Key plan must be oriented in same direction as site plan.
7) Include the legal description and site and property line zoning, including bearings and dimensions. If the site has a municipal address, include it in the plan.
8) Include the proposed land uses of surrounding parcels (i.e. residential, commercial, industrial, etc.) and school building envelope for MSR sites.
9) Include utility locations, legal easements, Rights-of-Way, etc.
10) Include curb lines, sidewalks, utility poles, fences, and any other boundary conditions.
11) Include location of trees, diameter at breast height (DBH), and (where possible) identify species.

Note: The plan drawing should be dated (month and year)**.**

2.3.2 Demolition Plan

In addition to ***2.3.1 General Requirements***, Demolition Plans must:

1) Be labeled as “Demolition.”
2) Show existing above & below grade features to be protected & to be removed.
3) Show existing vegetation.
4) Show existing irrigation.

2.3.3 Layout Plan

In addition to ***2.3.1 General Requirements***, Layout Plans must:

1) Be labeled as “Layout.”
2) Show the existing features to be saved.
3) Show the location of proposed structures and features.
4) Show the layout of playground as per ***CSA*** guidelines, including non-encroachment zones. Provide supplier elevations and cross section or photos or 3D renderings for all the playground designs where possible.
5) For poured-in-place fall surface, provide a cross-section on the landscape drawings showing the depth of the clay base, the road crush gravel layer, the rubber crumb base layer, and the rubber top layer.
6) Show the location of dog bylaw signs, restoration/reclamation signs, pathway signs (refer to ***6.1.2.11 Signage and Pathway Markings***), and trail signs (refer to ***6.2.2.18 Signage***).
7) Identify and label the following park areas:
   - Preservation Zone - identify the significance of the preservation areas, such as their habitat types and the grouping of vegetative communities that may support their ecological systems. Also, indicate how controlled human use is to be accommodated within the preservation areas.
   - ***Naturalized Zone*** - indicate how controlled human use is to be accommodated within the naturalized area.
   - ***Manicured Zone***

2.3.4 Planting Plan

In addition to ***2.3.1 General Requirements***, Planting Plans must:

1) Be labeled as “Planting.”
2) Show major items associated with “Layout” but not including dimensions, i.e. walkways, roads, curbs, hard surface areas, fountains, other structures, natural areas.
3) Show plant material with crowns at 2/3 maximum size as noted in *Alberta Yards & Gardens: What to Grow*.
4) Show the outline of planting beds.
5) Show proposed contours at 0.5 m intervals.

6) Show utilities and Rights-of-Way.
7) Include a plant list identifying species (botanical and common name), quantities, sizes, habit, spacing, and specific remarks as required. Newly planted trees within a community should not exceed fifteen percent (15%) for any one genus.
8) Include details of items that are not included in ***SECTION II: STANDARD SPECIFICATIONS FOR LANDSCAPE CONSTRUCTION*** (as required).

2.3.5 Natural Environment Park Restoration Plan for Approved Encroachments

In addition to ***2.3.1 General Requirements***, Restoration Plans should be prepared using the guidelines below.

Note: Refer to item 2 of ***1.6.1 Development Guidelines*** for more about The City of Calgary's Habitat Restoration Project (HRP) Framework.

1) Be labeled as "Restoration Plan".
2) Include a pre-development biophysical inventory of the site. At a minimum, the inventory will include:
   - An inventory of plant species composition and an assessment of relative abundance.
   - Soils described using the Canadian system of Soil Classification - classified to Soil Group. Provide texture and horizon depths.
   - Site description sufficient to establish the ecological characteristics of the site including:
   - Exposure (i.e. south facing, dry and exposed);
   - Slope position (i.e. mid-slope, slope crest, level); and
   - Topography (i.e. rolling with micro-topographic variation of approximately 5.0 m - hummocky).
   - Sufficient detail must be provided so that the current condition of the site can be assessed and used to determine the desired objectives of the restoration
3) Include site preparation methods (i.e. a season of weed control prior to reseeding).
4) Include seed mix design details. For best practices regarding seed mix design methodologies, rates, example seed mixes based on habitat types, time frames for seeding activities, seeding methods, and the use of cover crops, refer to *City of Calgary Seed Mixes*.
5) Show plant material with crowns at 2/3 maximum size as noted in *Alberta Yards & Gardens: What to Grow*.
6) Show proposed contours at 0.5 m intervals.
7) Show utilities and Rights-of-Way.
8) Include a plant list identifying species (botanical and common name), quantities, sizes, habit, spacing, and specific remarks as required.

Note: Plant cultivars are only acceptable if approved by Calgary Parks. The spacing and densities of plantings are to replicate the biophysical inventory.

For information regarding plant species selection, plant life form selection (e.g., potted material, seed, tall rooted stock, etc.), details to be considered to optimize restoration success, logistics planning and example plant species lists based on habitat type, landscape intent, and desired maintenance regime, refer to *City of Calgary Plant Lists*.

9) Include an achievable set of criteria that constitutes a successful restoration of the site to be prepared in consultation with the Developer.
10) Show depth of pre-development topsoil and location of proposed stockpile. Refer to *Soil Handling Recommendations* for best practices that preserve soil health during construction activities.
11) Include the proposed maintenance schedule.

2.3.6 Grading Plan

In addition to ***2.3.1 General Requirements***, Grading Plans must:

1) Be labeled as “Grading.”
2) Show major items associated with layout but not including dimensions, i.e. walkways, play fields, roads, curbs, other structures, and natural areas.
3) Show existing and proposed contours at 0.5 m contour intervals.
4) Show all grades in Geodetic measure and tied to the nearest A.S.C.M. benchmark. A.S.C.M. benchmark number to be indicated on plan.
5) Show elevations at each break point (top and toe of slope).
6) Label property lines and show spot elevations.
7) Show catch basin rim and invert elevations where required.
8) Show manhole rim elevations.
9) Show top of wall, top of curb, and finished floor elevations as required.
10) Show surrounding grade information affecting site development.
11) Label all concrete gutters.

    Note: Wherever possible, concrete gutters should be located on private property.

12) Show all trap lows with their 1:100 inundation area and emergency spill routes.

If site grades are significantly different from the approved Grading Plan and there appears to be a drainage problem as identified by the ***Development Inspector***, as-built Grading Plans on an acceptable grid and tied to legal boundaries are to be provided and approved by Calgary Parks prior to the signing of the CCC.

2.3.7 Grid Plan - For MSR Joint Use Sites Only

In addition to ***2.3.1 General Requirements***, Grid Plans must:

1) Be labeled as “Grid”.
2) Show existing and proposed spot elevations on a 15 m grid and tied to legal boundaries.
3) Show all grades in Geodetic measure and tied to the nearest A.S.C.M. benchmark. A.S.C.M. benchmark number to be indicated on plan.
4) Label property lines.
5) Show catch basin rim and invert elevations where required.
6) Show surrounding grade information affecting site development.
7) Ensure that the school building envelope has the same grade as the sports field envelope (i.e. 2%).
8) Ensure that the school building envelopes and adjacent road grades are at the same elevation.
9) Ensure that for every 1 m in elevation in excess of 2% slope, a minimum increase of 3 m has been included on site.

Note: Refer to ***CHAPTER 3: RECREATION FACILITIES*** for all sports field design and grading specifications.

2.3.8 Irrigation Plan

In addition to ***2.3.1 General Requirements***, Irrigation Plans must:

1) Be labeled as “Irrigation.”
2) Show major items associated with “Layout” (but not including dimensions), such as walkways, structures, fences, play fields, roads, curbs, and natural areas.
3) Show screened back major items of “Planting” and “Grading” plans.
4) Show proposed contours at 0.5 m intervals.
5) Show locations of all lines, sprinkler heads, valves, drains, sleeves, electrical drop-offs, 100 volt wire, 110 volt conduit, and electrical controllers, dimensional from adjacent property lines.

   Note: The irrigation system as shown on the plan is approximate and must be adjusted to suit site conditions.
6) Ensure that the irrigation system is designed so that sprinkler heads do not spray into playgrounds.
7) Indicate whether the system will be trenched or “plowed in” and whether the system will be gravity drained, blown out, or a combination.
8) Ensure that park water services are set back a minimum of 2.5 m from pathways, trails, hard surfaces and trees, and lateral irrigation lines are set back a minimum of 0.5 m from property lines.

9) Include a schedule of materials/products describing sizes, manufacturers and model numbers, pipe fitting method, performance standards, and sources of said materials/products. Approval of the list of materials/products is required prior to the placing of formal orders for them.

10) Ensure that the water window is justified by vandalism problems and horticultural requirements. The park water service maximum site sizes are:

Table 2-2: Park Water Service Maximum Site Sizes

Park Water Service	Maximum Size of Site
50 mm	0.83 ha
100 mm	3.02 ha
150 mm	6.79 ha
200 mm	11.17 ha

11) Include details of items that are not included in ***SECTION II: STANDARD SPECIFICATIONS FOR LANDSCAPE CONSTRUCTION*** (as required).

12) Ensure that the irrigation system is designed to the minimum static water pressure of the applicable pressure zone. Contact The City of Calgary Water Services' ***Field Services*** to obtain the Static Water Pressure, and then indicate the pressure on the plan.

13) Where the design conflicts with the guidelines and specifications in this manual, and the designer wishes approval for an override, identify conflicts and provide an explanation, i.e. "This design overrides specification 8.7 Layout, Item 4,for the following reasons…"

14) Complete an Irrigation Scheduling Chart to ensure that the irrigation design will function effectively within the practical water window.

Table 2-3: Irrigation Scheduling Chart Example

Station/ Zone	Head Type	Nozzle#	PSI	Flow (GPM)	Precipitation Rate	Slope	Aspect	Soil	Days of the Week	# of Cycles	Cycle Time	Soak Time
1	I-25	5@#13	56	58	1.575"/hr	3:1	South	Clay loam	M-W-F	3	10 min.	45 min.
2	Toro 570											
3												

The following are the water requirements and limitations for Calgary as per current data:

- The maximum ET measured during the last couple of weeks in July and the first two in August is 0.183" per day or 1.281" per week (based on Environment Canada 30-year data).
- The daily watering window is from 1:00 AM till 6:00 AM.
- For the health of the plants and to promote good root growth, each zone cannot operate more than once every second day.

2.4 FIELD LOCATION AND EMERGENCY SERVICE CALLS

2.4.1 Field Location Service Calls

Prior to the commencement of any work, the Contractor is responsible to contact the appropriate agencies for field locations as required to locate existing underground utilities and pipelines in or adjacent to the construction work site. A list of commonly used contacts is provided in ***APPENDIX B: CONTACTS***. The utility or pipeline agencies must be contacted two (2) working days in advance of commencement of work.

2.4.2 Excavation Permits

Prior to any excavation in public Rights-of-Way, excavation permits must be obtained from Calgary Roads' ***Traffic Permits***.

2.4.3 Emergency Service Calls

If you accidentally damage the coating or scrape, sever or rupture any underground line, please call the appropriate service immediately. A list of commonly used emergency contacts is provided in ***APPENDIX B: CONTACTS***.

Watch for above ground structures such as utility pedestals, power lines and hydrants that are located in roadways, lanes and private property. If they are damaged please report the incident immediately.

2.5 PERMISSION TO USE WATER FOR CONSTRUCTION

Refer to the current edition of The City of Calgary's *Standard Specifications Water Construction*, Section 504.13.00.

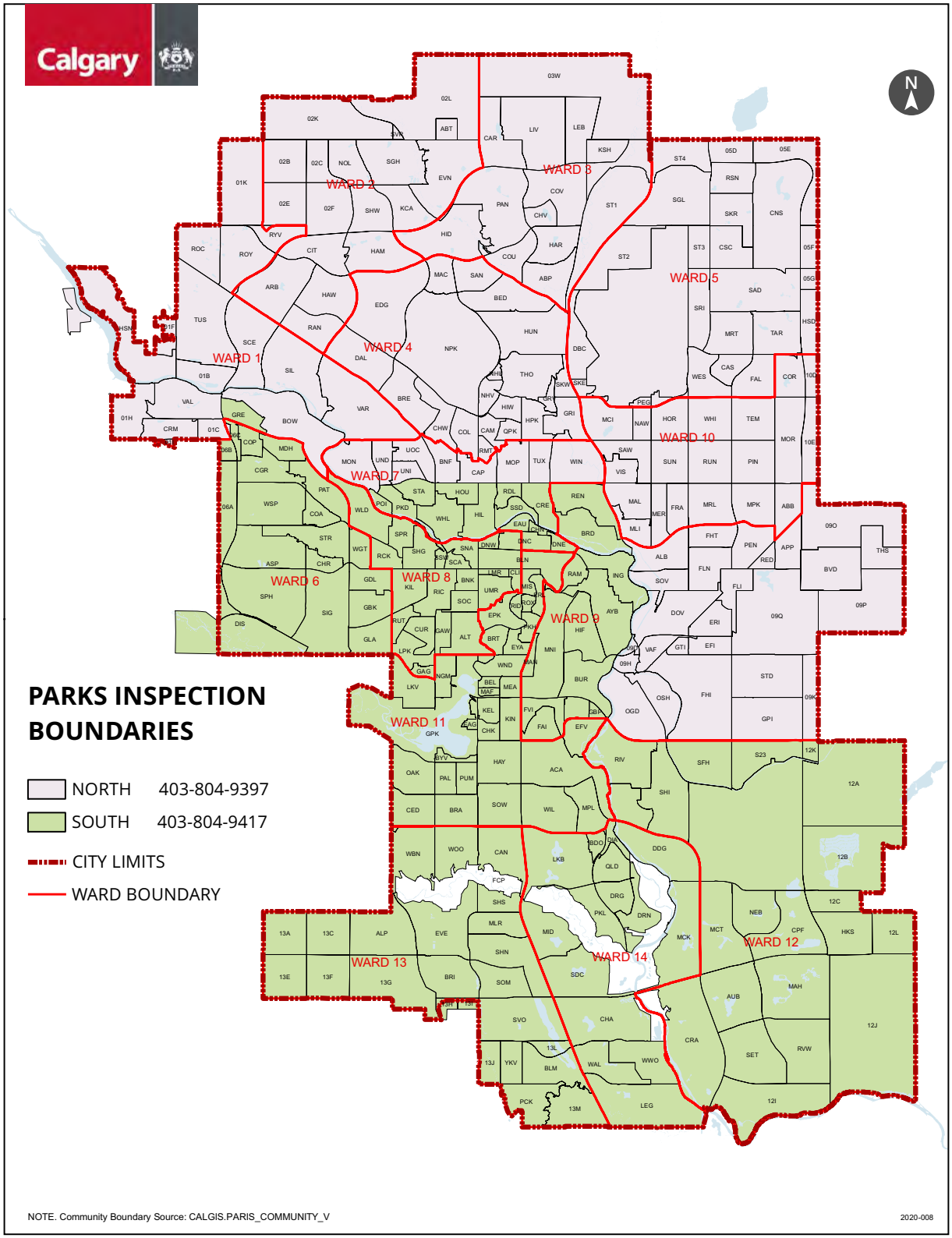
2.6 INSPECTIONS

1) Inspections by Calgary Parks are required at key times during project construction as described in ***SECTION II: STANDARD SPECIFICATIONS FOR LANDSCAPE CONSTRUCTION***. Contact the Calgary Parks ***Development Inspector*** for the area under construction as shown in ***Figure 2-1***.
2) An approved set of drawings (full size paper copies) must be provided to the Calgary Parks Inspector prior to start of construction.
3) Satisfactory construction inspections will be recorded on a *Construction Inspection Checklist and CCC Report* (refer to ***2.7.2***). It is the applicant's responsibility to keep a copy of the *Construction Inspection Checklist and CCC Report* on site to verify previous site inspections. If a checklist is not available, Development Inspectors are not required to review site development.
4) Calgary Parks must be given a minimum of 24 hours notice when requesting an inspection. As per ***2.7.2 CCC Construction Inspection Schedules***, landscape and irrigation inspections for interim development, Construction Completion Certificates (CCCs), or Final Acceptance Certificates (FACs) will only occur during regular business hours.

   Note: Development Inspectors work Monday to Friday each week, excluding holidays.
5) FACs submitted after September 30 for sites with an irrigation system will require the area's Calgary Parks Irrigation Foreman (or designate) present during the winterization procedure. Calgary Parks Operations will ensure that staff will be available upon 48 hours notice. Alternatively, Calgary Parks Operations staff will not be required on site during the winterization procedure provided the Developer agrees, in writing, to start the system and perform any repairs that may be required the following spring. Failure to notify the appropriate inspection service may require all work to be exposed for an inspection at the Contractor's expense.

   Note: Development Inspectors are not required to review site development unless stamped approved drawings are available on site.
6) Natural Environment Park restoration sites should receive regular inspections during their maintenance period (refer to ***2.8 MAINTENANCE PERIOD***) to ensure that restoration is on track. Inspection times and frequency will be determined through the scope of the habitat restoration project, as applicable. The Consultant can contact Calgary Parks' ***Capital Development*** between May and September to arrange for an annual inspection during the maintenance period.
7) Vegetation should not be mowed prior to FAC inspection, to allow for proper identification of vegetation species.

Figure 2-1: Park Inspection Boundaries Map



2.7 CONSTRUCTION COMPLETION CERTIFICATE (CCC)

2.7.1 CCC Application Requirements

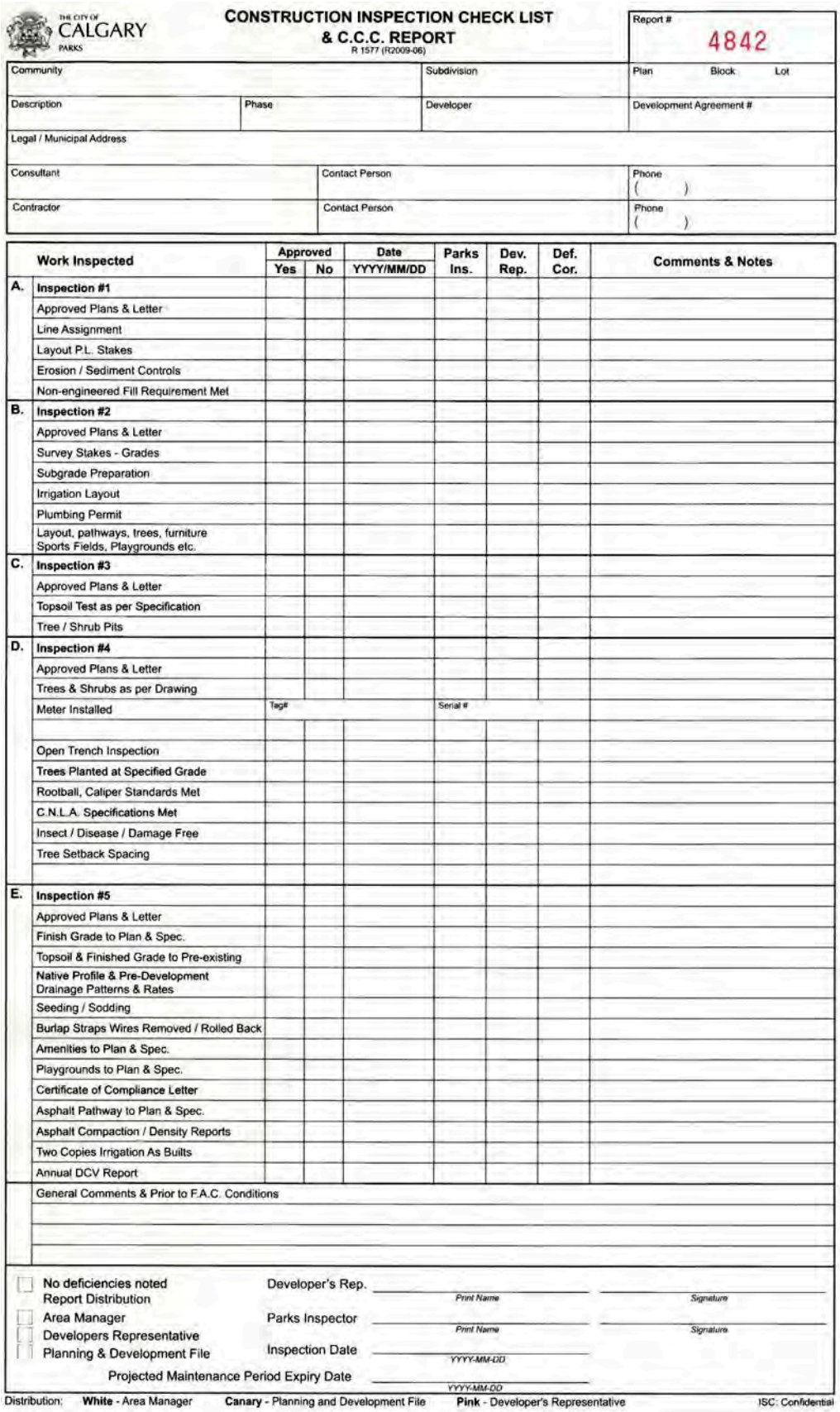
Note: This process applies to Development Agreements from 2002 onwards and is not retroactive.

1) Landscaping for ***Reserve Parcels***, Public Utility Lots (***PULs***), Rights-of Way (***RoWs)***, boulevards, medians, traffic islands, and ***Stormwater Ponds*** will be considered complete when:
   - All underground irrigation and water services have been installed, tested, and inspected.
   - Preliminary “as constructed” drawings have been submitted to Calgary Parks
   - The area has been graded, loamed, seeded or sodded.
   - The trees have been planted.
   - The paved or interlocking stone walkways, fencing, play equipment, and/or amenities have been constructed in accordance with this manual.
2) Park inspections must occur during the five critical stages (as identified in the *Construction Inspection Checklist and CCC Report* (refer to figure ***Figure 2-2*** and ***2.7.2 CCC Construction Inspection Schedules***).
3) The Developer's Consultant, Contractor(s) and the Calgary Parks ***Development Inspector*** will be in attendance at each of the critical stage inspections.

   Note: Each inspection will be initialed on the *Construction Inspection Checklist and CCC Report* by the Developer's Consultant or Contractor. The scope of work to be inspected must be complete prior to the inspection.
4) Essential and non-essential deficiencies will be recorded during each inspection stage, and both the Developer's Consultant and the Development Inspector will sign off on each inspection stage.
5) At the end of the five stages, if all essential work is complete, the Developer can apply to Calgary Approvals Coordination’s ***Coordinator Subdivision Development*** for a CCC. Along with the application, the Developer must submit a copy of the signed-off *Construction Inspection Checklist & CCC Report* (refer to figure ***Figure 2-2*** and ***2.7.2 CCC Construction Inspection Schedules***), noting the expiry date (before which all non-essential work must be complete).

   Note: In order to effectively inventory sites once CCC is issued, Calgary Parks requests that the Developer provide the Plan # (registered or tentative), Block #, Lot # and Type, and Development Agreement # on the CCC Application.

Figure 2-2: Construction Inspection Checklist & CCC Report



THE CITY OF CALGARY PARKS

CONSTRUCTION INSPECTION CHECK LIST & C.C.C. REPORT
R 1577 (R2009-06)

Report # 4842

Community		Subdivision	Plan Block Lot
Description	Phase	Developer	Development Agreement #
Legal / Municipal Address			
Consultant	Contact Person		Phone ( )
Contractor	Contact Person		Phone ( )

	Work Inspected	Approved Yes	Approved No	Date YYYY/MM/DD	Parks Ins.	Dev. Rep.	Def. Cor.	Comments & Notes
A.	**Inspection #1**							
	Approved Plans & Letter							
	Line Assignment							
	Layout P.L. Stakes							
	Erosion / Sediment Controls							
	Non-engineered Fill Requirement Met							
B.	**Inspection #2**							
	Approved Plans & Letter							
	Survey Stakes - Grades							
	Subgrade Preparation							
	Irrigation Layout							
	Plumbing Permit							
	Layout, pathways, trees, furniture Sports Fields, Playgrounds etc.							
C.	**Inspection #3**							
	Approved Plans & Letter							
	Topsoil Test as per Specification							
	Tree / Shrub Pits							
D.	**Inspection #4**							
	Approved Plans & Letter							
	Trees & Shrubs as per Drawing							
	Meter Installed	Tag#			Serial #			
	Open Trench Inspection							
	Trees Planted at Specified Grade							
	Rootball, Caliper Standards Met							
	C.N.L.A. Specifications Met							
	Insect / Disease / Damage Free							
	Tree Setback Spacing							
E.	**Inspection #5**							
	Approved Plans & Letter							
	Finish Grade to Plan & Spec.							
	Topsoil & Finished Grade to Pre-existing							
	Native Profile & Pre-Development Drainage Patterns & Rates							
	Seeding / Sodding							
	Burlap Straps Wires Removed / Rolled Back							
	Amenities to Plan & Spec.							
	Playgrounds to Plan & Spec.							
	Certificate of Compliance Letter							
	Asphalt Pathway to Plan & Spec.							
	Asphalt Compaction / Density Reports							
	Two Copies Irrigation As Builts							
	Annual DCV Report							
	General Comments & Prior to F.A.C. Conditions							

☐ No deficiencies noted
Report Distribution
☐ Area Manager
☐ Developers Representative
☐ Planning & Development File

Developer's Rep. _____ (Print Name) _____ (Signature)
Parks Inspector _____ (Print Name) _____ (Signature)
Inspection Date _____ (YYYY-MM-DD)
Projected Maintenance Period Expiry Date _____ (YYYY-MM-DD)

Distribution: **White** - Area Manager **Canary** - Planning and Development File **Pink** - Developer's Representative ISC: Confidential

6) Landscape components submitted for construction completion should be submitted in specific groupings by development phase to reduce both the frequency of inspections and the volume of documentation required by Calgary Approvals, Calgary Parks, and the Developer. Recommended groupings are:
   a) All ***Reserve Parcels***.
   b) All boulevards, medians, and traffic islands.
   c) All ***Environmental Reserve (ER)s***.
   d) All ***Dry Ponds***.
      Note: The CCC for Calgary Parks should be held at the same time as the CCC for Water Resources.
   e) All ***PULs***.
      Note: Where the PUL is dedicated for the purpose of a shallow utility cabinet or pedestal only, and embedded in a Municipal Reserve, the PUL may be included in the CCC application for the Municipal Reserve.
7) The Developer must prepare and issue four (4) copies of a *Construction Completion Certificate (CCC)* form (available on The City of Calgary's website) that is duly signed, sealed, and certified by the signing officer of the Consultant. The CCC must include the projected earliest maintenance expiry date.
8) Within thirty (30) days of the Development Inspector signing the *Construction Inspection Checklist & CCC Report*, the developer must forward four (4) copies of the *Construction Completion Certificate (CCC)* form and the *Construction Inspection Checklist & CCC Report* to Calgary Approvals.
9) Calgary Approvals will acknowledge receipt of the four (4) copies of the *Construction Inspection Checklist & CCC Report* and *Construction Completion Certificate (CCC)* form within fourteen (14) days.
10) Calgary Approvals will sign the four (4) copies of the Construction Completion Certificate and forward one copy to Calgary Parks.
11) No other site inspection by the Development Inspector will occur. The developer must complete all non-essential work items as per ***2.7.2 CCC Construction Inspection Schedules***.
12) As per the Residential Development Agreement, if the Developer does not complete the non-essential deficiencies before the expiry date, the CCC will either be revoked or the maintenance period will be extended one year from the time the deficiencies are completed.

2.7.2 CCC Construction Inspection Schedules

The five critical stages of construction are as follows:

1) Inspection 1 - Construction Start-up
2) Inspection 2 - Subgrade
3) Inspection 3 - Tree and Shrub Planting
4) Inspection 4 - Irrigation
5) Inspection 5 - Finish Grade

Table 2-4: CCC Construction Inspection Schedule 1

This schedule is applicable to:
- Sub-neighbourhood, Neighbourhood, Community, and Linear Parks
- Employment Centre Open Space
- Community Squares
- Commercial Plazas
- ***Stormwater Ponds***
- ***RoWs***.

Note: Approved plans required prior to work commencement.

Work Inspected	Seasonal Limits	Timing	% Essential Prior to CCC Approval
Site Layout, Grades, Topsoil, and Turf			
Layout P.L. Stakes	6" frost and/or no snow	Inspection 1	100
Erosion/Sediment Controls	None	Inspection 1	100
Survey Stakes - Grades	6" frost and/or no snow	Inspection 2	100
Sub-grade Preparation	6" frost and/or no snow	Inspection 2	100
Site Layout (i.e. pathways, trails, trees, amenities, sports fields, playgrounds etc.)	6" frost and/or no snow	Inspection 2	100
Topsoil Test	None	Inspection 3	100
Finished Grade to Plan and Spec.	Frost Free	Inspection 5	100
Seeding	Frost Free	Inspection 5	100
Sodding	Frost Free	Inspection 5	100
Compaction Reports	None	Inspection 5	Within 60 days of date on *Construction Inspection Checklist & CCC Report*
Trees/Shrubs			
Line Assignment	None	Inspection 1	100
Tree/Shrubs Pits/Beds	None	Inspection 3	100
Correct Number and Species	None	Inspection 4	100
Rootball/Caliper Standards Met	Frost Free	Inspection 4	100
Trees Planted at Specified Grade	Frost Free	Inspection 4	100
CNLA Specifications Met	Frost Free	Inspection 4	100
Insect/Disease/Damage Free	Active Growth	Inspection 4	100
Set back Spacing	No Snow	Inspection 4	100
Burlap Strapping/Wires Removed or Rolled Back	Frost Free	Inspection 5	100

Work Inspected	Seasonal Limits	Timing	% Essential Prior to CCC
Irrigation			
Plumbing Permit	At irrigation layout	Inspection 2	100
Irrigation Layout	6" frost and/or no snow	Inspection 2	100
Meter Received by Contractor and Meter information sheet is submitted	Sept. 30th or permission from Wastewater	Inspection 4	100
Open Trench Inspection	Frost Free	Inspection 4	100
Two Copies Preliminary As-built	None	Inspection 5	2 weeks prior to CCC Inspection
Annual DCV Report	Within 30 days of start-up	Inspection 5	100
Pathways & Trails			
Pathway Alignment	6" frost and/or no snow	Inspection 2	100
Trail Alignment	6" frost and/or no snow	Inspection 2	100
To Approved Plan and Specification	No snow	Inspection 5	100
Compaction Reports	No snow	Inspection 5	100
Playgrounds			
To Approved Plan and Specification	No snow	Inspection 5	100
Certificate of Compliance Letter	Prior to CCC	Inspection 5	100
Amenities			
To Approved Plan and Specification	No snow	Inspection 5	Prior to FAC
Executed Maintenance Agreement	Prior to FAC	Inspection 5	Prior to FAC

Table 2-5: CCC Construction Inspection Schedule 2

This schedule is applicable to natural environment parks and engineered stormwater wetlands.
Note: Approved biophysical impact assessment, environmental significance assessment, wetland development assessment, and construction & restoration plans required prior to work.

Work Inspected	Seasonal Limits	Timing	% Essential Prior to CCC Approval
Site Layout, Grades, Topsoil, and Native Seed/Sod			
Layout P.L. and Approved Utility/ ROW Encroachments	6" frost and/or no snow	Inspection 1	100
Erosion/Sediment Controls	None	Inspection 1	100
Survey Stakes - Grades	6" frost and/or no snow	Inspection 2	100
Sub-grade Preparation	6" frost and/or no snow	Inspection 2	100
Site Layout (i.e., trees, pathways, trails, amenities, etc.)	6" frost and/or no snow	Inspection 2	100
Pre-development Topsoil Stored	Frost Free	Inspection 2	100
Topsoil Depth & Finished Grade to Pre-existing Native Profile & Pre-Development Drainage Patterns & Rates	Frost Free	Inspection 5	100
Seeding	Frost Free	Inspection 5	100
Sodding	Frost Free	Inspection 5	100
Compaction Reports	None	Inspection 5	Within 60 days of date on *Construction Inspection Checklist & CCC Report*

Work Inspected	Seasonal Limits	Timing	% Essential Prior to CCC
Native Trees/Shrubs			
Tree/Shrubs Pits/Beds	None	Inspection 3	100
Correct Number and Species	None	Inspection 4	100
Rootball/Caliper Standards Met	Frost Free	Inspection 4	100
Trees Planted at Specified Grade	Frost Free	Inspection 4	100
CNLA Specifications Met	Frost Free	Inspection 4	100
Insect/Disease/Damage Free	Active Growth	Inspection 4	100
Set back Spacing	No Snow	Inspection 4	100
Burlap Strapping/Wires Removed or Rolled Back	Frost Free	Inspection 5	100
Pathways & Trails			
Pathway Alignment	6" frost and/or no snow	Inspection 2	100
Trail Alignment	6" frost and/or no snow	Inspection 2	100
To Approved Plan and Specification	No snow	Inspection 5	100
Compaction Reports	No snow	Inspection 5	100
Amenities			
Restoration/Reclamation Signage	No snow	Inspection 1	100
To Approved Plan and Specification	Prior to CCC	Inspection 5	Prior to FAC

2.8 MAINTENANCE PERIOD

The Developer, at no expense to The City, must maintain the following over a continuous period for one (1) growing season:

- ***Reserve Parcels*** and ***Stormwater Ponds***.
- Boulevards, medians, and traffic islands.
- Public Utility Lots (***PULs***).
- Rights-of Way (***RoWs***).

One (1) growing season is defined as the period of time between the date that the Calgary Parks ***Development Inspector*** signs the CCC to June 30 of the following year, or, in the sole opinion of Calgary Parks, on the date when the irrigation systems are operating and the vegetation is in full leaf, whichever event occurs **last**.

Note: Where Landscaping is to receive a CCC after September 30th, Calgary Parks may extend the maintenance period to (at the latest) September 30th of the following year. CCC inspections are subject to the seasonal limits identified in ***2.7.2 CCC Construction Inspection Schedules***.

2.9 FINAL ACCEPTANCE CERTIFICATE (FAC)

1) Not less than three (3) months prior to the maintenance period expiry date, or earlier if weather conditions permit, the Developer and the Contractor must inspect ***Reserve Parcels***, Public Utility Lots (***PULs***), ***Stormwater Ponds***, Rights-of Way (***RoWs)***, boulevards, medians, and traffic islands, and the Developer must ensure that the Contractor corrects all defects and deficiencies due to damage and other causes, except defects or deficiencies caused by the negligence of The City or its agents, employees or servants in the performance of their duties on behalf of The City.

   During the site review, the Developer should ensure that plant material and turf is healthy, that the irrigation system is complete (including required paperwork), and that all plans reflect the final product. If this is not completed, no conditional FAC will be considered.

   Note: The date of inspection by the Consultant must be recorded on the FAC Application.

2) Subsequent to the correction of all defects and deficiencies noted in item 1, the Developer must submit to the Calgary Parks ***Development Inspector*** four (4) copies of an *FAC Application Form* that is duly signed and sealed by a signing officer of the Consultant.

   Note: FAC Applications are not to be submitted prior to site completion. Development Inspectors will not 'hold' document until site is ready.

3) Landscape components submitted for final acceptance should be submitted in specific groupings by development phase to reduce both the frequency of inspections and the volume of documentation required by Calgary Approvals, Calgary Parks, and the Developer. Recommended groupings are:

   a) All ***Reserve Parcels***.

   b) All boulevards, medians and traffic islands.

   c) Residential street trees.

   d) All ***Environmental Reserve (ER)s***.

   e) All ***Stormwater Ponds***.

   f) All ***PULs***.

      Note: Where the PUL is dedicated for the purpose of a shallow utility cabinet or pedestal only, and embedded in a Municipal Reserve, the PUL may be included in the FAC application for the Municipal Reserve.

4) ***Community Parks*** and ***District Parks*** containing ***MSR*** sites must be fully developed, and an FAC Application must be submitted:

   a) No later than at least one (1) full year prior to occupancy of a school.

   b) By the time thirty percent (30%) of the lots or projected lots located within the catchment area, which is deemed to be all lands located within 1.2 km from the property line of the said parcel of land, are occupied.

c) No later than September 30th of the year of application. FAC application inspections may be performed after September 30th subject to weather and ground conditions that allow for an effective assessment of the property and at the discretion of the Manager, Capital Development, Calgary Parks.

All development has to be checked and approved on site by Development Inspectors prior to signing of the FAC. If defects or deficiencies are apparent, the process will be as per item 5, below.

5) Calgary Parks will schedule an on-site inspection with the Developer within thirty (30) days of receipt of the FAC by Calgary Approvals, and if no advice of defects or deficiencies has been sent to the Developer within that time, the improvement must be deemed by The City to be complete.

Note: Prior to the inspection with the Consultant, the Development Inspector will inspect the site with a representative of Parks.

6) If the inspection:

a) Shows to the satisfaction of the Calgary Parks ***Development Inspector*** that the improvement is completed and any third party damages are rectified, the Development Inspector will sign the FAC Application.

b) Shows defects or deficiencies, the Development Inspector will issue a *Final Acceptance Inspection Check List & Report* (refer to ***Figure 2-3***) detailing the defects or deficiencies that exist, and will record the last day of the one (1) month period on the Inspection Check List and Report under "Application Expiration Date."

The Development Inspector will retain the FAC for one (1) month (until the "Application Expiration Date").In the event that the defects or deficiencies are not corrected by the Developer within the one (1) month period, the FAC will be returned unsigned. Deficiencies indicated on the FAC inspection are to be corrected as soon as possible (not at the end of the 30 day expiration period). The Developer can resubmit the FAC once the defects and deficiencies are corrected.

Note: Only one (1) *Final Acceptance Inspection Check List & Report* (refer to ***Figure 2-3***) will be issued during the inspection process.

7) If weeds are identified in a *Final Acceptance Inspection Checklist & Report* (refer to ***Figure 2-3***) and a herbicide is applied to rectify the deficiency, a biocide application report must be submitted prior to the signing of the FAC.

8) Conditional FAC will be considered if site was complete and third party damage occurs where time restraints do not permit rehabilitation, or when there are exceptional circumstances (i.e. drought).

9) Marketing signs and flags will not interfere with the FAC process providing the Developer submits a letter acknowledging responsibility for continued maintenance and repairs to the parcel, as well as a map outlining where the signs and marketing items are located. It will be the Developer's responsibility to ensure that all the marking signs and flags are compliant with all Municipal, Provincial, and Federal regulations that may apply. The Developer shall

provide to The City thirty (30) days notice of their intent to turn the parcel(s) over to The City. Once the signs and/or marketing items have been removed, the Developer shall initiate a re-inspection of the property as per the FAC procedure.

Figure 2-3: Final Acceptance Inspection Checklist & Report

THE CITY OF CALGARY PARKS

***FINAL ACCEPTANCE INSPECTION CHECK LIST & REPORT**

COMMUNITY		SUBDIVISION
DESCRIPTION	PHASE	DEVELOPER
LEGAL/MUNICIPAL ADDRESS		
CONSULTANT	CONTACT PERSON	PHONE
CONTRACTOR	CONTACT PERSON	PHONE
F.A.C. APPLICATION RECEIVED: ☐ YES ☐ NO		DATE YY MM DD

WORK INSPECTED	DEFICIENCY	INSPECTOR'S REPORT DETAIL
A. SURFACE CONDITION:		
settlement		
ponding/drainage		
repair required		
B. TURF:		
turf quality acceptable		
bare spots requiring top dressing and overseeding		
weed problems		
others		
C. TREES:		
tree replacement		
pruning required		
staping removed		
wires removed		
burlap removed		
guying removed		
tree well cultivated		
soil settlement ie. tree too low		
others		
D. SHRUBS:		
shrubs replacement		
pruning required		
bed cultivated		
weed free bed		
mulch intact		
others		
E. FENCING		
F. PLAY EQUIPMENT:		
G. PATHWAYS/HARD SURFACE:		
H. AMENITIES:		
benches		
garbages receptacles		
others		
I. GENERAL COMMENTS:		
J. IRRIGATION SYSTEM:		
as-built drawings		
maintenance manuals received		
Annual D.C.V. report		
Irrigation information sheet		
Meter information sheet		
K. EXTENDED WARRANTY REQUIRED:		
L. MAINTENANCE LOG SUBMITTED:		
M. MYLARS RECEIVED (LANDSCAPE & IRRIGATION		

*NOTE: Contract documents and the Development Guidelines and Standard Specification for Landscape Construction override the Inspection Check List and Report.

☐ No deficiencies noted
☐ Application Expiration Date:_____

Report Distribution
☐ Industry Rep.
☐ Area Superintendent ☐ Design & Development File

Parks Area Rep.:_____
Industry Rep.:_____
Park Inspector _____
Inspection Date _____

2.10 CCC and FAC APPEAL PROCESS

In the event that a CCC or FAC Application is rejected by the Calgary Parks ***Development Inspector***, it will be returned to the Developer. The Developer can appeal the decision by mailing the application with a cover letter explaining the reason(s) for the appeal to the ***Manager, Capital Development***, Calgary Parks.

When an appeal is received, a review will be conducted based on the contractual obligations associated with the development agreement and this manual. The review will include the Manager, Operations, Calgary Parks, the Developer or their representative, and the Calgary Parks ***Development Coordinator***.

Where agreement or consensus is not achieved during the review, the appeal will be considered by the Manager, Capital Development, Calgary Parks, and the Manager, Calgary Approvals (or designate). The decision made at this point will be final.

SECTION II:
STANDARD SPECIFICATIONS FOR LANDSCAPE CONSTRUCTION

CHAPTER 3: RECREATION FACILITIES

3.1 SITE PLANNING TEAM'S JOINT USE SITE GUIDELINES

Table 3-1: Site Planning Team's Joint Use Site Guidelines

Type of School	Joint-Use Site Area	School Building Envelope	Sports Field Envelope	Educational Sports Field Requirements	Recreational Sports Field Requirements
Public Elementary School	4 hectares (10 acres)	1.6 hectares (4 acres)	2.4 hectares (6 acres)	- 2 Minor/1 Major overlapping soccer fields - Creative Playground	1 x 76 m ball diamond
Public Junior High School	4.9 hectares (12 acres)	1.6 hectares (4 acres)	3.2 hectares (8 acres)	- 2 Minor/1 Major overlapping soccer fields - Field event area	2 x 76 m ball diamond
Public Elementary & Junior High Schools	6.9 hectares (17 acres)	3.2 hectares (8 acres)	3.6 hectares (9 acres)	- 2 Minor/1 Major overlapping soccer fields - Field event area - Creative Playground	2 x 76 m ball diamond
Separate Elementary School	3.6 hectares (9 acres)	1.4 hectares (3.5 acres)	2.2 hectares (5.5 acres)	- 2 Minor/1 Major overlapping soccer fields - Creative Playground	1 x 76 m ball diamond
Separate Elementary & Junior High School	4.9 hectares (12 acres)	1.9 hectares (4.75 acres)	2.9 hectares (7.25 acres)	- 2 Minor/1 Major overlapping soccer fields - Field event area - Creative Playground	1 x 76 m ball diamond
Public/ Separate High School	9.2 hectares (23 acres)	4 hectares (10 acres)	5.3 hectares (13 acres)	- 2 Minor/1 Major overlapping soccer fields - 1 Football field - Track & field area	2 x 76 m ball diamond
Community Association Facility	1.2 - 1.6 ha. (3 - 4 acres)				- 1 Outdoor Rink - 2 Tennis Courts

Notes: **a)** Public Elementary & Junior High School sites will accommodate 2 school buildings.

b) All site sizes and building envelopes are minimum requirements. Additional land may be required where physical constraints exist.

c) For joint use sites with Recreation Facilities within ***Dry Ponds***, refer to ***3.2 HOCKEY RINKS AND LACROSSE FIELDS***, ***3.3 SOCCER FIELDS AND BALL DIAMONDS***, and ***3.4 TENNIS COURTS***.

d) Field Event areas include long jump, shot put, discus, etc.

3.2 HOCKEY RINKS AND LACROSSE FIELDS

1) Refer to ***Detail Sheet 1: Community Ice Hockey Rink & Lacrosse Field*** for rink dimensions.
2) Rink surface must be graded flat for water retention.
3) Hockey Rinks and Lacrosse Fields located within ***Dry Ponds*** must be placed above the 1:50 year flood level.

3.3 SOCCER FIELDS AND BALL DIAMONDS

1) Refer to the following detail sheets for soccer field and goalpost dimensions:
   - ***Detail Sheet 3: Soccer Fields- Combination Major/Minor***
   - ***Detail Sheet 4: Soccer Fields: Active Open Recreation Space***
   - ***Detail Sheet 5: Soccer Fields - Major/Minor Goal Posts***

2) Subject to Calgary Parks' approval, portable goalposts may be installed if they are securely anchored to the ground.

3) Refer to the following detail sheets for ball diamond & backstop dimensions:
   - ***Detail Sheet 6: Ball Diamonds - 76.2 m Softball***
   - ***Detail Sheet 7: Ball Diamonds - 76.2 m Little League Infield***
   - ***Detail Sheet 8: Ball Diamonds 91.4 m Little League Infield***
   - ***Detail Sheet 9: Ball Diamonds - 91.4 m Little League***
   - ***Detail Sheet 11: Ball Diamonds - Backstops***
   - ***Detail Sheet 11: Ball Diamonds - Backstops***
   - ***Detail Sheet 12: Ball Diamonds - Backstops***

4) All sports fields, and a buffer zone of 3 m, are to be graded to achieve a level, playable surface without ponding areas. The fields are to be graded to a maximum of 2% in all directions with a preference toward the "Optimal Drainage Patterns for Sports Fields" as per ***Detail Sheet 2: Optimal Drainage Patterns for Sports Fields***. Calgary Parks Development Coordinators will consider solutions other than the preferred sports field grading options if site conditions do not permit their execution.

   Goal-end to goal-end grading will only be permitted subject to demonstration that no other alternative is available. Only the 3 m adjacent to the sports field of the total 10 m buffer must be graded level and free of obstacles. The remaining 7 m of the buffer may include plant material, amenities and back-sloping.

5) Ball diamonds and soccer fields must be devoid of all obstacles, including catch basins, and they must be set back a minimum of:
   - 10 m from all property lines.
   - 20 m from playgrounds.
   - 10 m behind soccer goal posts.3 m around the perimeter of ball diamonds and along the sides of soccer fields.

   Note: Setback trees and shrubs as per ***Table 4-1***.

6) Soccer fields and ball diamonds located within ***Dry Ponds*** must meet the following performance criteria:
   a) Soccer fields, ball diamonds, and their buffer zones are to be located outside of the 1:5 year inundation level.

b) Inundation of soccer fields, ball diamonds, and their buffer zones must:
   i) Not be for more than 48 hours in any month of the year.
   ii) Not exceed six times per month
   iii) Leave fields suitable for play within 48 hours after the flood event has receded.

7) Backstop canopies shall be installed on **all** major ball diamond backstops.

8) A 6 foot chain-link fence must be added in front of the entire length of players' benches on all programmed fields, as indicated in the *Little League Baseball (Major/Minor) Divisions Field Layout*.

3.4 TENNIS COURTS

1) Tennis Courts will be permitted if developed minimally as double courts.

2) The guidelines and specifications in this section should be used in conjunction with the following detail sheets:

- ***Detail Sheet 13: Tennis Courts - Plan & Section View***
- ***Detail Sheet 14: Tennis Courts - Practice Board***
- ***Detail Sheet 15: Tennis Courts - Apron***
- ***Detail Sheet 16: Tennis Courts - Permanent Transom***
- ***Detail Sheet 17: Tennis Courts - Removable Transom***
- ***Detail Sheet 18: Tennis Courts - Net Posts***
- ***Detail Sheet 19: Tennis Courts- Surface Repair Schedule #1***
- ***Detail Sheet 20: Tennis Courts- Surface Repair Schedule #2***
- ***Detail Sheet 21: Tennis Courts- Surface Repair Schedule #3***

a) A geotechnical analysis on a maximum 10 m grid must be conducted to a 2 m depth.

b) Any organic or otherwise unsuitable material (as determined by the geotechnical analysis) must be removed to a minimum depth of 1 m below the existing grade, and replaced with 1 m of 75 mm minus pit run base gravel conforming to the current *Roads Construction Standard Specifications*. If no organic or otherwise unsuitable material is present, then the subgrade must be excavated to a minimum depth of 500 mm and back filled with 500 mm of 75 mm minus pit run base gravel conforming to the current *Roads Construction Standard Specifications*. The subgrade and base gravel must be compacted to a minimum average of 98%, with no single test showing less than 95% of standard Proctor.

c) 100 mm of 20 mm crushed gravel (conforming to the current *Roads Construction Standard Specifications*) must be placed and compacted to a minimum average of 98%, with no single test showing less than 95% of standard Proctor.

d) A 60 mm lift of Mix 'B' asphaltic concrete (conforming to the current *Roads Construction Standard Specifications)* must be placed and compacted to a minimum average of 98%, with no single test showing less than 95% of standard Proctor.

e) A 40 mm lift of mix 'M' asphaltic concrete (conforming to the current *Roads Construction Standard Specifications*) must be placed and compacted to a minimum average of 98% with no single test showing less than 95% of standard Proctor.

f) The entire court surface area must be power washed with a minimum 3000 P.S.I. power washer to ensure that the surface is clean and free of all dirt, oil, and deteriorated coatings. The contractor is required to remove all debris from the site prior to commencing court patching and surfacing.

g) Prior to the application of the “Asphalt Resurfacer” (Asphalt Emulsion Filler Coarse), the court surface area must be flooded with clean, potable water in the presence of the Development Inspector or a designated representative. After 45 minutes, any depressions holding water deeper than 1.25 mm must be marked out and filled with “Court Patch Binder” (High Strength Acrylic Bonding Liquid Patching Mixture). The use of asphaltic type emulsions or hot sand mix asphalt to fill depressions is prohibited.

   After an appropriate curing time, the court surface area must again be flooded (as described above) to ensure that all reasonable depressions have been filled. If it is determined that more filling is required, conduct additional filling as described above.

   Note: On new construction, it is expected that:

   - No depressions will be evident after the final lift of asphalt is laid.
   - The asphalt will cure for a minimum of 14 days prior to the application of any surface coating.

h) Upon completion of all depression patching, all surface divots and cracks must be filled in with “Plexipave Tennis Court Crack Filler” or an approved equivalent (highly flexible filler and/or a high strength acrylic bonding liquid patching mixture) as per the manufacturer’s specifications. The entire surface must then be scraped and/or ground to remove all ridges, and then be blown clean to remove all loose debris.

i) One coat of “SS1 Asphaltic Binder” must be applied to the entire court surface immediately prior to the first application of asphaltic emulsion filler (item j).

   Note: This step is not required for new construction.

j) Two coats of “Asphalt Resurfacer” (Asphalt Emulsion Filler Course) must be applied to the entire court surface as per the manufacturer’s specifications. The second coat must be applied at a 90 degree angle to the first coat. Once the second coat has cured, the surface must be scraped to remove any ridges, blown clean to remove all debris, and then rolled with a double drum mechanical roller.

k) Two coats of “Coloured Fortified Plexipave” or an approved equivalent (Fortified Acrylic Coloured Filler Emulsion using 80-100 mesh rounded sand) must be applied as per the manufacturer's specifications. The surface must be scraped and blown between coats (as described in item j). A final coat of “Coloured Plexichrome” (Fortified Acrylic Coloured Finish Emulsion) or an approved equivalent can then be applied to the entire surface as per the manufacturer’s specifications. The colour scheme must be green for playing pads and red for the perimeter, unless otherwise agreed to by Calgary Parks. For multi-use courts, the colour must be green.

l) For multi-use courts, in lieu of “Coloured Fortified Plexipave”, two coats of “Acrylotex” (Specialized Fortified Acrylic Coloured Filler Emulsion) or an approved equivalent must be applied as per the manufacturer's specifications.

Note: This step only applies to multi-use surface installations (i.e. basketball/inline hockey surfaces).

m) Court lines must be laid-out, masked, and rolled as per official dimensions. Two coats of “Plexicolor Textured White Line Paint” or an approved equivalent (100% Acrylic Emulsion Line Paint) must be brush applied. All lines must be straight and true, with sharp edges. The use of traffic oil, alkyd, or solvent vehicle type paints is prohibited.

n) Tennis posts must be painted with two coats of black epoxy enamel paint (Tremclad or an equivalent). Prior to painting, treat new posts with a light acid wash (acetone, vinegar, etc.) and remove old flaking paint from previously painted posts.

o) Place tennis courts located within ***Dry Ponds*** above the 1:50 year flood level.

Note: The resulting surface must be completely true (flat) with water ponding to a maximum depth of 1.25 mm. Any deviations must be corrected by the Contractor at no expense to The City of Calgary.

3) A 3.66 m high chain link fence (38 mm mesh - No. 9 gauge steel) is required around the perimeter. It must be constructed as per the standards in this manual. Refer to ***Detail Sheet 14a: Tennis Courts - Fencing*** for more information.

3.5 FOOTBALL FIELDS/TRACK & FIELD AREAS

Detail Sheet 69: 400 m Track and Football Field and ***Detail Sheet 70: Football Goal Posts*** are to be used in conjunction with the specifications in this section.

1) Football fields/track & field areas and their buffer zones must be graded to eliminate ponding areas, and must have an optimum gradient of 2% in all directions with a variance of +/- 0.5%.
2) Grading plans for football field/track & field areas must illustrate drainage patterns in a minimum of three directions.
3) Football field/track & field areas must not be located within ***Dry Ponds***.
4) Football fields/track & field areas form part of a ***District Park***, and are not part of the 10% Municipal Reserve Dedication. The appropriate School Board will be responsible for the development of these facilities.
5) The layout for field events may be varied to suit particular local requirements. Design specifications can be obtained by contacting the Calgary Parks ***Development Coordinator***.

3.6 BASKETBALL COURTS

The following detail sheets are to be used in conjunction with the specifications in this section:

- ***Detail Sheet 71: Basketball - Court***
- ***Detail Sheet 72: Basketball Goal Post***
- ***Detail Sheet 73: Basketball Court Surface Construction***

1) Prior to construction of the surface, a pavement design that has been prepared by a qualified geotechnical Engineer must be submitted to Calgary Parks. The design should be gravel based, and must include a review of existing subsoils and subgrade drainage conditions. Subgrade preparation, along with placing and compaction of gravel and asphaltic concrete, must be carried out in accordance with *Roads Construction Standard Specifications* unless otherwise specified in the design.
2) A final asphalt emulsion of two coats must be applied. The application must include a filling, sealing, and texturing process. Once the asphalt emulsion has been applied, the courts can be coloured and lined. This coating must be highly pigmented with prime colour and contain reinforcing pigments, which will provide a long and lasting finish.
3) Basketball courts located within ***Dry Ponds*** must be placed above the 1:50 year flood level.

Note: The resulting surface must be completely true (flat) with water ponding to a maximum depth of 2.50 mm. Any deviations must be corrected by the Contractor at no expense to The City of Calgary.

CHAPTER 4: TREES, SHRUBS, AND GROUNDCOVER

4.1 DEVELOPMENT GUIDELINES

4.1.1 Tree Planting Quantities

The Developer, at its sole cost and expense must:

1) Plant all trees within the Development Area in conformity with the *Parks Urban Forest Strategic Plan* using the "One Tree per Two Lot" formula and giving first priority to the planting of trees on public lands.
2) Plant all trees on public land within the Development Area in conformity with these specifications and the *Parks Urban Forest Strategic Plan*.
3) Instead of planting individual trees, Parks recommends planting trees in groups in planting beds wherever practical.
4) Newly planted trees within a community should not exceed fifteen percent (15%) for any one genus.

4.1.2 Setback/Spacing Guidelines

The edge of beds or clusters are to be located 2.5 m away from each other and other vertical elements.The following table shows the setback and spacing guidelines for all tree plantings in parks, Public Utility Lots (***PULs***), Rights-of Way (***RoWs***), and ***Stormwater Ponds.***

Table 4-1: Tree Planting Setback and Spacing Guidelines

		Poplar Trees, Willow Trees, and Shrubs	Other Deciduous Trees	Coniferous Trees
Setback Situation	Open Spaces: Vertical Elements, Hard Surfaces, and Irrigation Mainline.	5 m	2 m	½ maximum spread
	Boulevards and Medians: Back of curb, sidewalk, pathway, and driveway	10 m	1 m	½ maximum spread
	Private Property: • chain link fence • post & cable fence • wood screening fence	10 m	2 m	½ maximum spread
	Sport Fields	10 m	½ maximum spread from 3 m buffer	½ maximum spread from 3 m buffer
Tree Spacing		½ maximum spread or 5 m (whichever is less)	½ maximum spread	

Notes: **a)** Poplar trees:
i) All poplars except for trembling aspen and Swedish Columnar aspen.
ii) The minimum set backs for poplars may be reviewed upon request.
b) If other deciduous trees and coniferous trees are less than 3.5 m from vertical elements and hard surfaces or private property lines the trees must be placed in mulched beds.
c) Maximum tree spread as per *Alberta Yards & Gardens: What to Grow - Agdex 200/32-1*.
d) No more than 50% of any one species planted in a park will be poplar as per the Poplar Tree Policy.
e) For planting within roundabouts, refer to ***Landscaping Guidelines with Roundabouts***.

Note: Deciduous trees that are 100 mm caliper or larger and coniferous trees that are 4.0 m high or taller will require a warranty and a five (5) year maintenance period. The five (5) year maintenance period is calculated from the date of issuance of CCC

4.1.3 Line Assignment (i.e. Setback) Requirements

1) For setback requirements of trees planted along roadways, refer to The City of Calgary's *Design Guidelines for Subdivision Servicing* and ***Detail Sheet 38: Pathway Culvert and Edge***.
2) The following table shows setback requirements for trees planted adjacent to utilities.

Table 4-2: Tree Separations To Utilities

Deep Utilities	**Poplar**		**Deciduous**			**Coniferous**		
	Services	**Mains** Parallel to tree line	**Services** Medians	**Services** Blvds	**Mains** Parallel to tree line	**Services** Medians	**Services** Blvds	**Mains** Parallel to tree line
Sanitary	3.0 m	4.0 m	0 m [b]	2.5 m	3.0 m	0 m [b]	3.0 m	4.0 m
Storm (<4.5 m deep)	3.0 m	4.0 m	0 m [b]	2.5 m	3.0 m	0 m [b]	3.0 m	4.0 m
Water	3.0 m	4.0 m	0 m [b]	2.5 m	3.0 m	0 m [b]	3.0 m	4.0 m
Hydrants	3.0 m	4.0 m	N/A	2.5 m	2.5 m	N/A	3.0 m	4.0 m
Shallow Utilities	**Poplar**		**Deciduous**			**Coniferous**		
	Services	**Mains** Parallel to tree line	**Services**		**Mains** Parallel to tree line	**Services**		**Mains** Parallel to tree line
ATCO	2.0 m [a]	2.0 m [a]	2.0 m		2.0 m	2.0 m [a]		2.0 m [a]
TELUS	2.0 m [a]	2.0 m [a]	1.5 m		1.5 m	2.0 m [a]		2.0 m [a]
CTV	2.0 m [a]	2.0 m [a]	1.5 m		1.5 m	2.0 m [a]		2.0 m [a]
ENMAX	2.0 m [a]	2.0 m [a]	1.5 m		1.5 m	2.0 m [a]		2.0 m [a]
Enmax	**Poplar**		**Deciduous**			**Coniferous**		
Overhead (to outside conductor)	9.0 m		7.0 m - 9.0 m			7.0 m - 9.0 m		
Transformers (within Utility Rights of Way)	N/A (Tree planting not permitted within Utility Rights-of-Way)							
Street Light Poles	**Poplar**		**Deciduous**			**Coniferous**		
	5.0 m		4.0 m - 5.0 m			Min. 4.0 m		

Notes: **a)** A 3.0 m separation may be required at the discretion of the utilities.
b) Pipe joints are not permitted on water or sewer services located under medians.
c) Trees on residential (15.0 m RoW) boulevards, with no sidewalks, can be planted 1.0 m from driveways. Driveway crossings are to be aligned, wherever possible, to allow space for tree planting.

4.1.4 Traffic Islands

The following are setback requirements for trees and shrubs planted on traffic islands:

1) All trees and shrubs adjacent to primary streets must be a minimum of 7.5 m from the bullnose or the back of the walk extended through the island, whichever is greater.
2) For irregular-shaped traffic islands adjacent to primary streets, all trees and shrubs must be a minimum of 4.5 m from the bullnose curb.
3) All trees and shrubs must be a minimum of 3.0 m from the bullnose inside the cul-de-sac.
4) All Poplar trees, except for Trembling Aspen and Swedish Columnar Aspen, must be planted 6.0 m from back of curb, except when the Director of Calgary Parks and the Director of Roads give conditional approval.
5) All coniferous trees must be planted 3.0 m from the back of the curb.

Note: To obtain line assignment and construction approvals for plantings, please; submit seven (7) sets of folded drawings to Calgary Parks' ***Capital Development*** for new subdivisions, or seven (7) sets of folded drawings to The City of Calgary's ***Right-of-Way Management Services*** for non-standard tree planting proposals existing areas and where utility lines are involved.

4.1.5 Play Structure Plantings

Type and spacing of plantings must ensure clear sight-lines into the play structure area.

4.1.6 Tree Protection Guidelines

The *Street Bylaw (20M88)* and the *Tree Protection Bylaw (23M2002)* contain clauses intended to protect trees growing on Public Land. The intent of these clauses is to maintain public trees as long-term assets to the community and to The City of Calgary in general.

Tree protection requires forethought and planning well before construction activities commence. A Tree Protection Plan and other protection measures are only required on City-owned land, however applicants are encouraged to apply tree protection measures on private land, as well. Effective tree protection places limits on damage and disturbance to tree branches, trunks, and root systems.

For more information about Tree Protection Plan requirements and specifications, refer to the *Tree Protection Plan Guide*, contact Calgary Parks' ***Urban Forestry Tree Protection*** or consult the Calgary Parks' *website*.

1) An Urban Forestry-approved Tree Protection Plan is required **prior to project commencement** when a disturbance occurs on City-owned land (not just a City boulevard) within 6 m of a public tree. Tree Protection Plans can be submitted for approval to ***Urban Forestry Tree Protection***.

A Tree Protection Plan outlines tree protection measures and describes construction techniques and activities. It offers specifics on tree retention, proposed removals, and tree protection zones. Standard tree protection zone size is a 4 m radius from the trunk or to the drip line. Smaller tree protection zones may be approved by Urban Forestry, depending on site details.

2) A Tree Protection Plan should:
   - Be completed by a qualified professional that is knowledgeable in arboricultural standards and City requirements.
   - Indicate when a pre-construction meeting is scheduled with Calgary Parks ***Urban Forestry*** to evaluate proposed development with regard to public trees.
   - Provide an inventory of all trees within 6 m of ground disturbance and access routes.
   - Identify the tree protection zone, where activities are restricted.
   - Identify species, diameter (to be measured as specified in the *Guide for Plant Appraisal* by the Council of Tree & Landscape Appraisers (CTLA)), height, condition and existing flaws or damage, significant pests, and diseases.
   - Identify whether tree(s) or shrubs are to be moved, removed, or protected.
   - Identify whether tree pruning is required to provide clearance.
   - Locate staging, hoarding, and storage areas of construction.
   - Locate limits of land disturbance, excavation, trenching and grade changes, routing of utilities, and irrigation systems, sidewalks, driveways, construction access roads, changes to street lighting, fire hydrants, utilities boxes.
   - Identify construction methods and equipment to be used on City-owned lands.
   - Identity measures to ensure tree branches, trunk and roots are protected during construction. Measures may include effective barrier fencing, branch and or root pruning, protective mulch, supplementary water, soil aeration, and/or informational signage.
   - Identify pre- and post- construction tree care measures.
   - Provide contact information for a designated individual that will be responsible for ensuring all work adheres to the approved Tree Protection Plan.

3) Calgary Parks prohibits:
   a) Unauthorized removal of a public tree
   b) Damage to a public tree, including roots, trunk, and branches
   c) Pruning of a public tree without authorization from Parks, including roots.
   d) Stockpiling of material (including soil) within tree protection zones.
   e) Work on City-owned land within 6 m of a public tree without a Tree Protection Plan.
   f) Construction activities requiring use of or cross any portion of the road Right of Way (including boulevards) without a permit issued by The City of

Calgary. Permits must be obtained from Calgary Roads' ***Traffic Permits***. For further information call 3-1-1 or consult the Calgary Roads' *website*.

g) Unauthorized soil disturbance on City-owned land within 6 m of a City Tree.

h) Unauthorized deviation from a Tree Protection Plan approved by Calgary Parks.

i) Unauthorized entry into a Tree Protection Zone or interference with tree protection barriers.

j) The attachment of objects to the trunk or branches.

k) The use of equipment for which there is insufficient canopy clearance.

4) Calgary Parks requires:

a) Contractors who work on public trees to meet the following requirements:

- Have an ISA *Certified Arborist* designation.
- Carry $5 million of auto insurance and $5 million of general liability insurance.
- Have a Worker's Compensation Board (WCB) *Clearance Letter*.
- Have an Occupational Health & Safety (OHS) *Certificate of Recognition (COR)*.
- Ensure that if an aerial unit is used, it has a current commercial vehicle inspection and a current non-destruct boom inspection.

b) Immediate contact with Urban Forestry when damage occurs to a public tree, for assessment and to determine required corrective action.

c) All trees and landscaping on public land to be established and receive construction inspections in accordance with this manual.

d) A completed *Public Tree and Stump Removal Application for Development Sites* to be included with the Tree Protection Plan if the plan calls for Public Trees to be removed. Public tree removals will not be approved if the form is submitted on its own - it must be part of a Tree Protection Plan.

e) Compensation for trees removed or damaged as per appraisal methodologies accepted by the ISA and as determined to be fair and reasonable by Calgary Parks' ***Urban Forestry Lead***. This appraised value is valid for one year from the date of the last appraisal.
Individual Public Trees can have values ranging in the thousands of dollars depending on size, species, condition and location. Applicants are urged to consider this cost during the design and development phase of a project. Applicants that are unfamiliar with tree protection or tree appraisal are advised to consult an arborist (found in the telephone directory under "Tree Service").

f) A hardcopy of the City-approved Tree Protection Plan must be visibly posted on site, in close proximity to all other permits.

5) Failure to comply with public tree protection measures may result in fines ranging from $100 to $10000, in accordance with The City of Calgary's *Tree Protection Bylaw*. Other compliance measures may be required by a duly appointed Enforcement Officer.

4.1.7 Tree Replacement/Compensation Guidelines

1) If approval is received from Calgary Parks to remove trees from public lands and replacement trees are planted, a credit per tree planted on public land can be applied for. Replacement value shall be at current City of Calgary *tree installation costs*. The replacement tree must be 60-85 mm, and be over and above all requirements in the *Land Use Bylaw* and any other City of Calgary requirements. Application for reimbursement can be made after the issuance of the FAC and be submitted to Calgary Parks' ***Urban Forestry***.
2) If approval is received from Calgary Parks to remove trees from public lands and there are plans for replacement, The City of Calgary must be paid the difference (if applicable) between the cost of the replacement trees and the value of the trees to be removed as determined by a Calgary Parks' ***Urban Forester*** using the ***International Society of Aboriculture (ISA)*** formula.
3) If trees are removed or damaged on public lands (by Contractors, Developers, or even other City business units) while performing a City public works project without approval of Calgary Parks, they must compensate for the value of those trees, based upon the procedures set out in the *Guide for Plant Appraisal* by the Council of Tree & Landscape Appraisers (CTLA). The City of Calgary most commonly uses the Trunk Formula Methodology for determining appraised tree value.
4) If Native Vegetation is removed or damaged in any of the above three scenarios, the replacement of the vegetation will be evaluated on a site-by-site basis to ensure that the integrity of the site's vegetation is reasonably maintained. For more information, contact 3-1-1 and place a service request for a Calgary Parks' ***Urban Forester***. The technician might determine that a Habitat Restoration Project (HRP) is required. Refer to item 2 of ***1.6.1 Development Guidelines*** for more information about The City of Calgary's HRP Framework.

   For information regarding plant species selection, plant life form selection (e.g., potted material, seed, tall rooted stock, etc.), details to be considered to optimize restoration success, logistics planning and example plant species lists based on habitat type, landscape intent, and desired maintenance regime, refer to *City of Calgary Plant Lists*.

4.1.8 Shrubs

4.1.8.1 Parks

Up to 1% of total area of park can be shrubs. Plantings to be approved on a site-by-site basis.

For appropriate shrub species and considerations, refer to *City of Calgary Plant Lists.*

4.1.8.2 Boulevards

Shrub planting is permitted on boulevards to replace a shrub that is part of a designated historical streetscape. No shrub planting is permitted on boulevards except at interchanges where gradients exceed 3H:1V.

Note: Special projects to be reviewed on a site-by-site basis for larger boulevards as long as the shrubs:

i) Are utilitarian.

ii) Do not cause excess maintenance requirements.

iii) Do not restrict the visibility between pedestrians and vehicles.

iv) Are not in conflict with utilities.

v) Are of a suitable species and growth habit.

4.1.8.3 Medians & Traffic Islands

No shrub planting is permitted on medians and traffic islands.

Note: Special projects to be reviewed on a site-by-site basis.

4.1.8.4 Utility Easements & Right-of-Ways

No shrub planting is permitted on Utility Easements and Right-of-Ways unless otherwise approved by The City of Calgary Right of Way Management Service's ***Corporate Analytics and Innovation***.

4.2 STANDARD SPECIFICATIONS

4.2.1 Description/Quality Assurance

1) This section specifies the supply and planting of trees, shrubs and ground covers.
2) Planting work is to be carried out by experienced personnel under the direction of a skilled horticultural foreman.

4.2.2 Product Delivery, Storage and Handling

1) Supply manufactured items (such as fertilizer, bone meal, mulch, etc.) in standard containers, with the contents, weight, component analysis, the name of the manufacturer, and WHMIS code (if required) clearly indicated.
2) Store manufactured materials subject to deterioration in a weatherproof place on site, and in such a manner that their effectiveness is not impaired.
3) Root balls of the following minimum sizes must be provided to meet the corresponding tree size:
   a) Hand Planting

Table 4-3: Hand Planting - Minimum Root Ball Size

	Caliper	Root Ball Diameter
Deciduous Trees	#40 mm (1.5")	600 mm (2'0")
Coniferous Trees	1.0 m (3.28') - 1.5 m (4.92')	600 mm (2'.0")

Root ball sizes for naturalized and natural area plantings will be approved by Calgary Parks on a site-by-site basis. Root balls will be a minimum of 450 mm diameter, up to a maximum of 600 mm diameter.

Wrap root balls up to 600 mm (2’ 0”) diameter with 142 g (5 oz.) hessian burlap, single wrap.

Bare root stock to not exceed 40 mm (1.5") caliper. Root Ball diameter will be 300 mm (12") for every 25 mm (1") caliper.

   b) Machine Method (Trees Dug by Spade)

Table 4-4: Minimum Root Ball Size For Deciduous Trees (*CNLA* Standard)

Caliper	Ball Diameter	Ball Depth
40 mm	60 cm	40 cm
50-60 mm	70 cm	40 cm
70 mm	80 cm	50 cm
80 mm	90 cm	50 cm
90 mm	90 cm	50 cm
100 mm	100 cm	50 cm
125 mm	120 cm	80 cm
150 mm	150 cm	80 cm

Caliper	Ball Diameter	Ball Depth
175 mm	175 cm	80 cm
200 mm	200 cm	80 cm

Notes: **a)** These root ball sizes are considered minimum and will only be used for trees grown under proper nursery conditions (i.e. transplanted or root pruned at least once within previous four years).

b) Multi-stem trees will require a root ball at least one size larger.

Table 4-5: Minimum Root Ball Size For Coniferous Trees (*CNLA* Standard)

Height	Root Ball Size	Height	Root Ball Size
50 cm	30 cm	200 cm	80 cm
60 cm	35 cm	225 cm	90 cm
80 cm	40 cm	250 cm	90 cm
100 cm	45 cm	275 cm	100 cm
125 cm	50 cm	300 cm	122 cm
150 cm	60 cm	350 cm	127 cm
175 cm	70 cm		

Notes: **a)** These root ball sizes are considered minimum and will only be used for trees grown under proper nursery conditions (i.e. transplanted or root pruned at least once within previous four years).

b) Root ball must be burlapped and wire basketed. Wire basket must be laced at the top and of sufficient strength to withstand lifting the tree by the top loops of the basket at a minimum of two points.

4) Cut all roots cleanly when digging plants. Roots should be cut even with the edges of the root ball.
5) Protect plant material from damage and breakage. Protect all parts of plant material from drying out and maintain adequate moisture levels.
6) Ensure that during transport, plant material is adequately protected.
7) Carefully tie in all branches before transporting.
8) Pad all points of contact between plant material, equipment, and basket.
9) Heel-in with soil or other suitable material and water any plant material that cannot be planted during the current day's operations. All plant material should be planted within 24 hours of delivery to site. Calgary Parks reserves the right to reject any material not installed within this time frame, weather permitting.
10) Keep all roots and root balls watered prior to planting.
11) Nursery grown deciduous trees that are 100 mm caliper or larger and coniferous trees that are 4.0 m high or taller will require a warranty and a five (5) year maintenance period. The five (5) year maintenance period is calculated from the date of issuance of CCC.
12) Avoid purchasing material with encircling roots.

4.2.3 Job Conditions/Substitutions

1) Proceed with planting operations during suitable weather conditions or at the discretion of Calgary Parks.
2) Supply and install plant material as specified on the plant list. Substitution with other plant material will be allowed only with the written approval of Calgary Parks.

4.2.4 Inspections

1) An approved set of drawings and specifications and an approved line assignment must be available on site prior to calling Calgary Parks for an inspection.
2) Make plant material available for inspection at the source by Calgary Parks.
3) Approval of plant material at source will not impair the right of Calgary Parks to inspect plants upon arrival on the site or during the course of construction, or to reject plants that have been damaged or that in any way do not conform to the specifications in this manual.
4) Give timely notice (refer to ***2.6 INSPECTIONS***) to Calgary Parks when inspection and acceptance are required. Inspections must be requested when holes or wells have been excavated and when all work is complete.
5) Plant material at CCC and FAC must be:
   - True to name and type.
   - Structurally sound.
   - Well branched.
   - Healthy, vigorous.
   - Free from disease, insect infestations, rodent damage, sun scald, frost cracks, and other untreated abrasions to the bark.
   - Densely foliated with a healthy, well developed root system.

   Pruning wounds must show vigorous callus growth on all edges and all parts must show live and green cambium tissue when cut. Final inspection of all plant material will be made at the end of the specified guarantee period.

4.2.5 Plant Material

1) Trees should comply with the ***Canadian Nursery Certification Institute (CNCI)'s*** Domestic Phytosanitary Certification Program (DPCP) standards whenever possible.
2) As a minimum, all plant material must be nursery grown and meet the specifications set out in the latest *Canadian Standards for Nursery Stock* prepared by the ***Canadian Nursery Landscape Association (CNLA)*** and the ***International Society of Aboriculture (ISA)*** for size, height, spread, grading, quality and method of cultivation.
3) Nomenclature of specified plants must conform to the *International Code of Nomenclature for Cultivated Plants* and the latest edition of *Standardized Plant*

Names. Nomenclature of native plants shall conform to the current Alberta Conservation Information Management System (ACIMS) database and include the scientific name.

4) Any plant material not conforming to ***Canadian Nursery Landscape Association (CNLA)*** standards and specifications and/or not grown according to good nursery practices will be designated as “collected plants”.
5) “Collected plants” may only be used when approved in writing by Calgary Parks. “Collected plants” must be of good health and free of pests and diseases.
6) All material must conform to the sizes shown on the plant list. Larger material may be used only when approved by Calgary Parks. Use of larger plants will not increase the contract price.

4.2.6 Mulch

1) All the planting beds, vaults, and wells must be mulched.
2) Materials:
   a) Type: Any wood type is acceptable, except those that are chemically treated or salvaged from construction lumber, building demolition, or shipping waste.
   b) Size: Coarsely ground mulch is preferred; otherwise, use an even mixture in a range of sizes from 10x10x5 mm to 40x60x35 mm.
   c) Consistency: Material should have no more than 5% (by volume) of soil, sawdust, peat moss, or needles.

   Note: The best material is pulled out of piles that have composted for a year.
   d) Sanitation: No mulch from diseased or infested plant material is allowed, unless it can be shown that the material presents no risk to tree health.
   e) Substitutions: All non-wood types of mulch require the approval of Calgary Parks. Approval criteria will include:
      • Safety.
      • Aesthetics.
      • Durability.
      • Rate of decomposition.
      • Ease of renewal and replacement.
      • Breakdown products.
      • Resistance to salts and solvents.
      • Recyclability.
      • Permeability.
      • Impact on water retention, soil structure, and biology.
      • How unfavorable impacts will be mitigated.
   f) Application: 75 mm deep. Keep material 150 mm away from trunks and stems to prevent rotting of bark.

4.2.7 Preparation

1) Obtain the approval of Calgary Parks for all planting excavations prior to commencing planting operations. Calgary Parks Development Inspector approval does not preclude the applicant obtaining appropriate approvals that might be required by other City Business Units, Utility providers, or regulators.
2) All necessary permits, approvals and plants must be available on site, including (but not limited to) utility locates, line assignments, street use and excavation permits, and Calgary Parks' approved construction plans.
3) Tree hole excavations exposing utilities including irrigation must be inspected by the utility owner. A list of commonly used contacts is provided in ***APPENDIX B: CONTACTS***. Inspections of City owned irrigation can be arranged by calling 3-1-1.
4) If using a nitrogen fertilizer, it must be a slow or controlled release product. Synthetic or natural organic fertilizers are preferred.
5) Supply plant material as specified on the plant list, or make substitutions as approved by Calgary Parks.
6) Provide dig material, specified “B.R.” (bare root) on the plant list, while in a dormant state and with the root system extending a minimum of 300 mm (12") diameter per 25 mm (1") of tree caliper. Immediately after digging, wrap the roots in wet burlap and keep the burlap wet during transport and storage.
7) Provide material, specified “W.B.” (wire basketed and burlapped) to ***Canadian Nursery Landscape Association (CNLA)*** specifications.

   Note: Refer to ***Table 4-4*** and ***Table 4-5*** for root ball size.
8) Do not use plant material on which the root ball has been cracked or broken prior to or during the planting process.
9) Container stock to be as per ***Canadian Nursery Landscape Association (CNLA)*** specifications.

4.2.8 Installation

The guidelines and specifications in this section should be used in conjunction with the following detail sheets:

- ***Detail Sheet 22: Tree Planting- 35 mm Caliper Trees and Smaller Bare Root***
- ***Detail Sheet 23: Tree Planting - 40 mm to 100 mm Caliper Trees***
- ***Detail Sheet 24: Tree Planting - 40 mm to 100 mm Caliper Trees Spade Dug***
- ***Detail Sheet 25: Tree Planting - Shrubs***
- ***Detail Sheet 26: Tree Planting- Beds***
- ***Detail Sheet 27: Tree Planting - Slopes***
- ***Detail Sheet 27b: Tree Planting - Protection Fencing***

1) Dig out the tree holes and shrub beds by tree spade, backhoe, or hand shovel, and remove excess soil off site.

2) Ensure width of all planting excavations is 450 mm greater on all sides than the width of the root ball, or as per site conditions, to maintain soil volume. Scarify subgrade to a depth of 75 mm under all tree pits and shrub beds.
3) Depth of planting beds are as follows:
   • 450 mm for flower beds
   • 600 mm for shrub beds
4) Place plant plumb in the centre of the planting pit with a firm base under the root ball. Face the plant to give the best appearance or relationship to adjacent structures. Grafted trees should be planted at root crown depth.The graft must be above soil grade. Trees are to be planted with root crown at grade or above.
5) Place bare root plants so that the roots lie in a natural position. Container grown trees are to have the root crown exposed (remove excess potting soil). Encircling roots are to be separated or cut and laid out radially from the root crown.
6) At the time of planting, cut away the strappings and remove the top 1/3 of the wire and burlap. Leave two wire handles intact during the maintenance period. Remove these wire handles to the first wire ring prior to FAC.
7) Backfill with topsoil or other material as specified by Calgary Parks and firmly compact the soil to ensure that the plant retains its orientation. Ensure that no air pockets remain around the roots.
8) Thoroughly water trees on the same working day they are planted. Water probing is not acceptable.
9) Ensure that the trees remain at grade, surrounded by a tree well to a depth of 100 mm, after planting and watering. All trees must be mulched, starting 50 mm from the root flare (trunk) and extending the length of the hole.
10) Beaver wiring or equivalent (as per approved landscape construction drawings) shall be provided as per ***Detail Sheet 27b: Tree Planting - Protection Fencing*** to protect trees where a Biophysical Inventory Assessment (BIA) identifies the presence of beavers. As well, rabbit guards shall be installed as per ***Detail Sheet 27b: Tree Planting - Protection Fencing*** on all newly deciduous trees. Wire protection is not required where Tree watering bags are used. These protections shall not be removed at FAC.

4.2.9 Maintenance/Pruning/Clean-up

1) Maintain all plant material from the time of planting until the date of FAC issue.
2) Maintenance must include all measures necessary to establish and maintain all plants in a vigorous and healthy growing condition, as specified in ***CHAPTER 9: LANDSCAPE MAINTENANCE STANDARDS***.
3) At the time of acceptance, all material must be in a healthy, vigorous growing condition. Unmulched beds and tree pits must be freshly cultivated and free of weeds, rubbish, and debris. Mulched beds should be free of weeds, rubbish and debris.

4) Remove all dead branches. If there is a double leader, shorten the non-dominant leader to approximately half its original length, back to a live branch that points away from the trees that is about one-third the diameter of the leader cut. Prune broken portions of branches back to live lateral.
5) Ensure that all damage to surrounding work is repaired before leaving the site.
6) Each day, ensure that all debris is cleaned up and disposed of off site, and that the project site is left in a tidy, organized condition.

4.2.10 Transplanting Existing Trees

Transplanting of existing trees will be approved by The City of Calgary on a site-by-site basis, and should be conducted as described in ***4.2.6 Mulch***, ***4.2.7 Preparation***, ***4.2.8 Installation***, and ***4.2.9 Maintenance/Pruning/Clean-up***.

4.2.11 Pruning

The *Parks Urban Forest Strategic Plan* outlines both acceptable and prohibited reasons for pruning trees.

1) Acceptable reasons for tree pruning:
   - Overhead utility clearance.
   - Public safety.
   - Tree health.
   - Tree structure.
2) Prohibited reasons for tree pruning:
   - Mitigation of minor nuisances such as fruit, seeds, fluff, pollen, sticky bud caps, leaves, minor pest infestation, etc.
   - Mitigation of landscape damage.
   - Creation of views and clearance of advertising signs.
3) Tree pruning is to be in accordance with the best practices published on the ***International Society of Aboriculture (ISA)'s*** *website*.
4) Branch removal should be limited to necessary clearance pruning for public and electrical safety and the removal of dead, diseased, and/or defective wood to improve tree health and/or structure.
5) Trees are to be pruned and maintained in accordance with ***Illuminating Engineering Society of North America (IES)*** standards for Roadway Lighting.
6) Public trees interfering with overhead power lines can be pruned or removed as appropriate.

CHAPTER 5: SUBGRADE, TOPSOIL, SODDING, AND SEEDING

5.1 SUBGRADE AND TOPSOIL

5.1.1 Description and Quality Assurance

This section specifies the preparation of subgrade and the supply and spreading of topsoil. The Contractor must have experience at performing this type and scale of work and be willing to provide proof of this experience. Show depth of pre-development topsoil and location of proposed stockpile. Additional information on soil handling during construction, both in the planning and execution stages, is outlined in *Soil Handling Recommendations*.

5.1.2 Design Guidelines

5.1.2.1 General Requirements

1) The Developer, at its sole cost and expense, must provide a minimum 2% gradient across all ***Reserve Parcels***, medians, traffic islands, boulevards, Public Utility Lots (***PULs***), Rights-of-Way (***RoWs***), and ***Stormwater Ponds***.
2) Excessive fill that compromises the site design will not be acceptable.
3) Geotechnical testing may be required where questionable subgrades exist.
4) Joint-use site guidelines:
   - School building envelope to have same grade as sports field envelope (i.e. 2%).
   - School building envelopes and adjacent road grades must be at the same elevation.
   - School building envelope is to have topsoil applied to a maximum depth of 150 mm.
   - For every 1 m in elevation in excess of 2% slope, a minimum increase of 3 m will be required on site.

5.1.2.2 Rough grading and Backfilling with Non-Engineered Fill (Organic Material) within Municipal Reserve(s)

Where backfilling is conducted using organic material within the development and construction of ***Municipal Reserve (MR)*** and ***Municipal and School Reserve (MSR)*** lands (excluding school building envelope), the following parameters and construction specifications will be adhered to.

1) An overall construction and backfill procedure should be developed prior to construction commencing including incorporating necessary information in the projects Deep Fills report.

2) Construction procedures will take into account the design and development concepts for the reserve land(s). For example, should future structures or hard landscaping be planned on the open space or adjacent to it, appropriate foundation systems should be designed, appropriate backfill procedures should be adhered to, and necessary setbacks should be accommodated through the placement of the organic material.
3) Intended organic fill areas will be surveyed prior to construction to satisfy as built open space fill area requirements as per ***Detail Sheet 28a: Non-Engineered Fill Drawing***.
4) Organic backfill material stripped from the development lands will be comprised of organic A and B horizon only.
5) Waste, debris, trees, brush, and rocks larger than 300 mm are not acceptable for placement in reserve lands under this specification.
6) Backfilling will be conducted such that:
    - Material will be placed in uniform lift thickness not exceeding 500 mm.
    - All placed material will be compacted using suitable compaction equipment and as per the recommendations of the geotechnical engineer. Compaction testing of each lift will be completed following placement and compaction to ensure conformance to a minimum ninety-five percent (95%) Standard Proctor Maximum Dry Density (SPMDD)
7) Construction and backfill procedures relevant to the construction of a clay cap above placed organic material to address the future end use of the ***MR*** will be completed in accordance with the following criteria:
    - All work will be completed as per the recommendations of the Geotechnical Engineer in collaboration with Parks including the verification of suitable material for the clay cap.
    - Material will be placed in uniform lift thickness to a maximum lift thickness of 500mm.
    - All placed material will be compacted using suitable compaction equipment as recommended by the geotechnical engineer. Material compaction testing will be completed on placed fill ensuring conformance to a minimum ninety-eight percent (98%) SPMDD, and material moisture conditioning between optimum and plus three percent (3%) of optimum moisture content.
    - Typical clay caps are 0.30 m to 1.0 m in thickness.
8) All grading construction completed under this specification will be documented and reported as per the *Geotechnical Report Guidelines for Land Development Applications*.
9) The non-engineered fill drawing, documenting the limit and depth of the fill area and confirming that the fill area is outside the building envelope, must be provided at CCC. Refer to ***Detail Sheet 28a: Non-Engineered Fill Drawing*** for more information.

5.1.3 Drainage Guidelines

1) Wherever possible, drainage is to be picked up within ***Reserve Parcels***, ***PULs***, ***RoWs***, and ***Stormwater Ponds*** in grass swales.
2) Grass swales are to drain at a minimum 2% gradient.
3) Grass swales exceeding 60 m runs are to have a minimum gradient of 4%. If the swale is to drain at less than 4%, it must have weeping tile along the entire length of the swale tied into a catch basin or water drainage along a concrete swale or an approved equal. PVC cleanouts are required every 30 m along the weeping tile system (refer to ***Detail Sheet 39a: Weeping Tile in <4%Swales over 60 m in Length***).
4) Calgary Parks reserves the right to limit the amount of off-site drainage onto a ***Reserve Parcel***, ***PUL***, or ***RoW*** when, in their opinion, such drainage will compromise the integrity of the site.
5) All trap lows must be approved by Calgary Parks prior to construction. Trap lows must not compromise the use of the site and must be an integral part of the design.
6) All drainage swales that empty onto ***Reserve Parcels***, boulevards, ***PULs***, ***RoWs***, ***Natural Environment Parks***, and ***Stormwater Ponds*** must have concrete splash pads (refer to ***Detail Sheet 46: Concrete Splash Pad***) or an alternative approved by Calgary Parks' ***Development Coordinator***. Concrete splash pads must be installed at a 10% pitch or are to have erosion control fabric installed around the perimeter lip of the pad. The construction of concrete splash pads in a Natural Environment Park might require a habitat restoration project. Refer to item 2 of ***1.6.1 Development Guidelines*** for more information about The City of Calgary's Habitat Restoration Project (HRP) Framework. Refer to *City of Calgary Plant Lists* to inform restoration work.

5.1.4 Submittals

Submit required sample of topsoil to the testing laboratory and indicate intended use, type of mulches to be applied, type of sub-soil, and quality of drainage.

5.1.5 Product Delivery, Storage and Handling

1) Stockpile topsoil in locations designated by Calgary Parks.
2) Ensure that stockpiles have mitigation measures in place to deter nesting birds from using the piles as habitat. If nesting occurs, work will be discontinued until the chicks have fledged or additional approvals are obtained from regulatory authorities.
3) Do not spread topsoil in a muddy condition.
4) Other handling practices that increase restoration success as per The City of Calgary's Habitat Restoration Project (HRP) Framework are expanded and elaborated on in *Soil Handling Recommendations*.

5.1.6 Job Conditions and Protection

1) Report in writing to Calgary Parks, prior to commencing work, any conditions or defects that are encountered on site and that might adversely affect the performance of the work.
2) Do not commence work until all conditions or defects noted in item 1 have been investigated and corrected.
3) Commencement of work implies acceptance of surface conditions. After commencement of work, no claims for damages or extra work will be accepted, except where such conditions cannot be determined prior to construction.
4) Protect all existing trees and planting areas in accordance to ***4.1.6 Tree Protection Guidelines***.

5.1.7 Inspections and Topsoil Test

1) The Contractor must have an approved set of drawings and specifications available prior to calling Calgary Parks for inspection.
2) Obtain approval of the topsoil in writing from Calgary Parks. Topsoil testing must be done on the source of topsoil. Four samples must be taken (i.e. one within every 25% vertical increment of the stockpile) at a depth of one foot. The location of the samples within each vertical increment must be determined by Calgary Parks ***Development Inspector***.
3) Submit the name of the testing company who will conduct the soil analysis to the Development Inspector for approval.
4) Submit two (2) copies of the soil analysis report, including the location of the topsoil stockpile or source and recommendations for correction to the Development Inspector. Test the topsoil for NPK, particle size, soluble salt content, organic matter, and pH. Recommendations should clearly state the type, quantity, and application procedure for amendment.
5) Should the source of topsoil be exhausted, test topsoil from the new source before using. Submit a soil analysis report and recommendations for correction to obtain the approval of the Development Inspector.
6) Calgary Parks must approve both rough grade (prior to placing of topsoil) and finished grade (at appropriate times) before the Contractor proceeds with the next phase of work. For all joint-use sites and ***Community Parks***, as well as ***Stormwater Ponds*** containing sports fields in ***MR*** and ***MSR*** sites, the Contractor must:
    a) At Subgrade Inspection:
        - Supply grade stakes at all corners of sports fields, as well as along their centre line.
        - Supply grade stakes at the toe and heel of all slopes and swales. Spacing of the stakes is to be determined by Calgary Parks prior to their installation.

- Be available for a joint site inspection with Calgary Parks, and have on site a survey crew fully equipped to provide any additional elevations that may be requested.

b) At Finished Grade Inspection, supply grade stakes at the corners, centre, and quarter points of sports field, break of slopes, and along drainage channels.

Note: The information to be provided by the Developer on the grade stakes, if so requested by The City of Calgary, must include (but not be limited to):

- Offset distance (if applicable).
- Actual elevations.
- Grid Point (if applicable).
- Cuts/fills.

The Developer of any adjacent undeveloped lands is responsible for matching these final design elevations to the satisfaction of The City of Calgary.

5.1.8 Materials

Refer to ***Detail Sheet 28: Topsoil/Subgrade Preparation*** for more information on items in this section.

1) "Topsoil" is defined as a fertile, friable, natural loam, containing not less than 4% organic matter for clay loams and not less than 2% organic matter for sandy loams to a maximum of 15% capable of sustaining vigorous plant growth. It is free of rocks of 50 mm in diameter and over, subsoil contamination, roots, and weeds (as determined by Calgary Parks), and has a pH ranging from 7.0 to 8.5.
2) Volume of rock in topsoil (50mm in diameter and under) not to exceed 20%.

5.1.9 Subgrade Preparation

Refer to ***Detail Sheet 28: Topsoil/Subgrade Preparation*** for more information on items in this section.

1) Fine grade the subgrade to even running levels with a tolerance of +/- 75 mm. Remove all debris from the subgrade and ensure it is not contaminated and free of all deleterious materials.
2) Compact the finished subgrade and all fill material to 85% standard proctor Dry Density for areas under turf or planting.
3) Scarify the subgrade to a depth of 75 mm in all areas except where considered impractical by The City. Whenever compaction is greater than or equal to 95% standard proctor Dry Density, scarification will be required to 200 mm.

5.1.10 Spreading of Topsoil

1) Spread dry topsoil during dry weather over approved subgrade.
2) Apply topsoil to the following minimum depths, measured at right angles to the subgrade after leveling with a tolerance of 25 mm over a distance of 2.4 m:
   - 150 mm for seeded areas
   - 125 mm for sodded areas
   - 450 mm for flower beds
   - 600 mm for shrub beds

   Note: Parks encourages 300 mm topsoil (excluding school building envelope) for sodded and seeded areas.For sites with 300 mm topsoil. shrub bed pits are not required and standard tree pits are not required (but minimum depth of cover is required over the root ball).
3) Fine grade the topsoil to eliminate rough and low areas and to ensure positive drainage.
4) Ensure that the finished grade is flush to surface structures, project boundaries, and property lines.
5) Rake the topsoil to obtain even running levels and remove surface rock (refer to ***Detail Sheet 28: Topsoil/Subgrade Preparation*** for more information).
6) Make good any damage caused by topsoil spreading activities.
7) Control dust so as to have no impact on surrounding land uses.
8) Clean all adjacent walks, streets, and properties, as a result of work done under this section, at the end of each working day or as directed.

5.1.11 Spreading of Topsoil - Natural Environmental Parks

In addition to items 1, 4, 6, 7, and 8 of ***5.1.10 Spreading of Topsoil***, the following items apply to ***Natural Environment Parks***:

1) In restoration, the depth and finish grade of the topsoil should be tied to the depths and finish of the pre-existing native profile. This should be specified in the restoration plan and approved by Calgary Parks. Refer to item 2 of ***1.6.1 Development Guidelines*** for more information about The City of Calgary's Habitat Restoration Project (HRP) Framework.
2) Rough grade topsoil must ensure positive drainage and emulate the pre-development drainage patterns and rates.
3) Best practices to increase restoration success that are especially important in areas that support native vegetation communities are provided in *Soil Handling Recommendations*.

5.2 SODDING

5.2.1 Description and Quality Assurance

This section specifies the supply and placing of cultivated sod. The Contractor must have experience at performing this type and scale of work and be willing to provide proof of this experience.

5.2.2 Product Delivery, Storage and Handling

1) Cut sod by approved methods in accordance with recommendations of the ***Canadian Nursery Landscape Association (CNLA)***.
2) Roll or fold sod prior to lifting to prevent tearing or breaking.
3) Protect sod during transportation to prevent drying out and to ensure its arrival at the site in a fresh and healthy condition.
4) Sod should be installed upon arrival. If there is a delay in installation due to weather, keep the sod moist, cool, and protected from direct exposure to the sun until installation. Calgary Parks will reject sod that has dried out.
5) Provide fertilizer in standard manufacturer's containers, clearly marked with the name of the manufacturer, weight, and analysis.

5.2.3 Inspections

1) The Contractor must have an approved set of drawings and specifications available prior to calling Calgary Parks for an inspection.
2) Make all materials, including sod, available for inspection upon their arrival on the site, or at the source of supply when requested. Also, verify names of suppliers when requested.
3) Give timely notice (as per ***2.6 INSPECTIONS***) when materials are available for inspection.
4) Obtain approval of finished topsoil surface by Calgary Parks before proceeding with sodding.
5) Calgary Parks reserves the right to reject sod after it has been installed if:
   - The sod does not conform to the specification and/or drawings.
   - Each grass species within the sod does not show signs of survival.
   - The root system is not strong and fibrous.
   - The sod is not free of stones; or if the sod shows signs of burned or bare spots.
6) Remove all rejected materials immediately from the site.

5.2.4 Materials

1) **Premium Kentucky Bluegrass/Fescue sod blend**:
   a) For sports fields, use with dwarf cultivars. List sod type on plans
   b) For irrigated parks, use good quality blue grass/fescue mix suitable for the Alberta climate. List sod type on plans
   c) For non-irrigated parks, use a high-fescue sod. List sod type on plans.
2) **Fertilizer**: Type and application rate to be determined by soil test.
3) **Wooden pegs or approved equal**: Ensure pegs are long enough to securely anchor sod.

5.2.5 Preparation and Installation

Refer to ***Detail Sheet 29: Sod*** for more information on items in this section.

1) Proceed with sodding operation only during favourable weather conditions and in accordance with good horticultural practice.
2) Apply slow release fertilizer (NPK 2-4-1), (i.e. 12-25-10 at a rate of 1.5 kg of phosphorous per 100 m²). Desired nitrogen makeup must be 50% water-soluble and 50% polymer coated urea (slow release). This is subject to adjustment upon time of year, receipt of the topsoil analysis report, and the Contractor's recommendation as described in ***5.1.7 Inspections and Topsoil Test***.
3) Provide a finished topsoil surface (smooth and firm with a fine, loose texture, free of rocks, weeds, and debris over 50 mm in diameter) before sod is placed (refer to ***Detail Sheet 28: Topsoil/Subgrade Preparation*** for more information).
4) Lay sod with tight butt joints. Do not leave any open joints or overlap adjacent pieces of sod. Ensure that adjacent rows are laid in a staggered sequence.
5) Where big roll sod is to be installed, remove any and all shipping or packaging materials prior to installation. Remove nylon mesh nettings or any similar materials from rolls of sod prior to installation.
6) Ensure that finished sod surface is flush with adjoining grass areas, pavement, or top surface structures (such as curbs, manholes, sidewalks, irrigation boxes, etc.).
7) On slopes steeper than 3H:1V, lay sod across the face of the slope and peg each row at intervals of not more than 600 mm. Secure in an approved fashion.
8) Lay sod to a width of 3 m in swales. Place perpendicular to direction of swale unless otherwise noted on drawings.
9) Immediately after installation of sod, water the area with sufficient amounts to saturate the sod and underlying topsoil to a minimum depth of 100 mm.
10) After the sod and soil have dried sufficiently to prevent damage, roll the areas (if required) to ensure a good bond between sod and soil and to remove minor irregularities. Clean up and remove off site all waste and extra sod at the end of each day, or as directed.

11) Protect all newly sodded areas as required.
12) Remedy all damages, washouts, and eroded areas resulting from weather, improper protection, or other causes.

5.2.6 Maintenance and Acceptance

1) Maintain sodded areas as per ***CHAPTER 9: LANDSCAPE MAINTENANCE STANDARDS*** from the time of installation until the FAC is issued by Calgary Parks (refer to ***2.9 FINAL ACCEPTANCE CERTIFICATE (FAC)*** for more information.
2) Prior to acceptance, sod and water all bare spots larger than 15 cm^2. Acceptance will be given upon the establishment of the sodded area.

5.3 SEEDING

5.3.1 Description and Quality Assurance

This section specifies the supply and placing of grass seed. The Contractor must have experience at performing this type and scale of work and must be willing to provide proof of this experience.

5.3.2 Product Delivery, Storage and Handling

Deliver grass seed, fertilizer, mulch and other materials in standard containers, clearly marked with contents, weight, analysis, and name of supplier or manufacturer. Ensure that the quantities of each seed species within the seed mixtures are clearly marked.

5.3.3 Inspections

1) The Contractor must have an approved set of drawings and specifications available prior to calling Calgary Parks for an inspection.
2) Make all materials, including seed, available for inspection upon their arrival on the site, or at the source of supply when requested. Also, verify names of suppliers when requested.
3) Give timely notice (as per ***2.6 INSPECTIONS***) in writing, when materials are available for inspection.
4) Obtain the approval of Calgary Parks of the finished topsoil preparation before proceeding with seeding (refer to ***Detail Sheet 28: Topsoil/Subgrade Preparation*** for more information).
5) Where a hydro-seeding method is used, notify Calgary Parks 24 hours before loading seeder and allow for an inspection at location of loading operation. Also, provide all identification labels from materials placed in the hydro-seeder. Failure to notify Calgary Parks before loading occurs could result in a rejection of the seeding operation.
6) Installation of seed prior to inspection is the Contractor's responsibility. During an inspection, Calgary Parks reserves the right to reject seed if seed does not conform to specifications.
7) Remove all rejected materials from site immediately.

5.3.4 Materials

5.3.4.1 Grass Seed

Canada No.1, Blue, or Gold certified grass seed must be free of disease, weed seeds, or other foreign materials and must meet the requirements of the *Seeds Act*. All cultivars listed below must be rated in the top 25th percentile of the ***National Turfgrass Evaluation Program (NTEP)*** for overall turfgrass quality for cool season grasses and be ranked within the top 15 varieties in the ***Prairie Turfgrass Research Centre (PTRC)*** Varietal Trials.

Grass seed mixes approved by Calgary Parks are listed below, along with their appropriate application. Where practical, Urban A, B, C and F grass mixtures can be used adjacent to a Natural Environment Park only if a suitable barrier can be provided (such as a pathway with a root barrier) to prevent the Urban mix from encroaching into the native community.

1) Urban A: A coarse grass mixture for non-***Natural Environment Park*** slopes up to 3H:IV, highway boulevards, interface areas, and other areas where irrigation is not available.

   Urban A is composed of:

Kentucky Blue Grass (drought-tolerant cultivars)	20%
Fine Fescue Blend (creeping, chewing, hard)	65%
Perennial Rye Grass	15%

   Urban A is applied at a rate of 13g/m^2 or 130 kg/ha.

2) Urban B: A medium grass mixture for joint use sites, residential boulevards, and other non-irrigated but high use areas.

   Urban B is composed of:

Kentucky Blue Grass	30%
Fine Fescue Blend (creeping, chewing, hard)	55%
Perennial Rye Grass	15%

   Urban B is applied at a rate of not less than 13g/m^2 or 130 kg/ha.

3) Urban C: A fine grass mixture for irrigated tot lots and decorative parks.

   Urban C is composed of:

Kentucky Blue Grass (blend of at least 3 cultivars)	70%
Fine Fescue Blend	20%
Perennial Rye Grass	10%

   Urban C is applied at a rate of not less than 13g/m^2 or 130 kg/ha.

4) Sport A: A high performing seed blend designed to handle the stress of aggressive sport field activities, such as soccer and football.

Sport A is composed of:

Dwarf Kentucky Blue Grass (3 cultivar blend)	70%
Fine Fescue Blend	20%
Perennial Rye Grass	10%

Sport A is applied at a rate of not less than 13g/m^2 or 130 kg/ha.

5) Sport B: A high performing seed blend designed to handle the stress of less-aggressive sport field activities, such as the outfield of a softball diamond.

Sport B is composed of:

Dwarf Kentucky Blue Grass (3 cultivar blend)	55%
Fine Fescue Blend (creeping, chewing, hard)	35%
Perennial Rye Grass	10%

Sport B is applied at a rate of not less than 13g/m^2 or 130 kg/ha.

6) Urban D: A native grass seed used for habitat restoration in a ***Natural Environment Park*** where irrigation is not available. Use of Urban D must be approved by Calgary Parks. Refer to item 2 of ***1.6.1 Development Guidelines*** for more information about The City of Calgary's Habitat Restoration Project (HRP) Framework, and refer to *City of Calgary Seed Mixes* for best practices regarding seed mix design methodologies, suggested application rates, example seed mixes based on habitat types, and use of cover crops.

Proposals must be submitted to the Calgary Parks ***Development Coordinator***, and will be approved on a site-by-site basis. A proposed grass seed mix that makes every attempt to use seed that is native (locally indigenous) to the appropriate natural region in the Calgary area must be submitted and approved on a site-specific basis. Substituting due to lack of availability of native seed must be approved in advance by Calgary Parks. Submissions must indicate seed suppliers for verification of source.

Upon approval of the proposed grass seed mix, a Seed Testing Certificate shall be submitted for approval by Calgary Parks prior to application. Application rates to be determined on a site-specific basis.

7) Urban E: A native wildflower seed or a seed mix containing both native wildflowers and native graminoids for use as an alternative to Urban D for habitat restoration in a ***Natural Environment Park*** and in any other open spaces where irrigation and maintenance will not be available. Refer to *City of Calgary Seed Mixes* for best practices regarding seed mix design methodologies, suggested application rates, example seed mixes based on habitat types, advantages and disadvantages of wildflower (forb) mixes versus graminoid mixes containing forbs, and use of cover crops. Refer to item 2 of ***1.6.1 Development Guidelines*** for more information about The City of Calgary's Habitat Restoration Project (HRP) Framework.

The proposed native seed mix must be submitted to Calgary Parks for approval. Substituting due to lack of availability of native seed must be approved in advance by Calgary Parks. Submissions must indicate seed suppliers for verification of source. Native grass and wildflower seeding requires a Seed Testing Certificate to ensure quality/authenticity of seed mixes, in accordance with Alberta Agriculture and Rural Development's guidelines on purchasing high quality seed. Application rates to be determined on a site-specific basis.

8) Urban F: A graminoid mix that is similar to Urban A, Urban B, and Urban C, in that it contains species that provide quick growth, performs well under infrequent and frequent mowing regimes, and can be seeded at any time during the growing season. The other species in this mix allow it to do better in the long term than the other mixes, though, as it will remain greener during drought, is very tolerant of high usage, has additional soil binding qualities, and can withstand some salinity.

   Urban F is composed of:

Kentucky Blue Grass (turf quality 98/85)	10%
Creeping Red Fescue	12%
Annual Perennial Rye Grass	15%
Idaho (Bluebunch) Fescue	12%
Sheep's Fescue	18%
Rocky Mountain Fescue	18%
Tufted Hair Grass	10%
June Grass	5%

   If Rocky Mountain Fescue is unavailable, Sheep's Fescue Should be used instead. If any other species are unavailable, then the percentages of the other species should be increased proportionately.

   Urban F grass mixture is to be applied at a rate of not less than 13g/m^2 or 130kg/ha.

5.3.4.2 Fertilizer

Type and application of fertilizer to be determined by soil test.

5.3.4.3 Hydromulching

Hydromulching must be completed as per Alberta Transportation's *Civil Works Master Specifications*.

1) Mulch: Use approved wood fibre mulch manufactured from whole wood chips and containing no growth or germination inhibiting factors.
   a) The following specifications apply to mulch:

Table 5-1: Mulch Specifications

Item	Accepted Measure
Moisture Content	10%
Organic Matter	99.2%
Ash Content	8%
pH	4.8%
Water Holding Capacity	1000 gms/100gms of fibre

Note: Percent moisture content is determined in accordance with ***The Pulp and Paper Technical Association of Canada (PAPTAC)*** standards.

b) The area of coverage for a hydroseeder is based on the hydroseeder's carrying capacity and the application rate. The hydroseeder's carrying capacity is based on the water carrying capacity of the mulch and the volume of water that the hydroseeder can carry.

Equation 5-1: Mulch Required Per Hydroseeder Load

$$\frac{\text{Hydroseeder Volume} \times 3.785}{1000} \times \text{Water Carrying Capacity} = \text{Mulch Required Per Hydroseeder Load}$$

The water carrying capacity is quoted as the number of kg's of mulch necessary to hold 1000 litres of water.

Table 5-2: Mulch Water-Carrying Capacity

Manufacturer	kg/1000 L
Fibramulch	46.84
Siva-Fiber	50.00
Verdyol Standard	37.90

The area of coverage is then calculated based on the application rate and the mulch per load:

Equation 5-2: Area of Coverage Per Hydroseeder Load

$$\frac{\text{Mulch Per Load} \times 10000}{\text{Application Rate}} = \text{Area Covered}$$

The Mulch Application Rate is based on the slope and/or wind conditions.

Table 5-3: Mulch Application Rate

Slope and/or Wind Conditions		Application Rate
<6:1 (H:V)	Light Wind	1400 kg/ha
6:1 to 3:1	Medium Wind	1700 kg/ha
>3:1	High Wind	2000 kg/ha

The following is an example for calculating the area of coverage, assuming:

- Fibramulch is used.
- there is a high wind.
- Area covered is in m^2.
- 10000 is the conversion factor from ha to m^2.

$$\frac{3300 \times 3.785}{1000} \times 46.84 = 585 \text{ kg}$$

Therefore, each hydroseeder load requires 585 kg of Fibramulch. Since Fibramulch comes in 50 lb. (22.7 kg) bags, each tank load would require 25.77 bags.

$$\frac{585 \times 10000}{2000} = 2925 \text{ m}^2$$

Therefore, the area of coverage per hydroseeder load is 2925 m^2, whether it is doing seeding, fertilizing, or erosion control.

2) Tackifier: TA200 is an acceptable colloidal polysaccharide tackifier, adhering to mulch during manufacturing, non-toxic, and without growth or germination inhibiting factors. Apply as per labeled manufacturer's specifications for slopes 4:1 and greater.

   a) The recommended rates for the application of TA200 tackifier are based on slope and/or wind conditions:

Table 5-4: TA200 Tackifier Application Rate

Slope and/or Wind Conditions		Application Rate
<6:1 (H:V)	Light Wind	50 lbs/acre
6:1 to 3:1	Medium Wind	75 lbs/acre
>3:1	High Wind	100 lbs/acre

The metric conversion for the Application Rate is as follows:

Equation 5-3: Tackifier Application Rate - Metric Conversion

$$\frac{\textbf{Application Rate} \times \textbf{0.4536}}{\textbf{0.4047}} = \textbf{Metric rate (kg/ha)}$$

The following is an example for converting the application rate from lbs/acre to kg/ha for High Wind conditions:

- 0.4047 is the conversion factor for acres to ha
- 0.4536 is the conversion factor for lbs to kg.

$$\frac{100 \times .4536}{.4047} = 112 \text{ kg/ha}$$

Therefore, the metric application rate is 112 kg/ha in High Wind conditions.

b) The quantity of tackifier per hydroseeder tank load is calculated as follows:

Equation 5-4: Quantity of Tackifier per Tank Load

$$\frac{\textbf{Seeder Coverage x Application Rate}}{\textbf{10000}} = \textbf{Quantity (kg)}$$

The following is an example for calculating the amount of tackifier required per hydroseeder tank load:

- Area of coverage (as previously calculated in ***5.3.4.3 Hydromulching***) = 2925 m^2
- Application Rate (as calculated above) = 112 kg/ha
- Conversion factor from ha to m^2 = 10000

$$\frac{2925 \times 112}{10000} = 33.6 \text{ kg}$$

Therefore, 33.6 kg of tackifier is required per hydroseeder load.

c) The number of containers of Tackifier required per load is calculated as follows:

Equation 5-5: Number of Tackifier Containers per Load

$$\frac{\textbf{Weight Per Tank Load}}{\textbf{Weight Per Container}} = \textbf{\# of containers}$$

The following is an example for calculating the number of tackifier containers required per hydroseeder tank load:

- Packaging information on TA200 Tackifier - **1 Pail** (container) **= 50 lbs = 22.68 kg** (~ 20 litres)
- Amount of tackifier required per hydroseeder load (as calculated above) = 33.6 kg

$$\frac{33.6}{22.68} = 1.48$$

Therefore, each hydroseeder load will have 1.48 containers of tackifier.

3) Seed Quantity: The quantity of seed in a hydroseeder is calculated as follows:

Equation 5-6: Quantity of Seed in a Hydroseeder

$$\frac{\text{Seeder Coverage x Seed Application Rate}}{10000} = \text{kg}$$

Seed application should be at the following rates:

Table 5-5: Seed Application Rates

Seed Mix	Application Rate
Urban A, B, C	130 kg/ha
Sports A and B	130 kg/ha
Urban D and E	Site Specific
Urban F	130 kg/ha

The following is an example for calculating the quantity of seed in a hydroseeder, assuming:

- The project calls for Urban F on the job site.
- The area of coverage (as previously calculated in ***5.3.4.3 Hydromulching***) is 2925 m^2.

$$\frac{2925 \times 200}{10000} = 58.5 \text{ kg}$$

Therefore, each hydroseeder tank load will require 58.5 kg of seed. Based on 25 kg per bag of seed, each hydroseeder load will require 2.34 bags.

4) Fertilizer Quantity: The quantity of fertilizer in a hydroseeder is calculated as follows:

Equation 5-7: Quantity of Seed in a Hydroseeder

$$\frac{\text{Seeder Coverage x Fertilizer Application Rate}}{10000} = \text{kg}$$

Fertilizer application rates are variable, depending on the results of a soil analysis and the type of fertilizer applied. For the example below, it is assumed that:

- 16-20-0 fertilizer is being applied at 400 kg/ha.
- The area of coverage (as previously calculated in ***5.3.4.3 Hydromulching***) is 2925 m^2.

$$\frac{2925 \times 400}{10000} = 117 \text{ kg}$$

Therefore, each tank load will require 117 kg of fertilizer. Based on 20 kg per bag of fertilizer, each hydroseeder load will require 5.85 bags.

5.3.5 Preparation and Installation

1) Provide a finished topsoil surface prior to seeding that is:
   - Conducive to seed growth.
   - Even running and to finish grades.
   - Free of rocks over 25 mm in diameter.
   - Free of weeds and debris (refer to ***Detail Sheet 28: Topsoil/Subgrade Preparation*** for more information).
2) Ensure that finish grade meets flush and smooth with adjacent grades and surface structures such as curbs, manholes, sidewalks, irrigation boxes, etc.
3) On slopes exceeding 3H:1V, and where hydro-seeding is the application technique to be used, track packing is an acceptable form of preparation, subject to meeting the conditions in items 1 and 2 above. The long ridges of the tread are to run across the face of the slope.
4) Apply 91kg/ha of 16-20-0 fertilizer at the time of seeding and then, two months into the growing season, apply 32kg/ha of 32-4-8 fertilizer. This rate is subject to adjustment upon receipt of the topsoil analysis report and the Contractor's recommendation as per ***5.1.7 Inspections and Topsoil Test***.
5) Do all seeding in accordance with good horticultural practice during the period from May 1 to September 30 (or as weather permits), when wind speeds are minimal, and when site conditions are approved by Calgary Parks.
6) Two means of applying seed are acceptable to Calgary Parks:
   a) Hydraulic-seeding.
   b) Mechanical or “Brillion” type seeding.

   Hand broadcasting of seed is unacceptable under any conditions, except for isolated repair work or where approved in a Habitat Restoration Project. Refer to item 2 of ***1.6.1 Development Guidelines*** for more information about The City of Calgary’s Habitat Restoration Project (HRP) Framework.
7) Protect all newly seeded areas as required.
8) Remedy all damaged areas and maintain until turf has properly established.

5.3.6 Maintenance and Acceptance

1) Maintain seeded areas as per ***CHAPTER 9: LANDSCAPE MAINTENANCE STANDARDS*** from the time of installation until the FAC is issued by Calgary Parks (refer to ***2.9 FINAL ACCEPTANCE CERTIFICATE (FAC)*** for more information.
2) Prior to acceptance, top dress, seed, and water all bare spots larger than 15 cm^2. Acceptance will be given upon germination of seeded areas.
3) Maintain a seeded Natural Environment Park according to the approved habitat restoration project. Refer to item 2 of ***1.6.1 Development Guidelines*** for more information about The City of Calgary’s Habitat Restoration Project (HRP) Framework.

CHAPTER 6: PATHWAYS, TRAILS, AND PAVING STONES

6.1 Pathways

6.1.1 Planning Guidelines

The following list of guidelines is intended to assist in the development of a high quality and fully integrated pathway system. It includes legal requirements, official policies, established standards and practices, and desirable standards. The existing standards in *Geometric Design Guide for Canadian Roads* by the ***Transportation Association of Canada (TAC)*** are a supplement to this manual.

The objective of the planning guidelines is to lay out a pathway network, which links together residential area parks, natural areas, riverbanks, and public recreational facilities.

6.1.1.1 Pathway Classifications

1) The regional pathway system is a city-wide linear network that facilitates non-motorized movements for recreational and transportation purposes. The regional pathway is hard-surfaced, typically asphalt, and located off-street. It is a multi-use amenity, and no one user or type of user is to be given preference.

   The spine of the system parallels the major physical features of the river valleys park system, including waterways, escarpments and ravines. It should be designed as a continuous amenity that connects individual communities to:

   - City-wide and Regional Parks and recreation facilities.
   - Natural features, including water courses, escarpments, ravines, river valley parks and associated open space.
   - Regional joint use sites, commercial districts, employment centres, adjacent communities and key cultural attractions.
   - Local pathways, bikeways and trail systems.
   - LRT stations and transit routes.

2) A local pathway is a pathway that provides secondary routes within communities, linking residential areas to facilities such as neighbourhood parks, schools, and other local community designations. Local pathways may also serve as links to the regional pathway system.

6.1.1.2 Alignments

1) Pathways must be shown schematically in an Area Structure Plan and have their alignment confirmed at the Outline Plan and Construction Plan stages in accordance to the Council-approved

   Pathways, where desirable, should be routed to avoid environmentally significant areas in order to minimize the impact on natural areas as determined by a Biophysical Impact Assessment. Construction of pathways or

trails in natural areas will require a Habitat Restoration report/plan. Refer to item 2 of ***1.6.1 Development Guidelines*** for more information about The City of Calgary's Habitat Restoration Project (HRP) Framework, and refer to *City of Calgary Plant Lists* to inform restoration work.

2) Pathways, where desirable in existing Off-Leash Dog Areas, should be routed along the edges of Park area.
3) New regional pathway connections that form part of the primary cycling network through an area should be routed outside of the 1:100 year floodway, where applicable. Alternatives might be approved, at Calgary Parks' discretion.

6.1.1.3 Linear Parks

1) ***Linear Parks*** provide open space connections within and between communities through a formal pathway network. They should accommodate a regional pathway or perform a linear recreation function for the community as a whole by providing local or regional pathway links to educational, recreational, and open space features (i.e. ***Natural Environment Parks***).
2) Overland drainage features should be contained in linear parks only when they do not diminish the primary recreational and aesthetic function of the park, and do not occupy more than one-quarter of the park's width. Otherwise, the overland drainage feature should be contained in a ***Public Utility Lot (PUL)***.
3) Utility Rights-of-Way (***RoWs***) should not interfere with the recreational, environmental, and urban design functions of a linear park.
4) Linear parks should have a minimum width of 10 m and a maximum width of 20 m.

6.1.1.4 Boulevards

1) Avoid routing pathways along boulevards in front of residential properties.
2) Avoid routing pathways along boulevards where spacing of driveways and cross-streets is less than 200 m.
3) Design either an asphalt multi-use pathway or a parallel asphalt bicycle pathway and concrete sidewalk.

6.1.1.5 Pathway Easement

Where an easement has been required for a pathway, ensure that it is of an adequate width to facilitate the design and safe function of the pathway.

6.1.1.6 Street Crossings

1) Route pathways to street intersections wherever possible.
2) Mid-block crossings are discouraged, and permitted on local streets only. If mid-block crossings occur, then appropriate signage will be installed by The City of Calgary.
3) Avoid designs that make building mid-block pedestrian overpasses on major streets a necessity.

4) Adjust the subdivision layout to minimize the quantity of crossings.
5) Line up pathway entrances to ensure visual continuity.

6.1.1.7 Play Equipment Sites

1) Regional pathways should not be within 5.0 m of play area surfaces.
2) Provide a 2.0 m wide (minimum) asphalt link from the play equipment site to a local or regional pathway.

6.1.1.8 Parking Lots

1) Route pathways around parking lots; avoid going through.
2) Provide asphalt links from parking lots to pathways.
3) Locate pathway entrance at the street.
4) Parking lot signage will consist of two separate signs, stating the following:
   a) “Private Property - No Overnight Parking”.
   b) “Parking Lots Open Hours [##:## am/pm] to [##.## am/pm]”.

6.1.1.9 Natural Environment Parks

1) Ensure that pathway alignments correspond to the *Natural Area Management Plan*, Area Structure Plans, Outline Plans, and other Council-approved policy documents.

   Construction of pathways in a ***Natural Environment Park*** will require a Habitat Restoration Project (HRP). Refer to item 2 of ***1.6.1 Development Guidelines*** for more information about The City of Calgary’s HRP Framework. Refer to *City of Calgary Plant Lists* to inform restoration work.

6.1.2 Design Guidelines

The objective of the design guidelines is to produce safe and enjoyable pathways incorporating the needs of multiple users (i.e. walkers, children's strollers, runners/ joggers, people with disabilities, cyclists, in-line skaters, and skateboarders).

Where location and design considerations prevent transportation and recreation functions from being accommodated together, the recreation function should be given a higher priority.

In addition to the following guidelines, the pathway design guidelines in the Council-approved *Calgary Transportation Plan* should be applied. As well, The City of Calgary recommends following the guidelines outlined in the documents below (refer to ***APPENDIX C: REFERENCES*** for source information):

- *Geometric Design Guide for Canadian Roads* by the ***Transportation Association of Canada (TAC)***.
- *Pathway Network for Canada's Capital Region: 2006 Strategic Plan* by the ***National Capital Commission (NCC)***.
- *Planning and Design for Pedestrians and Cyclists* by Vélo, Québec.

6.1.2.1 Surface Materials and Pathway Widths

1) Regional and local pathways are hard-surfaced, typically of asphalt pavement, to accommodate multiple users.
2) Width shall be:
   a) 2.5 m minimum for local pathways.
   b) 3.0 m minimum for regional pathways, 2.5 m where constrained.
   c) 4.0 m minimum for river pathways, 3.5 m where constrained.
   d) 3.0 m minimum pedestrian pathways and 3.0 m minimum bicycle pathway for twinned pathways, 2.5 m where constrained.

6.1.2.2 Safety Clearance and Setback Requirements

1) Provide a minimum of 1.0 m setback from all vertical obstacles from the edge of pathway.
2) Provide 3.0 m clear of all obstacles overhead.
3) Avoid locating pathways over manholes.
4) Ensure a 2.5 m minimum clearance from park water services.
5) Set back pathways a minimum of 1.0 m from face of curb. If a full 1.0m cannot be provided, pave to curb and paint 75 mm white line.
6) Pathway guard rails must be installed when a pathway is within 2 m of the top of a 2:1 slope or steeper, and the slope is greater than or equal to 1 m in depth.
7) Under exceptional circumstances and subject to approval by Calgary Parks after an appropriate risk assessment, a safety railing may not be required. If a risk assessment is required it must be provided by The City of Calgary at no cost to the Developer.
8) Minimum railing height and design must be as per ***Detail Sheet 30: Pathway Guard Rail*** or an equivalent as approved by Calgary Parks.
9) Chain-link fence is only acceptable when the fabric is attached to, but not protruding above, the top rail.

   Note: Attachment will be with a knuckle finish.
10) Wooden fences are not acceptable unless specifically requested and approved of for use.

6.1.2.3 Pathway Junctions

1) Wherever possible, ensure that pathways join at 90 degree angles. Maximum acceptable skew angle is 60 degrees.
2) Provide widening of pathways with a radius of 4.0 m where pathways join other pathways (refer to ***Detail Sheet 32: Bollards- Permanent*** for more information).

6.1.2.4 Pathway Entrances/Wheel Chair Ramps

1) Extend pathway to street curb in all cases.
2) Ensure the pathway joins the road right of way at a 90-degree angle. The maximum acceptable skew angle is 75 degrees.
3) The pathway should widen and fan outward at the intersection with other pathways, sidewalks and the road or road right-of-way (***RoW***) to accommodate users who are merging onto or exiting.
4) Provide a standard steel bollard (refer to ***Detail Sheet 31: Bollards - Removable*** and ***Detail Sheet 32: Bollards- Permanent***) where the entrance to a pathway is on a street.
5) Provide a concrete wheelchair ramp (as per *Roads Construction Standard Specifications*) as required, where the entrance to a pathway is on a street and there is an existing concrete sidewalk.
6) Provide an asphalt wheelchair ramp complete with depressed concrete curb (refer to ***Detail Sheet 34: Wheelchair Ramp - Asphalt***) as required, where the entrance to a pathway is on a street and there is no existing concrete sidewalk.
7) Line up entrances for visual continuity where the pathway route crosses the street.
8) Ensure that no catch basins are located at the entrance.

6.1.2.5 Sight-lines

Wherever possible, ensure that there are no obstructions to visibility within 5.0 m of a junction with other pathways and streets (trees, shrubs, utility boxes, fences, etc).

6.1.2.6 Criteria for Bicycles

1) Maximum Grades:
   - Over 8%: Reroute, soften grades using switchbacks, or use stairs that incorporate a side bike ramp.
   - 5% to 8%: Not longer than 50 m (keep bicycles and pedestrians separate and avoid curves and constrictions).
   - 3% to 5%: Not longer than 200 m.
   - Under 3%: Acceptable.
2) Design Speed:
   - Flat terrain: Do not exceed 35 km/hr.
   - Downgrades: Do not exceed 50km/hr.
3) Super-elevation:
   - On curves: 2%.
   - Maximum: 5%.
4) Stopping Sight Distances (SSDs):

   A SSD of 35.0 m is considered to be a standard guideline, but SSDs can be calculated as follows:

Equation 6-1: Stopping Sight Distance

$$\text{Minimum SSD} = \frac{V^2}{[255\ (f+g)] + 0.695v}$$

where: SSD = stopping sight distance
V = bicycle design speed (typically 30km/hr)
f = coefficient of friction = 0.25
g = grade m/m (rise or descent/run)

The following table may also be used to obtain appropriate stopping sight distances.

Table 6-1: Stopping Sight Distance

	Level	Ascending		Descending	
Gradient	0%	2.5%	5.0%	2.5%	5%
SSD	35 m	33.5 m	32.5 m	36.5 m	38 m

5) Minimum Design Curve Radii (r):

A minimum design curve radii of 5.0 m is considered to be a standard guideline, but the minimum design curve radii is calculated as follows:

Equation 6-2: Minimum Design Curve Radii

$$\text{Minimum r} = \frac{V^2}{127\ (e+f)}$$

where: r = design curve radius
V = bicycle design speed (typically 30km/hr)
f = coefficient of friction = 0.25
e = super elevation

The following table may also be used to obtain the appropriate minimum radius for asphalt pathways with 2% banking.

Table 6-2: Stopping Sight Distance

Speed	10 km/hr	15 km/hr	20 km/hr
Radius	2 m	5 m	9.5 m

6) Stairs:

a) Wherever possible, avoid use of stairs within a pathway network.

b) Install a bicycle ramp along one side where stairs are unavoidable.

6.1.2.7 Lighting

1) For any and all parks and pathway lighting refer to the *Parks Lighting Plan*.

2) Provide lighting on river pathways in the downtown part of the city consistent with the boundaries defined in the Center City Plan.

6.1.2.8 Pedestrian Bridges and Overpasses

1) Railing height as per provincial building codes.
2) Minimum deck width of 3.0 m (between railings).
3) Concept drawings are submitted to Calgary Parks' ***Development Coordinator***, however, final approval will come from the The City of Calgary's ***Transportation Infrastructure***.
4) Ensure that all drawings of bridges and boardwalks are stamped by a professional engineer. Stamped and certified drawings shall be provided prior to final stamp approval of the landscape construction drawings. Partial approvals of drawing submissions shall not be granted.

6.1.2.9 Vehicular Bridges and Overpasses

1) In general, ensure that sidewalks for pedestrians and widened shoulder lanes for cyclists are provided along both sides of the structure.
2) Where a bridge is part of the pathway system, ensure that a combined pathway and sidewalk is provided along both sides of the structure.
3) Railing height as per provincial building codes.
4) Minimum pathway width of 3.0 m.
5) Submit concept drawings to Calgary Parks' ***Development Coordinator***, however, final approval will come from the The City of Calgary's ***Transportation Infrastructure***. The Developer must ensure that the proposed structure conforms to all applicable City Bylaws and to provincial building codes, and must ensure that all drawings are stamped by a professional engineer.

6.1.2.10 Pedestrian Underpasses

1) Minimum height of 3.0 m and minimum width of 3.0 m.
2) Ensure that drainage is kept in concrete swale along one side.
3) Ensure that they are well lit.
4) Preferable maximum length of 50 m.
5) Provide a skylight break in the underpass ceiling that corresponds with the median of a divided roadway on the surface above.

6.1.2.11 Signage and Pathway Markings

1) Signage:
   a) Provide standard identification signs (*Parks and Pathways Sign Manual* PAT-INFO-02) with pathway name at regional pathway entrances.
   b) Provide standard hazard warning signs. Contact Calgary Parks' ***Pathway Lead*** for more information.
2) Line Painting:
   a) Provide a centre line pavement marking on regional and river pathways and on separated bicycle pathways (75 mm wide, yellow paint).

b) Provide a double centre line pavement marking at hazardous locations including all pathway underpasses, tunnels, intersections, and blind corners (each line 75 mm wide, yellow paint).

3) Stencils:
   a) Stencils are required on all twinned and river valley pathways.
   b) Cyclist and pedestrian stencils must be painted on twinned regional pathways at intersections with other regional or local pathways, and where a single multi-use pathway becomes twinned, prior to FAC.
   c) For multi-use pathways in river valleys, a “shared pathway” stencil must be used prior to FAC.

6.1.2.12 Design Drawings

Submit drawings to the Calgary Parks’ ***Development Coordinator*** for approval for all local and regional paths as described in ***2.3 CONSTRUCTION PLAN REQUIREMENTS***.

6.1.2.13 Root Barriers

To protect pathway sections in the vicinity of aggressive rooting species, install root barriers (refer to ***Detail Sheet 36a: Pathway Painting - Regional/Regional Intersection Lines***) along sections of pathways that run through ***Natural Environment Parks*** where natural vegetation is being preserved and that have species of the Poplar family (except Aspen) or Willow family located within a 5 m set back of the edge of pathway. Horizontal root barriers are required under the full length and width of all pathway. Vertical root barriers do not need to run continuously, but should only be installed where there are encroaching species as per ***Detail Sheet 37a: Root Barriers - Locations***.

6.1.3 Standard Specifications

6.1.3.1 Description and Quality Assurance

This section specifies the construction of functional and cost effective pathways. The Contractor must have experience at performing this type and scale of work and be willing to provide proof of this experience.

6.1.3.2 Inspections

1) The Contractor must have an approved set of drawings and specifications available prior to calling Calgary Parks for an inspection.
2) The Contractor must obtain approval for the pathway alignment and sub-base (i.e. compaction and depth of gravel) prior to surfacing with asphalt.
3) All Regional pathways, must be inspected and maintained by Calgary Parks.

6.1.3.3 Materials

1) Sub-base: 25 mm crushed gravel.
2) Surface: City B Mix asphaltic concrete.

3) Bollard (refer to ***Detail Sheet 31: Bollards - Removable***, ***Detail Sheet 32: Bollards- Permanent*** and ***Detail Sheet 33: Bollard Detail - CP36 White City Post***):
   - Schedule 20 steel pipe, minimum 100 mm outside diameter.
   - 1 m height with 0.75 m in ground in concrete.
   - Steel cap welded on.
   - Painted white with 2 strips of reflective tape. All paint is to be powder-coated polyester.
   - Removable to ensure that service vehicles do not have to maneuver around it. Bollards shall only be permanent if absolutely required and approved.
4) Root Barriers: 40 mil. thickness HDPE (high-density polyethylene) product or approved equal (refer to ***Detail Sheet 36a: Pathway Painting - Regional/ Regional Intersection Lines*** and ***Detail Sheet 37a: Root Barriers - Locations***).
   Note: mil. is a unit of measurement used for plastic thickness; 40 mil. = 1 mm.

6.1.3.4 Installation

Refer to ***Detail Sheet 35: Pathways - Local Pathway Cross Sections*** and ***Detail Sheet 36: Pathways - Regional Pathway Cross Sections*** for more information on items in this section.

1) Compact subgrade to 98% S.P.D.
2) Compact sub-base to 98% S.P.D. The sub-base must be 100 mm thick of 25 mm crushed gravel.
3) Surface with 75 mm thick asphalt to ensure:
   - Minimum density of 96% of its maximum design density. Density values must be established by Marshall Method (50 blows with mechanical compaction). Densities less than 96% must be paid for as described in *Roads Construction Standard Specifications*, section 308.05.02
   - Central crown with 2% cross fall or 2% outslope, except where super-elevation is required on a curve.
   - No trapped low areas on pathway surface.
4) Ensure that pathways are not used as drainage swales. Use swales and culverts (refer to ***Detail Sheet 38: Pathway Culvert and Edge***) to ensure that there is positive drainage away from the pathway surface. Culverts are to be sized accordingly to adequately handle the anticipated flow.
5) Place good quality (raked and rolled) topsoil and sod, unless otherwise specified, on any turf areas damaged by construction.
6) Ensure that the sod surface is flush with the pathway edge.

6.1.3.5 Maintenance

Maintain pathways as per ***CHAPTER 9: LANDSCAPE MAINTENANCE STANDARDS*** from the time of installation until the FAC is issued by Calgary Parks (refer to ***2.9 FINAL ACCEPTANCE CERTIFICATE (FAC)*** for more information.

6.2 Trails

Trails are non-paved linear paths that facilitate non-motorized movements for recreational purposes via park-wide networks. Trail networks include any bridge or structure with which trails may be contiguous. Trails typically have a granular or compacted dirt surface designed to minimize impact on the natural environment. They are multi-use amenities, and no one user or type of user is to be given preference.

6.2.1 Planning Guidelines

1) Use trails to give pedestrian and cyclist access to parks where pathways are not appropriate.
2) Use trails as a secondary system to pathways.
3) Ensure that trail alignments correspond to the *Natural Area Management Plan*, Area Structure Plans, Outline Plans, and other Council-approved policy documents.
4) Locate crossings of major roads at overpasses or signalized intersections.
5) Submit proposed route plans for all ***Natural Environment Parks*** to Calgary Parks' ***Capital Development*** for approval.

6.2.1.1 Trail Classifications

1) Designated Trails:

   Designated trails are formally constructed, maintained, and recognized. The routes may or may not represent cultural landscapes (as defined by the *Cultural Landscape Strategic Plan*). Designated trail networks should be designed as a network that connects park users to:

   a) Regional and local pathway systems.
   b) Natural features, including water courses, escarpments, ravines, river valley parks and associated open space.
   c) Adjacent communities, key cultural landscapes and attractions.

2) Undesignated Trails:

   Undesignated trails are neither constructed nor maintained. They are desire lines created by park users that may or may not connect pathways, designated trails, or natural features. The routes may or may not represent cultural landscapes (as defined by the C*ultural Landscape Strategic Plan*).

6.2.1.2 Alignments

1) Trails must be shown schematically in an Outline Plan and have their alignment confirmed at the Construction Plan stages.
2) Route trails to pathways wherever appropriate.

3) Use existing undesignated trails or cultural landscape routes to develop designated trails where design guidelines can still be achieved. Cultural landscape routes may be subject to a Historic Resource Impact Assessment as defined by the *Cultural Landscape Strategic Plan*.
4) Route trails to connect positive control points (places you want trail users to visit), such as viewpoints or rivers.
5) Route trails to avoid negative control points (places you want trail users to avoid), such as low lying wet areas, water crossings, railway crossings, very steep areas, archaeological sites, or safety hazards.
6) Route trails in looped or stacked loop alignments wherever appropriate, and avoid dead-end trails.
7) Trail construction in a ***Natural Environment Park*** will require a Habitat Restoration Project (HRP). Refer to item 2 of ***1.6.1 Development Guidelines*** for more information about The City of Calgary's HRP Framework.
8) Trails, where desirable, should be routed to avoid environmentally significant areas or to locations with less sensitivity in order to minimize the impact on the park and reduce future desire lines and disturbance.

6.2.2 Design Guidelines

The objective of these design guidelines is to produce sustainable, safe and enjoyable trails that incorporate the needs of pedestrians, cyclists, skiers, and the disabled wherever possible while minimizing impact to the surrounding environment by providing positive drainage of water from trail surfaces and reducing soil erosion.

Trails should be multi-use where appropriate, and no one user or type of user shall be given preference unless explicitly designated as a special use trail or area. In ***Natural Environment Parks***, where recreational use and the long term survival of significant habitats conflict, protection of the resource will take precedence.

6.2.2.1 Natural Environment Parks

1) Align trails around significant areas and sites; never go through.
2) Avoid damage to natural features, wetlands, riparian areas, vegetation, and wildlife habitat.
3) Backslope angle must not exceed 2:1 to minimize fill coverage and minimize disturbance.
4) Submit proposed design plans for all ***Natural Environment Park*** parcels to Calgary Parks' ***Capital Development*** for approval as described in ***2.3 CONSTRUCTION PLAN REQUIREMENTS***.
5) Construction of trails in ***Natural Environment Parks*** will require a habitat restoration report/plan. See Habitat Restoration Project Framework for full details.
6) Use continual curves of non-constant radius for alignment. Avoid abrupt curves and long straight sections.

6.2.2.2 Surface Materials

1) Use dirt for informal trails.
2) Use wooden chips, red shale, or crushed gravel (crusher fines) for formal, designed trails.

6.2.2.3 Width

1) Shall be 0.3 m to 0.5 m for informal trails.
2) Shall be 0.5 m to 1.5 m for formal designed trails.

6.2.2.4 Slope Grades

1) General Grade Criteria:
   a) Follow the ***Half Rule***.: a trail's grade should not exceed half the grade of the side slope. If the trail's grade is steeper than half the grade of the side slope, it is considered a fall-line trail.
   b) Do not construct fall-line trails in order to prevent water erosion of trails. Where the half rule cannot be followed, the trail should be re-routed. If this is not possible, provide switchbacks, climbing turns, stairs, or steps.
   c) Build trails on the contour, use existing topography for placement, and build subtle grade reversals every 6m to 15m, depending on the trail grade, as per ***Detail Sheet 78: Trails- Grade Reversal***.
   d) Average trail segment grade (including grade reversals) should stay under 10% for dirt surfacing and 8% for Parks Gravel Trail Mix surfacing.
2) Minimum Grades:

   Trails shall not be constructed on level ground. The trail tread must always be slightly higher than the ground on at least one side so that water can drain properly.
3) Maximum Grades:
   a) Less than 3% is required if the trail will be wheelchair accessible.
   b) Less than 5% is ideal.
   c) 5% to 10% is acceptable.
   d) More than 10%: reroute trail. If this is not possible, provide climbing turns or switchbacks to reverse trail route direction or stepped trails or stairs to maintain trail route direction.
   e) Maximum sustainable grade is 15% over any given section of trail that is longer than approximately 3 m (except for natural or built rock structures). For highly technical trails where grade will sometimes exceed 15%, use natural rock, rock armoring or other rock features to add challenge and improve stability.
   f) Maximum sustainable grade is 20% over any given section of trail that is less than approximately 3 m in length.

6.2.2.5 Outslope and Rolling Grade Dips

1) Build trail tread with 3% to 5% outslope toward the outside edge of a hillside trail to help shed water off the trail.
2) Crown flat trails with 2% cross fall, with a minimum crown height of 50 mm, as per ***Detail Sheet 36: Pathways - Regional Pathway Cross Sections***.
3) Rolling Grade Dips:
   Locate at natural changes in trail grade where lower ground exists on the outer edge of the trail; do not locate at turns. Include a 3-6 m long ramp with a 5% outslope on lower portion, with length of ramp depending on trail grade. Ramp is followed by a 2.5-3.0 m long semi-circular knick in trail tread on upper portion, with a maximum 15% outslope at center of knick, as per ***Detail Sheet 79: Trails - Rolling Grade Dip***.

6.2.2.6 Climbing Turns and Switchbacks

1) Avoid switchbacks and climbing turns wherever possible. Provide switchbacks and climbing turns only for multi-use trails where trail route direction must be reversed, where it is not possible to re-route the trail, and where the half rule cannot otherwise be followed (refer to ***6.2.2.4 Slope Grades*** for more information).
2) Climbing Turns:
   a) Locate on side slopes with a grade of maximum of 7%, as per ***Detail Sheet 81: Gravel Trails - Climbing Turn***. Include a contour trail grade reversals above and below the turn.
   b) Upper and lower leg of the turn must have a maximum 5% outslope. There must be a minimum 6.0 m turning radius for the climbing turn, with the apex of the turn forming a short fall-line section.
   c) Consider adding rock armouring in the fall-line section of the turn and adding a choke point to slow trails users down before the turn.
3) Switchbacks:
   a) Locate on side slopes with a grade over 7%, but choose the flattest area possible, as per ***Detail Sheet 82: Gravel Trails - Switchback***. Include contour trail grade reversals above and below the switchback.
   b) Upper leg with should have a maximum 5% inslope to drain beyond turning platform, with inslope beginning approximately 9.0 m above turning platform (a grade dip may be used), and the trail grade of the upper leg should have a maximum 10% grade.
   c) The turning platform landing should be near-level and crowned with a maximum 5% outslope in all directions, and a minimum 2.0 m turning radius. Wrap the turning platform around an existing obstacle (such as a tree or a boulder) to prevent users from shortcutting.
   d) Lower leg should have a maximum 5% outslope, requiring a retaining wall (as described in ***7.12 Retaining Walls and Structures***) to extend the full length of the lower leg with 30 cm of elevation for every 8% to 10% side slope. Ensure a 5% outslope along the top of the retaining wall.

6.2.2.7 Stepped Trails

1) Avoid stepped trails wherever possible. Provide stepped trails only for pedestrian-only trails where trail route direction must be maintained, where it is not possible to re-route the trail, and where the half rule cannot otherwise be followed (refer to ***6.2.2.4 Slope Grades*** for more information).
2) Use squared timber or flagstone. Squared timber may be more appropriate for wider trails.
3) Ensure all steps within a flight of steps are uniform in size and spacing, with steps 18-23 cm high and 40-54 cm deep.
4) Provide a near-level landing below the bottom step.
5) On landings between flights of steps that are less than 1.8 m in length, provide the same uniform spacing pattern as the flights of steps, and maintain a maximum 4% slope grade on the landing.
6) Stone Steps:
    a) Ensure stones used have a flat face, are heavy enough to require at least two people to move them, and have sufficient dimensions for required step height while 1/3 buried (stones are twice as deep as required step height).
    b) Where two stones are used in one step, stones must abut each other so that surface material cannot wash into gap.
    c) Firmly anchor stones in undisturbed or well-compacted soil, with the base and back edge of the step aligning with original grade.
7) Timber Steps:
    a) Use pressure-treated squared timbers with rough-sawn finish that are at least 60 cm longer than the trail tread width.
    b) Firmly anchor both ends of timbers in undisturbed or well-compacted soil using one piece of rebar at least 60 cm long at each end, with the back edge of the step aligning with original slope grade.
    c) Ensure that timbers extend at least 30 cm beyond the edge of the trail tread width, with slope wrapping around the ends of extended timber.
    d) Ensure that any cut pressure treated timbers are treated.

6.2.2.8 Safety Clearance

1) Provide minimum 0.5 m clear of all obstacles on both sides (i.e. trees, signs, light poles etc.).
2) Provide minimum 2.1 m clear of all obstacles overhead (i.e. tree branches, bridges, etc.).

6.2.2.9 Trail Entrances

In general, one trail entrance should be provided every 500 m, or closer as needed.

6.2.2.10 Sight Lines

1) Where cyclists are permitted and where possible, provide line of sight ahead in both directions that is a minimum of 20 m for Parks Gravel Trail Mix or crushed limestone trails, and a minimum of 10 m for compacted dirt or flagstone trails. Sight line distance down a trail should be adequate for users to come to a complete stop if they are traveling at the design speed of the trail.
2) Avoid curves on hills.
3) Keep some vegetation at waist level to control trail width, anchor turns, and slow trail users, but still allow for clear sight lines.

6.2.2.11 Lighting

Lighting on trails shall not be installed in ***Natural Environment Parks***.

6.2.2.12 Pathway Guard Rail

1) Minimum railing height and design to be as per ***Detail Sheet 30: Pathway Guard Rail*** or to be an equivalent as approved by Calgary Parks.
2) Usually made of galvanized steel or wood.
3) Install where a trail is within 1 m of the top of a 2:1 slope or steeper, and the slope is greater than or equal to 1 m in depth.
4) Under exceptional circumstances, and subject to approval by Calgary Parks after an appropriate risk assessment, a pathway guard rail might not be required. If a risk assessment is required, it must be provided by The City at no cost to the Developer.
5) Chain link fence is less desirable than galvanized steel or wood, and is only acceptable when the fabric is attached to (but not protruding above) the top rail.

   Note: Attachment will be with a knuckle finish.

6.2.2.13 Stairs

1) Avoid stairs if the trail is to be accessible to skiers and wheelchairs.
2) Stairs must be1 m to 2 m wide and made of wood or rock.
3) Guard rails as required for safety.

6.2.2.14 Amenities

Provide park benches and picnic tables as assessed on a site-by-site basis.

6.2.2.15 Bridges

1) Railing height as per provincial building codes.
2) Minimum deck width: 1.5 m between railings.
3) Material examples: log stringers, laminated wooden beams, prefabricated steel and pre-cast concrete.

4) Submit concept drawings to Calgary Parks' ***Capital Development*** for approval as described in ***2.3 CONSTRUCTION PLAN REQUIREMENTS***, however, final approval will come from the The City of Calgary Roads' Bridges section. Ensure that all drawings are stamped by a professional engineer.

6.2.2.16 Accessible Use

1) Accessible Use is primarily required by people in wheelchairs or those without sight.The needs of these users are more stringent than for other walkers.
2) To fully accommodate all users in trail design, refer to ***6.2.2.20 Recommended References***.

6.2.2.17 Cross-Country Skiing

1) The needs of skiers are more stringent than for walkers.
2) To fully accommodate all users in trail design, refer to ***6.2.2.20 Recommended References***.

6.2.2.18 Signage

1) Provide standard trail head map signs at trail entrances and important junctions with trail name, "you are here" locations, trail distances, and park activity icons (refer to The City of Calgary's *Parks and Pathways Sign Manual*) to reflect allowed trail uses and to ensure continuity and legibility of trail routes.
2) Provide standard hazard warning signs (refer to The City of Calgary's *Parks and Pathways Sign Manual*) where appropriate.
3) Where standard signs could negatively impact the viewshed in ***Natural Environment Parks***, or where short trails do not need detailed directional signage, non-standard custom signs may be used at the discretion of Calgary Parks.
4) Keep signage to a minimum wherever possible, as per The City of Calgary's P*arks and Pathways Sign Manual*.

6.2.2.19 Design Drawings

1) Submit design drawings to Calgary Parks' ***Capital Development*** for approval as described in ***2.3 CONSTRUCTION PLAN REQUIREMENTS*** for all trail proposals in Environmental Reserves (***ERs***) and naturally vegetated areas.
2) Ensure that plans are at minimum 1:500 scale and include proposed trail details, gradients, and signage, plus adjacent park and land uses and roadways.

6.2.2.20 Recommended References

Refer to ***APPENDIX C: REFERENCES*** for source information.

- *AMC's Complete Guide to Trail Building & Maintenance* by the Appalachian Mountain Club.
- *Access Design Standards* by The City of Calgary.

- *Trail Builder's Resources* by Alberta Trailnet.
- *Alberta Recreation Corridor & Trails Classification System* by the Government of Alberta.
- *Trail Solutions: IMBA's Guide to Building Sweet Singletrack* by the International Mountain Bicycling Association.
- *Trails Design and Management Handbook* by Troy S. Parker.
- *Natural Surface Trails by Design* by Troy S. Parker.
- *Trail Planning, Design, and Development Guidelines* by the Minnesota Department of Natural Resources.
- *Lightly on the Land: The SCA Trail Building and Maintenance Manual* by Robert C. Birkby.

6.2.3 Standard Specifications

6.2.3.1 Description/Quality Assurance

This section specifies the construction of sustainable, safe, functional and cost effective trails. The Contractor will have experience at performing this type and scale of work and be willing to provide proof of this experience.

6.2.3.2 Inspections

1) The Contractor must have an approved set of drawings and specifications available prior to calling Calgary Parks for an inspection.
2) Prior to ground disturbance and surfacing, the Contractor must obtain approval for the trail alignment based on an in-field inspection of marked-out trail alignment by Calgary Parks.
3) Prior to CCC approval, the Contractor must provide compaction reports containing the results of compaction testing completed by a qualified independent agency.
4) When a Habitat Restoration Project (HRP) is required for trail construction causing disturbance in a ***Natural Environment Park***, inspection times and frequency will be determined by the HRP. Refer to item 2 of ***1.6.1 Development Guidelines*** for more information about The City of Calgary's HRP Framework.

6.2.3.3 Materials

1) Use Parks Gravel Trail MIx, compacted dirt (mineral soil), crushed limestone, or flagstone, depending on use and as approved by Calgary Parks.
2) Parks Gravel Trail Mix has been customized for pedestrian and bicycle oriented trails. It is not suitable for extensive vehicle use.Contractors can inquire about purchasing this material directly from The City of Calgary's Materials Plant by contacting ***Calgary Roads***.

   Note: Moisture content and timely compaction are important when placing this material.

a) Description:
   - Gravelly sand, some silt, trace of clay
   - Optimum Moisture Content: 7.5%
   - Grain Size Distribution:

Angular Gravel/Crushed Stone/ Crushed Recycled Concrete (80 minus)	21.8%
Sand	61.5%
Silt	12.8%
Clay	3.9%

b) The combined aggregates must meet the following gradation:

Table 6-3: Gradation Requirements

Sieve Size (mm)	% Passing
16	100
12.5	98 - 100
10	80 - 98
5	55 -80
2.5	40 - 60
1.25	35 - 50
0.63	28 - 43
0.315	23 - 36
0.160	15 - 25
0.80	8 - 18

c) Parks Gravel Trail Mix must be laid upon a dry firm sub-grade, true to grade and cross-section, and be free from all screening or other loose or foreign material. No gravel trail mix should be installed when the sub-grade is wet or when other conditions prevent proper spreading, finishing, or compaction.

3) Granular trail mix stockpiles stored on site greater than 30 days will be subject to inspection to ensure that the mix has retained correct properties (i.e. proportion of fine materials). After 30 days, contractor may be required to re-mix trail mix to ensure the correct distribution of materials.
4) All supply and installation of granular trails must be as per *Roads Construction Standard Specifications*, and this manual. Adherence to the desired mix will enhance the life of the product, which in turn will reduce the amount of materials washed away or broken down, and /or prevent/reduce potholes.

6.2.3.4 Installation

1) Install along an approved, marked-out trail route, with vegetation cleared for required horizontal and overhead safety clearance.
2) Strip existing organic surface material and sub-grade obstacles from desired tread width, including roots and rocks, to allow for a 150 mm compacted depth

of approved material (refer to ***6.1.3.3 Materials*** for more information) over mineral soil. For bench cut trails, broadcast excavated soils as far as possible down slope.

3) For bench cut trails, excavate and compact the back slope, ensuring a smoothly blended transition from back slope to trail tread. Broadcast excavated soils as far as possible down slope.
4) Filter fabric shall not be used for construction of trails.
5) Haul and place Parks Gravel Trail Mix to allow for crowning and compaction, as applicable. Material must be placed and compacted on the same day.
6) Provide 3% to 5% outslope or 2% cross-fall of central crown as determined by approved design drawings and micro-site conditions. Provide positive drainage away from the surface with grade reversals, rolling grade dips, and culverts (refer to ***Detail Sheet 38: Pathway Culvert and Edge***). Culverts are to be sized accordingly to adequately handle the anticipated flow.
7) Final surface must be level and true with minimal undulations. Ensure that there are no trapped low areas on the trail surface. Provide positive drainage away from the surface with diagonal water bars, ditches, swales, and culverts.
8) The finished trail tread must be compacted to 95% maximum dry density. Multiple passes by a vibrating roller with the application of water might be required to achieve the specified level of compaction. Ensure that no organic soil or loose fine materials are left on the surface.
9) The finished trail tread must be at the same elevation as any connecting existing trails or pathways. with crowns at least 25 mm higher than the adjacent vegetation and ground level. The final surface must be level and true with minimal undulations and no trapped low areas on the trail surface. All grading must be free draining, and must not impede existing drainage.
10) Place topsoil (raked and rolled) and seed mix, as approved by Calgary Parks, on areas damaged by construction. For bench cut trails, cover broadcasted soils with loose organic materials from up slope of trail. For trail reroutes, restore old trail tread and visual corridor thoroughly. Trail construction in a ***Natural Environment Park*** will require a Habitat Restoration Project (HRP). Refer to item 2 of ***1.6.1 Development Guidelines*** for more information about The City of Calgary's HRP Framework.

6.2.3.5 Maintenance

Maintain trails as per ***CHAPTER 9: LANDSCAPE MAINTENANCE STANDARDS*** from the time of installation until the FAC is issued by Calgary Parks (refer to ***2.9 FINAL ACCEPTANCE CERTIFICATE (FAC)*** for more information.

6.3 Concrete Paving Stones

6.3.1 Description and Quality Assurance

The Contractor must have experience at performing this type and scale of work and must be willing to provide proof of this experience.

6.3.2 Materials

6.3.2.1 Cement

Must be Portland Cement conforming to the requirements of CAN3-A5-M77.

6.3.2.2 Aggregates

Must conform to the requirements of CAB3-A23-M77.

6.3.2.3 Admixtures

Must conform to the requirements of CAN-A23.1-M77.

6.3.2.4 Concrete Compressive Strength

Prior to delivery to site:

- Average Strength: 55 MPa
- Minimum Strength: 50 MPa

6.3.2.5 Absorption

Maximum individual sample: *5%* in accordance with *ASTM C140 Standard Test Methods for Sampling and Testing Concrete Masonry Units and Related Units (Standard Specification for Solid Concrete Interlocking Paving Units)*.

6.3.2.6 Resistance to Freezing and Thawing

The manufacturer must satisfy the purchaser, either by proven field performance or a laboratory freezing-and-thawing test, that the paving units have adequate resistance to freezing and thawing.

If a laboratory test is used, when tested in accordance with *ASTM C67 Method for Sampling and Testing Brick and Structural Clay Tile (Standard Specification for Solid Concrete Interlocking Paving Units)*, specimens must have no breakage and not greater than a 1% loss in dry weight of any individual unit when subjected to 50 cycles of freezing and thawing. This test must be conducted not more than 12 months prior to delivery.

6.3.2.7 Abrasion Resistance

When tested in accordance with *ASTM C418 Standard Test Method for Abrasion Resistance of Concrete by Sandblasting (Standard Specification for Solid Concrete Interlocking Paving Units)*, specimens must not have a volume loss greater than 15 cm^3 per 50 cm^2. The average thickness loss must not exceed 3 mm.

6.3.2.8 Mix Design and Concrete Testing

The supplier must, immediately after the award of Tender and prior to any casting of interlocking stone, submit the proposed mix design (including source of proposed aggregates) to Calgary Parks' ***Capital Development f***or approval.

The supplier must notify Calgary Parks' ***Capital Development*** of casting items in order that arrangements for concrete testing and/or inspection can be made as required at the expense of The City of Calgary. The supplier must allow the Engineer free access to those portions of their plant where the pavers are being produced and stored for the purpose of that inspection.

6.3.3 Workmanship and Procedures

6.3.3.1 Forms

Forms must be true to the shape, lines, and dimensions called for on the drawings. They must be substantial and tight to prevent leakage of moisture. Maximum tolerance for final dimensions must be +/- 2 mm.

6.3.3.2 Concrete Compaction

During casting, sufficient vibratory or other mechanical effort must be applied to thoroughly compact the concrete.

6.3.3.3 Moist Curing

The surfaces of fresh concrete must be kept continuously moist for a period of at least seven days and must be protected against the harmful effects of sunshine, drying winds, cold running water, surface water, and mechanical shock. The temperature of the concrete must be kept at 20° Celsius for not less than seven days.

6.3.3.4 Steam Curing

If steam curing is used to maintain a daily cycle of casting, the following criteria for curing must be adhered to:

1) There must be a minimum of four hours delay after final placing of the concrete before steam is applied.
2) The maximum rate of concrete temperature rise is 20° Celsius per hour.
3) The maximum temperature to which the concrete must be raised is 70° Celsius.
4) The maximum rate of cooling is 20° Celsius per hour.

Immediately after stripping of forms, the members must be moist or steam cured for an additional five days at a temperature of not less than 65° Celsius.

6.3.3.5 Handling, Storage and Delivery

Care must be taken in the handling, storage, and delivery of completed interlocking stone to avoid damage. Damage to units prior to acceptance by The City of Calgary

at the point of delivery must be rectified by the supplier at no extra cost to The City of Calgary.

The concrete pavers must be delivered to the site of work as directed by Calgary Parks, and must be unloaded and stacked at the specified location.

6.3.3.6 Visual Inspection

All units must be sound and free of defects that would interfere with the proper placing of the unit or impair the strength of permanence of the construction. Minor cracks (incidental to the usual methods of manufacture) or minor chipping r(esulting from customary methods of handling in shipment and delivery) are not deemed grounds for rejection.

6.3.3.7 Sampling and Testing

The purchaser, or his authorized representative, must be accorded the proper facilities to inspect and sample the units at the place of manufacture from lots ready for delivery. Sample and test units in accordance with *ASTM C140 Standard Test Methods for Sampling and Testing Concrete Masonry Units and Related Units (Standard Specification for Solid Concrete Interlocking Paving Units)*.

6.3.3.8 Rejection

In case the shipment fails to conform to the specified requirements, the manufacturer may retain the lot, and new specimens can be selected by the purchaser from the retained lot and tested at the expense of the manufacturer. In case the second set of specimens fail to conform to the test requirements, the entire lot will be rejected.

6.3.4 The Base

Refer to ***Detail Sheet 39: Concrete Paving Stone*** for more information on items in this section.

Table 6-4: The Base

Sieve Size (mm)	% Passing
9.50 mm	100
4.75 mm	95 - 100
2.36 mm	80 - 100
1.18 mm	50 - 85
600 µm	25 - 60
300 µm	10 - 30
150 µm	2 - 10

This sand plus six percent (6%) Bentonite must be used for surface leveling and crack filling.

6.3.5 Sand Bedding Course

Refer to ***Detail Sheet 39: Concrete Paving Stone*** for more information on items in this section.

1) The sand-bedding course must be spread evenly over the area to a level that will produce the required 50 mm thickness when the paving stones have been placed and vibrated.
2) Once leveled, this sand-bedding course must not be disturbed in any way.

6.3.6 Installation

Refer to ***Detail Sheet 39: Concrete Paving Stone*** for more information on items in this section.

6.3.6.1 Base

1) Where service vehicles will be traveling on concrete paving stones, the pavers must be set on a concrete base and seated on a latex or polymer modified mortar. All joints must be mortar filled.
2) Where service vehicles will not be traveling on concrete paving stones, a subgrade and gravel base (each compacted to 95% S.P.D.) will be acceptable.

6.3.6.2 Edge Restraint

All edges of the pavers installation must be restrained. here must be positive edge restraint, and the type of restraint used must be subject to the approval of Calgary Parks.

6.3.6.3 Laying of Concrete Pavers

1) The concrete pavers must be laid in a pattern approved by Calgary Parks.
2) The concrete pavers must be laid in such a manner that the desired pattern can be maintained, and the joints between the stones do not exceed 3 mm.
3) The gaps at the edge of the paved surface must be filled with standard edge pieces or with stones cut to fit. The stones must be cut to a straight, even surface without cracks or chips.
4) The concrete pavers must be vibrated to their final level.
5) After vibration, sand must be brushed over the surface and vibrated to completely fill the joints. Sand worked between the paving stones must be thoroughly mixed with 6% by weight of bentonite clay.
6) After final vibrating, the surface must be true to line and grade and must not vary by more than 8 mm when tested with a 3 m board at any location on the surface.
7) When installation is complete, surplus material must be swept from the surface and the entire site left clean.

6.3.7 Maintenance

Maintain concrete paving stones from the time of installation until the FAC is issued by Calgary Parks (refer to ***2.9 FINAL ACCEPTANCE CERTIFICATE (FAC)*** for more information.

CHAPTER 7: AMENITIES

7.1 Development Guidelines

The *Land Use Bylaw* provides requirements for a Development Permit (DP). Under this bylaw certain amenity structures may require a DP prior to construction. The *Alberta Building Code*, as provincial legislation, also requires the approval of a Building Permit (BP) for certain works.It is the developer's responsibility to ensure that the proposed development complies with all applicable City standards, policies, and bylaws, as well as all applicable provincial building codes.

7.2 Material and Installation Standards

The following is a list of all standards and regulations referred to within this section of the manual.

All standard specifications are the latest issue, except when a year is mentioned. For standard organization contact information, refer to ***APPENDIX B: CONTACTS***.

7.2.1 American Society for Testing and Materials (*ASTM*)

A-36-81a	Specification for structural Steel
A-325-71a	Specification for high strength bolts for structural steel
D-693-70	Test for moisture-density relations of soils and soil aggregate mixtures

7.2.2 Canadian Standards Association (*CSA*)

0121-	M1978	Douglas Fir plywood
0141-	1970	Softwood lumber
0151-	M1978	Canadian softwood plywood
G40.21-	1976 & 2	Structural quality steels supplements
Can 3-G4021-	MB1	Structural quality steels
G164-	M1981	Hot dip galvanizing for irregularly shaped articles
W47.1-	1983	Certification of companies for fusion welding of steel structures
W59	M 1984	Welded steel construction (metal arc welding)

7.2.3 Canadian General Standards Board (*CGSB*)

1-GP-40C	Primer, structural steel OI, Alkyd type
CAN 2 - 138.1-.4-M80	Chain link fence fabric, framework, installation and gates
85-GP-1M	Painting Exterior Wood Surfaces

7.3 Play Structures

7.3.1 Description and Quality Assurance

This section specifies the supply and installation of Play Structures. The Contractor must have experience in performing this type and scale of work and must be willing to provide proof of their experience.

7.3.2 Inspections

1) The Contractor must have an approved set of drawings and specifications available prior to calling Calgary Parks for an inspection.
2) The design and installation of playground structures must comply with ***Canadian Standards Association (CSA)*** standards on children's play spaces and equipment.

   Note: A letter of compliance to CSA standards will be required prior to signing a construction completion certificate. Contact the ***CSA*** for more information.
3) Give timely notice (refer to ***2.6 INSPECTIONS***) to Calgary Parks when Construction Completion Certificate for work is required.

7.3.3 Materials

1) Playground edge restraints (refer to ***Detail Sheet 41: Playground Edge Restraint (Concrete)***) must be constructed of ACQ wood or concrete.

   Note: Plastic edge restraints will be of a minimum of 1.5 m in length.
2) Use nylon locking nuts or loctite only.
3) Provide 7-10 mm washed, screened, rounded rock base to the following depths:

Table 7-1: Base Depth

Structure Fall Height	Depth
<2.1 m	200 mm
2.1 m to 2.99 m	225 mm
3.0 m or greater	300 mm

4) When engineered wood fiber is proposed as the fall surface, drainage details must be provided as per manufacturers recommendations.

7.3.4 Equipment Design and Layout

7.3.4.1 Hardware

1) All suspended elements, such as trapeze bars, rings, tight rope cables and swing seats, must be fastened at the top and the bottom by means of a positive locking system, such as hammer locks or clevis hooks (no quick links). These hooks should have lock tight attachments to prevent removal by equipment users.

2) All chains must be at least 1/4” or larger, zinc or chrome plated or galvanized.
3) Swing seats and chains must be connected by means of a positive locking system, such as hammer locks or clevis hooks (no quick links).
4) Eye bolts must be forged or welded.
5) Bearing hangers must be complete with oil-impregnated bronze bushing and must be wrap-free in design.

7.3.4.2 Slides

1) The sitting section of all slides must have protective side enclosures that diminish from guardrail height (i.e. 600 mm) to side wall height (i.e. 100 mm) in a smooth curve. They must be designed so that the user's flow of hand movement is unhampered and smooth.
2) All sliding surfaces must have sidewalls to control and guide descent, and to prevent the lateral discharge of the child during descent. A minimum height of 100 mm of sidewall must be provided, and may be reduced to zero at the exiting section.
3) All slides must be oriented north or east (i.e. not south or west).

7.3.4.3 Swings

The distance between individual swings and the distance between a swing and the swing structure must be at least 750 mm (30”).

7.3.4.4 Posts

1) All support post must be a minimum of 3" square 11 - gauge galvanized tubing, or 3.5" round 11 - gauge galvanized tubing c/w polyester powder coat finish. For structures designed for 5 to 12 year-old children, there is a preference for posts of at least 5" diameter or 5" square.
2) Post caps must be secured by means of electronic weld, rivets or interference fit rib.
3) A settlement block (such as 2x6 pressure treated spf), larger than the footprint of the post, must be placed at the bottom of the hole prior to installation of posts.

7.3.4.5 Teeter Totters

Teeter totters must not have inclines more than 25° from the ground and the teeter totter beam must be of such a length that children are no more than 1.524 m (5 feet) from the ground.

7.3.4.6 Bridges

Suspended bridges must have a positive locking system, such as hammer locks.

7.3.4.7 Concrete Anchors

All concrete anchors must be installed at a minimum depth of 300 mm below the surface of the play area.

7.3.4.8 Coatings

All metal surfaces must be galvanized, plated, stainless steel, baked on paint etc. to resist corrosion. All paint must be lead free and conform to industry standard.

7.3.5 Installation

Refer to the following detail sheets for more information on items in this section:

- ***Detail Sheet 41: Playground Edge Restraint (Concrete)***
- ***Detail Sheet 42: Playground Drainage - Concrete Edge***
- ***Detail Sheet 43: Playground Drainage - Plastic Timber Edge***

1) In parks where play equipment is an appropriate development activity and a play structure will not be installed by the Developer, a level turf area of 25 m^2 must be made available by the Developer for future installation. Ensure that the future location is clearly labeled on the Layout Plan.
2) Prior to installation, the Contractor must submit the construction plans (including the product name and model type or number of the play structure) to Calgary Parks' ***Capital Development*** for approval as described in ***2.3 CONSTRUCTION PLAN REQUIREMENTS***.
3) Ensure that the base of the play area is constructed to provide adequate surface drainage (refer to ***Detail Sheet 42: Playground Drainage - Concrete Edge*** and ***Detail Sheet 43: Playground Drainage - Plastic Timber Edge***).

7.3.6 Maintenance

Maintain play structures as per ***CHAPTER 9: LANDSCAPE MAINTENANCE STANDARDS*** from the time of installation until the FAC is issued by Calgary Parks (refer to ***2.9 FINAL ACCEPTANCE CERTIFICATE (FAC)*** for more information.

NEW!

7.3.7 Pour-in-Place Rubber Fall Surface

7.3.7.1 QUALITY ASSURANCE

Calgary Parks reserves the right to use construction specifications and vetting processes available to it to ensure playground equipment and fall surfaces meet or exceed CSA Z614 performance and safety standards throughout the life cycle of the playground. Contractors that have installed poured in place (PIP) rubber fall surfaces under the same legal corporate structure for at least three years and who have demonstrated a technical proficiency with PIP rubber surface installations will be permitted to build PIP rubber fall surfaces on City of Calgary municipal reserves and properties.

7.3.7.2 CONSTRUCTION

7.3.7.2.1 Ambient Conditions During Installation

Construction of the poured-in-place rubber fall surface must be completed under conditions that are optimal to a successful outcome for the best functional longevity. The following installation conditions are mandatory:

- The ground onto which the rubber fall surface is to be installed must be dry and at least 5°C.
- The air temperature during the installation must be at least 5°C and rising.
- The fall surface must **not** be installed during a rain event. If it starts to rain during the installation, the contractor must stop work and take measures to protect the project.

7.3.7.2.2 Base Construction

Clay Base

The clay base needs to be at least 1m deep and fine graded with a minimum 2% cross fall over the full extent of the playground. It must not contain high points or depressions that would allow water to collect. The clay base must be topped with a layer of road crush gravel installed to a minimum depth of 100mm across the entire playground. The full extent of the base (clay and road crush) must be compacted to a minimum of 98% standard proctor density before the installation of the buff layer.

Concrete Base (optional)

A concrete base must be constructed with fibre-reinforced concrete poured to a depth of 90mm and cured before installing the buff layer. The slab must be poured when day and nighttime temperatures are at least 5°C and rising and a comprehensive strength of 25 MPa is achievable within 28 days. The slab must be broom finished with an even surface and minimum cross fall of 2% over the full extent of the slab.

7.3.7.2.3 Cushion (Buff Layer) Installation

The buff layer must be constructed with shredded styrene-butadiene rubber (SBR) of particle size 0.5-2.0mm in thickness and 3.0-20mm in length. The preferred installation is completed in one continuous pour. The depth of the buff layer must ensure adherence to impact attenuation performance standards for the defined fall height of the installed playground equipment as specified in CSAZ614. The preferred binder is an aliphatic polyurethane that is not negatively affected by water immersion, chlorine, or ultra-violet (UV) light. After installation, the buff layer is to be protected and fenced off until it is dry and inspected by a Calgary Parks inspector.

7.3.7.2.4 Wear Layer Installation

The wear layer is constructed with Ethylene Propylene Diene Monomer (EPDM) rubber granules 1.5 - 4mm in size. The binder must be an aliphatic polyurethane that is not negatively affected by water immersion, chlorine, or ultra-violet (UV) light. The preferred installation is completed in one continuous pour unless it is

composed of different color patterns. For multi-colored wear layers the contractor must use techniques that ensure the seams between colors do not detach, shrink and create cracks or gaps. The thickness for the wear layer on a 2 layer rubber surface is 50mm. For a 3-layer rubber surface, the middle and wear layers combined must be at least 50mm thick. After completion, the rubber surface is to be protected and fenced off until it is dry and approved by a Calgary Parks inspector.

7.3.7.2.5 Edge Restraint & Drainage

Edge restraints can be made of concrete, ACQ treated wood or plastic as per Parks specifications. The edger must be high enough to fully contain the base and be flush with the top of the wear layer. The edger must have drainage holes at the low point(s) of the playground where subsurface drainage is intended to exit the system. The holes in the edger must be aligned with the bottom of the road crush gravel when a clay base is used or at the bottom of the buff layer when a concrete base is used. Alternatively, a subsurface weeper system (e.g. solid, perforated pipe and drainage rock) that effectively collects and removes water from the PIP rubber surface system can be submitted for review and approval (clay base systems only).

7.3.7.2.6 Hills & Mounds

The subbase for poured in place rubber hills or mounds must be constructed with a suitable subsoil free of organics capped with a 1m layer of high-density clay. The subbase must be built in 200mm lifts compacted to 98% standard proctor density.

The base should be constructed with a 50mm rough-finish layer of fibre mesh concrete with an 80mm slump factor. The concrete must be poured when day and nighttime temperatures are at least 5°C and rising, and comprehensive strength of 25 MPa is achievable within 28 days. The concrete must be cured before the installation of the wear layer.

Due to the shear stress on the PIP rubber surface from ascending and descending foot traffic, the wear layer should be 50mm thick to provide greater tensile strength and durability.

7.3.7.2.7 High Friction Zone

The durability of the poured-in-place rubber surface is critical at high friction areas such as those under swings and at the exit of slides. To reinforce the impact zone at these locations, a 50mm single layer wear layer should be installed.

7.3.7.3 INSPECTIONS & SUPPORTING DOCUMENTS

7.3.7.3.1 CCC Inspections & Approvals

In support of a CCC approval, the poured in place fall surface must be inspected and approved by a Parks inspector. The following construction inspections, supporting documents and relevant Parks approvals are required for the playground fall surface:

- Inspection of the base & edger after the play equipment has been installed, grades have been fine-tuned and compaction is complete.

- Inspection of the cushion (buff) layer.
- Inspection of the wear layer.
- GMAX & HIC impact attenuation drop test and report by a 3rd party tester.
- Compaction tests for the base certified and provided in writing by a Geotech.
- The binder manufacturers technical data sheets that include the name of the binder(s) that were used on the project, and optimal temperatures for application and relevant cure time.

7.3.7.3.2 FAC Inspection & Approval

In support of an FAC approval the poured in place fall surface must be inspected and approved by a Parks inspector. To qualify for FAC approval the PIP fall surface must not show signs of:

- Obvious wear and granulation (loose granules).
- Obvious swelling or settlement.
- Cracking or tearing.
- Shrinking or separation.
- Unusual discoloration.
- Random changes in firmness.
- Failure to meet CSA Z614 GMAX & HIC impact attenuation standards.

7.3.7.4 PERFORMANCE REQUIREMENTS

The poured-in-place rubber fall surface **must** be drop tested at CCC and FAC by a certified 3rd party tester and completed following test standard ASTM F1292. To pass the drop test, the fall surface in the fall surfacing zone must have a GMAX not exceeding 200 and a HIC not exceeding 1000 when tested for the defined fall height. The test must be done at 3 to 5 locations following impact attenuation test specification ASTM F1292. Selection of the drop locations will be coordinated with the Parks inspector.

7.3.7.5 WARRANTY REQUIREMENTS

The warranty is focused on product safety (ASTM 1292-13) and accessibility (ASTM 1951). It protects the asset owner (Calgary Parks) from defects to the base and rubber surface relevant to workmanship and materials. The warranty period is seven years from the date of construction completion (CCC), as documented by the Parks Inspector on the CCC inspection checklist.

During the warranty period, the PIP rubber surface will be tested annually by Parks following test standard ASTM F1292 to ensure impact attenuation remains compliant with GMAX not exceeding 200 and HIC not exceeding 1000. Additionally, the fall surface will be subject to a thorough visual inspection to ensure the surface remains free of defects noted above in the FAC criteria for approval.

If deficiencies to the PIP surface are found during the warranty period, Parks will formally communicate the deficiencies to the PIP surface installer. A detailed description including measurements and photographs will be sent electronically to the email on record for the installer. Upon notification of a deficiency, the installer is expected to respond to Parks within five business days. However, if the deficiency presents a hazard to the playground users, the installer is expected to respond immediately and make arrangements to have the playground temporarily fenced off and closed until the deficiency is resolved to the satisfaction of Calgary Parks.

If at any time during the warranty period a major failure should occur that impacts 50% or more of the playground rubber fall surface or, the fall surface fails the HIC & GMAX fall attenuation test within multiple fall protection zones the entire rubber fall surface will have to be replaced at the installers cost. A 5-year warranty from the date the new rubber fall surface is completed will be required from the installer.

7.4 Site Furnishings

7.4.1 Description and Quality Assurance

This section specifies the supply and installation of site furnishings. The Contractor must have experience in performing this type and scale of work and must be willing to provide proof of this experience.

7.4.2 Inspections

Give timely notice as per ***2.6 INSPECTIONS*** to Calgary Parks when the CCC is required (refer to ***2.7 CONSTRUCTION COMPLETION CERTIFICATE (CCC)*** for more information.

7.4.3 Design, Materials and Installation

7.4.3.1 General Guidelines

1) All site furnishing designs and specifications must be reviewed and approved by Calgary Parks prior to installation.
2) Site furnishings design and finishes should be consistent with site furnishings in adjacent parkland, if applicable.
3) All site furnishings should be of a consistent style and type within the community and or development phase.

7.4.3.2 Trash Receptacles and Recycling Units

1) Design:
   a) Haul-all containers or equivalent are encouraged but are not mandatory (refer to ***7.4.3.1 General Guidelines***).
   b) The following applies to non-bear-proof containers:
      • Metal cladding encouraged, however, if wood is used, it must be a minimum of 2"x4".
      • Vandal resistant construction.
      • The container should accommodate a standard 75 litre receptacle that will hold a 66 x 91 cm (26 x 36") garbage bag.
   c) Recycling units use standard corporate public recycling blue colour and signage to ensure compliance with The City of Calgary's *Waste and Recycling Bylaw* and its amendments.
   d) Trash receptacles and recycling units shall be located adjacent to one another.
2) Trash Receptacle Materials:
   a) Timber Component:
      • Kiln dried and of nominal size.

- Fir/spruce/pine/cedar species.
- Chamfered on all sides and ends.
- Smooth finish.

b) Metal Component:
- No special cast pieces.
- Welded joints ground smooth.
- Metal finish to be electrostatically applied or polyester powder coating.
- Vandal resistant zinc coated metal fasteners.
- Galvanized steel is an acceptable option.

3) Installation:
a) Provide concrete, asphalt, or compacted granular base.
b) Ground model types must be bolted to a concrete pad using vandal-resistant fasteners as per the manufacturer's requirements.
c) Pedestal type must be set in concrete to a minimum depth of 300 mm below finish grade.
d) Set back trash receptacles and recycling units at least 10 m from all park benches wherever possible.

7.4.3.3 Bench

1) Design:
a) Length about 1.8 m.
b) Pedestals must be of a Schedule 40 metal.
c) Metal mesh or wooden seat/back.

2) Materials:
a) Timber Component:
- Kiln dried and nominal size.
- Fir/spruce/pine/cedar species.
- Smooth finish.

b) Metal Component:
- No special cast pieces.
- Seats and backs to be fabricated from 5 gauge welded wire.
- Cap ends appropriately with metal.
- Welded joints ground smooth.
- Metal finish to be electrostatically applied, polyester powder coating, hot dip vinyl, or galvanized.
- Field repair of metal finish will be accepted if performed in accordance with manufacturer's specifications.

3) Installation:
a) Provide a concrete or asphalt pad, or a compacted granular base.

b) Seating surface to be 410-440 mm above finished grade.
c) Pedestals must be set in concrete to a minimum depth of 600 mm below finished grade.
d) Ground model types must be bolted to a concrete pad using vandal-resistant fasteners as per the manufacturer's requirements.

7.4.3.4 Maintenance

Maintain site furnishings as per ***CHAPTER 9: LANDSCAPE MAINTENANCE STANDARDS*** from the time of installation until the FAC is issued by Calgary Parks (refer to ***2.9 FINAL ACCEPTANCE CERTIFICATE (FAC)*** for more information.

7.5 Metal Work

7.5.1 Description and Quality Assurance

1) This section specifies the fabrication, supply and installation of miscellaneous metal items and fasteners.
2) Work must conform to The City of Calgary's *Roads Construction Standard Specifications* where applicable.
3) The Contractor must have experience at performing this type and scale of work and be willing to provide proof of this experience.
4) The Contractor, where applicable, must be fully approved by the ***Canadian Welding Bureau (CWB)*** under the requirements of CSA W.-47.1. Welding is to be done in accordance with CSA W-59.

7.5.2 Shop Drawings and Submittals

1) Submit shop drawings for review by Calgary Parks' ***Capital Development*** as described in ***2.3 CONSTRUCTION PLAN REQUIREMENTS***.
2) Indicate materials, connections, attachments, anchorage, and location.
3) Submit samples of any or all specified materials, if requested, to Calgary Parks' ***Capital Development*** for approval as described in ***2.3 CONSTRUCTION PLAN REQUIREMENTS***.

7.5.3 Product Delivery, Storage and Handling

Store fabricated metal products and fasteners on racks or skids. Protect items from the elements and damage by other materials. Maintain steel in its fabricated form.

7.5.4 Job Conditions

1) Prior to commencing work, report (in writing) to Calgary Parks any conditions and/or defects encountered on the site upon which work of this section may depend, and which might adversely effect the performance of that work.
2) Do not commence work until such conditions and/or defects have been investigated and corrected.
3) Commencement of work implies acceptance of surface and conditions, and no claim for damages or resulting extra work will be accepted, except where such conditions cannot be determined prior to construction.
4) Protect all metal products from damage, trespassers, and the harmful effects of weather, water or mechanical shock until properly installed.

7.5.5 Inspections

1) The Contractor must have an approved set of drawings and specifications available prior to calling Calgary Parks for an inspection.
2) Obtain Calgary Parks' approval of the layout before proceeding with work.

3) Give timely notice as per ***2.6 INSPECTIONS*** to Calgary Parks when the CCC is required (refer to ***2.7 CONSTRUCTION COMPLETION CERTIFICATE (CCC)*** for more information.

7.5.6 Materials

1) General Purpose Steel - CSA G400-21.
2) Bolts and Nuts - ASTM A325-71A.
3) Galvanizing - CGSB G164 - 650 u zinc per m².
4) Welding Materials - CSA 516.
5) Structural Steel - CSA G40-21.
6) Paint - Ready mixed non-metal products as detailed and applied according to manufacturer's recommendations.

7.5.7 Fabrication

1) Verify site dimensions and conditions before proceeding with shop fabrication.
2) Fabricate all items in the shop to approved Shop Drawings.
3) Fabricate items complete with components for anchoring. After fabrication, radius all edges, welds, and corners.
4) Welds must be continuous fillet type, finished by grinding and filling for all amenities that are exterior installations.
5) Drill all holes, countersinking where required.
6) Fill open joints, depressions, and seams with metallic paste filler (or by continuous brazing or welding) and grind smooth to true form.
7) After fabrication, de-scale steel, remove roughness and irregularities, clean oil and grease from surface, and prepare for priming and galvanizing.
8) Where galvanizing is called for, fabricate out of galvanized material and paint all welds with a silver zinc-rich paint. Where galvanizing is not called for, the entire structure must be hot-dipped galvanized.
9) Where priming is called for, apply one full coat of primer.
10) Paint, where called for, with polyester coat finish or electrostatic. Obtain approval from Calgary Parks' ***Capital Development*** on colour and type before painting.
11) Bolts, nuts, washers, screws, nails, and all fasteners must be heavy duty galvanized or stainless steel. Supply all anchorages for attachment to structure as detailed.

7.5.8 Installation

1) Layout all work on-site according to drawings and obtain approval from Calgary Parks' ***Capital Development*** before proceeding.
2) Provide temporary supports and bracing as required to steady metal work until installation is complete.

3) Protect metal work from damage during installation. Touch-up primer and/or paint that was chipped during installation.
4) When excavating, ensure that all utility lines are properly staked. Hand excavation must take place as per standard utility requirements.
5) Make all pipe bends with approved bending tools. Bends are to be smooth transition, without kinks, crimps, bulges, or other deformations.
6) Where anchors, fastenings, or sleeves have to be built-in by other trades, supply necessary templates, instructions, and inspection to ensure satisfactory installation.
7) All broken welds must be completely separated and ground down, and the joints cleaned and re-welded as specified. Re-galvanize, or prime and paint entire unit, as required.
8) Clean up and remove off site all debris at the end of each working day, or as required.

7.5.9 Maintenance

Maintain all metal work from the time of installation until the FAC is issued by Calgary Parks (refer to ***2.9 FINAL ACCEPTANCE CERTIFICATE (FAC)*** for more information.

7.6 Timber and Woodwork

7.6.1 Description and Quality Assurance

1) This section specifies the supply and installation of timber and wood elements.
2) All work must be executed by skilled tradesmen having experience at performing this type and scale of work, and who must be willing to provide proof of this experience.
3) All wood must comply with the grade specified.

7.6.2 Shop Drawings

1) Submit shop drawings for review to Calgary Parks' ***Capital Development***.
2) Clearly show materials, connections, attachments, reinforcements, anchorage, and location.

7.6.3 Product Delivery, Storage and Handling

1) Protect all materials from harmful exposure during transportation to site.
2) On delivery, store all materials off the ground and protect from adverse conditions to prevent deterioration, damage, and/or impairment of structural or other essential properties

7.6.4 Job Conditions

1) Prior to commencing work, report (in writing) to Calgary Parks' ***Capital Development*** any conditions or defects encountered on the site which might adversely affect the performance of the work.
2) Do not commence work until such conditions and/or defects have been investigated and corrected.
3) Commencement of work implies acceptance of surfaces and conditions, and no claim for damages or resulting extra work will be accepted, except where such conditions cannot be determined prior to construction.
4) Protect all existing trees, structures, and adjacent areas from damage due to construction work. Make good all damage at no extra cost to the contract.
5) Check and verify all site dimensions governing the fabrication of shop made items, and report any discrepancies immediately to Calgary Parks' ***Capital Development***.

7.6.5 Inspections

1) The Contractor must have an approved set of drawings and specifications available prior to contacting Calgary Parks for an inspection.
2) All materials are subject to inspection by Calgary Parks on arrival on the site. Any materials not meeting the specifications will be rejected, and must be removed from the site immediately.

3) Give timely notice as per ***2.6 INSPECTIONS*** to Calgary Parks when the CCC is required (refer to ***2.7 CONSTRUCTION COMPLETION CERTIFICATE (CCC)*** for more information.

7.6.6 Materials

7.6.6.1 Timber and Lumber

All lumber must be #1 Construction Grade, dressed (S4S surface planed); Spruce, Western Pine or Douglas Fir, conforming to CSA 0141 - 1970 for nominal size. All timber and lumber must be straight, sound, and free of splits, warps, checks, large knots, or other defects. Rough sawn lumber will be used only where detailed, and must be sawn straight, square and true.

7.6.6.2 Plywood

Exterior type plywood, free of all checks, splits, open joints, cracks, knot holes, loose knots, and/or other defects, conforming to CSA 0151-M1978 and 0121-M1978 for thickness and grade

7.6.6.3 Nails, Spikes, Bolts, Lagscrews, etc.

Hot dipped galvanized in accordance with CSA G164-M1981 and of the size and/or weight specified.

7.6.6.4 Connecting Steel

Medium structural steel, conforming to CSA G40-4 latest edition, and hot dipped galvanized as specified in ***7.5 Metal Work***.

7.6.6.5 Steel Cable

Multi-strand 10 mm diameter galvanized steel cable with galvanized clamps as detailed and specified in ***7.5 Metal Work***.

7.6.7 Prefabricated Units

1) Manufacture all prefabricated units in strict accordance with approved shop drawings.
2) Items brought onto a site which does not conform to the shop drawings and specifications will be rejected.
3) Apply a shop coat of zinc primer conforming to CGSB 1-GP-40C to metal fasteners where specified.

7.6.8 Installation

1) Lay out all work true to line, level, and spacing. Plumb on true. Accurately place structural supports and members in position and brace securely to keep them plumb and true until permanently fixed.

2) Ensure that structural supports and members are capable of safely supporting imposed loads. Report any discrepancies immediately to Calgary Parks' ***Capital Development***.
3) Execute all fastening with nails, spikes, bolts, or framing anchors as detailed. Counter sink all exposed bolts and nuts where required. Drill the bolt hole 2 mm larger than the diameter of the bolt, and after final installation pean all bolts over to prevent removal of nuts.
4) Ensure that all debris is cleaned up and removed off site at the end of each working day or as required.
5) Ensure that all drilled, sawn, or routed edges are free of splinters or burrs. Sand smooth if required.
6) All woodwork is to be finished with an approved exterior paint or stain as detailed.

7.6.9 Maintenance

Protect and maintain all timberwork, woodwork and finishes from the time of installation until the FAC is issued by Calgary Parks (refer to ***2.9 FINAL ACCEPTANCE CERTIFICATE (FAC)*** for more information.

7.7 Fencing (Chain Link & Post-and-Cable)

7.7.1 Description and Quality Assurance

This section specifies the supply and installation of chain link and post-and-cable fencing. The Contractor must have experience at performing this type and scale of work and be willing to provide proof of this experience.

7.7.2 Job Conditions

1) Prior to commencing work, verify all job conditions on site. Report (in writing) to Calgary Parks' ***Capital Development*** any conditions at variance with the drawings and specifications.
2) Do not begin work until any such conditions have been investigated and corrected.
3) Commencement of work implies acceptance of conditions, and no claims for extra work will be allowed except where such conditions cannot be determined prior to construction.
4) Protect all plant material and structures from damage. Make good all damage at no extra cost (refer to ***4.1.7 Tree Replacement/Compensation Guidelines*** for more information).
5) The Contractor is responsible for contacting the appropriate Calgary Parks' office for irrigation locations (refer to ***General Information***).

7.7.3 Inspections

1) The Contractor must have an approved set of drawings and specifications available prior to contacting Calgary Parks for inspection.
2) Prior to construction, the Calgary Parks ***Development Inspector*** will verify the installation of fencing to protect ***Environmental Reserve (ER)s*** and ***Natural Environment Parks*** (refer to ***7.7.7 Location and Type*** for more information).
3) Give timely notice as per ***2.6 INSPECTIONS*** to Calgary Parks when the CCC is required (refer to ***2.7 CONSTRUCTION COMPLETION CERTIFICATE (CCC)*** for more information.

7.7.4 Materials - Chain Link

Refer to The City of Calgary's *Roads Construction Standard Specifications*.

7.7.5 Materials - Post-and-Cable

Refer to ***Detail Sheet 45: Post and Cable Barrier*** for more information on items in this section.

1) Lumber: All lumber must be rough-cut, No. 2 Construction Grade, and kiln dried.

2) Steel Cables and Clamps: All steel cables and clamps must be hot-dipped galvanized to CSA G164 or as specified. The steel cables must have a 10 mm (3/8”) diameter.

7.7.6 Fabrication - Chain Link

Refer to The City of Calgary’s *Roads Construction Standard Specifications.*

7.7.7 Location and Type

1) Flankage and rear of lots adjacent to parks, public utility lots (***PULs***), and rights-of-way (***RoWs***) must have chain link, wood screen, or other type of fencing as approved by Calgary Parks.
2) Where parks, public utility lots (***PULs***), and rights-of-way (***RoWs***) abut lanes, post-and-cable fencing must be installed.
3) A ***Natural Environment Park*** must be fenced off with snow fencing or equivalent by the Developer prior to construction. The Developer will contact Calgary Parks to arrange a meeting (between the Calgary Parks ***Development Inspector*** and a representative of Parks Natural Areas) to verify the location of this temporary fencing prior to installation.

7.7.8 Installation - Chain Link

Refer to The City of Calgary's *Roads Construction Standard Specifications.*

7.7.9 Installation - Post-and-Cable

Refer to ***Detail Sheet 45: Post and Cable Barrier*** for more information on items in this section.

1) Provide all new material unless directed otherwise.
2) Post spacing to be as detailed in approved drawings and specifications or as specified by Calgary Parks.
3) Orient the face cuts of the posts as directed by Calgary Parks’ ***Development Inspector*** on a site-specific basis.
4) Provide sufficient tension on steel cable to eliminate sag.
5) Install the first cable clamp over the end of the cable to eliminate frayed ends.

7.7.10 Maintenance

Maintain all fence installations from the time of installation until the FAC is issued by Calgary Parks (refer to ***2.9 FINAL ACCEPTANCE CERTIFICATE (FAC)*** for more information.

7.8 Lighting

1) Lighting will be permitted in parks in one (or more) of the following situations:
   a) It is identified by The City of Calgary as part of the transportation system.
   b) It is used as security for structures.
2) Lighting standards must be 6 Lux minimum.

7.9 Optional Amenities

1) Optional amenities are non-standard infrastructure development (i.e. ornamental fencing, water features, gazebos, sculptures, entrance features/ signs, decorative fixtures, etc.) in a public park or road right-of-way (***RoW***).
2) If a Developer or homeowners'/residents'/community association wishes to construct an optional amenity, they must receive approval from Calgary Parks for optional amenities within a public park and from The City of Calgary Roads for optional amenities within a road ***RoW***.
3) The intent to construct optional amenities must be identified at the Tentative Plan Stage via a Letter of Intent or other suitable mechanism.
4) If a Developer or homeowners'/residents'/community association wishes to construct an optional amenity, they must enter into an Optional Amenities Agreement and/or a Landscape Maintenance Agreement with The City of Calgary, or they must provide an Endowment Fund as per the corporate policy and procedures as approved by Council for *Enhanced Maintenance Agreement and Infrastructure Agreements*. Contact the ***Strategic Services Business Strategy and Contracts Lead*** for further details.
5) A firm indication of whether an Optional Amenities Agreement, Landscape Maintenance Agreement, or Endowment Fund will apply must be given at the Construction Plan Approval Stage.
6) An Optional Amenity Agreement, Landscape Maintenance Agreement, or payment of an Endowment Fund must be executed prior to Final Acceptance Certificate (FAC) approval.The process must be initiated a minimum of six to eight weeks prior to FAC application.
7) Maintenance manuals are to be submitted to Calgary Parks' ***Capital Development*** prior to FAC approval for all optional amenities associated with irrigation and/or water systems (i.e. water features, fountains, spray pools etc.).
8) Under the *Municipal Government Act*, community entrance features that contain the name, logo, and address of the community, or the Developer's identification, cannot be placed on Municipal Reserves (***MRs***). Community entrance features with this type of information must be placed on private lands, or within wider road ***RoWs*** upon approval by The City of Calgary Roads. All community entrance features are to be in compliance with the *Land Use Bylaw*, (Part 3: Rules Governing All Districts; Division 5: Signs).

   If Community entrance features are placed on road ***RoWs***, an Optional Amenities Agreement is required.

7.10 Landscape Boulders and Rocks

1) Landscape boulders/rocks placed in turf areas must have a 150x150 mm concrete mowing strip placed around their base, flush to final grade. All other landscape boulders/rocks must be placed in planting beds.
2) All boulders must be buried a minimum one third below finished grade.
3) All sandstone boulders must be structurally sound and free of any spalling, cracks, crevices, or splinters. Mud stone is not acceptable. Refer to ***Detail Sheet 74: Dry Pack Rock Retaining Wall*** for more information.
4) Landscape boulders/rocks near playgrounds must meet the safety setbacks as specified in the ***CSA*** standards.

Note: Landscape boulders and rocks are not allowed within a playground area.

7.11 Pedestrian Bridges and Boardwalks

Submit concept drawings to Calgary Parks' ***Capital Development***, however final approval will come from The City of Calgary's ***Transportation Infrastructure***. The Developer must ensure that the proposed structure conforms to all applicable City Bylaws and provincial building codes.

Ensure that all drawings of bridges and boardwalks are stamped by a professional engineer. Stamped and certified drawings shall be provided prior to final stamp approval of the landscape construction drawings. Partial approvals of drawing submissions shall not be granted.

All structures proposed within parks open space that require engineering stamps must have a two year maintenance period before FAC and be submitted as follows:

a) With the Quality Control Report.
b) With the maintenance manual, including all product data sheets (coatings, sealants, etc.).
c) With contractor warranties. Calgary Parks prefers that these are submitted to the City to ensure that the warranties are documented.
d) In required submission format: two full size drawing sets and PDFs of all other documentation on USB.
e) With the Final Inspection Checklist.

7.12 Retaining Walls and Structures

Submit concept drawings for approval to Calgary Parks' ***Capital Development***. If the retaining wall is to be made from sandstone, it must be constructed as per ***Detail Sheet 74: Dry Pack Rock Retaining Wall***. Ensure that a professional engineer stamps all drawings of retaining walls and other structures 1 m in height and higher. The Developer must ensure that the proposed retaining wall conforms to all applicable City Bylaws and provincial building codes.

All structures proposed within parks open space that require engineering stamps must have a two year maintenance period before FAC and be submitted as follows:

a) With the Quality Control Report.
b) With the maintenance manual, including all product data sheets (coatings, sealants, etc.).
c) With contractor warranties. Calgary Parks prefers that these are submitted to the City to ensure that the warranties are documented.
d) In required submission format: two full size drawing sets and PDFs of all other documentation on USB.
e) With the Final Inspection Checklist.

CHAPTER 8: IRRIGATION

8.1 General

8.1.1 Description and Quality Assurance

1) This section specifies the supply and installation of irrigation systems. Installers shall have experience at this type and scale of work and be willing to provide proof of experience.
2) Contractors working on irrigation systems and supplemental components that will eventually be turned over to The City shall be certified as a Certified Irrigation Contractor (CIC). The certification shall be issued by the ***Irrigation Association (IA)***. The contractor shall ensure the project superintendent, or authorized designate, responsible for the daily delivery of the project be certified as a CIC with a valid certification status.
3) The contractor shall be responsible for constructing the system in complete accordance with all local codes, ordinances, and laws.
4) The City reserves the right to reject material or work that does not conform to this manual.
5) Contractors shall have a copy of the approved irrigation design drawings on site.
6) Contractors shall verify all conditions on site and immediately report all discrepancies and variations from the drawings to Calgary Parks' ***Water Management***.

8.1.2 Design Guidelines

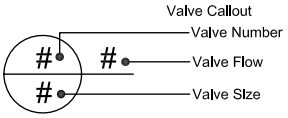
1) All irrigation design drawings and related calculations, irrigation master plans, pump station designs, reports, and plans shall be prepared and stamped by a Certified Irrigation Designer (CID) - Commercial as per ***2.3.1 General Requirements***.
2) Irrigation design drawings shall follow the format criteria set in ***2.3.1 General Requirements***. Irrigation legends shall include all components used in the design, complete with all related technical information, as shown in ***Figure 8-1*** and ***Detail Sheet IR-01: Irrigation As-Built Plan***.
3) Irrigation design and build arrangements are not acceptable, due to conflict of interests.
4) All irrigation designs shall follow the ***IA***'s current *Landscape Irrigation Best Management Practices*.
5) Irrigation audits shall be performed and signed by a Certified Landscape Irrigation Auditor (CLIA), and shall follow the current irrigation audit guidelines as issued by the IA.
6) All certifications shall be valid at the time that the work is being performed.

7) For a non-potable irrigation source, all components shall have purple ”non-potable” indicators.

8) Designers are required to communicate with Calgary Parks’ Water Management to fine tune the selection of controllers and communication hardware prior to formal submission of the design plans for approval

Figure 8-1: Irrigation Legend

SYMBOL	MANUFACTURER/MODEL/DESCRIPTION
	ROTOR
	ROTATOR
	SPRAY
	ELECTRIC CONTROL VALVE
	DRIP CONTROL ZONE KIT
	QUICK COUPLER
	DOUBLE CHECK VALVE ASSEMBLY
	IRRIGATION CONTROLLER
	ISOLATION VALVE
	PARKS WATER SERVICE
	150mm MAINLINE (CSA CL160 PVC / HDPE 4710 DR11)
	100mm MAINLINE (CSA CL160 PVC / HDPE 4710 DR11)
	50mm MAINLINE (CSA CL160 PVC / HDPE 4710 DR11)
	75mm LATERAL (CSA CL160 PVC / HDPE 4710 DR11)
	50mm LATERAL (CSA CL160 PVC / HDPE 4710 DR11)
	25mm CSA SERIES 100 POLYETHYLENE 'PIGTAIL' LATERAL
	DRIPLINE



Note: For all other symbols, refer to ***Detail Sheet IR-01: Irrigation As-Built Plan***.

8.1.3 Submittals

The contractor shall submit the following for approval prior to construction start:

1) Construction shop drawings for all irrigation system components, including pumps.
2) Copies of the heat fusion certificates of the personnel performing High Density Polyethylene (HDPE) pipe and fittings fusion.

8.1.4 Product Delivery, Handling, and Storage

1) Store all materials off the ground and under protection until they are ready for use. Support is required to prevent excessive strain on piping.
2) Remove all material that is damaged or rejected from the site. Damaged material must **not** be installed. The Parks' Water Management reserves the right to reject any material that does not meet the specifications outlined in this manual.
3) Fusion of HDPE pipes and fittings shall be performed under suitable weather and site conditions, as per manufacturer's recommendations.

8.1.5 Job Conditions

1) Proceed with irrigation installation only during suitable weather conditions.
2) Prior to commencing work, report (in writing) to Calgary Parks' Water Management any conditions or defects encountered on the site which might adversely affect the performance of the work.
3) Do **not** commence work until all conditions or defects and/or defects have been investigated and corrected.
4) Protect the system from being contaminated during construction by blocking all open pipe ends.

8.1.6 Inspections and Forms

1) Calgary Parks' ***Water Management*** shall be given a minimum of 24 hours' notice when any inspection is required.
2) The Contractor shall have an approved set of drawings and specifications available prior to calling The City of Calgary Parks Water Management for an inspection.
3) All installations require inspection acceptance from The City of Calgary Parks Water Management or The City representative.
4) The following is the minimum number of inspections required:

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a) Layout inspection - the Irrigation Designer shall be present.
b) Open trench inspection for main and laterals - the Irrigation Designer shall be present.
c) Field leak test for main line as per ASTM F2164-13 and as determined by Parks Water Management.
d) Construction Completion inspection and verification of As-built drawings.

e) Final Acceptance inspection.

5) The following forms are required at the Construction Completion inspection:
   a) Parks Irrigation Meter Sheet (refer to ***Figure 8-2***).
   b) Double Check Valve (DCV) Report.

Figure 8-2: Sample Parks Irrigation Meter Sheet.

Parks Irrigation Meter Sheet

MFRMOD	Quality Management Document Parks Irrigation Meter Report	ISO Elem: 4.0

Owner:	Approved by:	Issue Date:	Controlled Document:

Irrigated Site Information		
Address:	Legal Description:	
Reference Address:	Community:	Phase:
Developer:	Steward:	MGMT_NUM:

Meter Information				
Meter Pit Location:	Meter Size: mm	50 mm	100 mm	150
Tag #:	Serial #:			
Install Date:	Initial Reading:			
Power Sources: SOLAR ELECTRIC	Computer Hook Up:	No		Yes
Electric Meter: NO ☐ YES ☐ NUMBER	Outlet Tested:	No		Yes

Development Inspection Information	
Irrigation Contractor:	Development Inspector:
Phone:	As-Built: ☐ NO ☐ YES
Dev Agreement #:	Development Status: (CCC) (FAC) Date: Reading:

Developer & Consultant Information	
Name of Developer:	Name of Consultant:
Contact Person:	Phone:

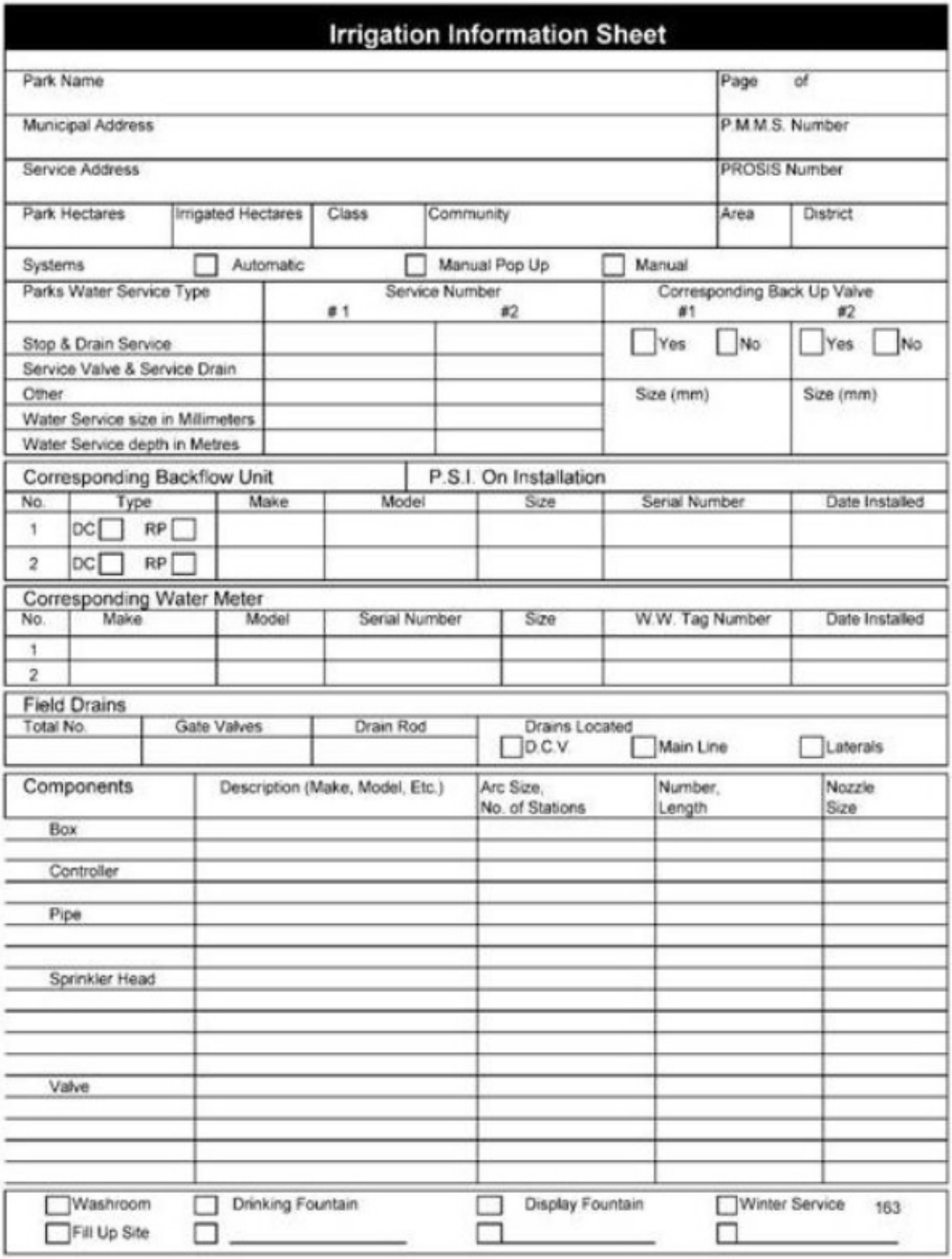
Meter Location Diagram

N

REF:	Revision Date:	Revision #:	Page:

Copy 1: Parks Inventory # 54 Copy 2: Waterworks: 334 Copy 3: Inspector Copy 4: Consultant

Figure 8-3: Sample Parks Irrigation Information Sheet.



Irrigation Information Sheet

Park Name				Page of	
Municipal Address				P.M.M.S. Number	
Service Address				PROSIS Number	
Park Hectares	Irrigated Hectares	Class	Community	Area	District

Systems ☐ Automatic ☐ Manual Pop Up ☐ Manual

Parks Water Service Type	Service Number #1	Service Number #2	Corresponding Back Up Valve #1	Corresponding Back Up Valve #2
Stop & Drain Service			☐ Yes ☐ No	☐ Yes ☐ No
Service Valve & Service Drain				
Other			Size (mm)	Size (mm)
Water Service size in Millimeters				
Water Service depth in Metres				

Corresponding Backflow Unit — P.S.I. On Installation

No.	Type	Make	Model	Size	Serial Number	Date Installed
1	DC ☐ RP ☐					
2	DC ☐ RP ☐					

Corresponding Water Meter

No.	Make	Model	Serial Number	Size	W.W. Tag Number	Date Installed
1						
2						

Field Drains

Total No.	Gate Valves	Drain Rod	Drains Located
			☐ D.C.V. ☐ Main Line ☐ Laterals

Components	Description (Make, Model, Etc.)	Arc Size, No. of Stations	Number, Length	Nozzle Size
Box				
Controller				
Pipe				
Sprinkler Head				
Valve				

☐ Washroom ☐ Drinking Fountain ☐ Display Fountain ☐ Winter Service 163
☐ Fill Up Site ☐ _____ ☐ _____ ☐ _____

Key Plan	Water Services Location: Sketch / Written

☐ Additional Information on Back of Sheet	☐ As Built ☐ Written	☐ Sketch ☐ Other	Records Last Updated	YYYY	MM	DD

Winterizing Procedures :

- ☐ Gravity Drain
- ☐ Compression
- ☐ Drain Main / Blow Laterals

Precipitation Rate per Zone (in/hr)

Additional Comments

163

To Be Filled Out By Calgary Parks ☐

8.1.7 Final As-Built Drawings

The guidelines and specifications in this section should be used in conjunction with ***Detail Sheet IR-01: Irrigation As-Built Plan***.

1) Submit as-built drawings in AutoCAD 2013 or newer version using the 3TM coordinate system, along with the PDF file, prior to Final Acceptance Certificate (FAC).
2) Draft as-built drawings in a professional manner, to scale on legal base plan, and show the exact as-built location of the system relative to the property line.
3) Include locations and information of all lines, sprinkler heads, nozzle numbers, valves (drain and zone control), boxes, double check valves, parks water service, curb stops, underground pipe fitting not adjacent to surface fixtures (tees, elbows, etc.), saddles for poly pigtails, and other irrigation materials prior to the issuance of the FAC. All the above items shall be tied in at minimum two points each from site property lines or other permanent on-site features.
4) As-built shall be surveyed by digital survey instruments.
5) Requirements for acceptable submission of as-built drawings will include, but not be limited to, the following:
    a) Ensure that sheet size is 594x841 mm, laid out on The City of Calgary Parks' title block.
    b) Label as “As-built Irrigation System” and date (mm-yyyy)
    c) Include key plan showing location of site, including street names.
    d) Ensure that labeling is a minimum of a 12 pt. font.
    e) Include a plan of the site showing property lines, bearings, surrounding site uses, north location, on-site structures, utilities, fences, buildings, walkways, shrub beds outline, etc., all to a suitable metric scale.
    f) Include a municipal address and legal description of the property, including a registered plan number and Park ID (supplied by the City at CCC stage). If more than one address applies, refer to the location of the park's water service.
    g) Use 1:250 scale with a minimum letter size of 12 pt. font. Scale may be increased to 1:200 or 1:150 for clarity.
    h) Drawing Legend: Do not include detail sheets in as-built drawings except those that are different to the standard details of this guideline.
    i) Provide specific make, model, type, and size of all components.
    j) Number all irrigation zones, starting from the Double Check Valve Assembly (DCVA) and turning to the right at a mainline junction. Return to the last main line turn and continue as before until all zones are numbered.
    k) Include the name, address and 24-hour phone number of the installer, owner/Developer, and Consultant (where applicable).
    l) Show all 110-volt electrical wire and 110-volt electrical conduit.
    m) Provide an irrigation schedule.
    n) Mark ground rod and plate location.

8.1.8 Central Control System

Large systems for remote control, monitoring and measuring processes are usually classified as Supervisory Control and Data Acquisition (SCADA) systems or Distributed Control Systems (DCS) using SCADA design. The core of the Calgary Parks system, like other systems of this size, is for gathering data, processing it, and then sending control commands to connected devices in the field.

In Water Management's case, Mottech ICC Pro is the Irrigation Central Control (ICC) software that Calgary Parks Water Management uses as its control system architecture. ICC is responsible for communicating with connected field controllers, which in turn use remote terminal units (RTUs) and programmable logic controllers (PLCs) to open and close electric valves and control water systems.

Controller and communication specifications are as follows:

1) Controller and communication hardware selection for each site shall be determined at the design stage, and shall be submitted to Calgary Parks Water Management for formal approval at the design and planning stage.

   Calgary Parks now requires the exclusive use of Motorola controllers, whether Legacy controllers (Scorpio, IRRIcom, and IRRInet-XL or XM) or New Generation controllers (IRRInet-ACE, IRRInet-M, PIU, or Piccolo-XR). Controllers and communication means are determined based on the site size, site location, site classification, the community existing or planned irrigation control system, etc.

2) The communication system may include a UHF radio (450 - 470 MHz band), GSM/LTE data modems, or any combination of the two.

3) The Developer shall be responsible for the installation of all required controller components, including (but not limited to) a Piccolo Interface Unit (PIU) at the nearest controller to complete the communication network.

8.2 Materials

8.2.1 Testing

Materials shall be new and without flaws or defects of any type. All irrigation items shall meet current specifications and go through a testing period of the duration specified and under the conditions determined by the type of product, but not less than one year. Refer to Calgary Parks Water Management's *Product Evaluation and Testing Procedure* for more information.

8.2.2 Substitutions

For substitutions, supply material with descriptive literature and samples at least three weeks before work commences. All substitutions must meet or exceed the specifications and performance standards of the proposed system, be approved by the Calgary Parks ***Water Management Lead***, and be completed without any additional cost to Calgary Parks.

8.2.3 Piping and Fittings

8.2.3.1 General

1) All polyethylene pipe, tubing, and fittings furnished under this specification shall conform to all applicable provisions and requirements of the latest revision of ***American Water Works Association (AWWA)*** C901, C906, or CSA B137.1 and, by inclusion, all appropriate standards referenced therein.
2) The Contractor shall provide the welding procedures to be used for the specific project.
3) Bead melts must conform to the guidelines listed in ***Detail Sheet IR-02: HDPE Bead Melt Detail***.

8.2.3.2 Piping

1) All piping on the downstream side of the park's water service must be either high density polyethylene pipe (using butt fusion or electro fusion according to manufacturer's recommendations and CGSB 41-GP-25 M) or NSF or CSA B137.3 certified series 160 PVC (with schedule 40 fittings and schedule 80 nipples). Medium density polyethylene pipe series 100 will be acceptable as laterals under extensive hard landscaping, shrub beds, and as "pigtails". Refer to the following detail sheets for more information:
   - ***Detail Sheet IR-03: 50 mm to 50 mm PVC Valve Connection***
   - ***Detail Sheet IR-08: Mainline Quick Coupler for PVC and HDPE***
   - ***Detail Sheet IR-09: Three Elbow Swing Joint for Plastic Sprinkler***
   - ***Detail Sheet IR-10: Three Elbow Swing Joint for Plastic Shrub Riser***
   - ***Detail Sheet IR-11: Pigtail Swing Joint for HDPE***

2) Where High Density Polyethylene is used:
   - On main lines, the pipe shall be PE4710 PR160 Standard Dimension Ratio DR13.5 or PE3608 PR160 DR11 and shall be listed by the ***Plastics Pipe Institute (PPI)*** as a PE 4710 or PE3608 resin with a hydrostatic design basis (HDB) of 1600 psi for water at 23°C. The material shall comply with ASTM D1248 as a Type III Class C, Category 5, Grade P34 material and with ASTM D3350-14 as a 445474C cell material for PE4710 and 345464C cell material for PE3608. The material shall have a design factor of 0.63 for water service at 23°C.
   - On lateral lines, the pipe shall be PE4710 DR 17.
3) For PVC mainline pipe with a diameter greater than 38 mm, bell and spigot type pipe and fittings with rubber gaskets shall be used. Solvent weld PVC joints will be permitted based on previous written approval from Calgary Parks.
4) CSA Series 100 medium-density poly pipe may only be used as laterals in extensive shrub bed installations. 25 mm poly pipe may be used in shrub beds if the approved drawing shows the changes in pipe size.

8.2.3.3 Fittings

1) All fitting and valves (except electric zone valves and double check valves) shall be sized to fit the downstream pipe diameter, as illustrated in the following detail sheets:
   - ***Detail Sheet IR-03: 50 mm to 50 mm PVC Valve Connection***
   - ***Detail Sheet IR-47: 100 mm Double Check Valve Assembly***
   - ***Detail Sheet IR-61: Road Crossing High Density Poly***
   - ***Detail Sheet IR-66: 50 mm Parks Water Service***
   - ***Detail Sheet IR-67: 150 mm Parks Water Service***
   - ***Detail Sheet IR-68: Drain Pit for High Density Pipe***
   - ***Detail Sheet IR-69: Drain Pit for PVC Pipe***
   - ***Detail Sheet IR-70: 25 mm Curb Stop Assembly***

   Electric valves and related fittings shall be one size smaller than the downstream lateral line size.
2) For medium density installations, all fittings shall be double clamped with galvanized or plastic inserts as per ***8.2.4 Swing Joints and Risers***.
3) Fittings for HDPE pipe shall be butt fusion type or electro fusion type. Fittings shall be molded or fabricated by the pipe manufacturer. Side wall fusion is not approved on both main and lateral lines. Electrofusion saddles are approved for HDPE lateral lines only. Use only fittings from Harco, Central Plastics, Integrity Fusion, Rahn Plastics, Elofit, IPEX-Friatec, Plasson, or approved equal. Heat fusion joining of pipes and fittings shall follow ***ASTM*** standards (such as F2620), ***AWWA*** Manual *M55 PE Pipe—Design and Installation*, and the current ***Plastics Pipe Institute (PPI)*** *Handbook of Polyetheleyne Pipe*.

4) Brass fittings for 3/4” to 4" PVC 160 series and PE 100 series shall be Cambridge 800 series hinged saddles, AY MacDonald 3802 & 3892 service saddles, tees, and crosses, or approved equals, as illustrated in the following detail sheets:
   - ***Detail Sheet IR-08: Mainline Quick Coupler for PVC and HDPE***
   - ***Detail Sheet IR-09: Three Elbow Swing Joint for Plastic Sprinkler***
   - ***Detail Sheet IR-10: Three Elbow Swing Joint for Plastic Shrub Riser***
   - ***Detail Sheet IR-31: 50 mm to 50 mm HDPE Valve Connection***
5) Brass fittings should have 1/2” to 1" female threaded outlet (FIPT). Bolts shall be of 18-8 non-corrosive stainless steel. Casting of saddle shall be:
   - 85% copper.
   - 5% zinc.
   - 5% tin.
   - 5% lead.

8.2.3.4 Thrust Blocks for PVC

1) Local conditions will determine the type and extent of thrust blocking to be used. Obtain approval from Calgary Parks Water Management for the base method (i.e. concrete, rebar or a combination of the former) before proceeding.
2) All PVC gasket pipes will require concrete thrust blocks. Concrete will be Class B as per The City of Calgary’s *Roads Construction Standard Specifications*.

8.2.4 Swing Joints and Risers

The guidelines and specifications in this section should be used in conjunction with the following detail sheets:

- ***Detail Sheet IR-08: Mainline Quick Coupler for PVC and HDPE***
- ***Detail Sheet IR-09: Three Elbow Swing Joint for Plastic Sprinkler***
- ***Detail Sheet IR-10: Three Elbow Swing Joint for Plastic Shrub Riser***
- ***Detail Sheet IR-11: Pigtail Swing Joint for HDPE***
- ***Detail Sheet IR-12: Pigtail Swing Joint for PVC***

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1) Swing joints shall be double O-ring, PVC three 25 mm elbows, rated at 315 psi maximum operating pressure at 73.4°F in accordance with ASTM D3139 and ASTM F1970. They must be pre-manufactured by LASCO, Rain Bird, Hunter, or an approved equal.
   Custom Swing Joints are acceptable on sprinkler heads as per the following details:
   a) For 1" Inlet Sprinkler Site Fab swing arms (in order of fitting from attachment to pipe) I-25/6504:

- 2" x 1" Hinged Brass/EF Saddle
- 1" Sch40 Street Ell
- 1" x 12" Sch80 Nipple
- 1" Sch40 Street Ell
- 1" Sch40 Street Ell
- Sprinkler

b) For 3/4" Inlet Sprinkler Site Fab swing arms (in order of fitting from attachment to pipe):
- 2" x 1" Hinged Brass/EF Saddle
- 1" Sch40 Street Ell
- 1" x 12" Sch80 Nipple
- 1" Sch40 Street Ell
- 1" Sch40 Threaded Ell
- 1" x ¾" Sch80 Reducer Nipple
- Sprinkler

c) For 1/2" Inlet Sprinkler Site Fab swing arms (in order of fitting from attachment to pipe):
- 2" x 1" Hinged Brass/EF Saddle
- 1" Sch40 Street Ell
- 1" x 12" Sch80 Nipple
- 1" Sch40 Street Ell
- 1" Sch40 Threaded Ell
- 1" x ½" Sch80 Reducer Nipple
- Sprinkler

2) All risers for shrub beds shall be galvanized or Schedule 80 PVC, and bushed down after the final elbow. A tee bar stake must be used, and it must be double clamped.

8.2.5 Water Delivery Components

8.2.5.1 Spray Heads

1) The following pressure compensating spray heads or an approved equal shall be used:
- Toro 570ZPR-4p, 6p, and 12p.
- Hunter PRS30, 4, 6 and 12.
- Rain Bird 1812 PRS & 1804 PRS.

Note: TORO 570Z-PRX is not approved.

2) The sprinkler heads shall be described on the drawings, and must conform to manufacturer's performance standards for durability and operation (i.e., operating pressure, flow, and nozzle size).

3) The sprinkler shall:

a) Be a fixed spray type, capable of covering a 2 m to 5.5 m radius at 30 psi with a full circle discharge rate of Maximum 5 gpm.
b) Have radius adjustment capabilities from top of the nozzle.
c) Be available in 4", 6", and 12" pop up.
d) Have heavy-duty riser seal to eliminate excess flow-by.
e) Have optional drain check valve.
f) Have ratcheting riser features on all bodies for easy adjustment.
g) Have 1/2” NPT female thread.
h) Have a five (5) year, over-the-counter warranty (not pro-rated).

4) If the static water pressure in a lateral zone, or the entire system, exceeds the maximum listed operating pressure in an irrigation manufacturers performance chart, then a pressure reducing device shall be installed in the head, on the lateral line, or after the meter.

8.2.5.2 Rotators

1) Only the following rotator nozzles shall be used:
   • Hunter MP Rotator.
   • Hunter MP Rotator SR series.
   Note: MP1000 is not approved.
2) Rotators shall be installed on approved pressure compensating spray bodies with a 40 psi pressure regulator such as Hunter PRS40, or approved equal.

8.2.5.3 Short Range Rotors

1) The following sprinklers or an approved equal shall be used:
   • Hunter I-20.
   • Rain Bird 5004 Plus SS.
   • Rain Bird 5006 Plus SS.
2) The rotor shall:
   a) Be of the gear driven rotary type.
   b) Be available with interchangeable nozzles.
   c) Have radius adjustment capabilities by means of a stainless steel adjustment screw.
   d) Be commercial duty, available in both full circle and adjustable part circle configurations. The adjustable unit shall have the capability of adjustment in all phases of installation (i.e., before installation and after installation static) and while in operation. Pop-up versions of the sprinkler shall have a ratcheting type riser assembly for final arc orientation.
   e) Have a minimum of 4" pop up; however, 6" is preferred.
   f) Have a rubber cover.
   g) Be equipped with a drain check valve to prevent low head drainage and be capable of checking up to 8 feet (2.40 m) in elevation changes.

h) Have a 3/4” National Pipe Thread (NPT) female thread inlet.

i) Be serviceable after installation in the field by unscrewing the body cap, removing the riser assembly, and cleaning the inlet filter screen.

j) Have a body constructed of non-corrosive heavy duty Acrylonitrile Butadiene Styrene (ABS), or durable plastic and the pop-up riser assembly shall be encased in stainless steel.

k) The sprinklers carry a five-year over the counter exchange warranty (not pro-rated).

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3) If the static water pressure in a lateral zone or the entire system exceeds the maximum listed operating pressure in an irrigation manufacturers performance chart (i.e., Hunter I-20 with #4 nozzle = 60 psi), then a pressure reducing device shall be installed on the electric valve of that lateral line or after the meter.

8.2.5.4 Long Range Rotors

1) The following sprinklers or an approved equal shall be used:
   - Hunter I-25-SS.
   - Hunter I-40.
   - Toro 640.
   - Nelson 7005.
   - Rain Bird Falcon 6504.
   - Rain Bird 8005-SS.

2) The rotor shall:
   a) Be of the gear driven rotary type.
   b) Be available with interchangeable nozzles.
   c) Have radius adjustment capabilities by means of a stainless steel adjustment screw.Arc adjustment should be accessed at the top of the sprinkler without having to take the sprinkler apart.
   d) Be commercial duty, available in both full circle and adjustable part circle configurations. The adjustable unit shall have the capability of adjustment in all phases of installation (i.e., before installation and after installation static) and while in operation. Pop-up versions of the sprinkler shall have a ratcheting type riser assembly for final arc orientation.
   e) Have a minimum of 4" pop up; however, 6" is preferred.
   f) Have a rubber cover.
   g) Be equipped with a drain check valve to prevent low head drainage and be capable of checking up to 8 feet (2.40 m) in elevation changes.
   h) Have a 3/4” NPT female thread inlet.

i) Be serviceable after installation in the field by unscrewing the body cap, removing the riser assembly, and cleaning the inlet filter screen.

j) Have a body constructed of non-corrosive heavy duty ABS or durable plastic, and the pop-up riser assembly shall be encased in stainless steel.

k) The sprinklers carry a five-year over the counter exchange warranty (not pro-rated).

3) If the static water pressure in a lateral zone or the entire system exceeds the maximum listed operating pressure in an irrigation manufacturers performance chart (i.e. Hunter I-25 with #7 nozzle = 70 psi), then a pressure reducing device shall be installed in the head on the lateral line or after the meter.

8.2.5.5 Flood Bubblers

1) The following flood bubblers or an approved equal shall be used:
   - Toro 500 Series, 514-20 Universal Flood Bubbler.
   - Rainbird I300A-F and 1400 series.
   - Signature 7300.
   - Hunter AFB Adjustable Flood Bubbler.
2) The flood bubblers shall:
   a) Have flow adjustment.
   b) Have a screw adjustment.
   c) Have a serviceable filter screen.
   d) Have a 1/2” NPT female thread inlet.
3) Root watering systems shall be 18”-long Hunter RZWS, Rainbird RWS, or approved equal with a retaining cap and vandal resistant locking grate. The root watering system should come with a factory installed spiral barb elbow or swing joint and bubbler. At installation, the root watering system shall be filled with 19 mm washed gravel to allow for proper drainage.

8.2.5.6 Drip and Drip Components

The guidelines and specifications in this section should be used in conjunction with the following detail sheets:

- ***Detail Sheet IR-13: Preferred Drip Line Centre and End Layouts***
- ***Detail Sheet IR-14: Preferred Drip Line Isometric***
- ***Detail Sheet IR-15: Drip Control Zone Kit PVC***

1) The following landscape driplines or an approved equal shall be used:
   - Netafim TLCV series
   - Rainbird XFD and XFS series
   - Hunter PLD series
   - TORO DL2000 series

2) The landscape dripline shall have pressure compensating in-line drippers with flows from 0.4 to 1 gallon per hour (gph) and a built-in check valve suitable for on-surface and subsurface applications.
   a) The dripline shall be installed at a 3 to 4” depth in soil under mulch, with dripline stakes every 4 feet or as recommended by the manufacturer.
   b) Dripline fittings shall be compatible insert or compression fittings.
   c) The landscape dripline shall be installed in the pattern and spacing indicated in the approved design plans.
   d) The dripline shall be purple color-coded when used with non-potable water.
3) Flush valves and air valves shall be installed in all landscape dripline applications as per manufacturers' recommendations, or as indicated in the approved design plans.
4) Drip control kits should have a 40 psi pressure regulator and a minimum 150 mesh stainless steel filter. The selection of the drip control kit should be suitable for the zone total flow (i.e., a low, medium, or high flow drip control kit) and shall be Netafim (LV CZS), Rainbird (XCZ-PRB-COM), Hunter (PCZ-101-40), TORO (DZK-700 series), or approved equal.

8.2.5.7 Quick Coupling Valve

1) The following quick coupling valves or an approved equal shall be used:
   • Buckner.
   • Rain Bird.
   • Hunter.
2) Quick coupling valves shall be 1” two-piece with yellow turf rubber cover capable of locking. Buckner, Rain Bird, Hunter, or approved equal.

8.2.6 Control System

Calgary Parks exclusively uses Motorola controllers. All Irrigation Central Control (ICC) equipment must be purchased (at preferred rates) from The City of Calgary's approved vendor for Motorola Irrigation Control Systems or as otherwise directed by The City.

Controllers can be set up as nodes, primaries, or secondaries, depending on the design, their specifications, and the conditions under which they are used.

- A "node" is a special type of master site that is allocated as a main communication hub for an entire City zone or portion thereof. Node locations are engineered for favorable communication paths and data loads.
- A "primary" is a controller that can communicate to the ICC via UHF radio or cellular modem and can communicate with secondaries via UHF radio.
- A "secondary" usually does not communicate with the ICC directly; rather, it communicates through a primary controller via UHF radio.

1) Approved controller and communication hardware include:
    a) Motorola ACE 3640 - a primary controller that is currently specified in AC configuration only. It requires 120VAC and is the only controller with the following abilities:
        - Largest communication flexibility.
        - PLC support.
        - Ladder logic.
        - Industry standard Modbus support.
        - I/O support from 16 zones to 120 zones (typical usage is 48 -80 zones).

        In general, sites requiring more than 48 zones use the ACE 3640 in the appropriate configuration (Node or Primary), however, other specialized configurations may be authorized by Calgary Parks Water Management at the design stage. If the communication protocol, site location, system loading and connected devices within ICC dictates, a Node may be specified by Calgary Parks Water Management at the design stage.
    b) IRRInet-M - the most commonly used controller. It can be configured as a Primary site in terms of system design or a Secondary site for basic communication or irrigation.

        IRRInet-M comes in standard 12-zone output capacity and can have an optional module for 24 zones per controller. Two IRRInet-Ms can be wired together to provided 36 or 48-zone outputs with optional expansion boards. They can be purchased in either AC or DC formats.
    c) Piccolo - a DC only controller with very limited range used for small irrigation systems. Piccolo's must always be used with a Piccolo interface unit (PIU) at a Primary site that has an Irrinet M or ACE controller.

        Both two and four zone outputs are available and require special DC latching hydrometer solenoids to operate.

2) Controller and communication hardware selection for each site shall be pre-approved at the design stage and shall be submitted to Calgary Parks Water Management for formal approval at the design and planning stage. Determining factors for selection are based on the site size, site location, site classification, system loading, the community location and/or planned irrigation control system PLC usage.
3) The Developer shall be responsible for the installation of all required controller components, including (but not limited to) a Piccolo Interface Unit (PIU) at the nearest controller to complete the communication network.

8.2.6.1 Radios and Modems

1) Calgary Parks Water Management currently uses the Motorola XPR5350 UHF radio as its work horse for radio communication between sites, and only occasionally the lower powered HT750 in specialized configurations with pre-approval.
2) Calgary Parks Water Management may specify the use of a Cellular network (Sierra wireless RV50x LTE modem) on sites with a high volume data stream or a location with challenging radio communication (i.e., node).

8.2.6.2 Antennas

Antenna selection for each site shall be determined at the design stage and shall be submitted to Calgary Parks Water Management for formal approval.

1) Where used, antenna masts should be as described as in ***Detail Sheet IR-18: Swivel Pole***
2) All antenna cabling through the mast should be LMR400.
3) Piccolo-XR and PIU antennas (factory package default) should be replaced with an Icom whip antenna with male SMA connector. The factory antenna isn't optimal for the City's frequency band.
4) Any antenna that is mounted directly to the controller cabinet and has coaxial cable lengths of 60 cm or shorter for the internal cabinet radio can have the LMR400 requirement substituted with LMR195, LMR200 or LMR240.
5) Antenna cross bars should be used for multiple antennas on a single mast.
6) Antennas that are mounted to buildings must be of aluminum or noncorrosive type and be securely mounted.

8.2.6.3 Weather Station

1) Where a weather station is required, as determined by Calgary Parks Water Management at the design stage, an ACE 3640 controller is also required.
2) The developer shall purchase and install the weather station and controller.
3) The weather station shall be Davis Vantage Pro 2 Plus (cabled version).
4) The weather station shall be installed on the antenna mast below the PIU antenna.
5) Weather station configuration must be supplied to Calgary Parks Water Management upon installation (via e-mail is acceptable).

8.2.6.4 Grounding and Power

1) All grounding shall be as per ***American Society of Irrigation Consultants (ASIC)*** Guideline 100-2002 for Earth Grounding Electronic Equipment in Irrigation Systems.
2) Grounding is frequency specific for lightning protection, therefore the use of bar or plate (or both) is determined at the construction stage and shall be installed as per the following detail sheets:
   - ***Detail Sheet IR-25: Up to 64 Stations - Non-rocky Soils***
   - ***Detail Sheet IR-26: Up to 96 Stations- Non-rocky Soils***
   - ***Detail Sheet IR-27: Up to 64 Stations - Rocky Soils***
   - ***Detail Sheet IR-28: Up to 96 Stations - Rocky Soils***
   - ***Detail Sheet IR-29: Ground Plate Sphere of Influence***
   - ***Detail Sheet IR-30: Ground Rod Sphere of Influence***
3) Grounding for the controllers is independent of and in addition to the grounding requirements of the power connection or building as required by electrical codes.
4) Power supply and wiring shall be in accordance with the *Canadian Electric Code* and other local codes and regulations.
5) A Merrsen surge protector is required inside the cabinet to cover all receptacles within its operation.

8.2.6.5 Automatic Irrigation System Wiring

1) Wiring between the controller and valves shall conform to the *Canadian Electric (CE) Code* (CSA 22.1) and any other local regulatory conditions that govern this type of installation.
2) Wire colour coding shall be as follows:
   - Common return wire - white - size 12 AWG.
   - Common return spare wire - black - size 12 AWG.
   - Field or zone wires - color grouped - size 14 AWG.
     Must be same-colour grouped according to function, and can be any colour other than white, black, red, or green (commonly used for grounding). For

example, all zone wires from the terminal strip to the zone valves could be blue and all metering/ master valve wiring could be orange.

- Zone spare wire - red - size 14 AWG.

3) Common wires shall be one size larger than control wires (i.e., if the control wire is 14 AWG then the common wire shall be 12 AWG).
4) Controller circuit common groupings shall be as follows:
   a) AC Controllers:
      - ACE controller - One common wire per 12 outputs.
      - IRRINET M controller - One common wire per group of 12 wires.
      - Piccolo controllers - One common wire per group of up to four outputs.
   b) DC IRRINET M controllers:
      - One common wire per group of six outputs.
      - Sequentially zone wired per right hand rule.
5) The voltage drop on control and common wires shall be calculated based on the furthest distance run and the maximum number of valves that can simultaneously be activated on that leg. The value will be based on the abilities of the controller specified. Size wires accordingly, and present calculations upon request. The smallest approved control wire size is 14 AWG and the smallest common wire is 12 AWG.
6) Use only PE jacketed UF rated wiring approved for underground burial.
7) Wire splices shall be 3M DBY/DBR or approved equal.
8) Wire splice boxes and lids shall:
   a) Be green in colour (lids, as well).
   b) Be Carson 910-10-4 or an approved larger equal sufficient in size for the number of wires inside.
   c) Have 500 mm of cable outside the box available for service space.
   d) Be labeled properly.
9) All wire splices shall be labeled with heat shrink, by zone number, before and after the splice.
10) All wiring within the cabinet must be taped, labeled and grouped as follows:
   a) Field wiring grouped by connected zone, per the right-hand rule, and labeled sequentially.
   b) Spare wiring grouped and labeled.
   c) Component wiring properly labeled and cable managed.
   d) Coaxial cable labeled by connections.
   e) Splice box wiring grouped and labelled.
11) 1 m of surplus wire must be left in the cabinet for cable management and for future cable reuse.

8.2.6.6 Cabinets

8.2.6.6.1 IRRINET M and ACE Controller Cabinets

1) The City of Calgary currently approves as standard the NEMA 4X stainless steel or aluminum cabinets with marine grade power coating that have serviceable (replaceable) parts such as hinges, doors and latches.
2) Cabinets by Dandy, Pentair, (EMX) Eurobex, or approved equal can be approved at the pre-design stage. Refer to detail sheets ***Detail Sheet IR-17: AC IRRInet-M or ACE Series Field Unit Cabinet & Pedestal***, ***Detail Sheet IR-20: Irrigation Controller Cabinet - NEMA 4X***, ***Detail Sheet IR-21: Indoor Wall-mounted Irrigation Cabinet***, ***Detail Sheet IR-22: Antenna, Weather Station and Weather Sensor*** for examples.
    a) Dandy approved part numbers DB3AL-2D series sizes 30-36-12 cm, 36-36-12 cm, 36-48-12 cm are preferred.
    b) Style must include dual doors, no post, and aluminum or stainless steel with marine grade paint/ powder coating.
    c) If the controller and power components do not fit the following standard enclosure sizes (with minimal electrical footprint), the City can request a larger enclosure at any time.

Table 8-1: Cabinet Sizing Guide

Standard Controller Enclosure Sizes (with Minimal Electrical Footprint		
Controller Type	**Outputs**	**Cabinet Size**
IRRINET M	12	30 x30 x 12 cm
	12-24	36 x36 x12 cm
	36-48	36 x36 x12 cm or 36 x 48 x 12 cm
ACE	16-32	48 x 36 x 12 cm
	48-80	48 x 36 x 12 cm
	80+	48 x 48 x 12 cm

3) If communication and system loading in an area dictate the need for a node communication site, Parks Water Management may specify it at design stage.
4) All cabinets and masts must be earth grounded for lightning protection. Refer to ***Detail Sheet IR-30: Ground Rod Sphere of Influence*** for more information.

8.2.6.6.2 Piccolo Controller Cabinets

1) The City of Calgary currently approves the following Piccolo-XR enclosures by Mottech Water Management.
    • Mottech Integrated Solar Enclosure
    • Channell Integrated Pedestal in green or brown and special-order granite.
    Refer to ***Detail Sheet IR-22: Antenna, Weather Station and Weather Sensor***, ***Detail Sheet IR-23: Piccolo-XR Integrated Pedestal*** and ***Detail Sheet IR-24: Piccolo-XR Solar Enclosure*** for more information.
2) The Mottech solar enclosure shall be mounted on a 5 cm (2”) diameter Stainless Steel pole.

8.2.7 Electric Valves

The guidelines and specifications in this section should be used in conjunction with the following detail sheets:

- ***Detail Sheet IR-03: 50 mm to 50 mm PVC Valve Connection***
- ***Detail Sheet IR-04: 50 mm to 50 mm PVC Valve Connection***
- ***Detail Sheet IR-05: Electric Control Valve Signal Wire Schematic***
- ***Detail Sheet IR-06: Right Hand Valve Wiring Rule***
- ***Detail Sheet IR-07: 100 mm to 50 mm PVC Valve Connection***
- ***Detail Sheet IR-16: 100mm to 38mm HDPE Valve Connection***
- ***Detail Sheet IR-31: 50 mm to 50 mm HDPE Valve Connection***
- ***Detail Sheet IR-32: 100 mm to 50 mm HDPE Valve Connection***
- ***Detail Sheet IR-33: 150 mm to 50 mm HDPE Valve Connection***
- ***Detail Sheet IR-34: 200 mm to 50 mm HDPE Valve Connection***

1) Zone control valves shall be CSA certified as Class II power limiting circuit low voltage (i.e., 24 volt) operated only
2) Zone control valves shall be electrically operated and self-cleaning, with a bronze or brass body and of a make and model compatible with the designed system. Hand operated valves shall be installed on the upstream side of every electric valve.
3) Griswold DWS, Toro 220 brass series, Rain Bird EFB-CP, or Rain Bird BPES series electric valve or an approved equal shall be used.
4) AC solenoids shall be used for valves with AC controller systems. DC solenoids shall be used for valves with DC controllers and piccolos.
5) The electric control valves shall meet the following technical requirements:
    a) Available sizes - 3/4” to 3".
    b) Valves shall be one size smaller than the lateral pipe or sized as per hydraulic design calculations.
    c) Body configuration - globe.
    d) Pressure rating - 200 psi.
    e) Power requirements - 3.43 VA to 7.2 VA holding, and 9.8 VA to 10.8 VA in rush.
    f) Operating voltage range 17-30.
    g) Warranty - 3 years.

8.2.8 Gate Valves

Refer to detail sheet I***Detail Sheet IR-35: 50 mm Compressor Connection & Meter Test Outlet Assembly*** for more information about items in this section.

1) Gate valves for drainage and flow control shall be bronze body with solid wedge disk, non-rising stem, removable handle, and a resilient rubber ring seal with a minimum pressure rating of 10 kg/cm2. All gate valves shall be installed in an upright position for accessibility.
2) For valves 3/4” to 3", a Red & White 280A shall be used (or an approved equal).

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3) Valves 100 mm or larger shall be resilient seat flanged valve with a nut and key OR wheel, and shall have a 15 mm test cock. Use Watts 405RW or an approved equal.

8.2.9 Double Check Valve Assemblies (DCVAs)

A double check valve assembly (DCVA) is an assembly composed of two independently acting, approved check valves, including tightly closing shut-off valves with resilient seats located at each end of the assembly and fitted with properly located test cocks as per CSA B64 series-1976. The guidelines and specifications in this section should be used in conjunction with the following detail sheets:

- ***Detail Sheet IR-46: 50 mm Double Check Valve Assembly***
- ***Detail Sheet IR-47: 100 mm Double Check Valve Assembly***
- ***Detail Sheet IR-48: 100 mm & 150 mm Spool Assembly***
- ***Detail Sheet IR-49: 150 mm Double Check Valve Assembly***
- ***Detail Sheet IR-50: 200 mm Double Check Valve Assembly***
- ***Detail Sheet IR-54: 100 mm Double Check Valve Assembly - Valve Box***
- ***Detail Sheet IR-55: 100 mm Double Check Valve Assembly - Aluminum Lid Frame***
- ***Detail Sheet IR-56: 100 mm Double Check Valve Assembly - Valve Box Crossbeam Support***
- ***Detail Sheet IR-57: 100 mm Double Check Valve Assembly - Valve Box Crossbeam Support***
- ***Detail Sheet IR-58: 100 mm Double Check Valve Box - Aluminum Lid***
- ***Detail Sheet IR-59: 100 mm Double Check Valve Box - Aluminum Lid***

1) All DCVAs shall conform to The City of Calgary's *Standard Specifications Waterworks Construction*, and be capable of being installed in field locations with a drainage function.
2) In addition, the device shall be drainable, in place, without any dismantling, adjustments, or movement of the assembly, through the use of a test cock or drain valve, as approved and certified by CSA.

3) 50 mm DCVAs shall be Zurn Wilkins Model 350. 100 mm DCVAs shall be Watts 709NRS. 150 mm or larger DCVAs shall be Watts 757NRS or an approved device of equal dimension to allow the assembly to fit into a standard box.

8.2.10 Irrigation Boxes

8.2.10.1 General Requirements

1) Where manufactured irrigation boxes are used, they shall:
   a) Be of heavy duty weight polyethylene.
   b) Be capable of being extended.
   c) Be capable of withstanding the weight of a heavy tractor on their surface.
   d) Have a locking capability (clearances noted on details).
   e) Have the following colour restrictions:
      • Boxes, lids, and extensions shall be green in colour.
      • Electric and piccolo boxes shall be beige colour.
2) Gravel beds in boxes shall consist of clean, washed, 19 mm gravel with an area marginally larger than the box opening. Refer to the following detail sheets for the depth of gravel and the distance the gravel shall be kept from the lowest point of the irrigation system:

- ***Detail Sheet IR-02: HDPE Bead Melt Detail***
- ***Detail Sheet IR-03: 50 mm to 50 mm PVC Valve Connection***
- ***Detail Sheet IR-04: 50 mm to 50 mm PVC Valve Connection***
- ***Detail Sheet IR-05: Electric Control Valve Signal Wire Schematic***
- ***Detail Sheet IR-06: Right Hand Valve Wiring Rule***
- ***Detail Sheet IR-07: 100 mm to 50 mm PVC Valve Connection***
- ***Detail Sheet IR-31: 50 mm to 50 mm HDPE Valve Connection***
- ***Detail Sheet IR-32: 100 mm to 50 mm HDPE Valve Connection***
- ***Detail Sheet IR-33: 150 mm to 50 mm HDPE Valve Connection***
- ***Detail Sheet IR-34: 200 mm to 50 mm HDPE Valve Connection***
- ***Detail Sheet IR-35: 50 mm Compressor Connection & Meter Test Outlet Assembly***
- ***Detail Sheet IR-36: 50 mm Blow Out Assembly (PVC/GALV.)***
- ***Detail Sheet IR-37: 50 mm Field Gate Valve Assembly (HDPE)***
- ***Detail Sheet IR-38: 50 mm Isolation Valve Main Control Valve (HDPE)***
- ***Detail Sheet IR-39: 100 mm Isolation Main Control Valve (HDPE)***
- ***Detail Sheet IR-40: 150 mm Isolation Valve Main Control Valve (HDPE)***
- ***Detail Sheet IR-41: 200 mm Isolation Valve Main Control Valve (HDPE)***
- ***Detail Sheet IR-42: 50 mm Isolation Valve Main Control Valve (PVC)***
- ***Detail Sheet IR-43: 100 mm Isolation Valve Main Control Valve (PVC)***
- ***Detail Sheet IR-44: 150 mm Isolation Valve Main Control Valve (PVC)***
- ***Detail Sheet IR-45: 200 mm Isolation Valve Main Control Valve (PVC)***
- ***Detail Sheet IR-46: 50 mm Double Check Valve Assembly***
- ***Detail Sheet IR-47: 100 mm Double Check Valve Assembly***
- ***Detail Sheet IR-64: 50 mm Combination Meter/Master Valve (PVC)***
- ***Detail Sheet IR-65: 50 mm Tee Hook-Up (PVC)***

- ***Detail Sheet IR-68: Drain Pit for High Density Pipe***
- ***Detail Sheet IR-69: Drain Pit for PVC Pipe***
- ***Detail Sheet IR-70: 25 mm Curb Stop Assembly***

8.2.10.2 Drain Boxes and Extensions

1) Boxes shall:
   - Be Carson 1419, NDS Pro, or an approved equal.
   - Have a heavy duty polyethylene body weighing 7 lbs.
   - Have a depth of 12".
2) Lids shall:
   - Be Carson 1419-4L, NDS Pro, or an approved equal.
   - Have a heavy duty polyethylene body weighing 3 1/2 lbs.
   - Be over the rim cover or T-lid.
   - Have locking 3/8” L-bolt with 9/16” head, non-corrosive, metal detector sensitive ball.
   - Have an “Irrigation Drain Box” marking.
   - Have a lift slot.
   - Be of depth - 2 1/8”.
   - Be interchangeable with box and extensions.
3) Box extensions shall:
   - Be Carson 1419-6X, NDS Pro, or an approved equal:
   - Have a heavy duty polyethylene body weighing 5 lbs.
   - Have a depth of 6 3/4”.

8.2.10.3 Control Valve Box, Isolation Valve Box, Meter Valve Box, and Gate Valve Outlet Box

1) Boxes shall:
   - Be Carson 1220-12, NDS Pro, or an approved equal for valves 50 mm or smaller.
   - Be Carson 1324-12, 1324-15, or 1730-18, NDS Pro, or an approved equal, for valves, larger than 50 mm.
   - Have a heavy duty polyethylene body weighing 8 lbs.
   - Have a depth of 12".
2) Lids shall:
   - Be Carson 1220-3L or 1220-5L or 1324-3L or NDS Pro or an approved equal.
   - Be non-hinged.
   - Have a heavy duty polyethylene body weighing 5 lbs.
   - Have locking 3/8” L-bolt with 9/16” head, non-corrosive, metal detector sensitive bolt.
   - Have a lift slot.
   - Have a depth of 1 3/4”.

- Have an appropriate lid marking, based on the use of the lid (i.e., “Irrigation, Control Valve Box”, “Irrigation Isolation Valve Box”, or “Irrigation Meter Valve”).
- Be inter-changeable with box and extensions.

3) Box extensions shall:
   - Be Carson 1419-6X, NDS Pro, or an approved equal:
   - Have a heavy duty polyethylene body weighing 5 lbs.
   - Have a depth of 6 3/4”.

8.2.10.4 50mm Double Check Valve Assembly Box

The guidelines and specifications in this section should be used in conjunction with ***Detail Sheet IR-46: 50 mm Double Check Valve Assembly***.

1) Boxes shall:
   - Be Carson 1730-18-3L, NDS Pro, or an approved equal.
   - Have a heavy duty polyethylene body weighing 25 lbs.
   - Have a depth of 18".
2) Lids shall:
   - Be Carson 1730-3L, NDS Pro, or an approved equal.
   - Be non-hinged.
   - Have a heavy duty polyethylene body weighing 10 lbs.
   - Have a locking 3/8” L-bolt with 9/16” head, and non-corrosive, metal detector-sensitive bolts.
   - Have a lift slot.
   - Have a depth of 2".
   - Have a “Double Check Valve Assembly Box” marking.

8.2.10.5 100 mm and Larger Double Check Valve Assembly Boxes

The guidelines and specifications for 100 mm DCV box and lid assembly, complete with access door for meter reading, are outlined in the following detail sheets:

- ***Detail Sheet IR-51: 100 mm Double Check Valve Assembly - Valve Box***
- ***Detail Sheet IR-52: 100 mm Double Check Valve Box Lid***
- ***Detail Sheet IR-53: 100 mm Double Check Valve Box Lid with Meter Viewing Lid***
- ***Detail Sheet IR-54: 100 mm Double Check Valve Assembly - Valve Box***
- ***Detail Sheet IR-55: 100 mm Double Check Valve Assembly - Aluminum Lid Frame***
- ***Detail Sheet IR-56: 100 mm Double Check Valve Assembly - Valve Box Crossbeam Support***
- ***Detail Sheet IR-57: 100 mm Double Check Valve Assembly - Valve Box Crossbeam Support***
- ***Detail Sheet IR-58: 100 mm Double Check Valve Box - Aluminum Lid***

- ***Detail Sheet IR-59: 100 mm Double Check Valve Box - Aluminum Lid***

8.2.11 Pumps

The specification criteria in this section represents the **minimum** requirements for pumps and pump control material.

8.2.11.1 General Requirements

1) All pump station designs shall be prepared and stamped by a Certified Irrigation Designer (CID). The design and construction shall include all necessary appurtenances to provide for a complete, automatic, smooth operating, and reliable pump system, and shall be submitted for approval at the design stage and prior to construction start.

   A complete set of mechanical arrangement drawings, electrical schematics, and control schematics shall be supplied upon request and shall be included in the operations and maintenance manual supplied with the pump system. A Development Permit may be required for the pump house as per Planning and Development Approval (PDA) application process for building structures.
2) All equipment and materials shall be approved by ***CSA***, ***Underwriters Laboratories of Canada (ULC)***, and ***National Electrical Manufacturers Association (NEMA)***, and shall confirm to local and national codes. The Contractor shall submit a complete material list for approval prior to performing any work. The material list shall include description of all equipment and components, the manufacturer, the model number, and the local supplier information.
3) Pumps must be packaged by Pumptronics, RainBird or approved equal suppliers. Pumps and motors must be manufactured by Grundfos, Robbco, Fairbanks Morse, Goulds, Franklin, or approved equal.
4) The pump system design shall determine whether a variable frequency drive (VFD) is required to automatically maintain a constant discharge pressure, regardless of varying flow demands within the system.
   a) In general, the pump shall start once the irrigation controller signals to the master valve/flow meter via pump start relay through the controller.
   b) If required, pumping systems may be designed to start based on pressure demand with the use of a pressure tank.
   c) The variable speed drive shall be a digital pulse width modulation VFD with an LCD display readout in English. The VFD LCD shall display the operating information (KWH, elapsed time, Hz, RPM, amps, voltage, etc.) and shall continuously scroll through the shutdown faults and operating data while the drive is running and stopped.
   d) All control logic shall be handled by an industrial grade, programmable logic controller (PLC) interfaced with a 10” colour touch display and a built-in clock calendar. The PLC shall provide demand controlled sequential pump start-up and shutdown and safety features. The PLC shall have LED

indicators for inputs, outputs, and diagnostic read-outs indication on/off status.

e) All logic for the system control, VFD speed control, and timing shall be handled by the PLC.

f) The VFD shall have a direct Modbus communication with the PLC so that all readings and alarms can be displayed on the PLC interface.

g) The design may require other forms of communication or remote pump station monitoring software depending on the application.

h) The VFD shall be manufactured by ABB or approved equal.

i) The PLC shall be manufactured by Panasonic or approved equal.

5) The following are the minimum recommended pump station site inspections by The City and the Consultant:

a) Pump House/Enclosure site location confirmation including survey layout of intake pipe, wet well, discharge line, concrete slab, etc.

b) Pump House/Enclosure layout review approval including installation of intake pipe, discharge pipe, wet well, potable back-up supply, sump/ backwash pit, pump room overflow drain back to the pond with mesh screen, mechanical and electrical components including filtration, treatment, control panel, irrigation controller, etc.

c) Completion and Commissioning inspection in the presence of the pump manufacturer. Commissioning of the pump station shall be conducted when permanent power is connected and as-built drawings are completed for items required at CCC (refer to items 8 and 9, below).

d) Final Acceptance inspection as part of the Final Acceptance Certificate application.

6) The manufacturer shall warrant that the pump system and/or components will be free of defects in workmanship for a minimum of two years from date of authorized start-up or commissioning. The manufacturer’s warranty shall not relieve the contractor of any liability under the contract guarantee. A copy of the warranty shall be added to the pump system Operation and Maintenance Manual. The City recommends that the manufacturer be present at the winterization and start-up of the system during warranty period.

7) The local representative of the manufacturer shall provide training to Operations personnel identified by The City prior to issuance of Final Acceptance Certificate.

8) The Contractor shall provide The City with two copies of the Operation and Maintenance Manual of the pumping system complete with operating philosophy, system description, material listing, sub-components documents, programming manuals, contact information, recommended maintenance procedures, and troubleshooting instructions.

Programming manuals of the PLC and material documents for the VFD, pressure tank, filters, UV treatment, intake screen, mechanical components, valves, etc. shall be all included in the Operation and Maintenance Manual.

9) The Contractor shall keep a copy of the approved design drawings on site preferably in the Control Panel and shall update the record set with site changes on daily basis.

   Final as-built drawings shall be produced as per ***8.1.7 Final As-Built Drawings*** and should include the details and dimensions of all equipment and components including piping, fittings, wiring, etc. In case of a pump house, the location and dimensions of components outside and inside the pump house shall be surveyed and updated in the as-built drawings.

8.2.11.2 Booster Pumps

1) The booster pump system shall be housed inside a NEMA type 3, 304 stainless steel 12-gauge enclosure sized suitably to house all the pump and control components. The enclosure shall be minimum 4' high complete with sloping and removable top access lid, flush mount front and back doors with flush mount door handles, a minimum 1" Styrofoam board insulation with cover skins, weatherproof NEMA type 4 gaskets around door with stainless steel hinges, and drip shield gasket between the lid and enclosure.

   The enclosure doors shall be 30" access wide. The enclosure heater shall be equipped with a thermostat control and on/off switch. At the discretion of the City, additional enclosure configurations may be reviewed and approved. Refer to ***Detail Sheet IR-60: Booster Pump*** for more information.

2) A schematic detail shall be submitted for approval at the design stage with a detailed drawing submitted for approval at the construction stage. The detail should show a by-pass line in case of pump servicing. All equipment including pumps, motors, inlet and outlet piping, valves, instrumentation, and control panel shall be structurally supported and mounted within a manufactured base and the enclosure unit to form a single homogeneous operating booster pump.

   The base shall supply sufficient rigidity to withstand the stresses of reasonable and competent transportation to site, off-loading by a forklift, installation, and operation. Suction and discharge pipes should be contained within the enclosure and through the concrete floor with a flexible rubber expansion joint used on the system discharge pipe.

3) All piping shall be constructed from epoxy painted ASTM A105 schedule 40 steel pipe or heavier as required to maintain the pressure safety factor and to be in accordance with *Alberta Regulation 119/2007: Alberta Safety Codes Act*

Plumbing Code Regulation. All subsurface metal pipe shall have cathodic protection.

8.2.11.3 Centrifugal Pumps

1) Centrifugal pumps may be approved for use in applications where the suction lift does not exceed the maximum draw down depth.
2) Centrifugal pump designs shall include the pump priming features, foot valve specifications, total head calculations, pump motor submergence considerations, storage tank details or pond details, etc.
3) The use of centrifugal pumps shall be evaluated and approved on case-by-case application. Where centrifugal pumps are not suitable, submersible or turbine pumps shall be used (refer to ***8.2.11.4 Submersible or Turbine Pumps***).

8.2.11.4 Submersible or Turbine Pumps

1) The pump station design shall consist of, but not be limited to, the pump house structural and architectural details, the intake pipe and screen, the wet well, the air gap for potable supplement, the mechanical pump layout, the water filtration system and treatment, the specialty valves, the electrical controls, and all the mechanical pipes and fittings. The pump station shall be sized to appropriately house all the listed components with enough future space for additional filtration, chemigation, etc.
2) The pump and motor selection shall be based on the most efficient pump for the operating conditions and to prevent service factor operation at any point on the pump curve. Pump efficiency below 80% will not be accepted.

   Multi stage turbine pumps should have a water lubricated stainless steel shaft, bronze impellers, and high-grade cast iron discharge heads. In general, the motor shall be heavy-duty squirrel cage induction type, NEMA design B, vertical hollow shaft motor, and high efficiency inverter rated suitable for use on the specified volts, three phase, 60 Hz electric service supply.
3) A detailed mechanical drawing shall be submitted for approval at the design stage complete with all mechanical and electrical components, instrumentation, wet well, intake line, structural steel base, concrete flooring, etc. Duty/standby configuration with a pressure maintenance pump is preferred.

   The pump skid shall be designed and fabricated to provide proper structural support for all the attached equipment, and shall be constructed from heavy weight channel or I-beam steel.
4) The pump skid, attached piping, and supports shall be grit-blasted and primed with an industrial grade epoxy primer to a minimum thickness of 2.5 mm. The finish coat shall be epoxy semi-gloss to a minimum thickness of 3 mm. All bolts used in the assembly shall be zinc plated or Stainless steel.
5) Electrical shall meet the following requirements:
   a) Controls and instrumentation should be housed in a NEMA 12 enclosure constructed with 12 gauge steel with integral latches unless specified otherwise.

b) The control panel shall be dip cleaned, acid etched and neutralized, coated with iron phosphate, and painted with a minimum 1.5mm polyurethane finish coat.

c) All indicating lights, reset buttons, selector switches, operator interface devices, speed potentiometer, etc. shall be mounted on the enclosure door.

d) All internal components shall be mounted to the removable back plate assembly of the enclosure.

e) A non-fusible main disconnect shall be provided through the door operator to isolate all controls and motor starting equipment from the incoming power.

f) Electrical equipment shall be protected by an ***ULC*** approved surge arrestor, as per the *Canadian Electric (CE) Code* (CSA 22.1) and any other local regulatory conditions. Power control circuitry shall be protected by a separate surge arrestor. The lightning arrestors shall have indicator lights to show the protection is active.

g) Power for the controls shall be provided by a dedicated control power transformer unless otherwise specified in the design.

h) All control components shall be protected by time delay circuit breakers of adequate size and voltage rating.

i) Electrical components shall be manufactured by ABB, Intermatic Corporation, Hammond, Marcus, Telemechanique, MSP, Seametrics, or approved equal.

6) The wet well shall be sized and located based on the design requirements for each project with all necessary pipping and level controls. The potable supplement shall be provided to the wet well above the vault and through an air gap above the flood level of the pond.

8.2.12 Automatic Filtration

1) The filter shall be automatic self-flushing according to pressure differential with a stainless steel screen and an epoxy coated carbon steel housing. The design may specify a stainless steel 316 filter housing depending on the application.

   The screen mesh shall be 100 microns unless otherwise requested in the design. The filter flushing process shall not interrupt the downstream flow. The filter selection shall be based on the flow and pressure of the designed pumps. Approved self-flushing filters are Orival, Amiad, RainBird, or approved equal.

2) UV treatment levels/systems and automatic self-cleaning filters suitable for UV treatment pre-filtration are currently being developed by Calgary Parks, along with related jurisdictions, and will be reviewed and approved on case-by-case basis, depending on the design.

3) Where non-potable water is used for irrigation, all water delivery components and valves shall have non-potable indicators such as purple covers or purple handles, and shall be suitable for use with non-potable/reclaimed water.

8.2.13 Sleeving

The guidelines and specifications in this section should be used in conjunction with ***Detail Sheet IR-61: Road Crossing High Density Poly***.

1) Sleeving shall be PVC C-900 (bell and spigot) pipe as per The City of Calgary's *Standard Specifications: Sewer Construction* (or an approved equal).
2) Diameter of the conduit shall be twice the diameter of the irrigation pipe. The size of the conduit shall be measured in 50 mm increments or as noted on the drawings.
3) Extend sleeving a minimum of 1 m beyond the edge of the pavement of the amenity area. Tape ends to prevent debris filling.

   Note: Do not cut wires or pipe on existing irrigation systems. Use one sleeve as per above and cut the sleeve down its length to create two half shells. Excavate under pipe and wires, then place one half of sleeve under wire and pipe, place the other half above pipe and wire, and then clamp the two halves together with two broken pipe repair clamps.

8.2.14 Miscellaneous Components

All miscellaneous components shall be of the type and size indicated on the drawings or details and installed according to approved manufacturer's directions, or at the direction of Calgary Parks. Miscellaneous components could include (but are not limited to) air relief valves (refer to ***Detail Sheet IR-62: Air Relief Valve HDPE/PVC***), pressure reducing valves (refer to ***Detail Sheet IR-63: Pressure Reducing Valve Assembly***), concrete vaults or meter boxes, and valve markers and caps.

8.2.15 Irrigation Products Currently Being Tested

Currently, one irrigation product is under testing: Plastic Electric Control Valve - Toro P220-26 Series.

8.3 Execution

8.3.1 Drawings

The Contractor must have an approved set of drawings and specifications available prior to calling Calgary Parks for an inspection. All installations require inspection acceptance from The City.

8.3.2 Coordination

Fully co-ordinate work with other trades so as not to delay work progress. If the water or electric service extends from a building, co-ordinate work with the building owner to ensure proper connections to services.

8.3.3 Inspections and Testing

The Contractor shall provide Calgary Parks Water Management 24 hour notice for all types of inspections or testing as required. The inspections listed in this section are the minimum requirements; additional tests and inspections may be required at the discretion of Calgary Parks ***Water Management***.

8.3.3.1 Layout Inspection

1) Large Parks and sites with sports fields shall be staked out by digital survey instrument, including locations of sprinkler heads and/or quick coupler valves, double check valve, zone control valves and tees, elbows for the pipe, as well as the layout of all the piping, park water service, irrigation controller, and the electrical drop. Confirm that the layout is within project boundaries and property lines, and ensure all surface hardware, excluding sprinklers, has been installed outside of sports fields and the three-meter buffer zones.

   Under exceptional circumstances and subject to the approval of Calgary Parks ***Water Management***, limited encroachment of surface hardware into the buffer zone may be acceptable. Heads shall be spaced to ensure head-to-head coverage. Where deviation from the design drawing is anticipated, submit change requests (in writing) to Calgary Parks ***Water Management***.
2) Verify (on site) the location of all sleeving under paving, and adjust to suit.
3) Verify the location of all underground utilities and use standard precautions when working near them. Make good all damages at the Contractor's cost.
4) Ensure that park water services are set back a minimum of 2.5 m from pathways, hard surfaces, and trees. Setback mainline a minimum of 2 m from pathways, hard surfaces and trees. Setback lateral irrigation lines must allow for the 3-elbow swing and rotor or spray to be a minimum of 150 mm from private property lines. Refer to ***Detail Sheet IR-66: 50 mm Parks Water Service*** and ***Detail Sheet IR-67: 150 mm Parks Water Service***) for more information.
5) Have the layout inspected and approved by Calgary Parks ***Water Management*** before commencing work.

6) Necessary adjustments to the spacing of the sprinklers in the field might be required (due to changes in landscape elements). Adjustments must be completed at no extra cost to Calgary Parks.
7) Ensure that the final grade does not carry overland water drainage into the DCVA box and zone control valve boxes, as per design parameters (refer to ***8.2.10.1 General Requirements***).
8) Provide a copy of the valid plumbing permit for all work related to the backflow prevention device.

8.3.3.2 Open Trench Inspections for Main and Laterals

1) Items that must be in place and complete for the open trench inspection include:
   a) Trench depth and alignment.
   b) Bedding material.
   c) Pipe alignment joints and expansion couplers, and valves.
   d) Butt fusion or electro fusion joints.
   e) Electric valves and DCV boxes with gravel sumps.
   f) Drains with gravel sumps.
   g) Swing joints and head locations.
   h) Thrust blocking and conduit under paving.
   i) Leak test without heads, if required. Refer to Section 8.3.3.3 for more information.
   j) Electrical wiring and electrical conduit.
   k) Meter, as supplied by The City of Calgary.
   l) 50 cm minimum separation between adjoining pipes. Pipes cannot share the same trench.
   m) Other items, as deemed appropriate by Calgary Parks ***Water Management***.
   n) Items 1c through 1m shall be inspected in the event that the system is “plowed- in.”

15) Before backfilling, ensure that acceptance and approval of the irrigation system, as viewed during the open trench inspection and leak test, has been received (in writing) from Calgary Parks ***Water Management***.
16) Calgary Parks ***Water Management*** shall be given a minimum of 24-hour’s notice of when the HDPE welding process is ready to begin.
17) All butt fusion and electro fusion welds shall meet applicable specifications. The Contractor shall keep a log of the fusion tests to be reviewed by Calgary Parks Water Management during inspection. Any butt fusion or electro fusion welds not meeting the specifications may require a Back Bend Test, at the discretion of Calgary Parks ***Water Management***.

    To conduct a Back Bend Test:

a) A strap or section shall be cut out of a fused section of pipe; the strap shall extend a minimum of 150 mm on either side of the fusion and shall be a minimum of 25 mm wide.
b) The strap shall then be bent back so that the ends of the strap are touching.
c) Any disbondment or voids at the fusion will indicate a poor fusion. If failure occurs, all fusion joints exhibiting similar deviations from the bead melt specifications will be rejected.
d) The Back Bend Test must be completed successfully before proceeding.

8.3.3.3 Leak Test

1) A Leak Test shall be performed consistent with ASTM F2164 - 13 (or most current) Standard Practice for Field Leak Testing of Polyethylene (PE) Pressure Piping Systems Using Hydrostatic Pressure.
2) The Leak Test shall not be done unless written proof of the open trench inspection is available.
3) At Calgary Parks' discretion, a pressure gauge shall be placed on any point in the system and a reading shall be taken to confirm pressure in the system during the Leak Test. Pressure gauges shall be minimum 50 mm face, 0-1000 kPa, Peacock or equal, complete with pet cock.

8.3.3.4 Construction Completion Inspection

1) Items that shall be in place and complete for the inspection include:
   a) Back filling and landscaping.
   b) Drain and valve boxes installed as per specifications and clear of debris.
   c) Water pressure on and flowing freely through the system.
   d) Irrigation head adjustment, and all heads activated and throwing water, to provide adequate coverage as per the manufacturer's recommendations and the approved irrigation drawing.
   e) Controller installation complete with power, grounding, enclosure, and concrete pad.

      Note: The installation of a temporary controller will be acceptable at CCC, however, the Developer shall install a permanent automatic controller one month prior to application for the FAC.

   f) Pumps and filters complete with all components.
   g) Written proof of approved inspections.
2) Submit a completed *Parks Irrigation Meter Sheet* (refer to ***Figure 8-2***).
3) Final as-built drawings shall be submitted within 60 days after CCC is issued, and are to include the Park ID provided by the Water Management Inspector at CCC.
4) Calgary Parks will issue (in writing) acceptance and approval of the construction completion inspection and pressure test.

Note: Annually test the backflow prevention device in accordance with *Wastewater Bylaw 40M2006*. A copy of the *Testing and Inspection Report for Double Check Valve Assemblies* shall be submitted to Calgary Parks ***Development Inspector*** for forwarding to The City of Calgary's Water Services ***Wastewater***. The municipal address of the site must be indicated on the Report.

8.3.3.5 Final Acceptance Certificate Inspection

1)) Irrigation items to be approved at an FAC inspection include:
   a) All valves, sprinkler heads, or other irrigation sprinkler system components, shall be undamaged and in good working condition.
   b) All valve boxes, shall be flush, set to the approved final grade, and free of debris. The valve assemblies must be exposed, as per this manual.
   c) All zone control valves and drain valves, which shall be functioning properly, with no leakage through the valve.
   d) All heads, which shall be in a vertical position and installed at a depth recommended by the manufacturer. As well, heads shall be activated and operating to provide necessary coverage with the arc set as designed and with minimum overspray outside of the park property.
   e) Pumps and filters, complete with all mechanical and electrical components.
   f) Irrigation controllers, complete with all components.
2) Provide copies of the yearly backflow prevention device test showing the assembly is operating properly.
3) Maintenance manuals are to be submitted to Calgary Parks ***Water Management*** in PDF format prior to FAC approval for all optional amenities associated with irrigation and/or water systems (i.e., water features, fountains, pumps, booster pumps, spray pools, rinks, etc.). A hardcopy is to be submitted to the Water Management Inspector at FAC.
4) Temporary irrigation systems shall be removed and their water services shall be "killed" (i.e., removed to the water main). Provide certification from The City of Calgary's Water Services ***Wastewater*** that this has been completed to their satisfaction.
5) Submit a completed Parks Irrigation Meter Sheet form (refer to ***Figure 8-2***), and a completed Parks Irrigation Information Sheet (refer to ***Figure 8-3***).

   Note: The Irrigation Information Sheet must contain actual calculated values, not the standard numbers out of the catalogues.
6) FACs approved after September 30th for sites with an irrigation system will require the presence of Parks ***Water Management*** (or designate) during the winterizing procedure. Calgary Parks ***Operations*** will ensure that staff will be available upon 48-hours notice. As an alternative, Parks staff will not be required on site during the winterization procedure provided the Developer or Contractor agree (in writing) to start the system and perform any repairs that might be required the following spring.

8.3.4 Trenching

1) Ensure that the grade has been set and approved by Calgary Parks before commencing trench operations.
2) Width of trench shall be a minimum of three times the diameter of the pipe.
3) Main line pipe depth shall be in accordance with ***Table 8-2*** to ensure adequate coverage.

Table 8-2: Pipe Depth

MAIN LINE PIPE DEPTH			
Pipe Size	**Min. Depth to Top of Pipe**	**Max. Depth of Bottom of Pipe**	**Imp. Depths**
2” (50 mm)	350 mm	600 mm	14” - 24”
4” (100 mm)	350 mm	650 mm	14” - 26”
6” (150 mm)	400 mm	750 mm	16” - 30”
8” (200 mm)	400 mm	800 mm	16” - 32”
LATERAL ZONE PIPING DEPTH			
Pipe Size	**Min. Depth to Top of Pipe**	**Max. Depth of Bottom of Pipe**	**Imp. Depths**
2” (50 mm) zone lines depth	300 mm	450 mm	12” - 18”

3) Bed with suitable material (refer to ***Backfill Material***) to the proper depth and compact to meet the approval of Calgary Parks.

4) The Contractor shall repair any settlement of the trenches by bringing them to grade with topsoil and sodding or approved landscape.

5) Plowing of HDPE lateral pipes shall be permitted by written approval of Calgary Parks Water Management only.

6) Install sleeving as required to enclose piping under paved areas. Depth of sleeving shall match ***Table 8-2***, minimum 1000 mm under roadways, or as approved by Calgary Roads and Calgary Parks’ Right of Way Management Service.

8.3.5 Installation

1) Submit a schedule (in writing) to Calgary Parks ***Water Management*** for the proper installation of the system. Coordinate irrigation installation with other aspects of site development to ensure proper construction and reduce the possibility of damage to and by other trades. All work shall conform to approved design drawings.
2) Install all piping so that it is not bent from a straight line in excess of the manufacturer's recommendation for local conditions, and with a minimum fall of 0.5% to drain boxes.
3) Ensure that a green 14 gauge tracer wire is installed for all lateral lines.
4) Make all joints and connections tight and in accordance with manufacturer's recommendations.

5) Ensure that the glue adhesive is appropriate for the ambient temperature at the time of installation and is used in accordance with manufacturer's specifications.
6) Ensure HDPE fusion is performed under suitable conditions by a certified fitter and as per manufacturers' recommendations.
7) Install risers with firmly connected and plumbed. Refer to the following detail sheets for more information:
   - ***Detail Sheet IR-08: Mainline Quick Coupler for PVC and HDPE***
   - ***Detail Sheet IR-09: Three Elbow Swing Joint for Plastic Sprinkler***
   - ***Detail Sheet IR-10: Three Elbow Swing Joint for Plastic Shrub Riser***
   - ***Detail Sheet IR-11: Pigtail Swing Joint for HDPE***
8) All sprinklers shall be adjusted and set flush with final grade using a three elbow swing joint (refer to ***Detail Sheet IR-08: Mainline Quick Coupler for PVC and HDPE*** and ***Detail Sheet IR-09: Three Elbow Swing Joint for Plastic Sprinkler***). Ensure that the horizontal nipple is no more than 45 degrees out of level when setting sprinklers. Where utility easements or property lines preclude the standard assembly, a “pigtail” swing joint shall be used (refer to ***Detail Sheet IR-11: Pigtail Swing Joint for HDPE***).

   Note: Pigtails shall be excluded in utility easements that contain concrete drainage swales. However, the Developer is responsible for repairs to the irrigation system during the maintenance period if remedial work is performed by The City of Calgary within the drainage easement.
9) All backflow prevention assemblies shall be installed in accordance with *Wastewater Bylaw 40M2006* and *Alberta Regulation 119/2007: Alberta Safety Codes Act Plumbing Code Regulation* (refer to ***Detail Sheet IR-46: 50 mm Double Check Valve Assembly***, ***Detail Sheet IR-47: 100 mm Double Check Valve Assembly***, ***Detail Sheet IR-49: 150 mm Double Check Valve Assembly***, and ***Detail Sheet IR-50: 200 mm Double Check Valve Assembly***).Backflow prevention assemblies shall be tested and tagged upon installation, and then annually thereafter prior to activating the system that year.
10) Ensure that items such as shrub heads are set at the proper height to obtain adequate coverage.
11) Block all changes of direction and pipe endings (tees, 45° and 90° elbows, and plugs). If concrete thrust blocks are used, protect the pipe from spillover (refer to ***8.2.3.4 Thrust Blocks for PVC***).
12) Ensure that the last sprinkler head tee is set no closer to the pipe end than 150 mm.
13) Install quick coupler valves in a small round Carson or NDS valve box. The maximum depth of the quick coupler from the top of the box is 50 mm.
14) Install drain valves and boxes at appropriate locations to accommodate the slope of the land and the size of the irrigation system (refer to ***Detail Sheet IR-***

68: Drain Pit for High Density Pipe and ***Detail Sheet IR-69: Drain Pit for PVC Pipe***). Ensure that all heads, valves, and drains are not set closer than 1 m from each other. If the mainline is less than 10 m in length, drain pits will not be required.

15) Install one 25 mm curb stop drain valve (refer to ***Detail Sheet IR-70: 25 mm Curb Stop Assembly***) at each end of a conduit under a roadway to ensure adequate drainage.
16) Install Park Water Services as per ***Detail Sheet IR-66: 50 mm Parks Water Service*** and ***Detail Sheet IR-67: 150 mm Parks Water Service***.
17) Where provided for by The City of Calgary, install a 50 mm master valve with a water meter as per ***Detail Sheet IR-66: 50 mm Parks Water Service***.

8.3.6 Backfilling

8.3.6.1 Backfill Material

1) Backfill material for pipe trenches within 150 mm of a pipe shall be clean, approved sand fill or gravel less than 12 mm diameter in size, free of stones and sharp objects that could damage the pipe.
2) Excavated material may be used for backfilling only when approved by Calgary Parks.

8.3.6.2 Backfilling Procedure

1) After an open trench inspection and the receipt of written approval from Calgary Parks, backfill with an approved fill (refer to ***8.3.6.1 Backfill Material***).
2) Place backfill in 150 mm lifts, placing and compacting all lifts to 85% Standard Proctor Density (S.P.D.) until 150 mm below finished grade. Place topsoil, seed, and/or sod as specified.
3) Adjust sprinkler heads to the correct spray angle to provide adequate coverage without excessive overspray.
4) All irrigation systems shall be flushed out in a satisfactory manner to remove accumulation of dirt and other deleterious matter. Flush all laterals in a manner approved by the manufacturer to prevent clogging of sprinkler screens or nozzles.
5) In the event that finished landscape grades are changed more than 150 mm, (either lower or higher) and thereby compromise the initial intent of the irrigation specifications, at the direction of Calgary Parks the irrigation piping and fixtures might have to be adjusted to meet the specifications and drain valve assemblies might require a change to the standard 25 mm curb stop size.
6) Repair as required upon final testing by Calgary Parks.

8.3.7 Clean Up

Remove off site all debris and excess material left over from installation at the end of each working day or as required.

8.3.8 Central Control System

1) All irrigated sites will include the installation of a Motorola irrigation central controller, as described in ***8.2.6 Control System*** and ***8.2.6 Control System***.
2) During layout inspection, Calgary Parks ***Water Management*** shall be on site to approve the location of control equipment prior to installation.
3) Electrical drops to controllers should have an additional 50 feet of power cable to allow proper placement of control equipment within the site.
4) All irrigation controllers/cabinets are to be set up as non-metered electric sites with the following exceptions:
    a) Sites that involve heavy power usage such as sites with pumps and/or motorized valve operations.
    b) Sites where other services have been added from the cabinet to operate non-irrigation related electrical components such as heated rink services, lights, etc.
    c) if a third party is actually the major user of energy and Calgary Parks is the site owner.

8.3.8.1 Controllers and Enclosures

1) For outdoor installations, controller enclosures shall be fixed to a concrete base as per ***Detail Sheet IR-19: Concrete Pad***. The cabinet shall be appropriately sealed and protected as per NEMA4X.
2) DC cabinets shall be installed facing the sun in a south direction, and should not be shaded by other site structures, houses, trees, or future potential growth of trees.
3) For indoor installations:
    a) The controller shall be installed in an approved cabinet (as described in section ***8.2.6 Control System***) and centered 1650 mm above the floor.
    b) The cabinet shall be accessible to Calgary Parks Water Management at all times. Exterior mounting is preferred for access reasons. Should a cabinet be approved to be installed in a locked location, all keys must be made available to Parks Water Management.
    c) Grounding shall be as per the building code.
4) Irrigation wire conduits to controller cabinets or buildings shall be sized in the same manner as field wires conduits.
5) For indoor cabinet installations, a minimum of 4-5 cm (1.5-2”) diameter galvanized or aluminum conduit should be used to run antenna and weather station cables to the exterior or through roof penetrations.
6) Piccolo-XR cabinets must be approved at design stage and shall be installed as follows:
    a) A Channell pedestal enclosure must be used as per ***Detail Sheet IR-23: Piccolo-XR Integrated Pedestal***.

b) The Mottech enclosure mounting must be via a 5 cm (2”) outside diameter (OD) galvanized steel pole or 5 cm (2”) as per ***Detail Sheet IR-24: Piccolo-XR Solar Enclosure***.

c) For safety, both cabinets must have earth grounding rods that are Cadwelded.

7) Piccolo-XRs with bollards shall be installed as close as possible to the control valves to limit subsurface irrigation wiring. Determination of bollard locations shall take into account, site amenities, communication paths, under ground infrastructure, and possible citizen impact. Prior to installation, Calgary Parks ***Water Management*** shall be on site to approve the Piccolo-XR locations.
8) The Contractor shall provide a radio communication survey when requested by Calgary Parks ***Water Management***.
9) All installed components shall fit inside the cabinet with a minimum of 15-20 cm of serviceable room for field wiring to be installed at the bottom of the cabinet.
10) All electrical panels shall have the smallest footprint possible and be mounted along either side of the cabinet interior to maximize the amount of footprint room for controllers and related hardware.
11) When used, antenna masts shall have an FM2 swivel pole and an electrical entre on the top of the mast that is used for wiring and coaxial cable management and to prevent water from entering the mast internals. Refer to ***Detail Sheet IR-18: Swivel Pole*** and ***Detail Sheet IR-22: Antenna, Weather Station and Weather Sensor*** for more information
12) All cabinets shall be cleaned internally and externally by the FAC date, with no debris inside.
13) In addition to the standard UHF radio, all ACE controllers shall be installed with a modem.
14) The City of Calgary is currently testing and evaluating new DC controller components, NEMA cabinet designs, and push button specifications for future inclusion in this manual.

8.3.8.2 Antennas and Weather Stations

1) Installation of antennas shall follow industry standards.
2) Installation of weather stations shall be installed as per the manufacturer’s recommendations to ensure proper weather proofing and calibration.

8.3.8.3 Electrical

8.3.8.3.1 AC Power

1) Controllers with AC power supply shall be installed in accordance with the *Canadian Electric (CE) Code* (CSA 22.1) and any other local regulatory conditions.
2) Quad receptacles shall be Ground Fault Interrupter (GFI) protected via an electrical panel GFI breaker, and surge protected for power fluctuations.
3) A dry contact output from the surge protector shall be provided for connection to the irrigation controller.
4) On sites where other services (lights, rinks, etc.) use the same power source as the controller, the main power breaker control should be on the irrigation controller side, with sub-breakers for the other services. This will ensure that in the case of a third party service power disconnect, the power to the irrigation controller will remain connected.
5) Install 110-volt wire in accordance with the *Canadian Electric (CE) Code* (CSA 22.1) and any other local regulatory conditions. 110-volt wiring shall be colour coordinated to be different from the 24-volt wiring and installed in a grey PVC electrical conduit. The electrical conduit shall be trenched, not ploughed, shall be marked with continuous yellow caution tape, and shall placed directly over the conduit 300 mm from the top.

8.3.8.3.2 DC Solar Power

DC solar power is pilot tested but not yet a Calgary Parks standard. Where DC solar use is specifically approved during the pre-design stage, the following standards must be adhered to:

1) DC Solar cabinets shall be sized as in cabinet guidelines for up to two Irrinet M controllers.
2) FM2 mast for solar panels and any antennas are required in the design.
3) All wires shall be installed within the mast and come up through the cabinet pedestal.
4) Wiring shall be appropriately sized for the solar design and distance to the cabinet.
5) The pilot tested DC solar controller is the Morningstar MPPT. It must be of correct amperage for the site size and the charge controller must have a low voltage disconnect (LVD) option.
6) Fuses or electrical breakers shall be installed between the solar panel and charge controller.
7) A fuse or breaker shall be installed before the battery terminals.
8) For power load reasons, only an approved portable radio (not mobile radio) shall be used.

9) If the site design requires it, a cellular LTE modem can be used such as the Sierra Wireless RV50.
10) For single Irrinet M DC controllers up to 24 stations (minimum specification), include:
    - 100 Ahr Battery
    - 120 W solar panel
    - FM2 mast with electrical entry.
    - Charge controller 10A MPPT with appropriate LVD for electrical current load.
    - Fuse and breakers on all power connections.
    - Grounding grid on cabinet.
    - Ground bar multi-connection.
    - HT750 radio only.
    - DC Latching Solenoid for hydrometer.
11) For dual Irrinet M DC controllers up to 48 stations, include:
    - 175 Ahr battery or two 100 Ahr batteries wired in parallel.
    - 120 W to 150 W solar panel.
    - FM2 mast with electrical entry.
    - Charge controller 10A MPPT with appropriate LVD for electrical current load.
    - Fuse and breakers on all power connections.
    - Grounding grid on cabinet.
    - Ground bar multi-connection.
    - HT750 radio only.

8.3.8.4 Grounding

The guidelines and specifications in this section should be used in conjunction with ***Detail Sheet IR-20: Irrigation Controller Cabinet - NEMA 4X*** and ***Detail Sheet IR-21: Indoor Wall-mounted Irrigation Cabinet***.

1) Provide Cadweld for field ground connections (i.e., ground rod shall be Cadwelded to ground connection cable and installed in a round valve box).
2) Internal cabinet grounding connections shall be by a ground bar and:
    a) The ground bar shall be sufficient for a minimum of six to eight (6-8) ground connections.
    b) All grounds within the cabinet and both electrical, lightning and earthing grounds shall be connected to this bar.
    c) The ground bar shall be installed as per the manufacturer instructions
    d) Grounding connections shall be on clean bare metal.
    e) Grounding connections shall be clean of any debris and/or paint.
3) Lightning grounding should be terminated to the ground bar.
4) Soil amendment material (referred to as ground enhancement material or contact material) such as GEM, PowerSet, and PowerFill, should be used to

improve the conductivity between the copper electrodes and the soil surrounding them.

8.3.8.5 Control Wiring

1) All wire shall follow irrigation lines where possible. Wiring that leaves the pipe alignment shall be placed in a PVC electrical conduit for below ground installation or in a galvanized conduit for above ground installation.
2) The maximum number of 14 AWG wires in a 50 mm conduit is 14 wires; in a 100 mm conduit, 40 wires; and in a 150 mm conduit, 70 wires.
3) Wire for the automatic control system shall not go in the same sleeve as the irrigation pipe. Irrigation wire shall have its own conduits.
4) Lay the wire in the trench with sufficient slack to accommodate backfilling and then backfill with suitable material (refer to***8.3.6.1 Backfill Material***) prior to installation of the piping (refer to ***Detail Sheet IR-04: 50 mm to 50 mm PVC Valve Connection***).
5) Provide an extra 600 mm (minimum) of coiled loops of wire at all control valves and changes in direction.
6) All subsurface wiring shall follow the established right hand rule (refer to ***Detail Sheet IR-06: Right Hand Valve Wiring Rule***).
7) All field wires shall be heat shrink labeled at the controller for permanent marking a according to the right hand rule (refer to ***Detail Sheet IR-06: Right Hand Valve Wiring Rule***).
    a) Print zone numbers in black on white background labels.
    b) All field wiring in splice boxes must have heat shrink labeling coming in and going out of the splice box with correct zone numbering.
8) DC controller wiring is different than AC wiring and should be treated accordingly (i.e., six (6) zones per common).
9) Use continuous wire runs wherever wire roll sizes allow.
10) Provide one (1) spare common wire for each main line leg.
11) Provide one (1) spare control wire run for each group of five (5) control zones or less, and terminate at the fifth or last valve box. The spare control wire shall be looped in each valve box to extend 500 mm above the valve boxes.
12) For sites with future expected expansion planned on the **same controller**, a 100 mm PVC electrical conduit may be added from the controller to the end of the capped main line run (where the expansion is planned) instead of installing an estimated number of spare wires that might not be necessary in the future. Calgary Parks Water Management will determine whether a conduit or spare lines install is required on a case-by-case basis.
13) Wire splices shall be made waterproof with the use of an acceptable outdoor waterproof wire connector. Field splices shall be identified, looped, labeled and located in a lockable irrigation box sized appropriate to the number of wires that are spliced.

14) When making field splices or valve wire connections, the length of wire for all control or common wires is to extend at least 500mm out of the box before meeting the watertight connector.
15) Power wiring material and conduits, including proper installation practices, shall be made in accordance with the *Canadian Electric (CE) Code* (CSA 22.1) and any other local regulatory conditions.

8.3.8.6 Radios, Modems and Antennas

1) Conduit size between the cabinet and mast shall be enough for the total number of antennas and equipment.
2) Piccolo XR controllers shall have their factory antennas replaced by a band specific to the City's frequencies (e.g., ICOM, portable antenna 450 to 470Mhz whip).
3) Antennas shall be professionally installed by authorized technicians to ensure safety and security.
4) All antenna coaxial cables shall be LMR400 or equivalent unless otherwise directly approved by City personnel.
5) Localized antennas, such as the Phantom type antenna (when approved), can be mounted onto the cabinet directly with LMR 195, LMR200 or LMR240 coaxial cables no more than 60 cm from source to antenna.

8.3.8.7 Weather Station

1) Weather station cabling must be internal to the mast.
2) The preferred location of a weather station is 3.0-3.6 m (10-12 feet) above turf.
3) The weather station control pad must be properly mounted inside the cabinet and properly cable managed for wiring.
4) Typically, the weather station will be mounted below the antennas on the mast.

8.3.9 Maintenance

Protect and maintain the entire irrigation system from the time of installation until the FAC is issued by Calgary Parks. Refer to ***2.9 FINAL ACCEPTANCE CERTIFICATE (FAC)*** and ***8.3.3.5 Final Acceptance Certificate Inspection*** for more information.

8.3.9.1 System Turn On

1) The system shall be operational by May 15.
2) Spray paint water services, and keep them clear and exposed from overgrowth (locator markings).

3) Follow all maintenance and repair procedures to ensure a completely functional system, with head to head coverage, according to the original intent of the design.
4) Implement and submit to Calgary Parks ***Water Management*** a weekly watering schedule for the season, which shall provide moisture to the turf and plant material as site conditions dictate.
5) Complete and submit to Calgary Parks ***Water Management*** a double-check valve test with the municipal address of the site indicated on the *Product Evaluation and Testing Procedure* as well as a completed tester tag that includes the address and date.

8.3.9.2 Monthly Checks

The following items shall be checked on a monthly basis for proper operation:

- Controller.
- Automatic valves.
- Double-check valve.
- Water services.
- Piping.
- Gate valves.
- Sprinkler heads (arcs).
- Boxes.
- Pumps and filters.
- General settling and grading problems.

8.3.9.3 System Turn Off

1) Turn off the water supply to the irrigation system in one of the following ways:
   - Stop and drain (or seal); 1/4 turn clockwise to close.
   - Turn service valve counter-clockwise to close, and turn drain rod 1/4 turn counter-clockwise to open.
2) Open all drain valves on the main line of the irrigation system and on all test cocks and drains on the double check valve assembly. Allow sufficient time for the water to drain out.
3) Close all drain valves opened in Step 2.
4) Connect an air compressor (600 cfm) to a quick coupler using a 25 mm hose (refer to ***Detail Sheet IR-08: Mainline Quick Coupler for PVC and HDPE***) or to a 50 mm gate valve outlet assembly using a 50 mm hose (refer to ***Detail Sheet***

IR-35: 50 mm Compressor Connection & Meter Test Outlet Assembly)
downstream of the double check valve assembly or water meter.

5) Activate all electric valves from the controller. Ensure that each zone blows “clean” of any water before proceeding to the next zone.

   Note: Pressure should not exceed 50 psi during blow-out.

6) After blow-out is complete, go to each electric valve and manually activate each zone to make sure you have not missed a zone. Return to the controller and repeat the procedure for each zone to dispel any remaining water.

7) Turn the air compressor off, and then drain the air from the main line through the drain valves. Check all drain valves to make sure no water is coming out. Disconnect the air compressor. **Do not** leave drain valves and test cocks open for the winter.

SECTION III:
LANDSCAPE MAINTENANCE

CHAPTER 9: LANDSCAPE MAINTENANCE STANDARDS

9.1 Introduction

Calgary Parks Operations Divisions have developed these maintenance standards as a benchmark for minimum level of performance. The Development Industry, at its discretion, may perform an increased level of maintenance. Sections within these standards are be specific to Calgary Parks Operations, and might not apply to the Development Industry.

9.2 Mowing

1) Applies to turf classifications ***A***, ***B***, and ***T***.
2) Desired Results: All turf has been cut evenly at the height designated below in a safe and efficient manner.
   - A - 5 - 7 cm
   - B - 5 - 10 cm
   - T - 10 - 20 cm.
3) Additional standards:
   - No excessive equipment “downtime”.
   - No areas have been missed.
   - No scalped turf.
   - No damage to trees, shrubs or other park features such as scraped bark on trees and shrubs, bent or scraped park furniture.
   - Prior to and after mowing, no visible litter on turf classification A areas and no more than one (1) piece of litter per $100m^2$ on turf classification B areas.
   - No highly visible grass clippings on turf classification A or B areas. Clippings should not accumulate to the point of creating an appearance problem or inhibit lawn growth on turf classification S or T areas.
   - Grass clippings should not be present on sidewalks, pathways, or any hard surfaces for any turf classification.
   - No lubricant or fuel spills on turf or non turf areas.

9.3 Small Mowing/Power Trim

1) Applies to turf classifications ***A*** and ***B***.
2) Desired Results: All turf has been cut evenly at the appropriate height (as designated below).
   - A - 5 - 7 cm
   - B - 5 - 10 cm
3) Additional standards:
   - No excessive equipment “downtime”.
   - No areas have been missed.
   - No scalped turf.
   - No damage to trees, shrubs or other park features such as scraped bark on trees and shrubs, bent or scraped park furniture.
   - Prior to and after mowing, no visible litter on turf classification A areas and no more than one (1) piece of litter per 100m^2 on turf classification B areas.
   - No highly visible grass clippings on turf classification A or B areas. Clippings should not accumulate to the point of creating an appearance problem or inhibit lawn growth on turf classification S or T areas.
   - Grass clippings should not be present on sidewalks, pathways, or any hard surfaces for any turf classification.
   - No lubricant or fuel spills on turf or non turf areas.

9.4 Litter Control

1) Applies to all park sites.
2) Desired Results:
   a) All “Ad Hoc” structures in the park (tree forts, etc.) must be removed.
   b) Fence lines must be cleaned of highly visible accumulated litter
   c) Visible litter must not exceed 2 pieces per 100 m^2 on turf classification ***A*** areas.

9.5 Garbage Receptacle Emptying

1) Applies to all park sites.
2) Desired Results:
   - All bags 75% full or over must be replaced.
   - All garbage cans must have a plastic garbage bag inside.
   - All garbage containers must be free of crusted garbage build-up and objectionable odors to prevent wasps or other insects from being attracted to the garbage can.
   - Area around garbage container must be litter free. All garbage bags, hazardous material, bio-hazardous waste must be safely disposed of according to applicable safety procedures.

9.6 Curb Sweeping, Spring and Fall Cleanup

1) Applies to all park sites.
2) Desired Results:
   - All possible areas within the site swept in a safe and efficient manner.
   - No litter or visible debris left on the turf.
   - Proper disposal of all hazardous material, including bio-hazardous waste, in compliance to applicable policy.
   - All debris piles removed from the site in a safe and efficient manner without damage to trees, shrubs, or other park features.
   - No damage to parks buildings or amenities.
   - No lubricant or fuel spills on turf or non-turf areas.

9.7 Fertilize

Note: Public Notice must be given prior to application.

1) Applies to turf classifications ***A*** and ***B***.
2) Desired Results:
   - Fertilizer application is even and uniform throughout.
   - No spillage of fertilizer.
   - No burning of turf grass.
   - No discolouring (streaking) of turf.
   - No damage to trees, shrubs, or other features, such as scraped bark on trees and shrubs and bent or scraped park furniture.
   - No lubricant or fuel spills on turf or non-turf areas.

9.8 Aerate

1) Applies to turf classifications ***A*** and ***B***.
2) Desired Results:
   - Aerator holes/cores should be 3” deep, 3” or less apart, and about ¾” in diameter.
   - No damage to trees, shrubs or other park features such as scraped bark on trees and bent or scraped park furniture, or damages to irrigation system.
   - No ripping or tearing turf (caused by sharp turns).
   - No missed areas.
   - No lubricant or fuel spills on turf or non-turf areas.

9.9 Top Dressing

1) Applies to turf classifications ***A*** and ***B***.
2) Desired Results:
   - Park site to be prepared for top dressing as required (i.e. removal of rocks and litter, mowing, sweeping, and aerating).
   - No damage to trees, shrubs, turf or other park features, such as scraped bark on trees and bent or scraped park furniture.
   - Accurate topsoil requirement calculations.
   - Appropriate soil mixture piling.
   - Loam spread and matted evenly throughout designated area.
   - No areas missed with top dressing material.
   - No remaining piles.
   - No damage to turf caused by loam piles.
   - No top dressing material on sidewalks or roadways.
   - No tools are to be left at the work site after completion of task.
   - No lubricant or fuel spills on turf or non-turf areas.

9.10 Chemical Weed Control

Note: Public Notice must be given prior to application.

1) Applies to all turf classifications, as well as all planting beds.
2) Desired Results:
   - No lubricant, chemical or fuel spills on turfed or non-turfed areas.
   - Threshold of 5 weeds per 1 m^2 attained on all turf classifications (for spot spraying refer to biocide report).
   - No damage to trees, shrubs or other park features as a result of spraying operations.
   - No spray (herbicide) damage to non targeted vegetation.
   - No spray (herbicide) damage within 10 meters of the edge of tot lots.
   - All signage removed.

9.11 Renovation of Park Site

Applies to all park sites except ***Natural Environment Parks***, which will require a Habitat Restoration Project (HRP). Refer to item 2 of ***1.6.1 Development Guidelines*** for more information about The City of Calgary's HRP Framework. Refer to *City of Calgary Plant Lists* to inform restoration work.

1) Desired Results: Renovations as required based on condition of site and specifics of those conditions. This could involve total renovation of park including (but not limited to):
   - Reseeding.
   - Resodding.
   - Change site's turf classification.
   - Renovation of playground area to meet new standards or safety. requirements (i.e. change of equipment from wooden structures to new metal/ plastic structures or a change of structure due to a health and safety issue like lead paint situation).

9.12 Tree Well Maintenance

1) Applies to all park sites except ***Natural Environment Parks***.
2) Desired Results:
   - Tree well to be either cultivated or mulched.
   - If the well is cultivated, it should be free of weeds and of a standard size (approximately 1 m in diameter).
   - Tree well should be intact and able to hold water.
   - If the well is mulched, mulch should be spread evenly to a depth of 4" and not piled against or touching the trunk of the tree (as this can rot the wood, causing decay or even death of the tree).
   - All visible litter has been removed.

9.13 Shrub Bed Maintenance

1) Applies to all park sites except ***Natural Environment Parks***.
2) Desired Results:
   a) Cultivated Beds:
      - No damage, such as broken branches or scraped bark.
      - Shrub bed area is cultivated and free of weeds.
      - No more than 5% of shrubs are dead, missing or diseased.
      - No more than 5% of broken, dead, or diseased shrub branches remain in the bed.
      - Shrub bed is 90% free of weeds.
      - All visible litter has been removed.
   b) Mulched Beds:
      - Shrub bed has been weeded and cultivated before mulch is applied.
      - Mulch is spread evenly to a depth of 4”.
      - Mulch should not be piled against the base of trees or shrubs, as this can rot the wood, causing decay or even death of the plant.
      - No more than 5% of shrubs are dead, missing or diseased.
      - No more than 5% of broken, dead, or diseased shrub branches remain in the bed.
      - Shrub beds is 90% free of weeds.
      - All visible litter has been removed.

9.14 Flower Bed Fertilizing

1) Applies to all park sites except ***Natural Environment Parks***.
2) Desired Results:
   - Flower displays are fertilized in a safe and efficient manner, using the correct rates and frequencies as recommended by the manufacturer.
   - Flower displays are healthy, vigorous, and colourful, in part due to an ongoing effective fertilizer program.
   - Even fertilizer coverage of target plants, without significant spillage.
   - No symptoms of toxicity as a result of over-fertilization.
   - No significant salt accumulations.
   - No fertilizer concentrate spilled on flower bed or surrounding area.
   - All immediate hazards have been removed.
   - All tools and equipment have been removed from site following completion of fertilizing activities.

9.15 Irrigation Maintenance

1) Applies to all irrigated park sites.
2) Desired Results: Successful completion of irrigation activities, including:
   - Service initiation.
   - DCV testing.
   - System turn-on.
   - All repairs (as required) must be completed so that the system operates effectively.
   - All systems are operational.
   - No water leaking from system.
   - No debris or parts left on site.
   - No irrigation boxes that have lids missing or in poor state of repair. All box lids are safe and locked.
   - The park's water value and drain rod are visible, to grade, and painted red after FAC.
   - All sprinkler heads/turf valves are to grade, so as not to be a tripping hazard.

9.16 Street Sidewalks (Snow Removal)

1) Applies to all park sites.
2) Desired Results:
   - Free of hazards and obstructions.
   - 98% clear of snow (snow and ice cleared in accordance with The City of Calgary *Streets Bylaw 20M88*).
   - Sand placed on 90% of slippery areas.
   - No damage to trees, fences, turf, or other features, such as scraped bark on trees and bent or scraped park furniture or fences.
   - No snow piled onto shrub/planting beds.
   - No lubricant or fuel spills on turf or non-turf areas.
   - No snow pushed onto private property.
   - No snow sprayed onto vehicles parked along the pathway or sidewalk.

9.17 Pathways, Designated Trails, Roads and Parking Lot Maintenance

1) Applies to all park sites.
2) Desired Results:
   - Must be maintained in order that they can be used for their intended purpose.
   - Must be inspected and repaired/renovated on a regular basis, either as required or as scheduled,
   - Must be maintained in a manner that meets all legislated requirements, including safety requirements.
   - Must be free of hazards and obstructions.
   - No damage to trees, fences, turf, or other park features, such as scraped bark on trees and bent or scraped park furniture or fences.
   - No lubricant or fuel spills on turf or non-turf areas.
   - No piles of debris or excess material left on site as a result of completed maintenance.

9.18 Park Features

1) Applies to all park sites.

   Note: Park features include (but are not limited to) park furniture signs, sculptures, garbage receptacles, lights, bollards, and stairway/platforms.
2) Desired Results:
   - All park features must be fully functional, as designed, at all times.
   - All park features must be installed as per ***SECTION II: STANDARD SPECIFICATIONS FOR LANDSCAPE CONSTRUCTION***.
   - All park features must be maintained to ensure safe operating conditions.
   - All park features must meet or exceed all legislated requirements.
   - All park features must be inspected and maintained on a regular basis, either as scheduled or as required.

9.19 Building and Janitorial Maintenance

1) Applies to all park sites.
2) Desired Results:
   a) Building Maintenance:
      - All vandalism must be reported according to procedure.
      - All breaches of security must be reported according to procedure.
      - All buildings must be safe and secure.
      - All fans, pumps, filters, furnaces, valves must be in working order and checked on a regular scheduled basis.
      - All lights and other electrical devices must be in working order.
   b) Building Janitorial:
      - Accumulations of water, mud, and dirt must not be present on more than 5% of the floor surface (after cleaning),
      - Broken glass or obvious litter must not be present,
      - Spill cleanup procedures and WHMIS policy must be adhered to.
      - Smudges, spots, stains, watermarks, etc. must not be present on more than 5% of any wall surface or mirrors.
      - Waste and sanitary receptacles must not be more than 75% full. Overflowing conditions and piles of litter around receptacles are not acceptable.
      - Dispensers (toilet paper, paper towels, etc.) must not be less than 25% full.
      - Toilets and sinks must be operable. Plugged, leaking, or overflowing toilets or sinks are not acceptable.

9.20 Playground Inspection and Maintenance

1) Applies to all park sites.
2) Desired Results:
   - Inspections must be completed as per established inspection schedule.
   - All formal (inspection report) documentation must be completed.
   - All minor repairs must be completed.
   - Any major repairs must be scheduled as per the inspection report.
   - Playground must be safe for public use.

9.21 Tree Pruning

1) Applies to all park sites, but only to a ***Natural Environment Park*** if a tree poses a hazard.
2) Desired Results:
   - Tree is cleaned of all dead, diseased, and broken branches.
   - Vertical clearance and visual clearance (for safety reasons) are maintained.
   - No low hanging branches that will interfere with vehicles, equipment, pedestrians or signs.
   - An obvious, prominent central leader is evident (if species and growth habit of tree allows).
   - Structural defects are mitigated (.i.e. hazards and dead branches have been removed).
   - The habit of growth for the species is maintained.
   - No stubs, flush cuts, or stumps and tearing. Final cuts should result in a flat surface, with adjacent bark firmly attached.
   - No more than 20% of the total live canopy and 20% of living wood on any branch can be removed in one season.
   - No debris from pruning operations on roadway, sidewalk, or private property.

9.22 Water Features

1) Applies to all park sites.

   Note: Ponds and lagoons are considered to be water features.
2) Desired Results:
   a) Summer Operation:
      - All areas/structures related to the water feature are safe and secure.
      - All fans, pumps, filters, valves, or other water volume regulatory devices are checked on a regular scheduled basis and are in proper working order.
      - All lights and/or other electrical devices are in proper working order.
      - All vandalism and/or security breaches are reported according to procedure.
      - All legislated requirements are adhered to, such as WHMIS, ISO14001, OH&S, etc.

   b) Winter Operation:
      - Snow is cleared and piled safely in a non-obstructive manner
      - No snow is sprayed on parked vehicles
      - All areas/structures related to the water feature must be safe and secure, and maintained as required.

- All maintenance activities must be carried out in a safe manner (i.e. sweeping ice, flooding, heavy snow removal, litter control, etc).
- All legislated requirements must be adhered to (i.e. WHMIS, OH and S, Working Alone Policy, etc).
- All areas must be free of obstacles and hazards.
- All standard manufacturer's operational procedures must be followed (i.e. use of fire hydrant for flooding, etc).
- Ice must be groomed, smooth, and fit for skating by Christmas (weather permitting).
- Ice must be free of anything that might constitute a hazard, such as holes, cracks, or rocks,/pop cans/etc imbedded in the surface.
- No damage to trees, fences, turf, or other park features.
- No lubricant or fuel spills on turf or non-turf areas.

9.23 Fence Maintenance

1) Applies to all park sites.
2) Desired Results:
   - No damage to trees, shrubs, or other park features, such as scraped bark on trees and shrubs, and bent or scraped park furniture.
   - No lubricant or fuel spills on turf or non-turf areas.
   - No fill piled up around posts.
   - No debris (i.e. rocks, pieces of wood, cable, pieces of fabric, tie wires, etc.) left laying around repaired fences.
   - No broken or bent posts.
   - Cable and/or fabric must be tightened as required.
   - Fence must be straight and at the same consistent height throughout.
   - Gates must be installed according to manufacturer specifications and all City of Calgary standard specifications, and must be fully operational.

9.24 Tennis Courts

1) Applies to all park sites.
2) Desired Results:
   - Nets must be neat and straight and at the correct height.
   - No surface dirt, gravel or other debris on the court.
   - No graffiti on the practice board.
   - All fencing, furniture, and signs are repaired as required.

9.25 Play Fields

1) Applies to all park sites.
2) Desired Results:
   - In all fields where shale is used, all edges where the shale meets the grass are straight.
   - Shale should be loosened regularly, to a depth of 1”.
   - Areas adjacent to the grass must be level.
   - Ball diamond infield and soccer fields must be weed free.
   - No holes in playing fields.
   - No glass or other hazardous materials on the playing surface.
   - Level, non-protruding surface.
   - All fixtures and amenities on or around play fields are inspected regularly and maintained in order to provide a safe playing area (i.e. goal posts, backstops, players benches, dugouts, bleachers, etc).
   - All irrigation sprinkler heads and/or box lids are set to grade, so as to not create a tripping hazard.
   - All irrigation box lids are fitted properly to boxes and locked.
   - All lighting and electrical amenities are maintained properly and in good working condition.

SECTION IV:
APPENDICES

APPENDIX A: GLOSSARY OF TERMS

Amenity

A park asset, such as pathway, trail, bench, or viewing platform.

Boulevard

The unpaved portion of the road's shoulder from the back of the concrete curb up to the common property line. This boulevard area is usually sodded, and includes a concrete sidewalk or paved pathway and street trees.

Community Park

Community parks (i.e. tot lots, school grounds, recreation grounds, or community lease sites) are ***MRs*** and/or ***MSRs*** that are 3.6 to 9.2 hectares (8.9 to 23 acres). These parks are part of the 10% reserve dedication. The following types of school sites, with or without a community lease site, are defined as Community Parks: Public Elementary School (4 ha./10 acres)

- Public Junior High School (4.9 ha./12 acres)
- Public Elementary and Junior High Schools (6.9 ha./17 acres)
- Separate Elementary School (3.6 ha./9 acres)
- Separate Elementary and Junior High school (4.9 ha./12 acres)

District Park

District parks (i.e. school grounds, recreation grounds, or community lease sites) are ***MRs*** and/or ***MSRs*** that are greater than or equal to 9.2 hectares (23 acres). These parks are not part of the 10% reserve dedication. Only Public/Separate High School sites (9.2 ha./23 acres) are defined as district parks.

Dry Pond

A ***Stormwater Pond*** used to temporarily store stormwater runoff in order to restrict downstream discharge to predetermined rates, and to reduce downstream flooding and erosion potential. Most dry ponds have no permanent pool of water.

Environmental Reserve (ER)

As defined in the *Municipal Government Act*, Part 17, section 616.

Environmentally Significant Area

A natural area site that has been inventoried prior to potential development and which, because of its features or characteristics, is significant from an environmental perspective to Calgary and has the potential to remain viable in an urban environment. A site is deemed to be an Environmentally Significant Area if it meets one or more of the criteria listed in Appendix C of Calgary Parks' *Open Space Plan*.

Half Rule

The half rule states that a trail's grade should not exceed half the grade of the side slope. If the trail's grade is steeper than half the grade of the side slope, it is considered to be a fall-line trail.

Historical/Archaeological

Refers to written/pre-written evidence and/or artifacts.

Linear Park

Linear Parks are ***MRs*** that have a minimum width of 10 m and a maximum width of 20 m, and that accommodate a regional pathway or perform a linear recreation function by providing local or regional pathway links to educational, recreational, and open space features (i.e., natural environment parks) within and between communities. These parks are part of the 10% reserve dedication.

Local Park

Local parks include ***Community Parks***, ***Neighbourhood Parks***, and ***District Parks***.

Manicured Zone

Manicured zones are portions of a park that have been developed consistent with ***Minimum and Maximum Landscape Development Activities*** and require maintenance that is relatively intense compared to Natural Environment Park and naturalized areas. Manicured areas include areas where large numbers of park users are anticipated, such as sports fields, playgrounds, and community uses.

Median

A road median is a raised central reserve area in a roadway that segregates the driving lanes of opposite directions of traffic flow.

Municipal Reserve (MR)

As defined in the *Municipal Government Act*, Part 17, section 616.

Municipal and School Reserve (MSR)

As defined in the *Municipal Government Act*, Part 17, section 616.

Native

A species of animal or plant that has not been introduced by people or their direct activity, and is listed as native in origin in the current Alberta Conservation Information Management System (ACIMS) database.

Naturalization

A type of ecological restoration; the process of leaving a disturbed site to natural processes (common definition) and/or activities that are intended to improve and enhance the natural environment. In a general sense, naturalization is the deliberate reintroduction of species that are native to a given area or are well adapted to the climate circumstance.

Naturalized Zone

Naturalized zones are parks or portions of parks that have been (or will be) undergoing the process of naturalization. They include manicured areas and/or disturbed or partially-disturbed natural areas. Vegetative cover includes native grasses, wildflowers and/or trees and shrubs that might support the ecological system. Once established, maintenance must be limited to fire control, weed control, and garbage removal.

Natural Environment Park

A planned (through the subdivision process) City-owned park, classified as ***MR*** and/or ***ER***, where the primary role is the protection of an undisturbed or relatively undisturbed area of land or water (or both), and that has existing characteristics of a natural/native plant or animal community and/or portions of a natural ecological and geographic system. Examples include wetlands, escarpments, riparian corridors, natural grasslands, and woodlots. Refer to Calgary Parks' *Open Space Plan* for more information.

Note: A relatively undisturbed Natural Environment Park would either retain or have re-established a natural character, although it need not be completely undisturbed.

Neighbourhood Park

Neighbourhood parks (i.e. tot lots, decorative parks, or ornamental parks) are ***MR***s that are 0.4 to 3.6 hectares (1.0 to 8.9 acres). These parks are part of the 10% reserve dedication.

Non-Native

Any species of animal or plant that has been introduced by people or their direct activity, and is listed as exotic in origin in the current Alberta Conservation Information Management System (ACIMS) database.

Public Utility Lot (PUL)

PULs are titled lots intended to provide for infrastructure and utility facilities, maintenance facilities, and public transportation uses. They can be operated (individually or jointly) by the Federal, Provincial, and Municipal levels of government.

Reclamation

A type of ecological restoration; the process of stabilizing disturbed lands to an ecologically productive use. A reclaimed ecosystem has low biodiversity and a minimal level of function compared to a reference habitat.

Reference Habitat

The target ecosystem for ecological restoration of a degraded habitat that might be adjacent to a project site or elsewhere in the natural region/sub-region. The reference habitat may be described from historic or contemporary data sources, or may be physically represented by undisturbed, similar native habitat appropriate for the site conditions of the degraded habitat. It could include multiples sites and sources of information where appropriate for a particular Habitat Restoration Project.

Rehabilitation

A combination of restoration, reclamation, and naturalization processes.,

Reserve Parcel

Reserve Parcels are sub-neighbourhood parks or linear parks. As well, they can be portions of neighbourhood, community, and district parks that have been designated as decorative parks, ornamental parks, and tot lots.

Restoration

A type of ecological restoration; the process of fully re-establishing a target level of ecosystem function and biodiversity to a disturbed ecosystem as defined by the ***Reference Habitat***, including species composition and vegetation community structure.

Right-of-Way (RoW)

An Easement, or a privilege for one party to pass over a portion of property belonging to another; however, the property owner retains the benefits and privileges of ownership. Also, an RoW preserves the rights for accommodating upon a portion of property a specific utility function such as a roadway, railway or utility pipeline.

School Reserve (SR)

As defined in the *Municipal Government Act*, Part 17, section 616.

Sub-Neighbourhood Park

Sub-neighbourhood parks (i.e. tot lots, decorative parks, or ornamental parks) are ***MR***s that are +/- 0.2 hectares (+/- 0.5 acres). These parks are part of the 10% reserve dedication.

Stormwater Pond

Stormwater ponds include dry ponds, wet ponds, wetlands, and any combinations thereof (hybrid ponds). An integral part of a major storm drainage system, they receive stormwater runoff from conveyance systems (ditches, drainage swales, roads and gutters, and storm sewers) and discharge to receiving waters such as wetlands, lakes, ponds, and streams, and/or to downstream conveyance systems.

Traffic Island

A road traffic island is an irregular-shaped, raised reserve area within a roadway that segregates the driving lanes and directs the flow of traffic in a roadway system.

Trail

A non-paved, linear path that facilitates non-motorized movement for recreational purposes via park-wide networks.Trail networks include any bridge or structure with which trails may be contiguous. Trails typically have a granular or compacted dirt surface designed to minimize impact on the natural environment. A trail is a multi-use amenity, and no one user or type of user is to be given preference.

Turf Classification A

Highly decorative show-piece parks, usually with numerous horticultural and landscape features.

These parks have a full or partial irrigation system capable of partial coverage of the turf area of the park.

Turf Classification B

Neighbourhood, regional. community or major thoroughfare orientated parks. Horticultural and landscape features are based on activities and usage. Programs are generally limited to tennis, soccer, baseball, and/of playgrounds. and can include areas designated for picnics.

These parks have a full or partial irrigation system capable of partial coverage of the turf area of the park.

Turf Classification S

Typically slopes not considered to be a ***Natural Environment Park***, with quality determined by minimally maintained conditions.

These parks are non-irrigated.

Turf Classification T

Tall grass areas not considered to be a ***Natural Environment Park***, such as public open spaces, major thoroughfares (i.e. boulevards and medians), and buffer zones. The grass will be coarse and sparse, with quality determined by minimally maintained conditions. There is usually a higher weed infestation present than in turf classifications ***A*** or ***B***.

These parks do not usually have an Irrigation system present.

Utility Encroachment

A non-legal and non-judgmental term that refers to utility development (i.e. natural gas, sewer, electrical, etc.) in an ***Environmental Reserve (ER)***.

Wet Pond

A ***Stormwater Pond*** that is similar to a lake in that there is always a permanent body of water. During rainstorms, additional temporary storage is provided above the normal water level (NWL); afterward, the water level gradually recedes back to its original level. Wet ponds are very similar to ***Wetlands***, but have a greater number of deep water zones, and aquatic vegetation is concentrated along the perimeter of the pond.

Wetland

Land that has been saturated with water long enough to promote wetland or aquatic processes, as indicated by poorly drained soils, hydrophytic vegetation, and various types of biological activity that are adapted to a wet environment. See the *Open Space Plan* for additional information.

APPENDIX B: CONTACTS

Calgary Parks Contacts

Operations

General Information

Phone 311 or go to *http://www.calgary.ca/CSPS/Parks/Pages/Contact-Parks.aspx.*

Note: Refer to ***Figure 2-1*** to determine the appropriate Operations division for the development area (North and West, North and East, South, or City Centre).

Pathways

Pathway Lead: Phone 403-537-7504

Strategic Services

Business Strategy and Contracts Lead: Phone 403-268-1733

Urban Forestry

Urban Forestry Lead: 403- 537-7519

Urban Forester: Phone 311

Tree Protection: Phone 311 or e-mail tree.protection@calgary.ca.

Fax: 403-537-7505

Mail: Tree Protection
Calgary Parks Urban Forestry
P.O. Box 2100, Station M, Mail Code #75
Calgary, AB T2P 2M5

Water Management

Water Management Lead: Phone 403-268-4531

Water Management Irrigation Supervisor: Phone 3-1-1

Mail: Calgary Parks Water Management
P.O. Box 2100, Station M, Mail Code #78
Calgary, AB T2P 2M5

Capital Development

General Information

Phone: 311 or go to *http://www.calgary.ca/CSPS/Parks/Pages/Contact-Parks.aspx*

Note: Refer to ***Figure 2-1*** to determine the appropriate division for the development area (North or South).

Manager

Mail: Calgary Parks, Manager, Capital Development
P.O. Box 2100, Station M, Mail Code #54
Calgary, AB T2P 2M5

Development Inspector

North: Phone 403-804-9397

South: Phone 403-804-9417

Central: Phone 403-620-3216

Development Coordinator

North: Phone 403-268-2367

South: Phone 403-268-1376

Central: Phone 403-268-2367

Right-of-Way Management Services

Corporate Analytics and Innovation: Phone 311

Mail: The City of Calgary Right of Way Management Services
P.O. Box 2100, Station M, Mail Code #8026
Calgary, AB T2P 2M5

Other City of Calgary Contacts

Calgary Roads

General Information

Phone 311

Mail: The City of Calgary Roads
P.O. Box 2100, Station M, Mail Code #4010
Calgary, AB T2P 2M5

Senior Plants Leader

Phone: 403-268-1264

Traffic Permits

Phone: 311

In Person: Traffic Permits Counter, Main Floor Building E
Manchester Centre, 2808 Spiller Road SE, Calgary

Transportation Infrastructure

General Information: Phone 311

Transportation Planning

General Information: Phone 311

Calgary Approvals Coordination

Coordinator Subdivision Development: Phone 403-268-6739
Mail: The City of Calgary, Calgary Approvals
P.O. Box 2100, Station M, Mail Code #8032
Calgary, AB T2P 2M5

Water Resources

Leader - Development Approvals: Phone 403-268-2855
Mail: P.O. Box 2100, Station M, Mail Code #409
Calgary, AB T2P 2M5

Water Services

Field Services: Phone 311
Wastewater: Phone 311

Service Calls

Field Location Service Calls

ATCO
Enmax
Telus
Wastewater
Petrogas

Alberta One-Call
1-800-242-3447
www.alberta1call.com

Emergency Service Calls

ATCO	780-245-7222 or 1-800-511-3447
Enmax	403-514-6100
Sewer/Wastewater/Roads	3-1-1
Telus	611
Shaw Cable	403-716-6000

Standards and Organizations

American Society of Irrigation Consultants (ASIC)
4700 S. Hagadorn Road, Suite 195D, East Lansing, MI 48823
Phone: 1-508-763-8140
http://asic.org/

American Society for Testing and Materials (ASTM)
1916 Race St., Philadelphia, Pennsylvania 19103
www.astm.org

American Water Works Association (AWWA)
6666 W. Quincy Ave., Denver, CO 80235-3098
Phone: 1-800-926-7337
www.awwa.org

Canadian General Standards Board (CGSB)
Canadian Government Publishing Centre, Supply and Services Canada
Ottawa, ON K1A 0S9
www.gc.ca

Canadian Nursery Certification Institute (CNCI)
http://cleanplants.ca

Canadian Nursery Landscape Association (CNLA)
7856 Fifth Line South, Milton, ON L9T 2X8
Phone: 1-888-446-3499
http://www.canadanursery.com/

Canadian Society of Landscape Architects (CSLA)
12 Forillon Crescent, Ottawa, ON K2M 2W5
Phone: 1-866-781-9799
http://csla-aapc.ca/

Canadian Standards Association (CSA)
5060 Spectrum way Suite 100T, Mississauga, ON L4W 5N6
Phone: 1-800-463-6727
www.csa.ca

Canadian Welding Bureau (CWB)
8260 Parkhill Drive, Milton, ON L9T 5V7
Phone: 1-800-844-6790
https://www.cwbgroup.org/

Illuminating Engineering Society of North America (IES)
120 Wall Street, Floor 17, New York, NY 10005-4001
Phone: 212-248-5000
http://www.iesna.org/

International Society of Aboriculture (ISA)
P.O. Box 3129, Champaign, IL 61826-3129
Phone: 1-888-472-8733
http://www.isa-arbor.com/

Irrigation Association (IA)
8280 Willow Oaks Corporate Drive, Suite 400, Fairfax, VA 22031
Phone: 1-703-536-7080
https://www.irrigation.org/default.aspx

National Capital Commission (NCC)
Client Services - Contact Centre
202–40 Elgin Street, Ottawa ON K1P 1C7
Phone: 1-800-465-1867
http://www.ncc-ccn.gc.ca/

National Electrical Manufacturers Association (NEMA)
1300 North 17th Street, Suite 900, Arlington, Virginia 22209
Phone: 1-703-841-3200
http://www.nema.org/

National Turfgrass Evaluation Program (NTEP)
Beltsville Agricultural Research Center-West
10300 Baltimore Ave. Bldg. 005, Rm. 307, Beltsville, Maryland 20705
Phone: 301-504-5125
Fax: 301-504-5167
https://ntep.org/

Prairie Turfgrass Research Centre (PTRC)
4500 50th Street, Olds, AB T4H 1R6
Phone 469-499-1044
Fax 469-499-1063
https://www.oldscollege.ca/research/areas-of-focus/turfgrass/index.html

Plastics Pipe Institute (PPI)
105 Decker Court, Suite 825, Irving TX, 75062
Phone 469-499-1044
Fax 469-499-1063
http://plasticpipe.org

The Pulp and Paper Technical Association of Canada (PAPTAC)
740 Notre-Dame St. W., Suite 1070, Montreal, Quebec H3C 3X6
Phone: (514) 392-0265
Fax: (514) 392-0369
http://www.paptac.ca/

Transportation Association of Canada (TAC)
2323 St. Laurent Blvd., Ottawa ON K1G 4J8
Phone: 613-736-1350
http://www.tac-atc.ca/

Underwriters Laboratories of Canada (ULC)
171 Nepean Street, Suite 400, Ottawa, ON K2P 0B4
Phone: 1-866-937-3852)
E-mail: cec@ul.com
http://canada.ul.com/ulcstandards/

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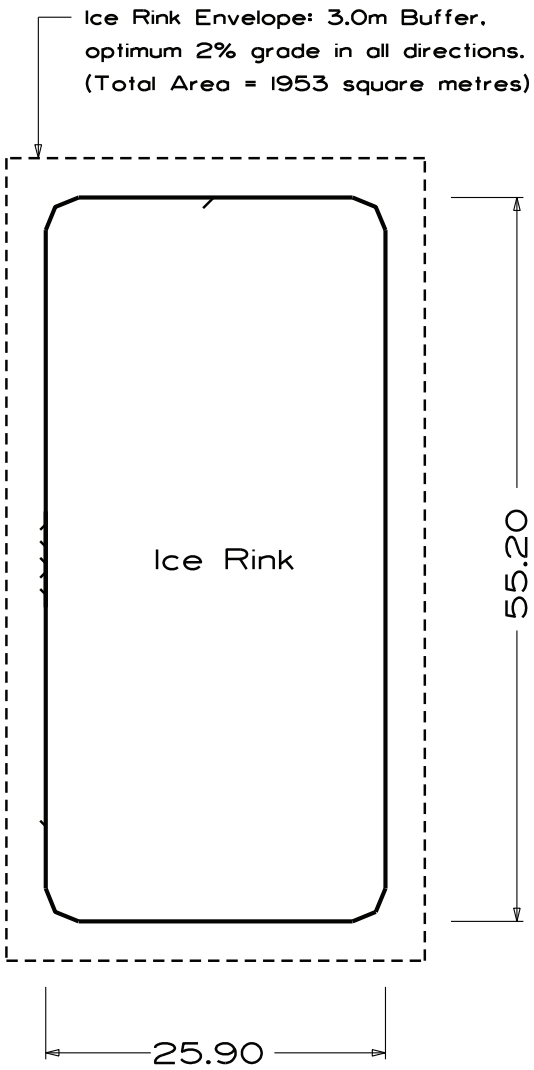
APPENDIX D: DETAIL SHEETS

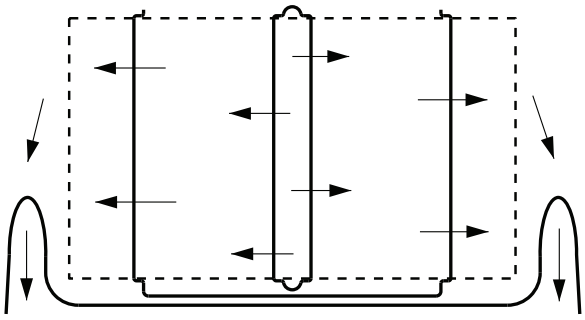
Detail Sheet 1: Community Ice Hockey Rink & Lacrosse Field



NOTE: All dimensions are in metres unless otherwise noted.

Calgary	PROJECT TITLE **SPECIFICATIONS** SHEET TITLE **COMMUNITY ICE HOCKEY RINK & LACROSSE FIELD**	DRAWN BY **WB /MM** DATE **2006 02 03** DESIGN BY **D.LaF.** DATE **1995 02 25**	SCALE **N.T.S.** SHEET NO. **1** FILE NO.

Detail Sheet 2: Optimal Drainage Patterns for Sports Fields



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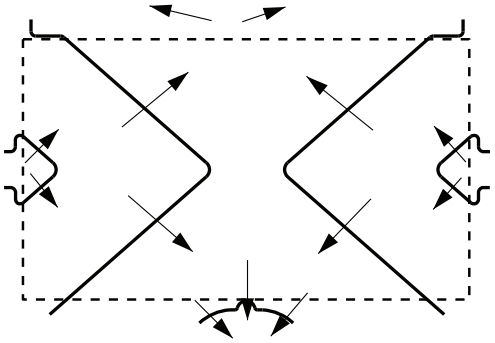

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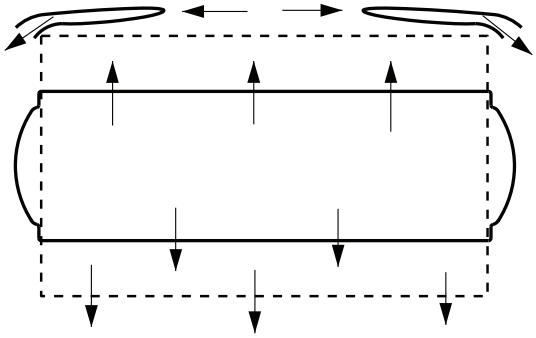

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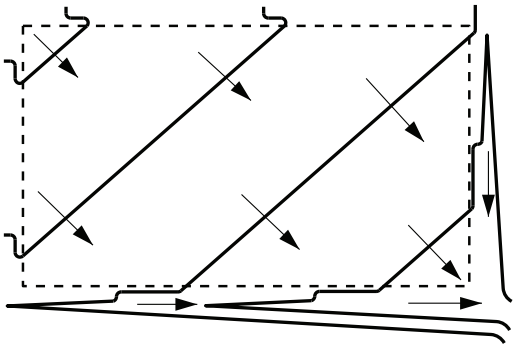
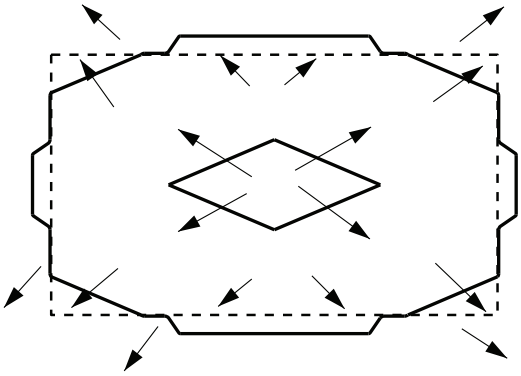


CORNER PITCH



HIGH POINT

LEGEND

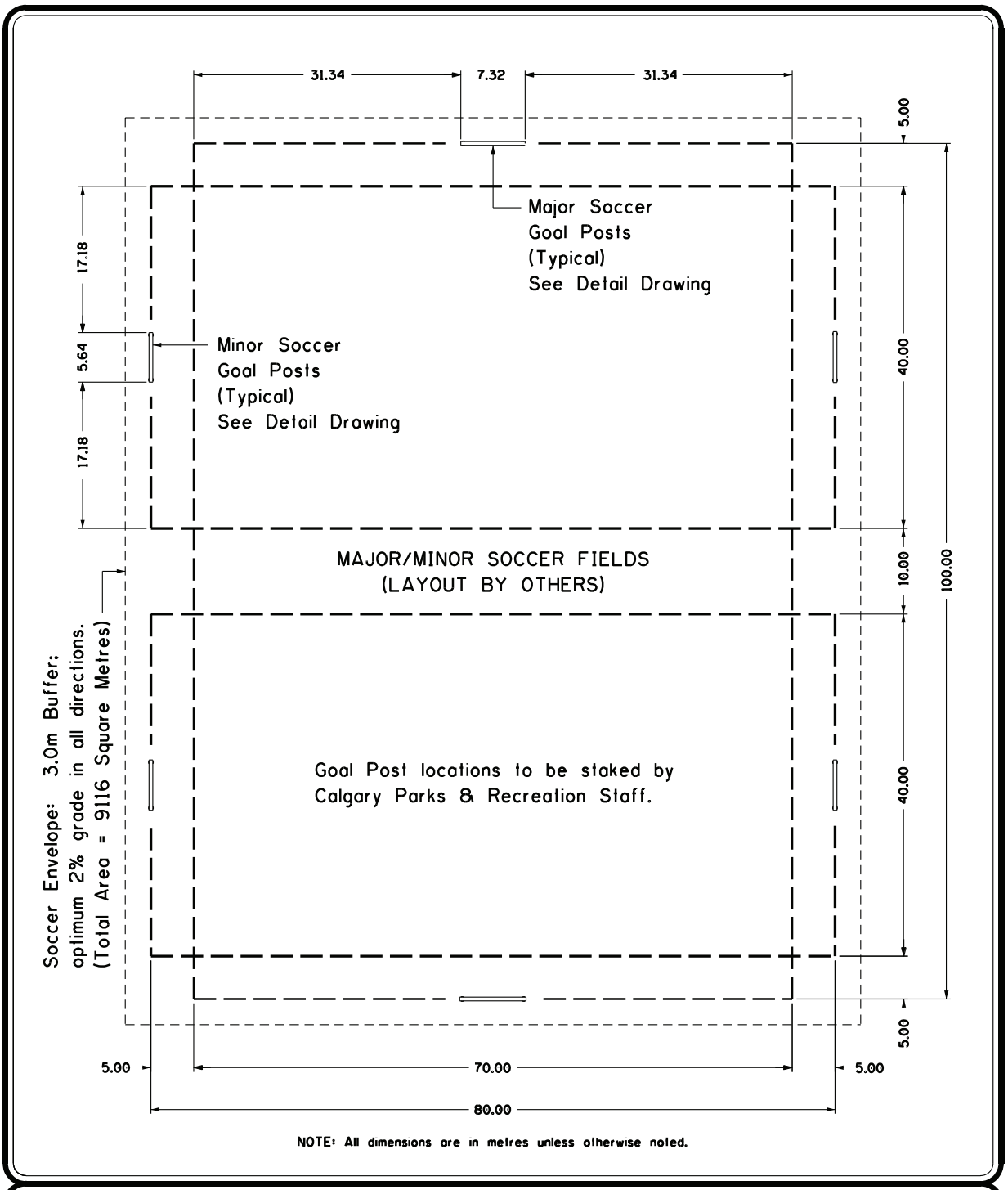
Sports Field

Direction of Surface Drainage

Graphic Representation of Contour Line – (no scale)

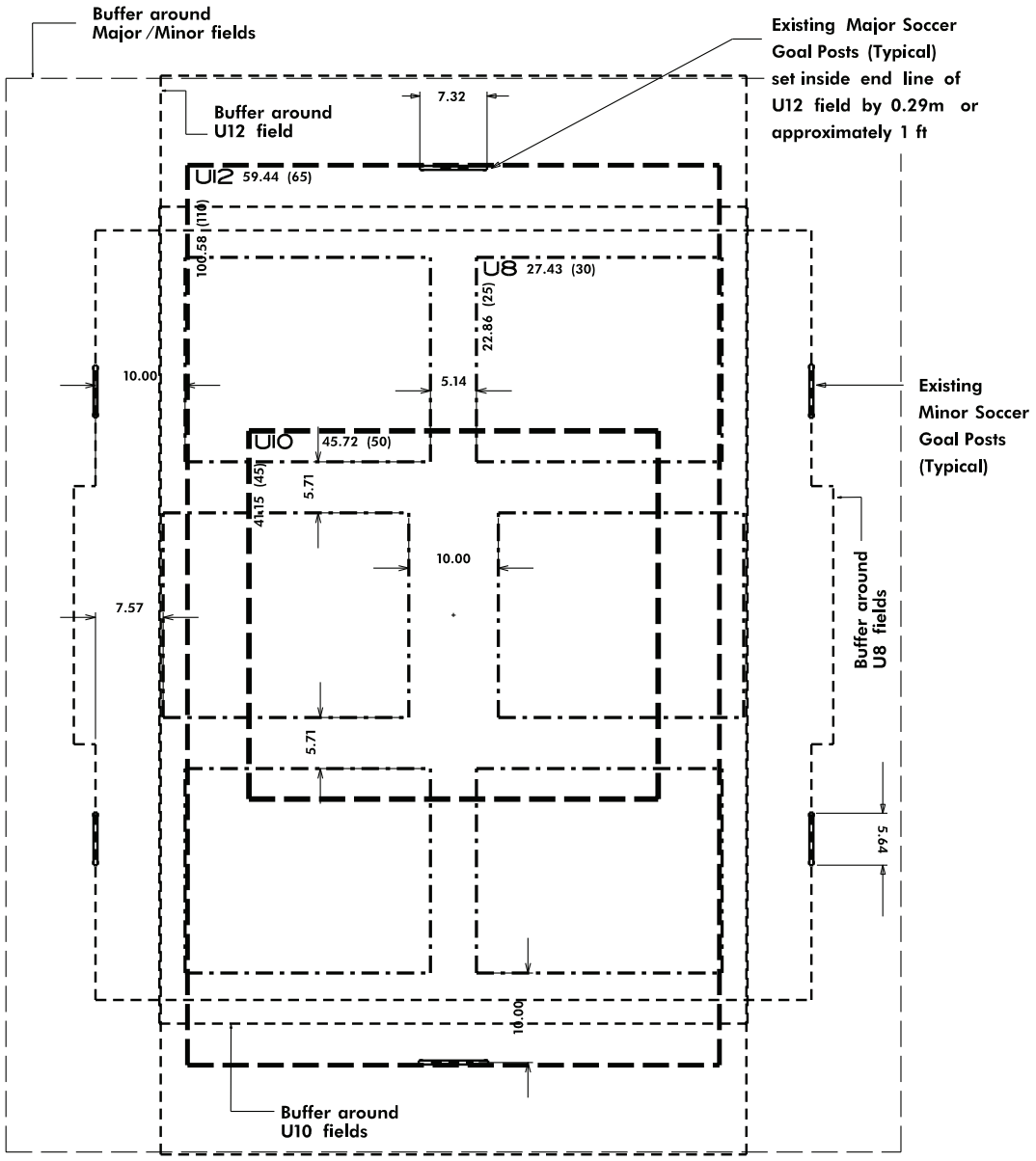
Calgary	PROJECT TITLE: SPECIFICATIONS SHEET TITLE: OPTIMAL DRAINAGE PATTERNS FOR SPORTS FIELDS	DRAWN BY: MM DATE: 2005 01 25 DESIGN BY: DK DATE:	SCALE: N.T.S. SHEET NO.: 2 FILE NO.:

Detail Sheet 3: Soccer Fields- Combination Major/Minor



Calgary	PROJECT TITLE **SPECIFICATIONS**	DRAWN BY **WB /MM**	SCALE **N.T.S.**
		DATE **2006 02 03**	SHEET NO. **3**
	SHEET TITLE **COMBINATION MAJOR – MINOR SOCCER FIELD**	DESIGN BY **D. LaF.**	FILE NO.
		DATE **1995 02 25**	

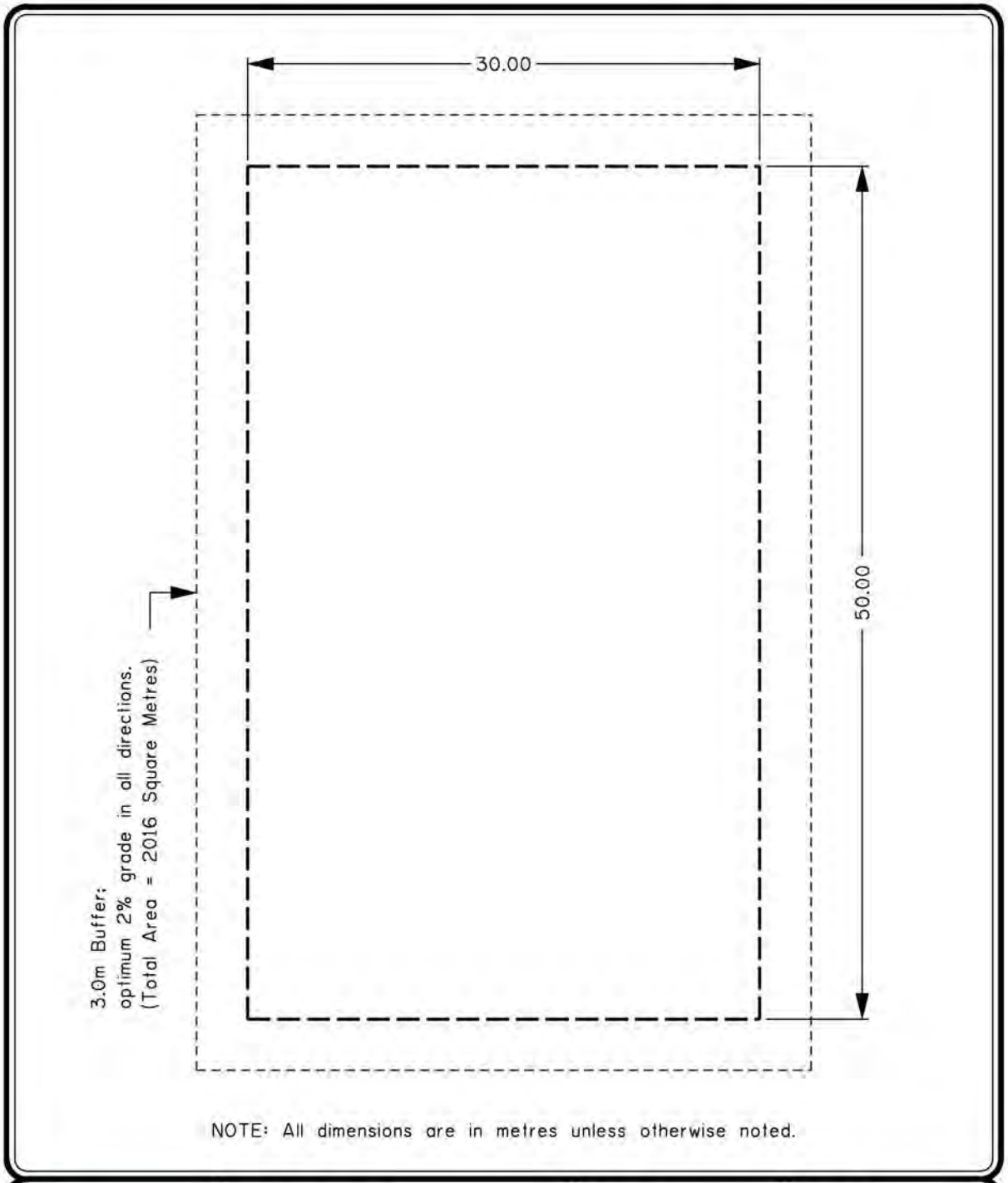
Detail Sheet 3a: Soccer Fields - U12-U6 Layout



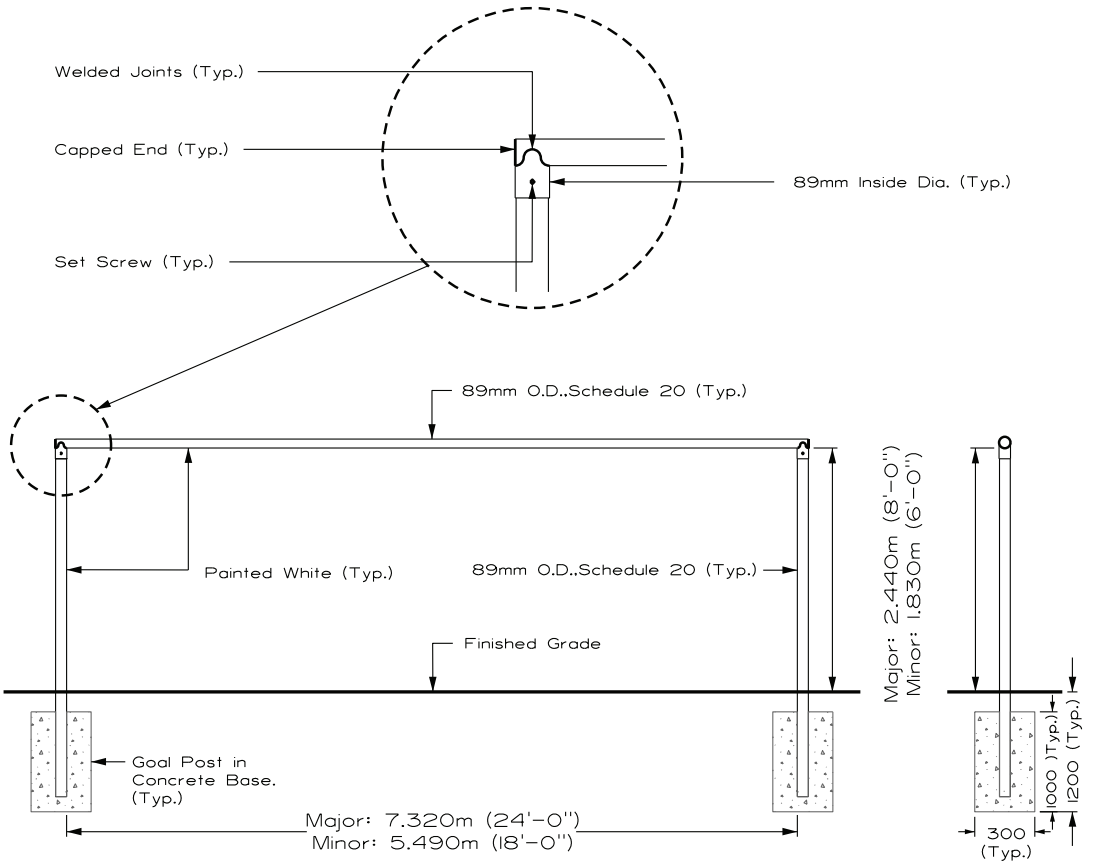
NOTE: All dimensions are in metres unless otherwise noted. Dimensions in yards are in brackets.
Typical buffers around fields are 10m behind goal posts and 3m along sidelines.
U6 fields are 27.43 x 18.29m (30 x 20yd) and lay out in the same locations as the U8 fields.

Calgary	PROJECT TITLE **SPECIFICATIONS** SHEET TITLE **U12–U6** **SOCCER FIELD LAYOUT**	DRAWN BY **MM** DATE **2005 01 25** DESIGN BY **DL** DATE	SCALE **N.T.S.** SHEET NO. **3a** FILE NO.

Detail Sheet 4: Soccer Fields: Active Open Recreation Space

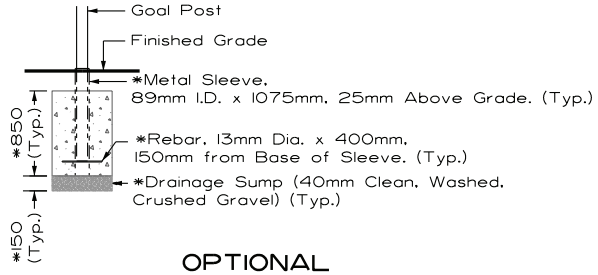


Detail Sheet 5: Soccer Fields - Major/Minor Goal Posts



FRONT ELEVATION

SIDE ELEVATION



OPTIONAL INSTALLATION *

NOTES:
All dimensions are in millimetres unless otherwise noted.

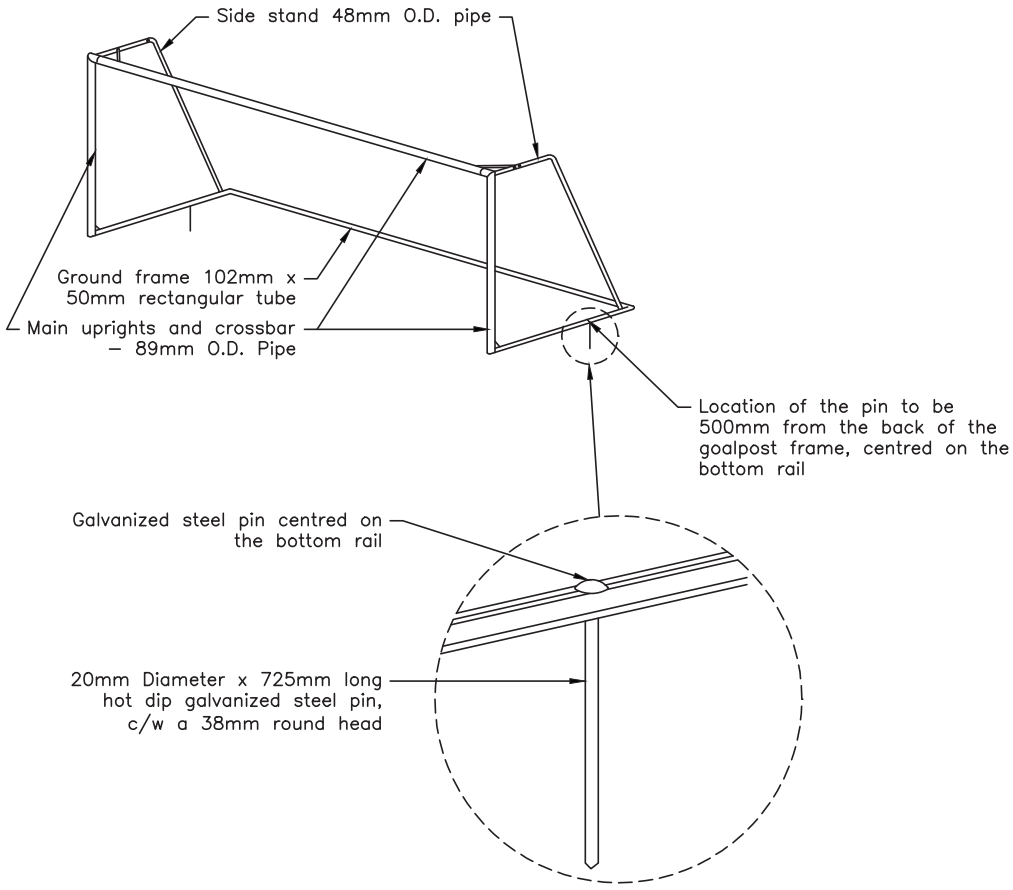
Subject to approval by The City, portable goalposts may be installed.

If portable goalposts are to be installed they must be securely anchored to ground.

* OPTIONAL – TO ALLOW REMOVAL
To be used when located near toboggan hills or as required by Calgary Parks.

Calgary	PROJECT TITLE **SPECIFICATIONS**	DRAWN BY **W.B.** DATE **2009-10-27**	SCALE **N.T.S.**
	SHEET TITLE **MAJOR / MINOR SOCCER GOAL POST DETAIL**	DESIGN BY **D.LaF.** DATE **1997-07**	SHEET NO. **5**
			FILE NO.

Detail Sheet 5a: Soccer Fields - Portable Soccer Goal



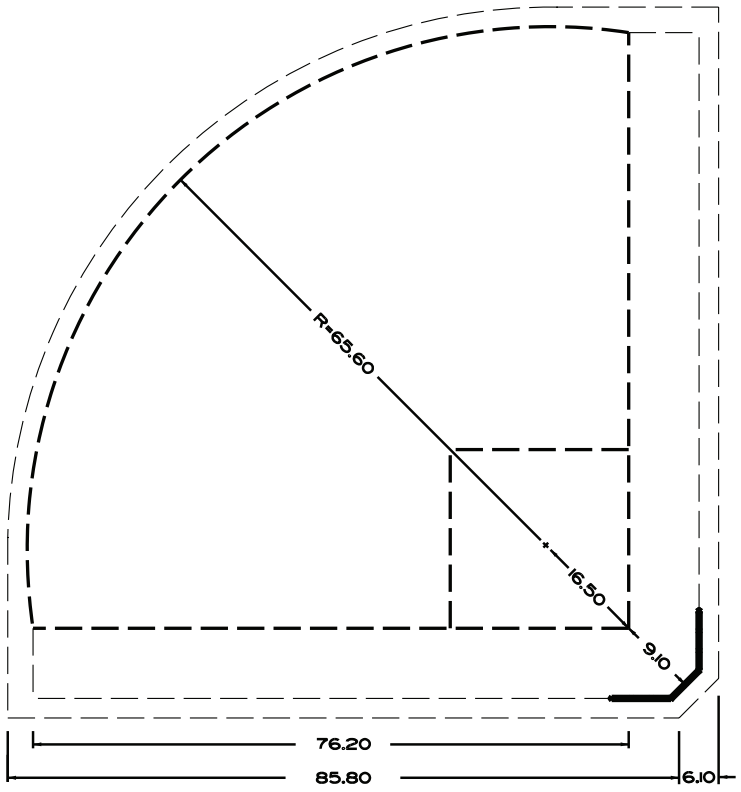
NOTES:
1. All dimensions are in millimetres unless otherwise noted.

2. All goal pipe shall be powder coated steel.

Calgary	PROJECT TITLE: SPECIFICATIONS SHEET TITLE: PORTABLE SOCCER GOAL	DRAWN BY: TCP DATE: 2010/11/25 DESIGN BY: D.B. DATE: 2010/11/25	SCALE: N.T.S. SHEET NO.: 5a FILE NO.: N.T.S.

Detail Sheet 6: Ball Diamonds - 76.2 m Softball

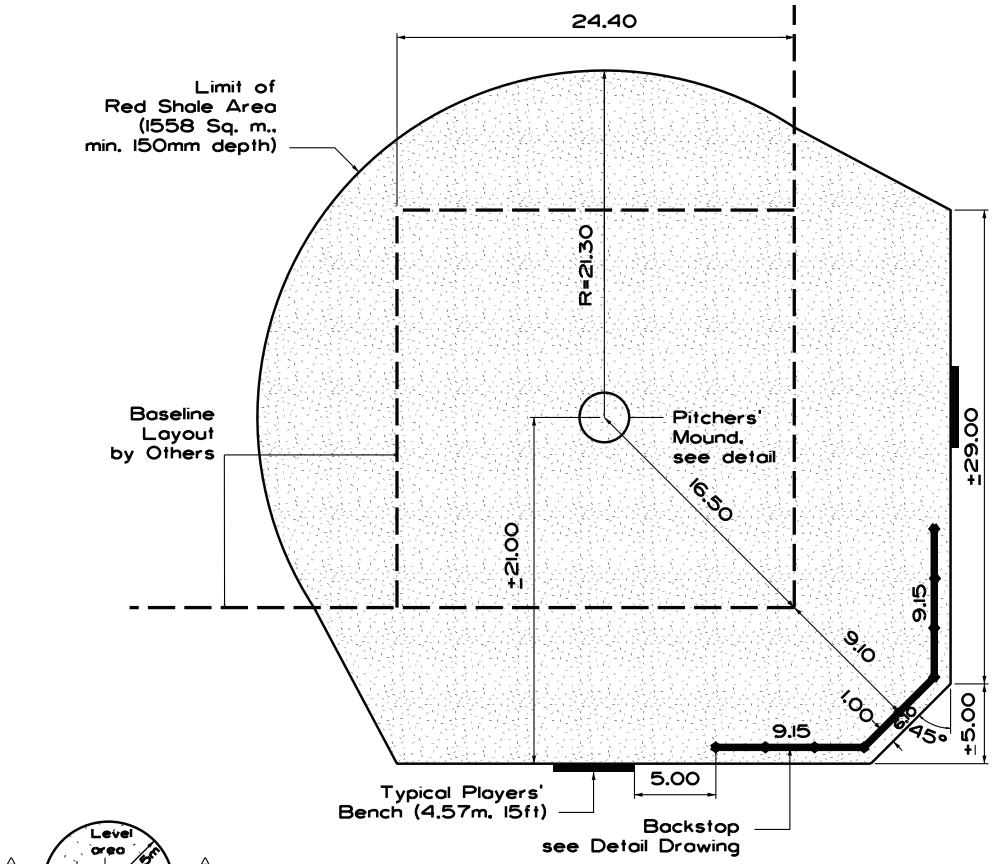
Softball Envelope:
- 3.0m Buffer.
- optimum 2% grade in all directions.
- Total area including buffer
equals 7406 square metres

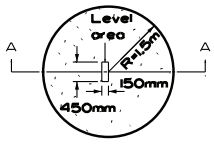


NOTE: All dimensions are in metres unless otherwise noted

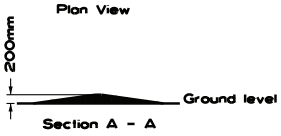
Calgary	PROJECT TITLE **SPECIFICATIONS** SHEET TITLE **76.2m SOFTBALL DIAMOND**	DRAWN BY **WB /MM** DATE **2006 02 03** DESIGN BY DATE	SCALE **N.T.S.** SHEET NO. **6** FILE NO.

Detail Sheet 7: Ball Diamonds - 76.2 m Little League Infield





Plan View



Section A - A

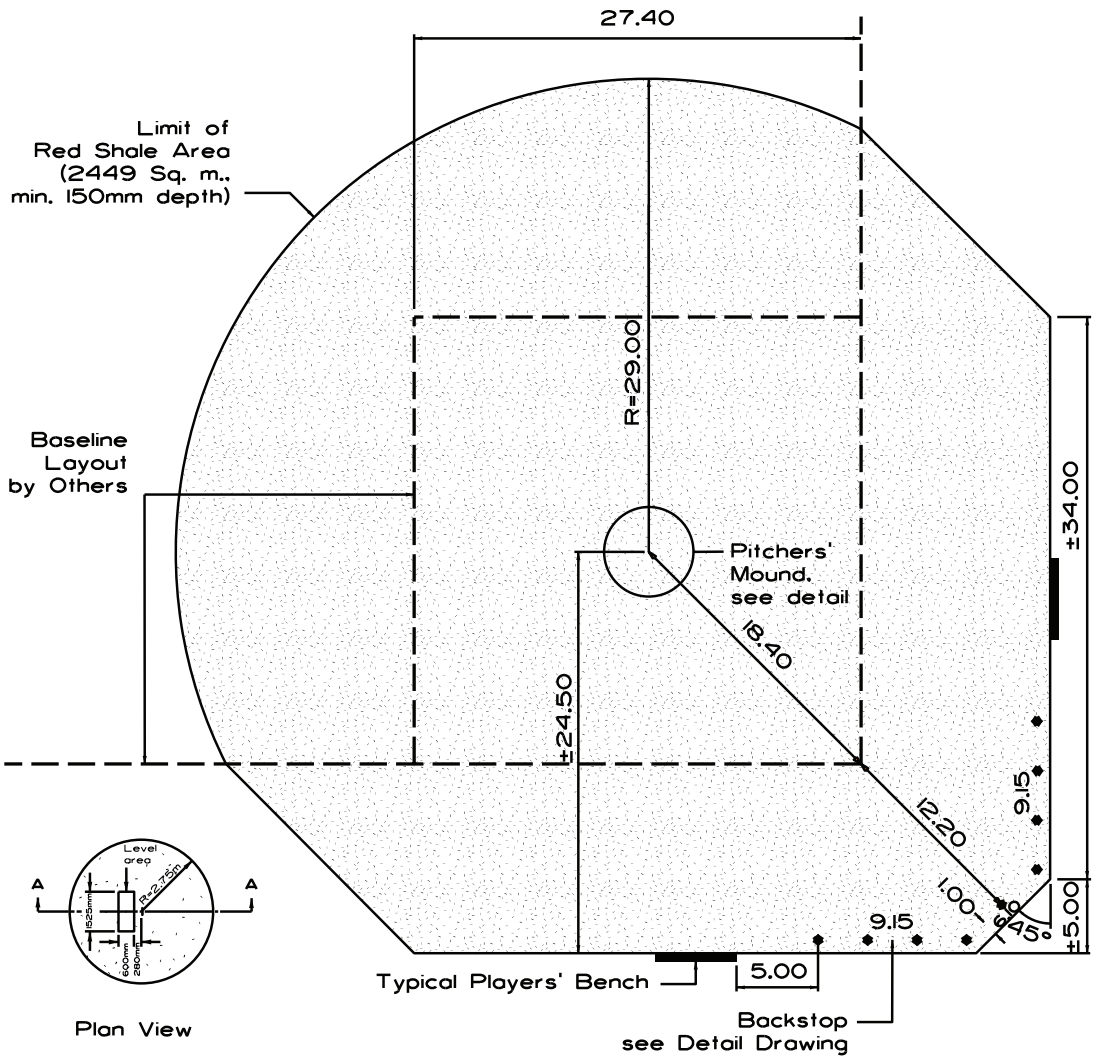
Pitchers' Mound
Detail
(N.T.S.)

NOTE: Backstop & Red Shale corner locations to be staked by Calgary Parks.

All Dimensions are in metres unless otherwise noted.

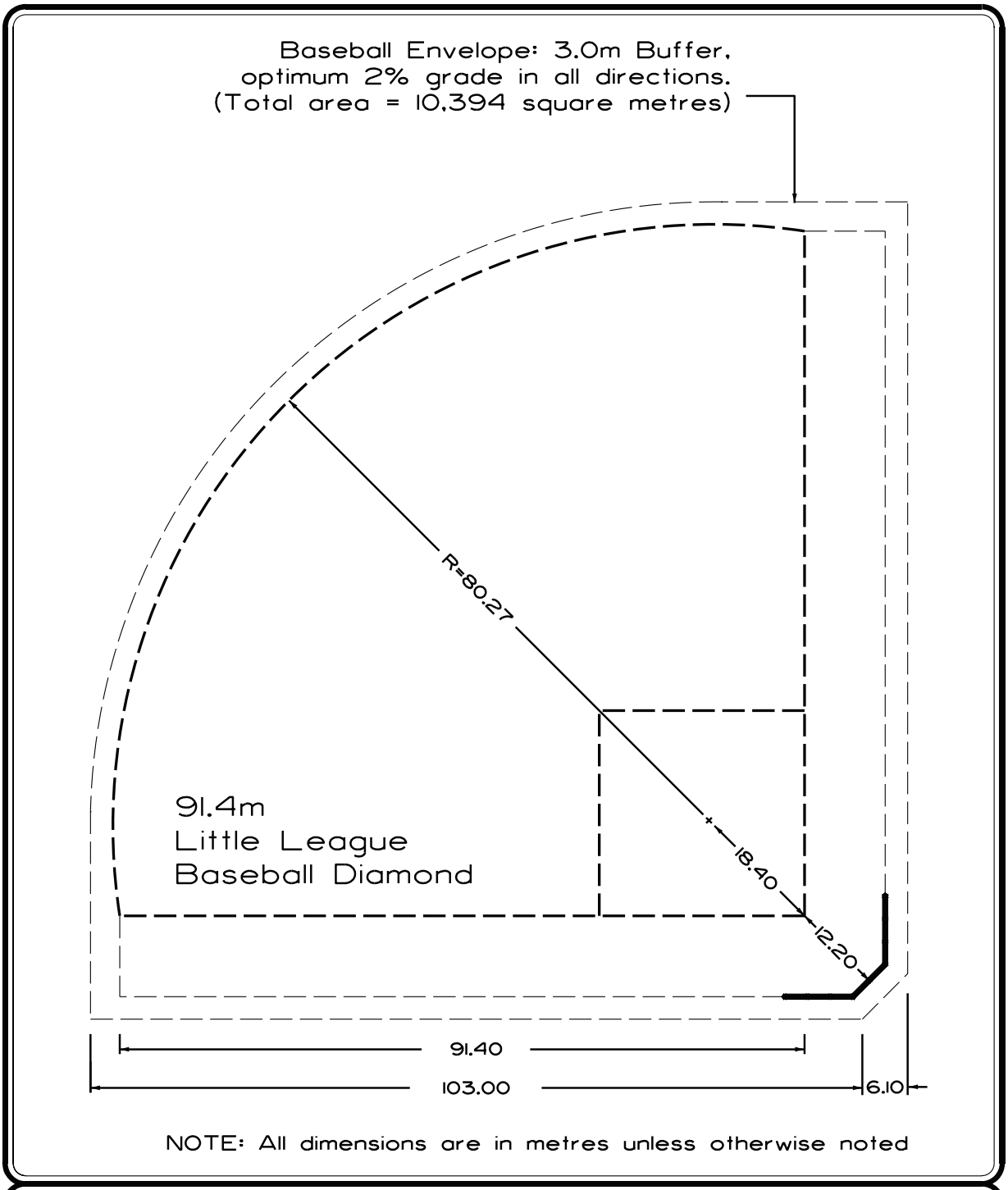
Calgary	PROJECT TITLE SPECIFICATIONS SHEET TITLE 76.2m LITTLE LEAGUE BASEBALL DIAMOND INFIELD	DRAWN BY W.B. DATE 2005 01 25 DESIGN BY D.LaF. DATE 1997-03-08	SCALE 1:400 SHEET NO. 7 FILE NO.

Detail Sheet 8: Ball Diamonds 91.4 m Little League Infield



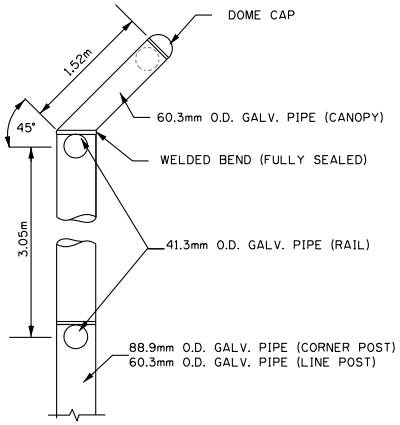
Calgary	PROJECT TITLE **SPECIFICATIONS** SHEET TITLE **91.4m LITTLE LEAGUE BASEBALL DIAMOND INFIELD**	DRAWN BY **W.B.** DATE **2002-03-05** DESIGN BY **D.LaF.** DATE **1997-03-08**	SCALE **1:400** SHEET NO. **8** FILE NO.

Detail Sheet 9: Ball Diamonds - 91.4 m Little League

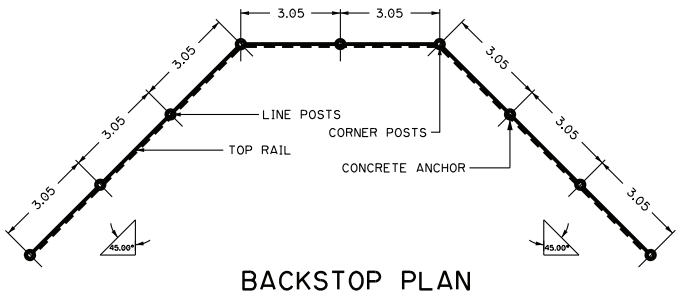


Calgary	PROJECT TITLE **SPECIFICATIONS** SHEET TITLE **91.4m LITTLE LEAGUE BASEBALL DIAMOND**	DRAWN BY **WB /MM** DATE **2006 02 03** DESIGN BY **D. LaF.** DATE **1996 03 08**	SCALE **N.T.S.** SHEET NO. **9** FILE NO.

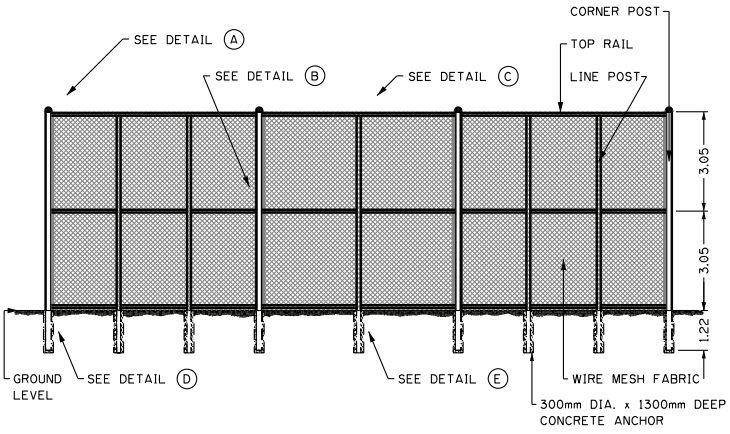
Detail Sheet 11: Ball Diamonds - Backstops



CANOPY DETAIL
N.T.S.
NOTE: NO.6 OR NO.9 GAUGE
WIRE MESH FOR CONOPY



BACKSTOP PLAN

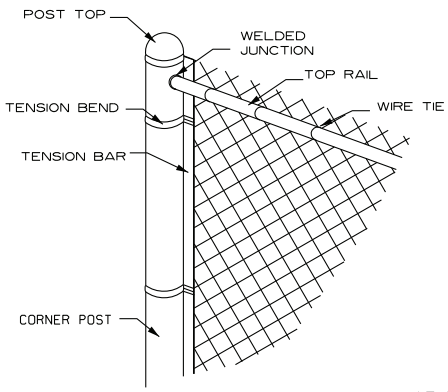


BACKSTOP ELEVATION

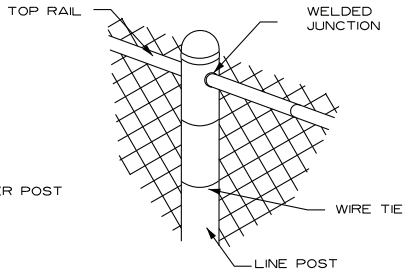
Calgary	PROJECT TITLE **SPECIFICATIONS** SHEET TITLE **BACKSTOP DETAIL**	DRAWN BY **MK** DATE **2006 05 25** DESIGN BY DATE	SCALE **N.T.S.** SHEET NO. **11** FILE NO.

Detail Sheet 12: Ball Diamonds - Backstops

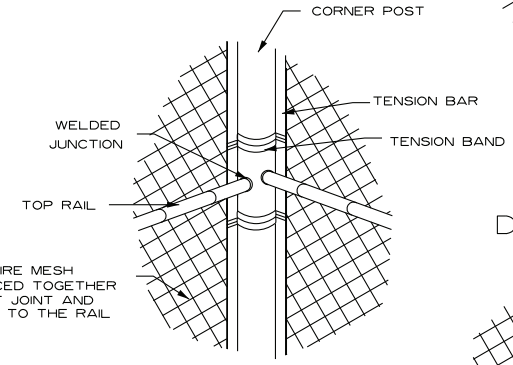
DETAIL A



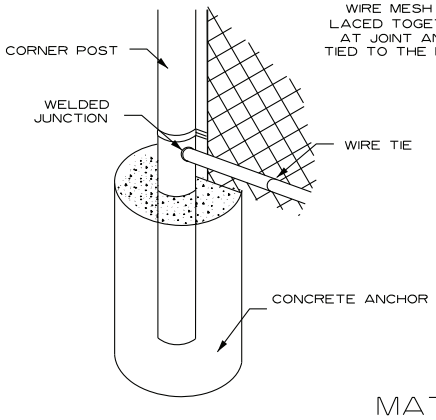
DETAIL C



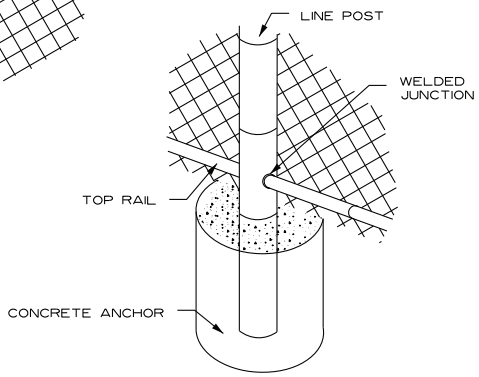
DETAIL B



DETAIL D



DETAIL E



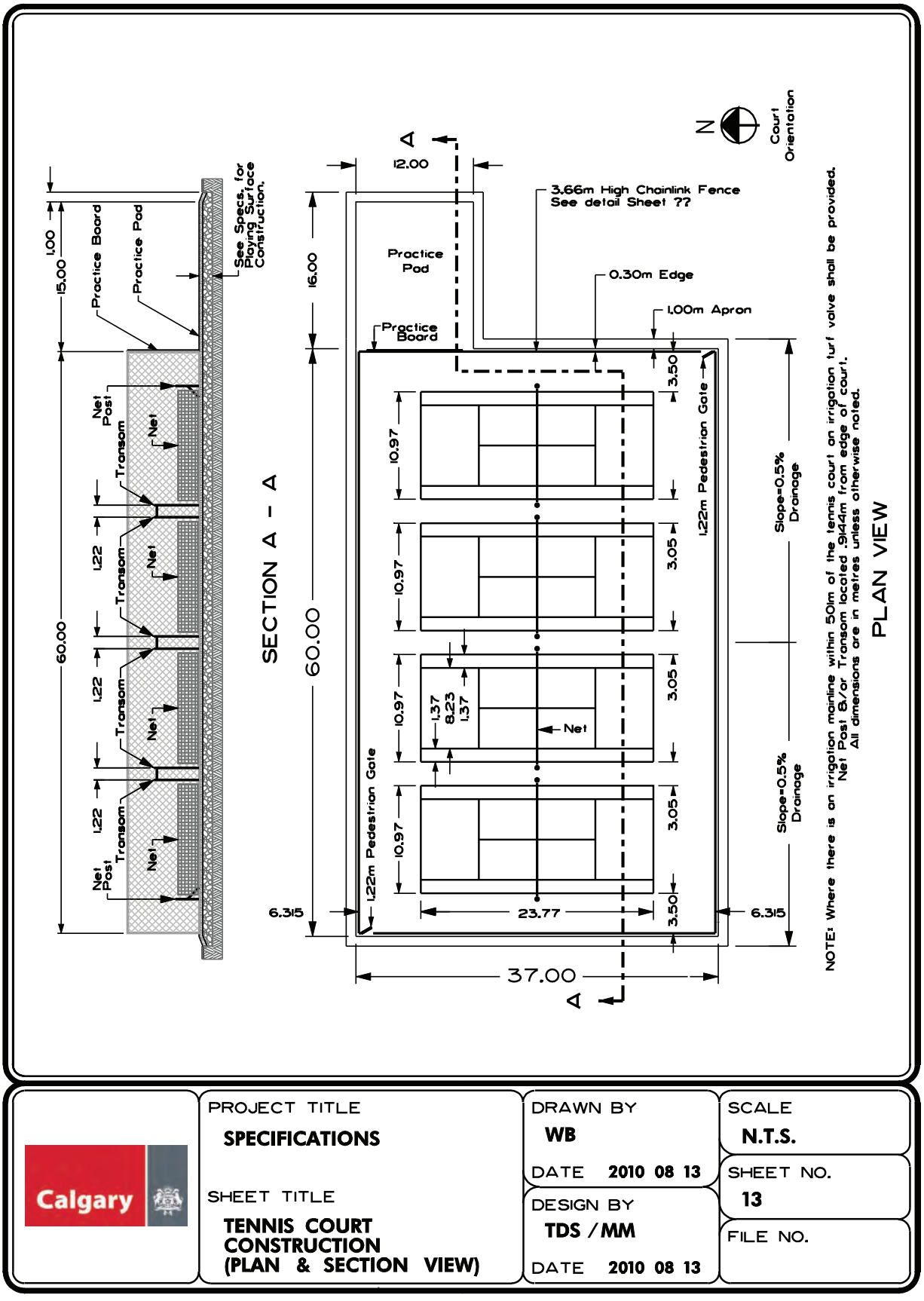
MATERIAL LIST

QTY	SIZE	DESCRIPTION
49 m	3.05m x 50mm	No. 6 Gauge Wire Mesh
147m	41.3mm O.D	Top Rail
4	88.9mm O.D. x 7.32m	Corner Post
5	60.3mm O.D. x 7.32m	Line Post
4	56.9mm I.D.	Post Tops
12	3.05m	Tension Bars
9.07kg	No.16 Gauge	Lacing Wire
72	38mm x 7.9m	Bolts c/w Locks & Nuts
72	88.9 I.D.	Tension (offset) Bands

BACKSTOP MATERIALS
(38 WELDED JUNCTIONS
CONOPY NOT INCLUDED)

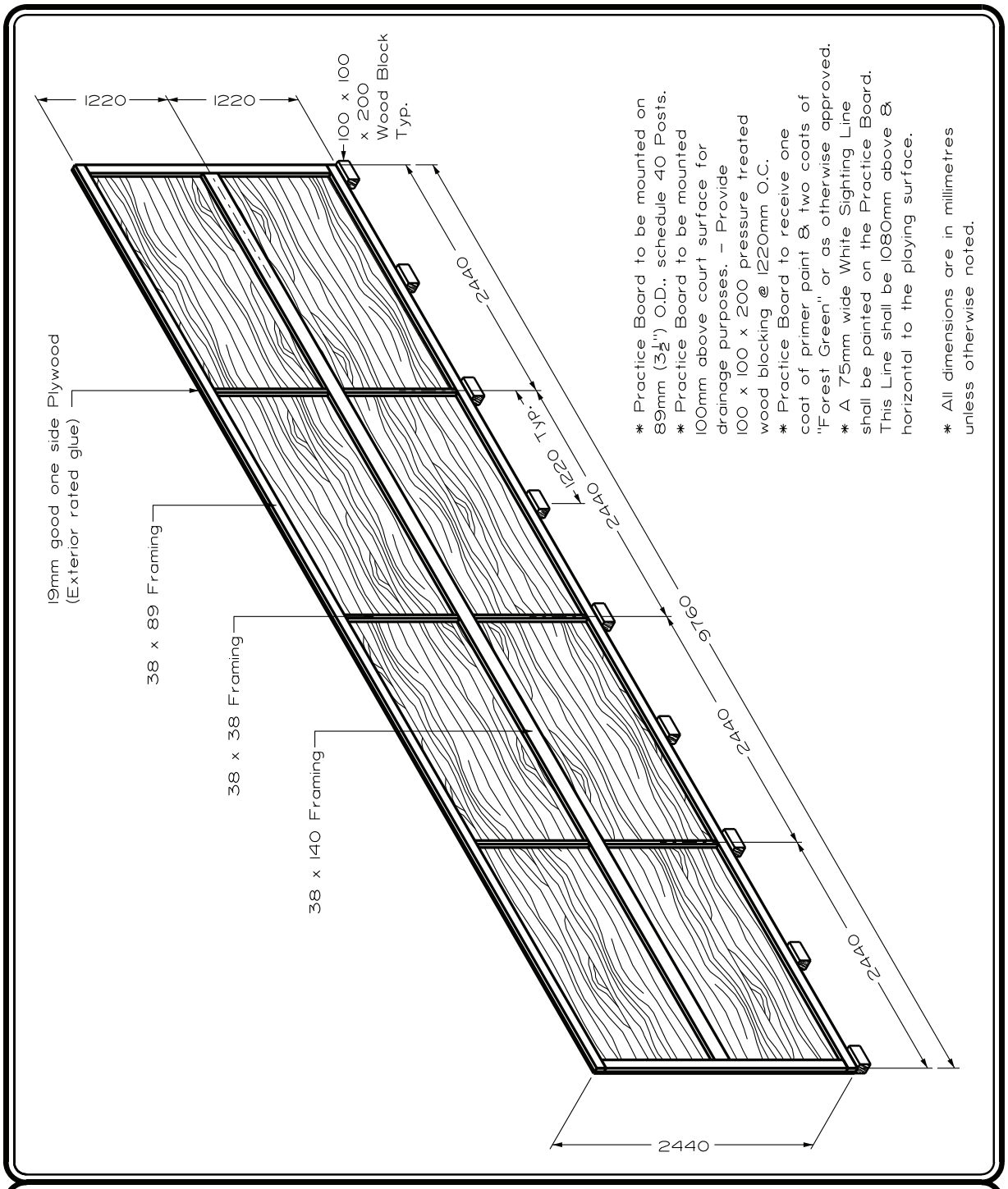
Calgary	PROJECT TITLE **SPECIFICATIONS** SHEET TITLE **BACKSTOP DETAIL**	DRAWN BY **MK** DATE **2006 05 24** DESIGN BY DATE	SCALE **N.T.S** SHEET NO. **12** FILE NO.

Detail Sheet 13: Tennis Courts - Plan & Section View



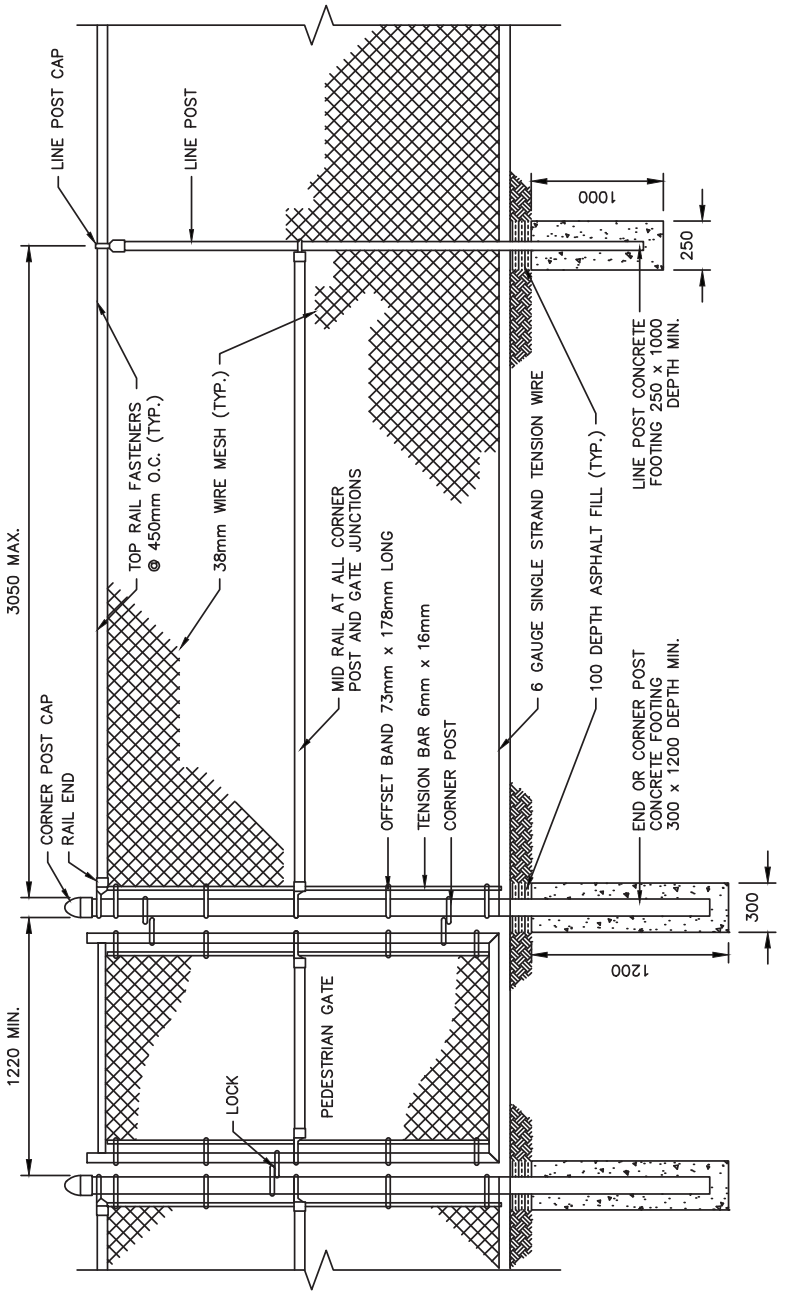
Calgary	PROJECT TITLE **SPECIFICATIONS**	DRAWN BY **WB**	SCALE **N.T.S.**
	SHEET TITLE **TENNIS COURT CONSTRUCTION (PLAN & SECTION VIEW)**	DATE **2010 08 13**	SHEET NO. **13**
		DESIGN BY **TDS / MM**	FILE NO.
		DATE **2010 08 13**	

Detail Sheet 14: Tennis Courts - Practice Board



Calgary	PROJECT TITLE **SPECIFICATIONS** SHEET TITLE **TENNIS COURT CONSTRUCTION (PRACTICE BOARD)**	DRAWN BY **WB** DATE **2006 02 04** DESIGN BY DATE	SCALE **N.T.S.** SHEET NO. **14** FILE NO.

Detail Sheet 14a: Tennis Courts - Fencing

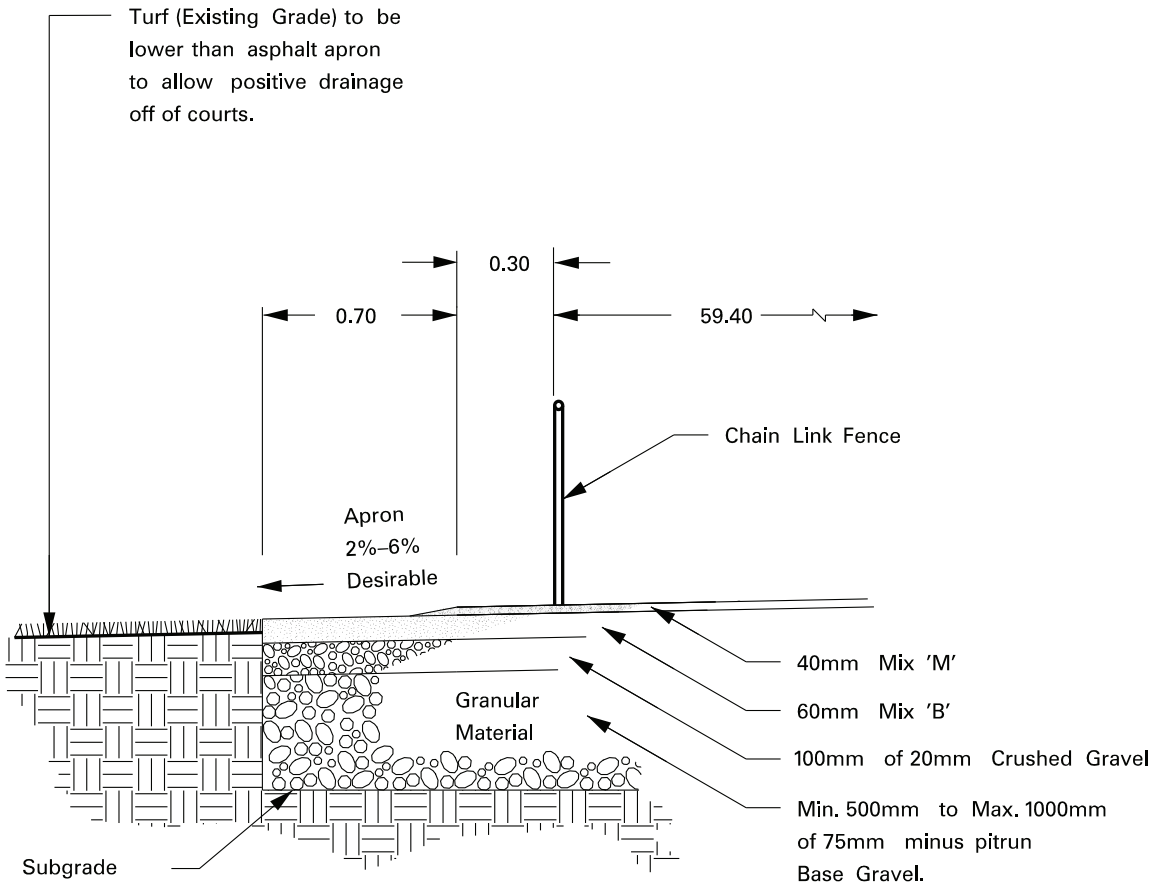


NOTES:
1. All dimensions are in millimetres unless otherwise noted.
2. Concrete footings shall be 21 MPa strength.
3. 3.66m height chain link mesh
4. All posts shall be schedule 40 steel.
5. Mesh size shall be 38mm – 9 gauge galvanized or coloured vinyl.
6. Mesh to hang no more than 25mm off surface and no less than 12.5mm off surface.
7. Mesh on inside of court.
8. 400 mm – 600 mm square of asphalt to be removed prior to augering post holes. Repair using asphalt to grade level with surrounding surface.

3660mm CHAIN LINK FENCE:
1. LINE POSTS: 63mm x 4500mm
2. CORNER POSTS: 89mm x 4730mm
3. TOP RAILS: 35mm x 6700mm
4. LINE POST CAPS: 63mm
5. CORNER POST CAPS: 89mm
6. RAIL ENDS: 35mm
7. CENTRE BANDS FOR LINE POSTS: 63mm
8. CENTRE BANDS FOR CORNER POSTS: 89mm
8. OFFSET BANDS FOR CORNER POSTS: 89mm
9. TENSION BARS: 3660mm

Calgary	PROJECT TITLE: SPECIFICATIONS SHEET TITLE: TENNIS COURT FENCING	DRAWN BY: TCP DATE: 2010/11/25 DESIGN BY: DATE:	SCALE: N.T.S. SHEET NO.: 14a FILE NO.:

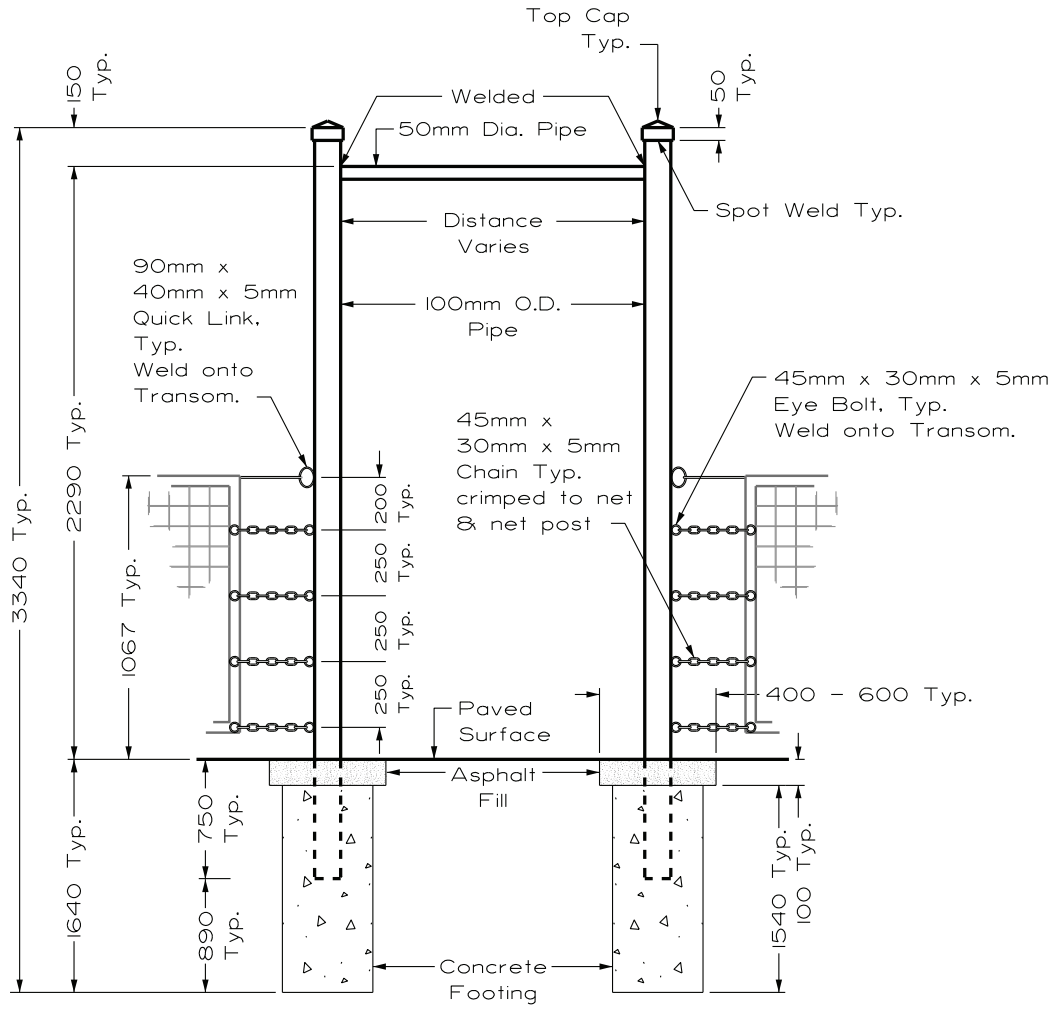
Detail Sheet 15: Tennis Courts - Apron



NOTE: All dimensions are in metres unless otherwise noted.
See design information for Tennis Courts.

Calgary	PROJECT TITLE SPECIFICATIONS SHEET TITLE TENNIS COURT CONSTRUCTION APRON DETAIL	DRAWN BY W.B./M.M. DATE 2010 06 16 DESIGN BY TDS / MM DATE 2010 06 16	SCALE N.T.S. SHEET NO. 15 FILE NO.

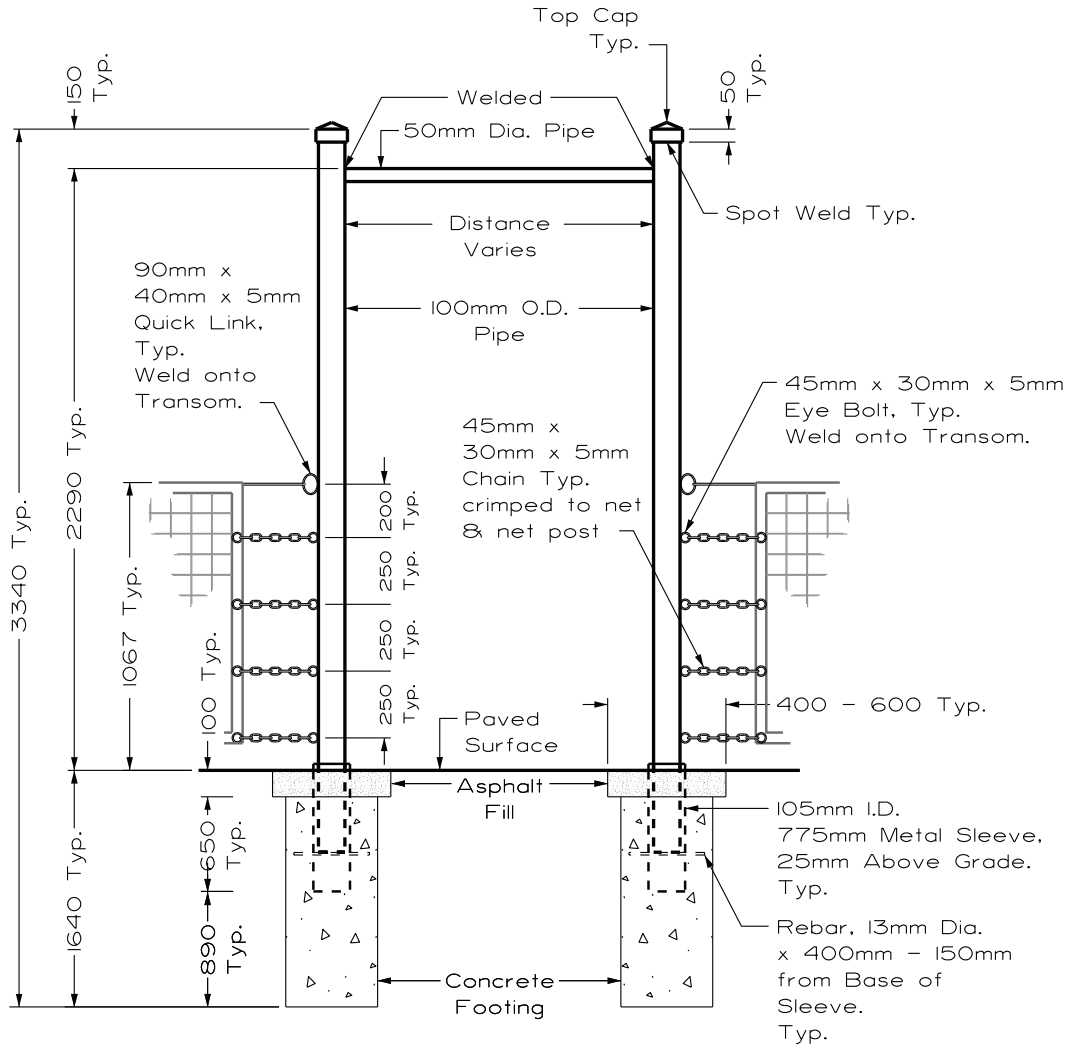
Detail Sheet 16: Tennis Courts - Permanent Transom



NOTES: - 400mm - 600mm square of asphalt to be removed prior to augering post holes. Repair using asphalt and grade level with surrounding surface.
- All Pipe to be Glavanized Schedule 40.
- All dimensions are in millimetres unless otherwise noted.

Calgary	PROJECT TITLE **SPECIFICATIONS** SHEET TITLE **TENNIS COURT CONSTRUCTION (PERMANENT TRANSOM)**	DRAWN BY **WB** DATE **2010 08 13** DESIGN BY **TDS / MM** DATE **2010 08 13**	SCALE **N.T.S.** SHEET NO. **16** FILE NO.

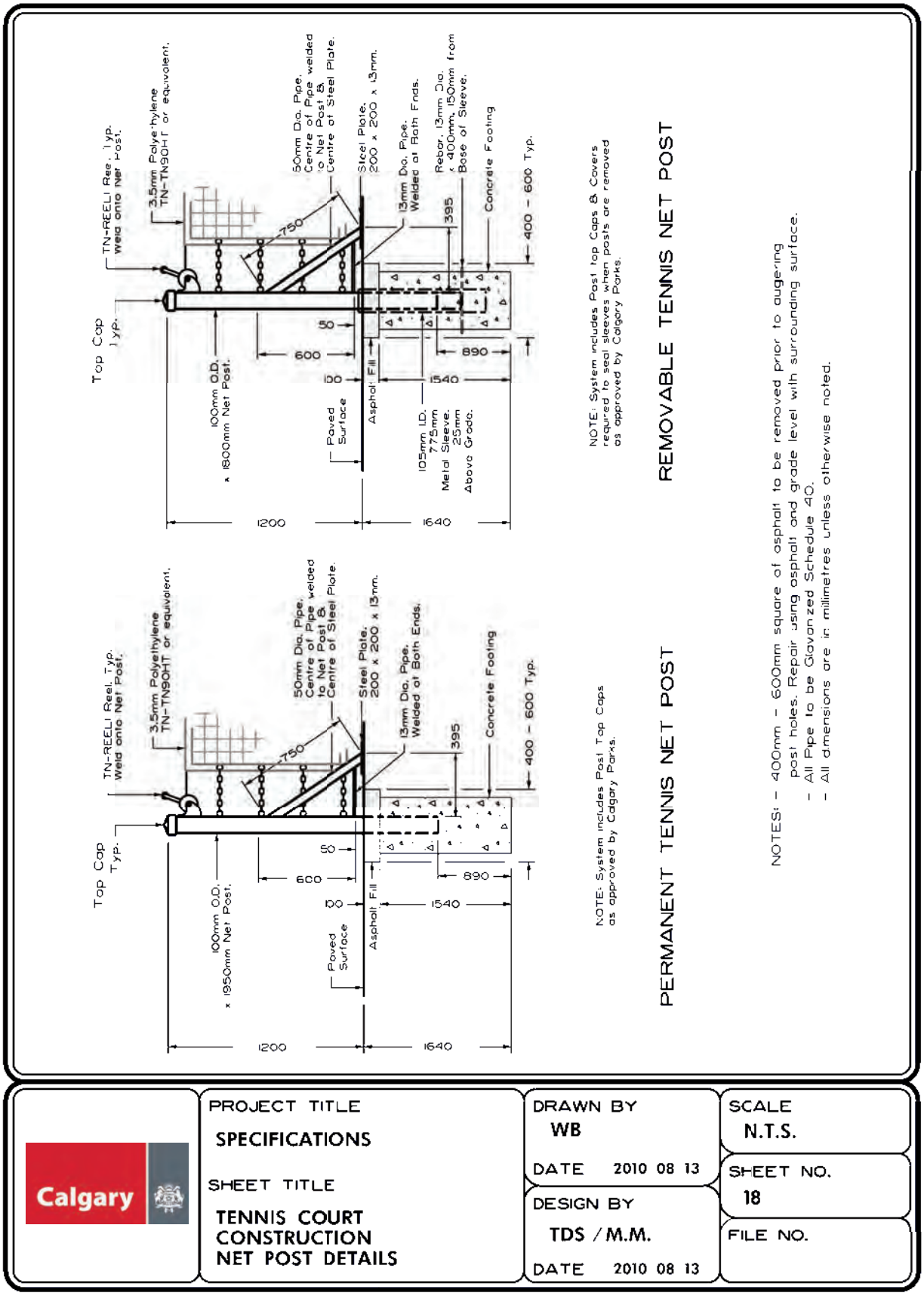
Detail Sheet 17: Tennis Courts - Removable Transom



NOTES: - 400mm - 600mm square of asphalt to be removed prior to augering post holes. Repair using asphalt and grade level with surrounding surface.
- All Pipe to be Glavanized Schedule 40.
- All dimensions are in millimetres unless otherwise noted.

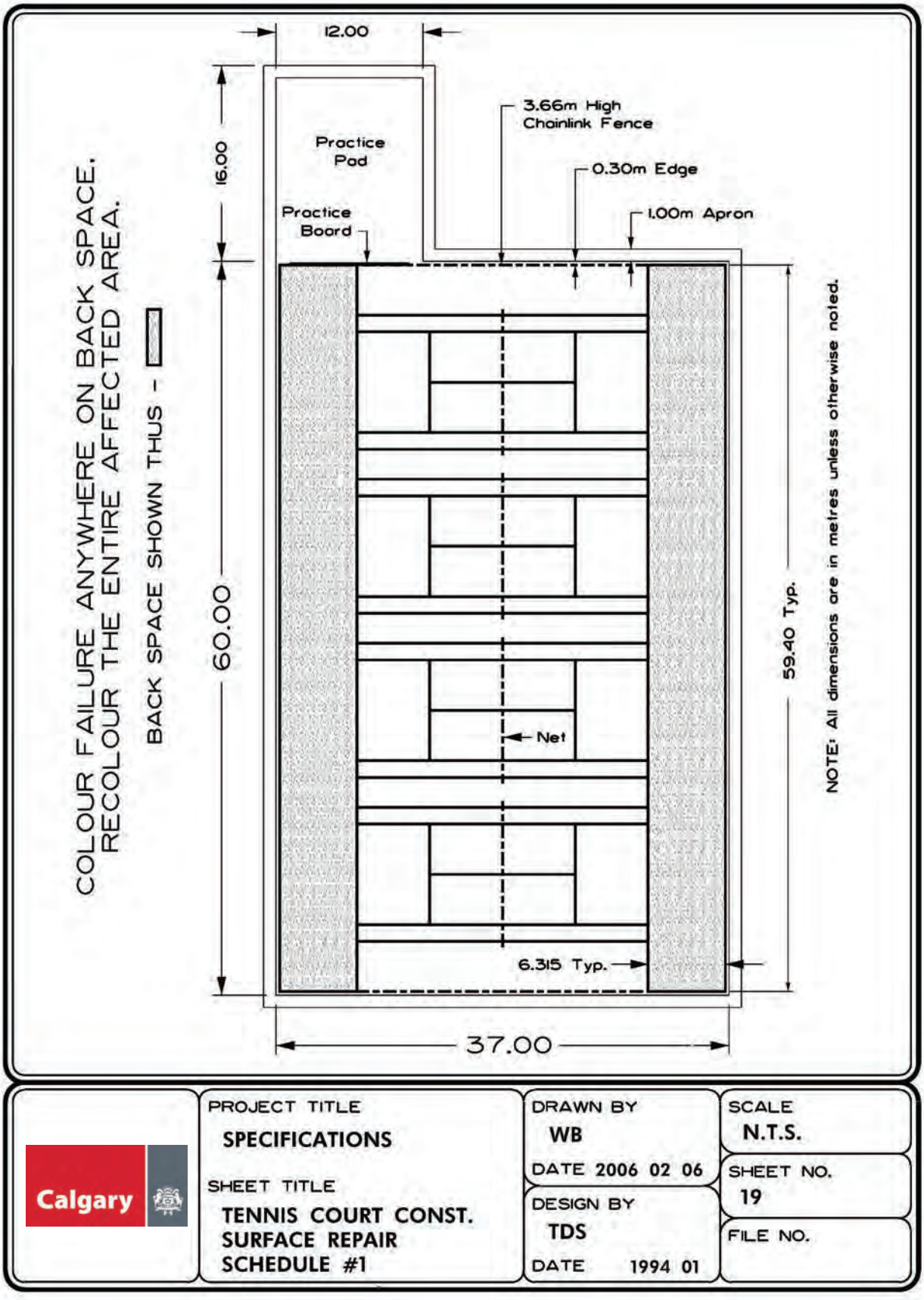
Calgary	PROJECT TITLE **SPECIFICATIONS** SHEET TITLE **TENNIS COURT CONSTRUCTION (REMOVABLE TRANSOM)**	DRAWN BY **WB** DATE **2010 08 13** DESIGN BY **TDS /M.M.** DATE **2010 08 13**	SCALE **N.T.S.** SHEET NO. **17** FILE NO.

Detail Sheet 18: Tennis Courts - Net Posts

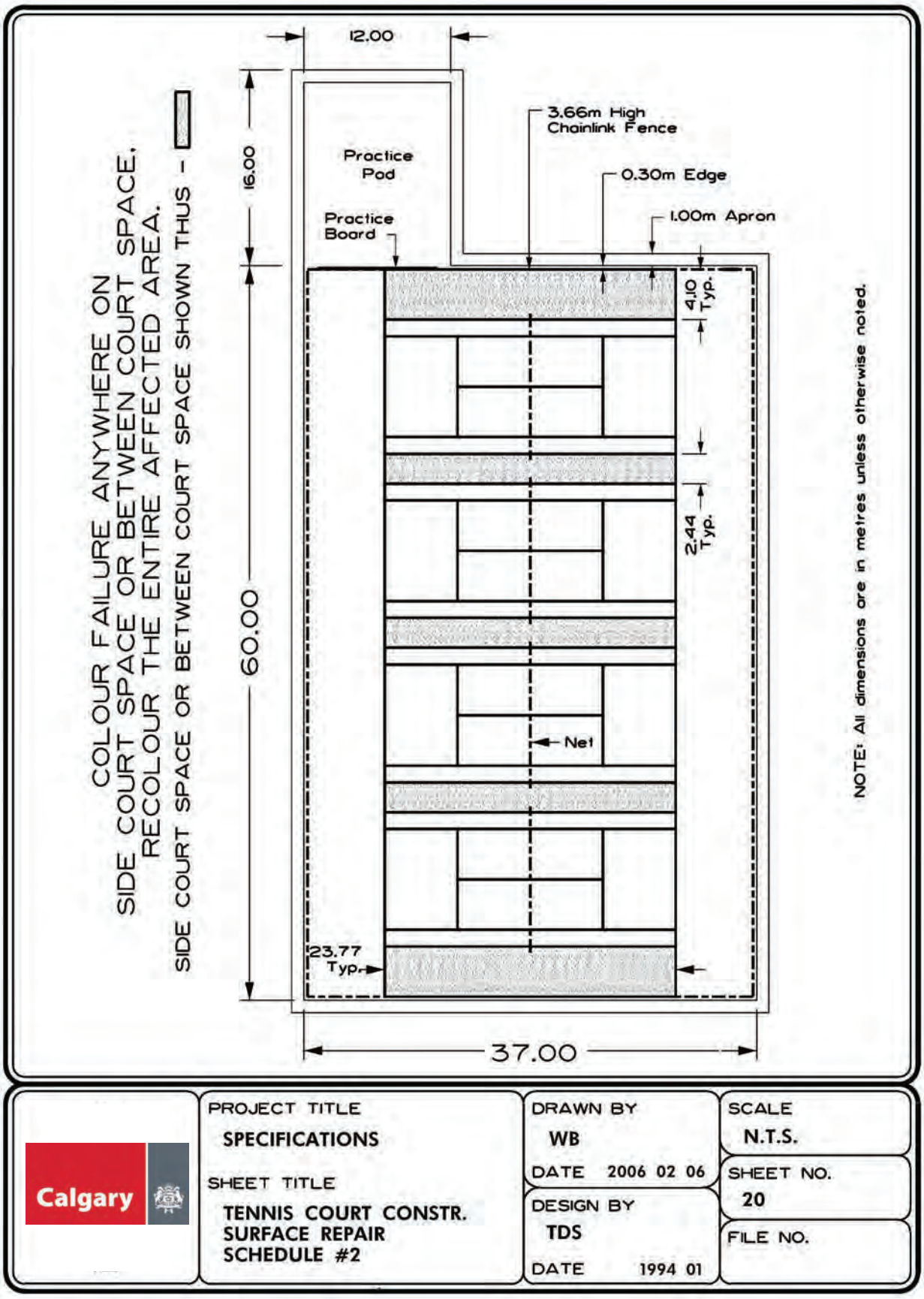


Calgary	PROJECT TITLE SPECIFICATIONS SHEET TITLE TENNIS COURT CONSTRUCTION NET POST DETAILS	DRAWN BY WB DATE 2010 08 13 DESIGN BY TDS / M.M. DATE 2010 08 13	SCALE N.T.S. SHEET NO. 18 FILE NO.

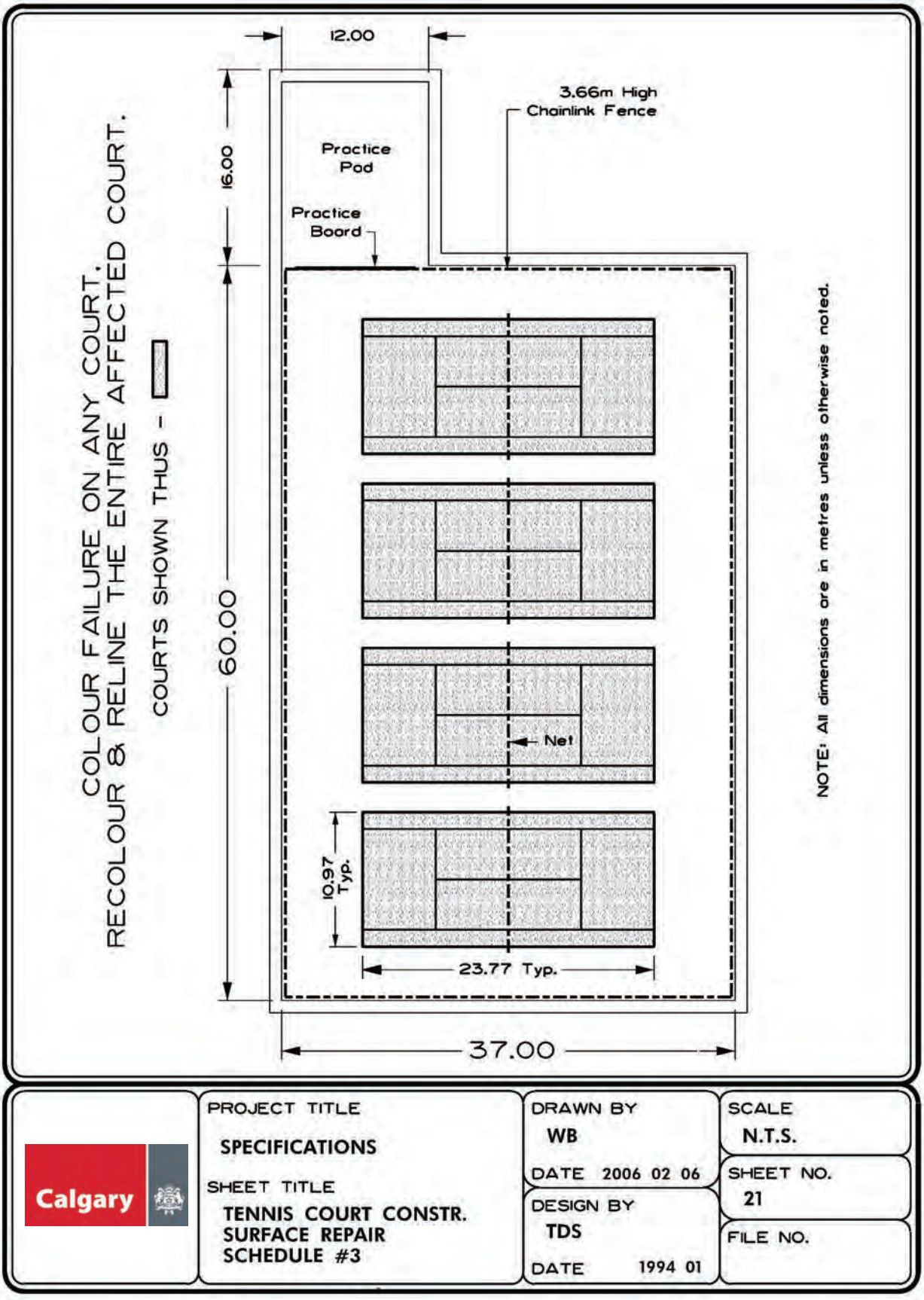
Detail Sheet 19: Tennis Courts- Surface Repair Schedule #1



Detail Sheet 20: Tennis Courts- Surface Repair Schedule #2



Detail Sheet 21: Tennis Courts- Surface Repair Schedule #3



Detail Sheet 22: Tree Planting- 35 mm Caliper Trees and Smaller Bare Root

TREE PLANTING DETAIL

The following Tree Planting Detail will be used for Bare Root Trees up to 35mm Caliper.

NOTES:

- Spread out roots in hole (hole shall be twice the diameter of the root spread).

- Flush out broken or frayed root ends with secateurs

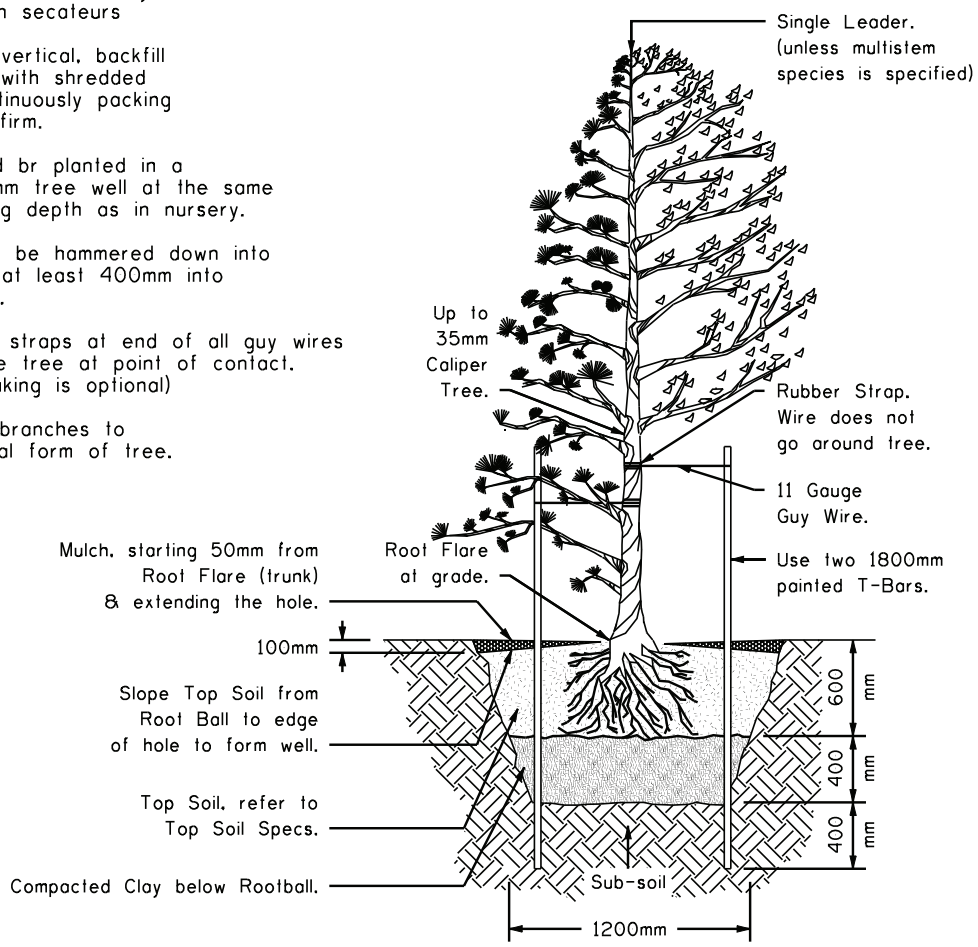
- Hold trunk vertical, backfill around roots with shredded loam mix, continuously packing the soil until firm.

- Tree should br planted in a 75mm - 100mm tree well at the same original growing depth as in nursery.

- Bars should be hammered down into solid footing (at least 400mm into sub-soil base).

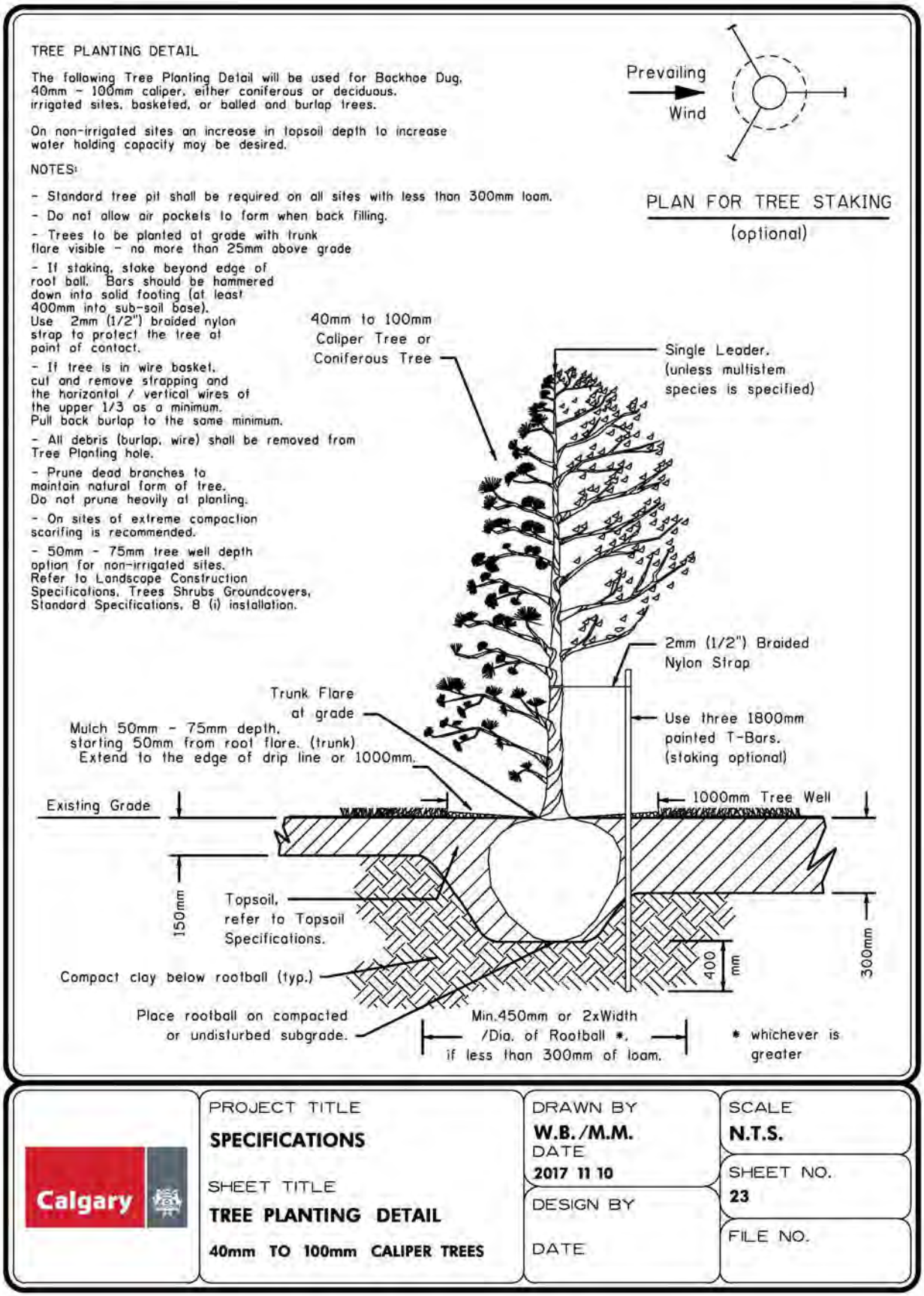
- Use rubber straps at end of all guy wires to protect the tree at point of contact. (Guying & Staking is optional)

-Prune dead branches to maintain natural form of tree.



Calgary	PROJECT TITLE **SPECIFICATIONS**	DRAWN BY **W.B.**	SCALE **N.T.S.**
	SHEET TITLE **TREE PLANTING DETAIL** **35mm CALIPER TREES & SMALLER BARE ROOT**	DATE **2003-01-23**	SHEET NO. **22**
		DESIGN BY	FILE NO.
		DATE	

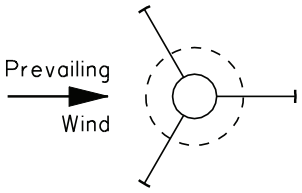
Detail Sheet 23: Tree Planting - 40 mm to 100 mm Caliper Trees



Detail Sheet 24: Tree Planting - 40 mm to 100 mm Caliper Trees Spade Dug

TREE PLANTING DETAIL

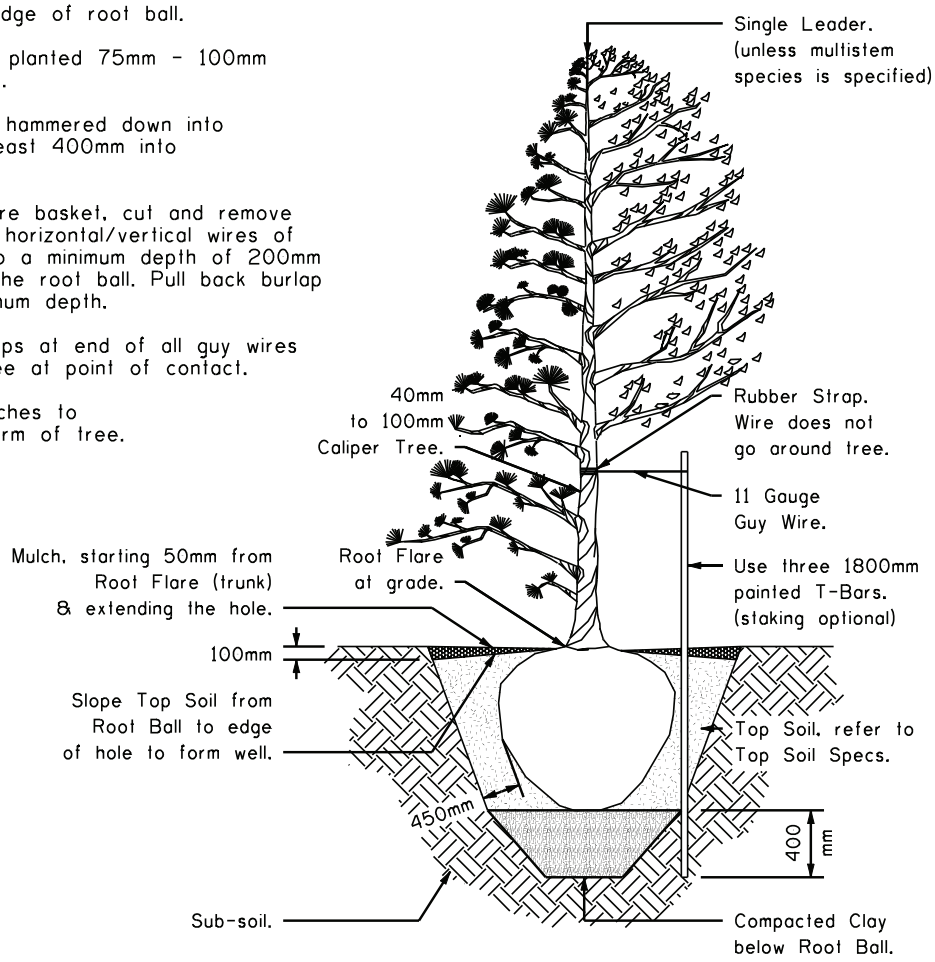
The following Tree Planting Detail will be used for Spade Hole Preperation.
40mm - 100mm Caliper.
either Coniferous or Deciduous.
Basket or Ball & Burlap Trees



PLAN FOR TREE STAKING
(optional)

NOTES:

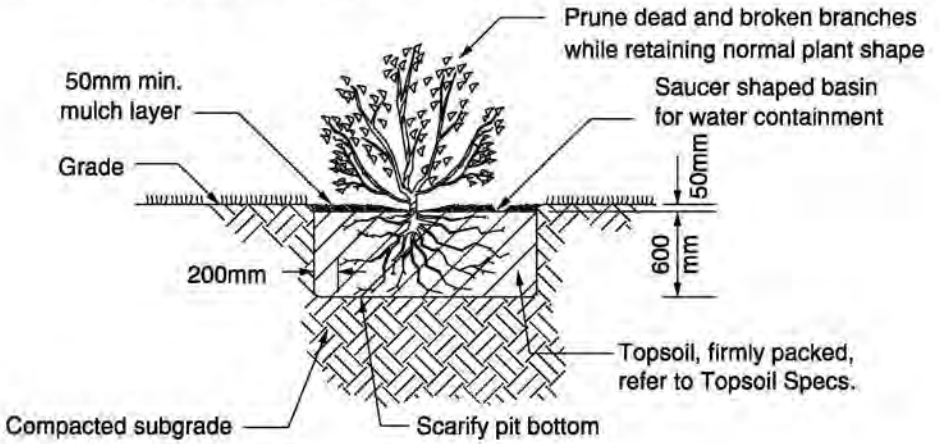
- Do not allow air pockets to form when back filling.
- Stake beyond edge of root ball.
- Tree should be planted 75mm - 100mm below ground level.
- Bars should be hammered down into solid footing (at least 400mm into sub-soil base).
- If tree is in wire basket, cut and remove strapping and the horizontal/vertical wires of the wire basket to a minimum depth of 200mm from the top of the root ball. Pull back burlap to this same minimum depth.
- Use rubber straps at end of all guy wires to protect the tree at point of contact.
- Prune dead branches to maintain natural form of tree.



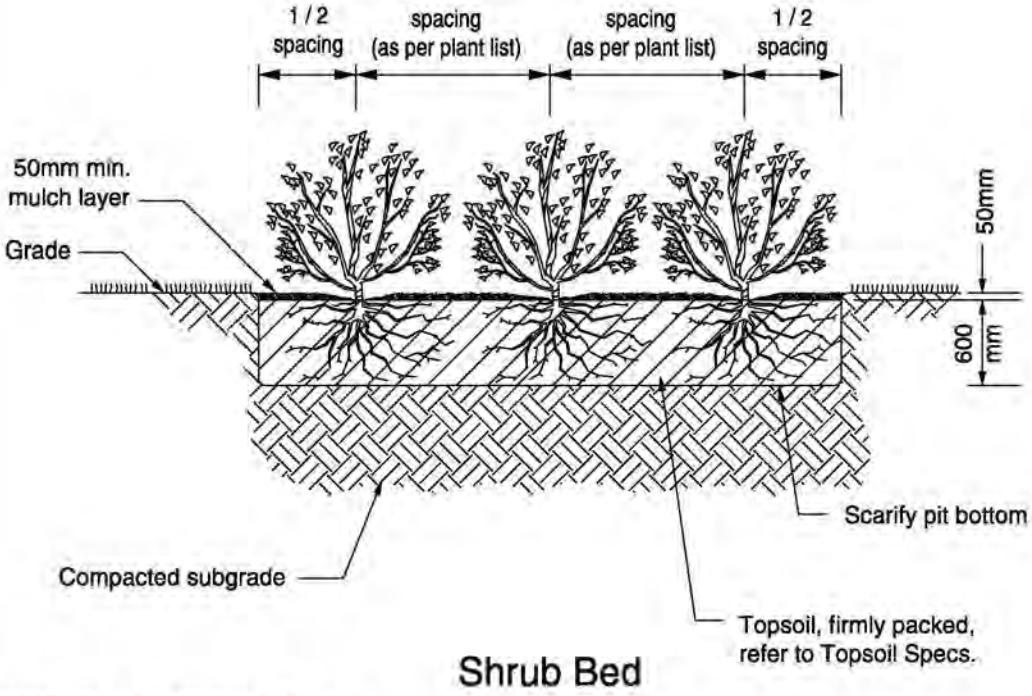
Calgary	PROJECT TITLE **SPECIFICATIONS**	DRAWN BY **W.B.**	SCALE **N.T.S.**
	SHEET TITLE **TREE PLANTING DETAIL** **40mm - 100mm CALIPER TREES SPADE DUG**	DATE **2003-01-23**	SHEET NO. **24**
		DESIGN BY	FILE NO.
		DATE	

Detail Sheet 25: Tree Planting - Shrubs

The following shrub planting detail will be used for all potted deciduous or coniferous shrubs



Shrub Pit

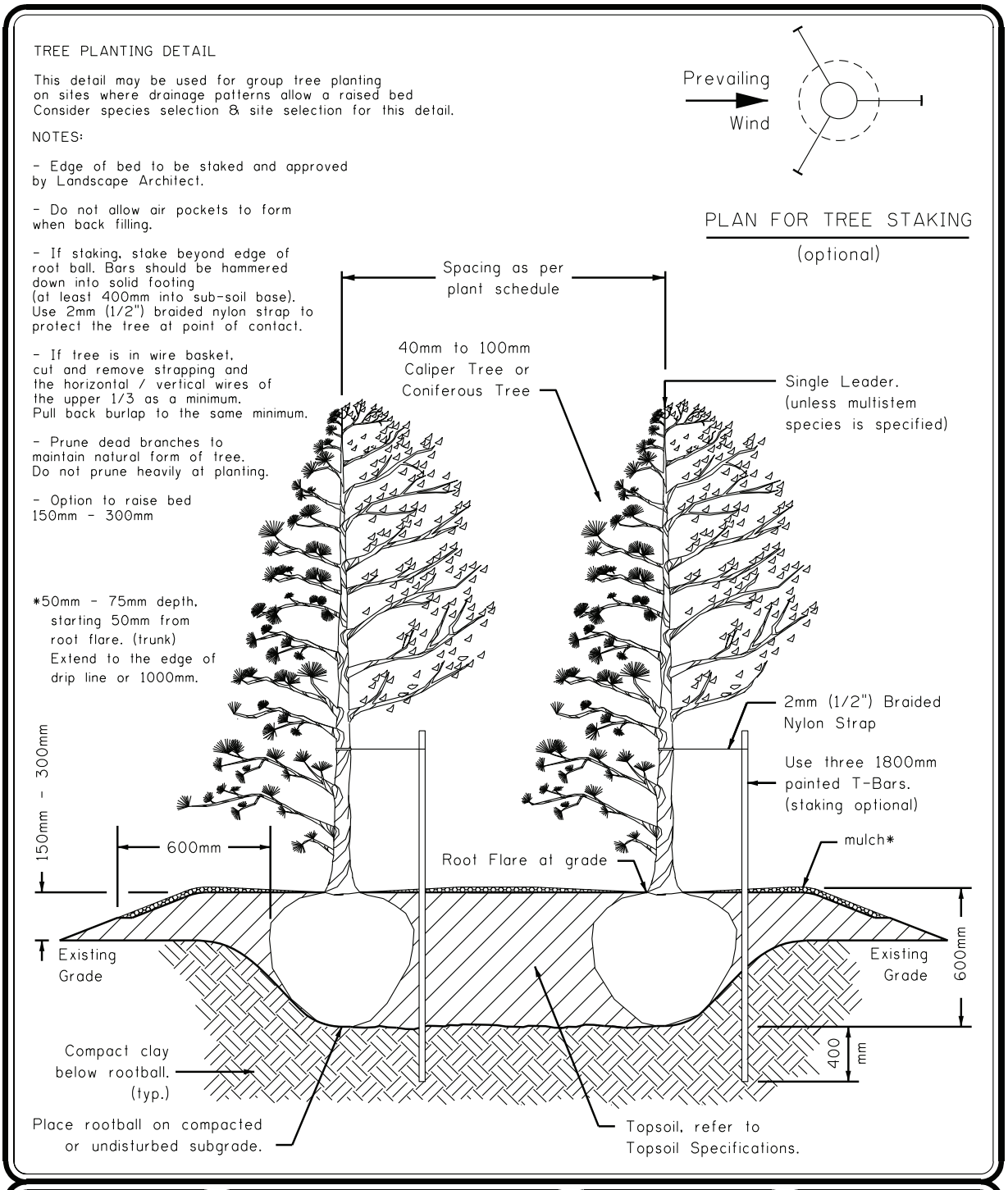


Shrub Bed

NOTE: If site is 300mm Loam
Shrub Bed excavation is not required.

Calgary	PROJECT TITLE: **SPECIFICATIONS**	DRAWN BY: **W.B./M.M.**	SCALE: **N.T.S.**
	SHEET TITLE: **SHRUB PLANTING DETAIL**	DATE: **2017 11 09**	SHEET NO.: **25**
		DESIGN BY:	FILE NO.
		DATE:	

Detail Sheet 26: Tree Planting- Beds



Calgary	PROJECT TITLE **SPECIFICATIONS** SHEET TITLE **TREE BED DETAIL**	DRAWN BY **W.B./M.M.** DATE **2009 10 27** DESIGN BY DATE	SCALE **N.T.S.** SHEET NO. **26** FILE NO.

Detail Sheet 27: Tree Planting - Slopes

NOTES:

- Do not allow air pockets to form when back filling.

- Stake beyond edge of root ball.

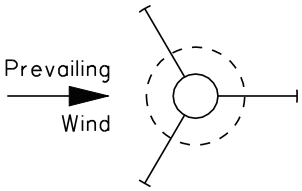
- Tree should be planted 75mm - 100mm below ground level.

- Bars should be hammered down into solid footing (at least 400mm into sub-soil base).

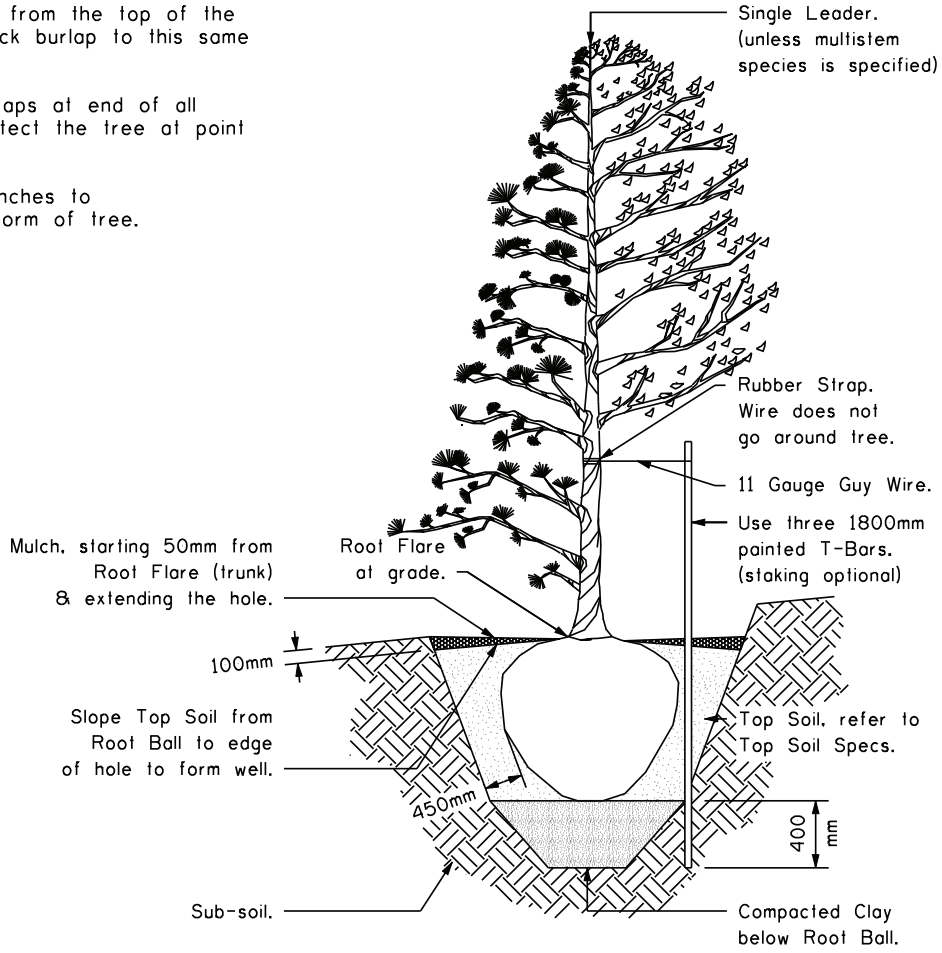
- If tree is in wire basket, cut and remove strapping and the horizontal/vertical wires of the wire basket to a minimum depth of 200mm from the top of the root ball. Pull back burlap to this same minimum depth.

- Use rubber straps at end of all guy wires to protect the tree at point of contact.

-Prune dead branches to maintain natural form of tree.

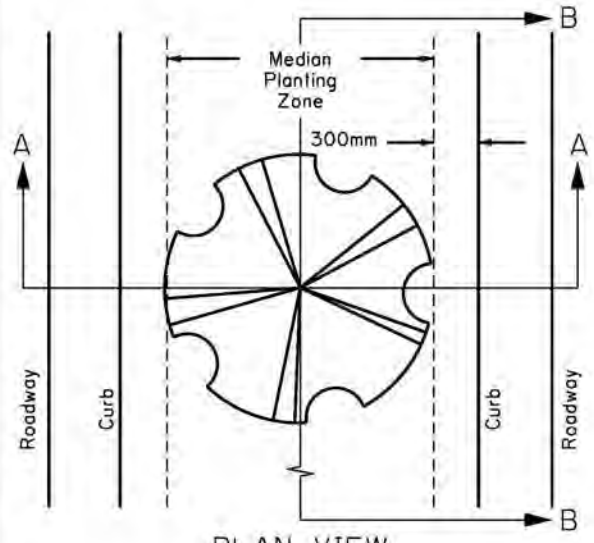


PLAN FOR TREE STAKING
(optional)

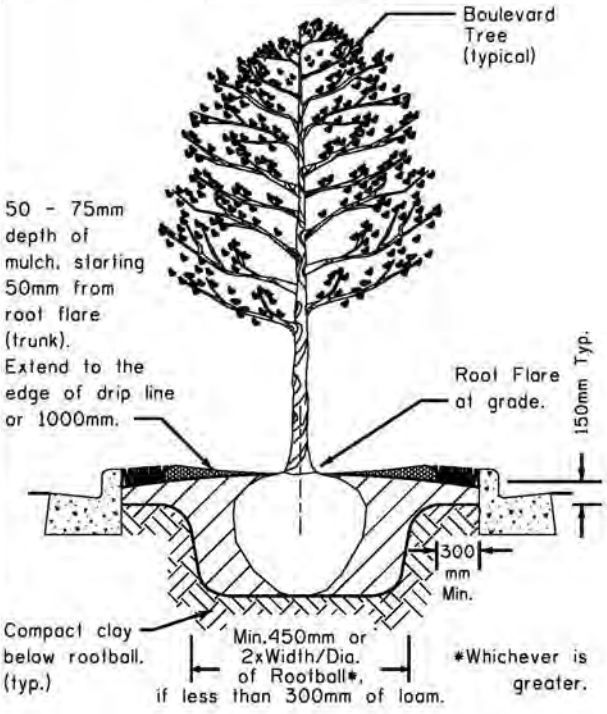


Calgary	PROJECT TITLE **SPECIFICATIONS**	DRAWN BY **W.B.**	SCALE **N.T.S.**
		DATE **2003-01-23**	SHEET NO. **27**
	SHEET TITLE **TREE PLANTING DETAIL FOR SLOPES**	DESIGN BY	FILE NO.
		DATE	

Detail Sheet 27a: Tree Planting - Boulevard and Median Trench



PLAN VIEW



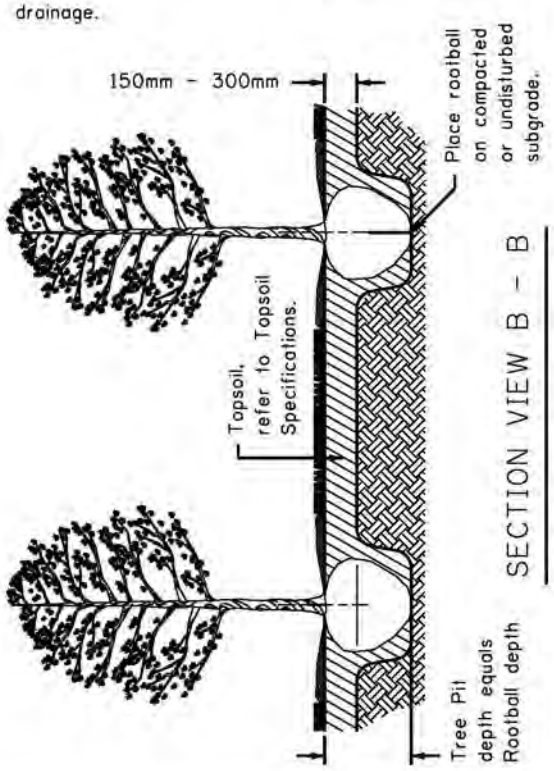
SECTION VIEW A - A

TREE PLANTING DETAIL

The following Tree Planting Detail will be used for all trees planted in the Boulevard and Median.

NOTES:

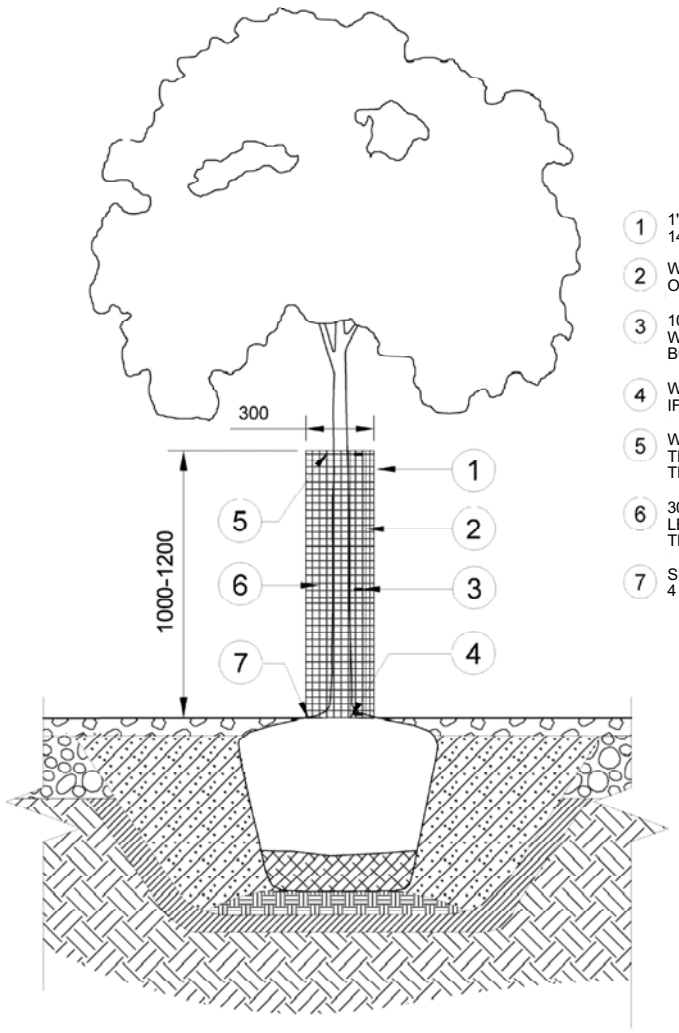
- Standard tree pit shall be required on all sites with less than 300mm loam.
- Depth of loam min 150mm to optimum of 300mm. Tree spade option if depth is 300mm.
- Do not allow air pockets to form when back filling.
- Trees to be planted at grade with trunk flare visible - no more than 25mm above grade.
- Staking, if required - refer to Tree Planting Detail #23, remove staking one year after installation.
- If tree is in wire basket, cut and remove strapping and the horizontal / vertical wires of the upper 1/3 as a minimum. Pull back burlap to the same minimum.
- All debris (burlap, wire) shall be removed from Tree Planting hole.
- Prune dead branches to maintain natural form of tree. Do not prune heavily at planting.
- Crown median to ensure positive drainage.



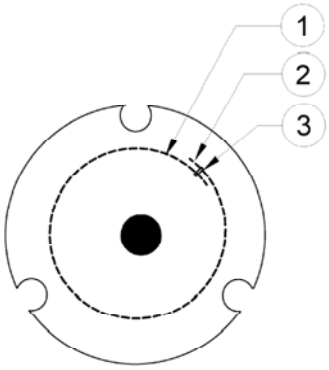
SECTION VIEW B - B

Calgary	PROJECT TITLE **SPECIFICATIONS**	DRAWN BY **W.B./M.M.** DATE **2017 11 10**	SCALE **N.T.S.**
	SHEET TITLE **TREE PLANTING, TRENCH, DETAIL** **BOULEVARDS AND MEDIANS**	DESIGN BY DATE	SHEET NO. **27a**
			FILE NO.

Detail Sheet 27b: Tree Planting - Protection Fencing



A: SECTION



B: PLAN - 1:10

1. 1" SQUARE MESH STUCCO WIRE FENCE. 14 GAUGE GALVANIZED WIRE.
2. WIRE MESH OVERLAPS BY 2 SQUARES OF MESH (50mm).
3. 100mm ALL WEATHER ZIP TIES FASTEN THE WIRE TOGETHER AT TOP, MIDDLE AND BOTTOM.
4. WIRE SITS FLAT ON THE GROUND ON ALL SIDES. IF TREE IS ON SLOPE, CUT WIRE TO FIT.
5. WIRE SHALL BE 1200mm TALL IN THE CASE OF MOST TREES, 1000mm TALL IN THE CASE OF SMALL TREES THAT WOULD REQUIRE EXCESSIVE PRUNING TO FIT.
6. 300mm DIA ON NEW TREES. ON EXISTING TREES, LEAVE 150mm SPACE AROUND ENTIRE TRUNK.
7. SECURE WIRE MESH TO GROUND WITH 4 X 200mm STAPLES.

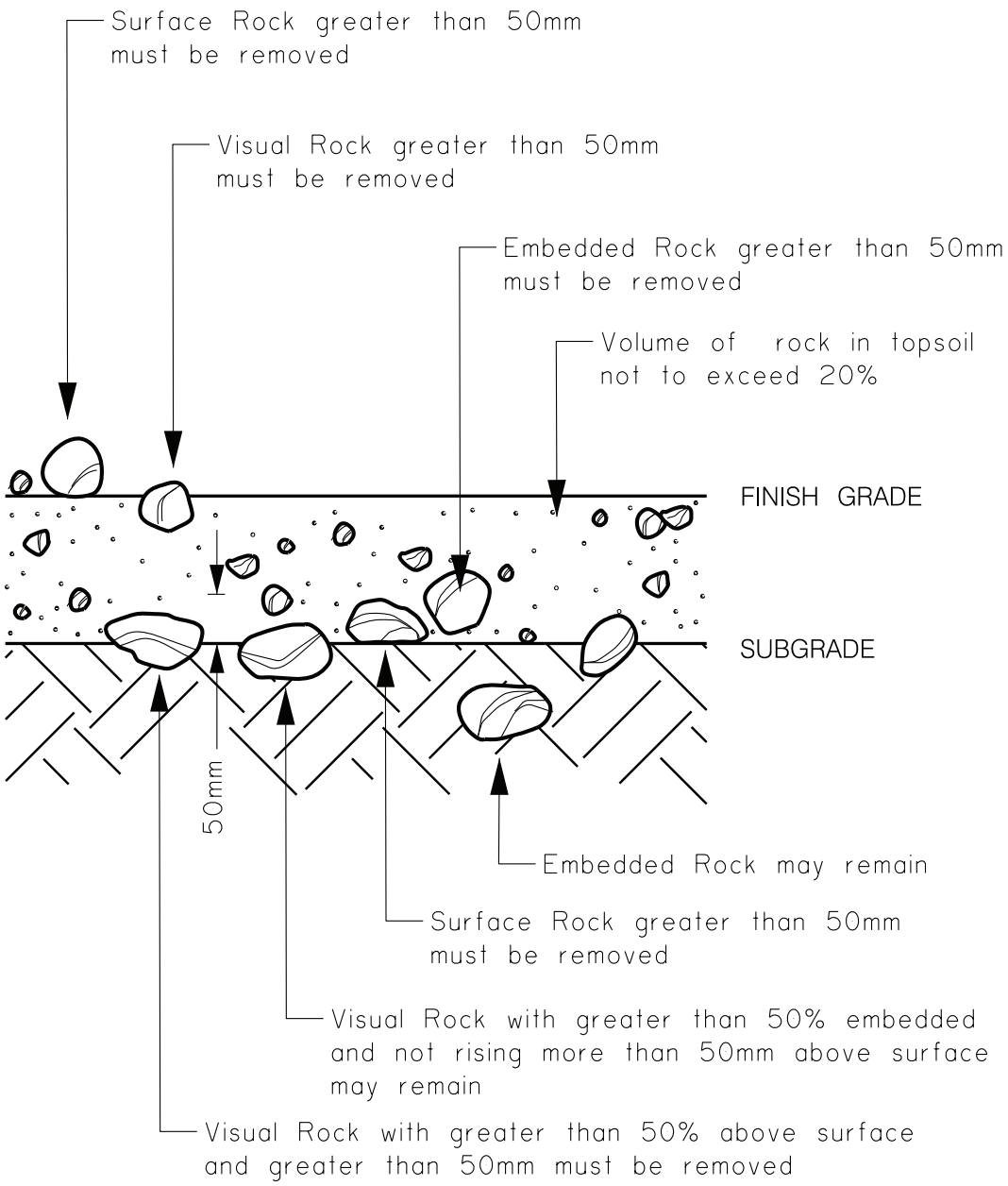
Calgary

SPECIFICATIONS

INDIVIDUAL TREE BEAVER / RABBIT PROTECTION FENCING

DESCRIPTION	SCALE	
	N.T.S.	
	DRAWN BY	FILE NO.
	DATE	SHEET NO.
	2019-01-18	27b

Detail Sheet 28: Topsoil/Subgrade Preparation



NOTE: Surface, visual or embedded rock that is greater than 25mm must be removed for all sportsfields.

Calgary	PROJECT TITLE **SPECIFICATIONS** SHEET TITLE **TOPSOIL /SUBGRADE PREPARATION**	DRAWN BY **MM** DATE **2006 01 06** DESIGN BY DATE	SCALE **N.T.S.** SHEET NO. **28** FILE NO.

Detail Sheet 28a: Non-Engineered Fill Drawing

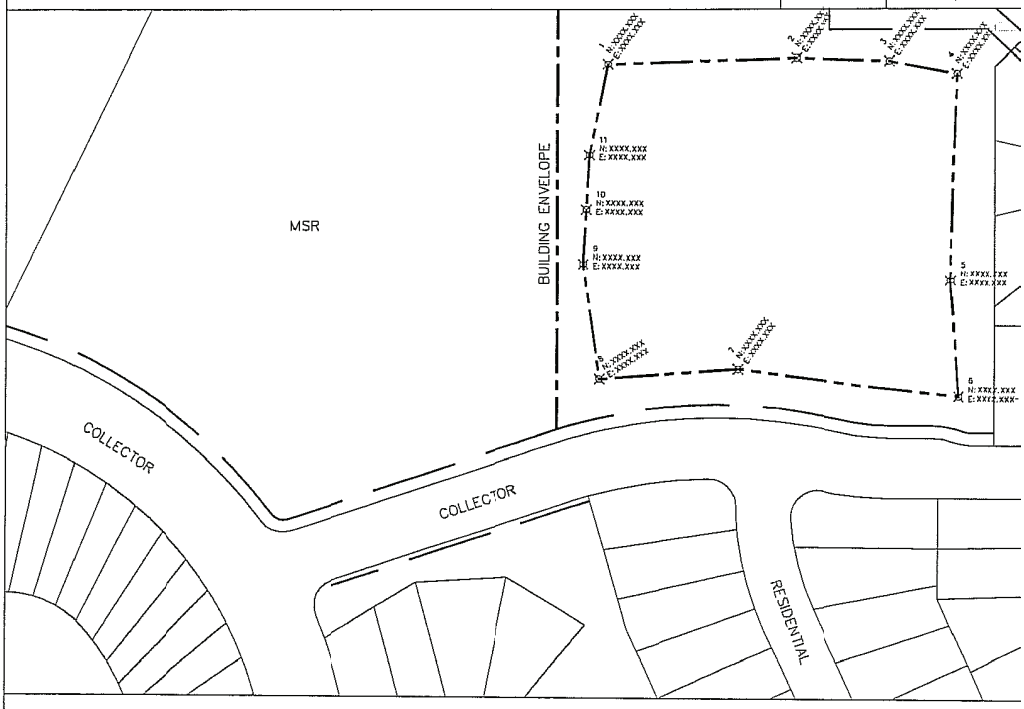
THE CITY OF CALGARY PARKS

NON-ENGINEERED FILL DRAWING

Report #

Community		Subdivision	Plan Block Lot
	Phase	Developer	Development Agreement #
Legal / Municipal address			
Consultant		Contact Person	Phone
Contractor		Contact Person	Phone
C.C.C. Application Received: ☐ Yes ☐ No			Date yyyy mm dd

LIMIT OF BORROW AREA
DEPTH OF BORROW = _____



SCALE 1:1500

LIST OF POINTS

POINT	NORTHING	EASTING	POINT	NORTHING	EASTING
1	XXXX.XXX	XXXX.XXX	6	XXXX.XXX	XXXX.XXX
2	XXXX.XXX	XXXX.XXX	7	XXXX.XXX	XXXX.XXX
3	XXXX.XXX	XXXX.XXX	8	XXXX.XXX	XXXX.XXX
4	XXXX.XXX	XXXX.XXX	9	XXXX.XXX	XXXX.XXX
5	XXXX.XXX	XXXX.XXX	10	XXXX.XXX	XXXX.XXX
			11	XXXX.XXX	XXXX.XXX

Calgary

PROJECT TITLE
SPECIFICATIONS

SHEET TITLE
NON-ENGINEERED FILL DRAWING

DRAWN BY **WB**
DATE **2007 06 28**

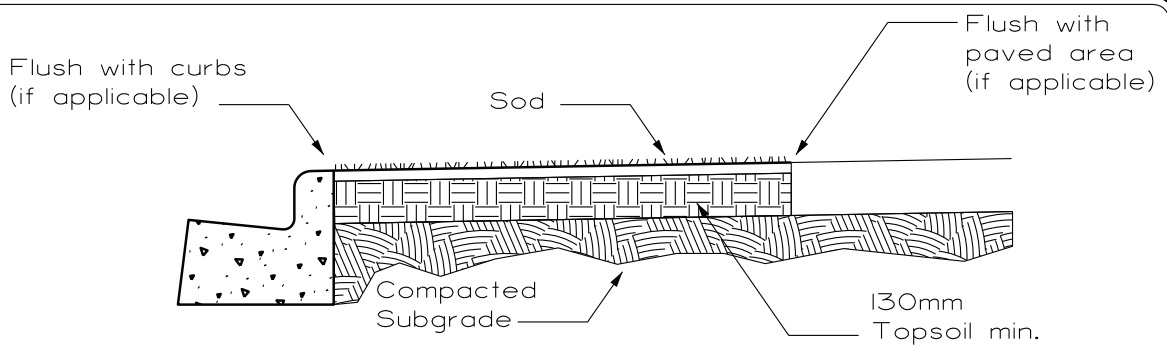
DESIGN BY
DATE

SCALE **N.T.S.**

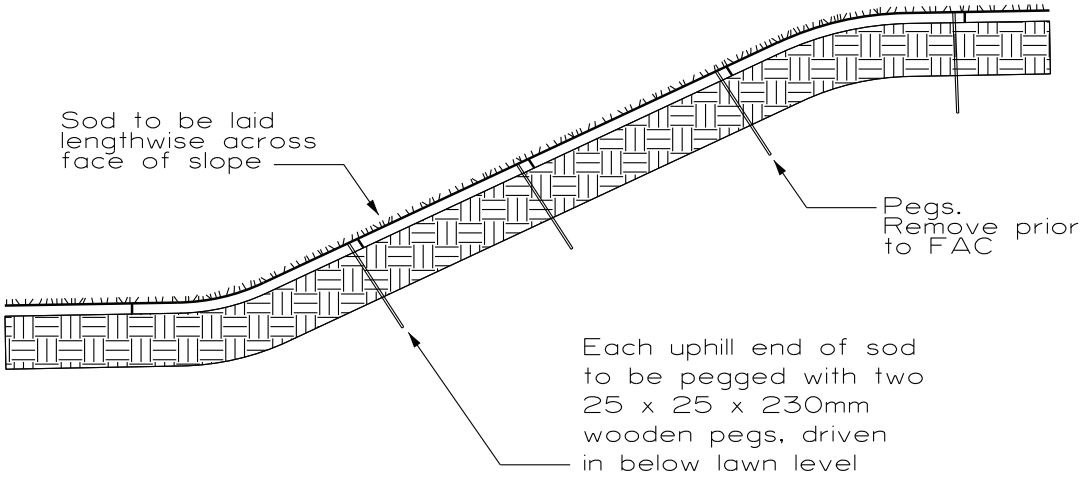
SHEET NO. **28a**

FILE NO.

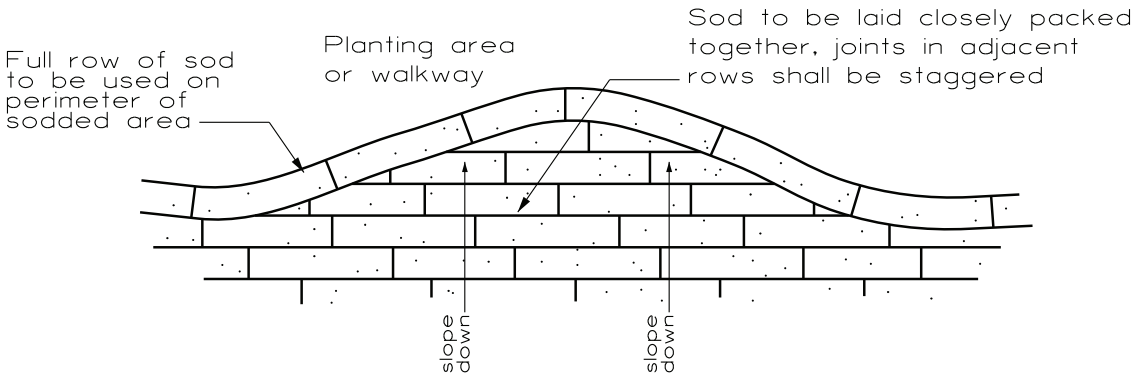
Detail Sheet 29: Sod



SECTION THROUGH SOD



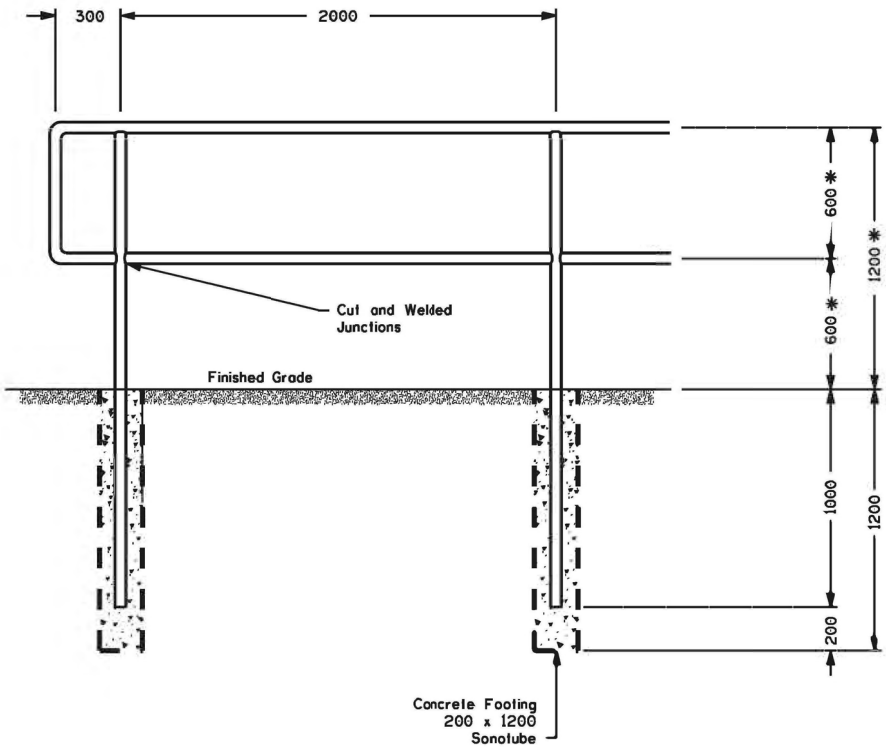
CROSS–SECTION OF 3H:1V SLOPE



PLAN VIEW OF SOD LAYOUT AND EDGING

Calgary	PROJECT TITLE **SPECIFICATIONS** SHEET TITLE **SOD DETAIL**	DRAWN BY **MM** DATE **2006 01 09** DESIGN BY DATE	SCALE **N.T.S.** SHEET NO. **29** FILE NO.

Detail Sheet 30: Pathway Guard Rail

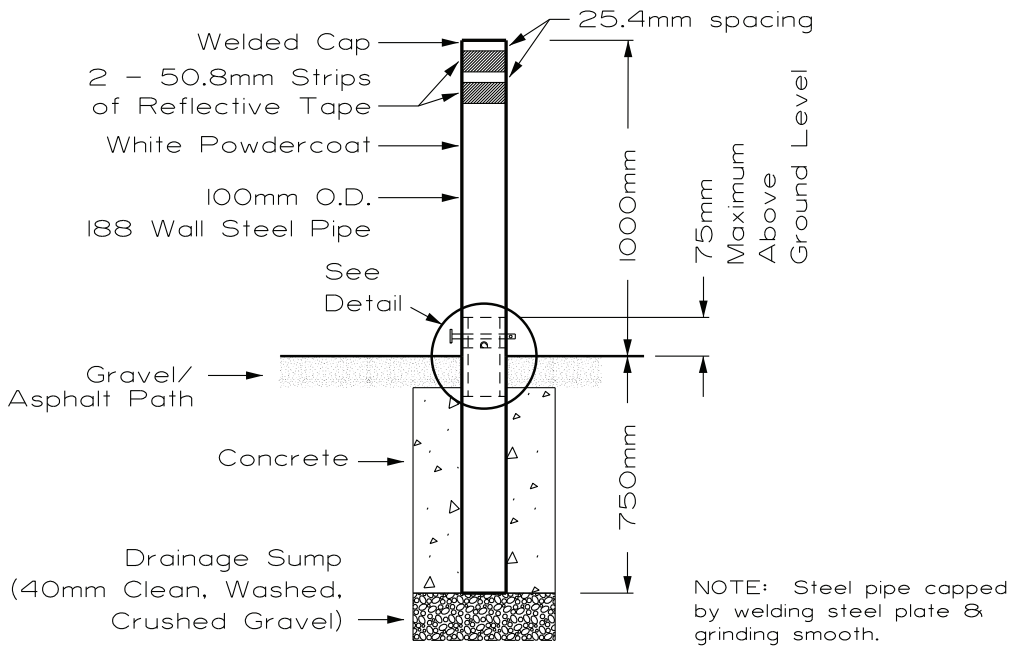


Elevation

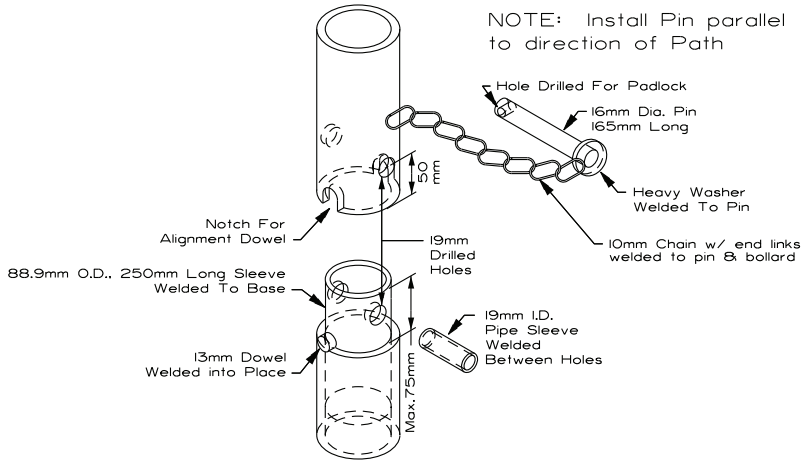
NOTE: - All dimensions are in millimetres unless otherwise noted.
- Posts - Schedule 40, 48mm OD
- Rails - .083 to .100 wall thickness, 48mm OD
- Post and Rails to be steel pipe, continuous weld, all joints.
- * Total railing height increases to 1400mm when required on a bridge.

Calgary	PROJECT TITLE: **SPECIFICATIONS**	DRAWN BY: **W.B./M.M./H.S.**	SCALE: **N.T.S.**
	SHEET TITLE: **PATHWAY GUARD RAIL**	DATE: **2010 03 24**	SHEET NO.: **30**
		DESIGN BY: **G.S.**	FILE NO.
		DATE: **1997 06**	

Detail Sheet 31: Bollards - Removable



ELEVATION
N.T.S.

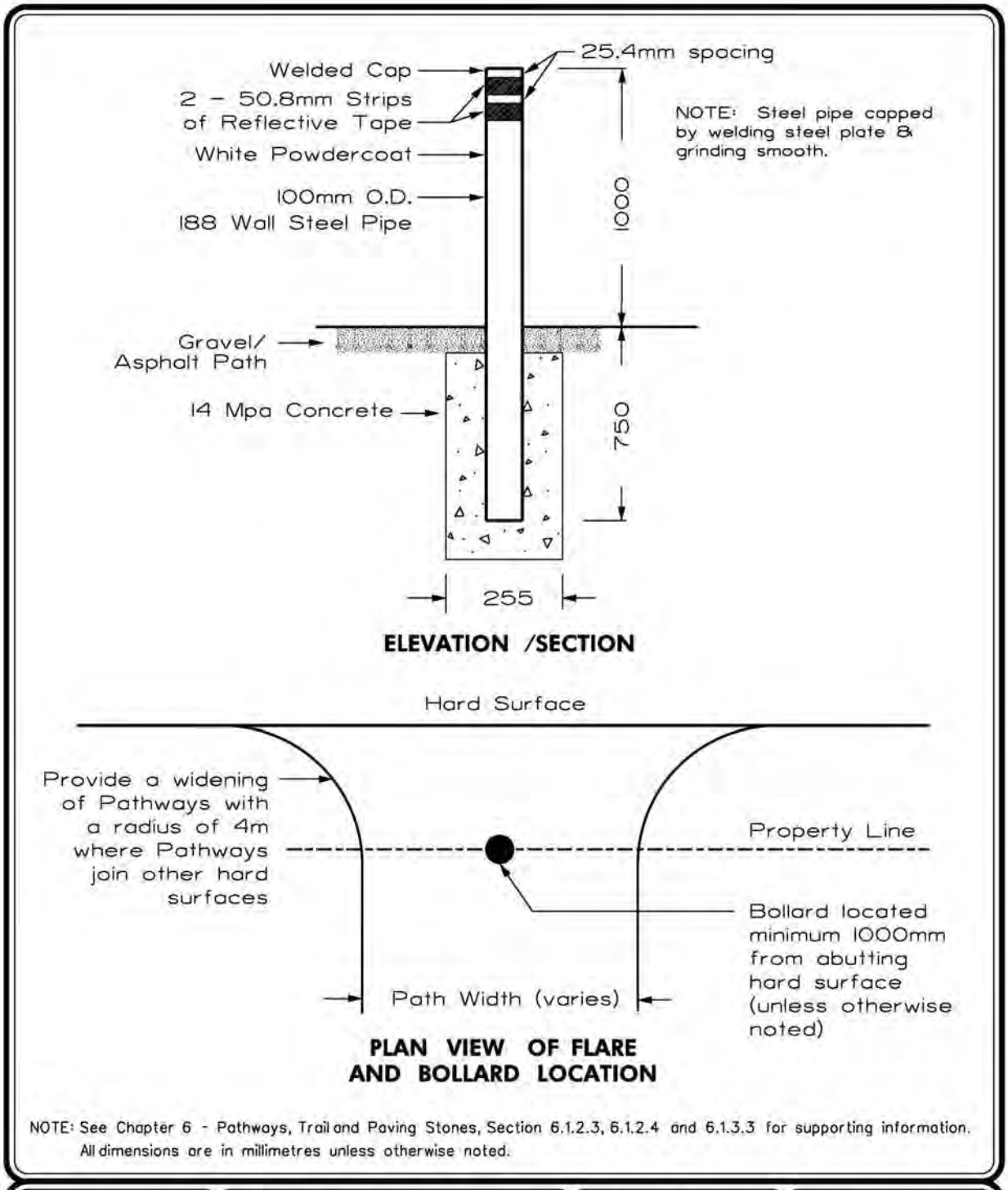


DETAIL
N.T.S.

NOTE: See Bollard in Pathways, Trails & Paving Stones section. Pg.93 Sec. 1.2.F.iii
All dimensions are in millimetres unless otherwise noted.

Calgary	PROJECT TITLE **SPECIFICATIONS**	DRAWN BY **S.P. / W.B.**	SCALE **N.T.S.**
		DATE **2006 06 07**	SHEET NO. **31**
	SHEET TITLE **REMOVABLE BOLLARD DETAIL**	DESIGN BY **G.S.**	FILE NO.
		DATE **1997-06**	

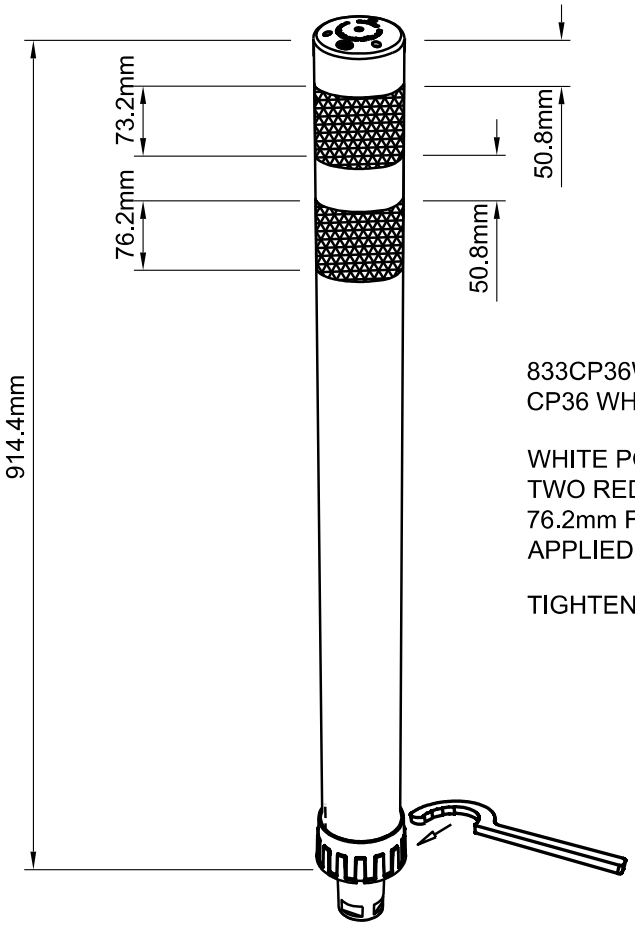
Detail Sheet 32: Bollards- Permanent



NOTE: See Chapter 6 - Pathways, Trail and Paving Stones, Section 6.1.2.3, 6.1.2.4 and 6.1.3.3 for supporting information.
All dimensions are in millimetres unless otherwise noted.

Calgary	PROJECT TITLE **SPECIFICATIONS**	DRAWN BY **SP / WB /MM**	SCALE **N.T.S.**
		DATE **2018 01 19**	SHEET NO. **32**
	SHEET TITLE **PERMANENT BOLLARD DETAIL**	DESIGN BY	FILE NO.
		DATE	

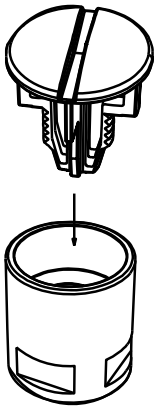
Detail Sheet 33: Bollard Detail - CP36 White City Post



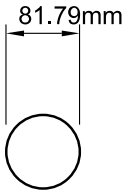
833CP36WHT111
CP36 WHITE CITY POST

WHITE POST WITH:
TWO RED
76.2mm FHIP WRAPS
APPLIED AS SHOWN

TIGHTEN WITH WRENCH AS SHOWN



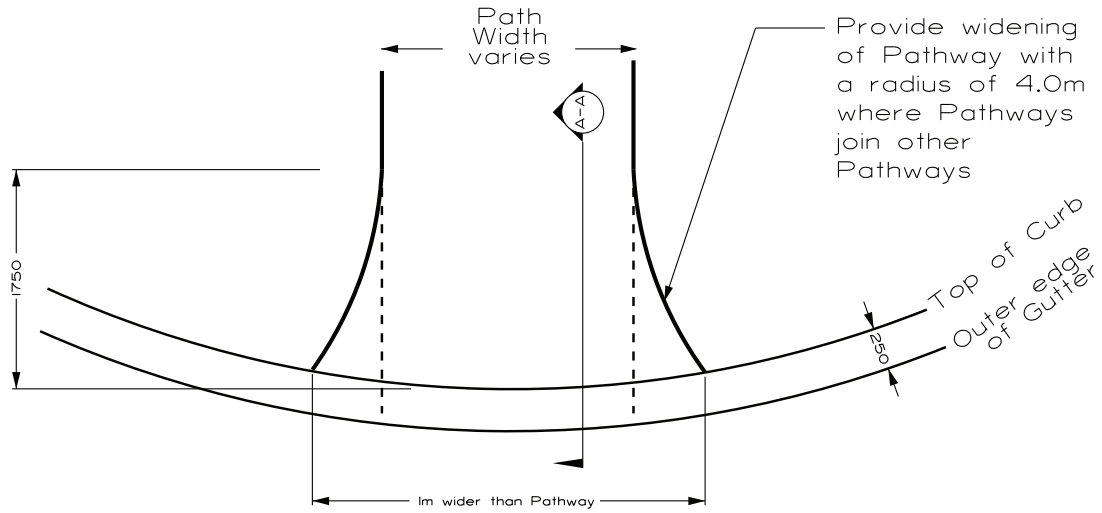
AT-GRADE-50.8mm
ALUMINIUM EMBEDDED
ANCHOR CUP
800BASE211
2:O.D.



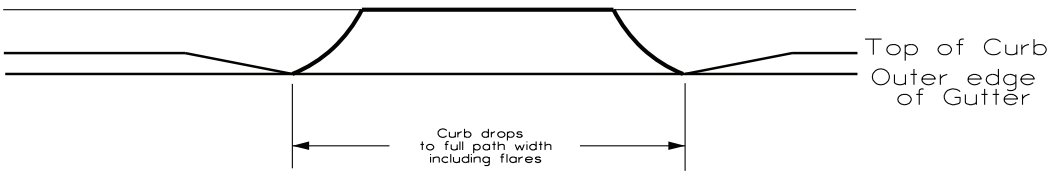
ANCHOR CUP CAP
800BASE218

Calgary	PROJECT TITLE BOLLARD EAC CP36 WHITE SHEET TITLE DETAIL (SECTION)	DRAWN BY A.W./P.O. DATE 2021 01 21 DESIGN BY DP DATE 2021 01 21	SCALE N.T.S. SHEET NO. 33 FILE NO. 2020-007

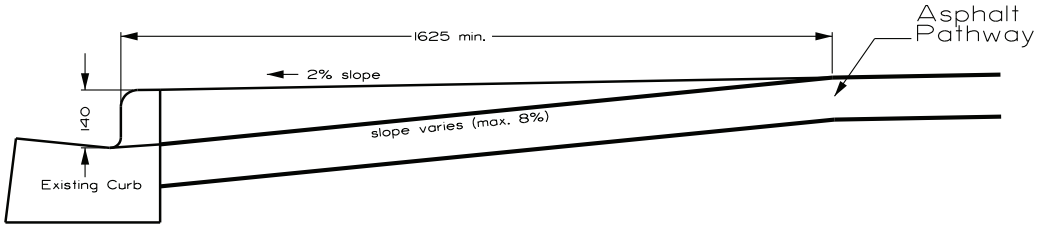
Detail Sheet 34: Wheelchair Ramp - Asphalt



PLAN VIEW



ELEVATION VIEW

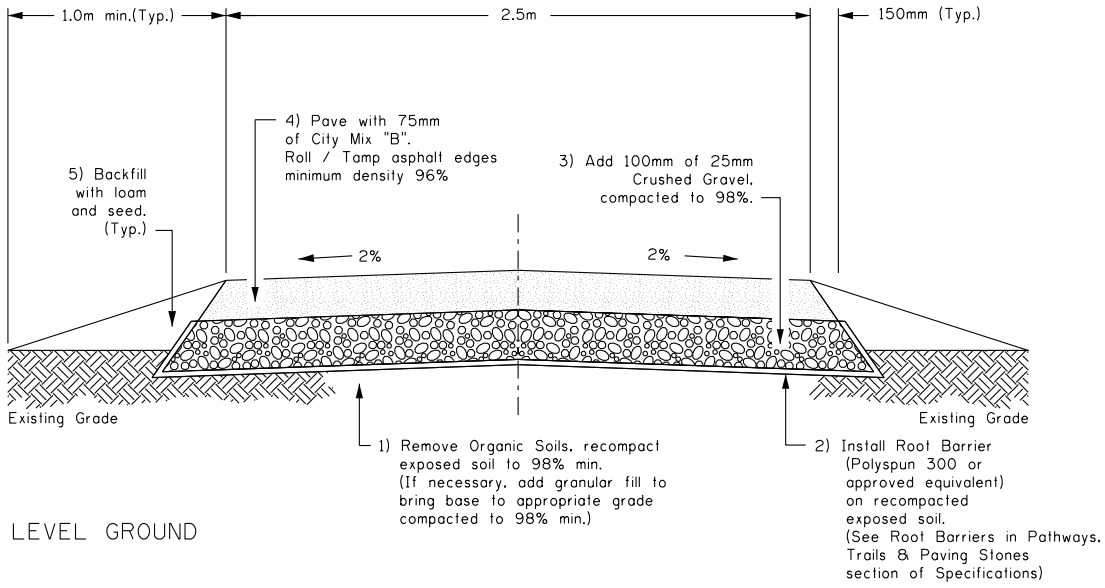


SECTION VIEW A–A

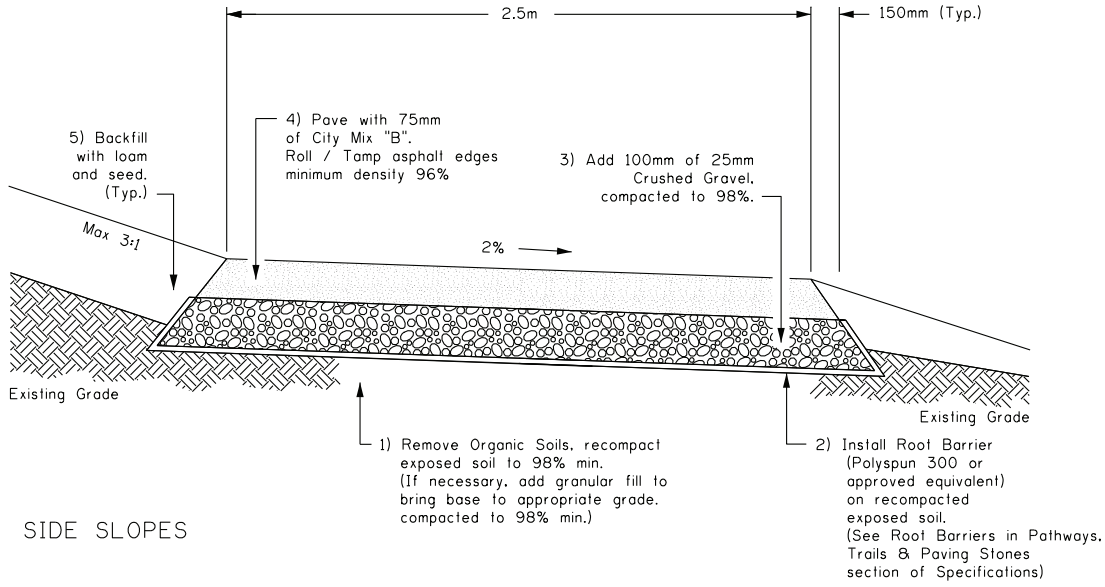
NOTE: Maximum slope of ramp 8.0%
All dimensions are in millimetres unless otherwise noted.

Calgary	PROJECT TITLE **SPECIFICATIONS**	DRAWN BY **MM** DATE **2006 06 07**	SCALE **N.T.S.**
	SHEET TITLE **ASPHALT WHEELCHAIR RAMP**	DESIGN BY **D.LaF.** DATE **2001 03 08**	SHEET NO. **34** FILE NO.

Detail Sheet 35: Pathways - Local Pathway Cross Sections



LEVEL GROUND



SIDE SLOPES

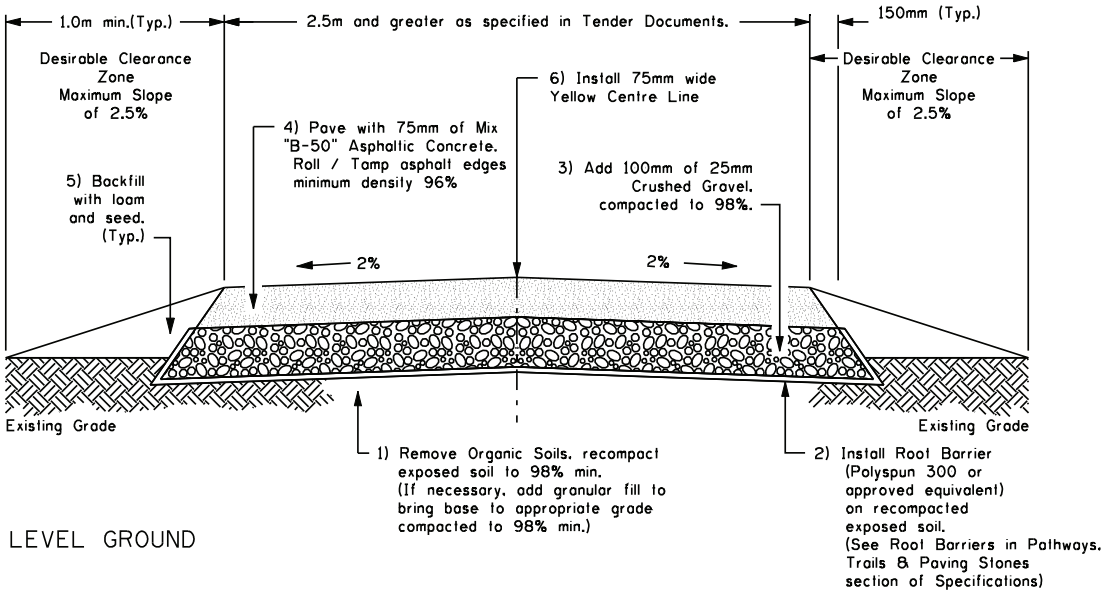
NOTES:

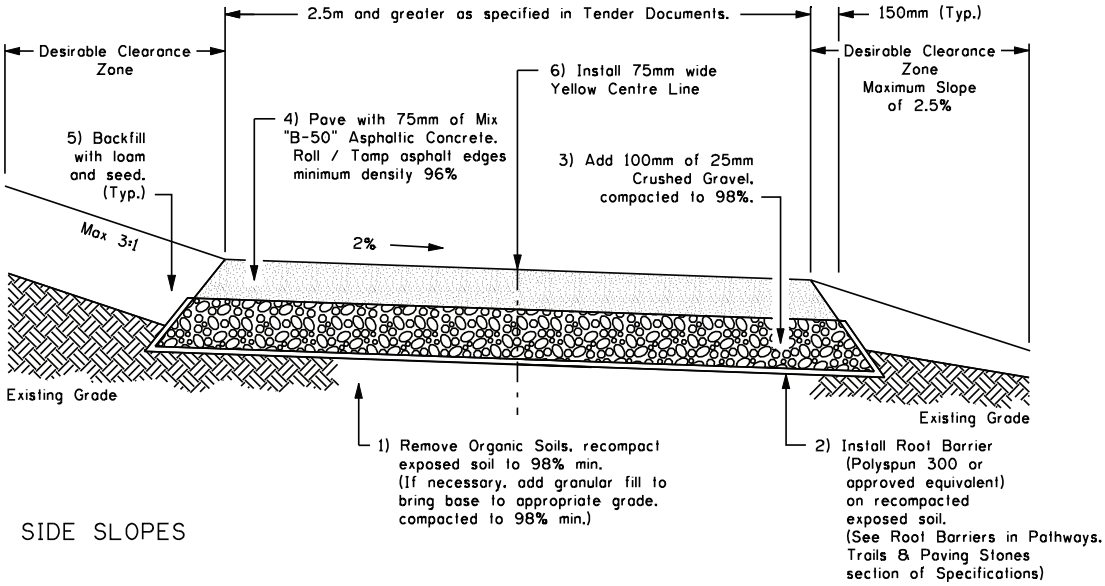
Asphalt type "B" mix. Refer to the current edition City of Calgary Standard Specifications, Roads Construction.

All dimensions are in metres unless otherwise noted.

Calgary	PROJECT TITLE **SPECIFICATIONS**	DRAWN BY **W.B.**	SCALE **N.T.S.**
	SHEET TITLE **TYPICAL LOCAL PATHWAY CROSS SECTIONS**	DATE **2006 05 17**	SHEET NO. **35**
		DESIGN BY **G.S.**	FILE NO.
		DATE **2002–03–05**	

Detail Sheet 36: Pathways - Regional Pathway Cross Sections



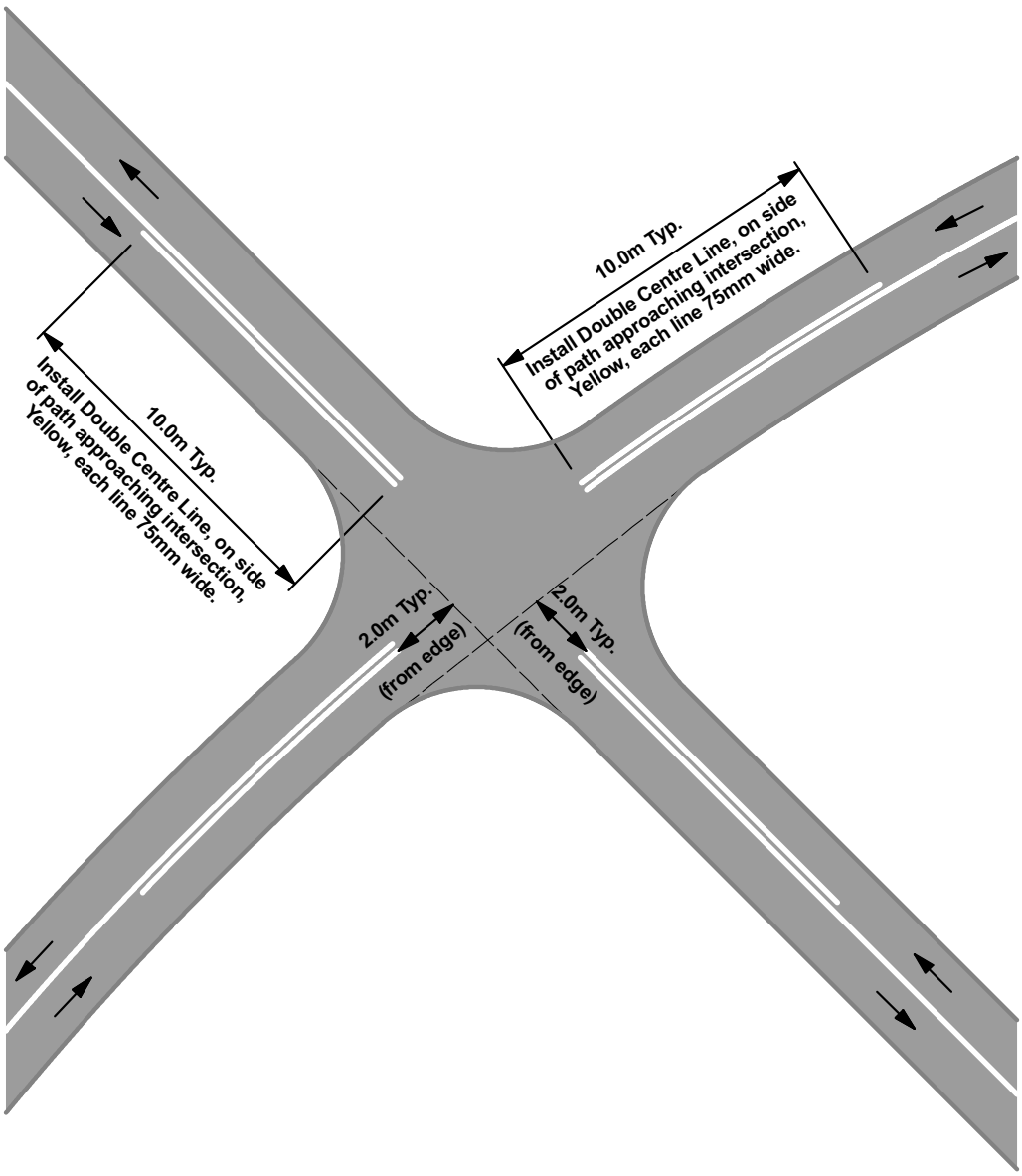


NOTES:

- Asphalt type "B" mix. Refer to the current edition City of Calgary Standard Specifications, Roads Construction.
- Where the Regional Pathway replaces a city sidewalk or is installed in a road right of way the Desirable Clearance Zones will Not apply.
- Safety railings, if required, may be installed within the Desirable Clearance Zones.
- All dimensions are in Metres unless otherwise noted.

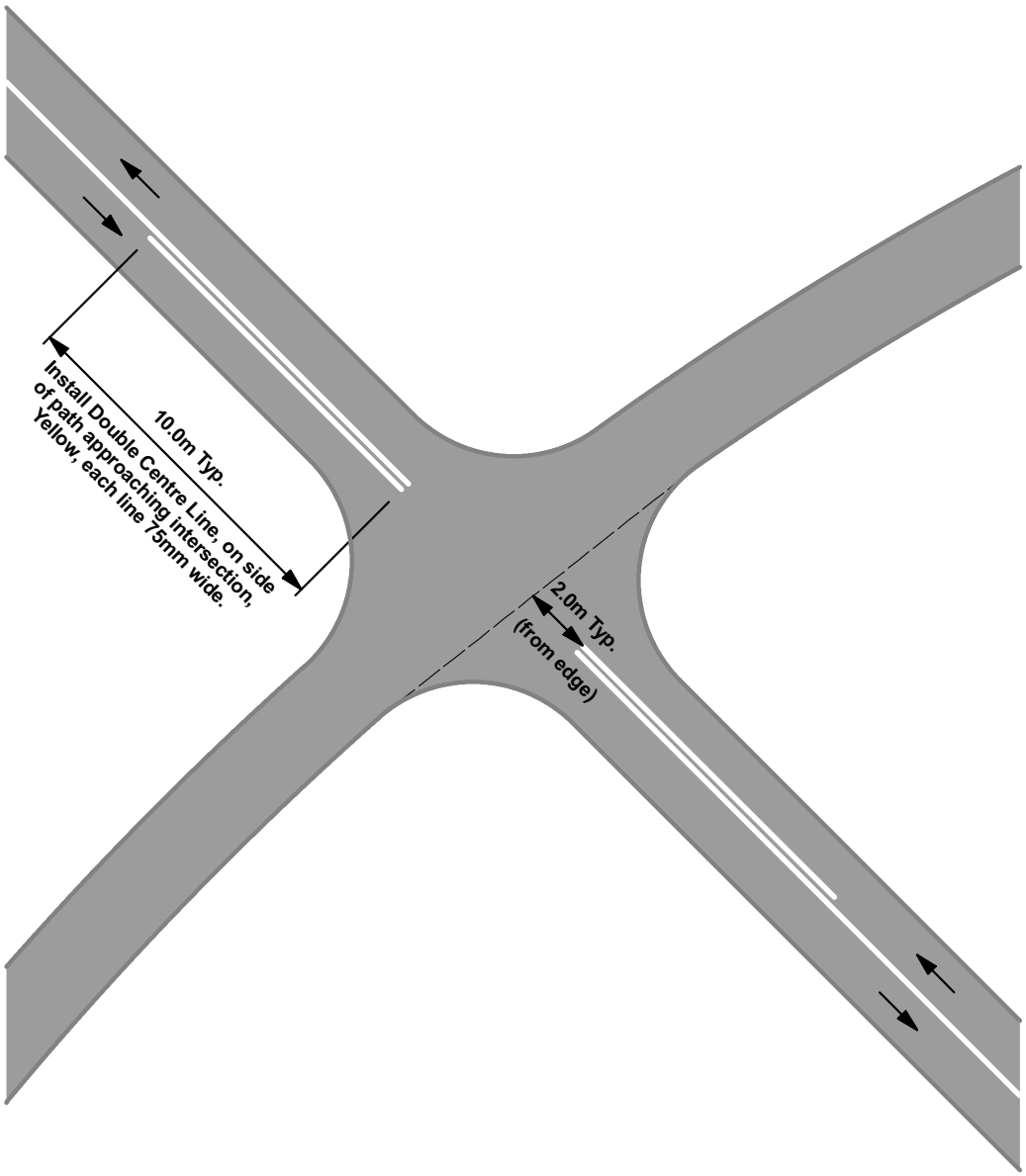
Calgary	PROJECT TITLE **SPECIFICATIONS**	DRAWN BY **W.B.**	SCALE **N.T.S.**
		DATE **2011 02 01**	SHEET NO. **36**
	SHEET TITLE **TYPICAL REGIONAL PATHWAY CROSS SECTIONS**	DESIGN BY **D.B.**	FILE NO.
		DATE **2011 02 01**	

Detail Sheet 36a: Pathway Painting - Regional/Regional Intersection Lines



Calgary	**SPECIFICATIONS** **PATHWAY LINE PAINTING** **DOUBLE CENTRE LINE** **REGIONAL PATHWAY** **INTERSECTION**	**DESCRIPTION**	**SCALE** N.T.S. **DRAWN BY** W.B. / **FILE NO.** **DATE** 2017-01-31 / **SHEET NO.** 36a

Detail Sheet 36b:Pathway Painting - Regional/Local Intersection Lines



Calgary

SPECIFICATIONS

PATHWAY LINE PAINTING
DOUBLE CENTRE LINE
REGIONAL PATHWAY & LOCAL
PATHWAY INTERSECTION

DESCRIPTION

SCALE
N.T.S.

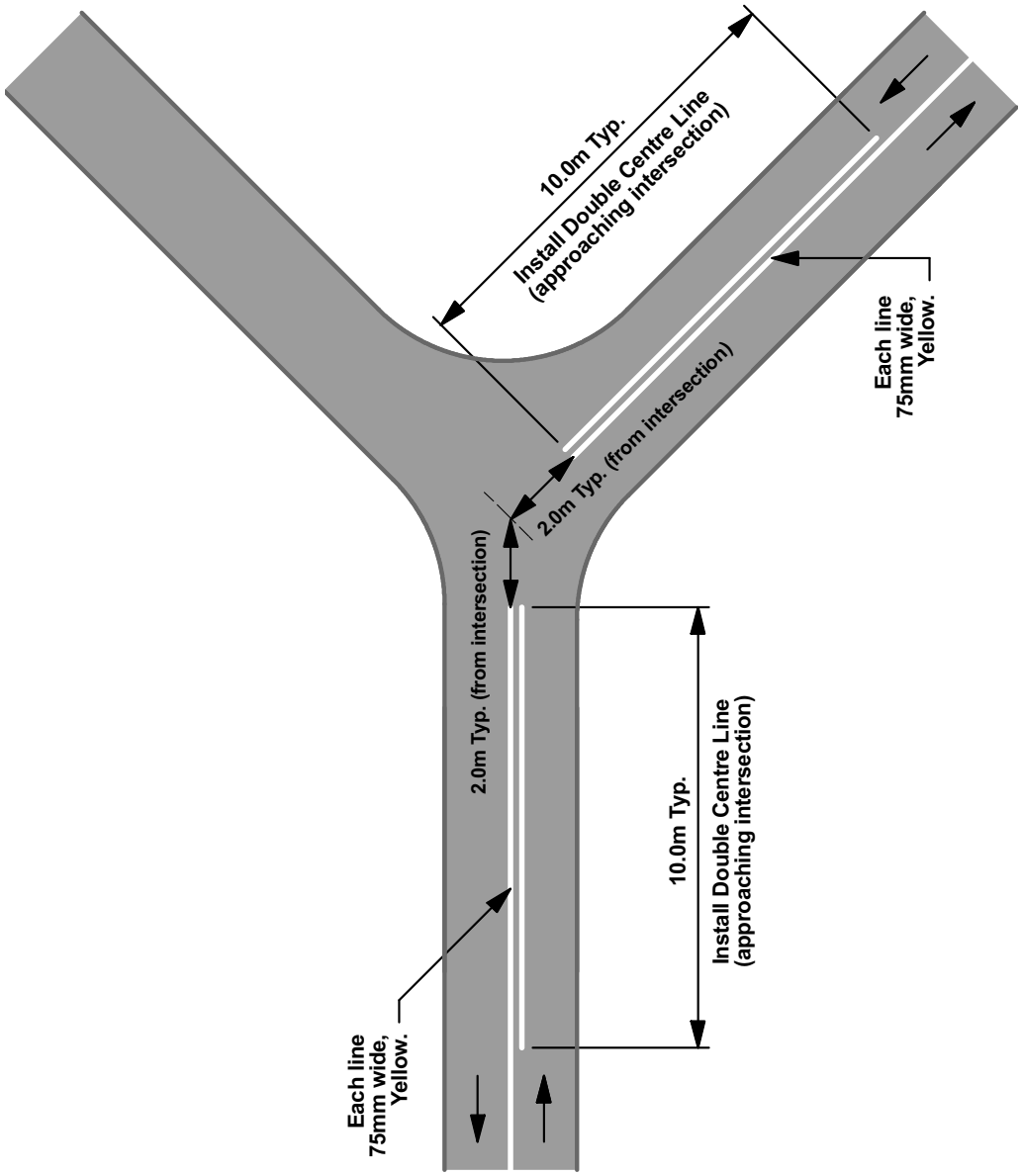
DRAWN BY
W.B.

FILE NO.

DATE
2017-01-31

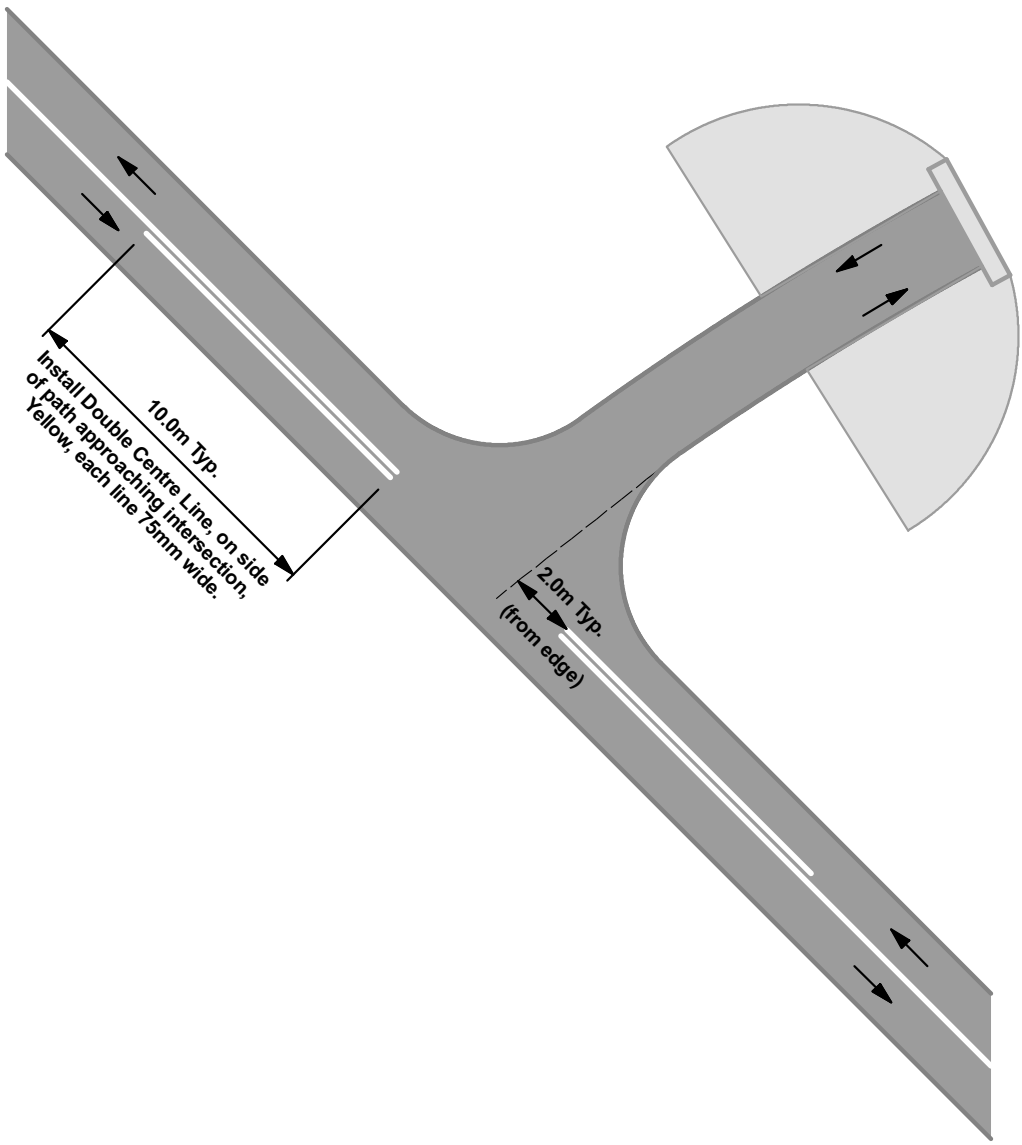
SHEET NO.
36b

Detail Sheet 36c: Pathway Painting - “Y” Intersection Lines



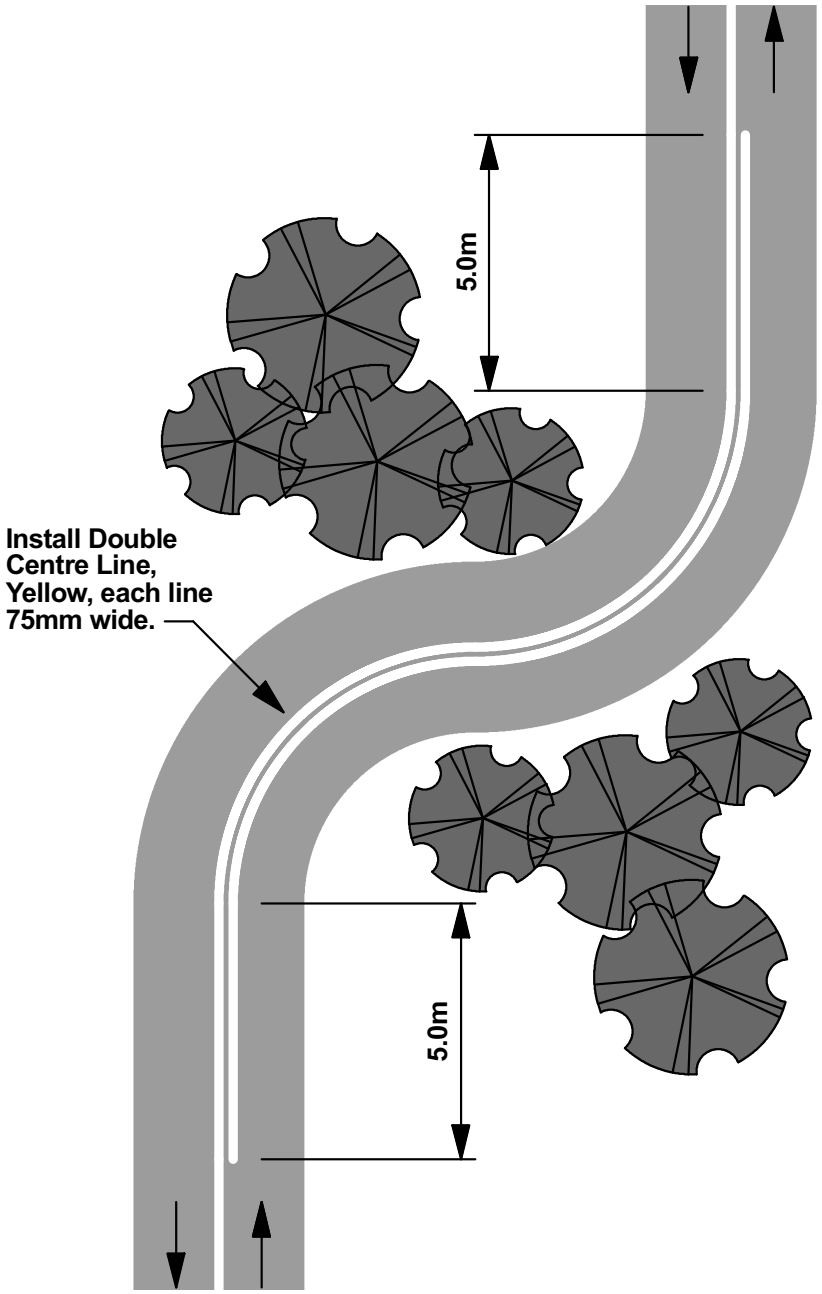
Calgary	**SPECIFICATIONS** **PATHWAY LINE PAINTING** **DOUBLE CENTRE LINE** **TYPICAL "Y"** **INTERSECTION**	DESCRIPTION	SCALE: N.T.S. DRAWN BY: W.B. FILE NO.: DATE: 2017-01-31 SHEET NO.: 36c

Detail Sheet 36d: Pathway Painting - “T” Intersection Lines



Calgary	**SPECIFICATIONS** **PATHWAY LINE PAINTING** **DOUBLE CENTRE LINE** **TYPICAL "T"** **INTERSECTION**	**DESCRIPTION**	**SCALE** N.T.S. **DRAWN BY** W.B. / **FILE NO.** **DATE** 2017-01-31 / **SHEET NO.** 36d

Detail Sheet 36e: Pathway Painting - Regional Blind Corner Lines



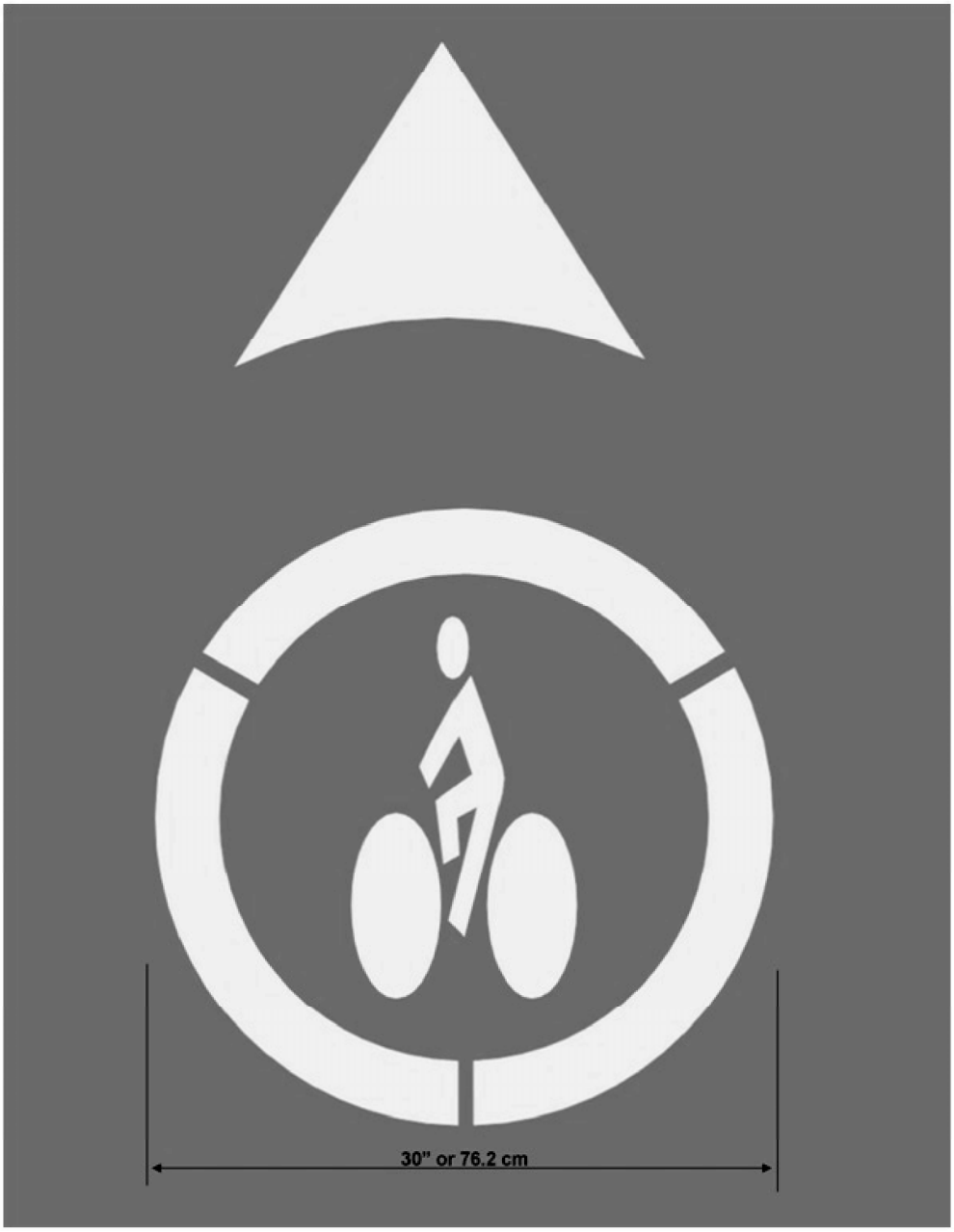
Calgary

SPECIFICATIONS

PATHWAY LINE PAINTING
DOUBLE CENTRE LINE
REGIONAL PATHWAY
BLIND CORNER

DESCRIPTION	SCALE	
	N.T.S.	
	DRAWN BY: W.B.	FILE NO.
	DATE: 2017-01-31	SHEET NO.: 36e

Detail Sheet 36f: Pathway Painting - “Cyclists Only” Stencil



Calgary	**SPECIFICATIONS** **“CYCLISTS ONLY” STENCIL IMAGE**	**DESCRIPTION**	**SCALE** N.T.S. **DRAWN BY** D.S. / **FILE NO.** **DATE** 2017-01-31 / **SHEET NO.** 36f

Detail Sheet 36g: Pathway Painting - “Pedestrians Only” Stencil

SPECIFICATIONS **“PEDESTRIANS ONLY” STENCIL IMAGE**	**DESCRIPTION**	**SCALE** N.T.S.	
		DRAWN BY D.S.	**FILE NO.**
		DATE 2017-01-31	**SHEET NO.** 36g

Detail Sheet 36h: Pathway Painting - “Multi-use Pathway” Stencil

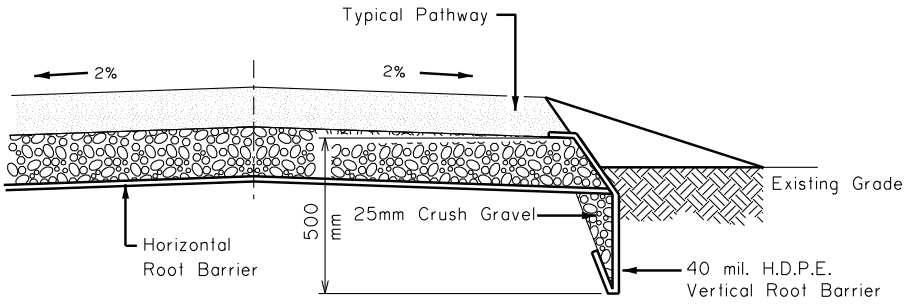
Calgary

SPECIFICATIONS

“MULTI-USE PATHWAY” STENCIL IMAGE

DESCRIPTION	SCALE	
	N.T.S.	
	DRAWN BY: D.S.	FILE NO.
	DATE: 2017-01-31	SHEET NO.: 36h

Detail Sheet 37: Root Barriers



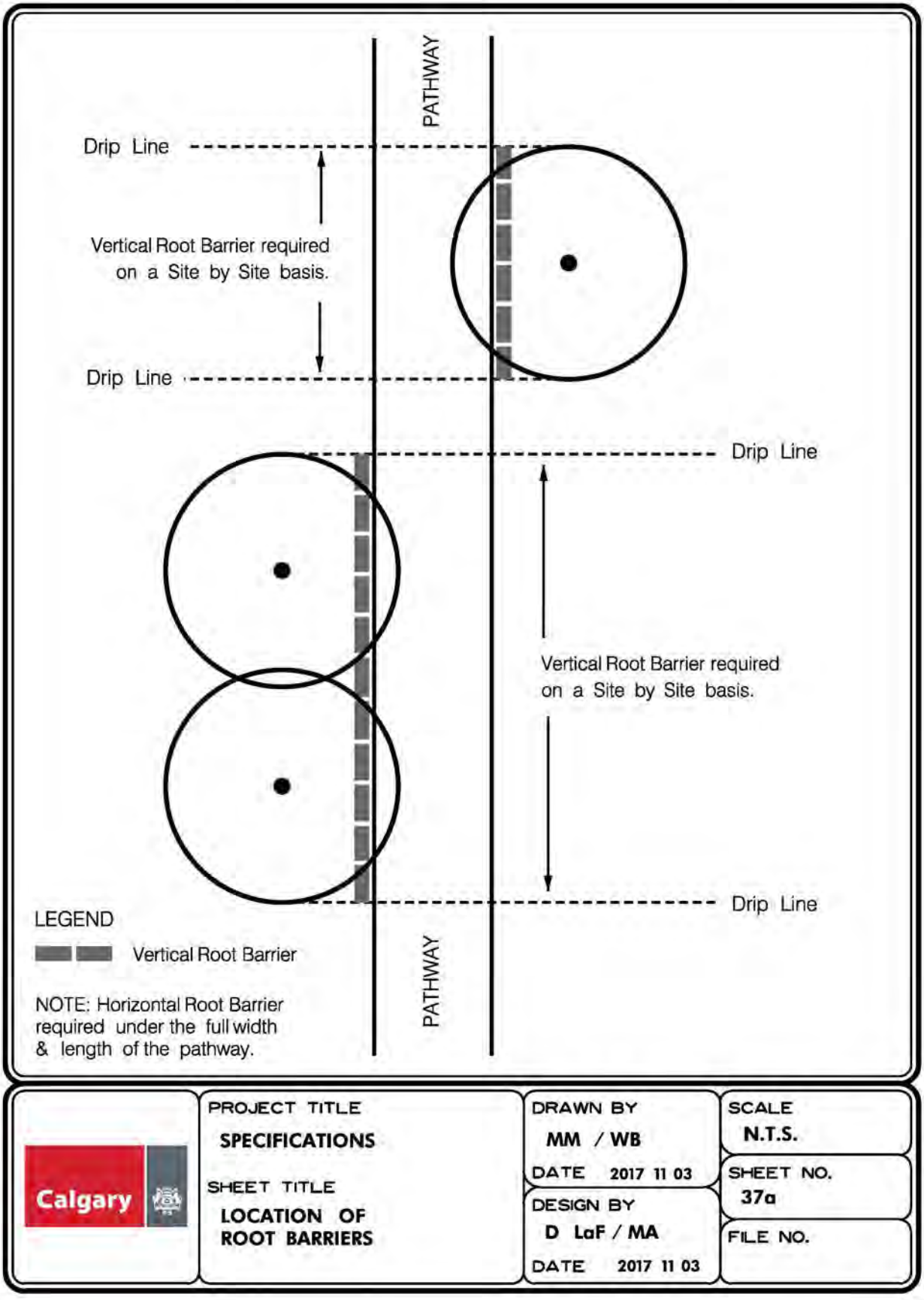
NOTES:

Within Streets Right-of-way,
compaction of 100mm of 25mm Crushed Gravel
shall be 100% in accordance with Section 305.02.01 of the
City of Calgary Standard Specifications Roads Construction

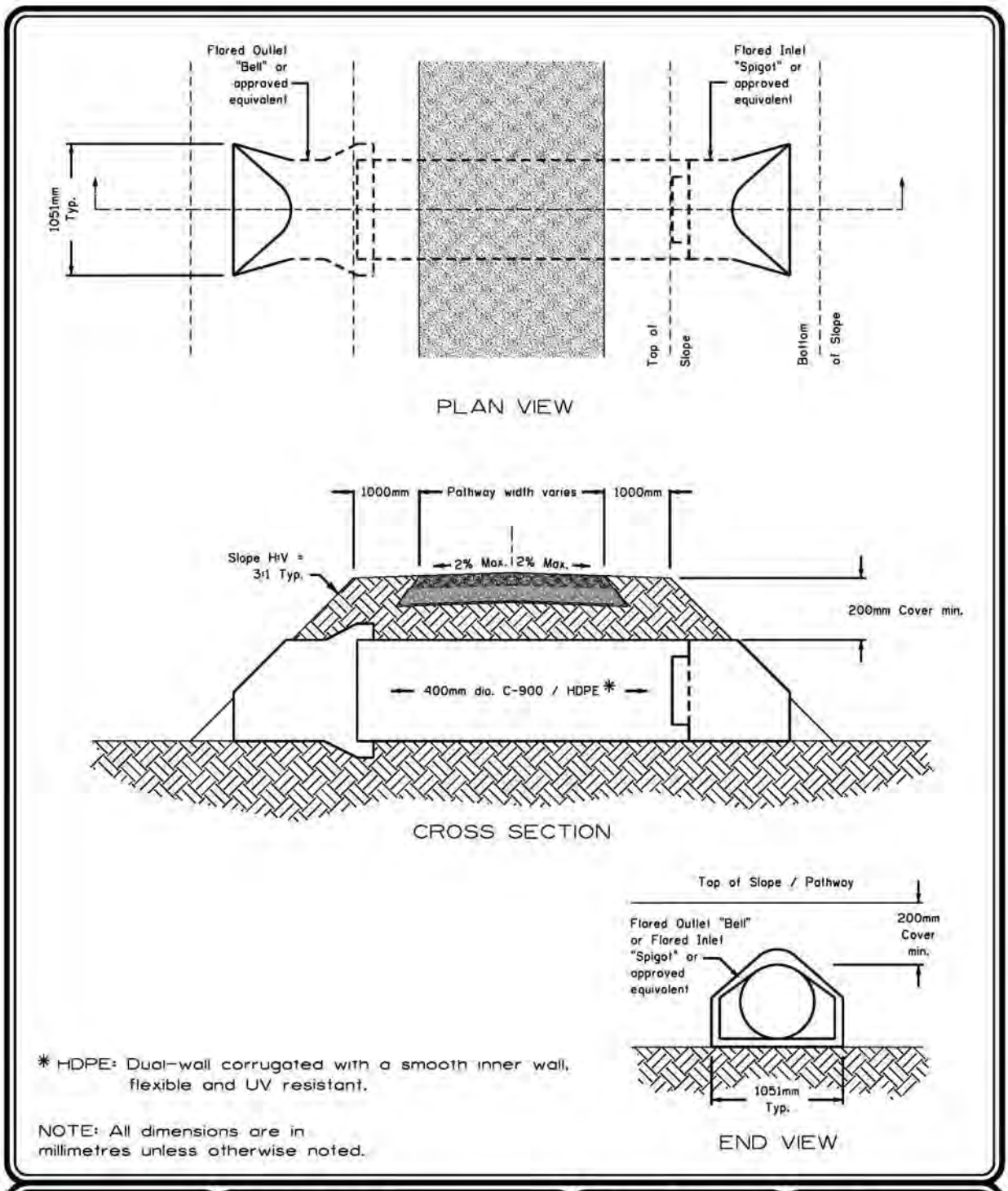
All dimensions are in metres unless otherwise noted.

Calgary	PROJECT TITLE **SPECIFICATIONS** SHEET TITLE **ROOT BARRIERS**	DRAWN BY **MM** DATE **2006 01 06** DESIGN BY **D.LaF.** DATE **1997 12 02**	SCALE **N.T.S.** SHEET NO. **37** FILE NO.

Detail Sheet 37a: Root Barriers - Locations

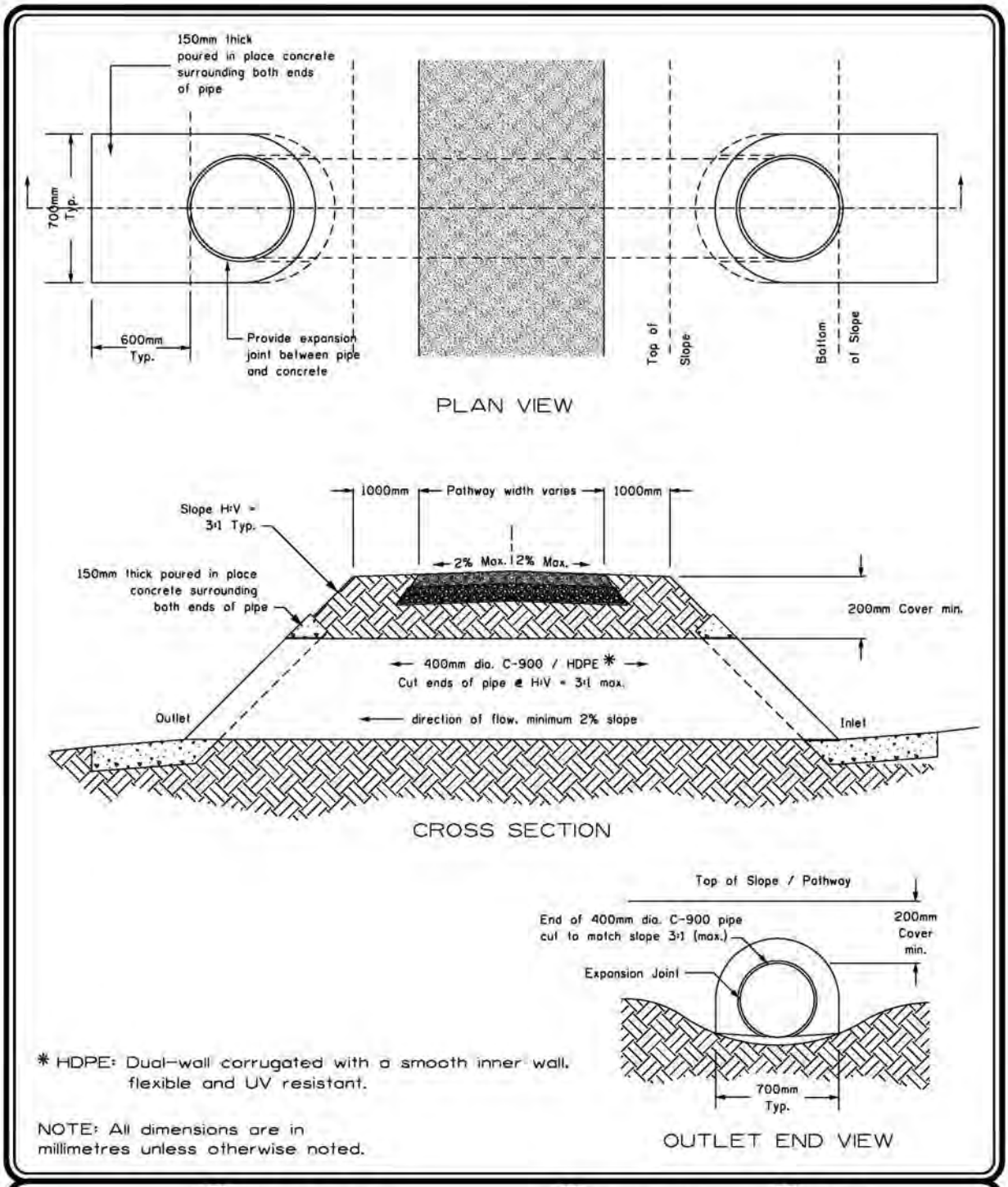


Detail Sheet 38: Pathway Culvert and Edge



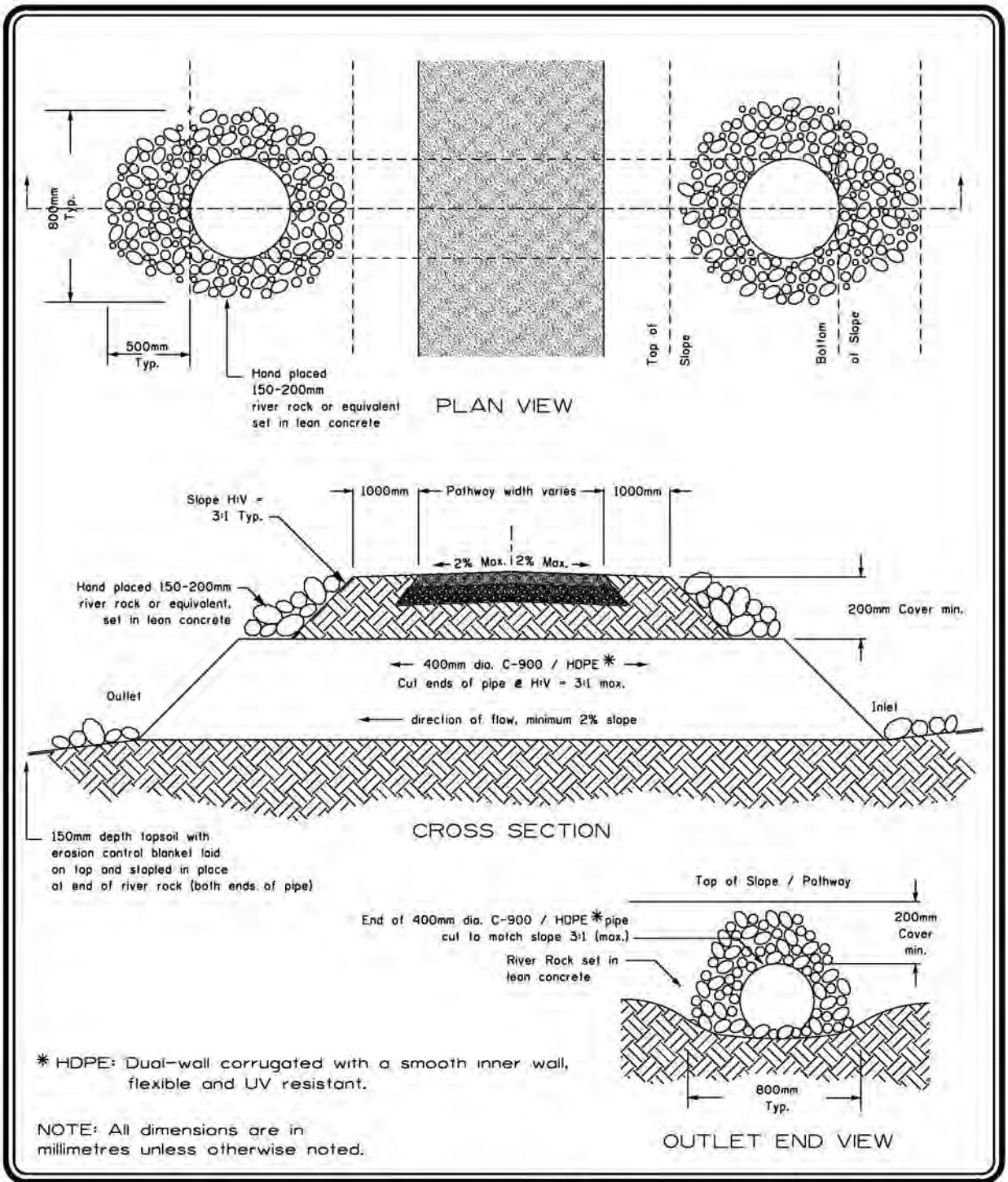
Calgary	PROJECT TITLE: SPECIFICATIONS	DRAWN BY: W.B.	SCALE: N.T.S.
		DATE: 2018-01-19	SHEET NO.: 38
	SHEET TITLE: PATHWAY CULVERT AND EDGE DETAIL	DESIGN BY:	FILE NO.:
		DATE:	

Detail Sheet 38a: Pathway Culvert with P-I-P Concrete at Ends



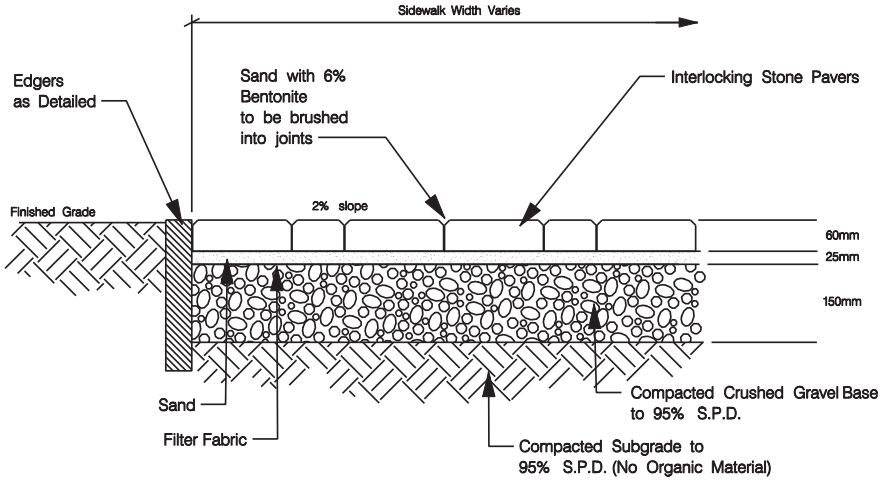
Calgary	PROJECT TITLE: SPECIFICATIONS	DRAWN BY: W.B./M.M.	SCALE: N.T.S.
		DATE: 2018-01-19	SHEET NO.: 38a
	SHEET TITLE: CULVERT WITH P-I-P CONCRETE AT ENDS	DESIGN BY:	FILE NO.
		DATE:	

Detail Sheet 38b: Pathway Culvert with River Rock at Ends

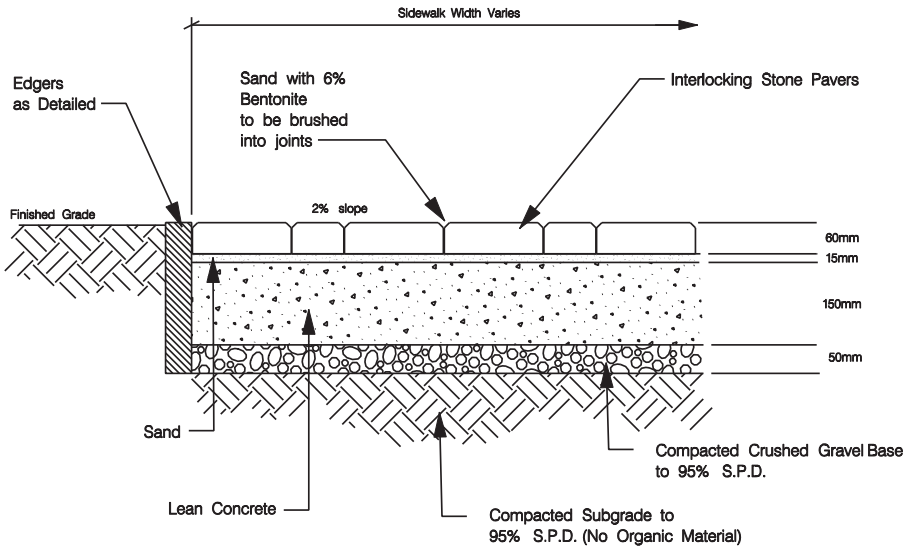


Calgary	PROJECT TITLE: SPECIFICATIONS	DRAWN BY: W.B./M.M.	SCALE: N.T.S.
		DATE: 2008-01-18	SHEET NO.: 38b
	SHEET TITLE: CULVERT WITH RIVER ROCK AT ENDS	DESIGN BY:	FILE NO.:
		DATE:	

Detail Sheet 39: Concrete Paving Stone



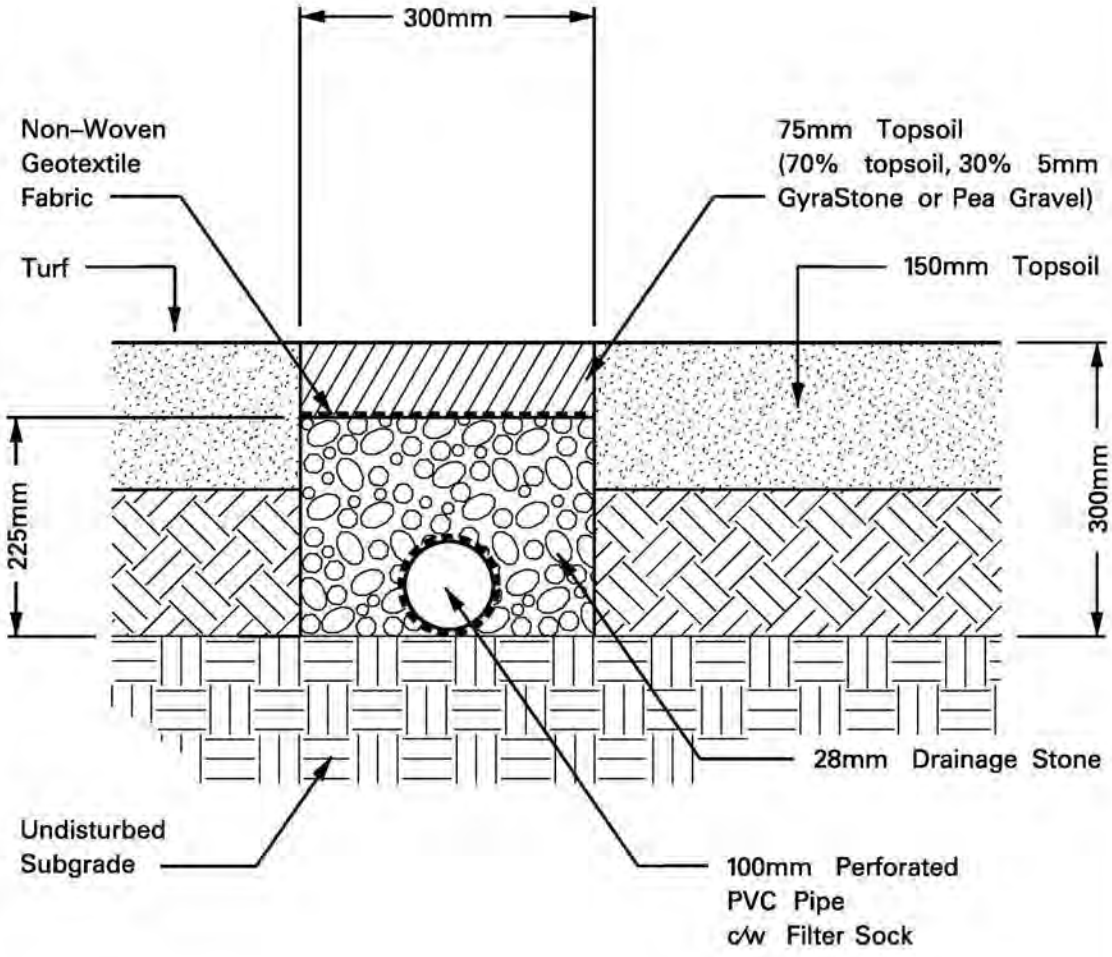
AREAS NOT SUBJECT TO VEHICLE TRAFFIC



AREAS SUBJECT TO VEHICLE TRAFFIC AND
AREAS WITHIN THE STREETS RIGHT-OF-WAY

Calgary	PROJECT TITLE **SPECIFICATIONS**	DRAWN BY **MM**	SCALE **N.T.S.**
		DATE **2006 02 14**	SHEET NO. **39**
	SHEET TITLE **CONCRETE PAVING STONE**	DESIGN BY **DG**	FILE NO.
		DATE **1997 03 15**	

Detail Sheet 39a: Weeping Tile in <4%Swales over 60 m in Length



Notes:

–Perforated PVC Weeping Tile to maintain a minimum 1% slope to catch basin barrel.

–Core hole in catch basin slightly larger than the weeping tile diameter.

–Insert perforated PVC into catch basin and caulk.

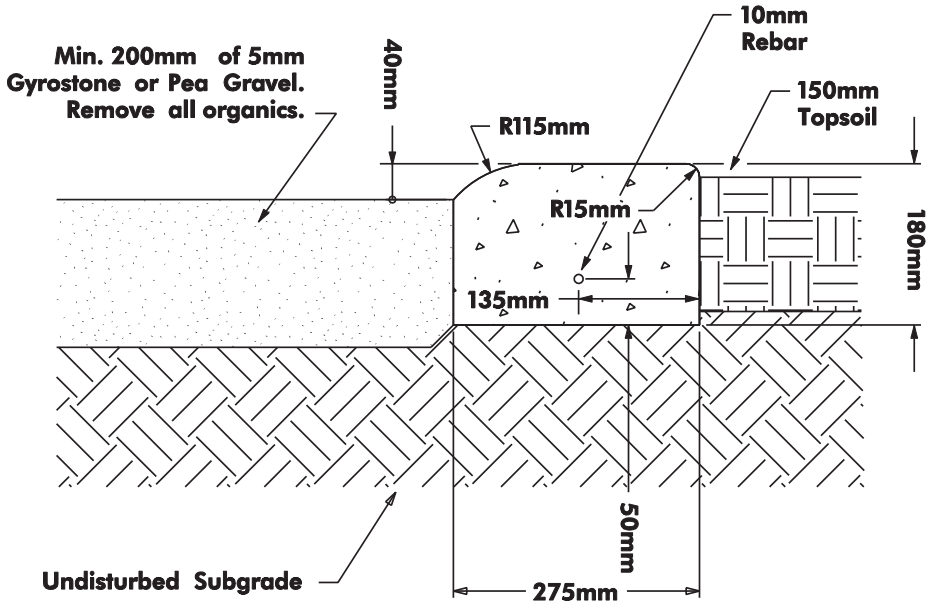
–Weeping tile to be installed along the entire length of the swale, PVC cleanout is required at every 30metre distance along the weeping tile system.

–Alternate design for a weeping tile system will be considered.

–The applicant shall cite the source for the manufacturer's performance specification.

Calgary	PROJECT TITLE: **SPECIFICATIONS**	DRAWN BY: **W.B./M.M.**	SCALE: **N.T.S.**
		DATE: **2018 01 19**	SHEET NO.: **39a**
	SHEET TITLE: **WEEPING TILE IN <4% SWALES OVER 60m IN LENGTH**	DESIGN BY:	FILE NO.:
		DATE:	

Detail Sheet 41: Playground Edge Restraint (Concrete)

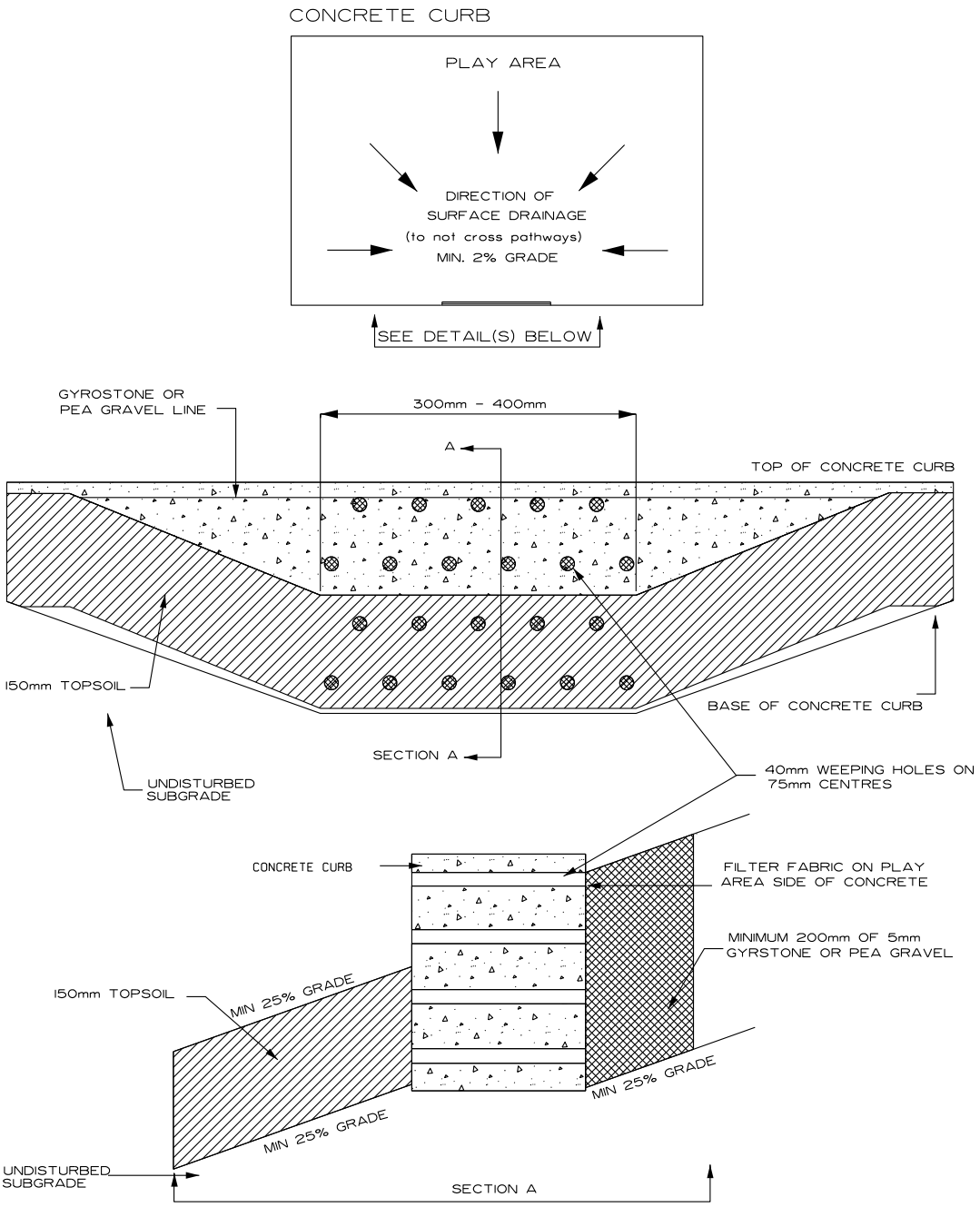


NOTES:
Contraction Joints shall be cut at every 1.5 metres by means of a marking tool or other approved method. Joints shall not be less than 30mm in depth and 6mm in width. The edges of the joint shall be rounded off with an edger having a radius of 6mm.

All dimensions are in millimeters unless otherwise noted.

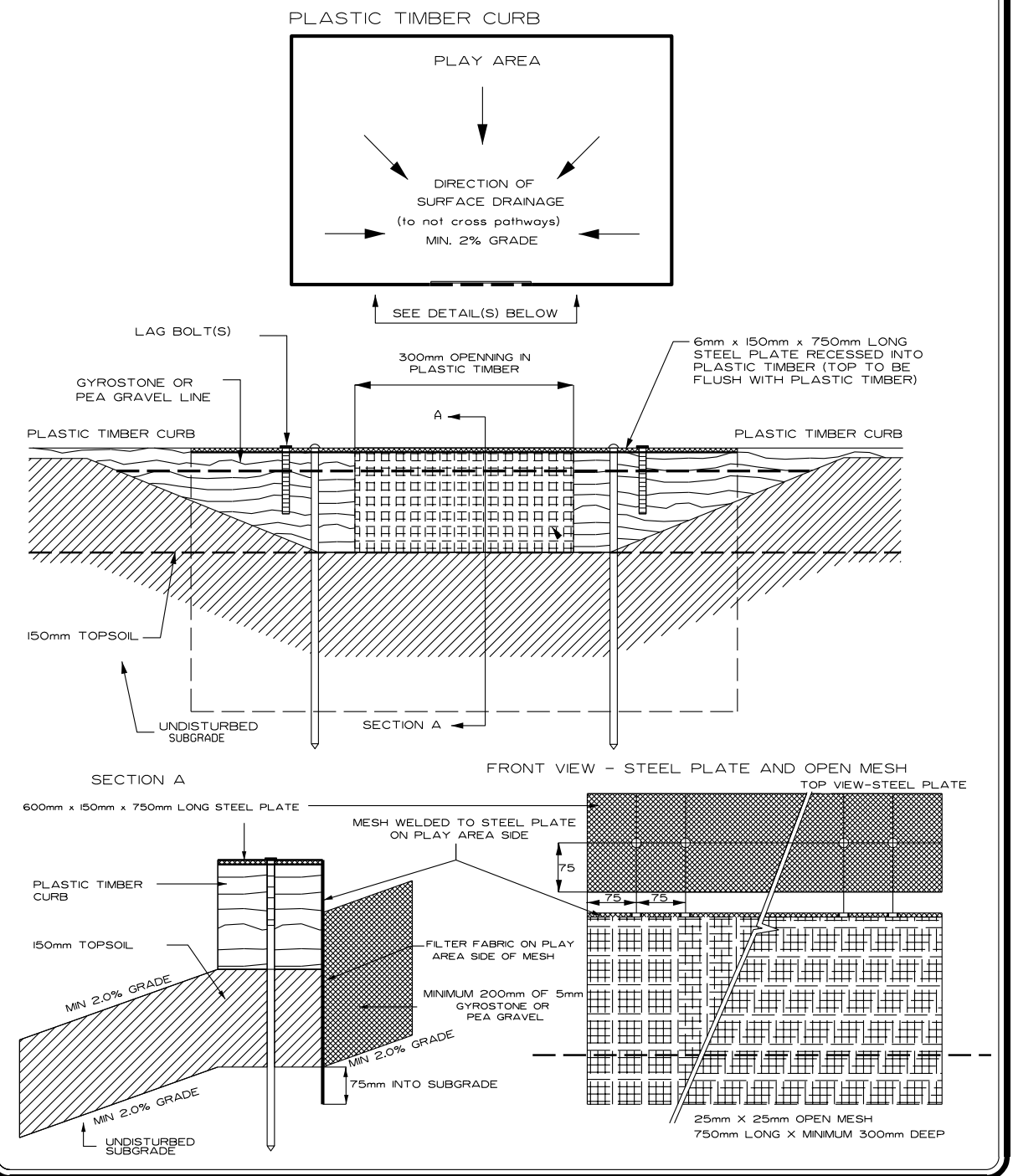
Calgary	PROJECT TITLE **SPECIFICATIONS** SHEET TITLE **PLAYGROUND EDGE RESTRAINT (CONCRETE)**	DRAWN BY **W.B.** DATE **2002-08-28** DESIGN BY DATE	SCALE **N.T.S.** SHEET NO. **41** FILE NO.

Detail Sheet 42: Playground Drainage - Concrete Edge



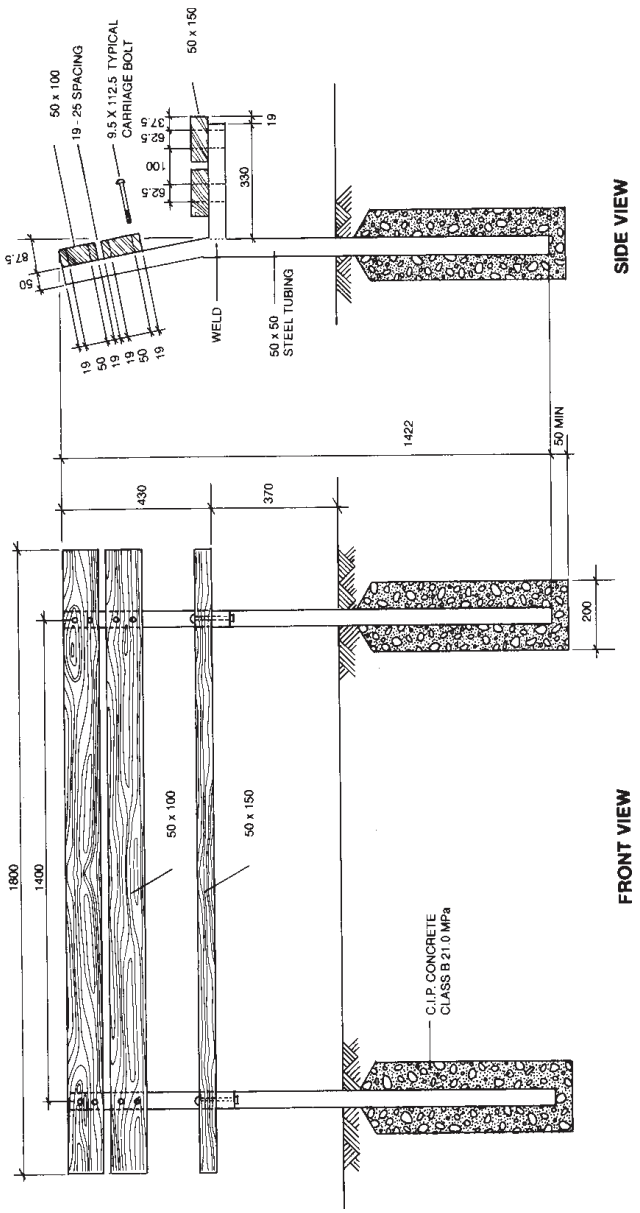
Calgary	PROJECT TITLE **SPECIFICATIONS** SHEET TITLE **PLAYGROUND DRAINAGE CONCRETE EDGE DETAIL**	DRAWN BY **MK** DATE **2006 05 23** DESIGN BY DATE	SCALE **N.T.S.** SHEET NO. **42** FILE NO.

Detail Sheet 43: Playground Drainage - Plastic Timber Edge



Calgary	PROJECT TITLE **SPECIFICATIONS** SHEET TITLE **PLAYGROUND DRAINAGE** **PLASTIC TIMBER EDGE DETAIL**	DRAWN BY **MK** DATE **2009 03 26** DESIGN BY DATE	SCALE **N.T.S.** SHEET NO. **43** FILE NO.

Detail Sheet 44: Park Bench



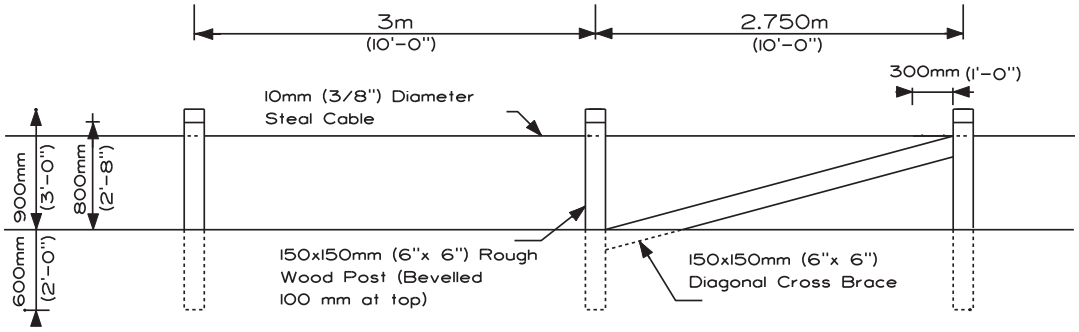
NOTES: All dimensions are in millimetres unless otherwise noted.

METRIC

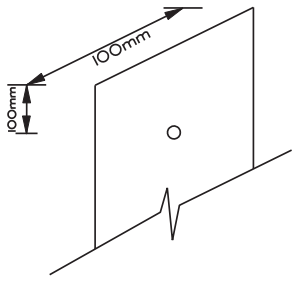
Calgary	PROJECT TITLE SPECIFICATIONS SHEET TITLE STANDARD PARK BENCH DETAIL	DRAWN BY DATE 2003 02 20 DESIGN BY DATE	SCALE N.T.S. SHEET NO. 44 FILE NO.

Detail Sheet 45: Post and Cable Barrier

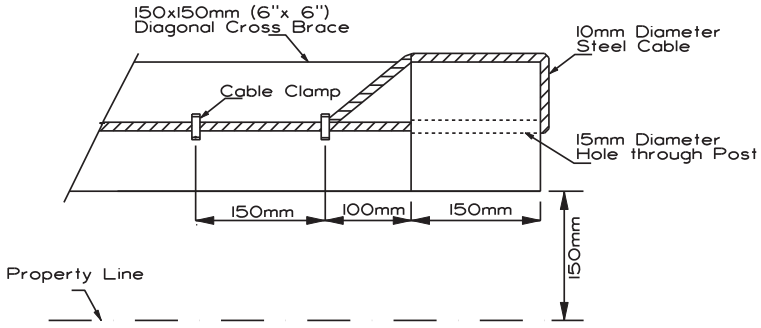
Elevation



Post Top Detail



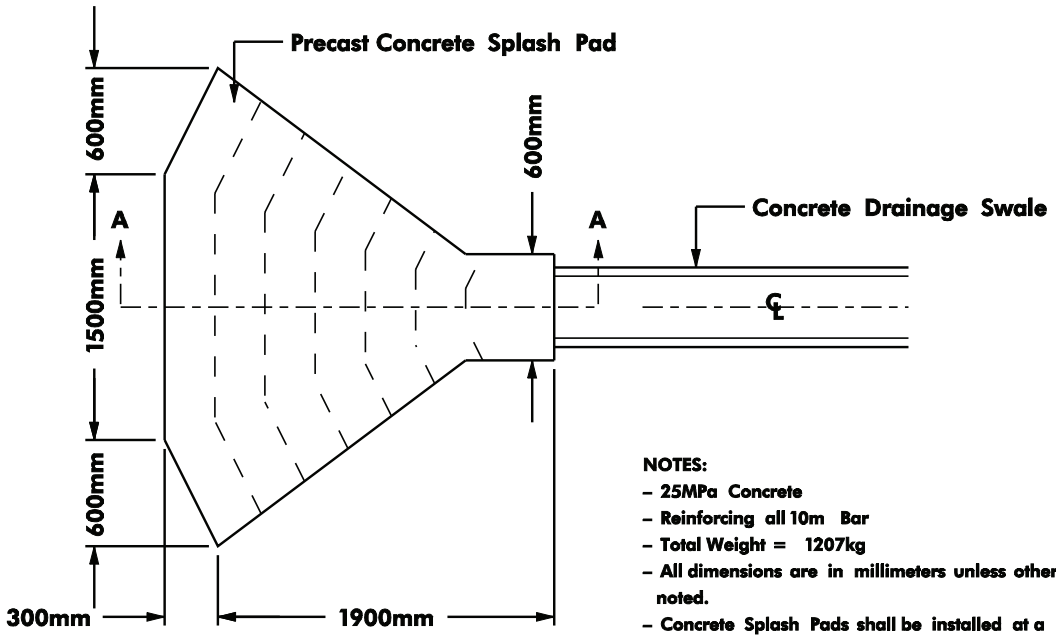
Plan View (End Post)



NOTE:
- All lumber shall be rough cut, No.2 construction grade and kiln dried
- The direction of the face cut will be specified on site when the posts are installed.
- All steel cables and clamps shall be hot-dipped galvanized to C.S.A. G 164 or as specified. Provide sufficient tension on steel cable to eliminate sag.
- The first cable clamps will be located at the end of the cable to eliminate frayed ends.
- Alternate Material: Where specified in contract, Wood Posts may be substituted with Grey Recycled Plastic Posts. All dimensions to remain the same.

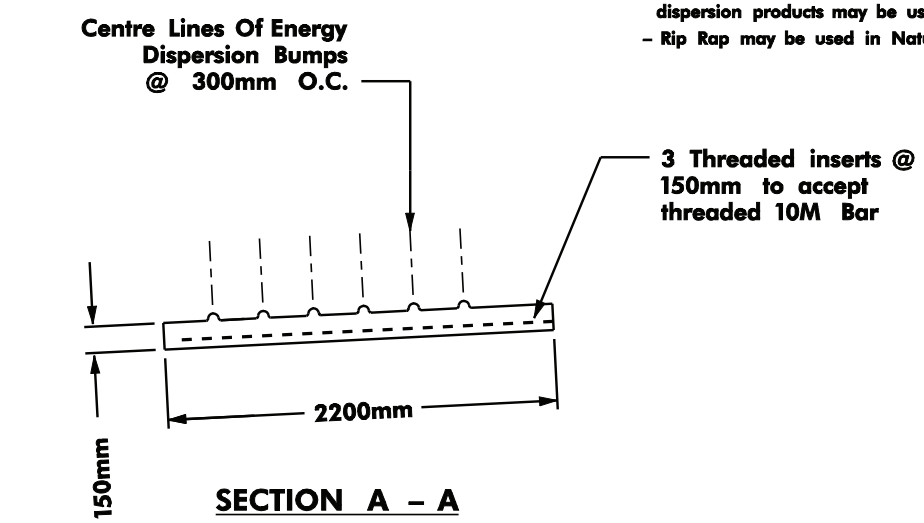
Calgary	PROJECT TITLE **SPECIFICATIONS**	DRAWN BY **MK**	SCALE **N.T.S.**
		DATE **2006 05 23**	SHEET NO. **45**
	SHEET TITLE **POST & CABLE BARRIER**	DESIGN BY	FILE NO.
		DATE	

Detail Sheet 46: Concrete Splash Pad



PLAN VIEW

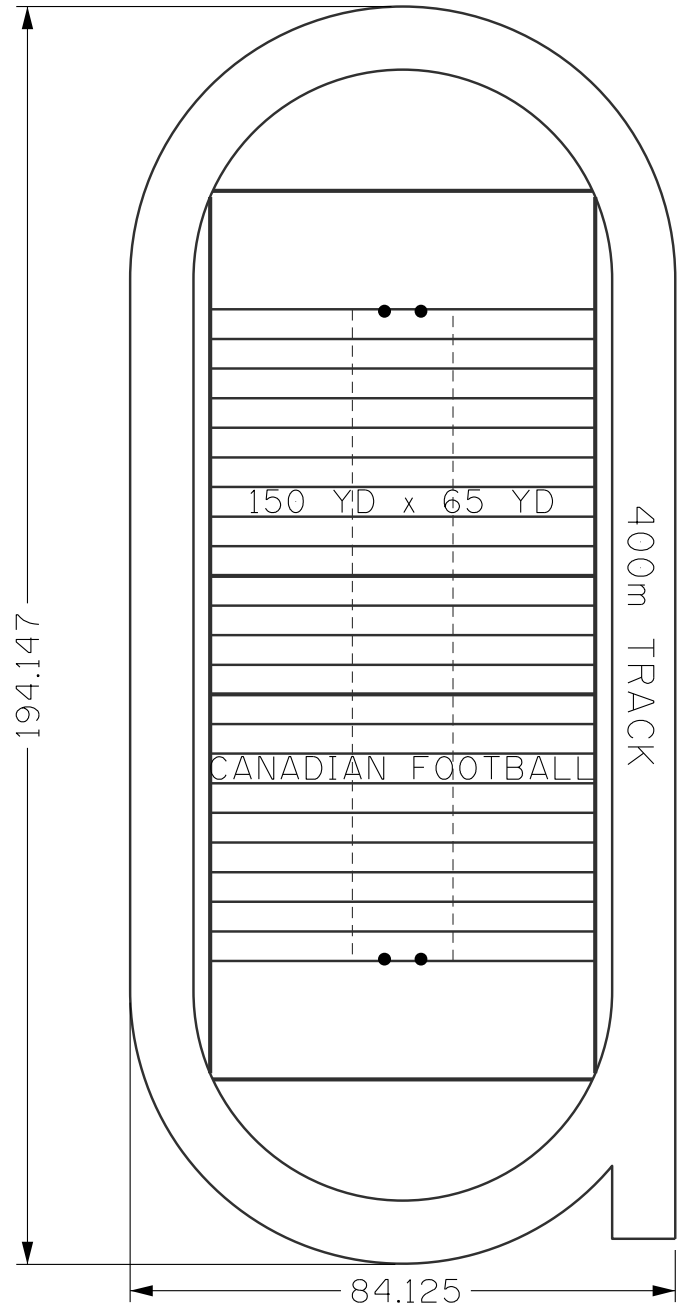
NOTES:
- 25MPa Concrete
- Reinforcing all 10m Bar
- Total Weight = 1207kg
- All dimensions are in millimeters unless otherwise noted.
- Concrete Splash Pads shall be installed at a 10% pitch, or erosion control fabric will be required at their end.
- Industry may use variable concrete splash pad sizes subject to the velocity not exceeding 0.9m/sec.
- Subject to approval by Parks other ECP/energy dispersion products may be used.
- Rip Rap may be used in Natural Areas.



SECTION A – A

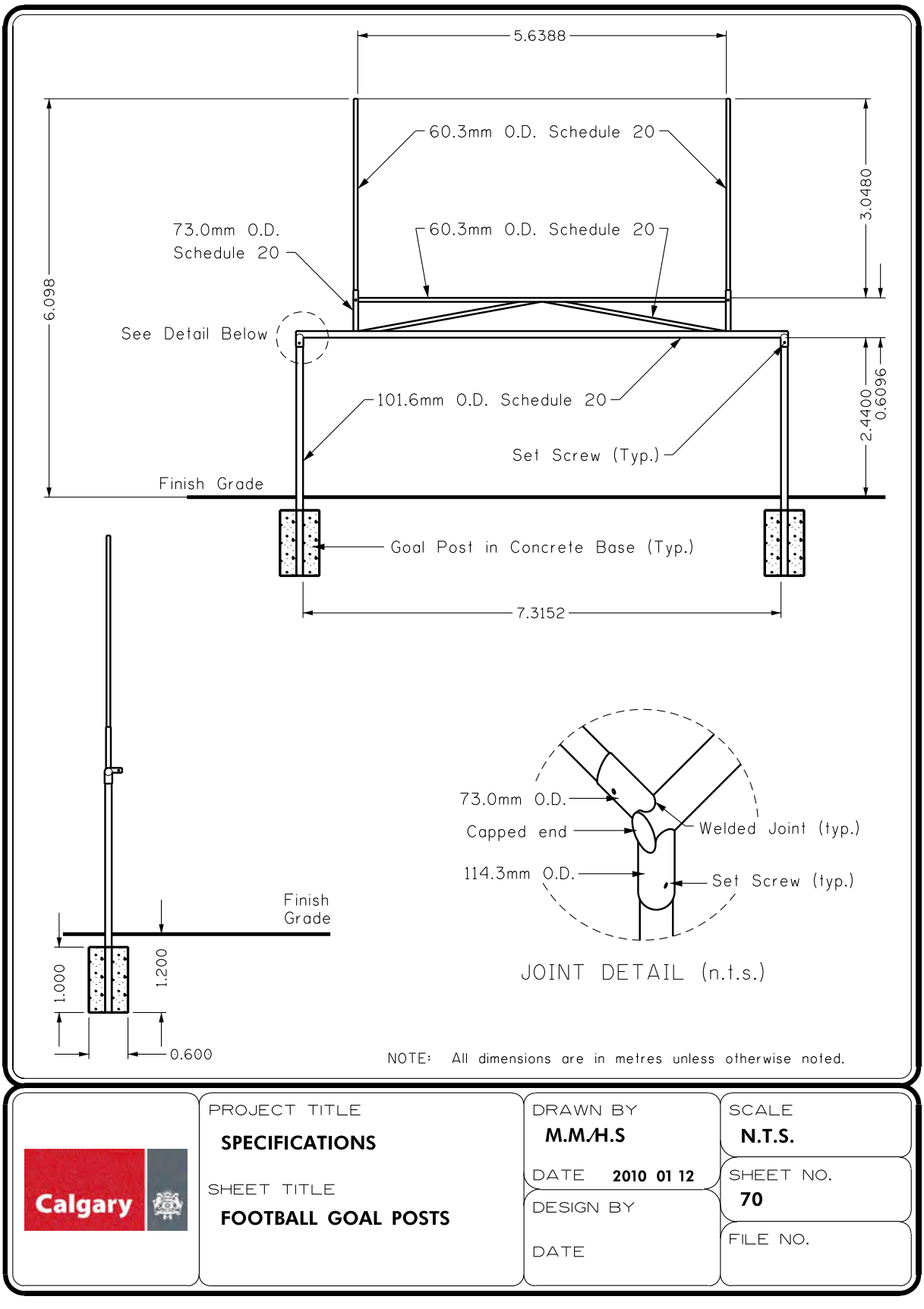
Calgary	PROJECT TITLE **SPECIFICATIONS** SHEET TITLE **CONCRETE SPLASH PAD ON PUBLIC EASEMENTS**	DRAWN BY **W.B.** DATE **2009 03 26** DESIGN BY DATE	SCALE **N.T.S.** SHEET NO. **46** FILE NO.

Detail Sheet 69: 400 m Track and Football Field



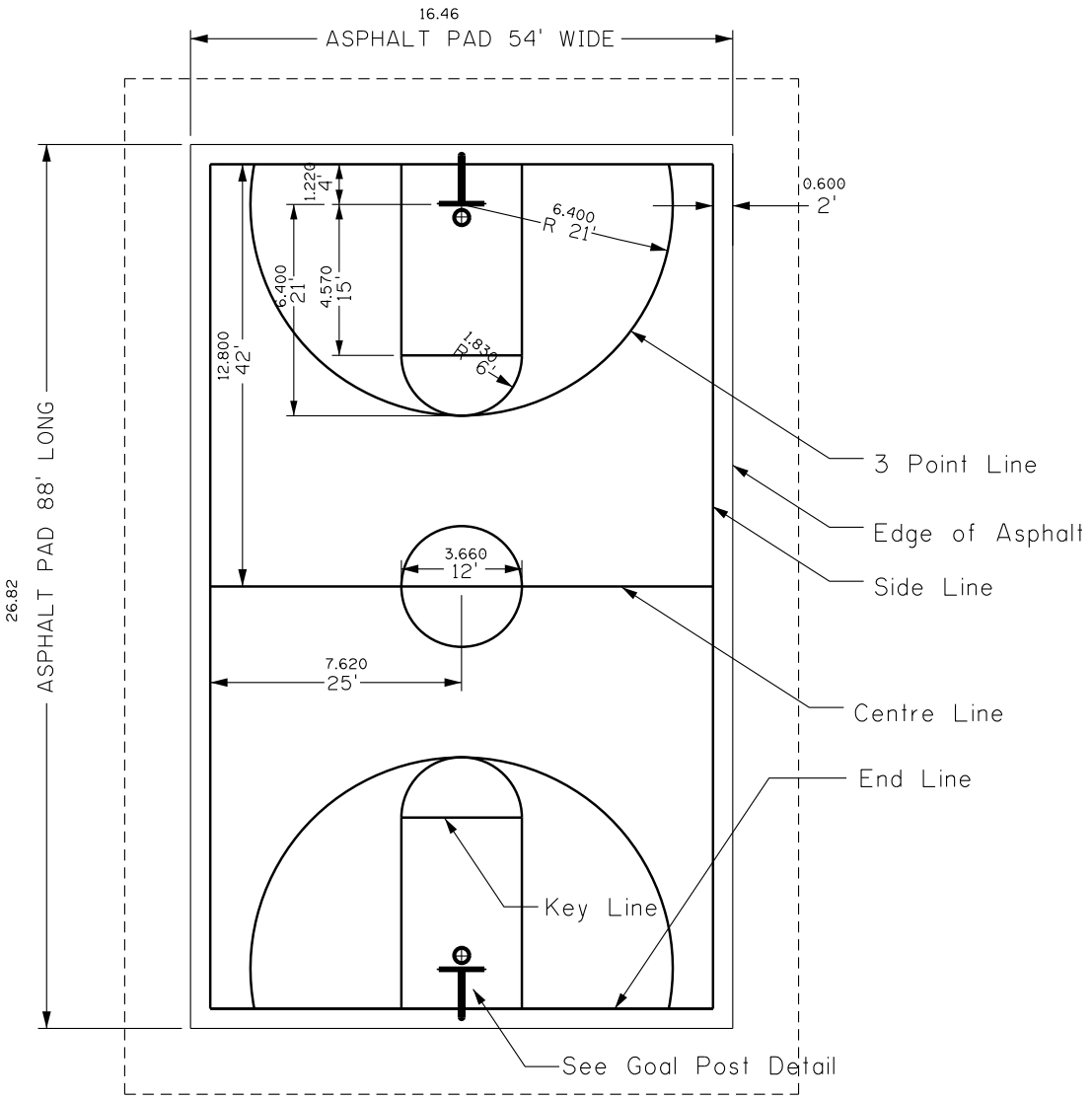
Calgary	PROJECT TITLE **SPECIFICATIONS** SHEET TITLE **400m TRACK AND FOOTBALL FIELD**	DRAWN BY **M.M.** DATE DATE **2002 01 25** DESIGN BY DATE	SCALE **1:1000** SHEET NO. **69** FILE NO.

Detail Sheet 70: Football Goal Posts



Calgary	PROJECT TITLE **SPECIFICATIONS**	DRAWN BY **M.M./H.S**	SCALE **N.T.S.**
	SHEET TITLE **FOOTBALL GOAL POSTS**	DATE **2010 01 12**	SHEET NO. **70**
		DESIGN BY	FILE NO.
		DATE	

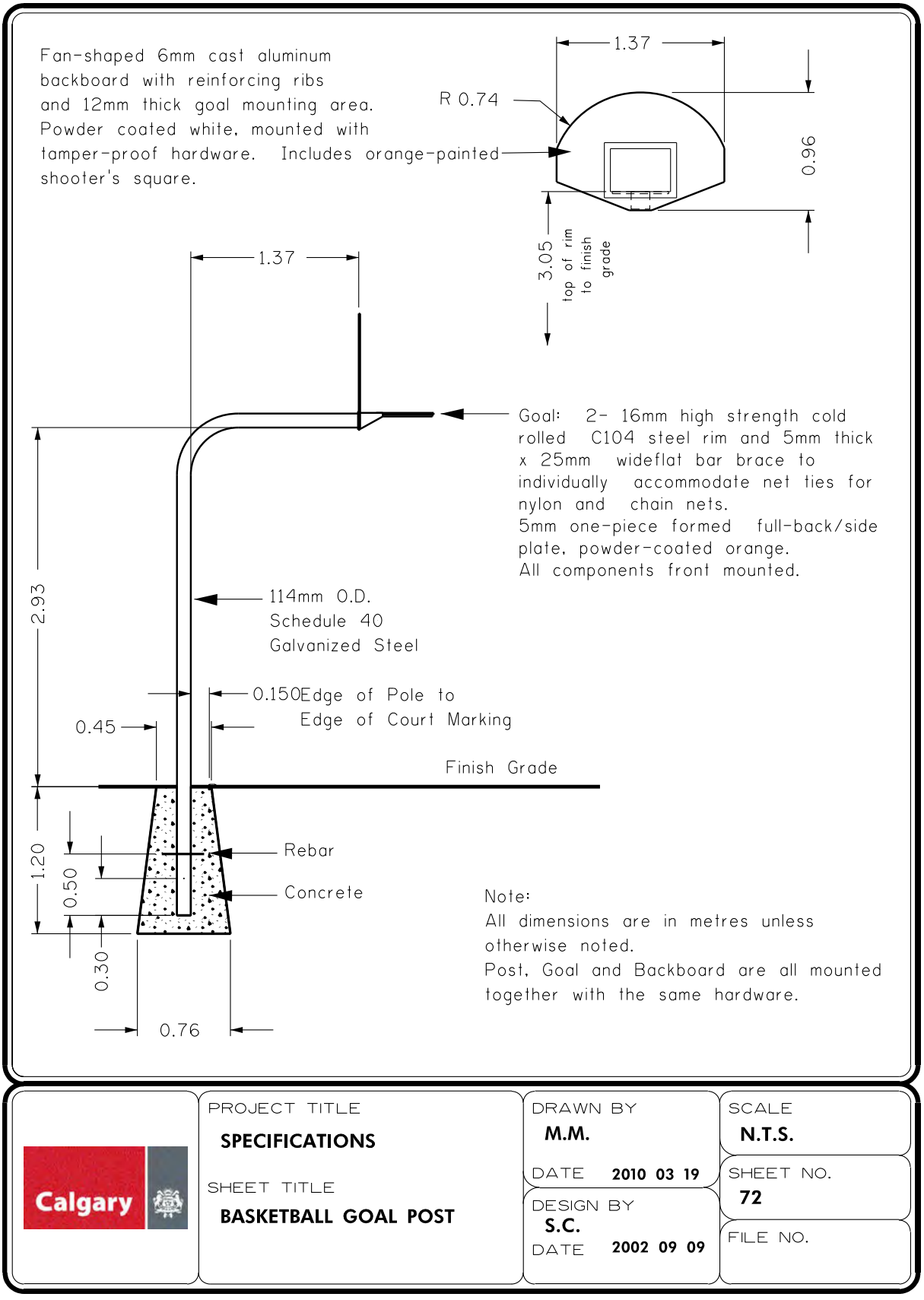
Detail Sheet 71: Basketball - Court



Notes:
Dimensions are in metres unless otherwise noted.
2m minimum buffer around asphalt edge.
All lines to be masked and striped with
100% acrylic latex paint only.

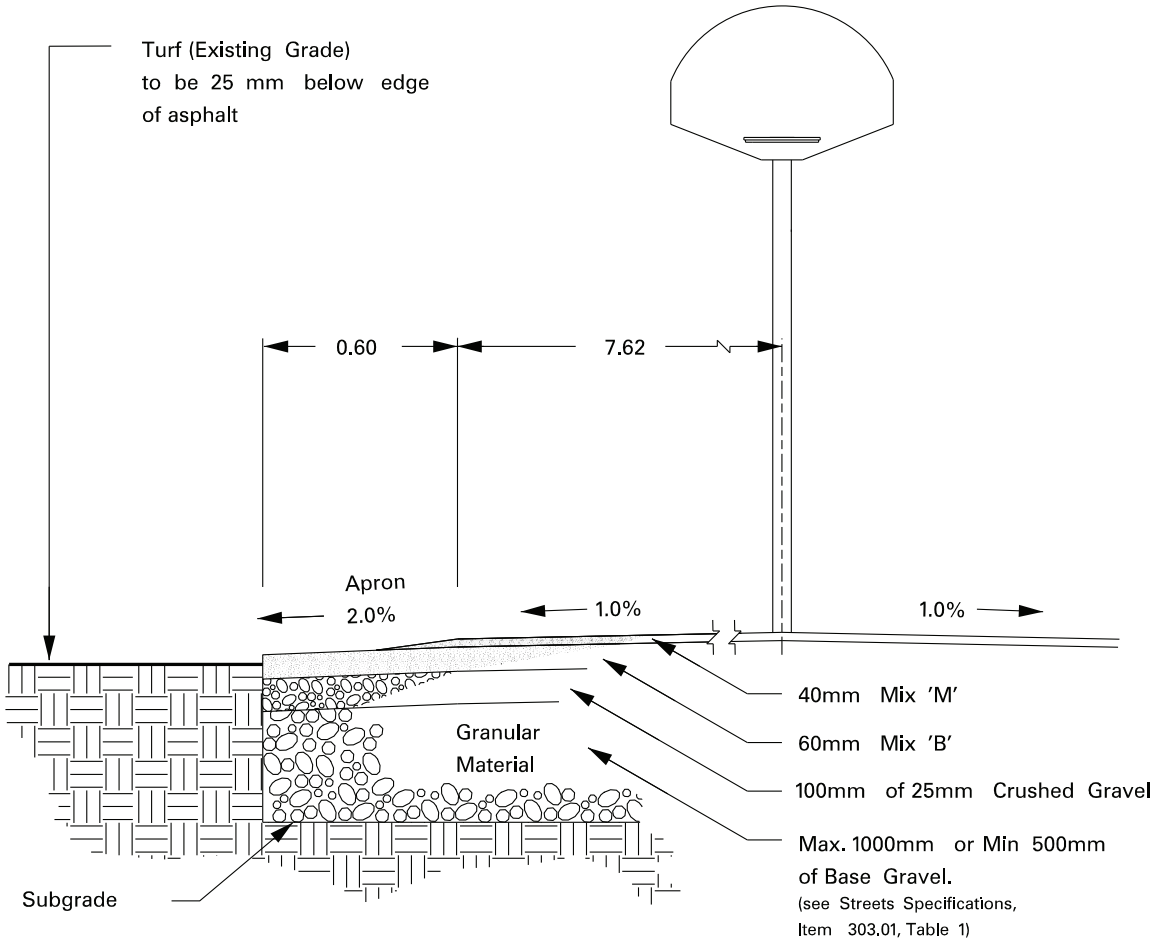
Calgary	PROJECT TITLE **SPECIFICATIONS**	DRAWN BY **M.M.** DATE **2003 01 23**	SCALE **N.T.S.**
	SHEET TITLE **BASKETBALL COURT**	DESIGN BY **S.C.** DATE **2002 09 09**	SHEET NO. **71**
			FILE NO.

Detail Sheet 72: Basketball Goal Post



Calgary	PROJECT TITLE **SPECIFICATIONS**	DRAWN BY **M.M.**	SCALE **N.T.S.**
		DATE **2010 03 19**	SHEET NO. **72**
	SHEET TITLE **BASKETBALL GOAL POST**	DESIGN BY **S.C.** DATE **2002 09 09**	FILE NO.

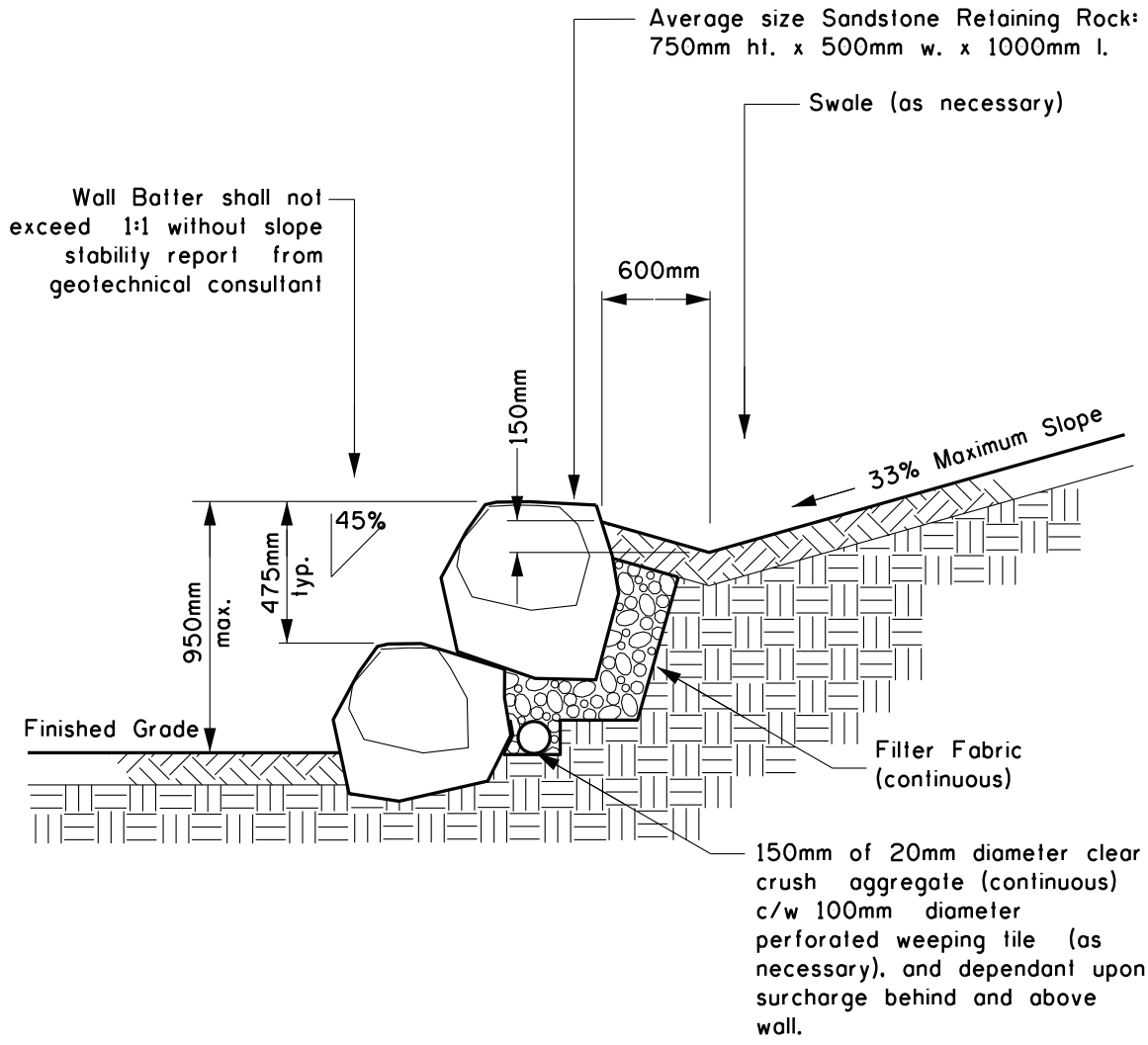
Detail Sheet 73: Basketball Court Surface Construction



NOTE: All dimensions are in metres unless otherwise noted.

Calgary	PROJECT TITLE **SPECIFICATIONS** SHEET TITLE **BASKETBALL COURT SURFACE CONSTRUCTION**	DRAWN BY **W.B./M.M.** DATE **2003 01 23** DESIGN BY **S.C.** DATE **2002 09 09**	SCALE **N.T.S.** SHEET NO. **73** FILE NO.

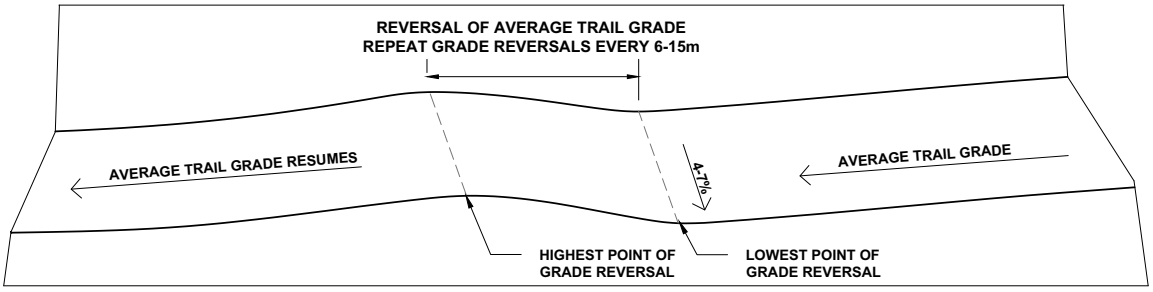
Detail Sheet 74: Dry Pack Rock Retaining Wall



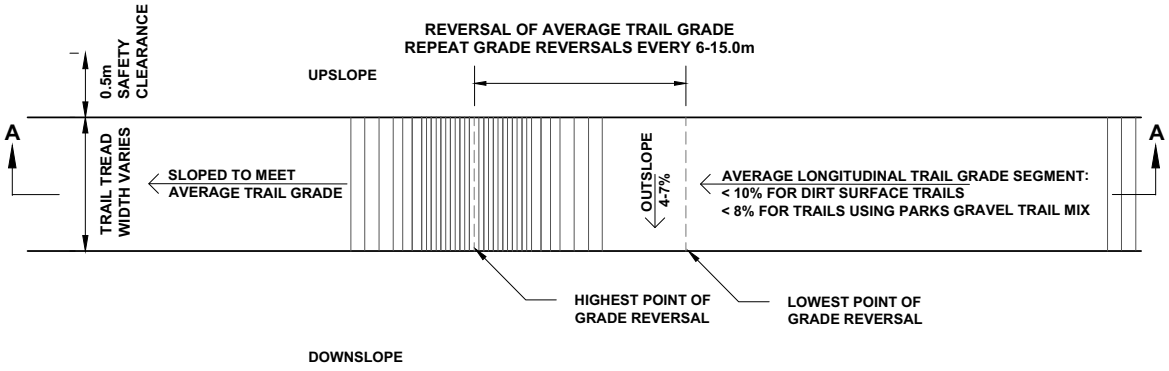
NOTES
All dimensions are in metres unless otherwise noted.
All void spaces to be filled with clear crushed aggregate and consolidated to prevent migration of fill materials.
All rocks to be structurally sound, free of any spalling, cracks, crevices or splinters. Mud stone is not acceptable.
All rocks to be buried 1/3 depth into ground. Place rocks to facilitate slope stability.
Wall shall conform to all current applicable legislation.
Filter fabric to be Amoco 4535 non-woven or equivalent. (unit weight 139 g/m2)

Calgary	PROJECT TITLE **SPECIFICATIONS**	DRAWN BY **W.B./M.M.**	SCALE **N.T.S.**
	SHEET TITLE **DRY PACK ROCK RETAINING WALL**	DATE **2003 12 31**	SHEET NO. **74**
		DESIGN BY	FILE NO.
		DATE	

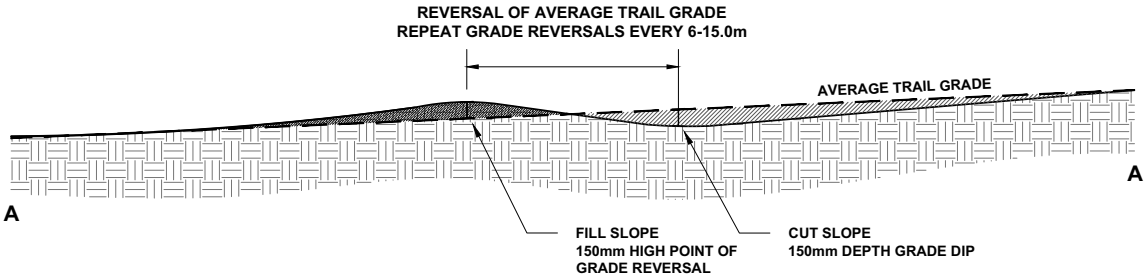
Detail Sheet 78: Trails- Grade Reversal



ELEVATION



TYPICAL PLAN



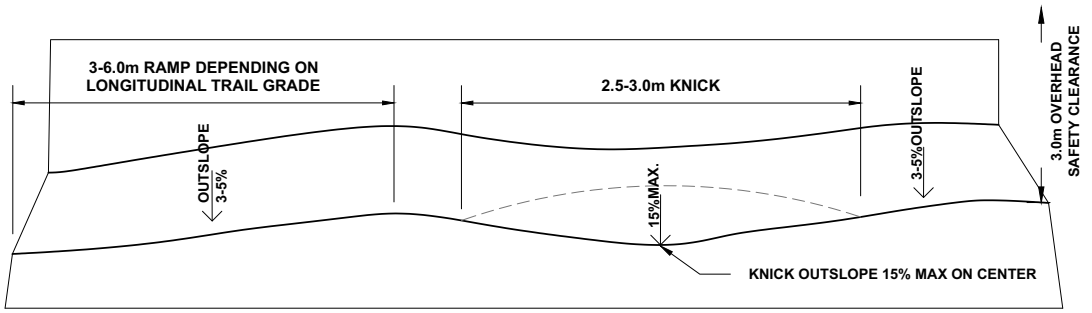
LONGITUDINAL SECTION A-A

NOTES:

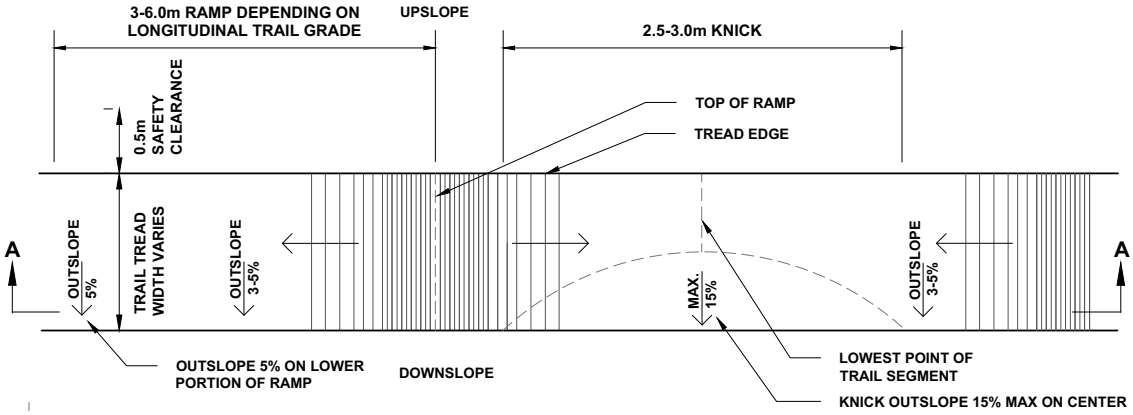
1. Dimensions in meters unless otherwise noted.
2. Parks gravel trail mix to be used for trails using gravel surfacing.

Calgary	PROJECT TITLE **SPECIFICATIONS**	DRAWN BY **CS** DATE **2016-09-15**	SCALE **N.T.S**
	SHEET TITLE **TRAILS -** **GRADE REVERSAL**	DESIGN BY DATE	SHEET NO. **78** FILE NO.

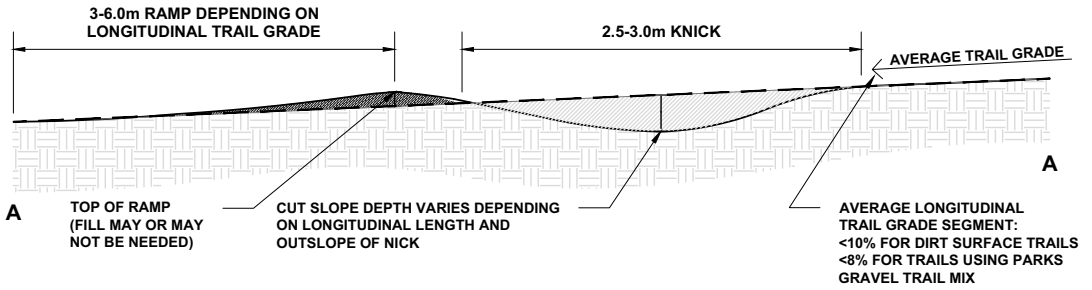
Detail Sheet 79: Trails - Rolling Grade Dip



ELEVATION



TYPICAL PLAN



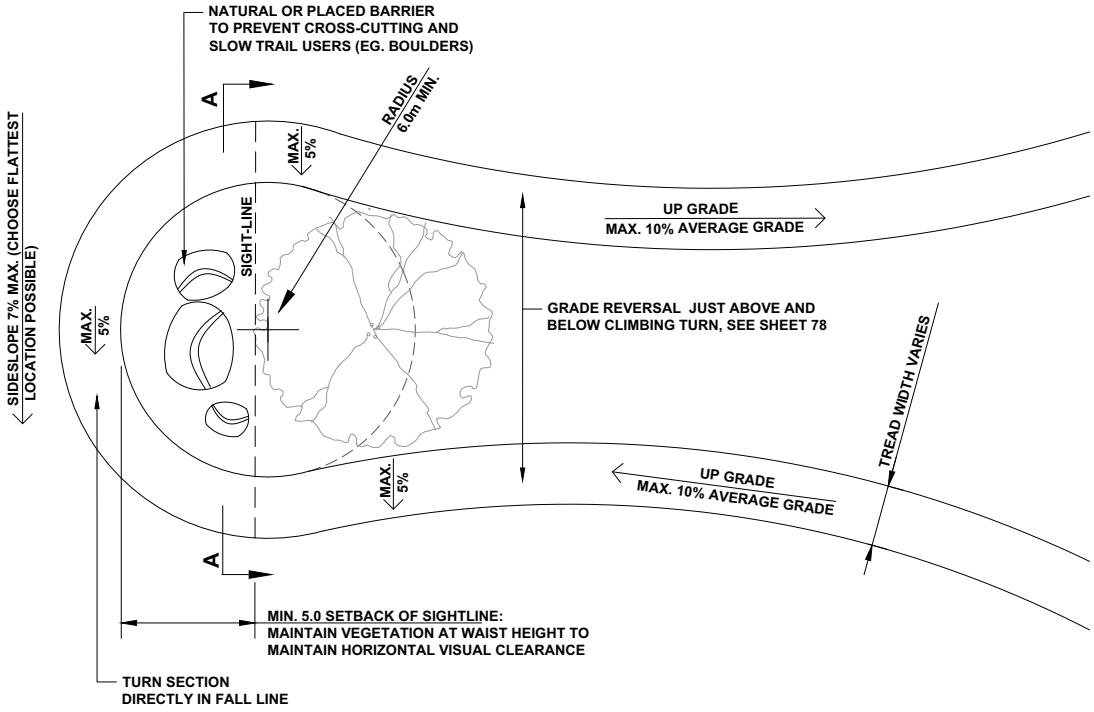
LONGITUDINAL SECTION A-A

NOTES:

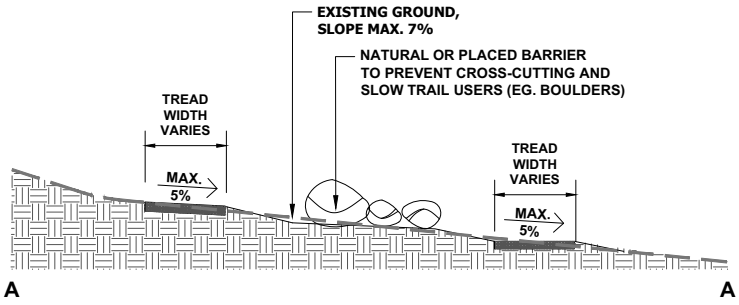
1. Dimensions in meters unless otherwise noted.
2. Parks gravel trail mix to be used for trails using gravel surfacing.
3. Fill is not always needed to construct ramp on rolling grade dip and knick.
4. 0.5m safety clearance and setback required on both sides of trail tread.
5. Locate at natural changes in trail grade where lower ground exists on the outer edge of the trail; do not locate at turns.

Calgary	PROJECT TITLE **SPECIFICATIONS**	DRAWN BY **CS**	SCALE **N.T.S.**
		DATE **2016-09-115**	SHEET NO. **79**
	SHEET TITLE **TRAILS - ROLLING GRADE DIP**	DESIGN BY	FILE NO.
		DATE	

Detail Sheet 81: Gravel Trails - Climbing Turn



PLAN VIEW (FOR SLOPES UP TO 7%)



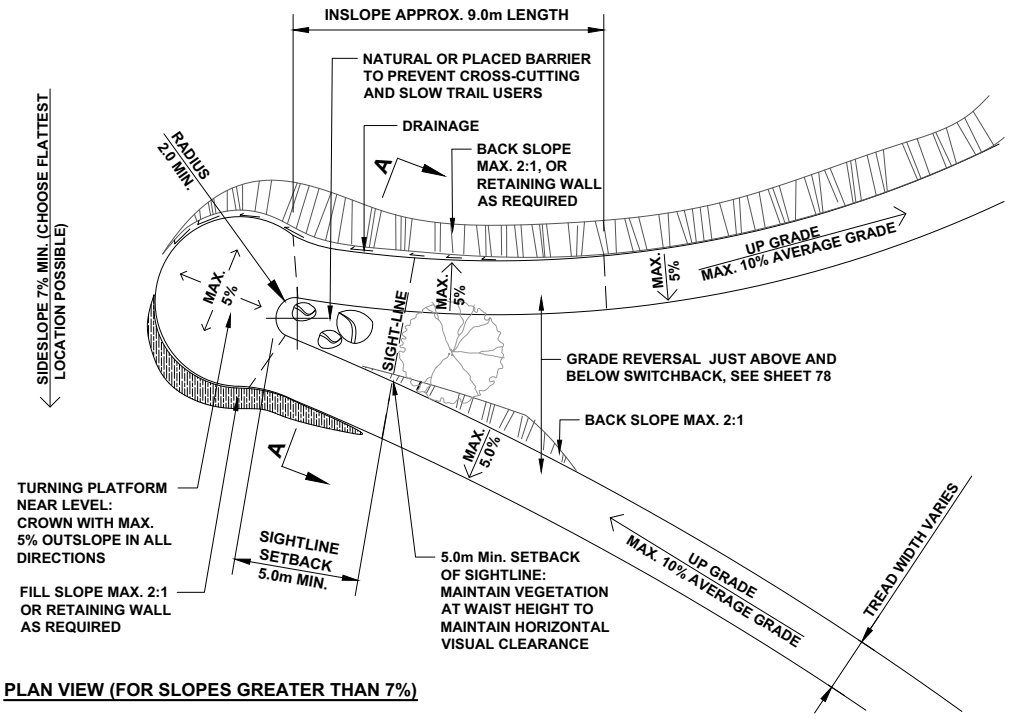
SECTION A-A (FOR SLOPES UP TO 7%)

NOTES:

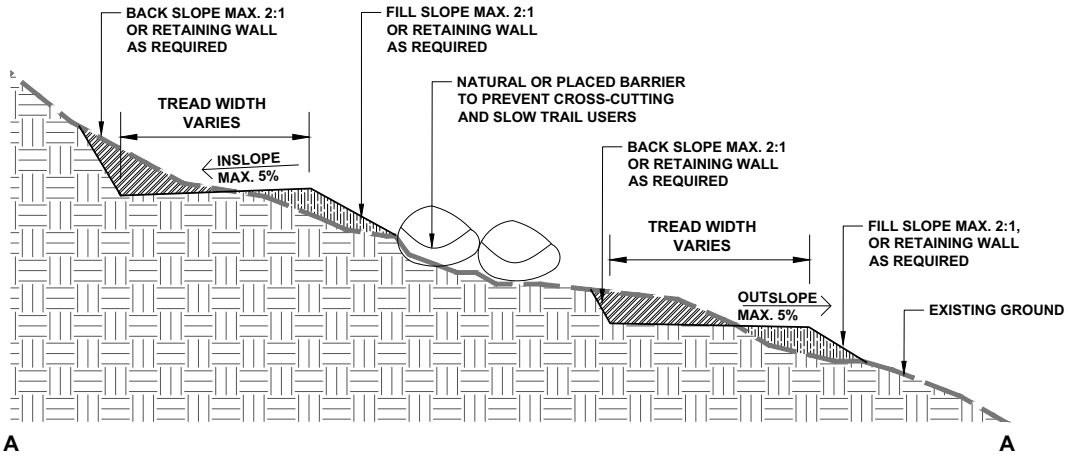
1. Dimensions in meters unless otherwise noted.
2. Climbing turn to be built on side slopes up to 7%. For side slopes greater then 7% see sheet 82 for switchback.
3. Where the half rule cannot be followed and reroute is not possible, on slopes up to 7%, stairs and steps also an option (see specifications).

Calgary	PROJECT TITLE **SPECIFICATIONS**	DRAWN BY **CS/RG**	SCALE **N.T.S**
		DATE **2016-09-16**	SHEET NO. **81**
	SHEET TITLE **GRAVEL TRAILS** **CLIMBING TURN**	DESIGN BY	FILE NO.
		DATE	

Detail Sheet 82: Gravel Trails - Switchback



PLAN VIEW (FOR SLOPES GREATER THAN 7%)



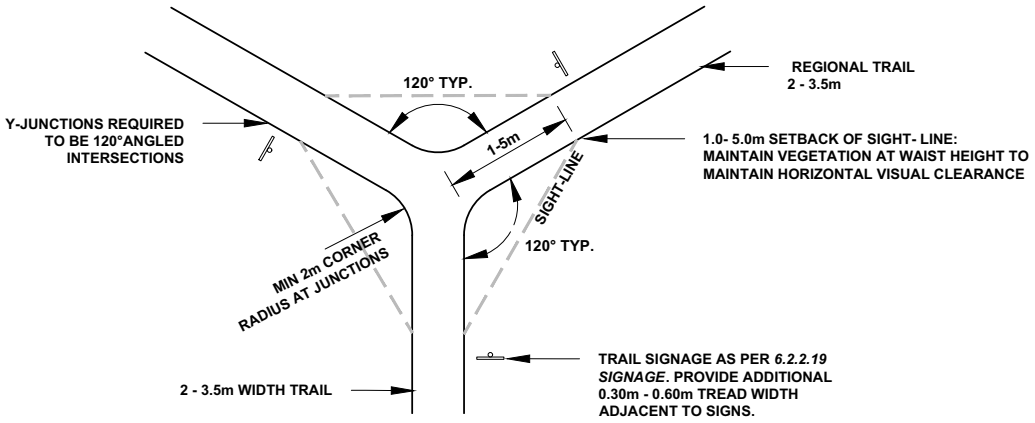
SECTIONS A-A (FOR SLOPES GREATER THAN 7%)

NOTES:

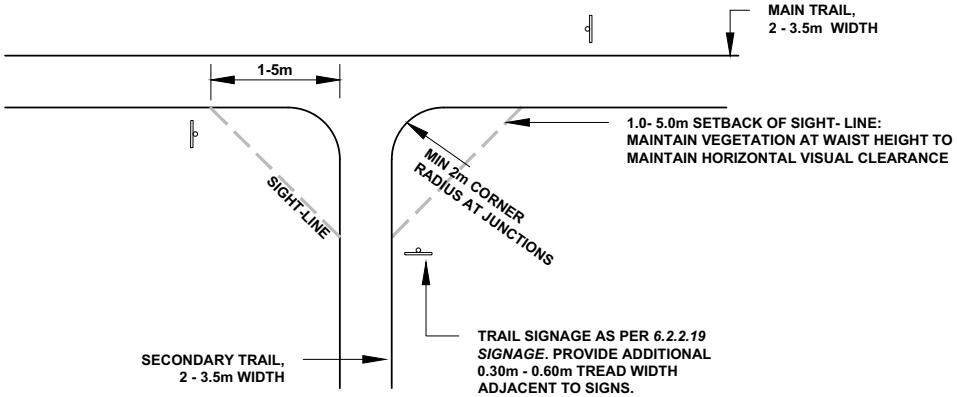
1. Dimensions in meters unless otherwise noted.
2. Switchback to be built on side slopes steeper than 7%. For slopes up to 7% see sheet 81 for climbing turn.
3. Where the half rule cannot be followed and reroute is not possible, on slopes steeper then 7%, stairs and steps also an option (see specifications).

Calgary	PROJECT TITLE **SPECIFICATIONS**	DRAWN BY **CS/RG**	SCALE **N.T.S**
		DATE **2016-09-16**	SHEET NO. **82**
	SHEET TITLE **GRAVEL TRAILS - SWITCHBACK**	DESIGN BY	FILE NO.
		DATE	

Detail Sheet 83: Trail Junctions



Y-SHAPED JUNCTION



T-SHAPED JUNCTION

NOTES:

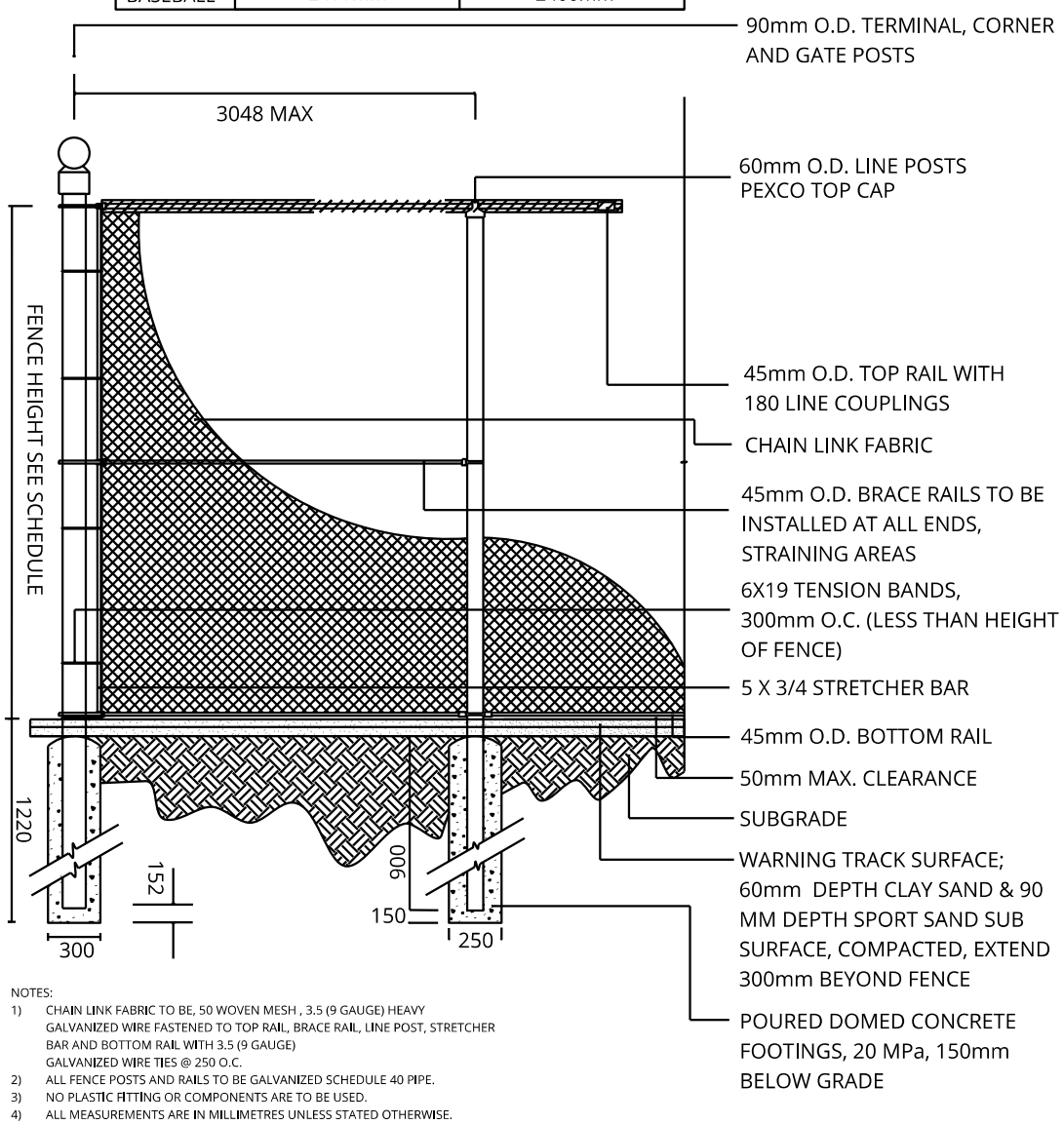
1. All specified dimensions are in millimeters.
2. See specifications for further information.
3. Align junctions for gentlest grades possible along trails; 3% grade is ideal.
4. Maintain horizontal visual clearance of 1-5m sight-line setbacks.
5. Ensure junctions are Y-shaped as much as possible, with all trails entering at a 120° angle. Where importance of trails entering a junction varies, T-shaped junctions may be used, with the trail of lesser-use entering at a 90° angle.
6. Provide traffic signage as per specifications. Provide additional 0.30m - 0.60m tread width adjacent to signs.
7. Trail junctions apply to all surface types.

Calgary	PROJECT TITLE **SPECIFICATIONS**	DRAWN BY **DD**	SCALE **N.T.S.**
		DATE **2016-09-16**	SHEET NO. **83**
	SHEET TITLE **TRAIL JUNCTIONS**	DESIGN BY	FILE NO.
		DATE	

Detail Sheet 84: Baseball and Softball Fence - Baseball Amenities

HEIGHT SCHEDULE

	BASELINE FENCE HT	OUTFIELD FENCE HT
SOFTBALL	1800mm	2400mm
BASEBALL	2400mm	2400mm



NOTES:
1) CHAIN LINK FABRIC TO BE, 50 WOVEN MESH , 3.5 (9 GAUGE) HEAVY GALVANIZED WIRE FASTENED TO TOP RAIL, BRACE RAIL, LINE POST, STRETCHER BAR AND BOTTOM RAIL WITH 3.5 (9 GAUGE) GALVANIZED WIRE TIES @ 250 O.C.
2) ALL FENCE POSTS AND RAILS TO BE GALVANIZED SCHEDULE 40 PIPE.
3) NO PLASTIC FITTING OR COMPONENTS ARE TO BE USED.
4) ALL MEASUREMENTS ARE IN MILLIMETRES UNLESS STATED OTHERWISE.

Calgary

PROJECT TITLE
BASEBALL AND SOFTBALL FENCE

SHEET TITLE
BASEBALL AMENITIES (3.3)

DRAWN BY
M.L.
DATE 2021 01 15

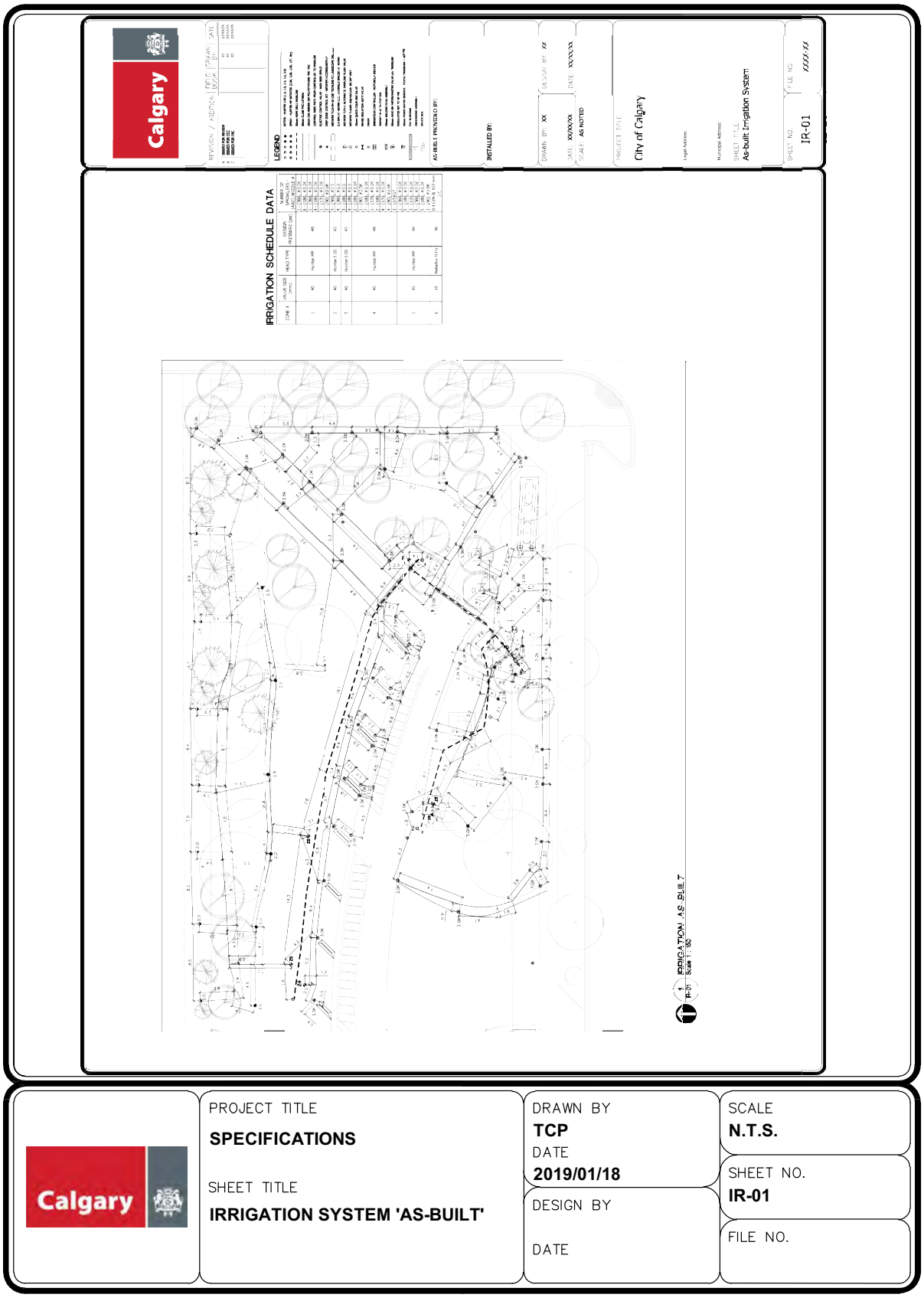
DESIGN BY
D.K.
DATE 2021 01 15

SCALE
N.T.S.

SHEET NO.
84

FILE NO.
2021-009

Detail Sheet IR-01: Irrigation As-Built Plan

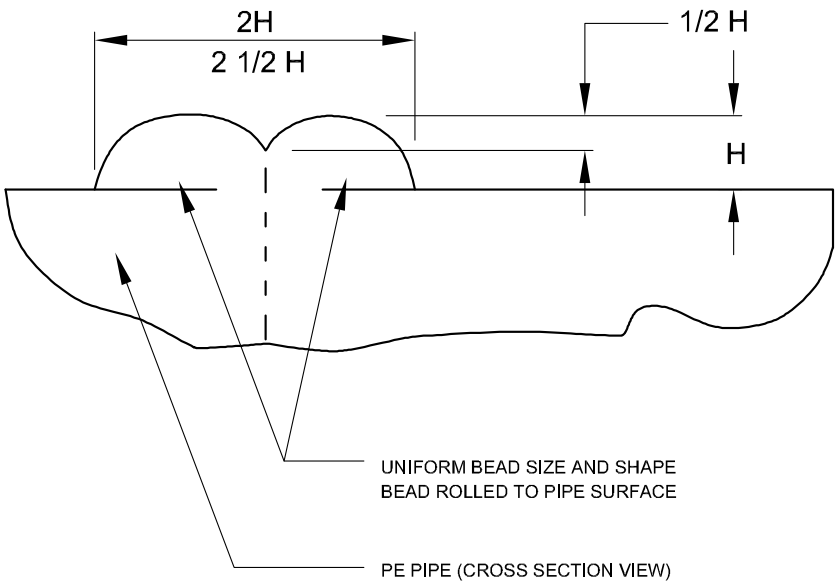


Calgary	PROJECT TITLE **SPECIFICATIONS** SHEET TITLE **IRRIGATION SYSTEM 'AS-BUILT'**	DRAWN BY **TCP** DATE **2019/01/18** DESIGN BY DATE	SCALE **N.T.S.** SHEET NO. **IR-01** FILE NO.

Detail Sheet IR-02: HDPE Bead Melt Detail

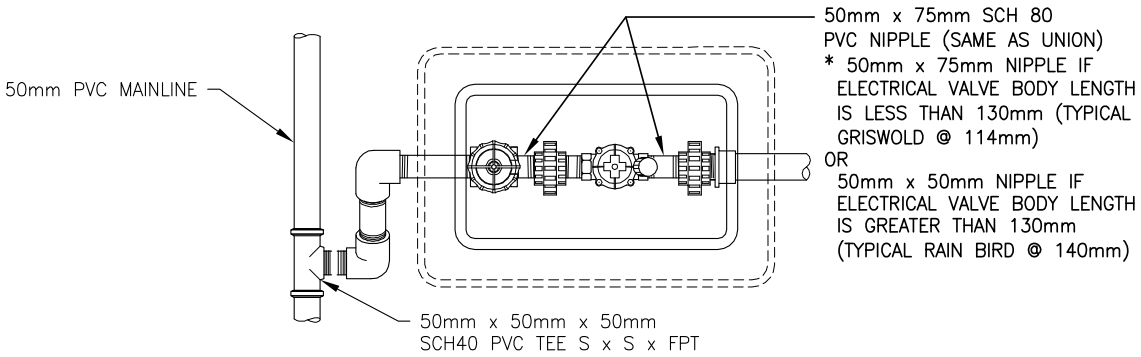
HDPE BEAD MELT DETAIL

PIPE SIZE		APPROX. MELT BEAD SIZE	
Inches	Millimeters	Inches	Millimeters
<1 1/4	<31.25	1/32 - 1/16	.75 to 1.5
1 ¼ to 3	31.25 to 75	about 1/16	1.5
3 to 8	75 to 200	1/8 to 3/16	3 to 4.5
8 to 12	200 to 300	3/16 to 1/4	4.5 to 6.25

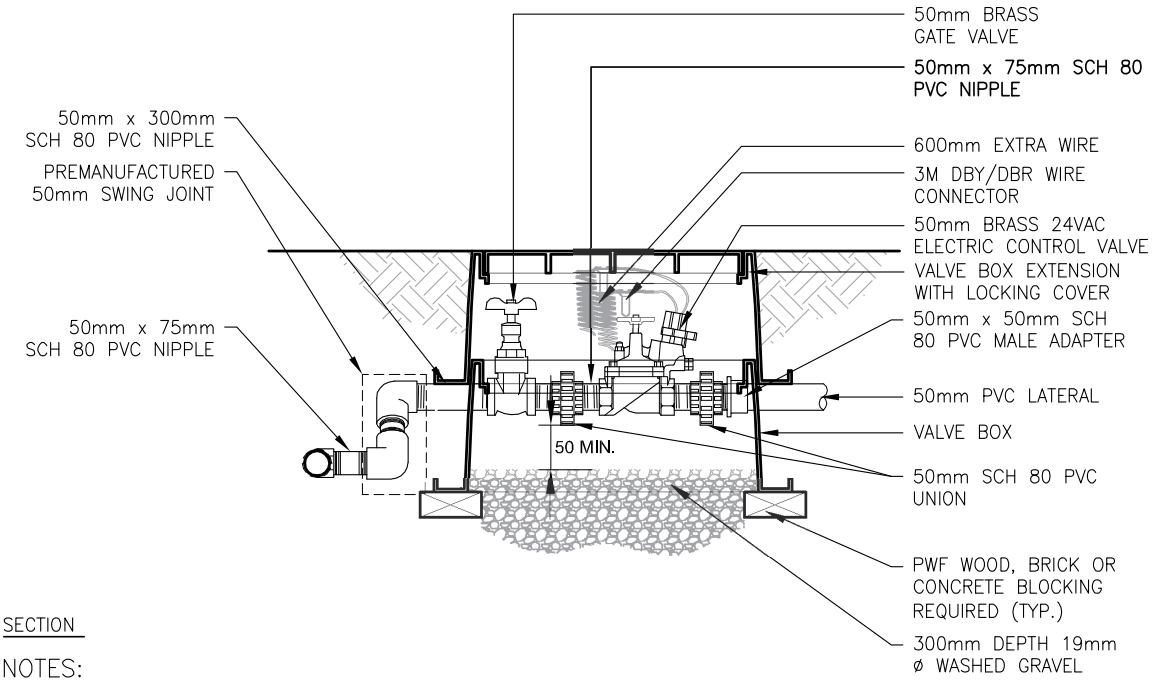


Calgary	PROJECT TITLE **SPECIFICATIONS** SHEET TITLE **HDPE BEAD MELT DETAIL**	DRAWN BY **WYC** DATE **2008/12/05** DESIGN BY DATE	SCALE **N.T.S.** SHEET NO. **IR-02** FILE NO.

Detail Sheet IR-03: 50 mm to 50 mm PVC Valve Connection



PLAN



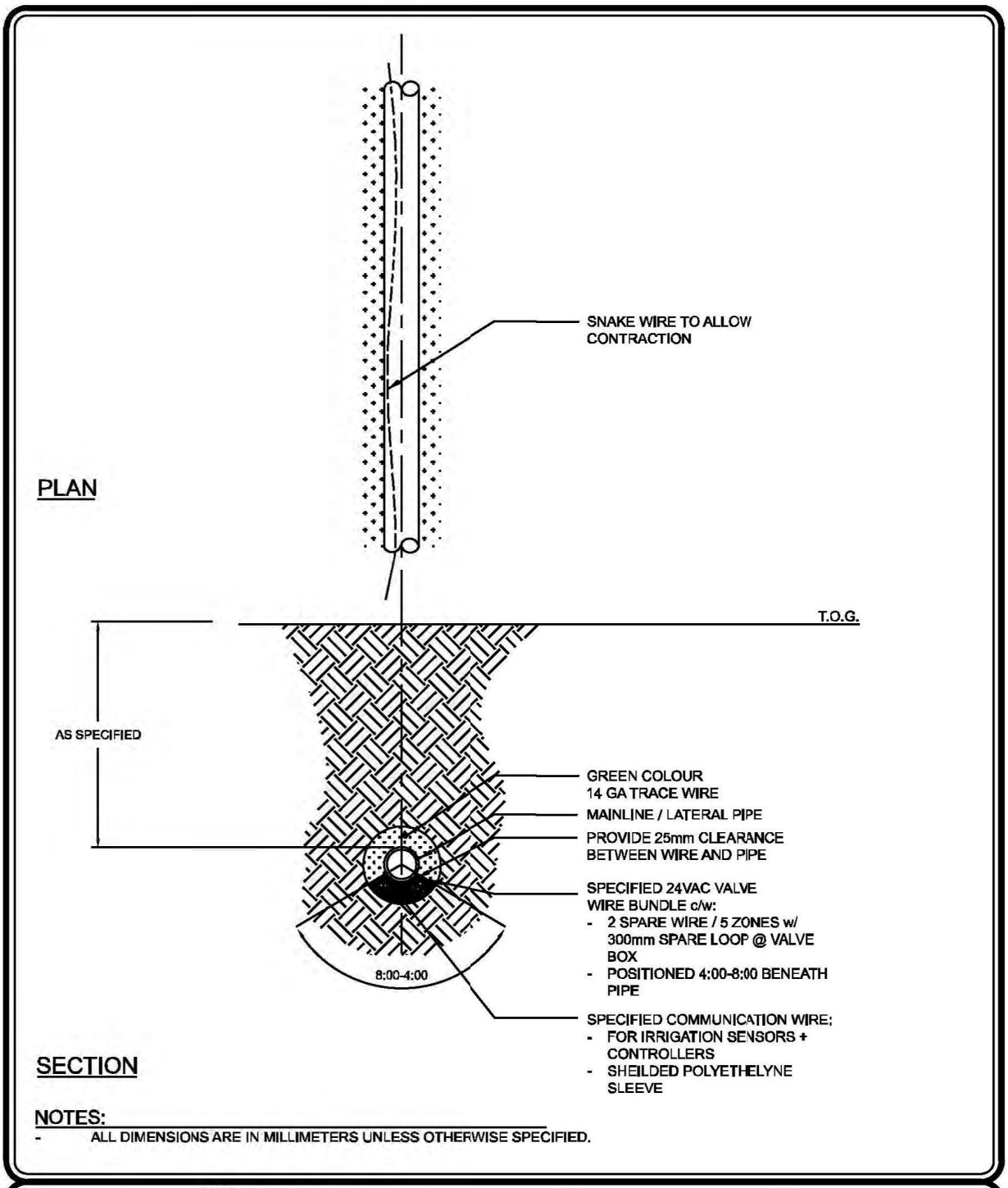
SECTION

NOTES:

1. USE PRE-MANUFACTURED EXTENSIONS WHEN OBTAINING PROPER HEIGHT OF BOXES.
2. IF ELECTRIC VALVE NOT INSTALLED, CENTRE GATE VALVE IN CENTRE OF BOX.
3. FOR BOX SPECIFICATIONS REFER TO SPECIFICATION SECTION 8.2.10.
4. ALL DIMENSIONS ARE IN MILLIMETRES UNLESS OTHERWISE SPECIFIED.
5. SCH 80 PVC UNIONS SHALL HAVE UNION COLLARS INSTALLED TOWARDS VALVE.

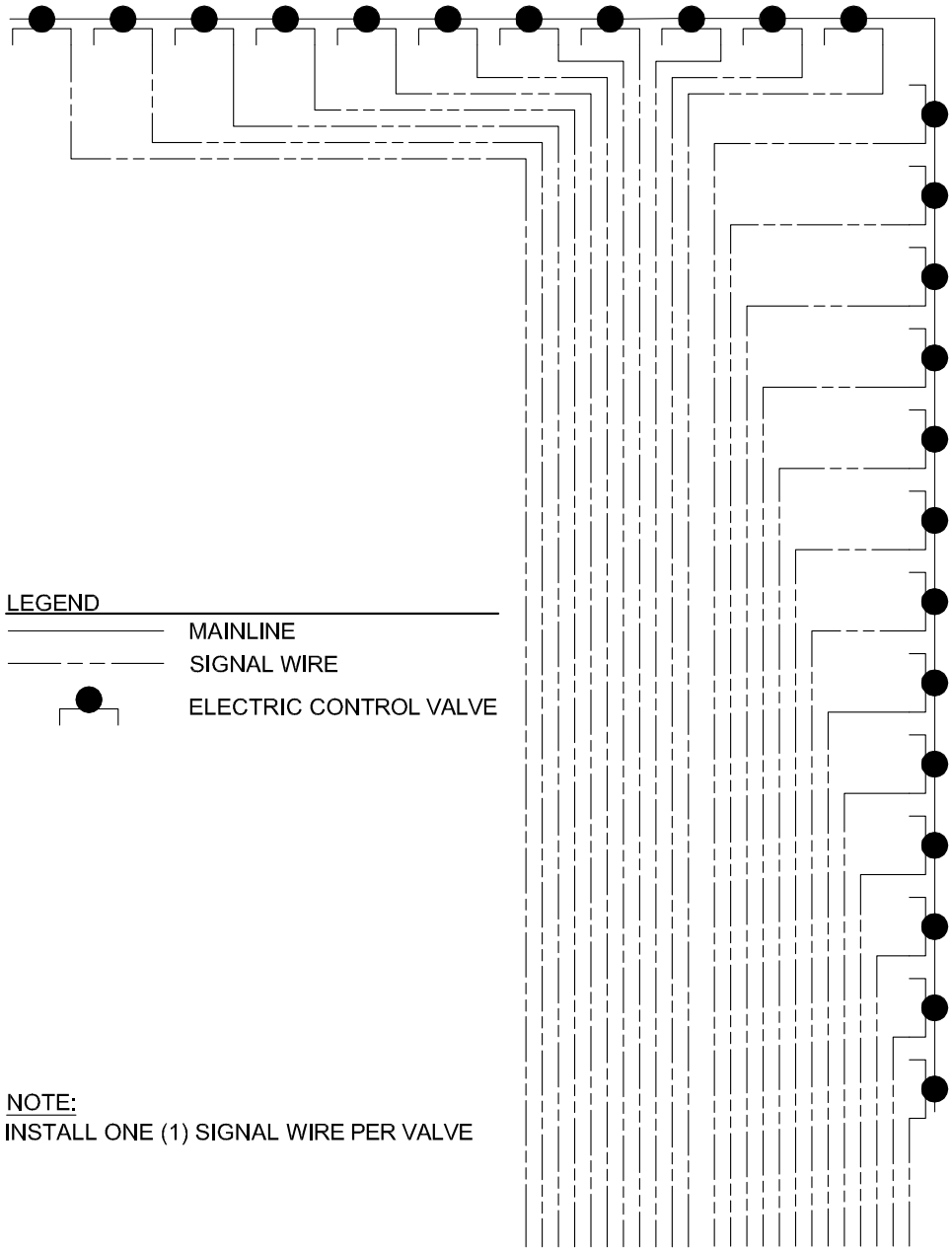
Calgary	PROJECT TITLE **SPECIFICATIONS** SHEET TITLE **50mm TO 50mm PVC VALVE CONNECTION**	DRAWN BY **TCP** DATE **2016/08** DESIGN BY DATE	SCALE **N.T.S.** SHEET NO. **IR-03** FILE NO.

Detail Sheet IR-04: 50 mm to 50 mm PVC Valve Connection



Calgary	PROJECT TITLE: SPECIFICATIONS SHEET TITLE: IRRIGATION FIELD WIRE ALIGNMENT	DRAWN BY: MRM DATE: 2006 05 24 DESIGN BY: DATE:	SCALE: N.T.S. SHEET NO.: IR-04 FILE NO.:

Detail Sheet IR-05: Electric Control Valve Signal Wire Schematic

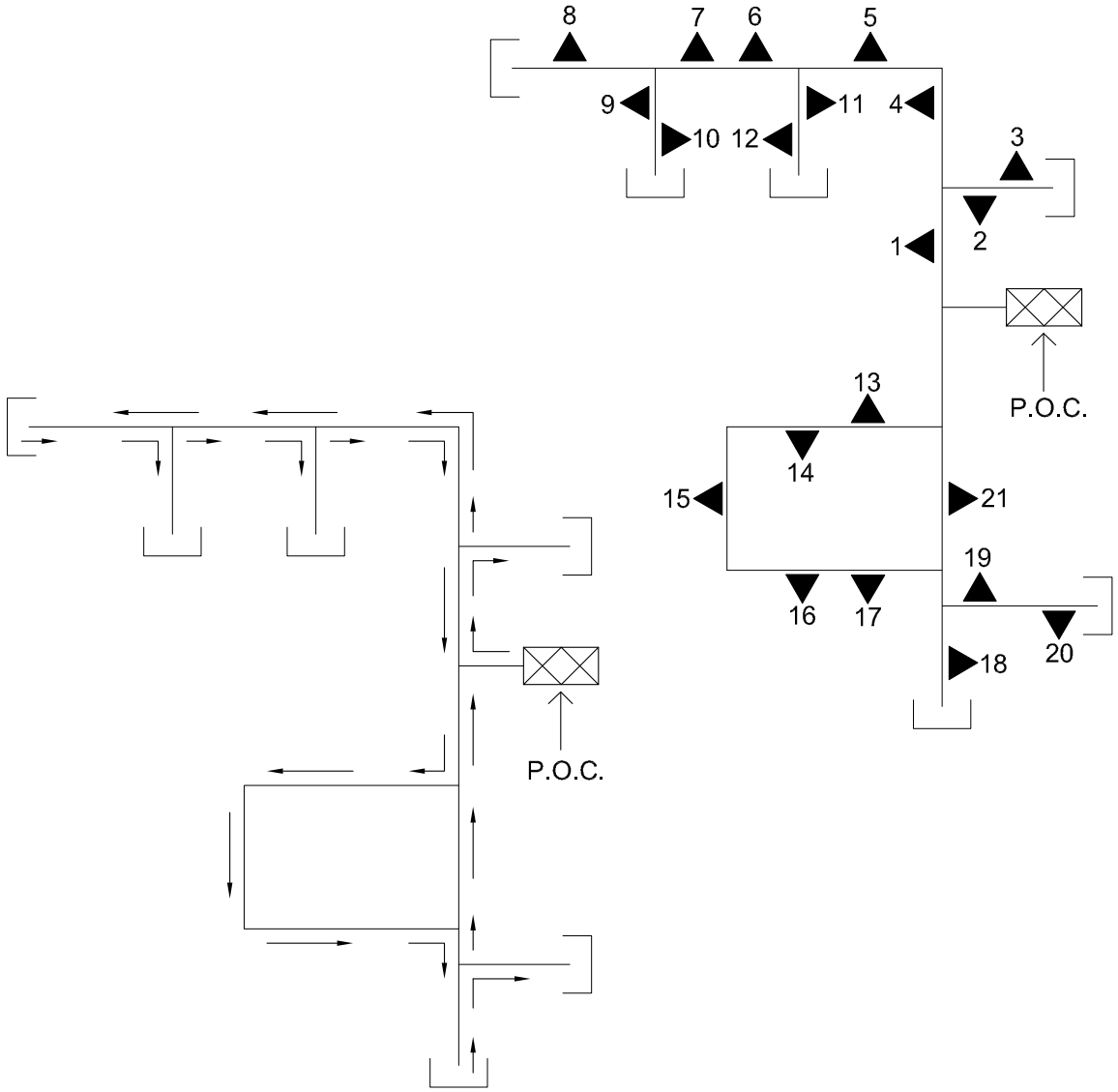


NOTE:
INSTALL ONE (1) SIGNAL WIRE PER VALVE

Calgary	PROJECT TITLE **SPECIFICATIONS**	DRAWN BY **MM** DATE **2009 01 16**	SCALE **N.T.S.**
	SHEET TITLE **ELECTRIC CONTROL VALVE SIGNAL WIRE SCHEMATIC**	DESIGN BY **MM** DATE **2009 01 16**	SHEET NO. **IR-05**
			FILE NO.

Detail Sheet IR-06: Right Hand Valve Wiring Rule

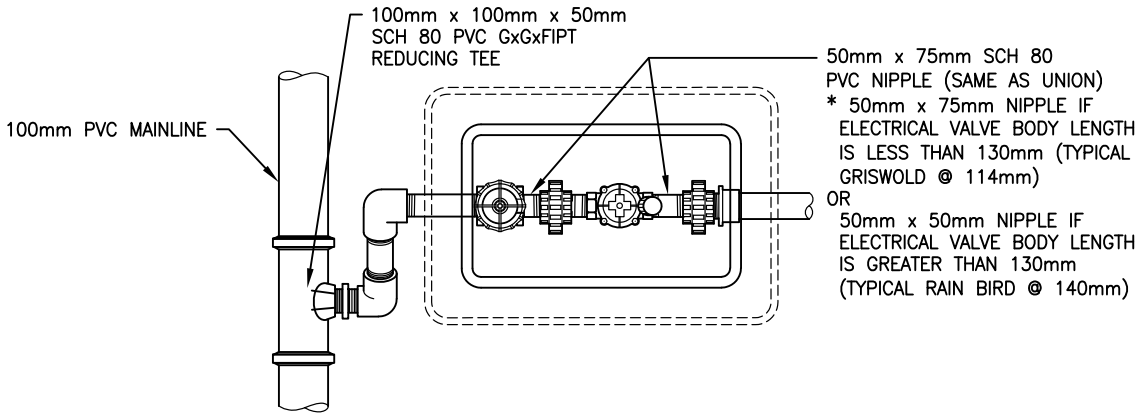
RIGHT HAND VALVE WIRING RULE



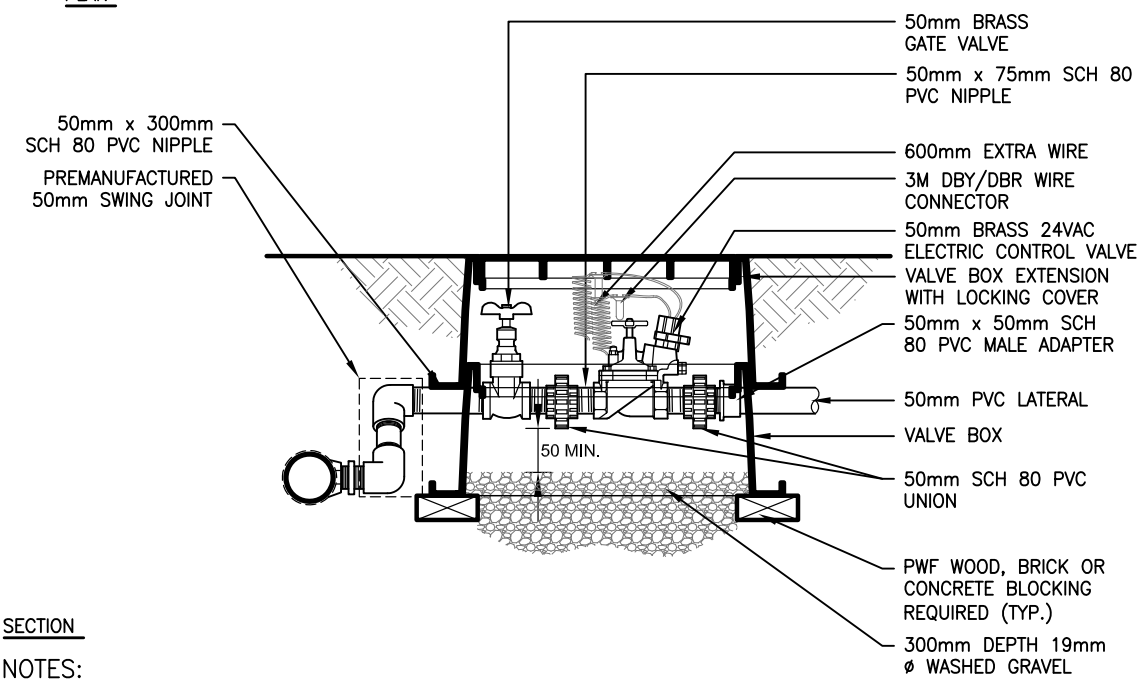
P.O.C: (POINT OF CONNECTION)

Calgary	PROJECT TITLE **SPECIFICATIONS** SHEET TITLE **RIGHT HAND VALVE WIRING RULE**	DRAWN BY **WYC** DATE **2009 02 25** DESIGN BY **MM** DATE **2009 02 25**	SCALE **N.T.S.** SHEET NO. **IR-06** FILE NO.

Detail Sheet IR-07: 100 mm to 50 mm PVC Valve Connection



PLAN



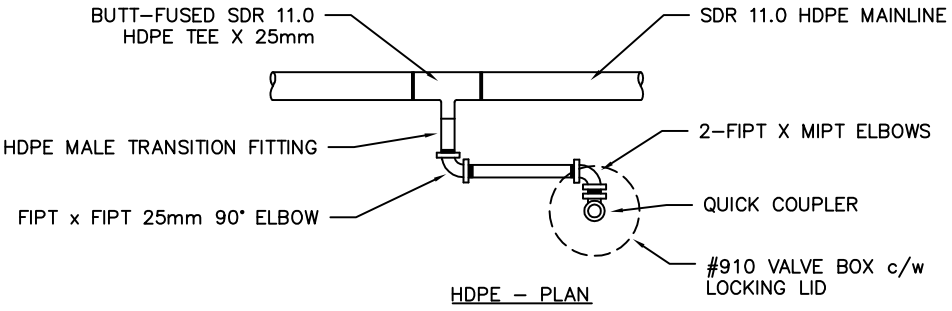
SECTION

NOTES:

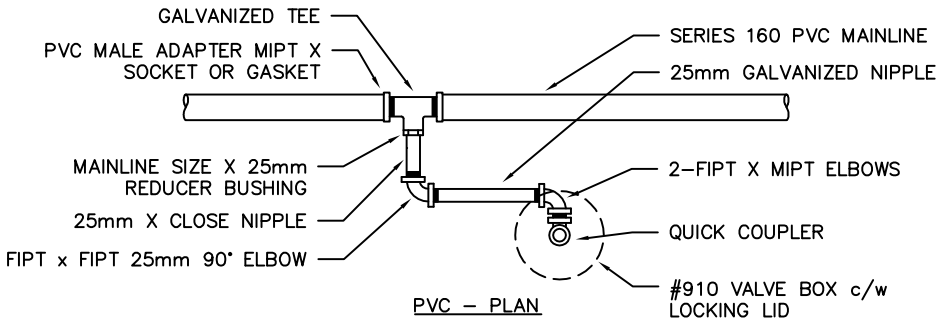
1. USE PRE-MANUFACTURED EXTENSIONS WHEN OBTAINING PROPER HEIGHT OF BOXES.
2. IF ELECTRIC VALVE NOT INSTALLED, CENTRE GATE VALVE IN CENTRE OF BOX.
3. FOR BOX SPECIFICATIONS REFER TO SPECIFICATION SECTION 8.2.10.
4. ALL DIMENSIONS ARE IN MILLIMETRES UNLESS OTHERWISE SPECIFIED.
5. SCH 80 PVC UNIONS SHALL HAVE UNION COLLARS INSTALLED TOWARDS VALVE.

Calgary	PROJECT TITLE **SPECIFICATIONS** SHEET TITLE **100mm TO 50mm PVC VALVE CONNECTION**	DRAWN BY **DB** DATE **2020/12/18** DESIGN BY DATE	SCALE **N.T.S.** SHEET NO. **IR-07** FILE NO.

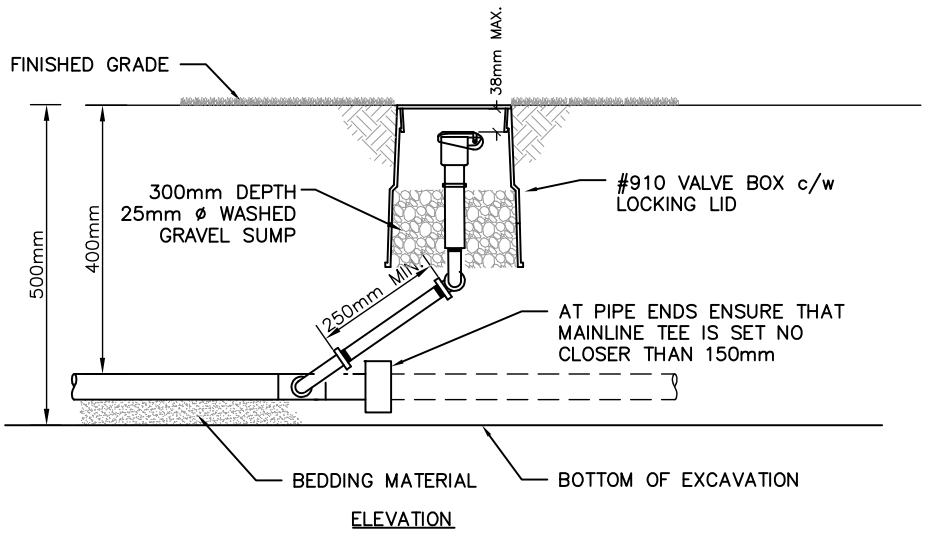
Detail Sheet IR-08: Mainline Quick Coupler for PVC and HDPE



HDPE – PLAN



PVC – PLAN



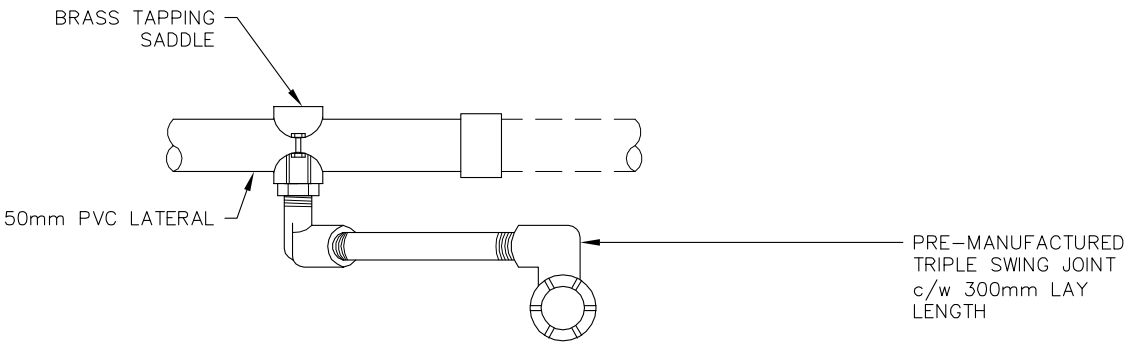
ELEVATION

NOTES:

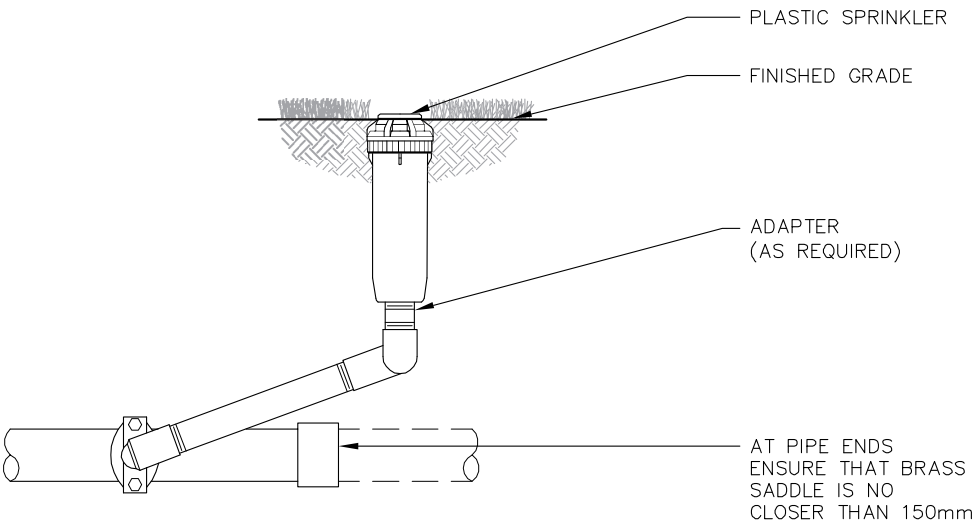
1. INSTALL SWING JOINT SO THAT ALL WATER DRAINS BACK INTO PIPE.
2. USE GALVANIZED FITTINGS WHEN INSTALLING QUICK COUPLING VALVES. USE TEFLON TAPE AT ALL CONNECTIONS AS PER PROPER TRADE PRACTICE.
3. ALL DIMENSIONS ARE IN MILLIMETRES UNLESS OTHERWISE SPECIFIED.

Calgary	PROJECT TITLE **SPECIFICATIONS** SHEET TITLE **MAINLINE QUICK COUPLER DETAIL FOR PVC AND HDPE**	DRAWN BY **CWM** DATE **2020/12/18** DESIGN BY DATE	SCALE **N.T.S.** SHEET NO. **IR-08** FILE NO.

Detail Sheet IR-09: Three Elbow Swing Joint for Plastic Sprinkler



PLAN



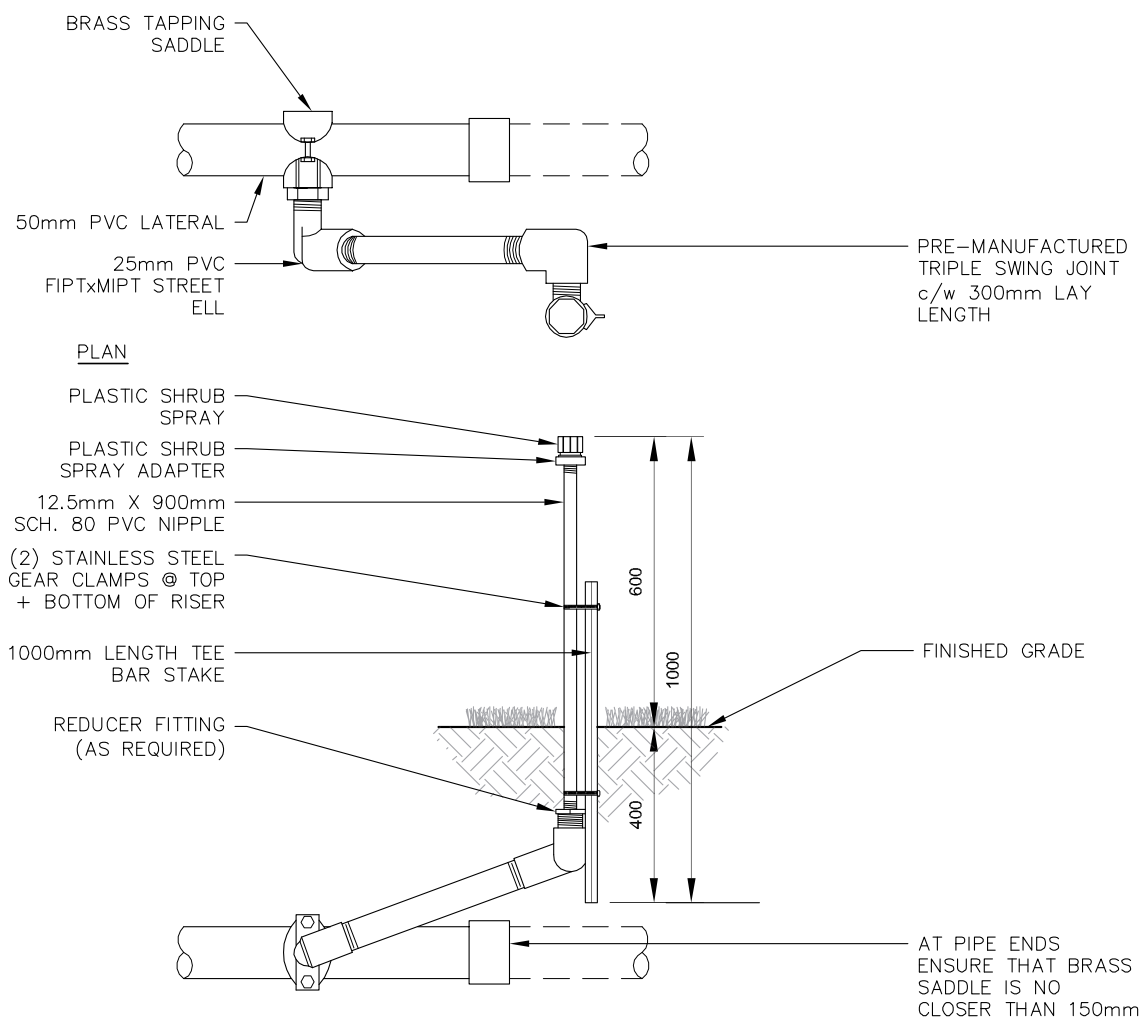
SECTION

NOTES:

1. INSTALL SWING JOINT SO THAT ALL WATER DRAINS BACK INTO PIPE.
2. USE GALVANIZED FITTINGS WHEN INSTALLING TURF VALVES OR METAL SPRINKLERS. USE TEFLON TAPE AT ALL CONNECTIONS AS PER PROPER TRADE PRACTICE.
3. USE SCHEDULE 40 PVC FITTINGS AND SCHEDULE 80 PVC NIPPLES WHEN INSTALLING PLASTIC SPRINKLERS.
4. ALL DIMENSIONS ARE IN MILLIMETRES UNLESS OTHERWISE SPECIFIED.

Calgary	PROJECT TITLE **SPECIFICATIONS** SHEET TITLE **THREE ELBOW SWING JOINT FOR PLASTIC SPRINKLER**	DRAWN BY **TCP** DATE **2016/08** DESIGN BY DATE	SCALE **N.T.S.** SHEET NO. **IR-09** FILE NO.

Detail Sheet IR-10: Three Elbow Swing Joint for Plastic Shrub Riser

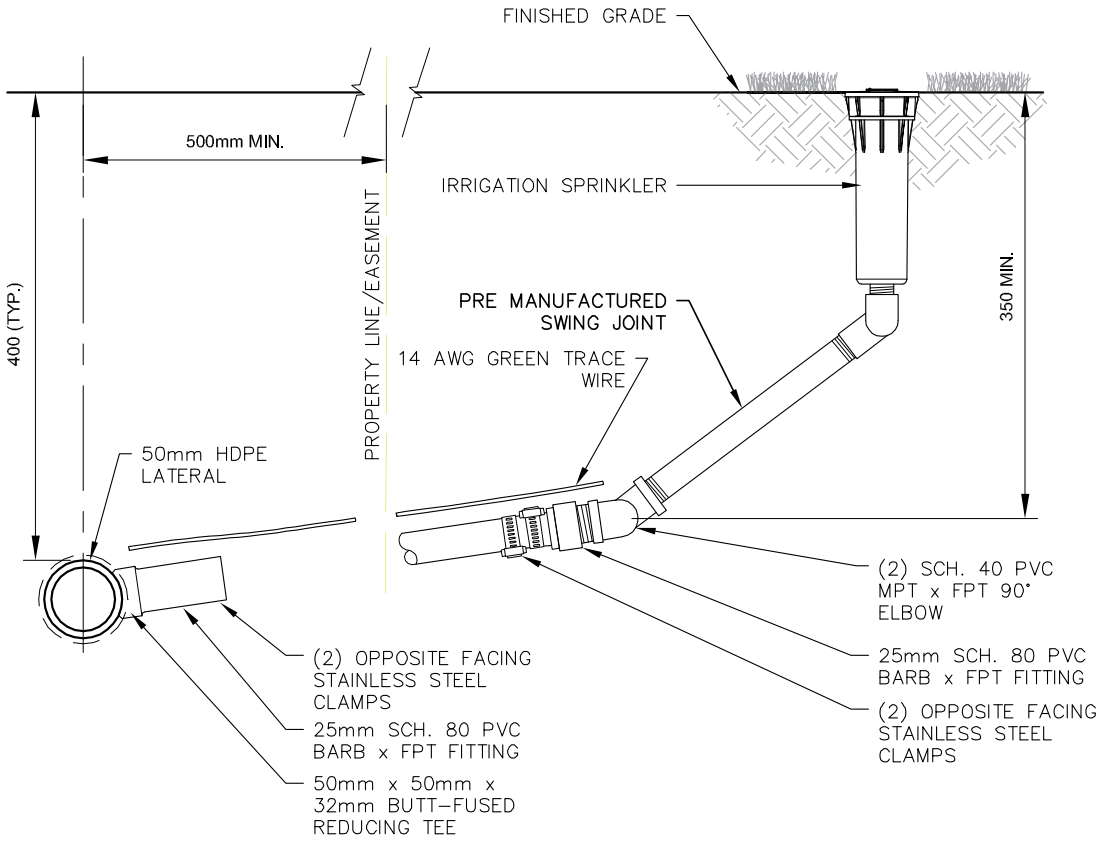


NOTES:

1. INSTALL SWING JOINT SO THAT ALL WATER DRAINS BACK INTO PIPE.
2. USE GALVANIZED FITTINGS WHEN INSTALLING TURF VALVES OR METAL SPRINKLERS. USE TEFLON TAPE AT ALL CONNECTIONS AS PER PROPER TRADE PRACTICE.
3. USE SCHEDULE 40 PVC FITTINGS AND SCHEDULE 80 PVC NIPPLES WHEN INSTALLING PLASTIC SPRINKLERS.
4. ALL DIMENSIONS ARE IN MILLIMETRES UNLESS OTHERWISE SPECIFIED.

Calgary	PROJECT TITLE **SPECIFICATIONS** SHEET TITLE **THREE ELBOW SWING JOINT FOR PLASTIC SHRUB RISER**	DRAWN BY **TCP** DATE **2016/08** DESIGN BY DATE	SCALE **N.T.S.** SHEET NO. **IR-10** FILE NO.

Detail Sheet IR-11: Pigtail Swing Joint for HDPE



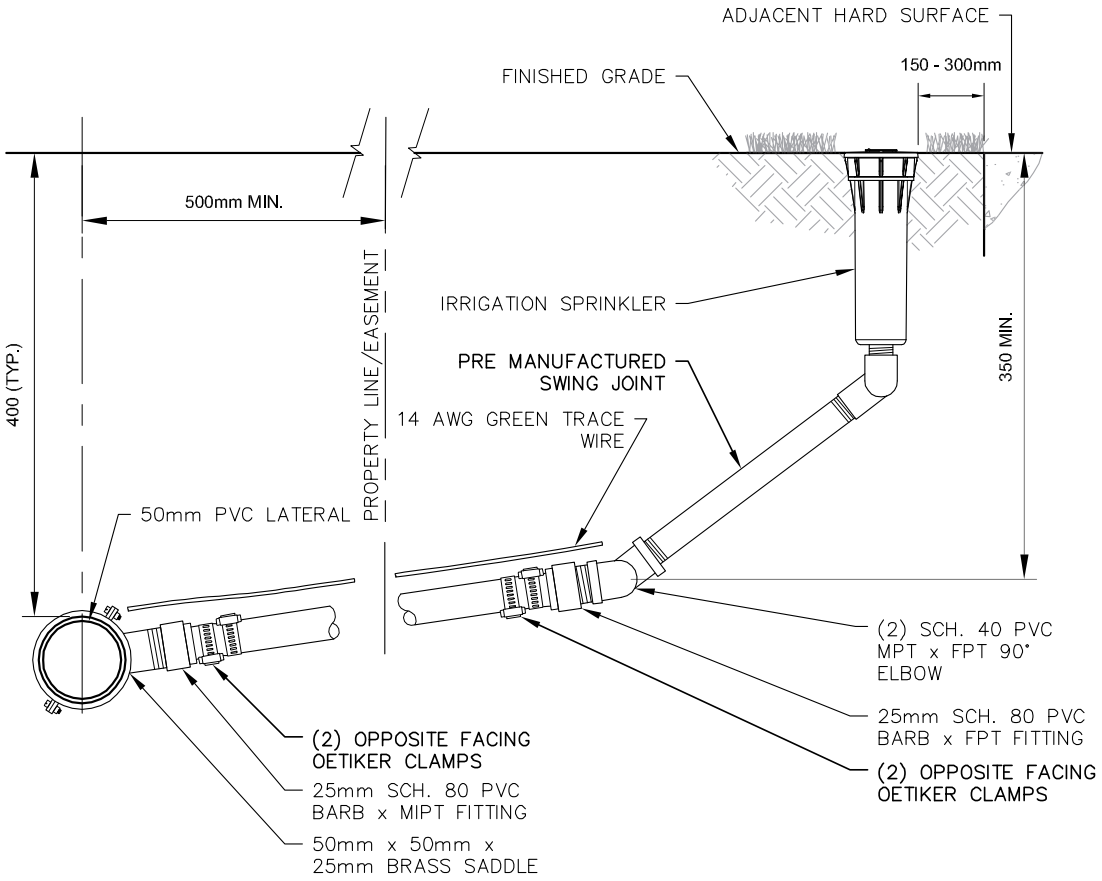
SECTION

NOTES:

1. 25mm x 900mm (TYP.) MDPE SHALL BE USED AS A PIGTAIL FOR OBSTRUCTIONS SUCH AS PROPERTY EASEMENTS, UTILITY RIGHT OF WAYS, TREE ROOTS, ETC.
2. POLY 'PIGTAIL' SHALL BE CSA SERIES 100 MEDIUM DENSITY POLYETHYLENE.
3. DISTANCE FROM IRRIGATION PIPE TO SPRINKLER HEAD SHALL BE INDICATED ON AS BUILT DRAWINGS.
4. SWING JOINT AND POLY PIGTAIL SHALL BE MIN. 350mm DEPTH AND SHALL HAVE 14 AWG GREEN TRACE WIRE FROM PIPE CONNECTION TO BASE OF SWING JOINT.
5. ALL DIMENSIONS ARE IN MILLIMETRES UNLESS OTHERWISE SPECIFIED.

Calgary	PROJECT TITLE **SPECIFICATIONS** SHEET TITLE **PIGTAIL SWING JOINT FOR HDPE**	DRAWN BY **TCP** DATE **2016/08** DESIGN BY DATE	SCALE **N.T.S.** SHEET NO. **IR-11** FILE NO.

Detail Sheet IR-12: Pigtail Swing Joint for PVC



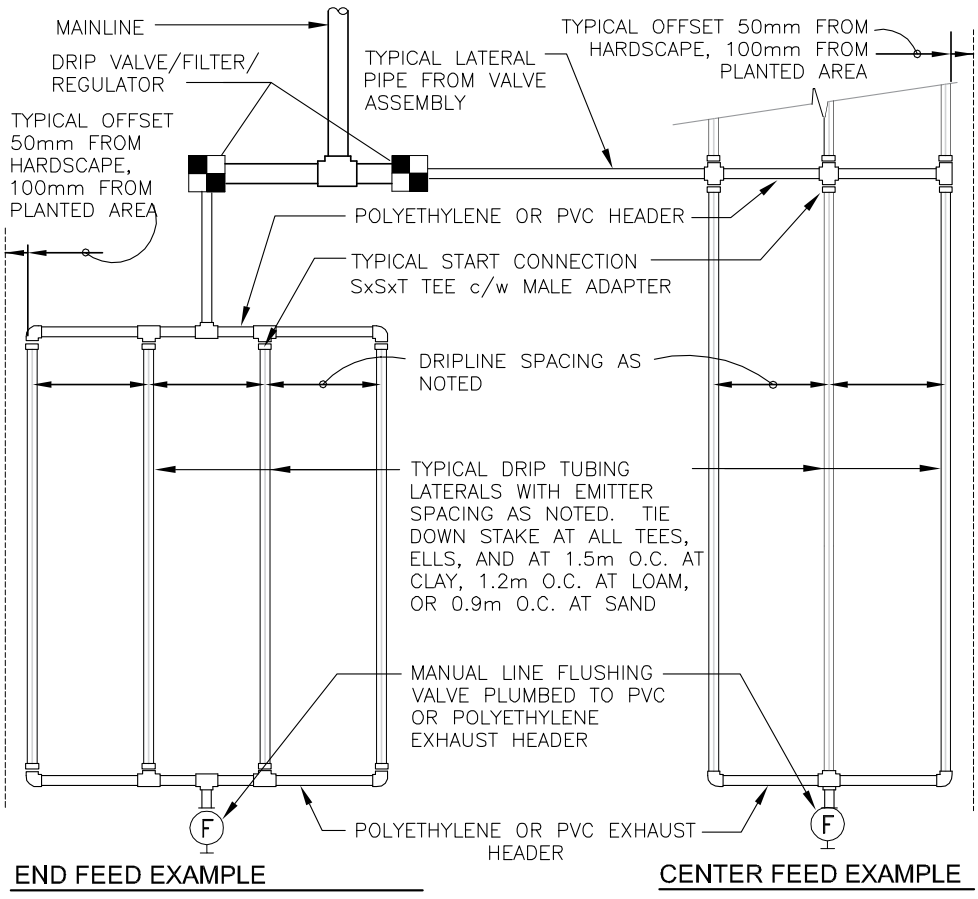
SECTION

NOTES:

1. 25mm x 900mm (TYP.) MDPE SHALL BE USED AS A PIGTAIL FOR OBSTRUCTIONS SUCH AS PROPERTY EASEMENTS, UTILITY RIGHT OF WAYS, TREE ROOTS, ETC.
2. POLY 'PIGTAIL' SHALL BE CSA SERIES 100 MEDIUM DENSITY POLYETHYLENE.
3. DISTANCE FROM IRRIGATION PIPE TO SPRINKLER HEAD SHALL BE INDICATED ON AS BUILT DRAWINGS.
4. SWING JOINT AND POLY PIGTAIL SHALL BE MIN. 350mm DEPTH AND SHALL HAVE 14 AWG GREEN TRACE WIRE FROM PIPE CONNECTION TO BASE OF SWING JOINT.
5. ALL DIMENSIONS ARE IN MILLIMETRES UNLESS OTHERWISE SPECIFIED.

Calgary	PROJECT TITLE **SPECIFICATIONS** SHEET TITLE **PIGTAIL SWING JOINT FOR PVC**	DRAWN BY **TCP** DATE **2016/08** DESIGN BY DATE	SCALE **N.T.S.** SHEET NO. **IR-12** FILE NO.

Detail Sheet IR-13: Preferred Drip Line Centre and End Layouts



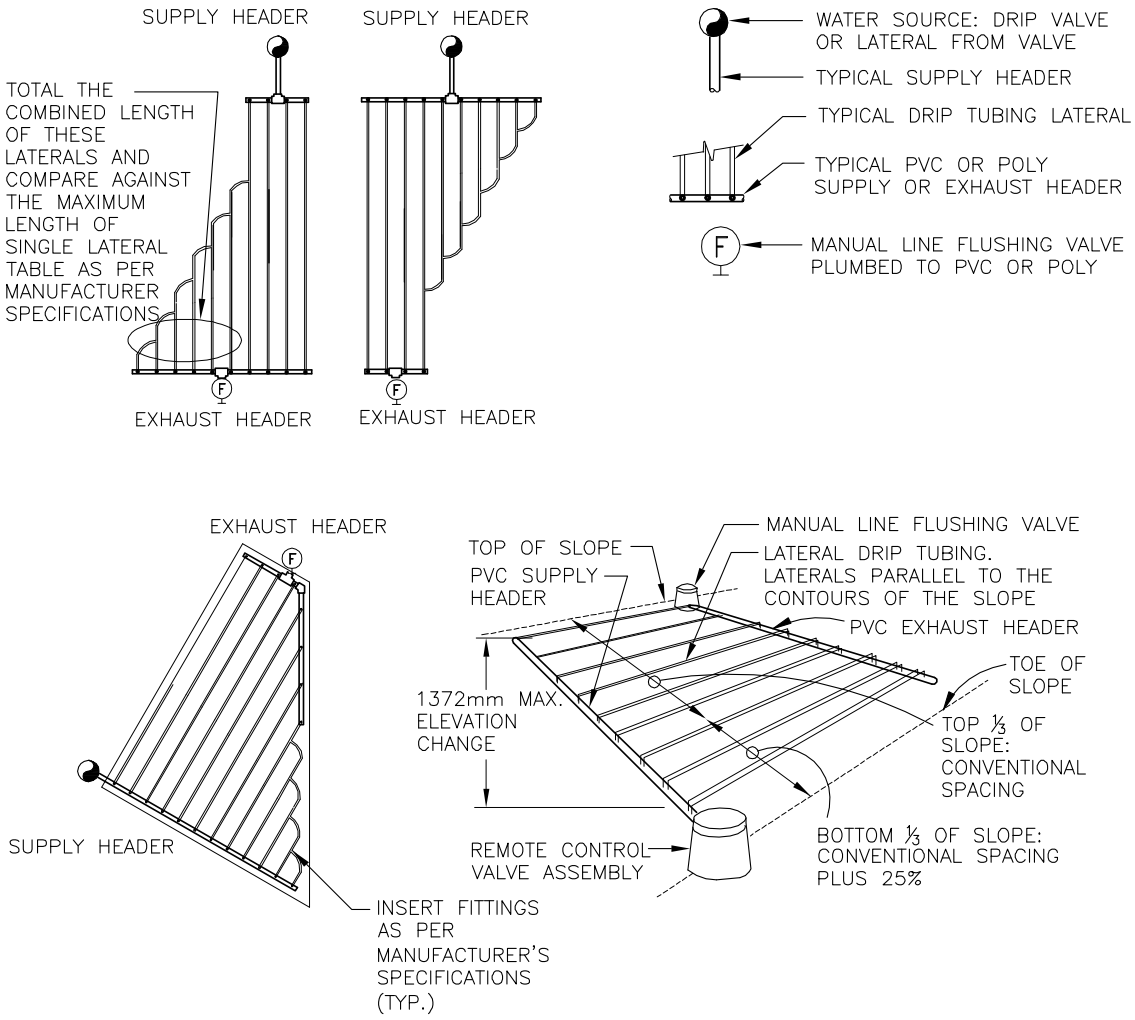
SECTION

NOTES:

1. USE PRE-MANUFACTURED EXTENSIONS WHEN OBTAINING PROPER HEIGHT OF BOXES.
2. FOR BOX SPECIFICATIONS REFER TO SPECIFICATION SECTION 8.2.10.
3. ALL DIMENSIONS ARE IN MILLIMETRES UNLESS OTHERWISE SPECIFIED.
4. SCH 80 PVC UNIONS SHALL HAVE UNION COLLARS INSTALLED TOWARDS VALVE.
5. INSTALL DRIP COMPONENTS AS PER MANUFACTURERS SPECIFICATIONS.
6. INSTALL ONE DRIP AIR RELIEF VALVE PER ZONE AT HIGH POINT.

Calgary	PROJECT TITLE **SPECIFICATIONS** SHEET TITLE **PREFERRED DRIP LINE CENTRE & END LAYOUTS**	DRAWN BY **TCP** DATE **2016/08** DESIGN BY DATE	SCALE **N.T.S.** SHEET NO. **IR-13** FILE NO.

Detail Sheet IR-14: Preferred Drip Line Isometric



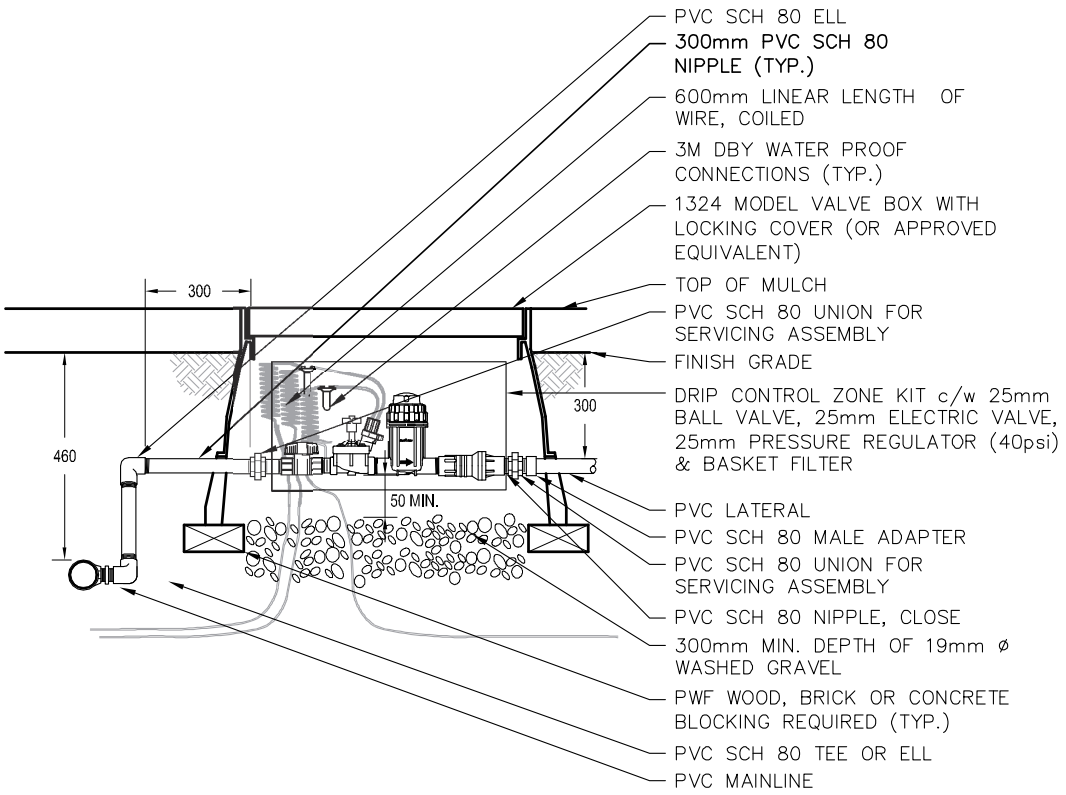
SECTION

NOTES:

1. USE PRE-MANUFACTURED EXTENSIONS WHEN OBTAINING PROPER HEIGHT OF BOXES.
2. FOR BOX SPECIFICATIONS REFER TO SPECIFICATION SECTION 8.2.10.
3. ALL DIMENSIONS ARE IN MILLIMETRES UNLESS OTHERWISE SPECIFIED.
4. SCH 80 PVC UNIONS SHALL HAVE UNION COLLARS INSTALLED TOWARDS VALVE.
5. INSTALL DRIP COMPONENTS AS PER MANUFACTURERS SPECIFICATIONS.

Calgary	PROJECT TITLE **SPECIFICATIONS**	DRAWN BY **TCP**	SCALE **N.T.S.**
	SHEET TITLE **PREFERRED DRIP LINE ISOMETRIC**	DATE **2016/08**	SHEET NO. **IR-14**
		DESIGN BY	FILE NO.
		DATE	

Detail Sheet IR-15: Drip Control Zone Kit PVC



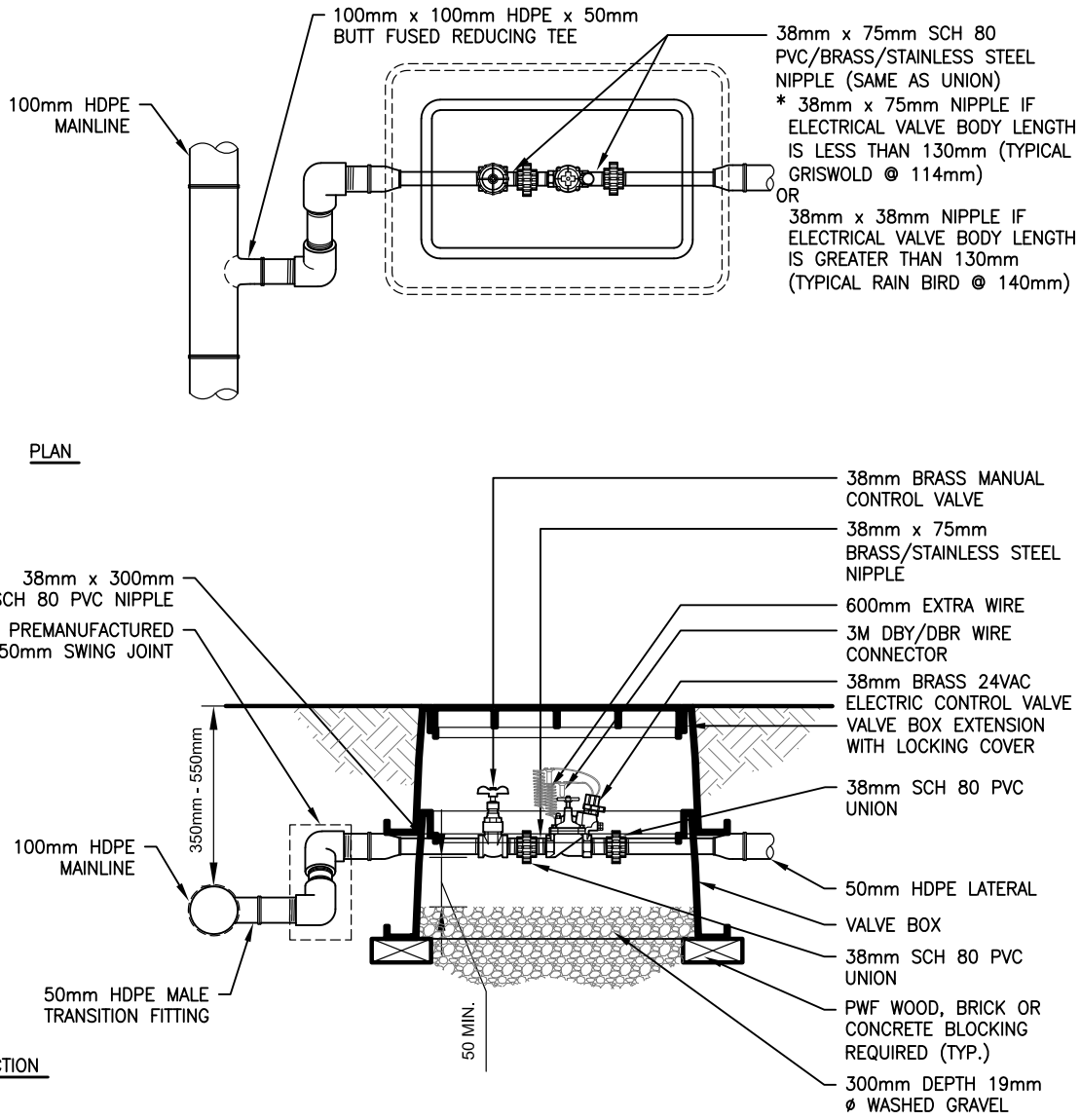
SECTION

NOTES:

1. USE PRE-MANUFACTURED EXTENSIONS WHEN OBTAINING PROPER HEIGHT OF BOXES.
2. FOR BOX SPECIFICATIONS REFER TO SPECIFICATION SECTION 8.2.10.
3. ALL DIMENSIONS ARE IN MILLIMETRES UNLESS OTHERWISE SPECIFIED.
4. SCH 80 PVC UNIONS SHALL HAVE UNION COLLARS INSTALLED TOWARDS VALVE.
5. INSTALL DRIP COMPONENTS AS PER MANUFACTURERS SPECIFICATIONS.
6. ACTUAL COMPONENT LAYOUT MAY VARY BY BRAND AND MODEL.

Calgary	PROJECT TITLE **SPECIFICATIONS** SHEET TITLE **DRIP CONTROL ZONE KIT PVC**	DRAWN BY **TCP** DATE **2016/08** DESIGN BY DATE	SCALE **N.T.S.** SHEET NO. **IR-15** FILE NO.

Detail Sheet IR-16: 100mm to 38mm HDPE Valve Connection

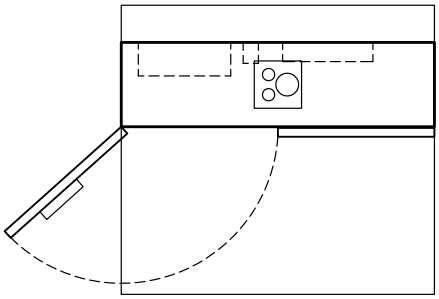


NOTES:

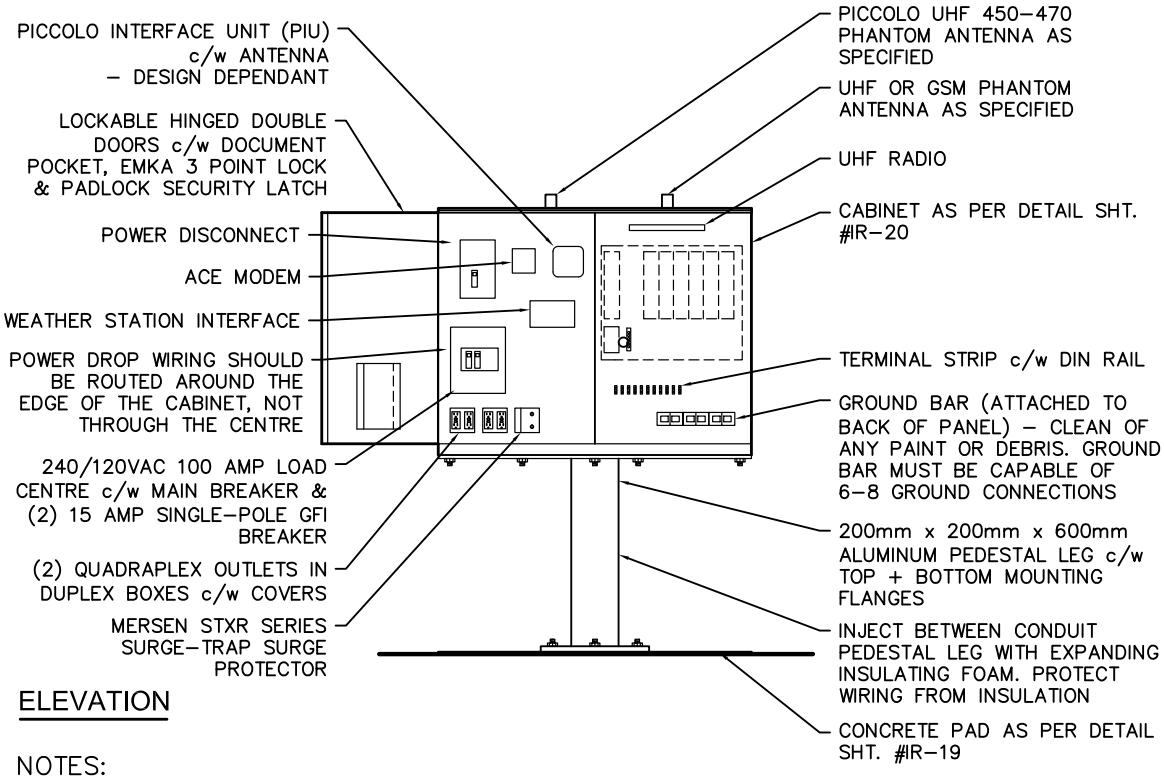
1. USE PRE–MANUFACTURED EXTENSIONS WHEN OBTAINING PROPER HEIGHT OF BOXES.
2. ALL HIGH DENSITY FITTINGS ARE TO BE BUTT FUSED OR ELECTRO–FUSION.
3. IF ELECTRIC VALVE NOT INSTALLED, CENTRE HAND VALVE IN CENTRE OF BOX.
4. ALL DIMENSIONS ARE IN MILLIMETRES UNLESS OTHERWISE SPECIFIED.
5. SCH 80 PVC UNIONS SHALL HAVE UNION COLLARS INSTALLED TOWARDS VALVE.
6. ELECTRO–FUSED TEES & BUTT–FUSED TEES ARE ACCEPTABLE FOR USE ON MAINLINES.

Calgary	PROJECT TITLE **SPECIFICATIONS** SHEET TITLE **100mm TO 38mm HDPE VALVE CONNECTION**	DRAWN BY **DB** DATE **2020/12/18** DESIGN BY DATE	SCALE **N.T.S.** SHEET NO. **IR-16** FILE NO.

Detail Sheet IR-17: AC IRRInet-M or ACE Series Field Unit Cabinet & Pedestal



PLAN



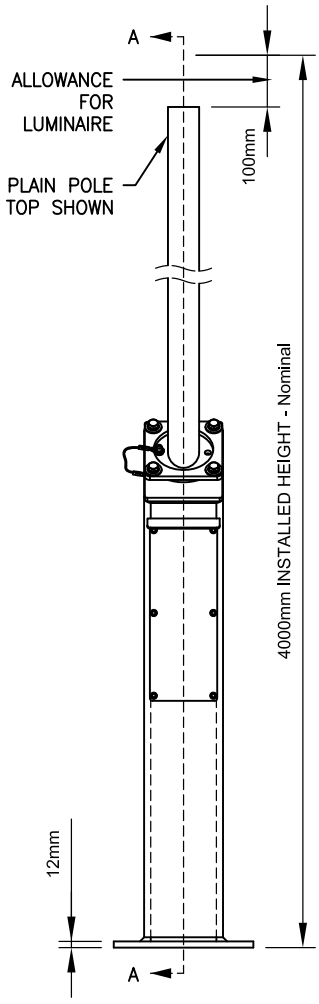
ELEVATION

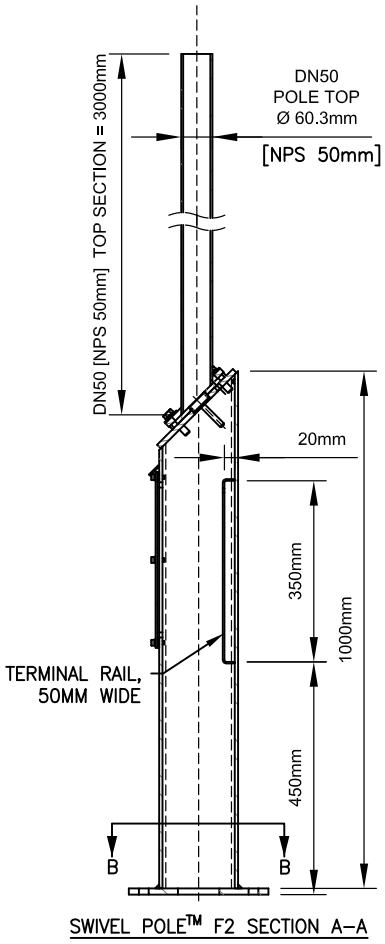
NOTES:

1. CONTROLLER CABINET SHALL HAVE ELECTRICAL SURGE PROTECTION AND GROUNDED TO 5 ohms OR LESS
2. CONTRACTOR SHALL CONFIRM ALL PEDESTAL BOLT TEMPLATES
3. TERMINAL STRIP SIZE DETERMINED AT PLANNING STAGE
4. ALL DIMENSIONS IN MILLIMETRES UNLESS OTHERWISE SPECIFIED
5. ALL COMPONENTS SHALL BE CSA APPROVED AND SUBJECT TO APPLICABLE NATIONAL, PROVINCIAL AND MUNICIPAL CODES/BYLAWS
6. ALL COMPONENTS INSIDE CABINET MUST BE LABELED ACCORDINGLY. SITE ADDRESS, SITE ID, RADIO INFREQUENCES, COAX PURPOSE, FIELD WIRING, ETC.
7. MINIMUM 1m OF FIELD WIRE TO EXTEND OUTSIDE THE CABINET FOR PROPER WIRING PURPOSES.

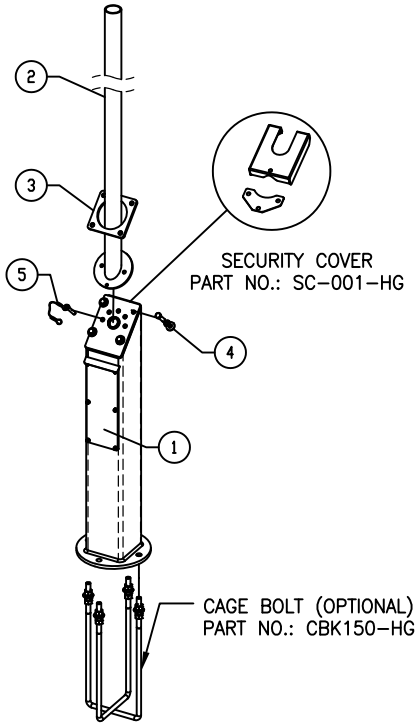
Calgary	PROJECT TITLE **SPECIFICATIONS** SHEET TITLE **AC IRRInet-M OR ACE SERIES FIELD UNIT CABINET & PEDESTAL**	DRAWN BY **DB** DATE **2021/01/25** DESIGN BY DATE	SCALE **N.T.S.** SHEET NO. **IR-17** FILE NO.

Detail Sheet IR-18: Swivel Pole

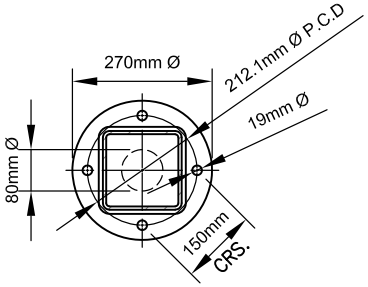




SWIVEL POLE™ F2 SECTION A–A



F2 – FLOOR MOUNTED POLE
TYPICAL INSTALLATION



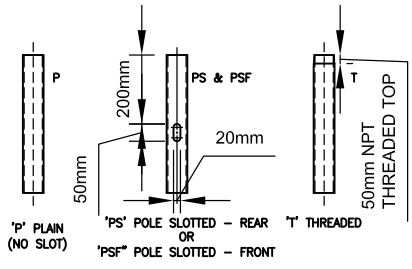
SECTION B–B

ITEM NO.	QTY.	PART NUMBER	DESCRIPTION	WEIGHT
1	1	F2–RBP1000–LR–HG	F2 BASE SECTION (SHS) – Round Base Plate	74.1 lb (33.7 kg)
2	1	T50 TOP POLE (HG)	DN50 [NPS 2.0in] TOP POLE	37.4 lb (17.0 kg)
3	1	CP10–150–001–HG	CLAMP PLATE 10mm	2.0 lb (0.9 kg)
4	4	FSNK–002–HG	50mm Fastener Kit (50Hex–Bolt,Ft–Washr,Sp–Washr)	0.18 lb (0.08 kg)
5	1	SP10–HG	SAFETY PIN AND CABLE	0.15 lb (0.07 kg)

INSTALLED HEIGHT	PRODUCT CODE	NEC / IEC
4000 [13']	F2–4000–P–HG	NEC
4000 [13']	F2–4000–PS–HG	IEC
4000 [13']	F2–4000–PSF–HG	IEC
4000 [13']	F2–4000–T–HG	NEC

POLE PART No.	WEIGHT
F2–4000 Series	114.4 lb (52.0 kg)

(with ROUND BASE PLATE)



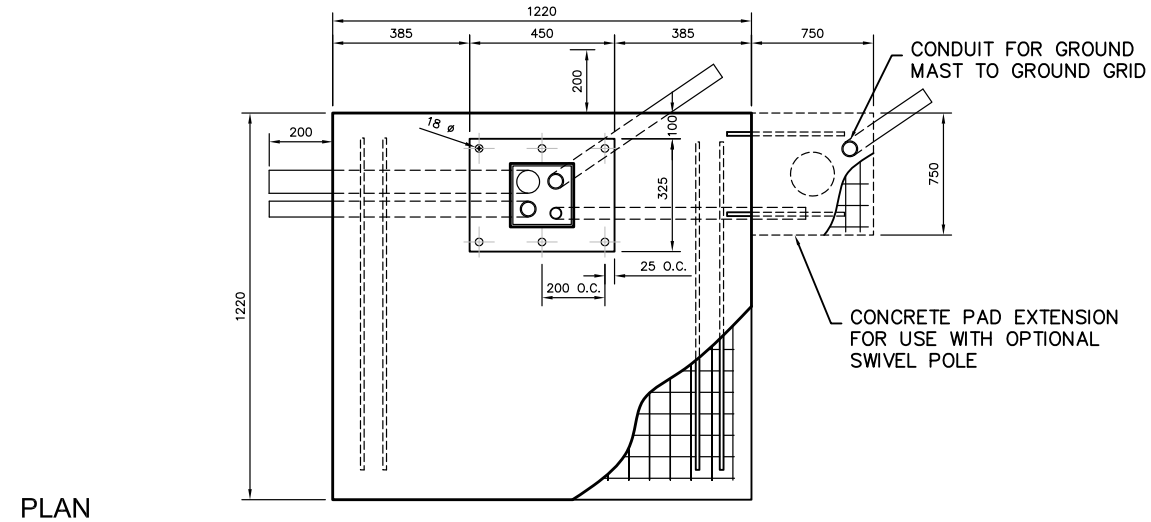
POLE TOP OPTIONS

NOTES:

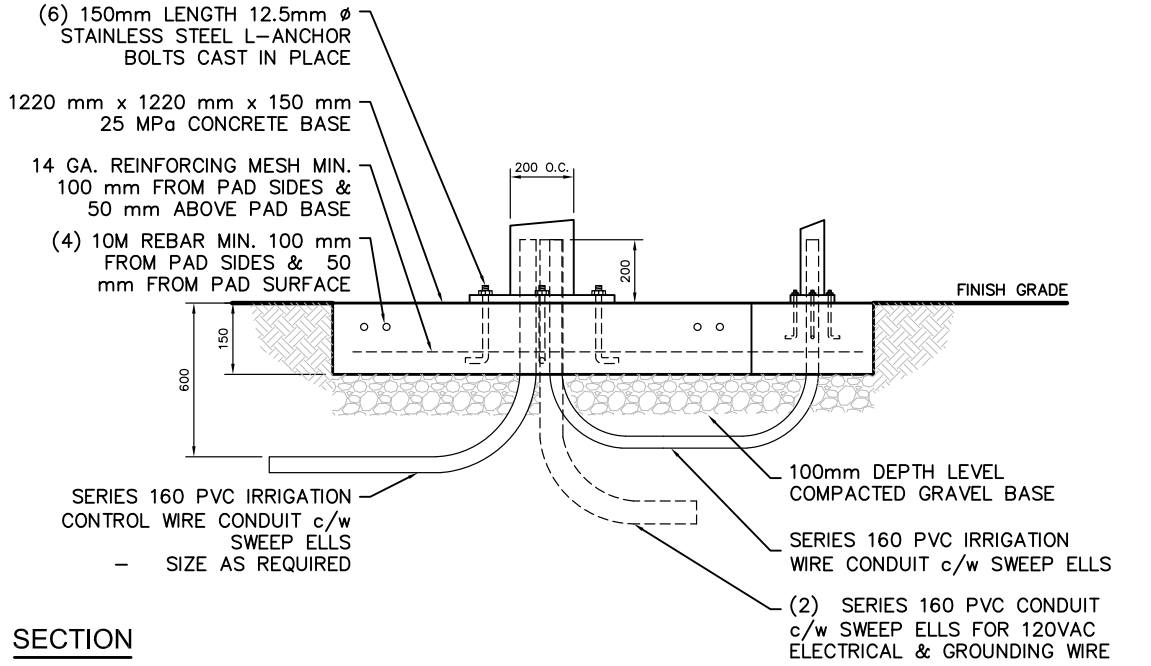
1. POLE SHALL BE GROUNDED TO GROUNDING GRID WITH 6 AWG WIRE.

Calgary	PROJECT TITLE **SPECIFICATIONS**	DRAWN BY **DB**	SCALE **N.T.S.**
	SHEET TITLE **SWIVEL POLE**	DATE **2021/01/25**	SHEET NO. **IR-18**
		DESIGN BY	FILE NO.
		DATE	

Detail Sheet IR-19: Concrete Pad



PLAN



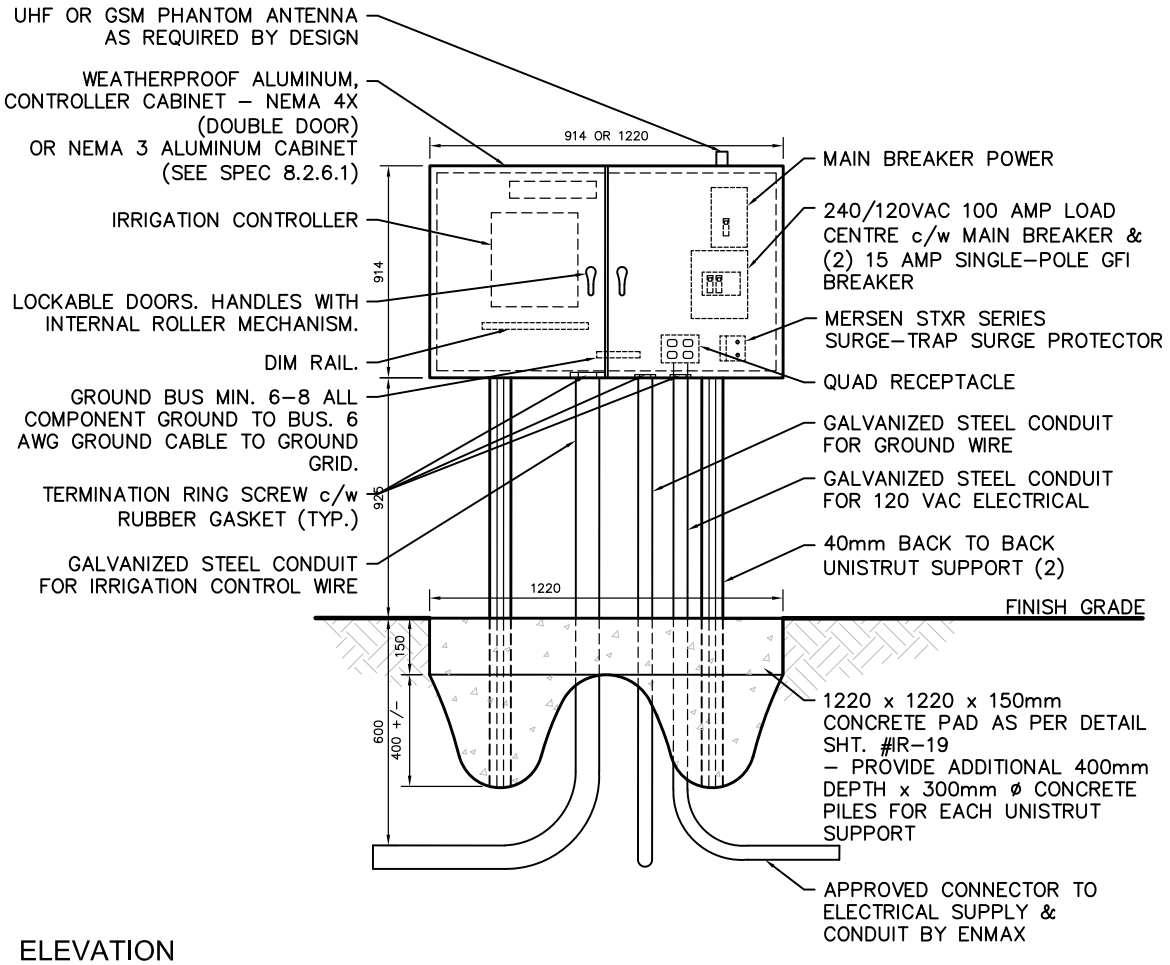
SECTION

NOTES:

1. CONTRACTOR SHALL CONFIRM ALL BOLT TEMPLATES w/ CABINET MANUFACTURER PRIOR TO CONSTRUCTION OF CONCRETE PAD
2. CONDUIT SHALL BE SIZED SO AS WIRES DO NOT EXCEED 40% ø OF PIPE DIAMETER
3. VERIFY ANCHOR BOLT PLACEMENTS w/ BOLT TEMPLATE SUPPLIED BY PEDESTAL MANUFACTURER
4. CONCRETE TO HAVE BROOM FINISH WITH TROWELED EDGING

Calgary	PROJECT TITLE **SPECIFICATIONS**	DRAWN BY **DB**	SCALE **N.T.S.**
		DATE **2021/01/25**	SHEET NO. **IR-19**
	SHEET TITLE **TYPICAL CONCRETE PAD**	DESIGN BY	FILE NO.
		DATE	

Detail Sheet IR-20: Irrigation Controller Cabinet - NEMA 4X



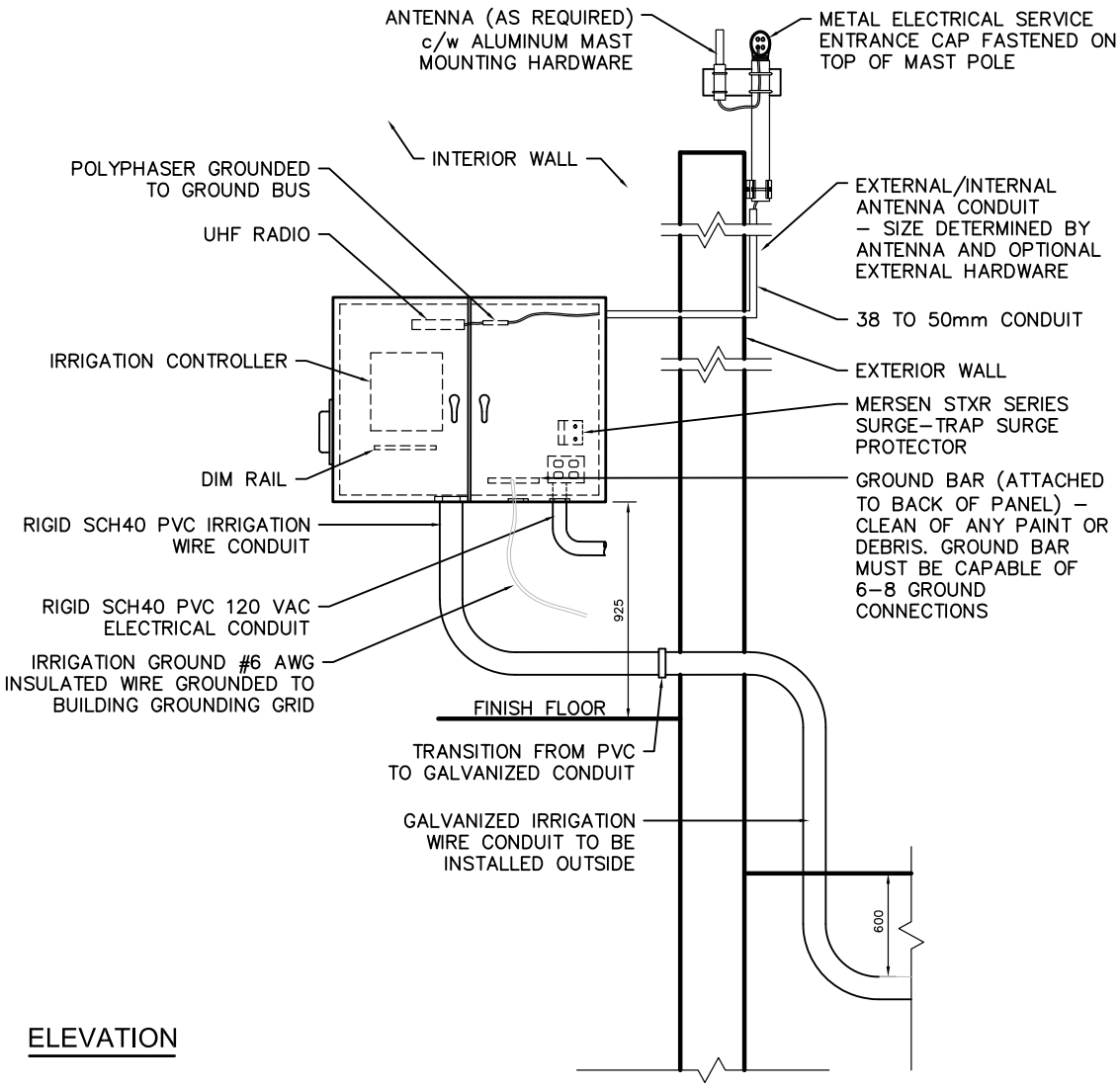
ELEVATION

NOTES:

1. CONTROLLER CABINET SHALL HAVE ELECTRICAL SURGE PROTECTION AND GROUNDED TO 5 ohms OR LESS
2. REFER TO 8.2.6.1 FOR CABINET SIZE
3. ALL DIMENSIONS IN MILLIMETRES UNLESS OTHERWISE SPECIFIED
4. ALL COMPONENTS SHALL BE CSA APPROVED AND SUBJECT TO APPLICABLE NATIONAL, PROVINCIAL AND MUNICIPAL CODES/BYLAWS
5. SEE DETAIL IR–22 FOR MAST ANTENNA DETAIL
6. PEDESTAL MOUNT OR APPROVED ALTERNATIVE

Calgary	PROJECT TITLE **SPECIFICATIONS** SHEET TITLE **IRRIGATION CONTROLLER CABINET - NEMA 4X**	DRAWN BY **DB** DATE **2021/01/25** DESIGN BY DATE	SCALE **N.T.S.** SHEET NO. **IR-20** FILE NO.

Detail Sheet IR-21: Indoor Wall-mounted Irrigation Cabinet

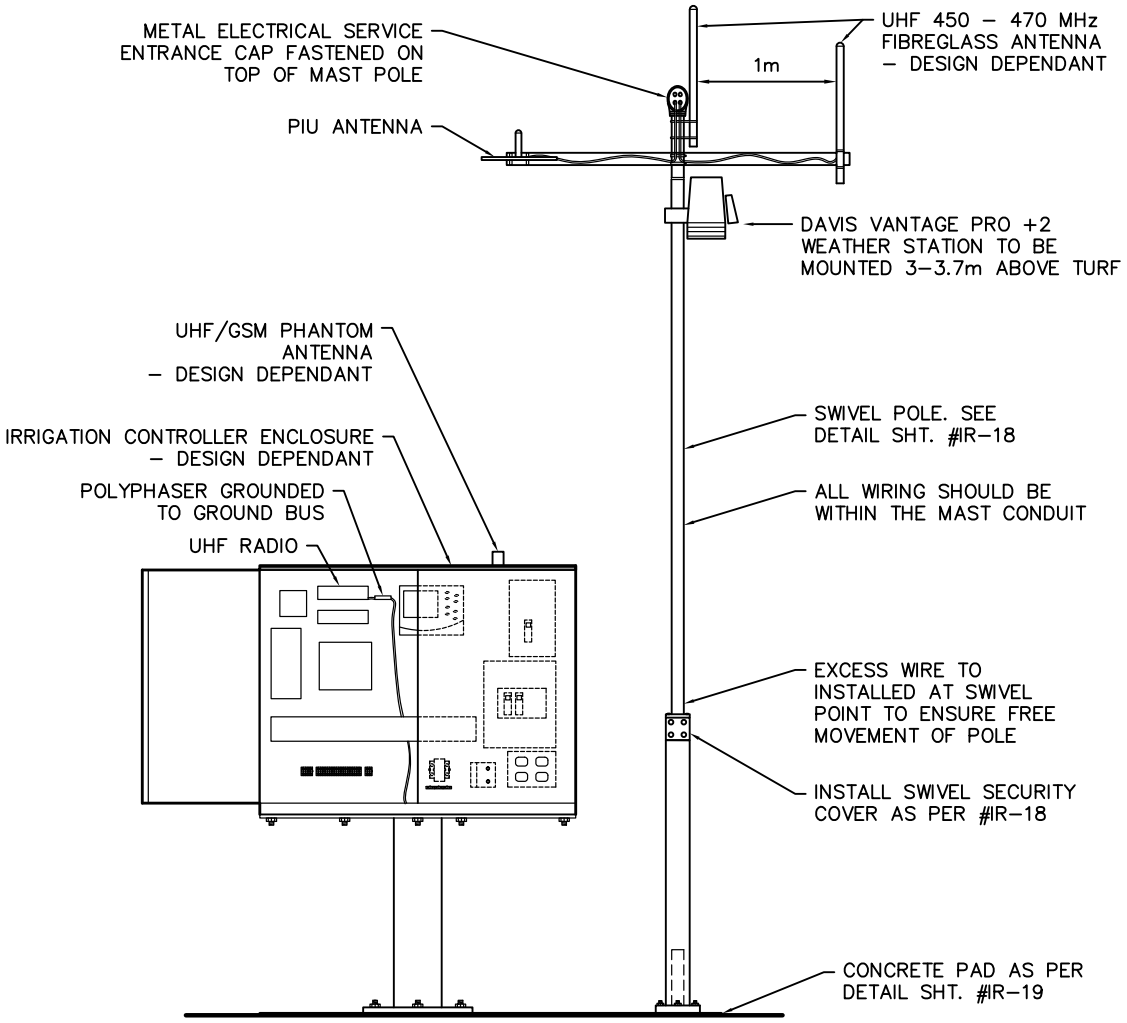


NOTES:

1. CONTROLLER CABINET SHALL HAVE ELECTRICAL SURGE PROTECTION AND GROUNDED TO 5 ohms OR LESS
2. CONTROLLER CABINET SHALL BE NEMA 4X OR AS SPEC 8.2.6.1
3. ALL DIMENSIONS IN MILLIMETRES UNLESS OTHERWISE SPECIFIED
4. ALL COMPONENTS SHALL BE CSA APPROVED AND SUBJECT TO APPLICABLE NATIONAL, PROVINCIAL AND MUNICIPAL CODES/BYLAWS
5. ANY MODIFICATIONS TO THIS CONFIGURATION SHALL BE APPROVED BY PARKS WATER MANAGEMENT AT DESIGN STAGE
6. REFER TO DETAIL IR–02 FOR NOTES #1 AND 2

Calgary	PROJECT TITLE **SPECIFICATIONS** SHEET TITLE **INDOOR WALL-MOUNTED IRRIGATION CABINET**	DRAWN BY **DB** DATE **2021/01/25** DESIGN BY DATE	SCALE **N.T.S.** SHEET NO. **IR-21** FILE NO.

Detail Sheet IR-22: Antenna, Weather Station and Weather Sensor



ELEVATION

NOTES:

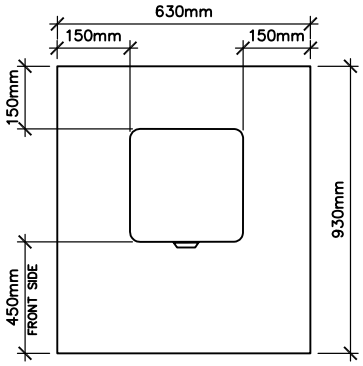
1. ALL CABLING TO BE LMR400
2. TERMINAL STRIP SIZE DETERMINED AT PLANNING STAGE
3. ALL DIMENSIONS IN MILLIMETRES UNLESS OTHERWISE SPECIFIED
4. ALL COMPONENTS SHALL BE CSA APPROVED AND SUBJECT TO APPLICABLE NATIONAL, PROVINCIAL AND MUNICIPAL CODES/BYLAWS
5. ANTENNA AND WEATHER SENSING EQUIPMENT SHALL BE DETERMINED BY PARKS WATER MANAGEMENT AT DESIGN STAGE
6. SEE DETAIL IR–20 FOR OPTIONAL UNI–STRUT CABINET
7. CONTRACTOR TO CONTACT WATER MANAGEMENT FOR DIRECTIONAL PLACEMENT OF ANTENNA'S

Calgary	PROJECT TITLE **SPECIFICATIONS** SHEET TITLE **ANTENNA, WEATHER STATION & WEATHER SENSOR**	DRAWN BY **DB** DATE **2021/01/25** DESIGN BY DATE	SCALE **N.T.S.** SHEET NO. **IR-22** FILE NO.

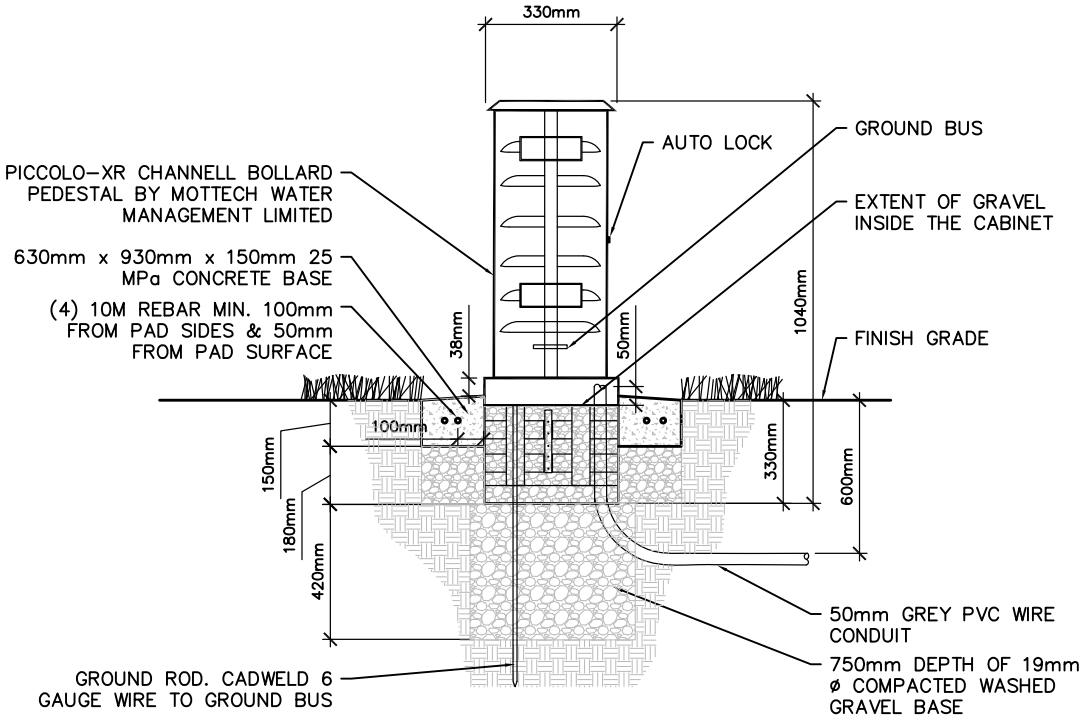
Detail Sheet IR-23: Piccolo-XR Integrated Pedestal

NOTES:

1. CONTROLLER LOCATION SHALL BE APPROVED BY PARKS WATER MANAGEMENT PRIOR TO INSTALLATION



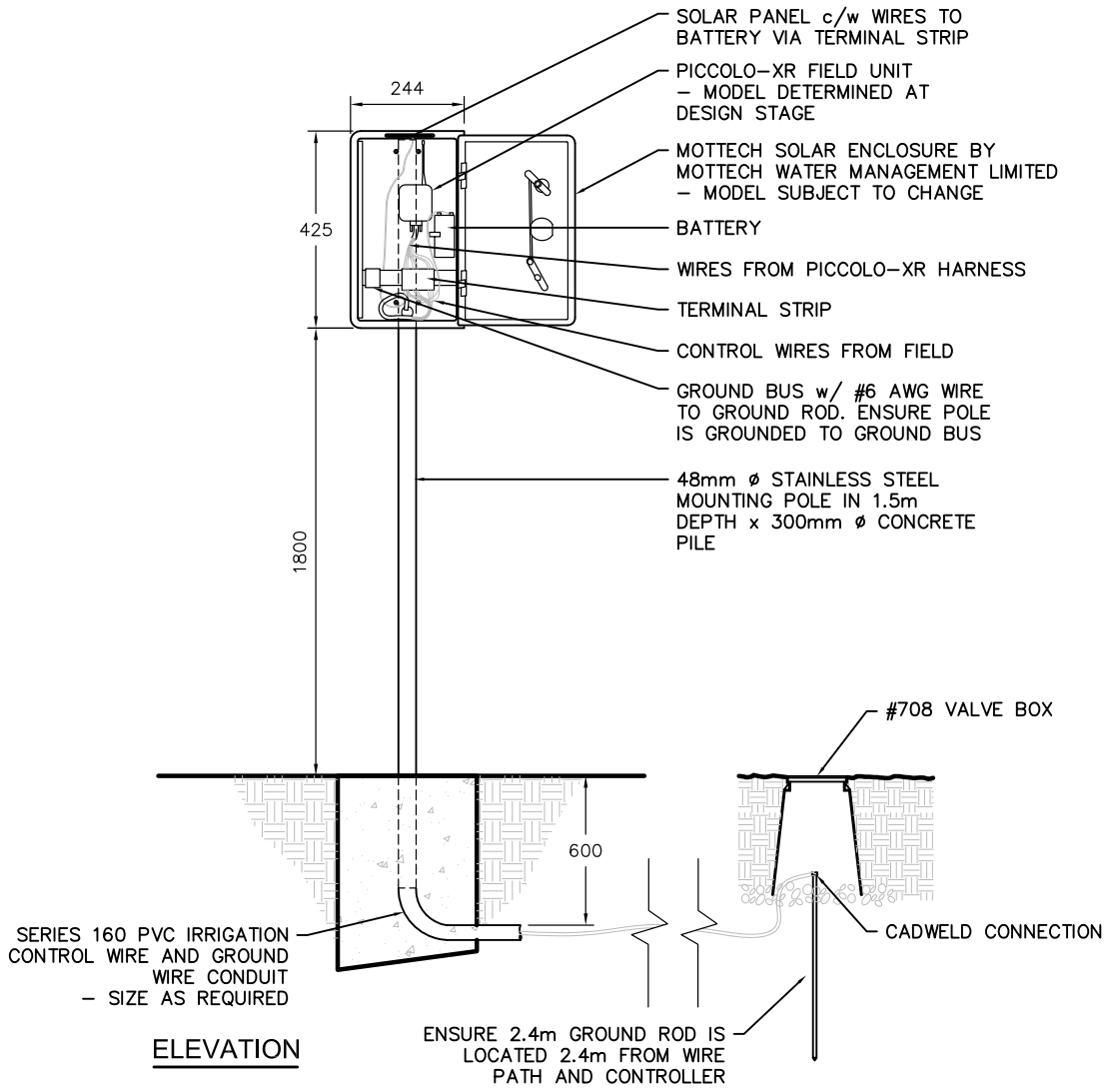
PLAN



SECTION

Calgary	PROJECT TITLE **SPECIFICATIONS** SHEET TITLE **PICCOLO-XR INTEGRATED PEDESTAL**	DRAWN BY **DB** DATE **2021/01/25** DESIGN BY DATE	SCALE **N.T.S.** SHEET NO. **IR-23** FILE NO.

Detail Sheet IR-24: Piccolo-XR Solar Enclosure



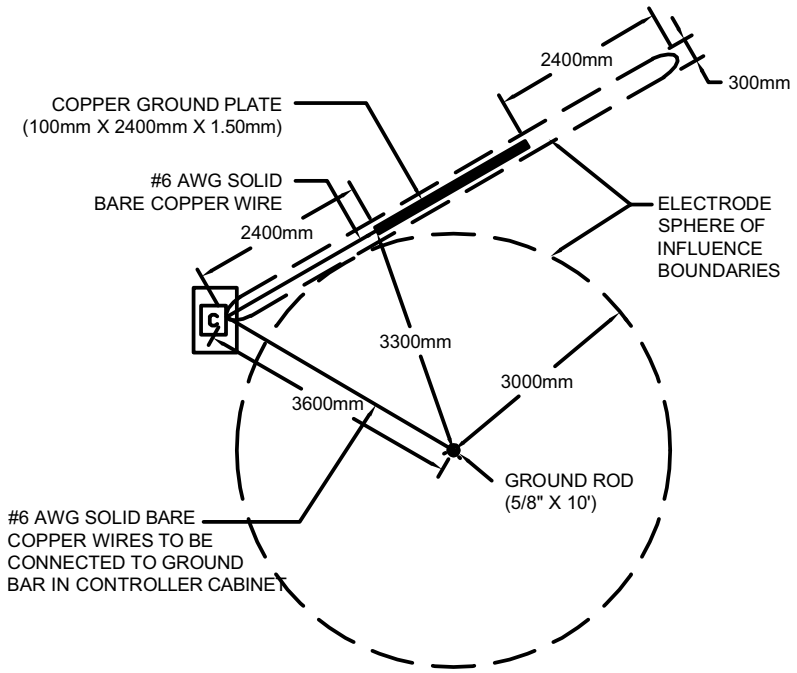
NOTES:

1. ALL CABLING TO BE LMR400
2. TERMINAL STRIP SIZE DETERMINED AT PLANNING STAGE
3. RAIN/FREEZE SENSOR TYPES ARE CURRENTLY UNDER REVIEW
4. ALL DIMENSIONS IN MILLIMETRES UNLESS OTHERWISE SPECIFIED
5. ALL COMPONENTS SHALL BE CSA APPROVED AND SUBJECT TO APPLICABLE NATIONAL, PROVINCIAL AND MUNICIPAL CODES/BYLAWS

Calgary	PROJECT TITLE **SPECIFICATIONS**	DRAWN BY **DB**	SCALE **N.T.S.**
		DATE **2021/01/25**	SHEET NO. **IR-24**
	SHEET TITLE **PICCOLO-XR SOLAR ENCLOSURE**	DESIGN BY	FILE NO.
		DATE	

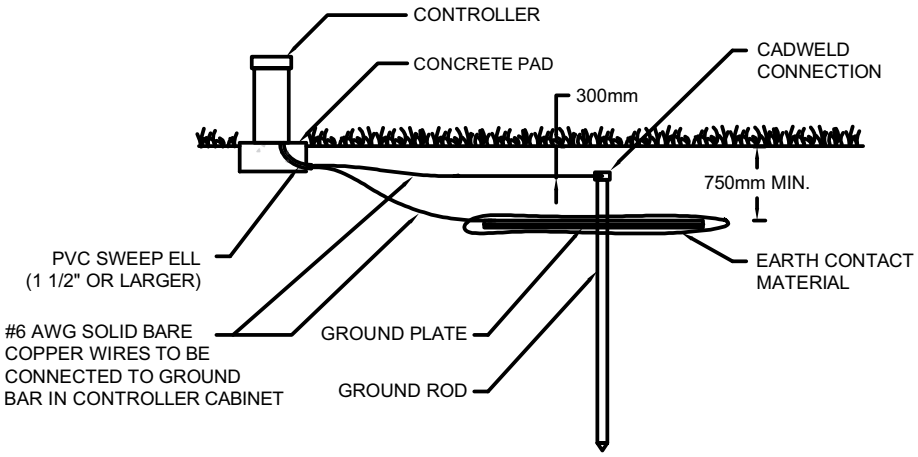
Detail Sheet IR-25: Up to 64 Stations - Non-rocky Soils

TOP VIEW



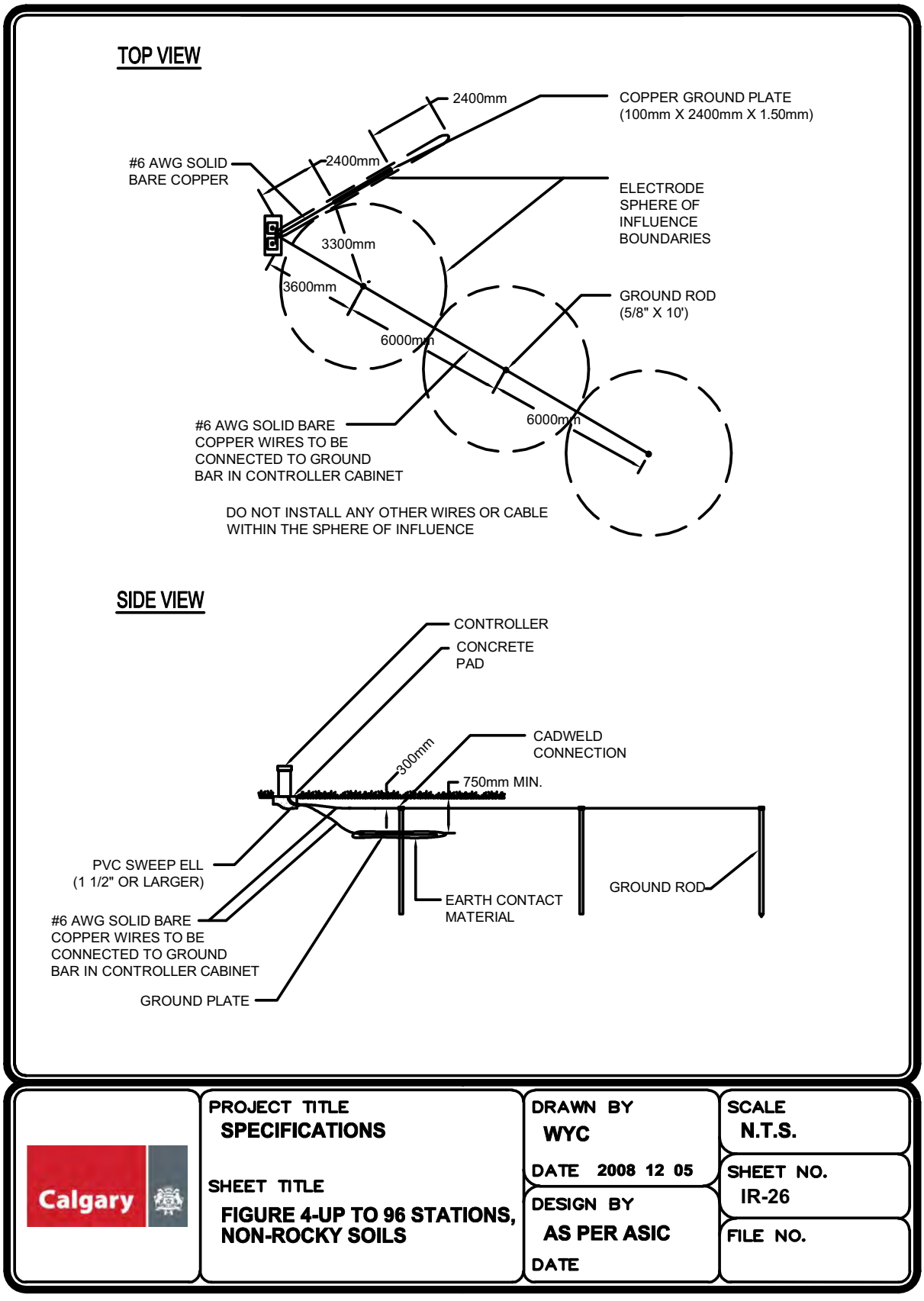
DO NOT INSTALL ANY OTHER WIRES OR CABLE
WITHIN THE SPHERE OF INFLUENCE

SIDE VIEW



Calgary	PROJECT TITLE **SPECIFICATIONS** SHEET TITLE **FIGURE 2-UP TO 64 STATIONS, NON-ROCKY SOILS**	DRAWN BY **WYC** DATE **2008 12 05** DESIGN BY **AS PER ASIC** DATE	SCALE **N.T.S.** SHEET NO. **IR-25** FILE NO.

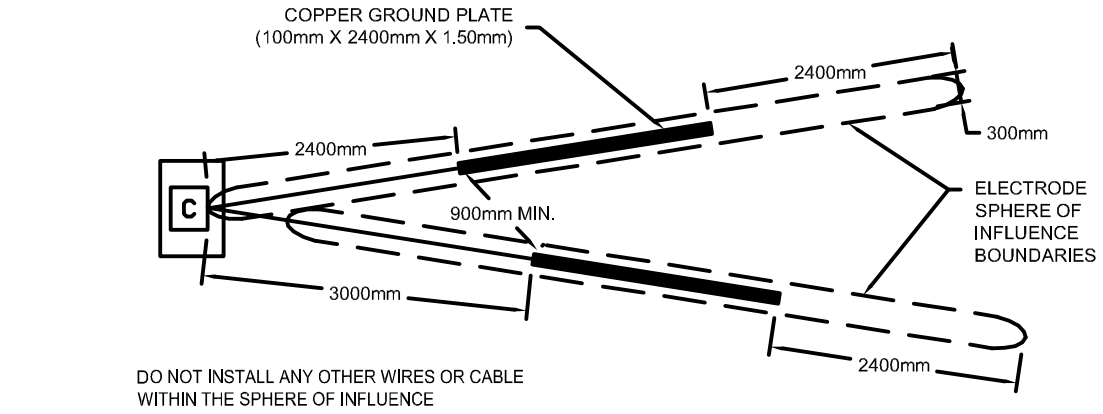
Detail Sheet IR-26: Up to 96 Stations- Non-rocky Soils



Calgary	PROJECT TITLE SPECIFICATIONS SHEET TITLE FIGURE 4-UP TO 96 STATIONS, NON-ROCKY SOILS	DRAWN BY WYC DATE 2008 12 05 DESIGN BY AS PER ASIC DATE	SCALE N.T.S. SHEET NO. IR-26 FILE NO.

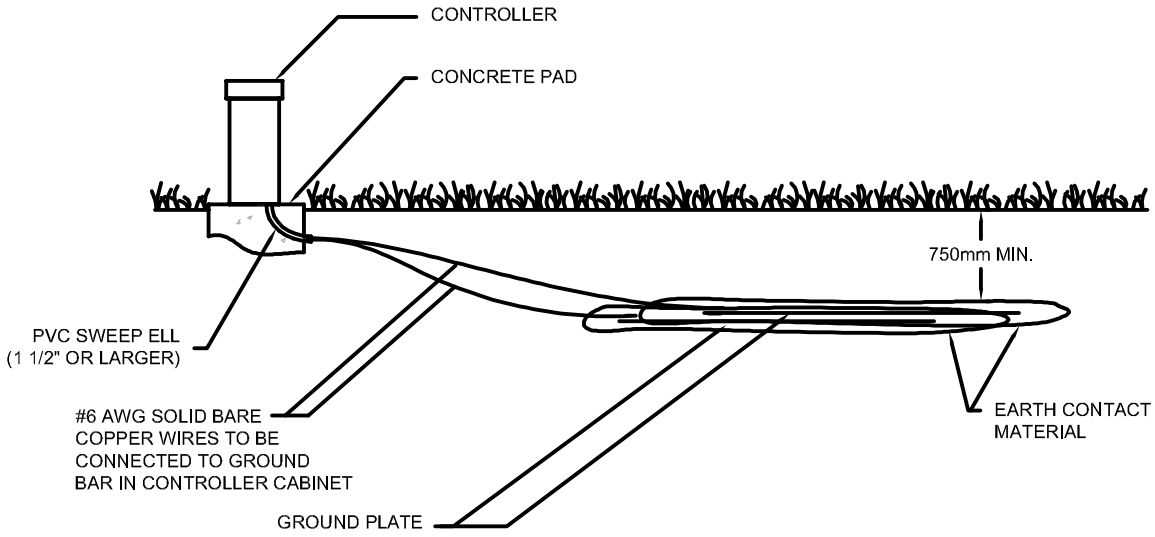
Detail Sheet IR-27: Up to 64 Stations - Rocky Soils

TOP VIEW



DO NOT INSTALL ANY OTHER WIRES OR CABLE
WITHIN THE SPHERE OF INFLUENCE

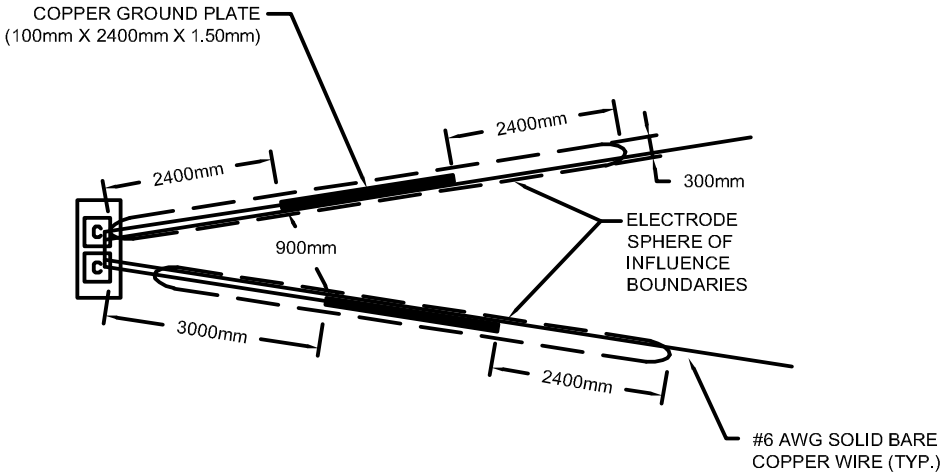
SIDE VIEW



Calgary	PROJECT TITLE SPECIFICATIONS SHEET TITLE FIGURE 3-UP TO 64 STATIONS, ROCKY SOILS	DRAWN BY WYC DATE 2008 12 05 DESIGN BY AS PER ASIC DATE	SCALE N.T.S. SHEET NO. IR-27 FILE NO.

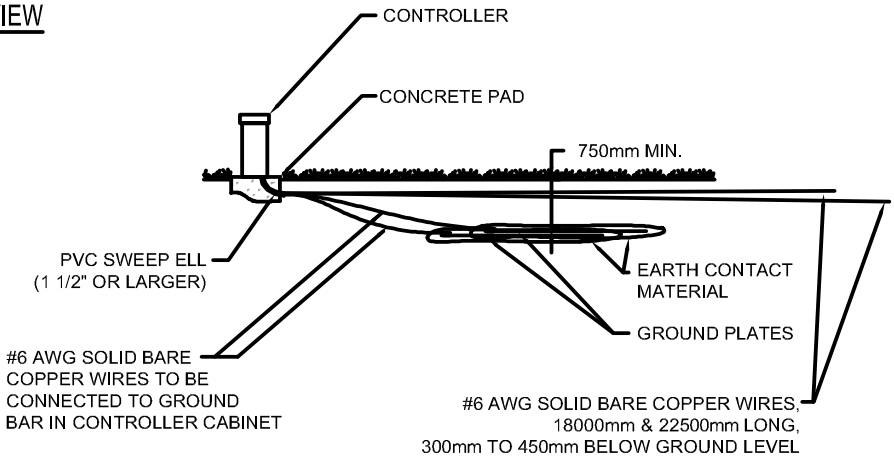
Detail Sheet IR-28: Up to 96 Stations - Rocky Soils

TOP VIEW



DO NOT INSTALL ANY OTHER WIRES OR CABLE
WITHIN THE SPHERE OF INFLUENCE

SIDE VIEW

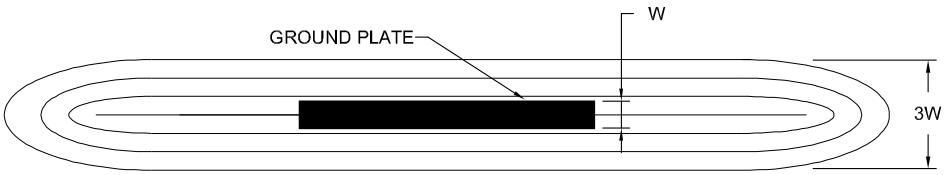


* FOR SITES WITH MORE STATIONS CONTACT THE CITY OF CALGARY
WATER MANAGEMENT COORDINATOR FOR DESIGN INFORMATION

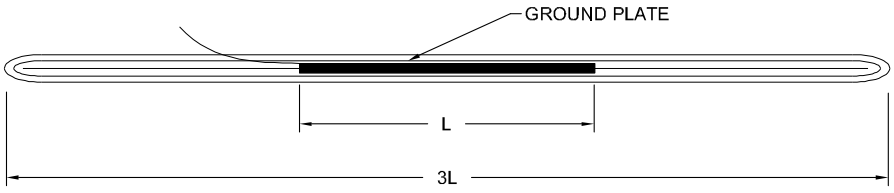
Calgary	PROJECT TITLE SPECIFICATIONS SHEET TITLE UP TO 96 STATIONS, ROCKY SOILS	DRAWN BY WYC DATE 2008 12 05 DESIGN BY AS PER ASIC DATE	SCALE N.T.S. SHEET NO. IR-28 FILE NO.

Detail Sheet IR-29: Ground Plate Sphere of Influence

TOP VIEW



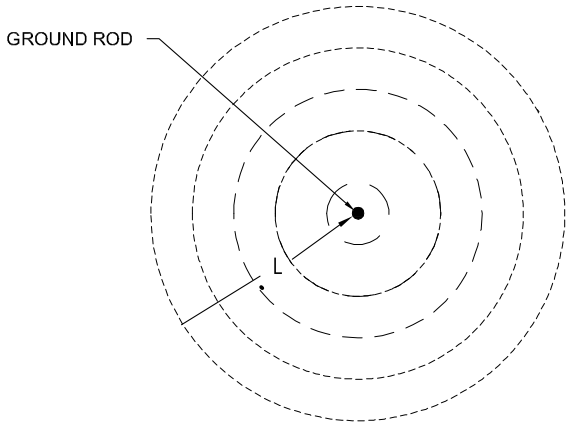
SIDE VIEW



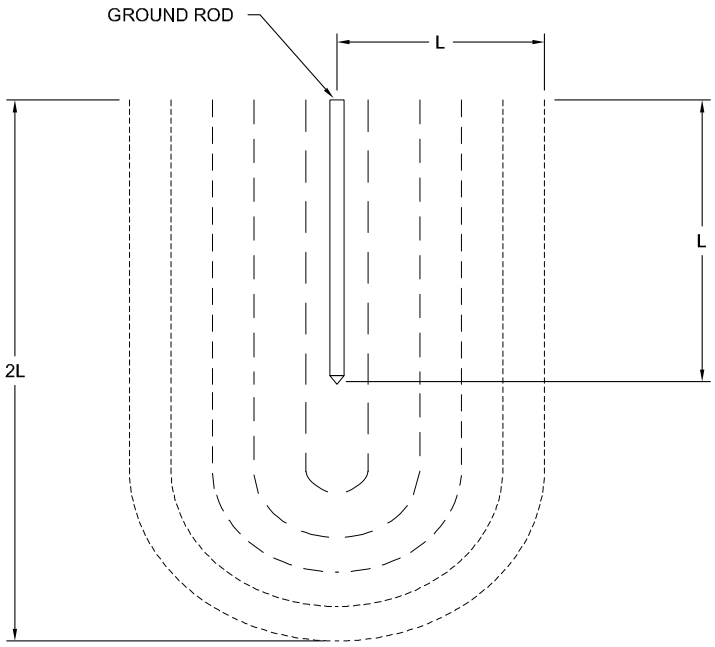
Calgary	PROJECT TITLE **SPECIFICATIONS**	DRAWN BY **WYC**	SCALE **N.T.S.**
	SHEET TITLE **GROUND PLATE SPHERE OF INFLUENCE**	DATE **2008 12 05**	SHEET NO. **IR-29**
		DESIGN BY **AS PER ASIC**	FILE NO.
		DATE	

Detail Sheet IR-30: Ground Rod Sphere of Influence

TOP VIEW

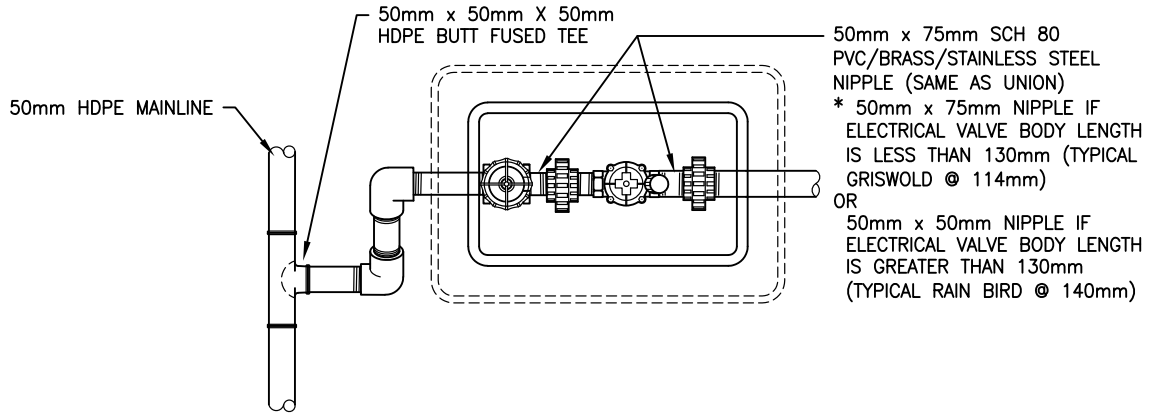


SIDE VIEW

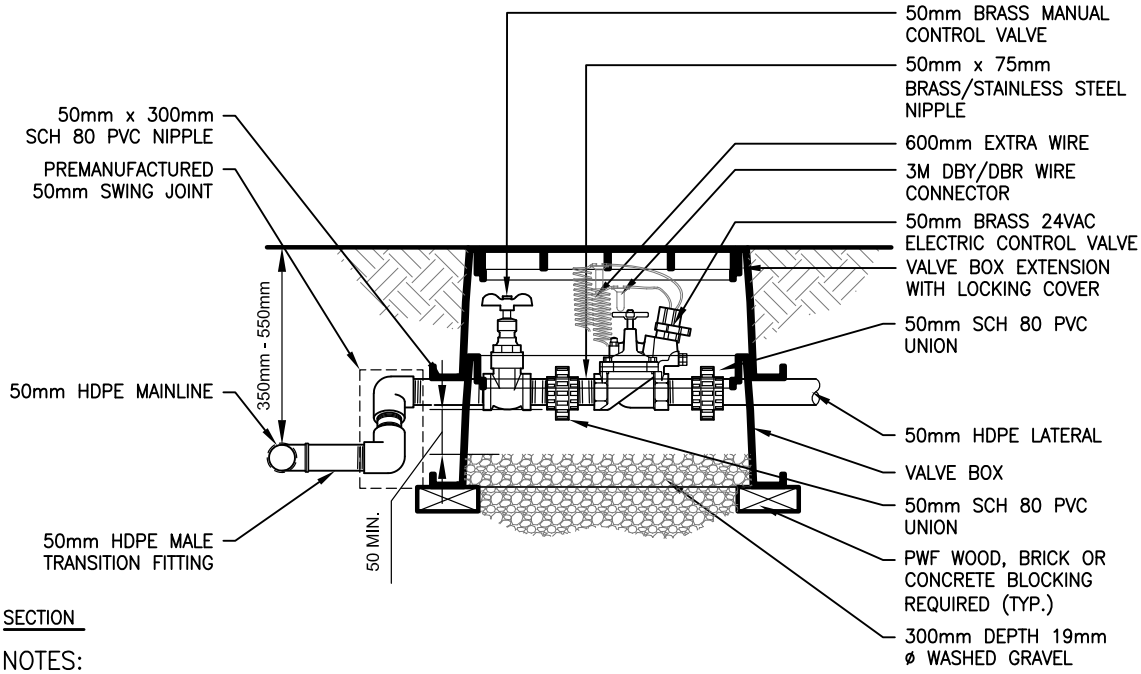


Calgary	PROJECT TITLE **SPECIFICATIONS** SHEET TITLE **GROUND ROD SPHERE OF INFLUENCE**	DRAWN BY **WYC** DATE **2008 12 05** DESIGN BY **AS PER ASIC** DATE	SCALE **N.T.S.** SHEET NO. **IR-30** FILE NO.

Detail Sheet IR-31: 50 mm to 50 mm HDPE Valve Connection



PLAN



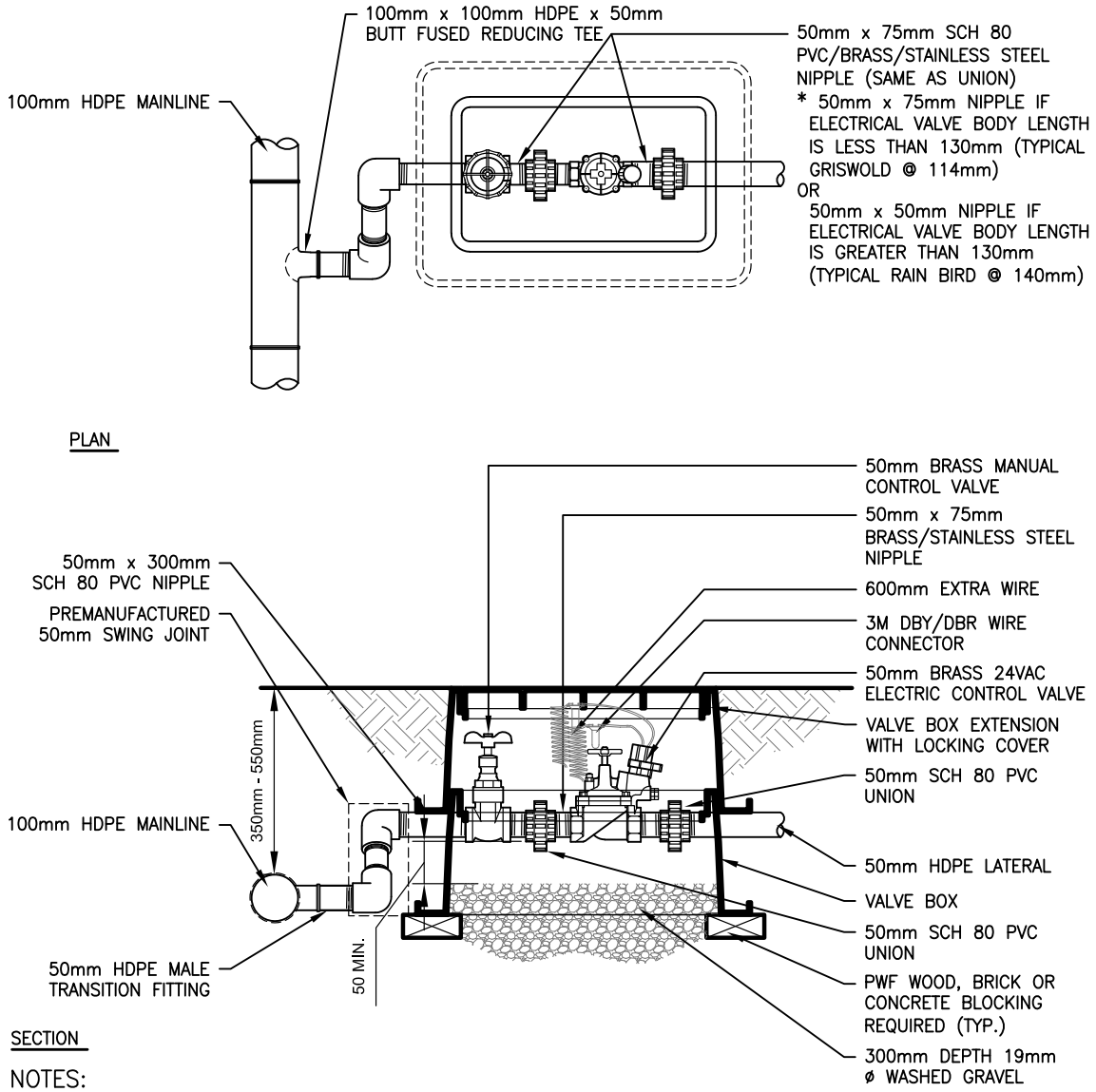
SECTION

NOTES:

1. USE PRE-MANUFACTURED EXTENSIONS WHEN OBTAINING PROPER HEIGHT OF BOXES.
2. ALL HIGH DENSITY FITTINGS ARE TO BE BUTT FUSED OR ELECTRO-FUSION.
3. IF ELECTRIC VALVE NOT INSTALLED, CENTRE HAND VALVE IN CENTRE OF BOX.
4. ALL DIMENSIONS ARE IN MILLIMETRES UNLESS OTHERWISE SPECIFIED.
5. SCH 80 PVC UNIONS SHALL HAVE UNION COLLARS INSTALLED TOWARDS VALVE.
6. ELECTRO-FUSED TEES & BUTT-FUSED TEES ARE ACCEPTABLE FOR USE ON MAINLINES.

Calgary	PROJECT TITLE **SPECIFICATIONS** SHEET TITLE **50mm TO 50mm HDPE VALVE CONNECTION**	DRAWN BY **CM** DATE **2020/12/18** DESIGN BY DATE	SCALE **N.T.S.** SHEET NO. **IR-31** FILE NO.

Detail Sheet IR-32: 100 mm to 50 mm HDPE Valve Connection

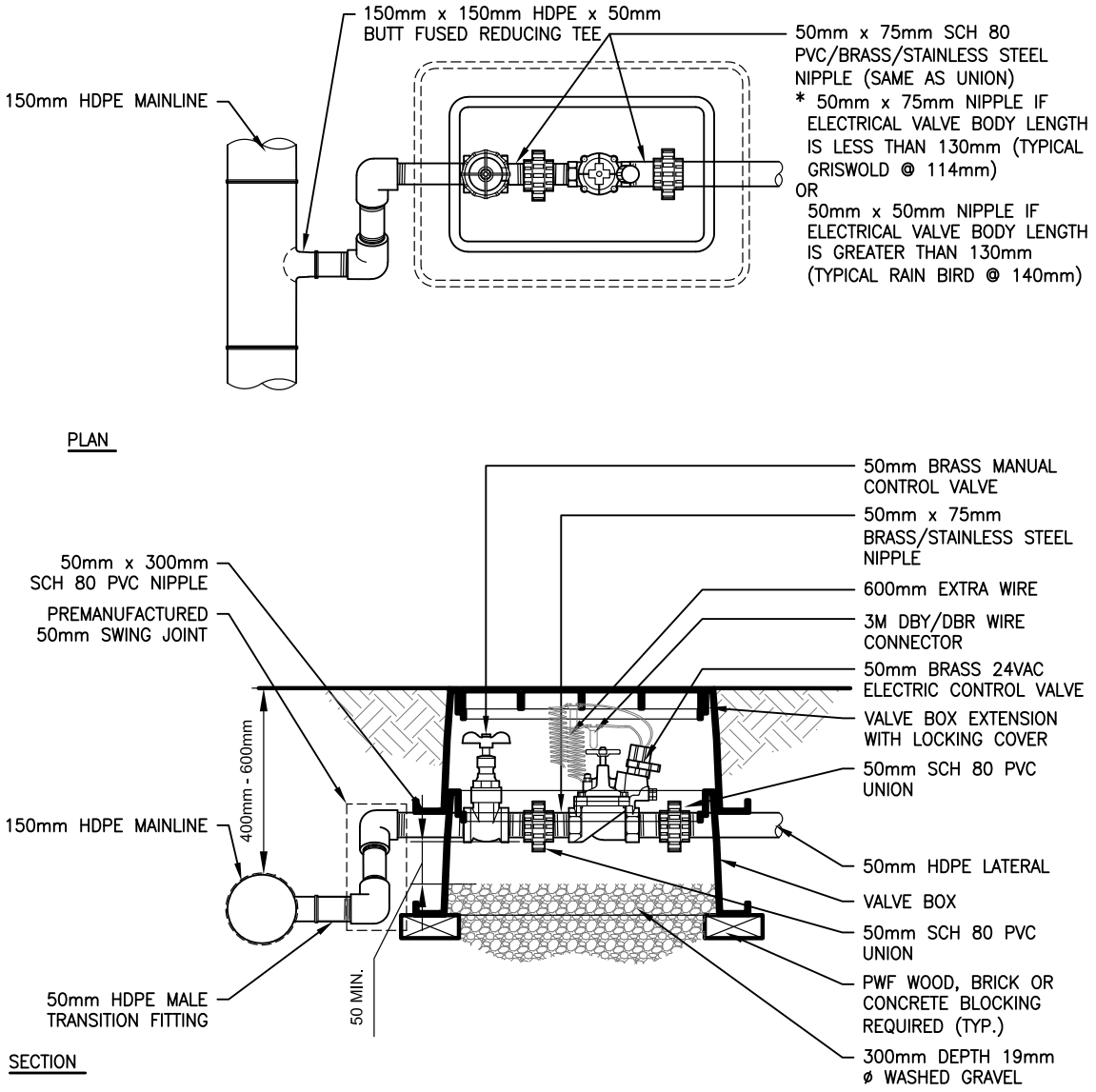


NOTES:

1. USE PRE–MANUFACTURED EXTENSIONS WHEN OBTAINING PROPER HEIGHT OF BOXES.
2. ALL HIGH DENSITY FITTINGS ARE TO BE BUTT FUSED OR ELECTRO–FUSION.
3. IF ELECTRIC VALVE NOT INSTALLED, CENTRE HAND VALVE IN CENTRE OF BOX.
4. ALL DIMENSIONS ARE IN MILLIMETRES UNLESS OTHERWISE SPECIFIED.
5. SCH 80 PVC UNIONS SHALL HAVE UNION COLLARS INSTALLED TOWARDS VALVE.
6. ELECTRO–FUSED TEES & BUTT–FUSED TEES ARE ACCEPTABLE FOR USE ON MAINLINES.

Calgary	PROJECT TITLE **SPECIFICATIONS** SHEET TITLE **100mm TO 50mm HDPE VALVE CONNECTION**	DRAWN BY **DB** DATE **2020/12/18** DESIGN BY DATE	SCALE **N.T.S.** SHEET NO. **IR-32** FILE NO.

Detail Sheet IR-33: 150 mm to 50 mm HDPE Valve Connection

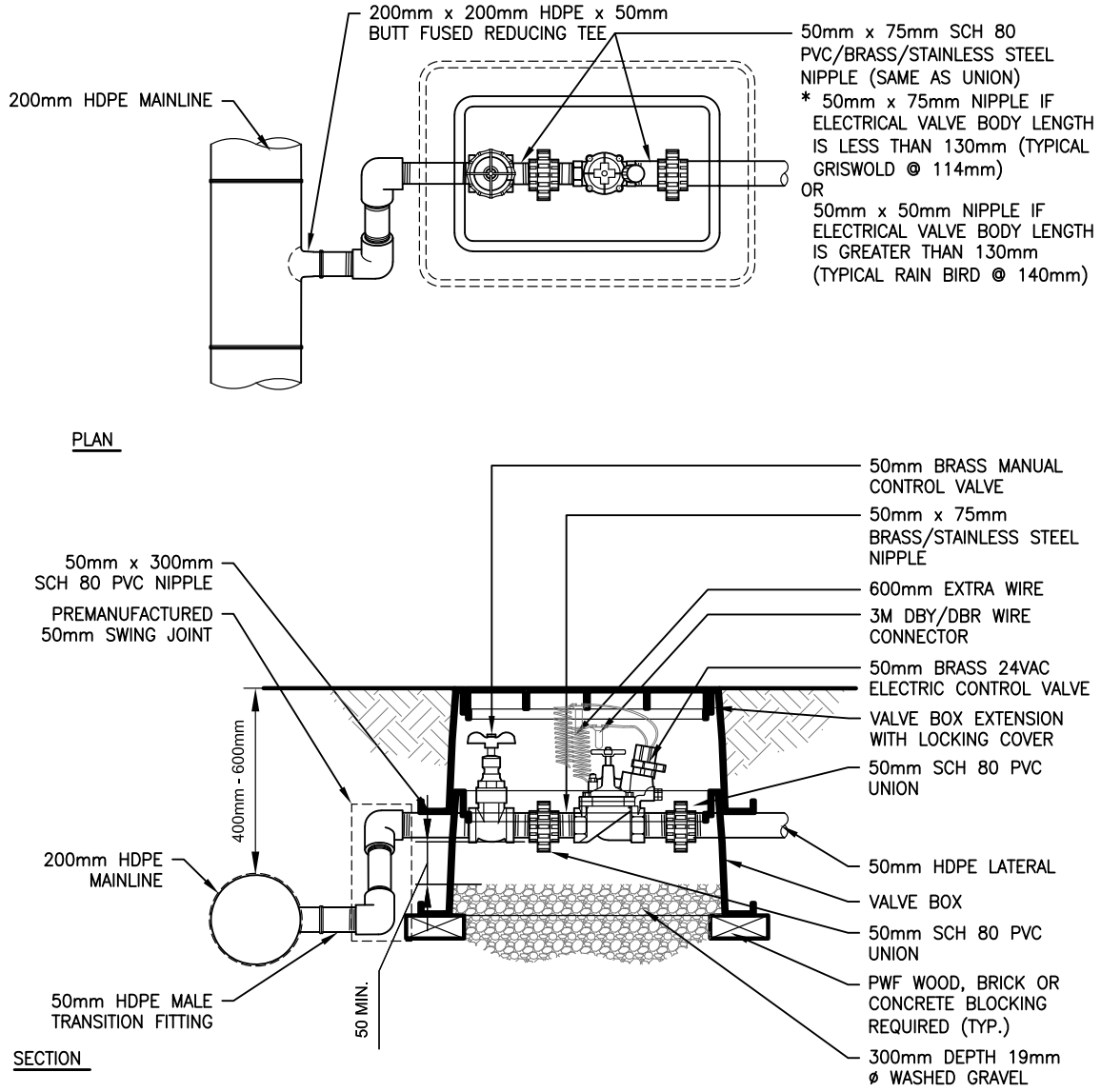


NOTES:

1. USE PRE-MANUFACTURED EXTENSIONS WHEN OBTAINING PROPER HEIGHT OF BOXES.
2. ALL HIGH DENSITY FITTINGS ARE TO BE BUTT FUSED OR ELECTRO-FUSION.
3. IF ELECTRIC VALVE NOT INSTALLED, CENTRE HAND VALVE IN CENTRE OF BOX.
4. ALL DIMENSIONS ARE IN MILLIMETRES UNLESS OTHERWISE SPECIFIED.
5. SCH 80 PVC UNIONS SHALL HAVE UNION COLLARS INSTALLED TOWARDS VALVE.
6. ELECTRO-FUSED TEES & BUTT-FUSED TEES ARE ACCEPTABLE FOR USE ON MAINLINES.

Calgary	PROJECT TITLE **SPECIFICATIONS** SHEET TITLE **150mm TO 50mm HDPE VALVE CONNECTION**	DRAWN BY **DB** DATE **2020/12/18** DESIGN BY DATE	SCALE **N.T.S.** SHEET NO. **IR-33** FILE NO.

Detail Sheet IR-34: 200 mm to 50 mm HDPE Valve Connection

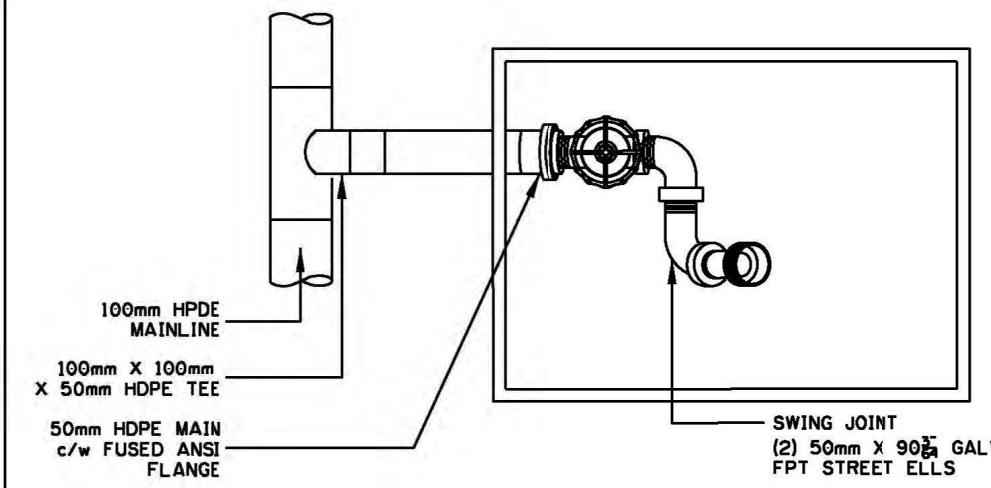


NOTES:

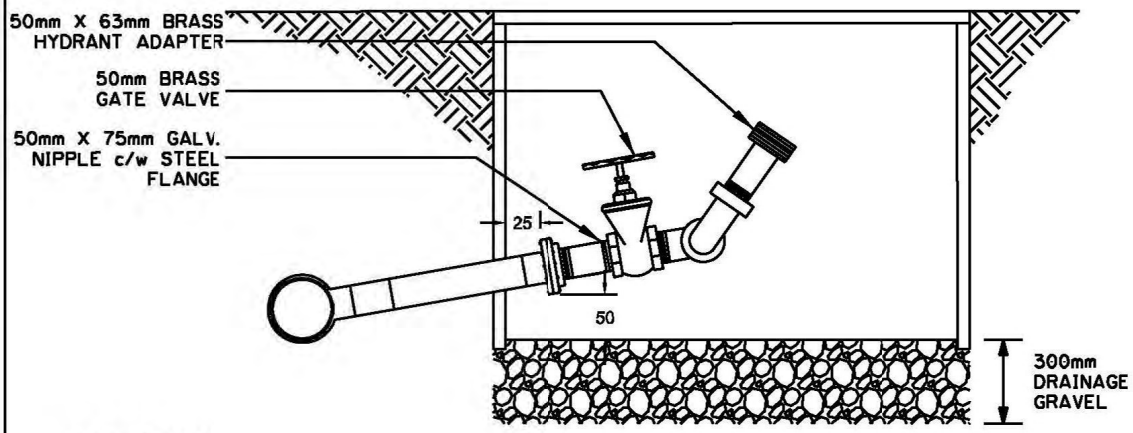
1. USE PRE–MANUFACTURED EXTENSIONS WHEN OBTAINING PROPER HEIGHT OF BOXES.
2. ALL HIGH DENSITY FITTINGS ARE TO BE BUTT FUSED OR ELECTRO–FUSION.
3. IF ELECTRIC VALVE NOT INSTALLED, CENTRE HAND VALVE IN CENTRE OF BOX.
4. ALL DIMENSIONS ARE IN MILLIMETRES UNLESS OTHERWISE SPECIFIED.
5. SCH 80 PVC UNIONS SHALL HAVE UNION COLLARS INSTALLED TOWARDS VALVE.
6. ELECTRO–FUSED TEES & BUTT–FUSED TEES ARE ACCEPTABLE FOR USE ON MAINLINES.

Calgary	PROJECT TITLE **SPECIFICATIONS** SHEET TITLE **200mm TO 50mm HDPE VALVE CONNECTION**	DRAWN BY **DB** DATE **2020/12/18** DESIGN BY DATE	SCALE **N.T.S.** SHEET NO. **IR-34** FILE NO.

Detail Sheet IR-35: 50 mm Compressor Connection & Meter Test Outlet Assembly



PLAN

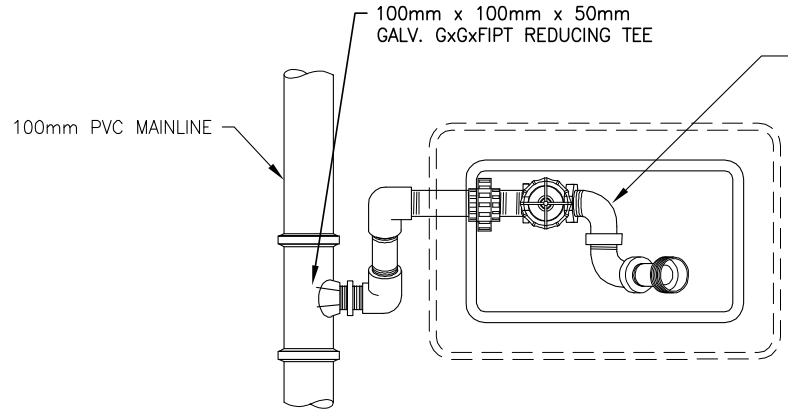


ELEVATION

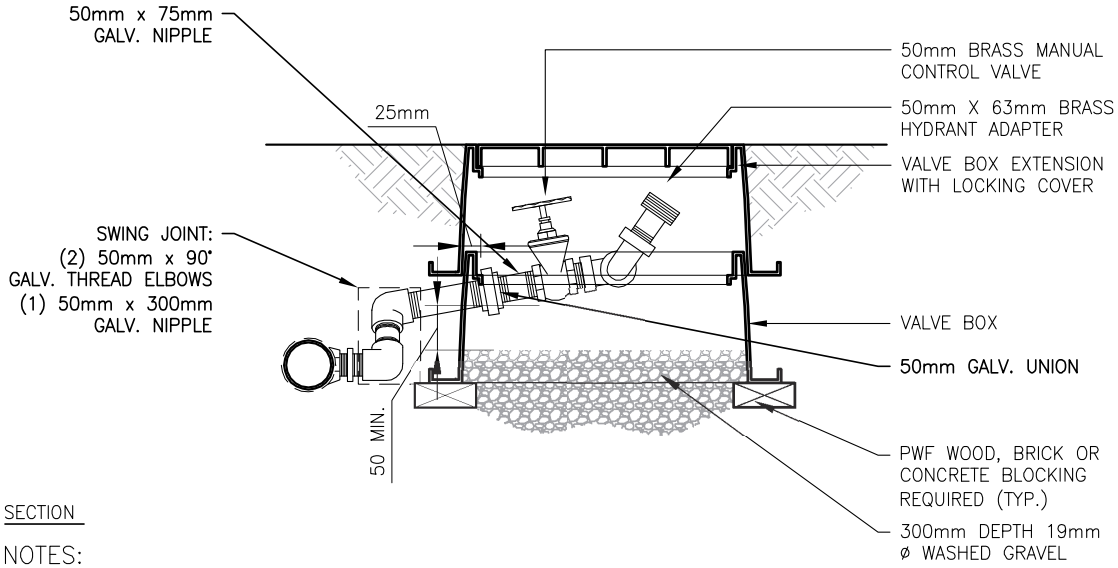
NOTES:
- INCREASE ANGLE AT ELBOW TO ALLOW FOR EASIER HOSE CONNECTION TO ADAPTER
- FOR BOX SPECIFICATIONS REFER TO DETAIL SHEET #48
- ALL DIMENSIONS ARE IN MILLIMETRES UNLESS OTHERWISE NOTED.

Calgary	PROJECT TITLE: SPECIFICATIONS SHEET TITLE: 50mm COMPRESSOR CONNECTION & METER TEST OUTLET ASSEMBLY	DRAWN BY: W.B./M.M./RSP DATE: 2006 05 24 DESIGN BY: DATE:	SCALE: N.T.S. SHEET NO.: IR-35 FILE NO.

Detail Sheet IR-36: 50 mm Blow Out Assembly (PVC/GALV.)



PLAN



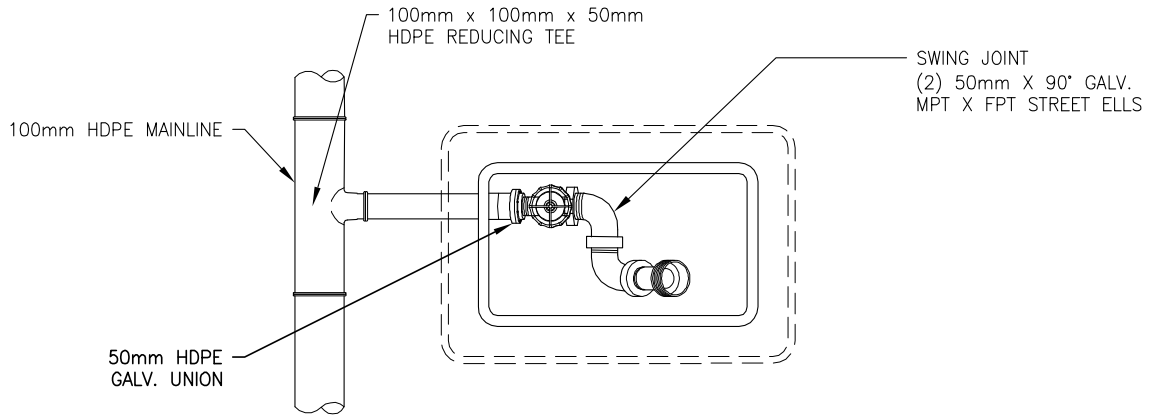
SECTION

NOTES:

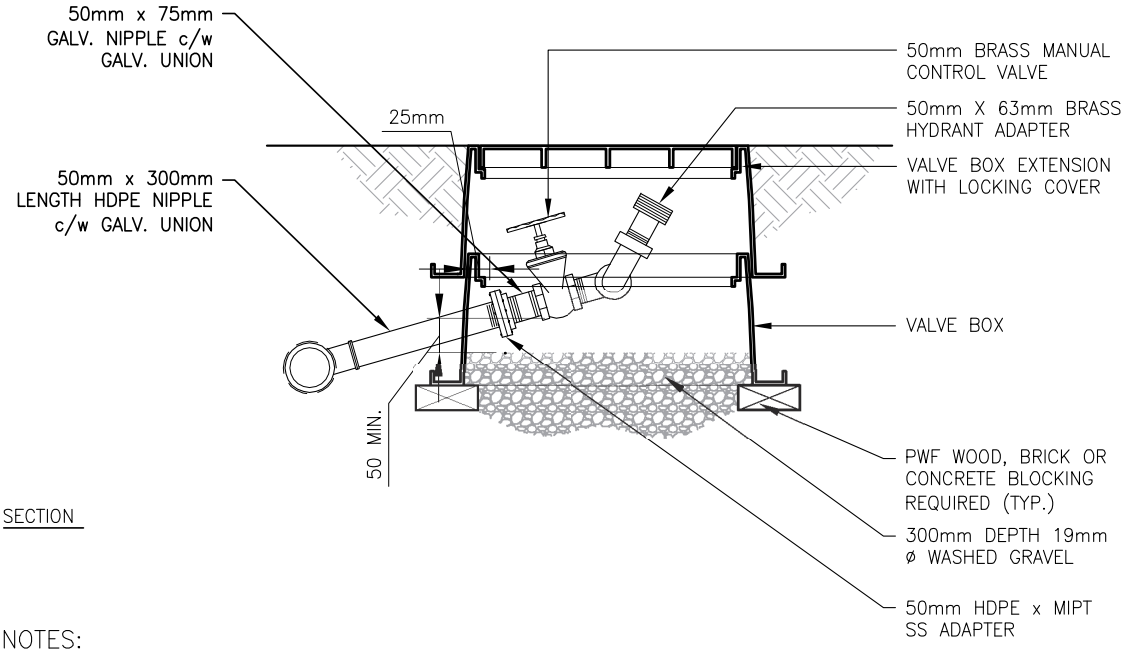
1. INCREASE ANGLE AT ELBOW TO ALLOW FOR EASIER HOSE CONNECTION TO ADAPTER.
2. FOR VALVE BOX SPECIFICATIONS REFER TO SPECIFICATION SECTION 8.2.10.
3. IF VALVE ASSEMBLY MAY BE USED AS FUTURE ZONE VALVE, LEAVE ELECTRICAL WIRES FOR FUTURE ELECTRICAL VALVE.
4. USE PREMANUFACTURED EXTENSIONS WHEN OBTAINING PROPER HEIGHT OF BOXES.
5. ALL DIMENSIONS ARE IN MILLIMETRES UNLESS OTHERWISE NOTED.

Calgary	PROJECT TITLE **SPECIFICATIONS** SHEET TITLE **50mm BLOW-OUT ASSEMBLY (PVC/GALV.)**	DRAWN BY **TCP** DATE **2016/08** DESIGN BY DATE	SCALE **N.T.S.** SHEET NO. **IR-36** FILE NO.

Detail Sheet IR-37: 50 mm Field Gate Valve Assembly (HDPE)



PLAN



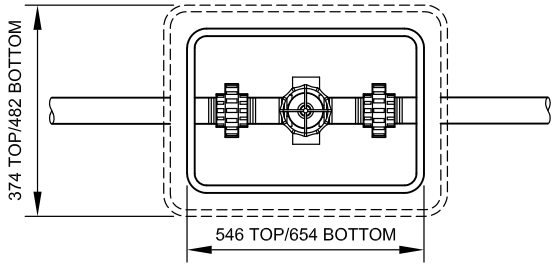
SECTION

NOTES:

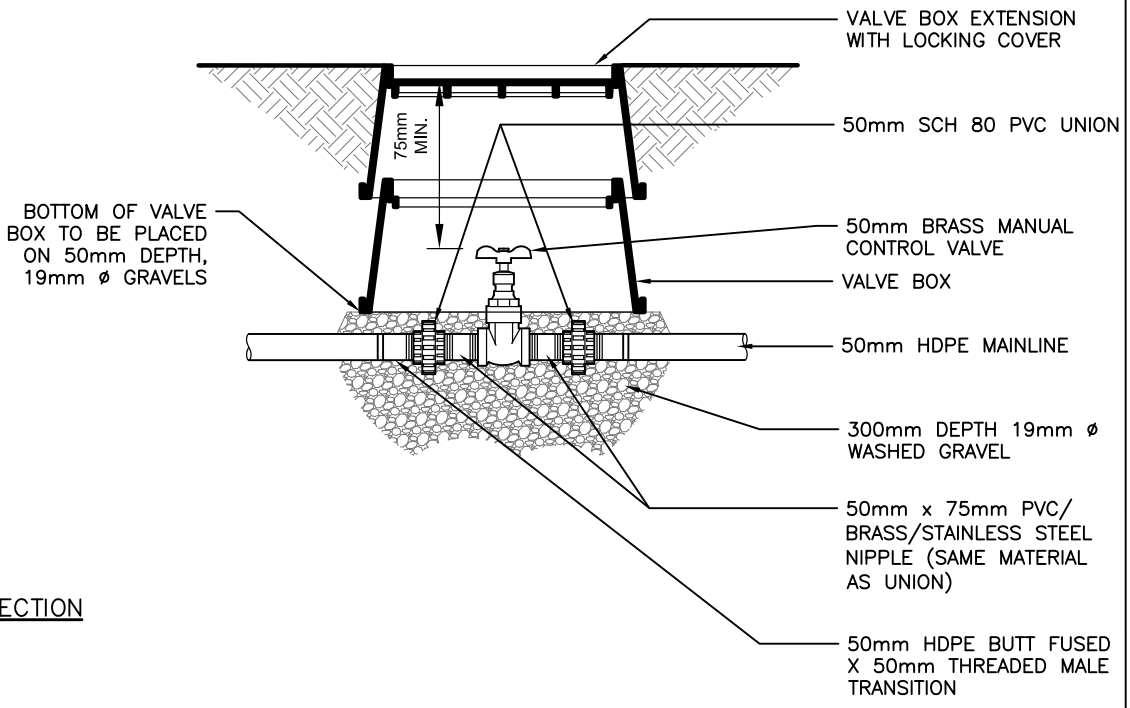
1. INCREASE ANGLE AT ELBOW TO ALLOW FOR EASIER HOSE CONNECTION TO ADAPTER.
2. FOR VALVE BOX SPECIFICATIONS REFER TO SPECIFICATION SECTION 8.2.10.
3. USE PREMANUFACTURED EXTENSIONS WHEN OBTAINING PROPER HEIGHT OF BOXES.
4. ALL DIMENSIONS ARE IN MILLIMETRES UNLESS OTHERWISE NOTED.

Calgary	PROJECT TITLE **SPECIFICATIONS** SHEET TITLE **50mm FIELD GATE VALVE ASSEMBLY (HDPE)**	DRAWN BY **TCP** DATE **2016/08** DESIGN BY DATE	SCALE **N.T.S.** SHEET NO. **IR-37** FILE NO.

Detail Sheet IR-38: 50 mm Isolation Valve Main Control Valve (HDPE)



PLAN



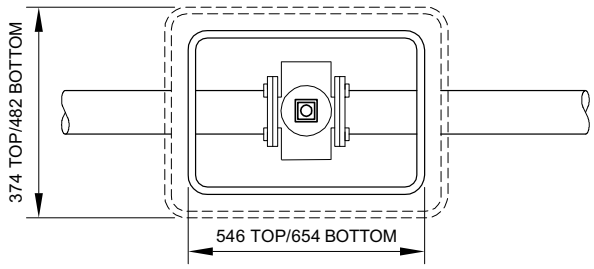
SECTION

NOTES:

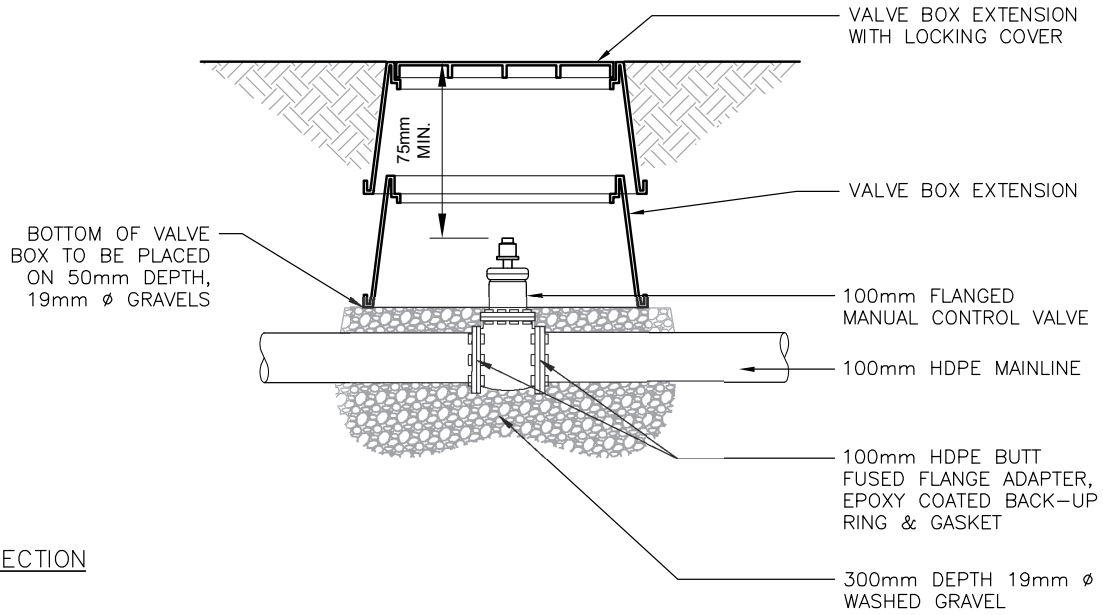
1. ALL DIMENSIONS ARE IN MILLIMETERS UNLESS OTHERWISE SPECIFIED.

Calgary	PROJECT TITLE **SPECIFICATIONS** SHEET TITLE **50mm ISOLATION VALVE MAIN CONTROL VALVE (HDPE)**	DRAWN BY **DB** DATE **2020/12/18** DESIGN BY DATE	SCALE **N.T.S.** SHEET NO. **IR-38** FILE NO.

Detail Sheet IR-39: 100 mm Isolation Main Control Valve (HDPE)



PLAN



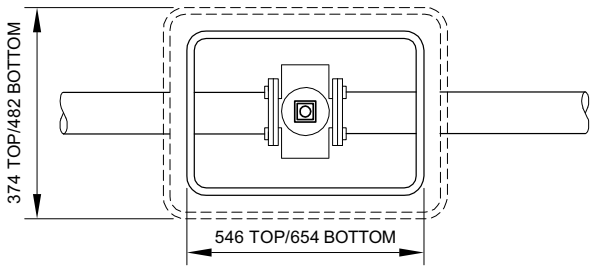
SECTION

NOTES:

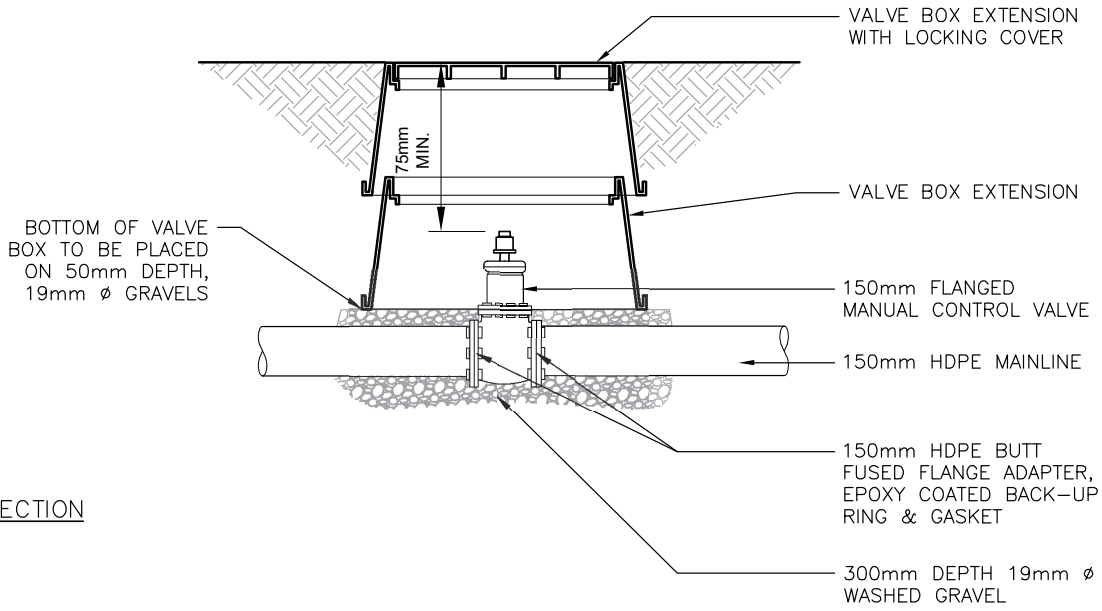
1. ALL DIMENSIONS ARE IN MILLIMETERS UNLESS OTHERWISE SPECIFIED.
2. ALL BOLT HEADS ON FLANGES SHALL BE FACING TOWARDS VALVE.

Calgary	PROJECT TITLE **SPECIFICATIONS** SHEET TITLE **100mm ISOLATION VALVE MAIN CONTROL VALVE (HDPE)**	DRAWN BY **TCP** DATE **2016/02** DESIGN BY DATE	SCALE **N.T.S.** SHEET NO. **IR-39** FILE NO.

Detail Sheet IR-40: 150 mm Isolation Valve Main Control Valve (HDPE)



PLAN



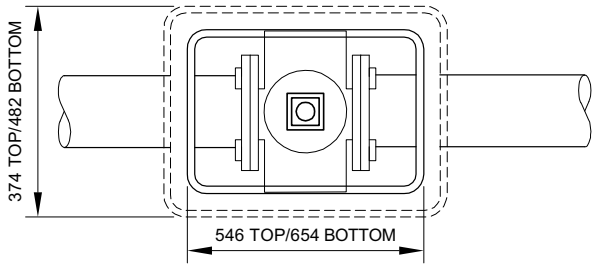
SECTION

NOTES:

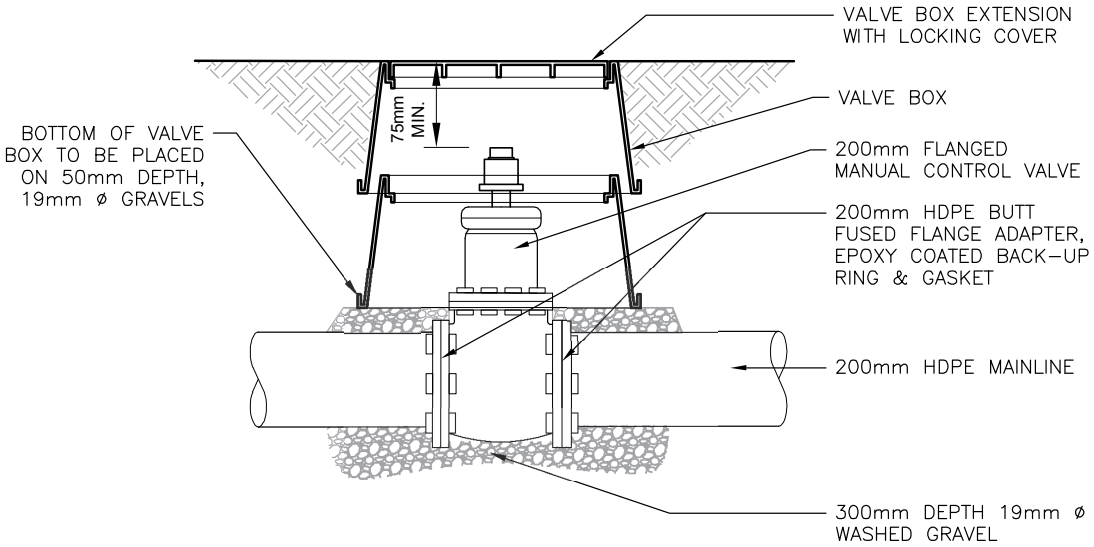
1. ALL DIMENSIONS ARE IN MILLIMETERS UNLESS OTHERWISE SPECIFIED.
2. ALL BOLT HEADS ON FLANGES SHALL BE FACING TOWARDS VALVE.

Calgary	PROJECT TITLE **SPECIFICATIONS** SHEET TITLE **150mm ISOLATION VALVE MAIN CONTROL VALVE (HDPE)**	DRAWN BY **TCP** DATE **2016/02** DESIGN BY DATE	SCALE **N.T.S.** SHEET NO. **IR-40** FILE NO.

Detail Sheet IR-41: 200 mm Isolation Valve Main Control Valve (HDPE)



PLAN



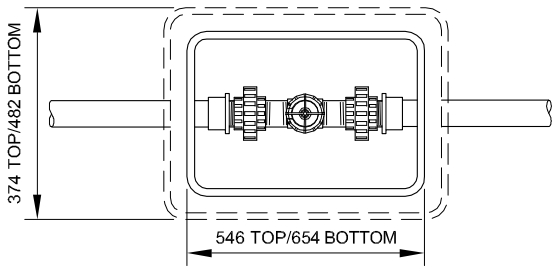
SECTION

NOTES:

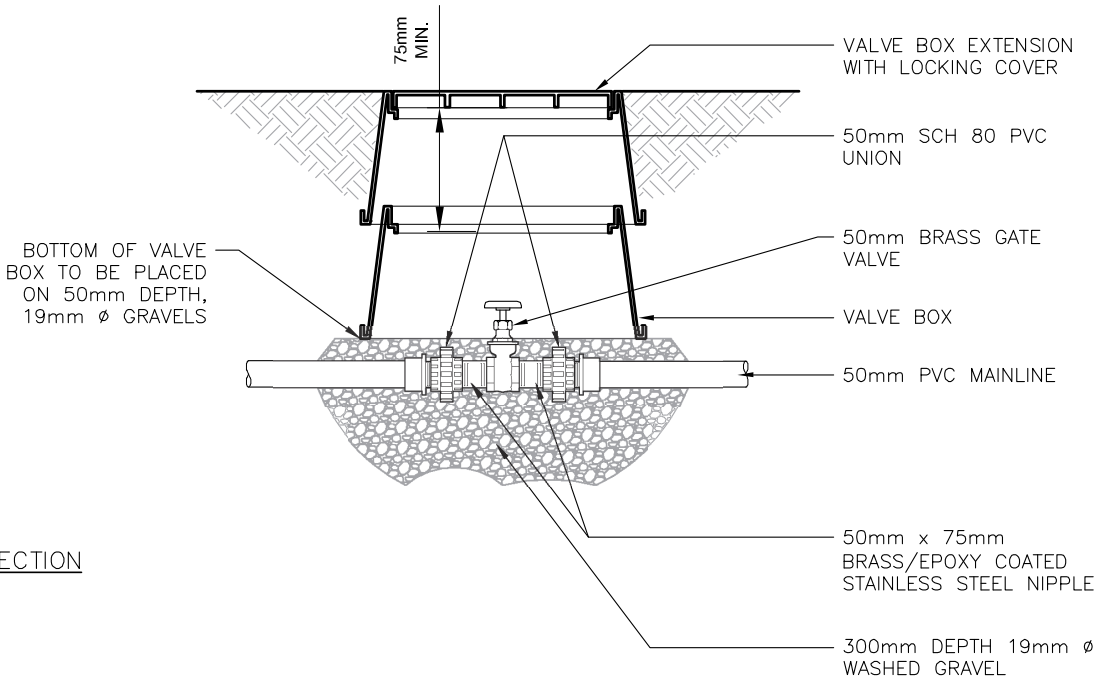
1. ALL DIMENSIONS ARE IN MILLIMETERS UNLESS OTHERWISE SPECIFIED.
2. ALL BOLT HEADS ON FLANGES SHALL BE FACING TOWARDS VALVE.

Calgary	PROJECT TITLE **SPECIFICATIONS** SHEET TITLE **200mm ISOLATION VALVE MAIN CONTROL VALVE (HDPE)**	DRAWN BY **TCP** DATE **2016/02** DESIGN BY DATE	SCALE **N.T.S.** SHEET NO. **IR-41** FILE NO.

Detail Sheet IR-42: 50 mm Isolation Valve Main Control Valve (PVC)



PLAN



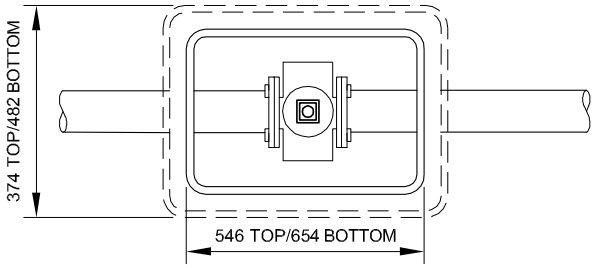
SECTION

NOTES:

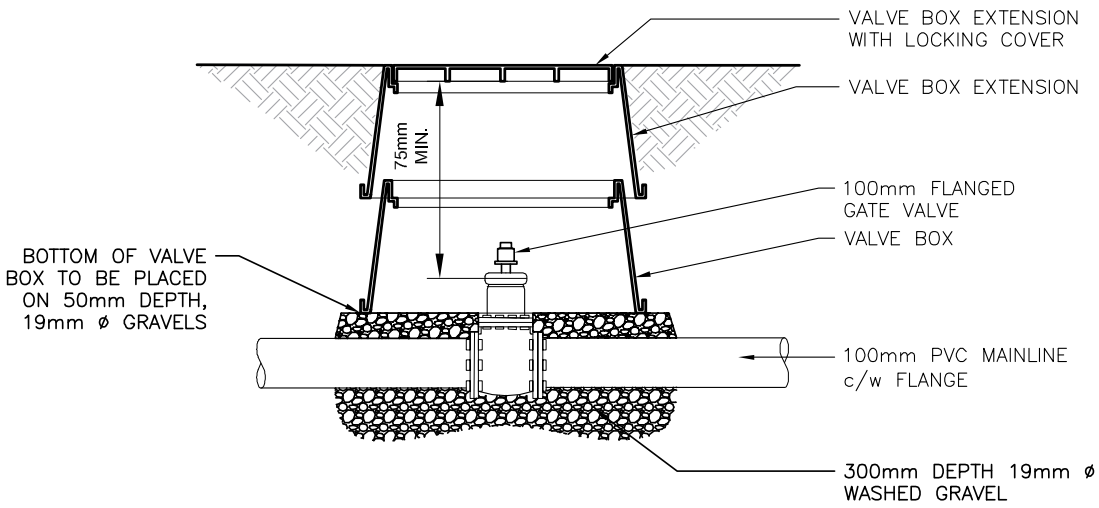
1. ALL DIMENSIONS ARE IN MILLIMETERS UNLESS OTHERWISE SPECIFIED.
2. SCH 80 PVC UNIONS SHALL HAVE UNION COLLARS INSTALLED TOWARDS VALVE.

Calgary	PROJECT TITLE **SPECIFICATIONS** SHEET TITLE **50mm ISOLATION VALVE MAIN CONTROL VALVE (PVC)**	DRAWN BY **TCP** DATE **2016/08** DESIGN BY DATE	SCALE **N.T.S.** SHEET NO. **IR-42** FILE NO.

Detail Sheet IR-43: 100 mm Isolation Valve Main Control Valve (PVC)



PLAN



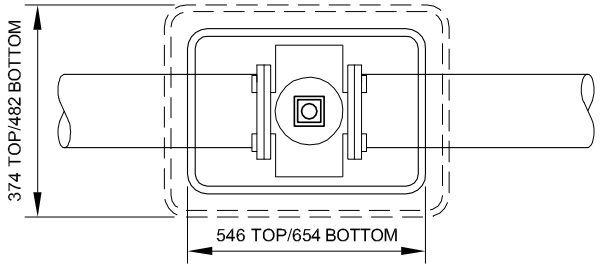
SECTION

NOTES:

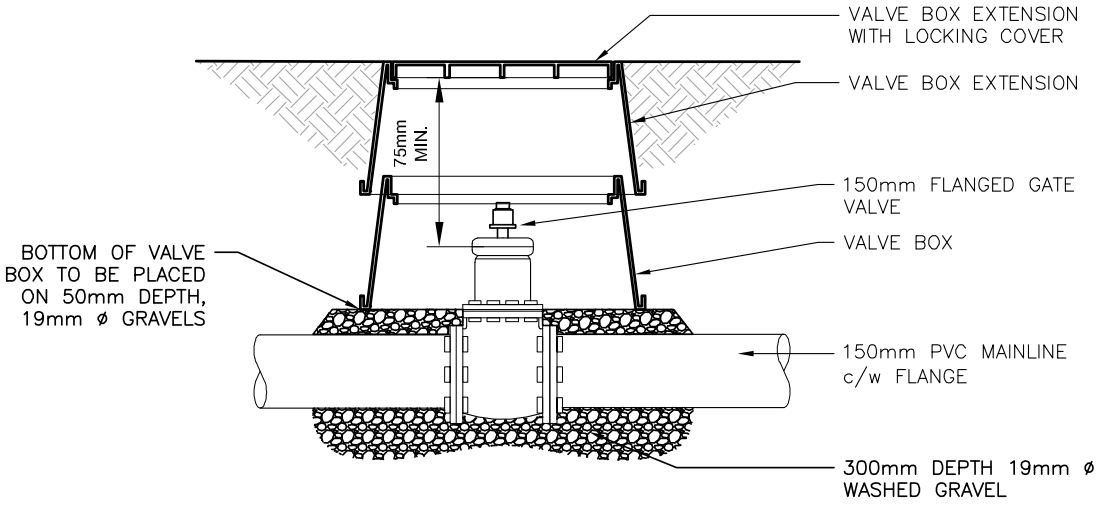
1. ALL DIMENSIONS ARE IN MILLIMETERS UNLESS OTHERWISE SPECIFIED.
2. ALL BOLT HEADS ON FLANGES SHALL BE FACING TOWARDS VALVE.

Calgary	PROJECT TITLE **SPECIFICATIONS** SHEET TITLE **100mm ISOLATION VALVE MAIN CONTROL VALVE (PVC)**	DRAWN BY **TCP** DATE **2016/08** DESIGN BY DATE	SCALE **N.T.S.** SHEET NO. **IR-43** FILE NO.

Detail Sheet IR-44: 150 mm Isolation Valve Main Control Valve (PVC)



PLAN



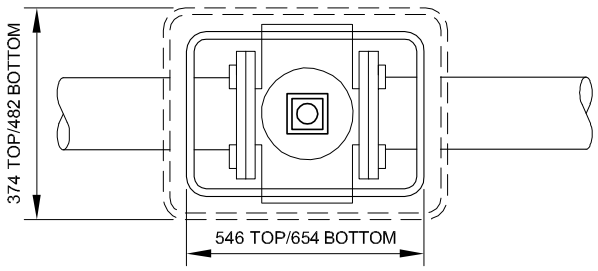
SECTION

NOTES:

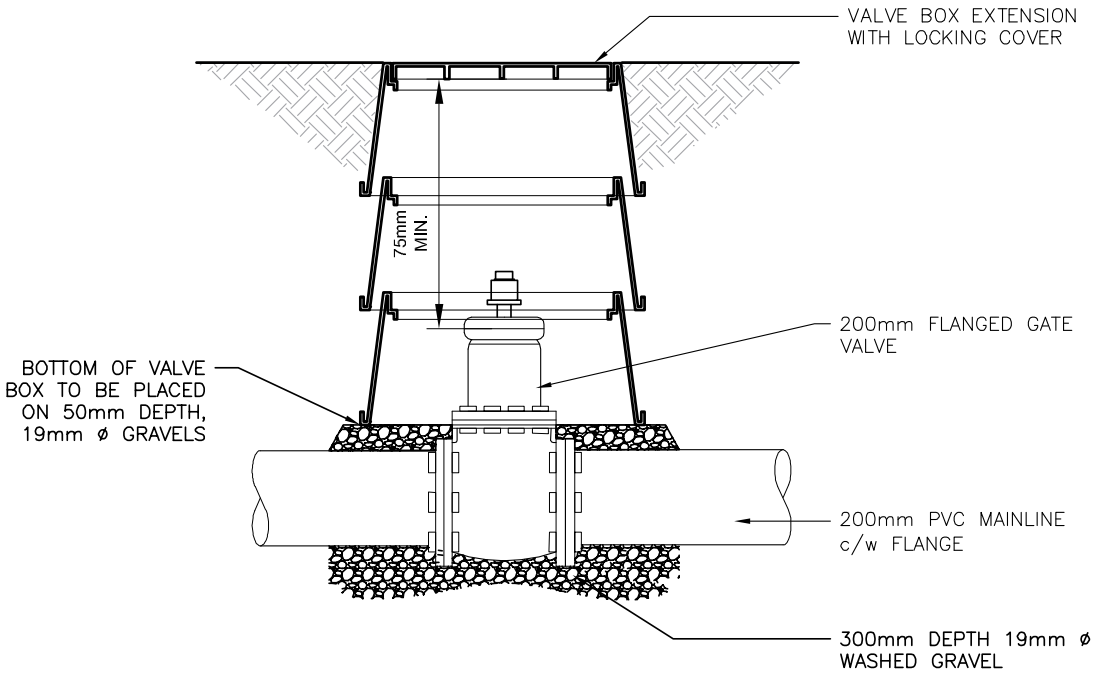
1. ALL DIMENSIONS ARE IN MILLIMETERS UNLESS OTHERWISE SPECIFIED.
2. ALL BOLT HEADS ON FLANGES SHALL BE FACING TOWARDS VALVE.

Calgary	PROJECT TITLE **SPECIFICATIONS** SHEET TITLE **150mm ISOLATION VALVE MAIN CONTROL VALVE (PVC)**	DRAWN BY **TCP** DATE **2016/08** DESIGN BY DATE	SCALE **N.T.S.** SHEET NO. **IR-44** FILE NO.

Detail Sheet IR-45: 200 mm Isolation Valve Main Control Valve (PVC)



PLAN



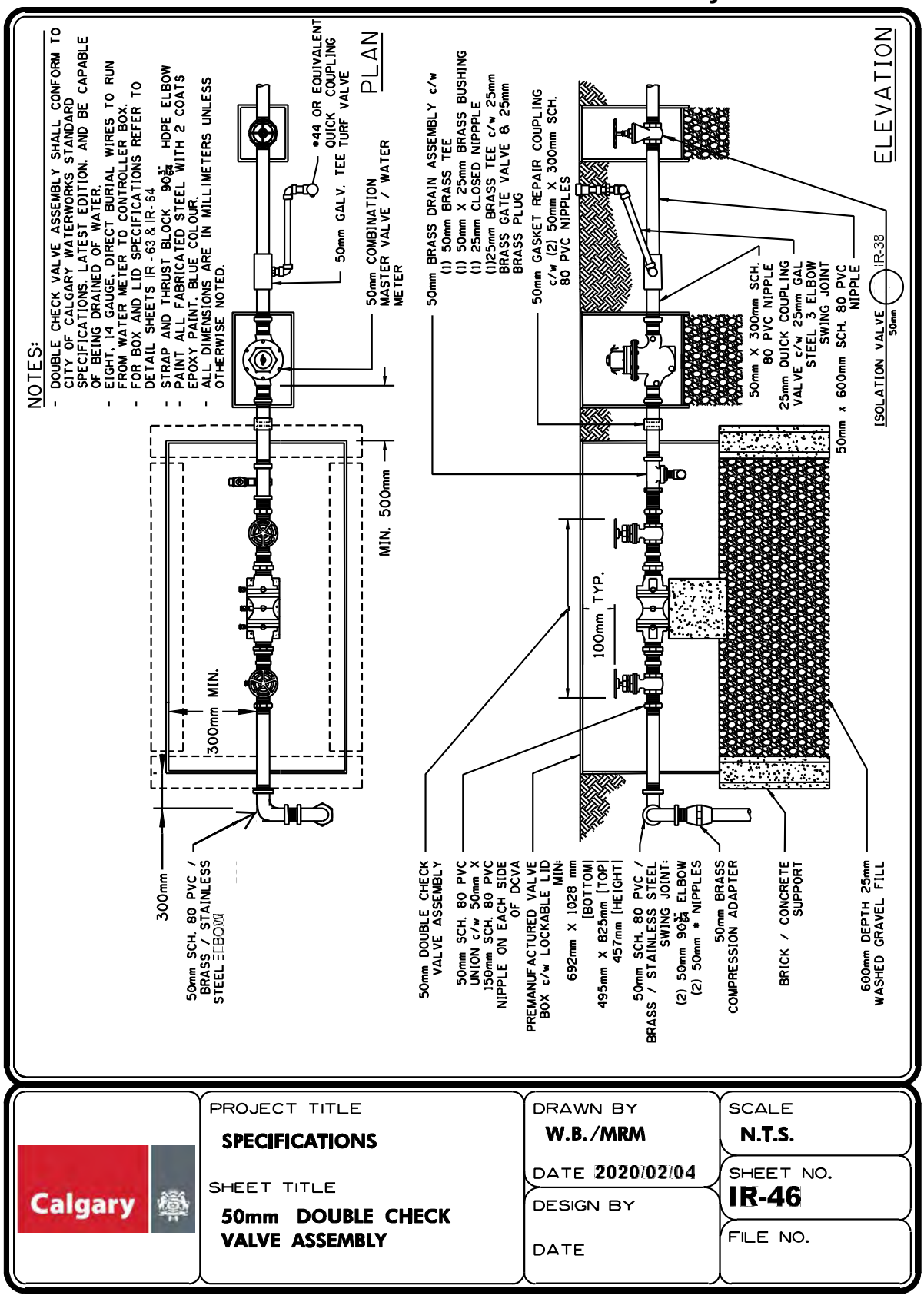
SECTION

NOTES:

1. ALL DIMENSIONS ARE IN MILLIMETERS UNLESS OTHERWISE SPECIFIED.
2. ALL BOLT HEADS ON FLANGES SHALL BE FACING TOWARDS VALVE.

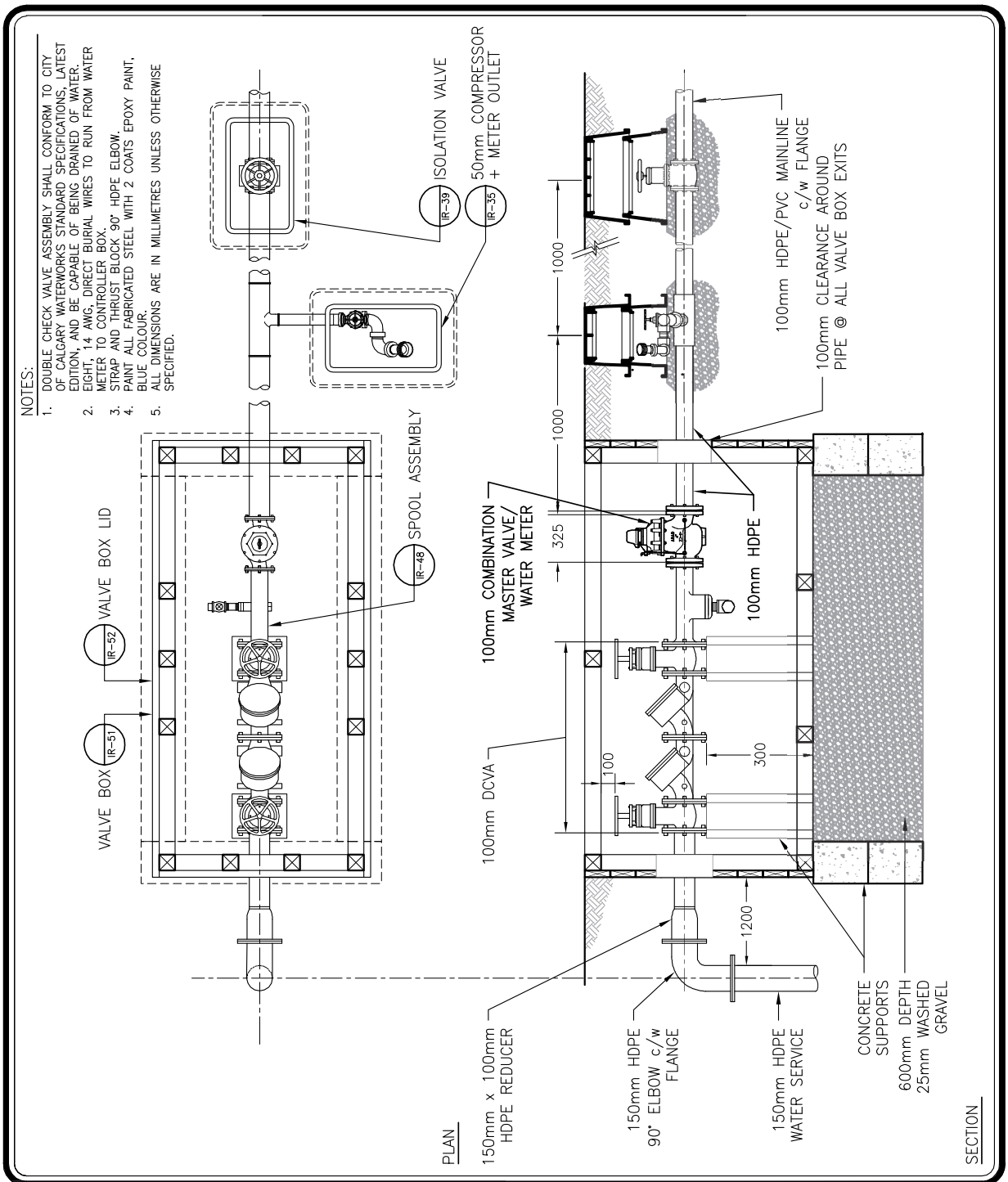
Calgary	PROJECT TITLE **SPECIFICATIONS** SHEET TITLE **200mm ISOLATION VALVE MAIN CONTROL VALVE (PVC)**	DRAWN BY **TCP** DATE **2016/08** DESIGN BY DATE	SCALE **N.T.S.** SHEET NO. **IR-45** FILE NO.

Detail Sheet IR-46: 50 mm Double Check Valve Assembly



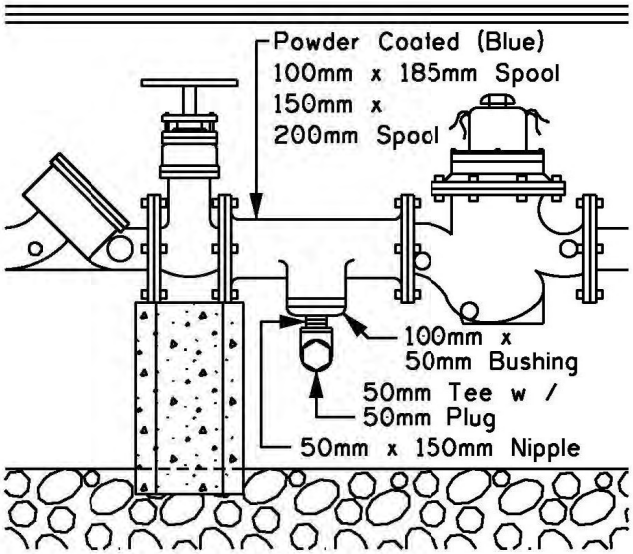
Calgary	PROJECT TITLE: **SPECIFICATIONS**	DRAWN BY: **W.B./MRM**	SCALE: **N.T.S.**
	SHEET TITLE: **50mm DOUBLE CHECK VALVE ASSEMBLY**	DATE: **2020/02/04**	SHEET NO.: **IR-46**
		DESIGN BY:	FILE NO.
		DATE:	

Detail Sheet IR-47: 100 mm Double Check Valve Assembly

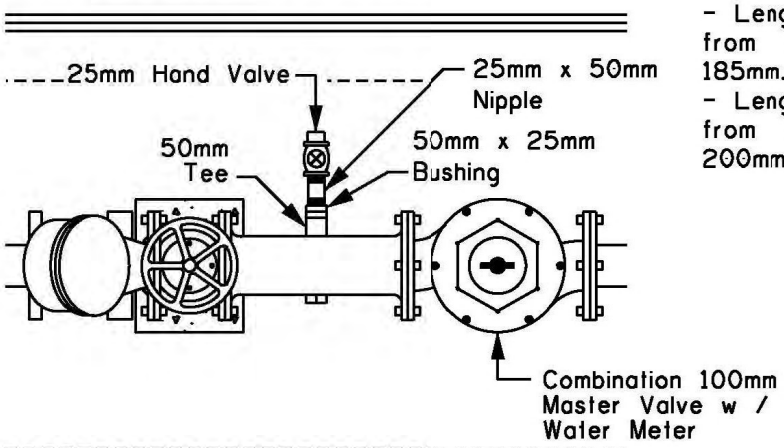


Calgary	PROJECT TITLE **SPECIFICATIONS** SHEET TITLE **100mm DOUBLE CHECK VALVE ASSEMBLY**	DRAWN BY **TCP** DATE **2016/08** DESIGN BY DATE	SCALE **N.T.S.** SHEET NO. **IR-47** FILE NO.

Detail Sheet IR-48: 100 mm & 150 mm Spool Assembly



ELEVATION

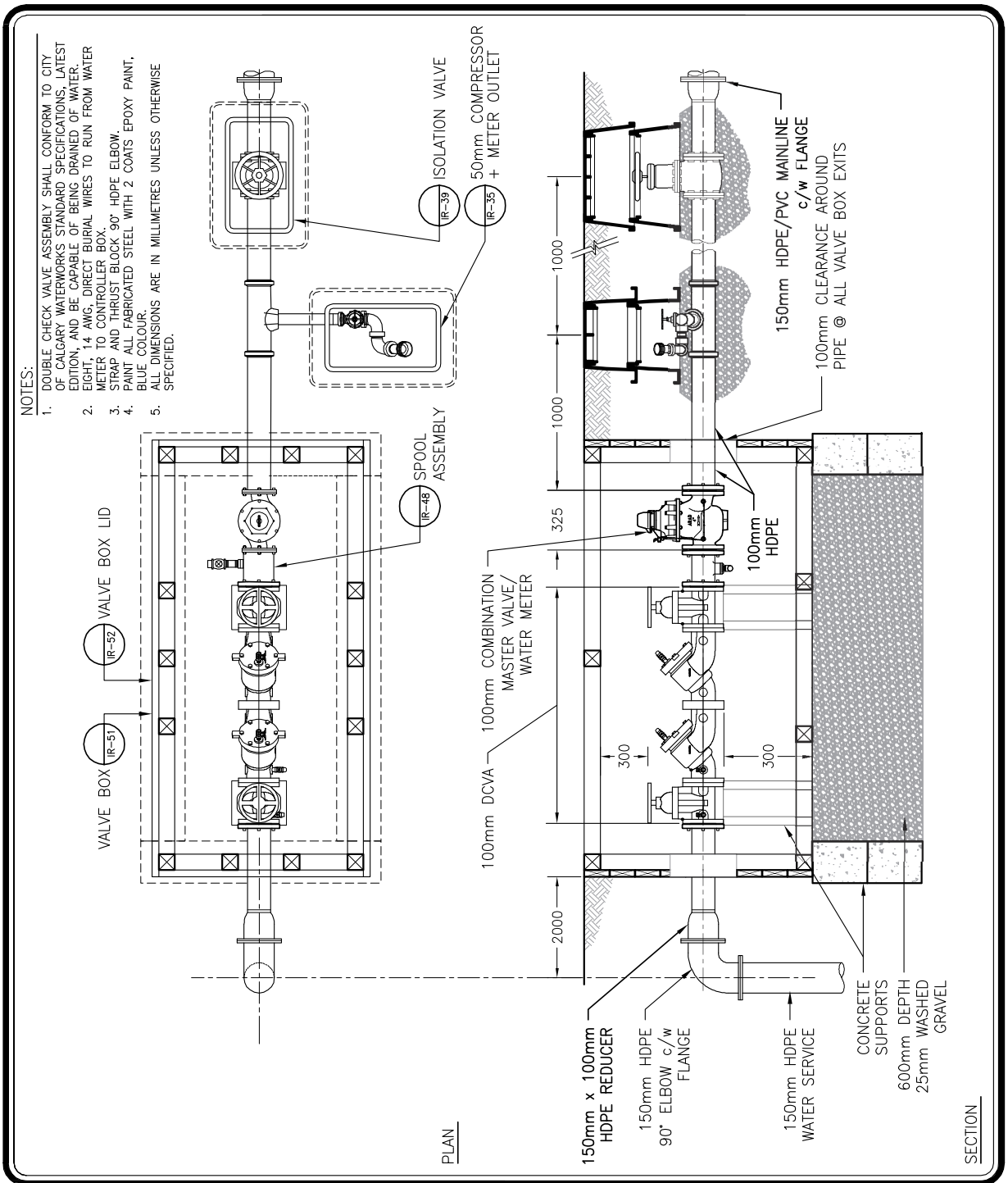


PLAN

NOTES:
- All dimensions are in millimetres unless otherwise noted.
- All 25mm Hand Valve Fittings are to be Sch 80 PVC, Brass or Stainless Steel
- Length of 100mm Spool from flange to flange is 185mm.
- Length of 150mm Spool from flange to flange is 200mm.

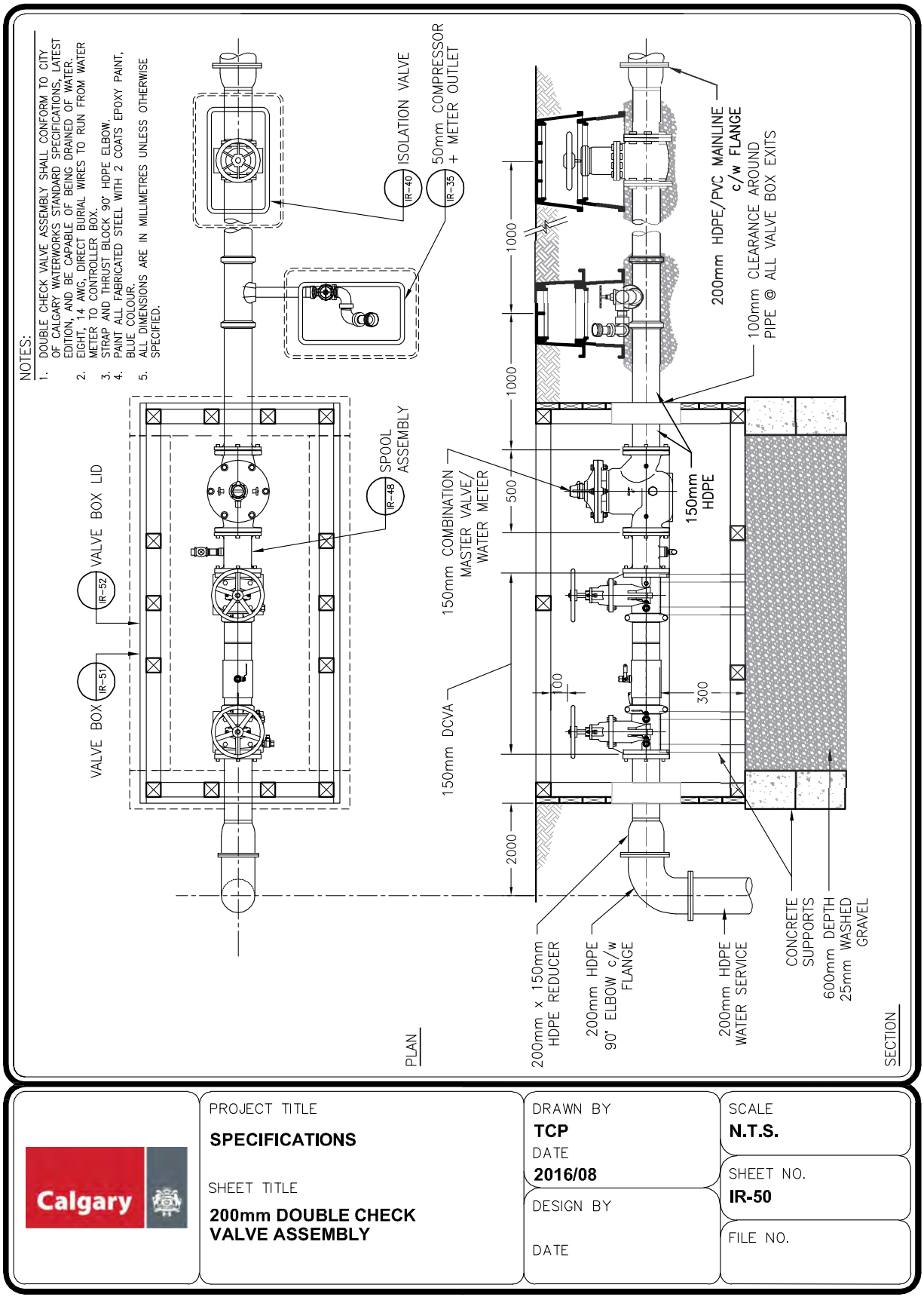
Calgary	PROJECT TITLE: **SPECIFICATIONS** SHEET TITLE: **100mm & 150mm DETAIL OF SPOOL ASSEMBLY**	DRAWN BY: **W.B.** DATE: **2005 01 25** DESIGN BY: DATE:	SCALE: **N.T.S.** SHEET NO.: **IR-48** FILE NO.

Detail Sheet IR-49: 150 mm Double Check Valve Assembly



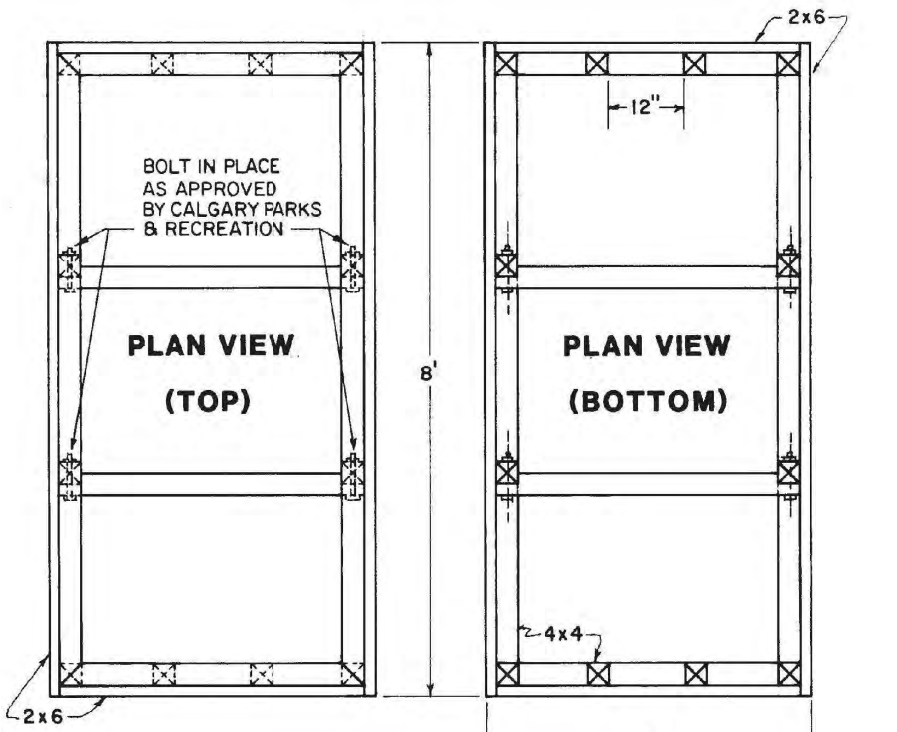
Calgary	PROJECT TITLE **SPECIFICATIONS** SHEET TITLE **150mm DOUBLE CHECK VALVE ASSEMBLY**	DRAWN BY **TCP** DATE **2016/08** DESIGN BY DATE	SCALE **N.T.S.** SHEET NO. **IR-49** FILE NO.

Detail Sheet IR-50: 200 mm Double Check Valve Assembly



Calgary	PROJECT TITLE **SPECIFICATIONS** SHEET TITLE **200mm DOUBLE CHECK VALVE ASSEMBLY**	DRAWN BY **TCP** DATE **2016/08** DESIGN BY DATE	SCALE **N.T.S.** SHEET NO. **IR-50** FILE NO.

Detail Sheet IR-51: 100 mm Double Check Valve Assembly - Valve Box



CUTTING LIST

SIDE BOARDS – 18 PCS. – 2x6x8'

END BOARDS – 18 PCS. – 2x6x45"

BOTTOM PLATES – 2 PCS. – 4x4x93"

– 2 PCS. – 4x4x38"

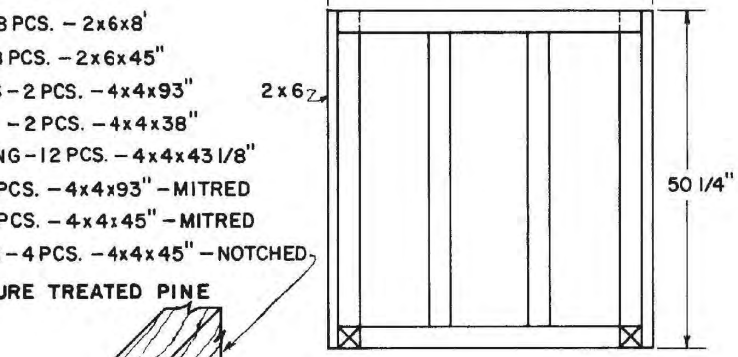
VERTICAL BRACING – 12 PCS. – 4x4x43 1/8"

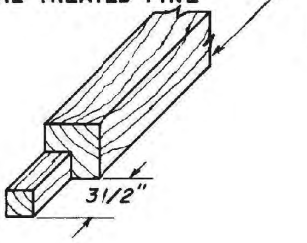
TOP PLATES – 2 PCS. – 4x4x93" – MITRED

– 2 PCS. – 4x4x45" – MITRED

CENTRE BRACES – 4 PCS. – 4x4x45" – NOTCHED

WOOD – PRESSURE TREATED PINE

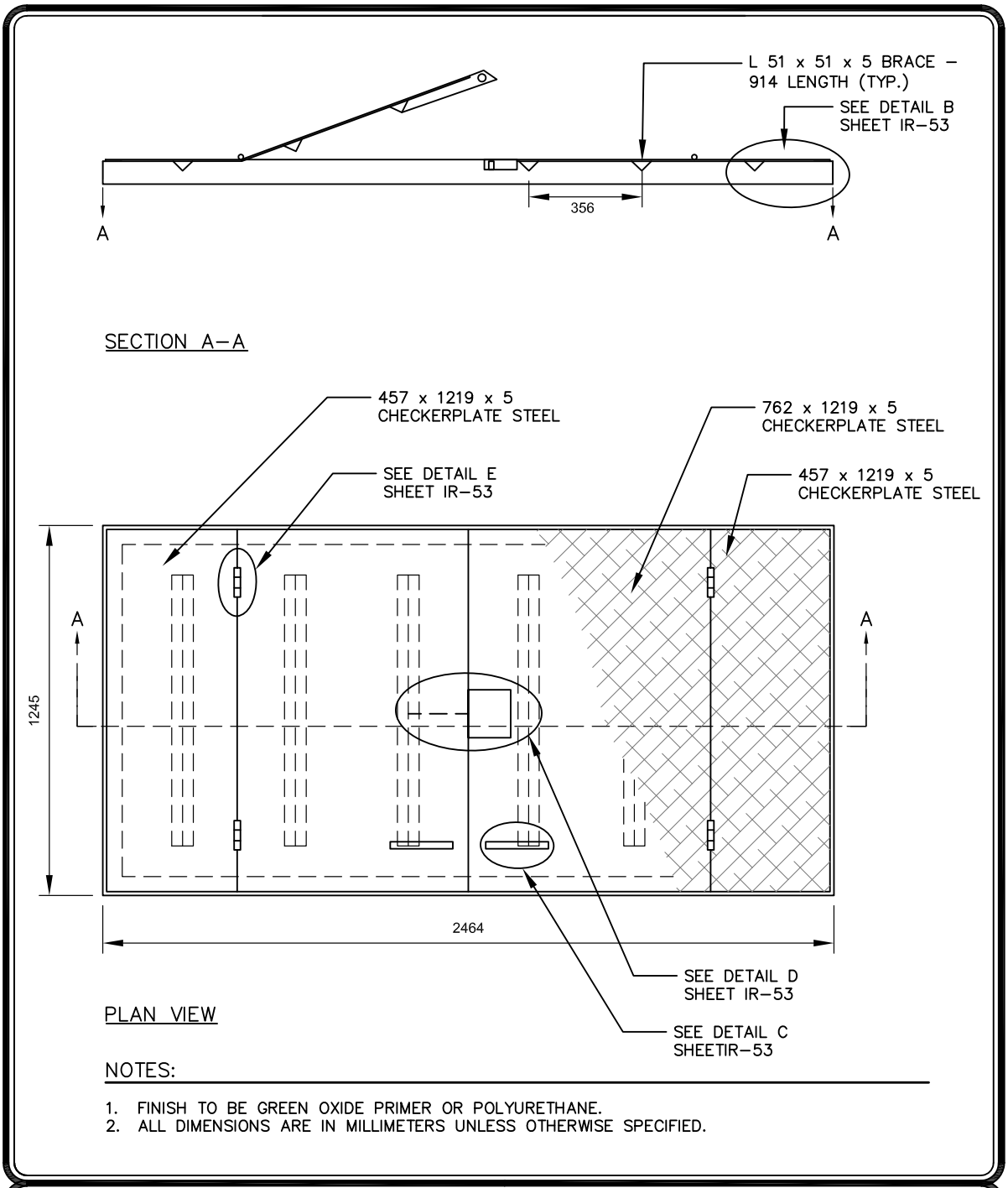




METRIC

Calgary	PROJECT TITLE SPECIFICATIONS	DRAWN BY DATE	SCALE N.T.S.
	SHEET TITLE VALVE BOX DETAILS FOR 100mm DOUBLE CHECK VALVE ASSEMBLY	DESIGN BY DATE	SHEET NO. IR-51
			FILE NO.

Detail Sheet IR-52: 100 mm Double Check Valve Box Lid

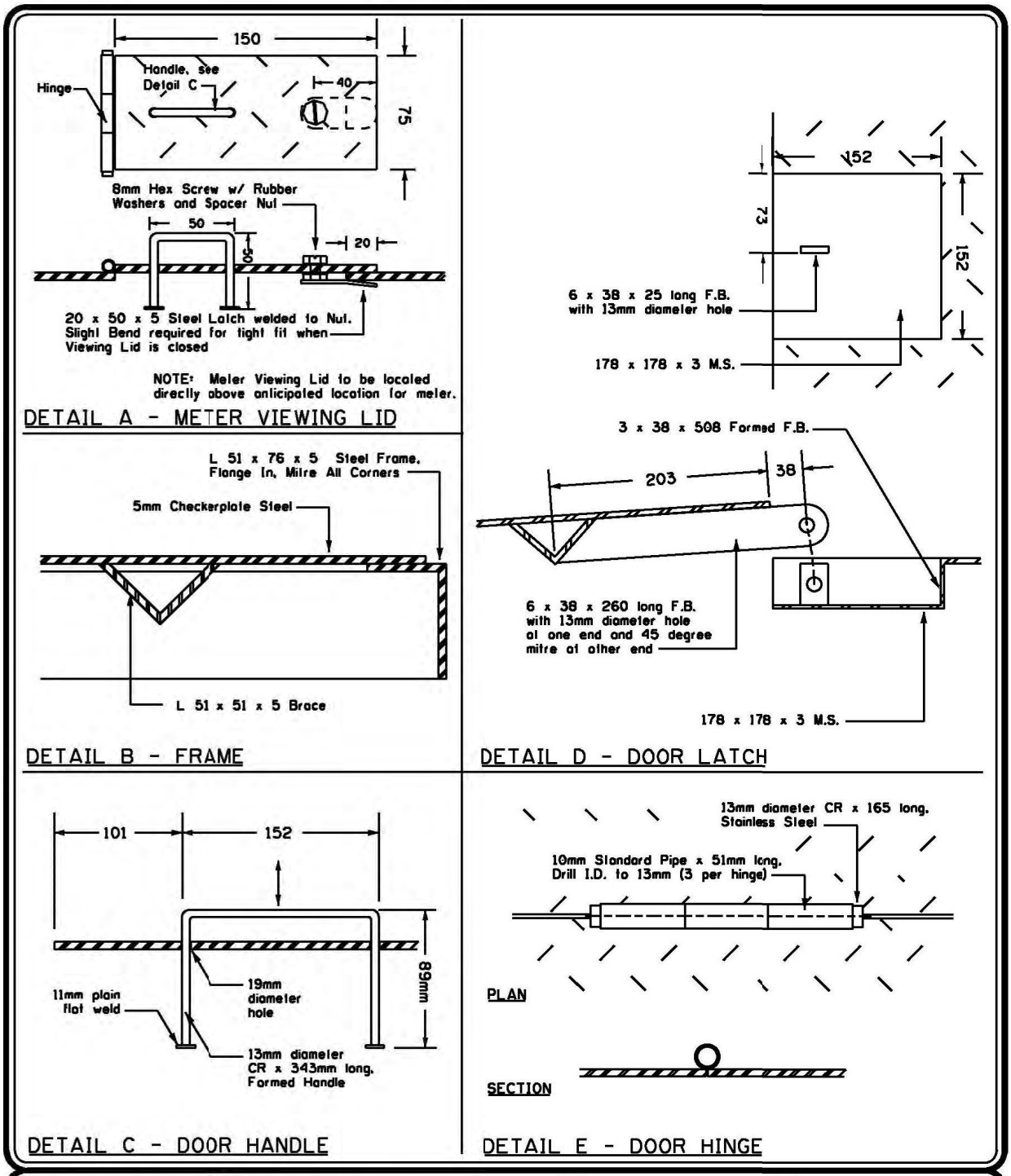


NOTES:

1. FINISH TO BE GREEN OXIDE PRIMER OR POLYURETHANE.
2. ALL DIMENSIONS ARE IN MILLIMETERS UNLESS OTHERWISE SPECIFIED.

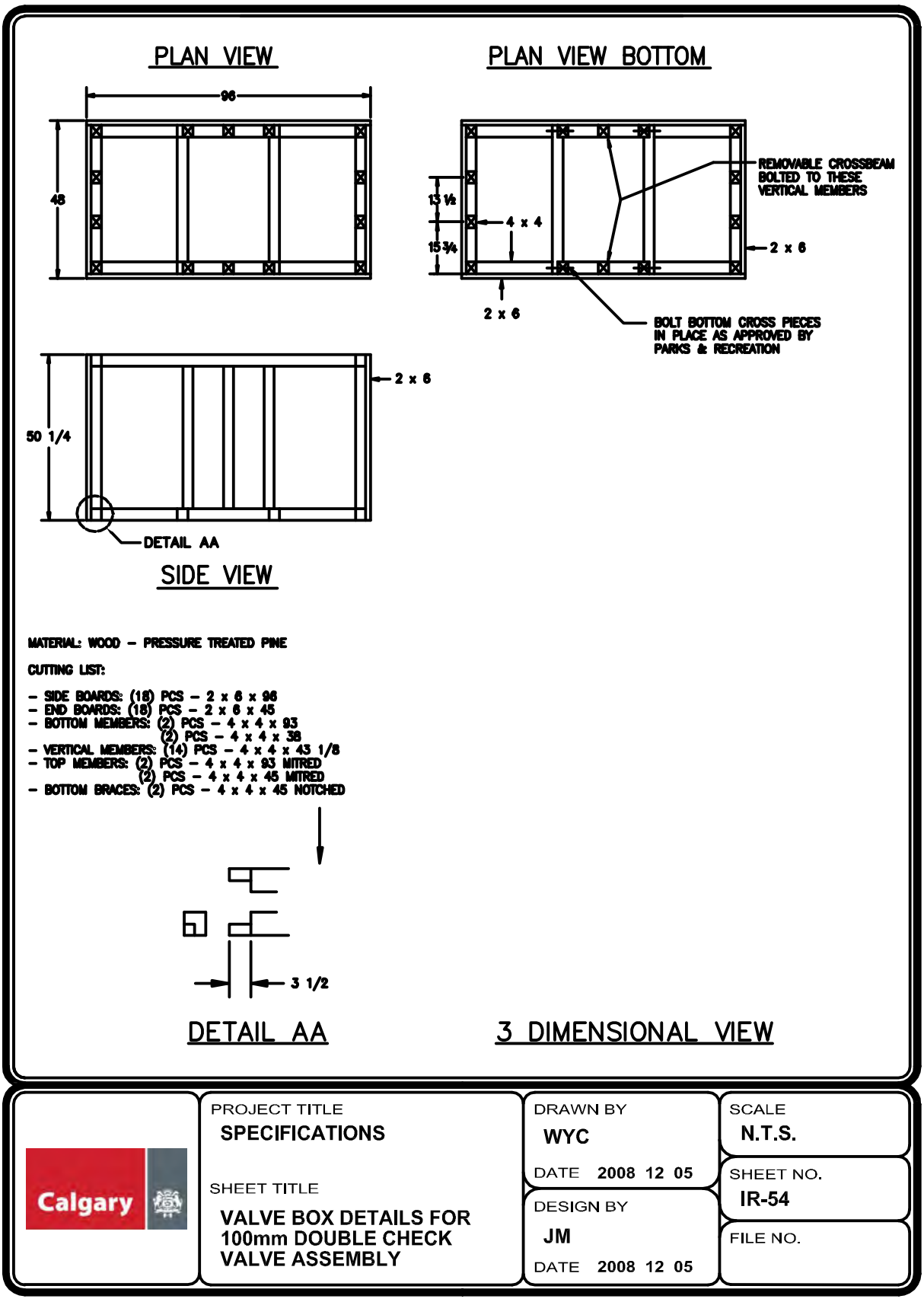
Calgary	PROJECT TITLE **SPECIFICATIONS** SHEET TITLE **100mm DOUBLE CHECK VALVE BOX LID**	DRAWN BY **DB** DATE **2020/12/18** DESIGN BY DATE	SCALE **N.T.S.** SHEET NO. **IR-52** FILE NO.

Detail Sheet IR-53: 100 mm Double Check Valve Box Lid with Meter Viewing Lid



Calgary	PROJECT TITLE: **SPECIFICATIONS** SHEET TITLE: **DETAILS FOR 100mm DOUBLE CHECK VALVE BOX LID WITH METER VIEWING LID**	DRAWN BY: **MM** DATE: **2005 02 02** DESIGN BY: DATE:	SCALE: **N.T.S.** SHEET NO.: **IR-53** FILE NO.:

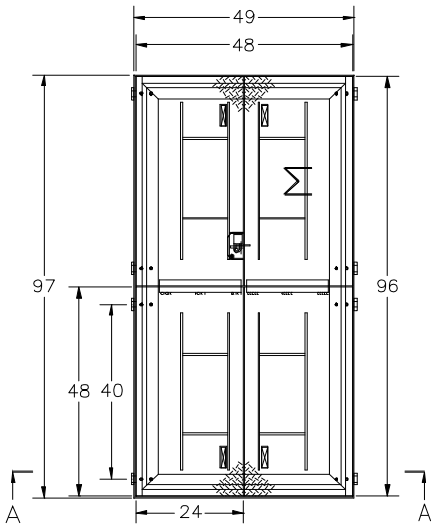
Detail Sheet IR-54: 100 mm Double Check Valve Assembly - Valve Box



Calgary	PROJECT TITLE **SPECIFICATIONS** SHEET TITLE **VALVE BOX DETAILS FOR 100mm DOUBLE CHECK VALVE ASSEMBLY**	DRAWN BY **WYC** DATE **2008 12 05** DESIGN BY **JM** DATE **2008 12 05**	SCALE **N.T.S.** SHEET NO. **IR-54** FILE NO.

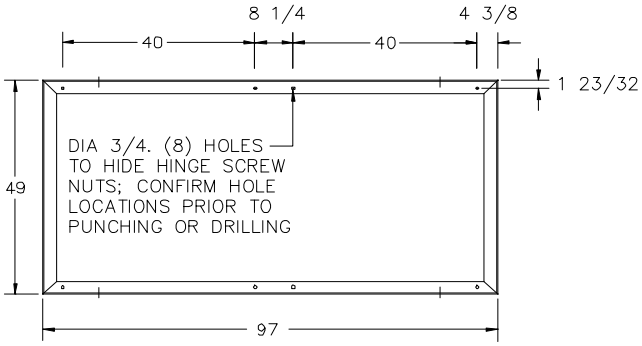
Detail Sheet IR-55: 100 mm Double Check Valve Assembly - Aluminum Lid Frame

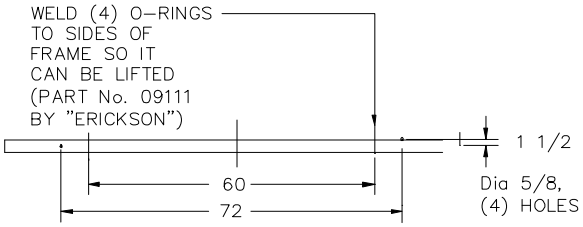
GENERAL ARRANGEMENT

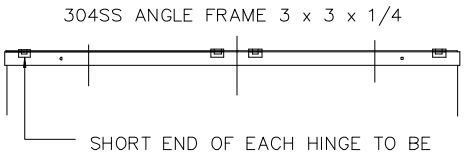


FOR MAIN WOODEN BOX c/w CROSSBEAM. SEE SHEET #2

MAIN ANGULAR FRAME

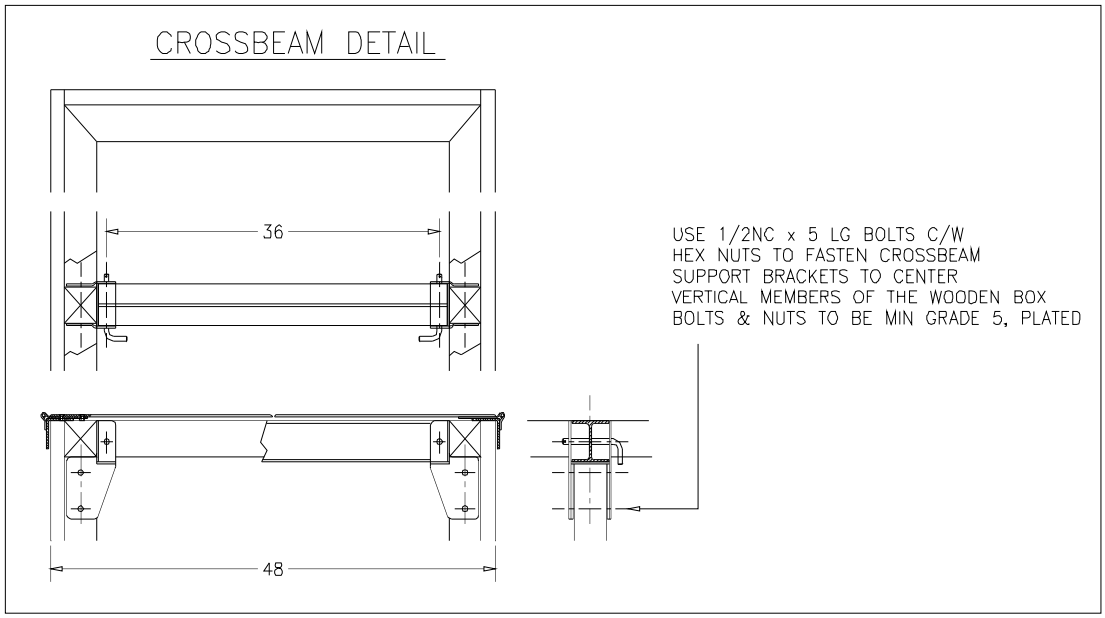


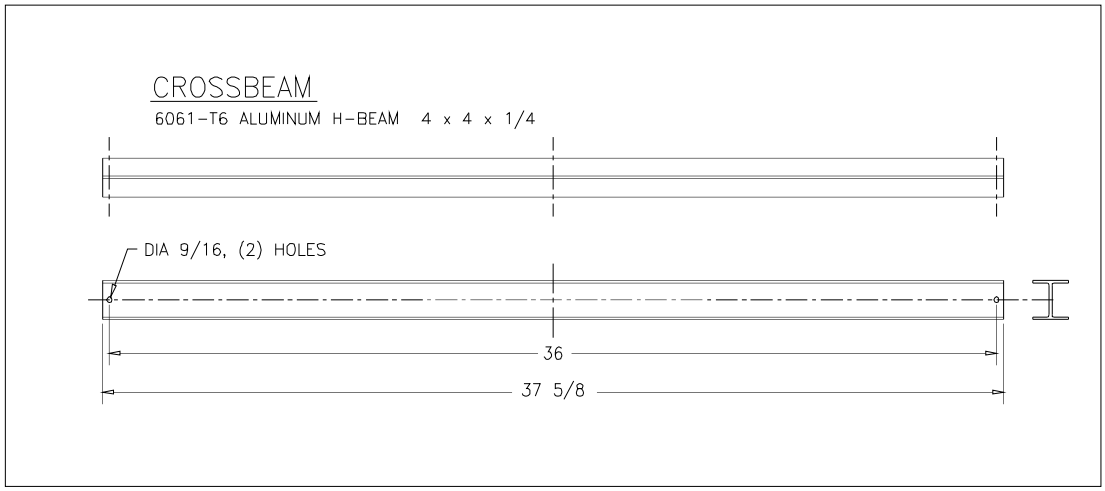




Calgary	PROJECT TITLE **SPECIFICATIONS**	DRAWN BY **WYC**	SCALE **N.T.S.**
	SHEET TITLE **FRAME DETAIL FOR 100mm DOUBLE CHECK VALVE BOX ALUMINUM LID**	DATE **2008 12 05**	SHEET NO. **IR-55**
		DESIGN BY **JM**	FILE NO.
		DATE **2008 12 05**	

Detail Sheet IR-56: 100 mm Double Check Valve Assembly - Valve Box Crossbeam Support

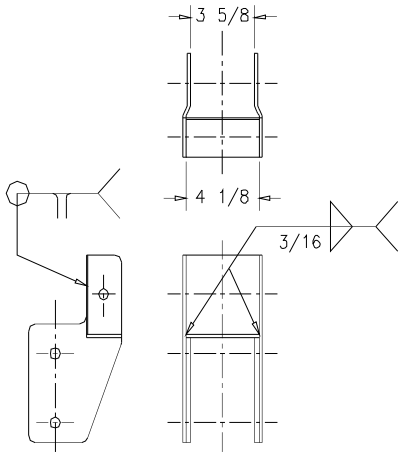




Calgary	PROJECT TITLE **SPECIFICATIONS** SHEET TITLE **VALVE BOX CROSSBEAM SUPPORT DETAILS FOR 100mm DOUBLE CHECK VALVE ASSEMBLY**	DRAWN BY **WYC** DATE **2008 12 05** DESIGN BY **JM** DATE **2008 12 05**	SCALE **N.T.S.** SHEET NO. **IR-56** FILE NO.

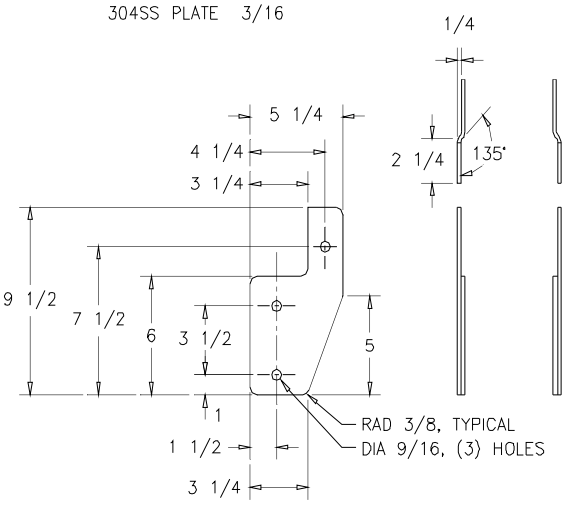
Detail Sheet IR-57: 100 mm Double Check Valve Assembly - Valve Box Crossbeam Support

CROSSBEAM SUPPORTS



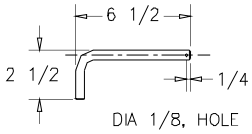
SIDE PLATES: LEFT & RIGHT

304SS PLATE 3/16



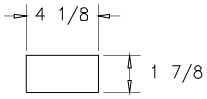
PIN

304SS ROUND BAR DIA 1/2



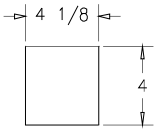
SHELF

304SS PLATE 3/16



BACK PLATE

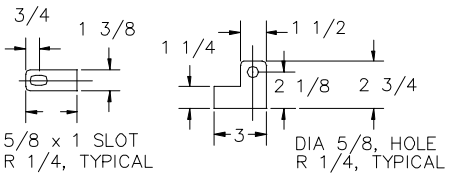
304SS SHEET 12ga



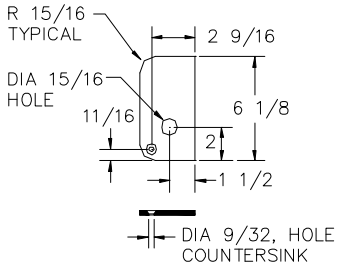
Calgary	PROJECT TITLE **SPECIFICATIONS**	DRAWN BY **WYC**	SCALE **N.T.S.**
	SHEET TITLE **VALVE BOX CROSSBEAM SUPPORT DETAILS FOR 100mm DOUBLE CHECK VALVE ASSEMBLY**	DATE **2008 12 05**	SHEET NO. **IR-57**
		DESIGN BY **JM**	FILE NO.
		DATE **2008 12 05**	

Detail Sheet IR-58: 100 mm Double Check Valve Box - Aluminum Lid

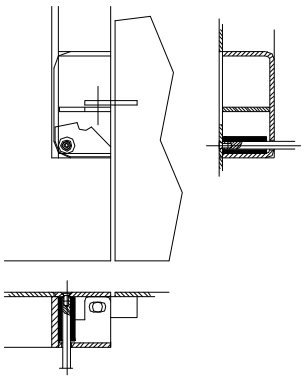
PADLOCK BOX DETAIL

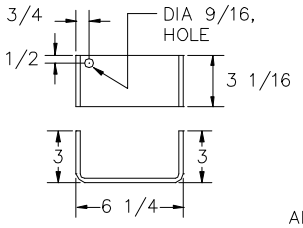


5052–H32 ALUMINUM PLATE 1/4

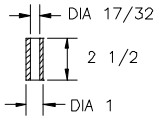


ALUMINUM CHECKER PLATE 1/4

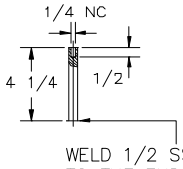




5052–H32 ALUMINUM PLATE 1/4



ALUMINUM ROUND, DIA 1

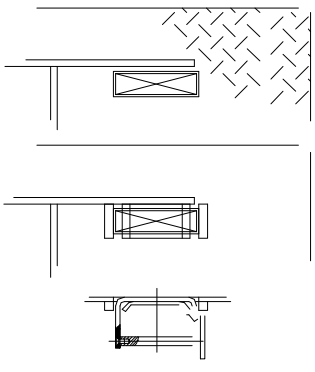


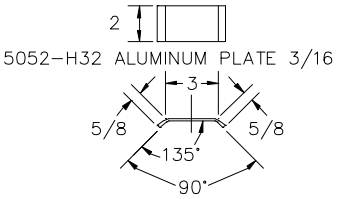
WELD 1/2 SS WASHER
TO THE END OF SHAFT

304SS ROUND BAR, DIA 1/2

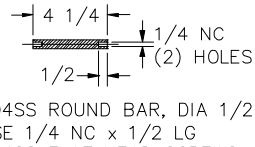
USE 1/4 NC x 1/2 LG
304SS FLAT HEAD SCREW

HANDLE DETAIL

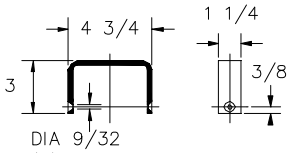




5052–H32 ALUMINUM PLATE 3/16



304SS ROUND BAR, DIA 1/2
USE 1/4 NC x 1/2 LG
304SS FLAT HEAD SCREWS



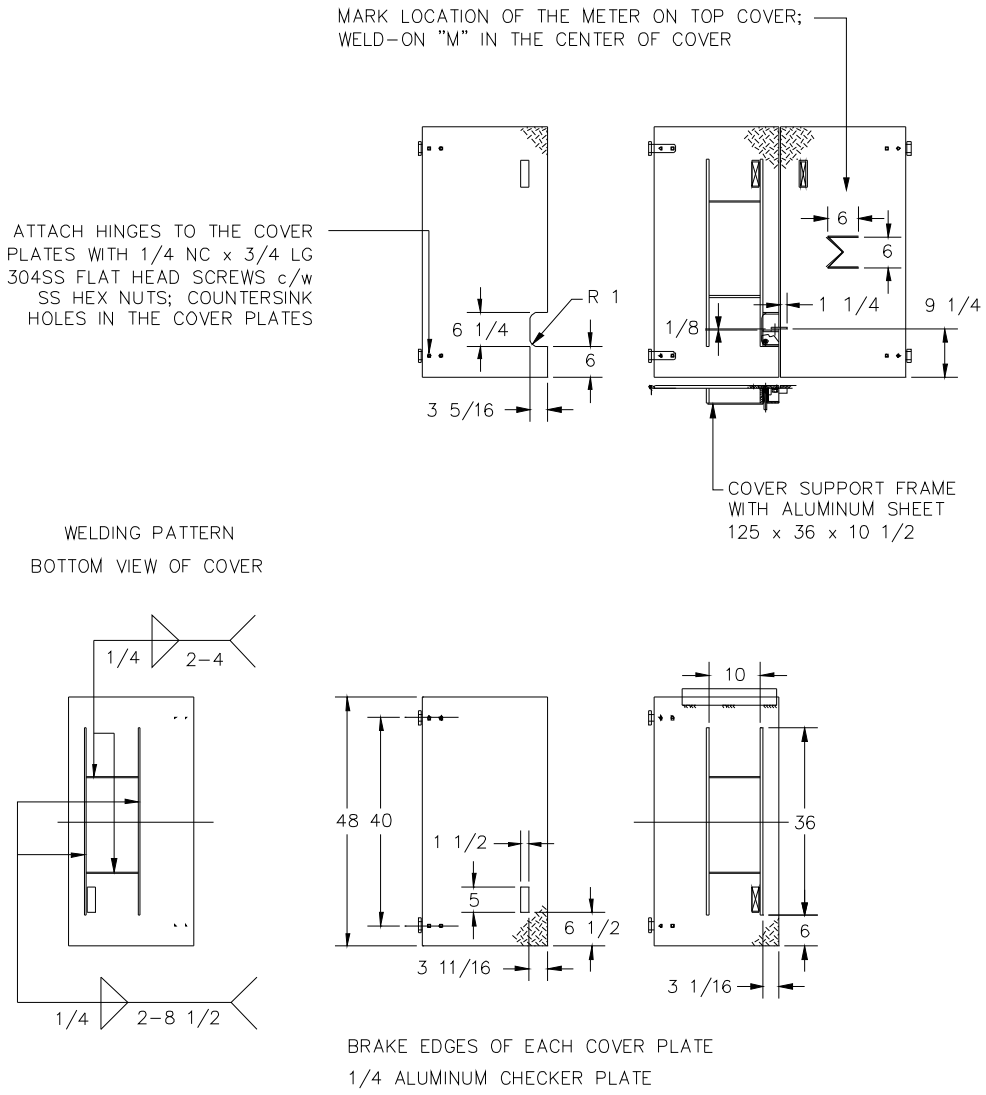
5052–H32 ALUMINUM PLATE 1/4

ALUMINUM SQUARE BAR 1/2

Calgary	PROJECT TITLE **SPECIFICATIONS**	DRAWN BY **WYC**	SCALE **N.T.S.**
	SHEET TITLE **DETAILS FOR 100mm DOUBLE CHECK VALVE BOX ALUMINUM LID**	DATE **2008 12 05**	SHEET NO. **IR-58**
		DESIGN BY **JM**	FILE NO.
		DATE **2008 12 05**	

Detail Sheet IR-59: 100 mm Double Check Valve Box - Aluminum Lid

COVER PLATES DETAIL

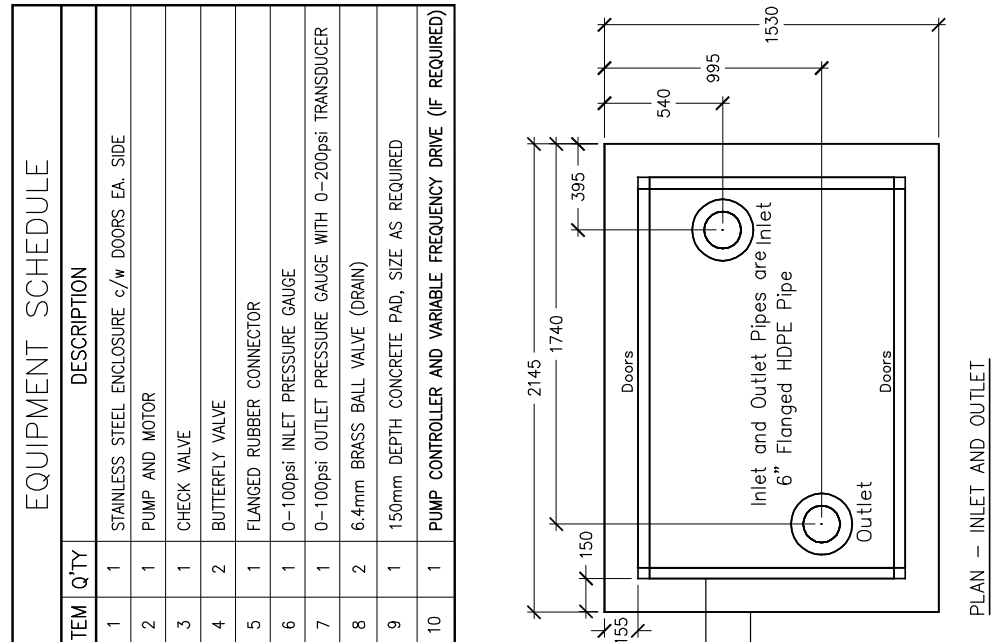


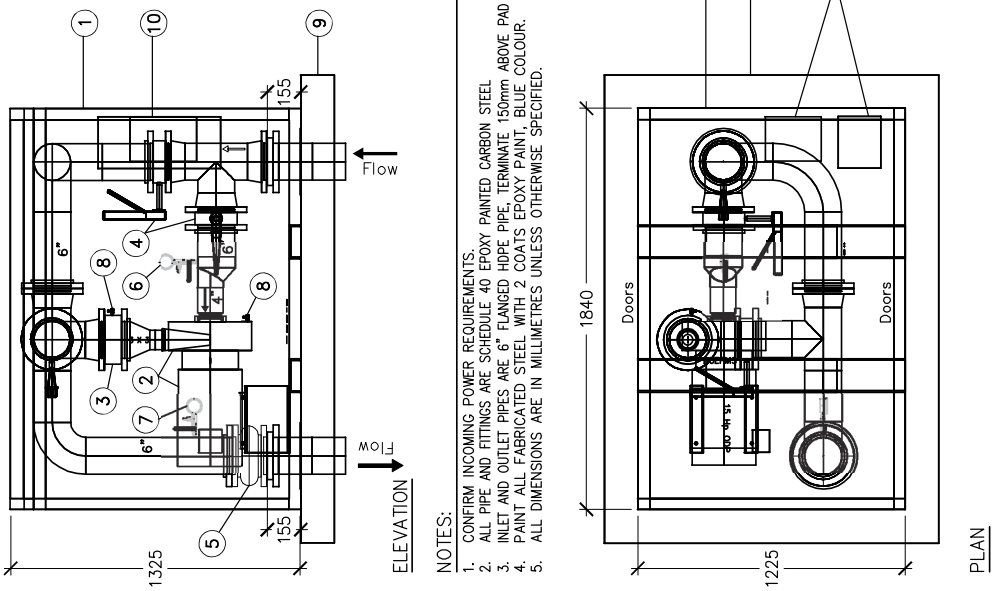
Calgary	PROJECT TITLE **SPECIFICATIONS**	DRAWN BY **WYC**	SCALE **N.T.S.**
	SHEET TITLE **DETAILS FOR 100mm DOUBLE CHECK VALVE BOX ALUMINUM LID**	DATE **2008 12 05**	SHEET NO. **IR-59**
		DESIGN BY **JM**	FILE NO.
		DATE **2008 12 05**	

Detail Sheet IR-60: Booster Pump

EQUIPMENT SCHEDULE

ITEM	Q'TY	DESCRIPTION
1	1	STAINLESS STEEL ENCLOSURE c/w DOORS EA. SIDE
2	1	PUMP AND MOTOR
3	1	CHECK VALVE
4	2	BUTTERFLY VALVE
5	1	FLANGED RUBBER CONNECTOR
6	1	0-100psi INLET PRESSURE GAUGE
7	1	0-100psi OUTLET PRESSURE GAUGE WITH 0-200psi TRANSDUCER
8	2	6.4mm BRASS BALL VALVE (DRAIN)
9	1	150mm DEPTH CONCRETE PAD, SIZE AS REQUIRED
10	1	PUMP CONTROLLER AND VARIABLE FREQUENCY DRIVE (IF REQUIRED)





NOTES:
1. CONFIRM INCOMING POWER REQUIREMENTS.
2. ALL PIPE AND FITTINGS ARE SCHEDULE 40 EPOXY PAINTED CARBON STEEL
3. INLET AND OUTLET PIPES ARE 6" FLANGED HDPE PIPE, TERMINATE 150mm ABOVE PAD
4. PAINT ALL FABRICATED STEEL WITH 2 COATS EPOXY PAINT, BLUE COLOUR.
5. ALL DIMENSIONS ARE IN MILLIMETRES UNLESS OTHERWISE SPECIFIED.

Calgary

PROJECT TITLE
SPECIFICATIONS

SHEET TITLE
TYPICAL BOOSTER PUMP

DRAWN BY
TCP
DATE
2016/03

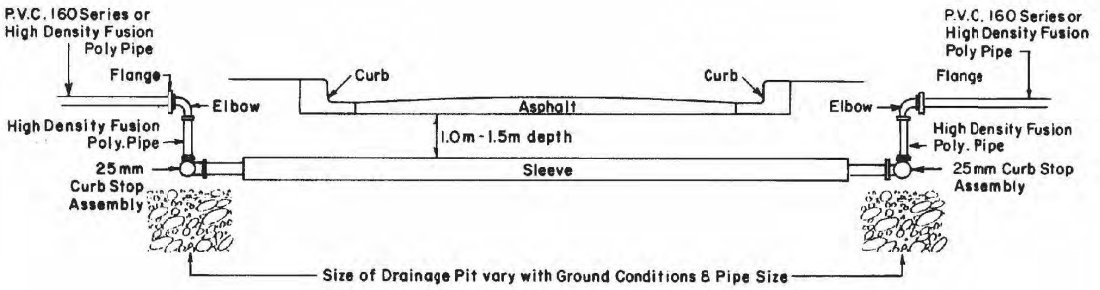
DESIGN BY
DATE

SCALE
N.T.S.

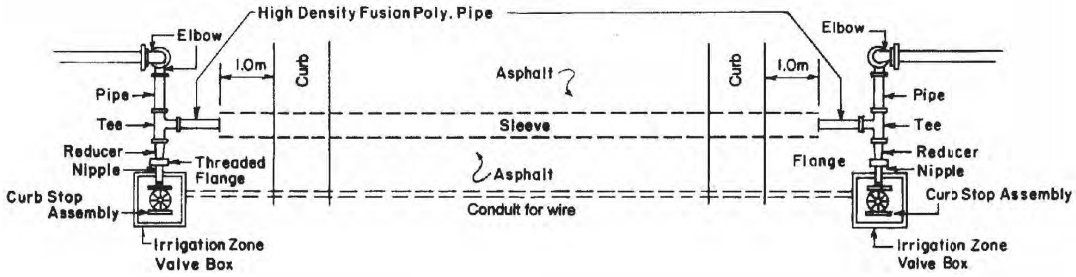
SHEET NO.
IR-60

FILE NO.

Detail Sheet IR-61: Road Crossing High Density Poly



Elevation



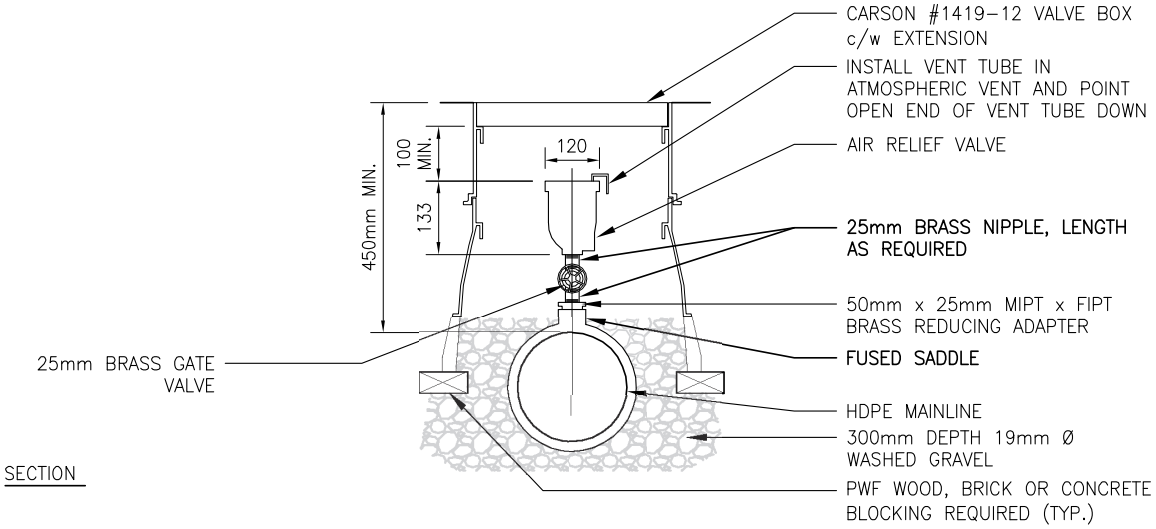
Plan View

Note - All dimensions are in metres unless otherwise noted.

METRIC

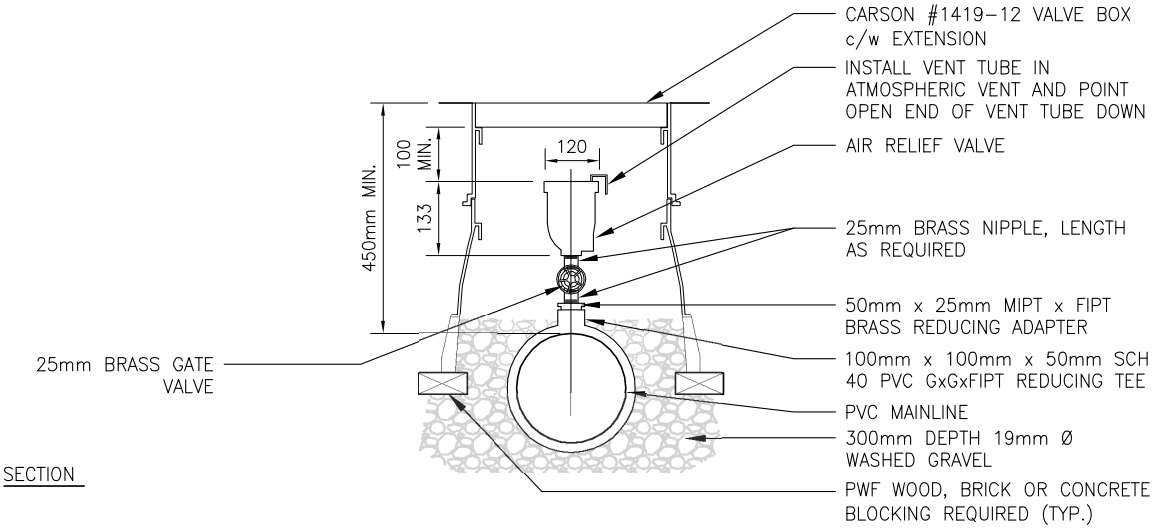
Calgary	PROJECT TITLE SPECIFICATIONS SHEET TITLE ROAD CROSSING HIGH DENSITY POLY	DRAWN BY W.B. DATE 1997 03 08 DESIGN BY D.LaF. DATE 1997 03 08	SCALE N.T.S. SHEET NO. IR-61 FILE NO.

Detail Sheet IR-62: Air Relief Valve HDPE/PVC



SECTION

AIR RELIEF VALVE (HDPE)



SECTION

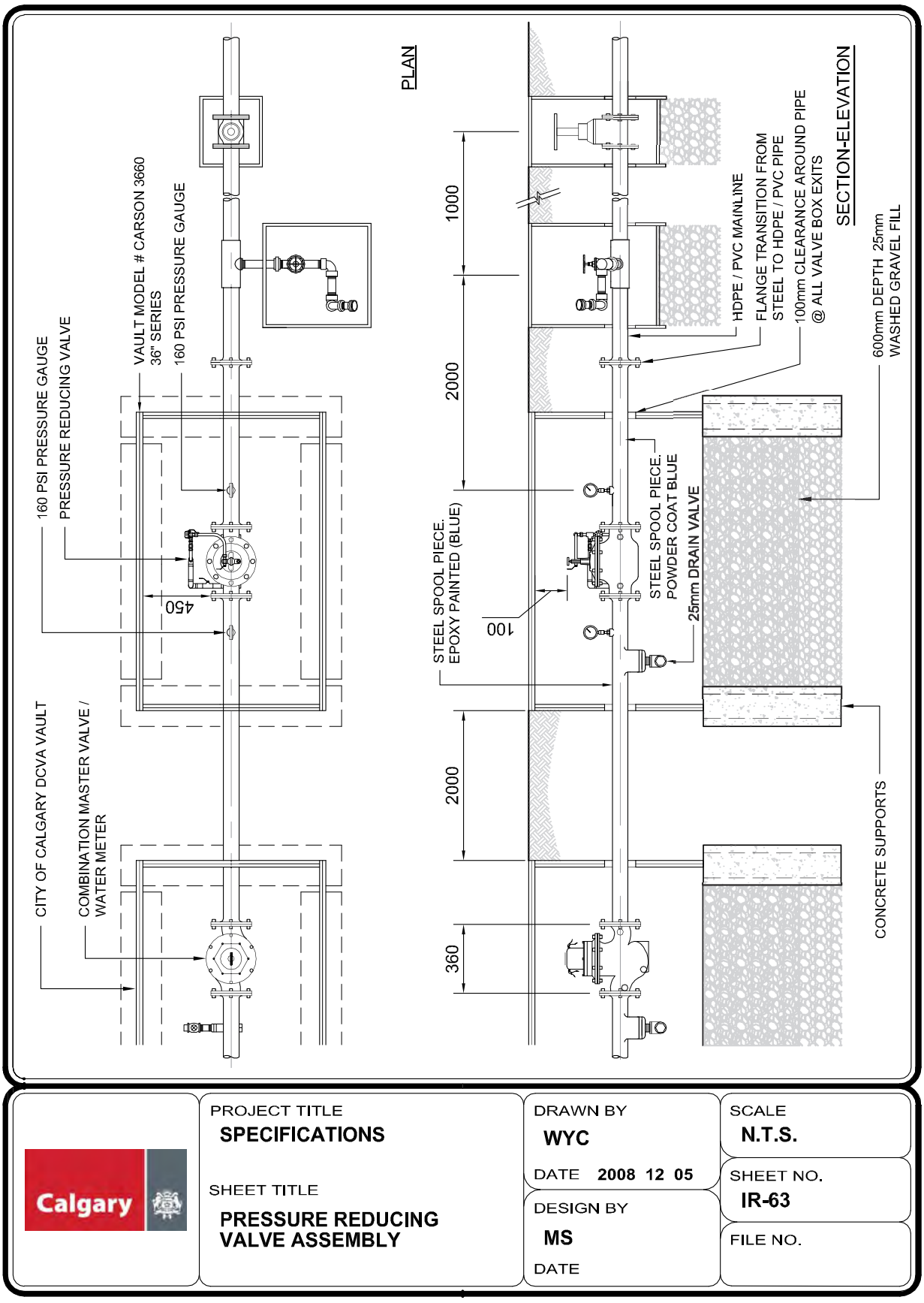
AIR RELIEF VALVE (PVC)

NOTES:

1. ENSURE MAINLINE DEPTH FROM TOP OF PIPE TO FINISHED GRADE IS AT MINIMUM 450mm.
2. USE PREMANUFACTURED EXTENSIONS WHEN OBTAINING PROPER HEIGHT OF BOXES.
3. ALL DIMENSIONS ARE IN MILLIMETRES UNLESS OTHERWISE NOTED.

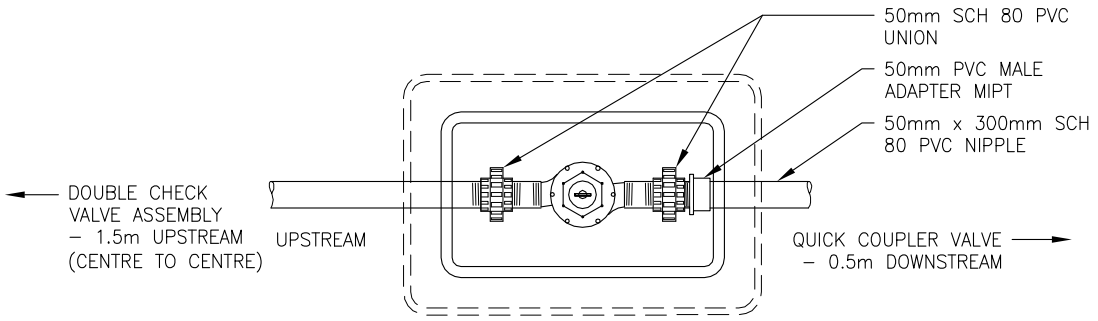
Calgary	PROJECT TITLE **SPECIFICATIONS**	DRAWN BY **TCP**	SCALE **N.T.S.**
	SHEET TITLE **AIR RELIEF VALVE HDPE/PVC**	DATE **2016/08**	SHEET NO. **IR-62**
		DESIGN BY	FILE NO.
		DATE	

Detail Sheet IR-63: Pressure Reducing Valve Assembly

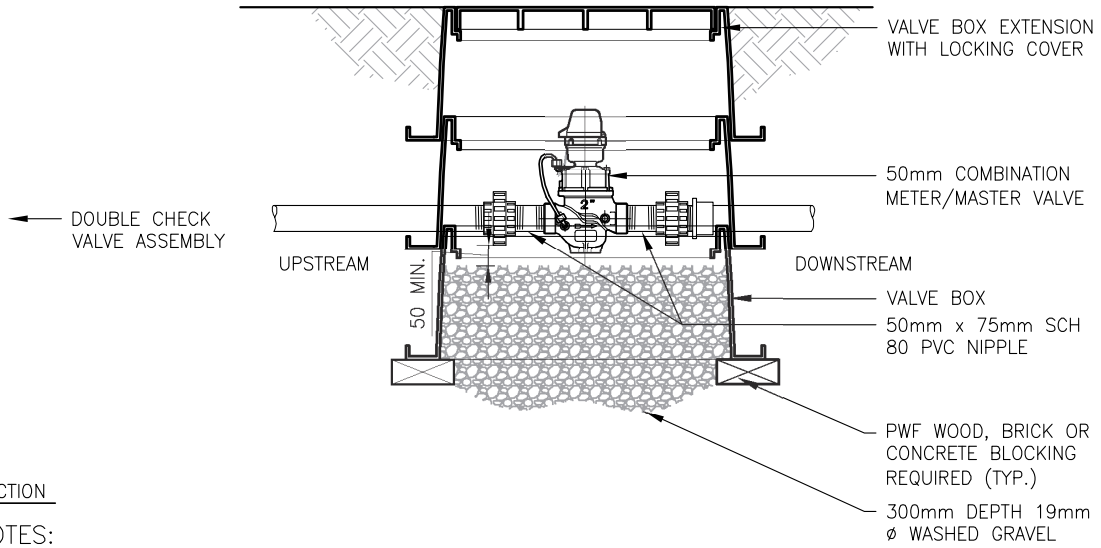


Calgary	PROJECT TITLE **SPECIFICATIONS**	DRAWN BY **WYC**	SCALE **N.T.S.**
	SHEET TITLE **PRESSURE REDUCING VALVE ASSEMBLY**	DATE **2008 12 05**	SHEET NO. **IR-63**
		DESIGN BY **MS**	FILE NO.
		DATE	

Detail Sheet IR-64: 50 mm Combination Meter/Master Valve (PVC)



PLAN



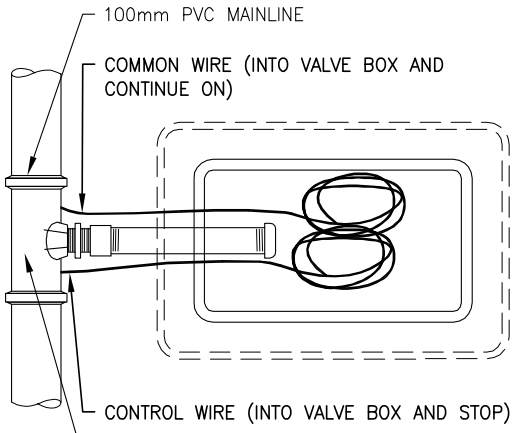
SECTION

NOTES:

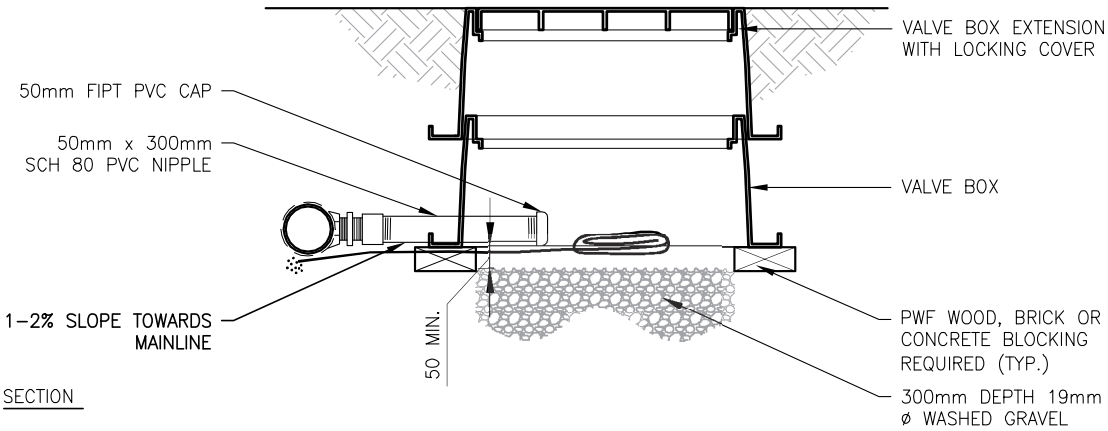
1. EIGHT – 14 AWG DIRECT BURIAL WIRES TO RUN FROM COMBINATION METER/MASTER VALVE TO IRRIGATION CONTROLLER.
2. FOR VALVE BOX SPECIFICATIONS REFER TO SPECIFICATION SECTION 8.2.10.
3. USE PREMANUFACTURED EXTENSIONS WHEN OBTAINING PROPER HEIGHT OF BOXES.
4. ALL DIMENSIONS ARE IN MILLIMETRES UNLESS OTHERWISE NOTED.

Calgary	PROJECT TITLE **SPECIFICATIONS** SHEET TITLE **50mm COMBINATION METER/ MASTER VALVE (PVC)**	DRAWN BY **TCP** DATE **2016/09** DESIGN BY DATE	SCALE **N.T.S.** SHEET NO. **IR-64** FILE NO.

Detail Sheet IR-65: 50 mm Tee Hook-Up (PVC)



PLAN



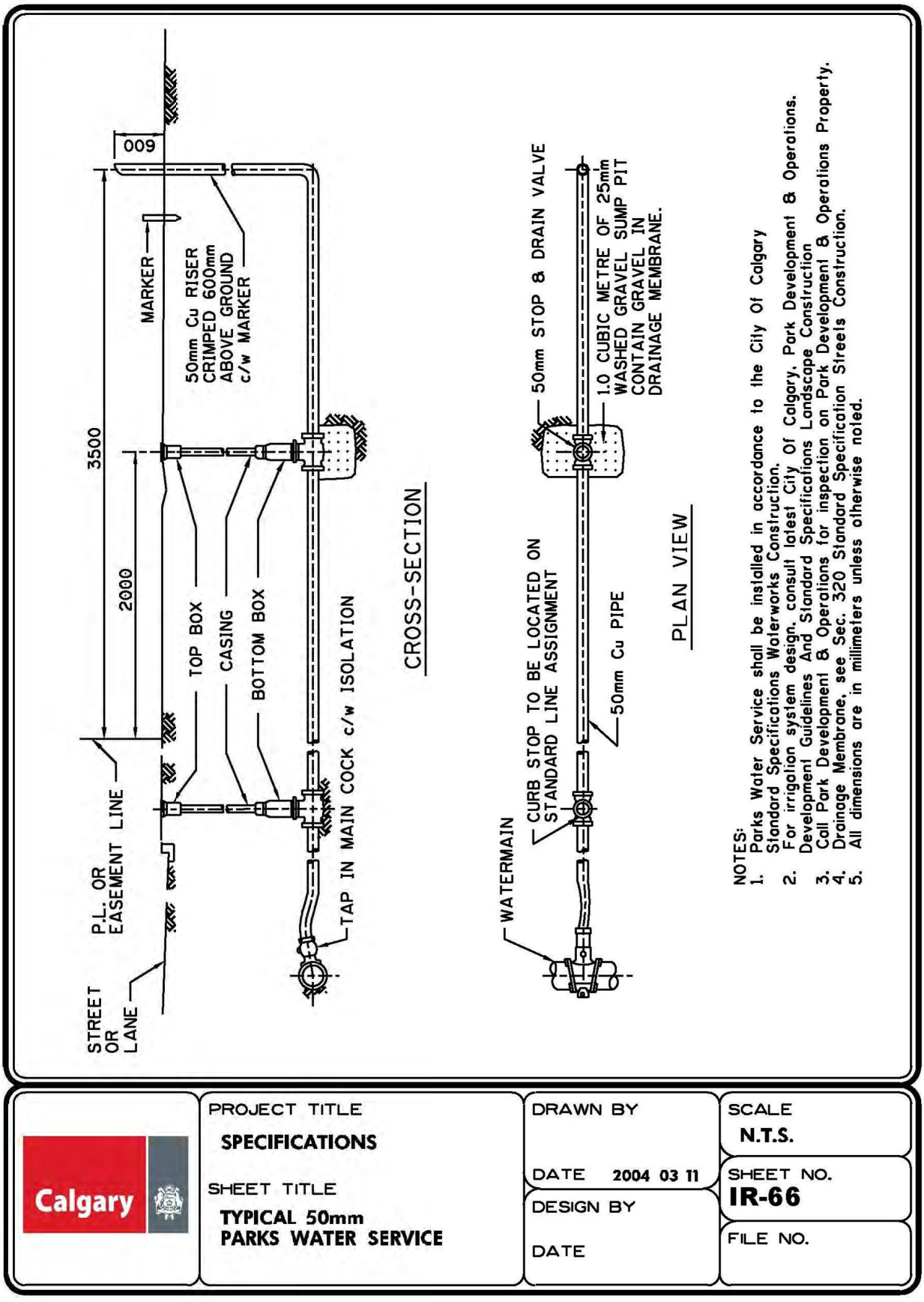
SECTION

NOTES:

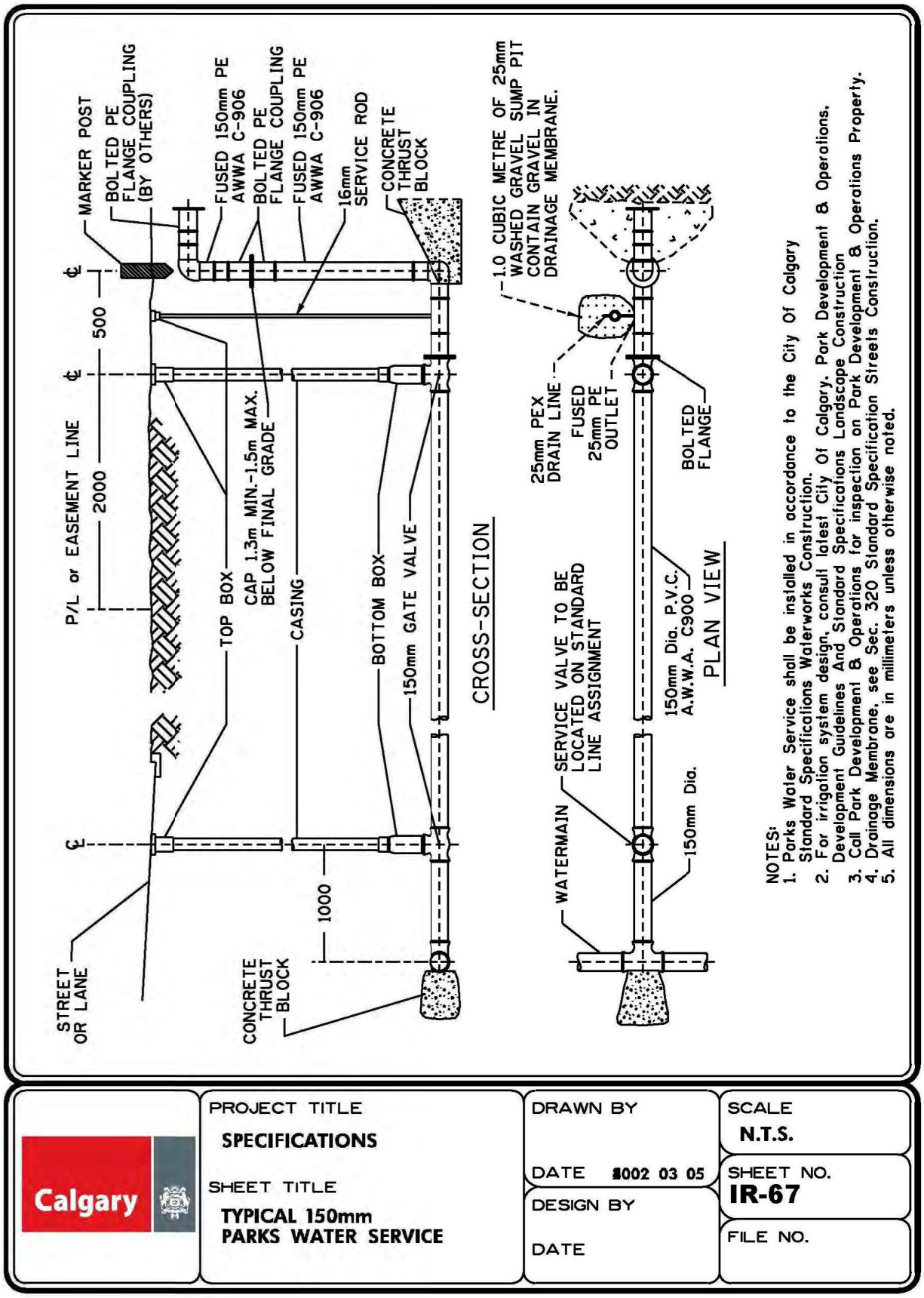
1. FOR VALVE BOX SPECIFICATIONS REFER TO SPECIFICATION SECTION 8.2.10.
2. USE PREMANUFACTURED EXTENSIONS WHEN OBTAINING PROPER HEIGHT OF BOXES.
3. ALL DIMENSIONS ARE IN MILLIMETRES UNLESS OTHERWISE NOTED.

Calgary	PROJECT TITLE **SPECIFICATIONS** SHEET TITLE **50mm TEE HOOK-UP (PVC)**	DRAWN BY **TCP** DATE **2016/08** DESIGN BY DATE	SCALE **N.T.S.** SHEET NO. **IR-65** FILE NO.

Detail Sheet IR-66: 50 mm Parks Water Service

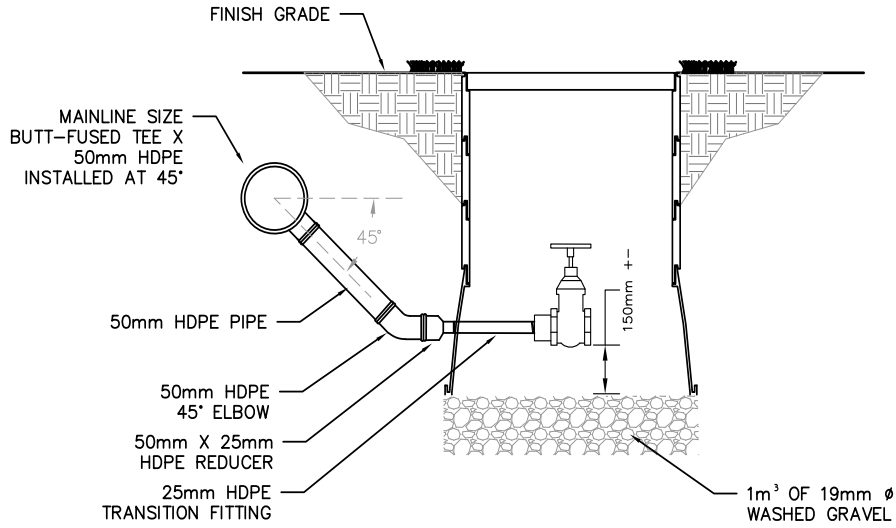


Detail Sheet IR-67: 150 mm Parks Water Service

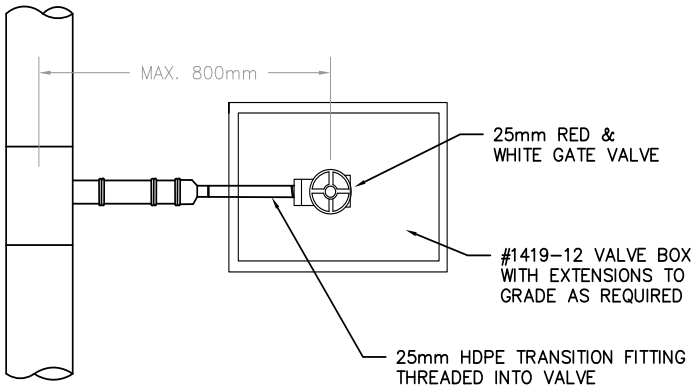


REVISED!

Detail Sheet IR-68: Drain Pit for High Density Pipe



ELEVATION



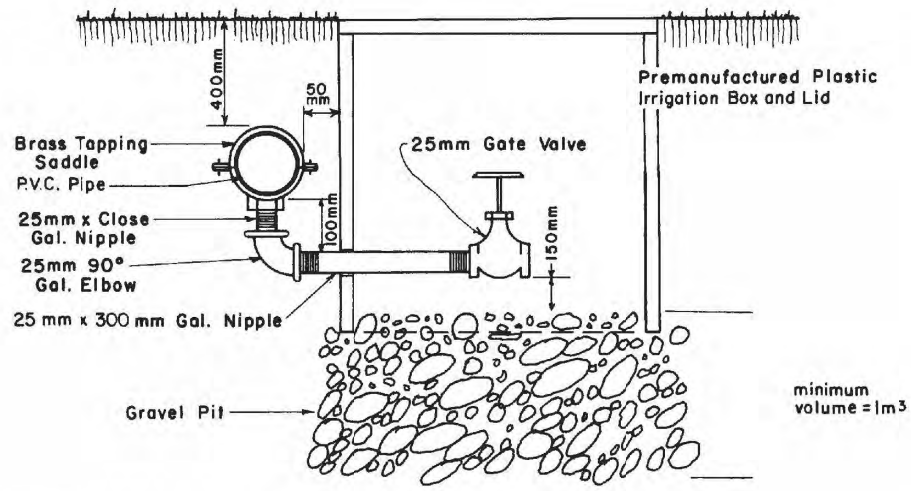
PLAN

NOTES:

1. LOCATE DRAIN PITS AT LOWEST RELATIVE GRADE TO ENSURE POSITIVE GRAVITY DRAINAGE. NUMBER AND LOCATION OF DRAIN PITS WILL DEPEND ON TOPOGRAPHIC CONDITIONS AND EXTENT OF SYSTEM.
2. SIZE OF DRAINAGE PIT SHALL VARY WITH PIT CONDITIONS AND PIPE SIZE

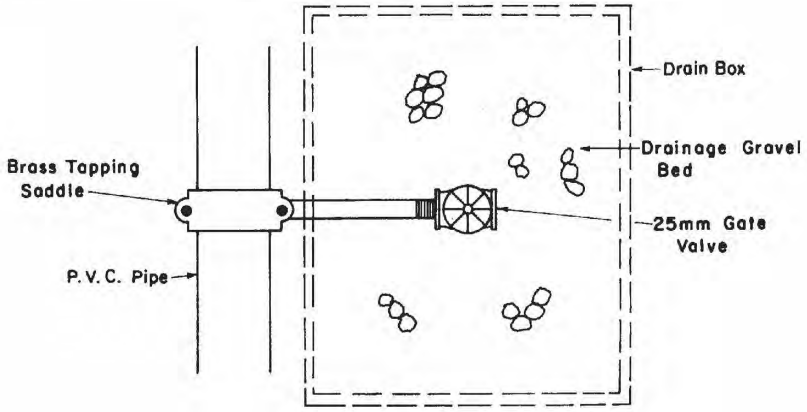
Calgary	PROJECT TITLE **SPECIFICATIONS** SHEET TITLE **DRAIN PIT FOR HIGH DENSITY PIPE**	DRAWN BY **DB** DATE **2020/12/18** DESIGN BY DATE	SCALE **N.T.S.** SHEET NO. **IR-68** FILE NO.

Detail Sheet IR-69: Drain Pit for PVC Pipe



Use premanufactured extensions when obtaining proper height of boxes.

Elevation



Plan

NOTE;

1. Locate Drain Pits at lowest relative grade to ensure positive gravity drainage. Number and location of Drain Pits will depend on topographic conditions and extent of system.
2. Size of Drainage Pit shall vary with pit conditions and pipe size
3. For Medium Density Polyethylene Pipe installation, use Double Clamped Insert Fittings in lieu of Brass Tapping Saddle.

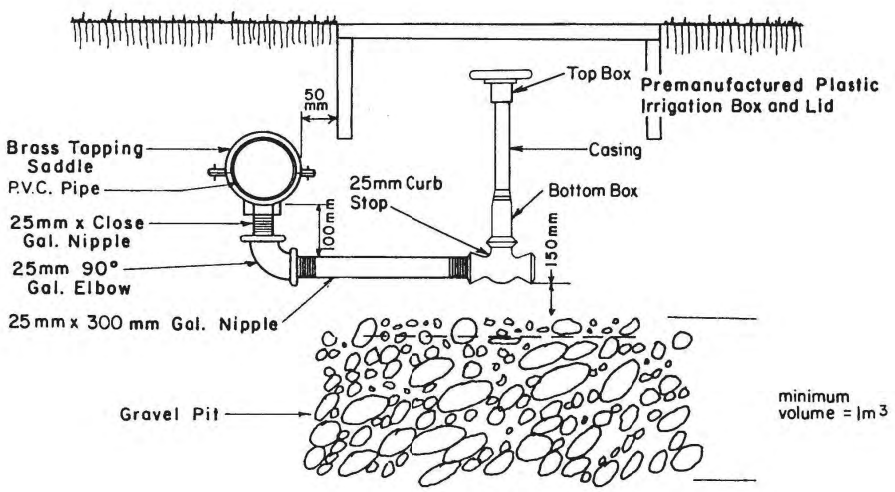
-Box Measurements: (all outside measurements)

Bottom.....	391mm x 536mm
Top.....	298mm x 431mm
Height.....	304mm

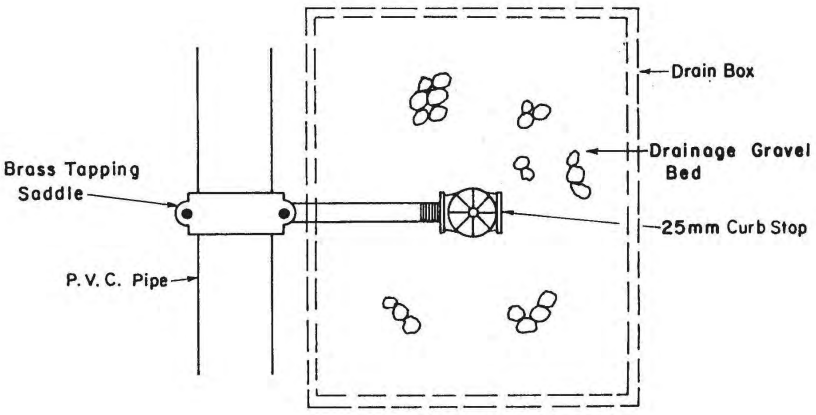
METRIC

Calgary	PROJECT TITLE SPECIFICATIONS SHEET TITLE DRAIN PIT FOR P.V.C. PIPE	DRAWN BY W.B. DATE 1997 03 08 DESIGN BY DATE	SCALE N.T.S. SHEET NO. IR-69 FILE NO.

Detail Sheet IR-70: 25 mm Curb Stop Assembly



Elevation



Plan

NOTE;

1. Locate Drain Pits at lowest relative grade to ensure positive gravity drainage. Number and location of Drain Pits will deperd on topographic conditions and extent of system.
2. Size of Drainage Pit shall vary with pit conditions and pipe size
3. For Medium Density Polyethylene Pipe instalation, use Double Clamped Insert Fittings ir lieu of Brass Tapping Saddle.

-Box Measurements: (all outside measurements)

Bottom.....	391mm x 536mm
Top.....	298mm x 431mm
Height.....	304mm

METRIC

Calgary	PROJECT TITLE SPECIFICATIONS SHEET TITLE 25mm CURB STOP ASSEMBLY	DRAWN BY W.B. DATE 1997 03 08 DESIGN BY DATE	SCALE N.T.S. SHEET NO. IR-70 FILE NO.