

# **Unearthing Pipestone:**

## **A Design Strategy for the Proposed Pipestone Creek Dinosaur Museum**

**by Kathryn J. Glendinning**

A Practicum submitted to the Faculty of Graduate Studies of  
The University of Manitoba  
in partial fulfilment of the requirements of the degree of  
**MASTER OF LANDSCAPE ARCHITECTURE**

University of Manitoba

Winnipeg

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**Pipestone Creek Dinosaur Museum**

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### Committee Members

Alan Tate – Chair  
Heather Cram – Internal Examiner  
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## **Abstract**

The discovery of one of the world's most dense dinosaur bonebeds, which holds the remains of a previously unknown species of dinosaur, creates a unique set of issues not only from the perspective of the palaeontologist, but also from the perspective of the site designer. How can the realms of science and tourism work together? How does one specialised role support the other? Within this practicum these questions are explored and a design strategy is presented that displays how a significant palaeontology site can be developed in a manner which responds to the unique circumstances existing at Pipestone Creek. Guidelines have been developed to respond to user needs, to site conditions and to flexible site and resource boundaries. The strategy and these guidelines have then been applied to the Pipestone Creek site and a design solution has been presented.

## Acknowledgements

I would like to thank my various 'practicum therapists' who have taken various forms over the past few years. Thank you for listening, helping me laugh, helping me gain a little perspective, ranting with me and for lighting the fire when needed. It has been a very long journey, but without the various pit stops and without your support I never would have reached this point. Again, thank-you.

To my parents, thank you for throwing this site onto my lap, oh so many Christmases ago and supporting me without question. To all my friends, especially the Crazy Ladies, my masters education would never have been the same or as fun without you. And, to my committee, Alan, Blake and Heather, thank you for your patience, guidance and steering me in various directions. Ultimately, it benefited my work and helped me realise the endless possibilities of what landscape architects may accomplish.

## Dedication

To all the UofM design students.

Yes, sometimes it is worth taking five years to complete your masters.

*"Design is easy. All you do is stare at the screen until drops of blood form on your forehead." – Marty Neumeier*

	<b>Abstract</b>	<b>i</b>
	<b>Acknowledgements</b>	<b>ii</b>
	<b>Contents</b>	<b>iii</b>
	<b>List of Figures</b>	<b>vi</b>
	<b>List of Tables</b>	<b>xi</b>
<b>1</b>	<b>Introduction</b>	
	Introduction	1
	Vision and Intent	2
	Objectives	4
<b>2</b>	<b>Beginnings</b>	
	What is Landscape?	5
	Landscape Narratives	6
<b>3</b>	<b>Pipestone Creek's Record</b>	
	Site History	
	i. Geological History	11
	ii. County of Grande Prairie No. 1	16
	iii. Pipestone District	19
	iv. First Nation Presence	22
	v. Pipestone Creek Park	24

	Site Palaeontological Significance	
	i. The Bonebed	28
	ii. The Dinosaur	35
	iii. Fossilisation	39
<b>4</b>	<b>Potential and Learning from Others</b>	
	Tourism and Target Markets	46
	Precedent Analysis	
	i. Palaeontology Interpretative Areas	58
	ii. Archaeology Interpretative Areas	62
	iii. Recreation Areas	66
<b>5</b>	<b>The Influences</b>	
	Palaeontology Approach	71
	First Nation Understanding	72
	Landscape Values	
	i. UNESCO Criteria	73
	ii. Parks Canada Principles	75
	iii. Heritage Preservation Services Definitions	78
	2005 Alberta Centennial Legacy Program	80
	Site Analysis	83
<b>6</b>	<b>Pipestones' Skeleton</b>	
	Character and Design Imagery	107
	Areas of Development	116
	Design Guidelines	136

## **7      Unearthing Pipestone**

Conceptual Design Solution and  
Details

**144**

## **Appendix**

- A      World Heritage Convention and Outstanding Value Criteria**
- B      IUCN Fossil Site Evaluation Checklist**
- C      Parks Canada: Framework for Selecting Sites for the Tentative List**
- D      National Park Service and Heritage Preservation Services Defining Landscape Terminology**
- E      Pipestone Creek Park Staging Plan**
- F      Pipestone Creek Park Programme and Standards**
- G      Pipestone Creek Park Programme & Standards Applied in the Proposed Design Solution**

## **Bibliography**

## List of Figures

Fig. 2.0 Published Definitions of 'landscape'	5
Fig. 2.1 The World's Largest Dinosaur	7
Fig. 2.2 Use of dinosaur iconography by local merchants	7
Fig. 3.1 Earth's Geologic Timeline	12
Fig. 3.1 Jurassic Alberta	14
Fig. 3.2 Cretaceous Alberta	14
Fig. 3.3 Vegetation of the Late Cretaceous Period	15
Fig. 3.4 Vegetation of the Late Cretaceous Period	15
Fig. 3.5 "La Grande Prairie" Settlement Pattern	18
Fig. 3.6 Map Showing the first 50 years of development along the Wapiti	19
Fig. 3.7 VanHorne Sawmill	20
Fig. 3.8 Carl Brooks Outfitter	20
Fig 3.9. The Pipestone Creek Store & Post Office	21
Fig. 3.10 Wapiti-Pipestone Ferry	21
Fig. 3.11 Community Picnic	22
Fig. 3.12 <i>Pachyrhinosaurus</i> reconstruction	28
Fig 3.13 Pipestone Creek Bonebed Location	30
Fig. 3.14 Pipestone Creek Bed	30
Fig. 3.15 Effects of Coring Study on Site	31
Fig. 3.16 Pipestone Creek	32
Fig. 3.17 Fossil discoveries in NW Alberta & NE B.C.	33
Fig. 3.18 Fossil discoveries sites in the Grande Prairie Area	34
Fig. 3.19 Cast of the <i>Pachyrhinosaurus</i> fossil	35
Fig. 3.20 Cranial Characteristic of Pipestone Creek <i>Pachyrhinosaurus</i>	36
Fig. 3.21 Quadrupe Trackways	37
Fig. 3.22 Size of Pipestone Creek <i>Pachyrhinosaurus</i>	38
Fig. 4.0 The Northern Alberta Heritage Trail	46
Fig. 4.1 The Deh Cho Travel Connection	47
Fig. 4.2 Distance Chart	49
Fig. 4.3 National and Provincial Parks in north-western North American	50
Fig. 4.4 Promotion of Alberta's Dinosaur Sites	51

Fig. 4.5 Promotion of fossil findings in the Peace River Region	52
Fig. 4.8 Existing Recreational Areas In the Grande Prairie Area	54
Fig. 4.9 Distances Between Existing Recreation Areas	55
Fig. 4.10 Potential Parkways In the Grande Prairie Area	55
Fig. 4.11 Potential Pipestone Creek Parkway Timeline	56
Fig. 4.12 Fossil Enclosure Structures	58
Fig. 4.13 Fossil Left In-Situ	59
Fig. 4.14 Park Interpreters	59
Fig. 4.15 Trail Signage at RTM	60
Fig. 4.16 Exploration Trail	60
Fig. 4.17 "Dinosite" Tour at RTM	61
Fig. 4.18 Interior Exhibit	64
Fig. 4.19 Engraved Trail Markers	64
Fig. 4.20 Approach to Death Site	65
Fig. 4.21 Trail through park	66
Fig. 4.22 Native Grassland	66
Fig. 4.23 Approach to Bird Viewing Platform	67
Fig. 4.24 Interpretative Signage	67
Fig. 4.25 Universal Accessible Trail	68
Fig 5.0 Map of Alberta with Peace River Region	83
Fig 5.1 Vehicular Access to Pipestone Creek	85
Fig 5.2 Existing Pipestone Creek Park Features	87
Fig. 5.3 Existing Slope Analysis	93
Fig. 5.4 Existing Profiles	94
Fig. 5.5 Flood Lines	95
Fig. 5.6: Potential Vehicular Links Access	102
Fig. 5.7: Potential Pedestrian Connections	102
Fig. 5.8: Public and Private Development Zones	103
Fig. 6.0 Imagery Collage	110
Fig. 6.1 Potential Vista Development	111
Fig. 6.2 Precedent Design Vocabulary	112
Fig. 6.3 Precedent Design Vocabulary	113
Fig. 6.4 Wayfinding Design Concepts	114
Fig. 6.5 Fencing and Seating Design Concepts	115

Fig. 6.6: Pipestone Creek Baseline Drawing with Potential Development Areas Identified	117
Fig. 6.7: Agricultural land adjacent to existing park entry.	118
Fig. 6.8: Clearing along entry drive to existing Pipestone Creek Park	119
Fig. 6.9: Entry drive	119
Fig. 6.10: Vista along entry drive	119
Fig. 6.11: Example of existing signage.	121
Fig. 6.12: Existing grading.	121
Fig. 6.13: Existing trail to creek.	122
Fig. 6.14: Typical surfacing	122
Fig. 6.15: Affects of slope stability test adjacent to bonebed.	124
Fig. 6.16: Layers of sedimentary rock along creek bank.	125
Fig. 6.17: Existing Pipestone Creek museum.	127
Fig. 6.18: Day use area playground.	127
Fig. 6.19: Fencing as safety barrier..	128
Fig. 6.20: Access point to Pipestone Creek.	128
Fig. 6.21: Campsite in multi-day-use area.	130
Fig. 6.22: Open play area in multi-day-use area.	130
Fig. 6.23: Recreation space and view towards Wapiti River.	131
Fig. 6.24: View towards boat launch area from south banks of Wapiti River	132
Fig. 6.25: Pedestrian access to Wapiti River.	133
Fig. 6.26: Topography along Old Ferry road.	134
Fig. 6.27: View towards the Pipestone Bonebed	135

## List of Tables

Table 5.0: Slope Conditions and Development Issues	92
Table 5.1: Temperature (°C)	96
Table 5.2: Humidity	97
Table 5.3: Wind	97
Table 5.4: Wind Chill	97
Table 5.5: Precipitation (mm)	98
Table 5.6: Bright Sunshine	98

# 1 Introduction

The following practicum presents a design strategy for a proposed dinosaur museum in northwestern Alberta. The proposed Pipestone Creek dinosaur museum is currently being developed by the County of Grande Prairie to rival in size and consequence the Royal Tyrrell Museum in Drumheller, Alberta. Similar to the Royal Tyrrell Museum, the Pipestone Creek Museum will provide a education based experience for visitors and establish a scientific research center for paleontologists in northwestern Alberta. However, the Pipestone Creek Museum site differs from the Royal Tyrrell as the site development will not be static, will not be set in one time frame. The approach to the development of Pipestone Creek will be evolutionary. Pipestone Creek is an active palaeontological site, where the significant finding is a previously unidentified dinosaur. The hard boundaries of the site are flexible, as the extent of this relatively new fossil discovery is unknown. It is for this reason that there will be a continually shift between tourism and science at Pipestone. Flexible, adaptable and responsive design to the functions and context is require at Pipestone, therefore design guidelines have been developed. This type of design strategy addresses the need for versatility on site and allows the site to be 'unearthed' as time passes as different design interventions and solutions are required by the users.

## Vision and Intent

The vision for this practicum is to establish a design strategy that could be used to cultivate the site as a tourist destination, where the interpretative areas and boundaries of the park evolve with the scientific activity on site and the passing of time. Establishing and developing “Pipestones’ Skeleton”, as detailed in Chapter 6, is a method of creating the framework from which design solutions may be presented that embrace the natural character of the site but that still reveal and unearth the pre-history of Pipestone Creek and its significance. This type of framework allows a staging plan to be established, where the design may evolve over a number of years, yet all development is rooted within one unifying vision for the site.

At the core of the staging plan is a series of design guidelines, a list of design opportunities and a design program with standards which heighten the interpretation of the fossil resource found in northwestern Alberta. Prior to establishing the staging plan, the site was divided into areas of development. These seven areas were defined by the existing conditions and activity zones, as well by the potential development and opportunities. The intent for this practicum study is to apply the design guidelines and standards to the Pipestone Creek site. As a result conceptual design of two of the identified design areas and details driven by the site specific standards are presented. By referring to and using these documents (see Chapter 6 & Appendices D,E,F), a site topology and character is established. The site is evolutionary in nature and hard boundaries and design interventions fixed in time would not be appropriate at this time, as the site and the exploration of the fossil finding is an additive process which will respond to the on-going scientific research. Despite this constraint, four scales were explored in the approach to this work. They are:

- i. MACRO: Examination of the site and how to ensure that it merges appropriately with the existing tourism context of Alberta.
- ii. REGIONAL: Examination of the site in response to the context of the County of Grande Prairie.
- iii. PARK: Examination of the elements on site and their relationship with the potential design areas and opportunities at Pipestone Creek. Exploration of how these conditions will be developed and emerge as a cohesive interpretative park.
- iv. USER: Examination of the user groups and investigation of their unique site demands and interaction with the fossil resource.

The rationale and intent for developing a 'staging' plan versus a 'master' plan or 'site development' plan is that, as previously stated, the limits of the site are inherently flexible. Time, erosion, and further exploration of the space, allow the boundaries of the site to evolve as the extent of the fossil deposit is still unknown, and only with time can the parameters of the area begin to reveal themselves. The idea of 'master plan' or 'site development plan' implies a notion of a fixed point or firm understanding of the project boundaries. Therefore by proceeding under the concept of a design strategy, the project embraces the notion that this is an evolving site that will undergo various stages in its development and expression of use. (See Appendix E for the detailed Pipestone Creek Staging Plan.)

## Objectives

The three primary objectives to be met by the design strategy for the proposed Pipestone Creek dinosaur museum are to:

- i. Be responsive to the unique relationships that exists on site.  
Use design and the development of a design strategy as an act of mediation between science and tourism at Pipestone Creek.
- ii. Use UNESCO World Heritage List criteria and Parks Canada Standards and Guidelines for the Conservation of Historic Places in Canada, as the basis for the development of the design guidelines and staging plan.
- iii. Demonstrate the potential application of the strategy through the conceptual design for two potential areas of development in the site.

# 2 Beginnings

## What is landscape?

*"Landscape: the external world mediated through human subjective experience"*

– Denis Cosgrove<sup>1</sup>

What is *landscape*? If one were to ask ten individuals, it is likely you would receive ten different answers. It can be argued the 'definition' of *landscape* is subjective, personal, depending on an individual's life experiences. *Landscape* can therefore be described as a concept rather than being given a finite definition. As Lucy Lippard describes in her book The Lure of the Local the notion of *landscape* "is everything you see when you go outdoors – if you're looking. It's what

property are kept out where the government does not guarantee their validity (*compare* LAND TITLES OFFICE).  
**landscape** • *noun* **1** natural or imaginary scenery, as seen in a broad view. **2** a picture representing this; the genre of landscape painting. **3** (of a page, book, etc., or the manner in which it is set or printed) having or in a rectangular shape with the width greater than the height (*compare* PORTRAIT **3**). **4** the general characteristic of an activity, field, sphere, etc.; *the political landscape*.  
 • *verb* (**landscapes**, **landscaped**, **landscaping**)  
 alter (a piece of land) by landscape gardening.  
**► landscaper** *noun* **landscaping** *noun*  
**landscape architect** *noun* a person who designs outdoor environments, esp. parks or gardens together with buildings and roads.  
**landscape architecture** *noun* the art or practice of planning and designing the outdoor environment, esp. parks or gardens together with buildings and roads.  
**landscape gardener** *noun* a person who lays out grounds in a way that is ornamental or that imitates natural scenery.  
**landscape gardening** *noun* the art or practice of laying out ornamental grounds or grounds imitating natural scenery.  
**landslide** *noun* **1 a** the sliding down of a mass of land from a mountain, cliff, etc. **b** the mass of land which

Fig. 2.0 Published Definitions of 'landscape'

Source: Student's Oxford Canadian Dictionary.  
 Oxford University Press, 2004. (pg. 574)

you see from a single (static or mobile) point of view – a set of surfaces, the pictorial or the picturesque"<sup>2</sup>. If one were to accept this account of *landscape*, it is reasonable to suggest that there are endless means of experiencing and shaping one's account of *landscape*. It can be through the act of viewing the countryside from a car window, by hiking through a network of trails, sitting in an urban plaza or walking the fanciful streets of a theme park. Ultimately, it is the spaces which help

form and determine an individual's *landscape*, "the spatial experience of a landscape can be impressive because it evokes a known place or, on the other hand, because it is so unfamiliar"<sup>3</sup>. One particular means of expanding an individual's concept of landscape is through tourism-based activities, and one current trend in tourism is the dinosaur-based experience or paleo-tourism. Paleo-tourism can evoke a sense of childlike wonder when an individual is offered the opportunity to begin to visualise how and where these mysterious creatures once roamed and lived in environments which are foreign yet familiar. This type of education-based tourism allows an opportunity to engage the users with the landscape and become a part of its narrative.

*"I suspect no landscape, vernacular or otherwise, can be comprehended unless we perceive it as an organisation of space; unless we ask ourselves who owns or uses the spaces, how they were created and how they change. – John Brinckerhoff Jackson"*<sup>4</sup>.

## Landscape Narratives

Within every landscape, however defined, there are narratives that are waiting to be discovered and read. These narratives are created by the natural processes and cultural practices acting on the landscape<sup>5</sup>. However, to move beyond explicitly divulging the narrative, one must move beyond the site analysis of a site and begin to engage the allegorical texts of the landscape. By the development of design character and imagery, it is intended that a narrative be created within the Pipestone Creek site which displays and tells the story of the fossilised dinosaur and how time, layering, and the process of erosion have influenced the site. However, the intention of this *narrative* will be to allow for an understanding of the site by avoiding the use

of explicit references (e.g. typical dinosaur icons, see Figures 2.1 & 2.2) or the creation of a veneer of representation, where dinosaur sculptures are applied on the site as gimmicks in contrast to incorporating the iconography with the site. As Michael Benedikt states in *For an Architecture of Reality*, "symbols can be non-significant, things can be significant and not be symbolic; between symbolism and significance, significance has the existential import and is the larger category"<sup>6</sup>. The design guidelines and staging plan build upon the idea that within the current Pipestone Creek landscape there is a **process** narrative, and there exists the opportunity to evolve this site into an **interpretative landscape**. A **process** narrative is described as "actions or events that are caused by some agency (wind, water, economics) and occur in succession or proceed in stages toward some end (progress; entropy). Erosion, growth, succession, restoration, demolition, and weathering are visible records of change that inscribe time into landscape form"<sup>7</sup>.

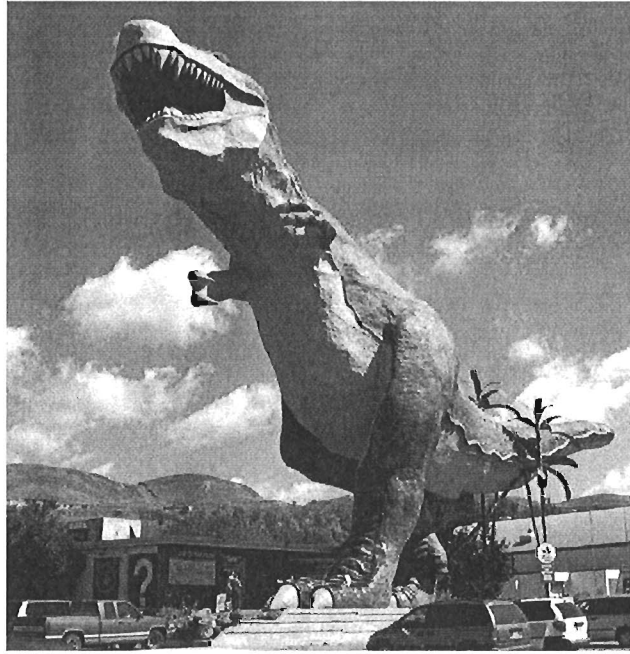


Fig. 2.1 *The World's Largest Dinosaur* – Drumheller tourist information center.

Source: photo by author, August 10, 2004



Fig. 2.2 Use of dinosaur iconography by local merchants.

Source: photo by author, August 10, 2004

Whereas a ***interpretative landscape***, as described by Matthew Potteiger, is a landscape where “elements and programs tell what happened in a place, the intent is to make existing or ongoing narratives intelligible”<sup>8</sup>. The notion of a ***themed landscape*** will also be explored. The aim, however, is not to create a ‘Disneyfied’ Pipestone Creek Park but rather to design elements that may be conducive to a ***interpretative landscape*** rather than a ***storytelling landscape***.

***Storytelling landscapes:*** *places designed to tell specific stories with explicit references to plot, scenes, events, character, etc. the stories may be either existing literary or cultural narratives or produced by the designer*<sup>9</sup>.

***Themed landscape:*** *for very different purposes themed landscapes shape and reconstitute memory into clear, controlled narrative tableaux....as a phenomenon of the late 20<sup>th</sup> century, the themed landscape serves a more pervasive nostalgia and compensates for a sense of fragmentation and lack of security outside its bounds*<sup>10</sup>.

The Pipestone Creek ‘theme’ will evolve and be expressed through the use of organic and fabricated materials, standard furnishing, way-finding signage and surface treatments.

As Matthew Potteiger and Jamie Purinton outline in Landscape Narratives: Design Practices for Telling Stories, narratives begin to link the sense of time, event, memory and other intangibles to the more tangible aspects of a place<sup>11</sup>. Throughout this practicum, narratives are built upon the inherent qualities of the site. These are stories that have built up as “layers of history, organised sequences...and traces within the landscape which hold secrets and invite interpretation”<sup>12</sup>. The development of the narrative within the site becomes critical because it is through the unfolding of the site’s natural processes and human forces that the users will

become familiar with Pipestone Creek and the processes that have affected this area. As a designer, it is important to recognize these factors and allow them to be articulated in the design development. Ultimately, it is through the articulation of these factors that the site topology and character is cultivated. The narratives that will be drawn upon from Pipestone Creek include:

### **Non-human Factors**

- i. **Reveal (erosion):** erosion has begun to expose portions of the *Pachyrhinosaurus* fossils that formed over the span of 73 million years, and it is the force of further erosion that may begin to reveal fossils that could be studied in the future.
- ii. **Layering:** the layering of sedimentary rocks helped create the appropriate conditions for the rare occurrence of fossilisation.
- iii. **Time:** time is essential to the fossilisation process and time will begin to influence how this site is experienced.
- iv. **Geomorphology:** the landforms and how they were created.
- v. **Hydrology:** water shaped the landscape, water is the cause of the mass mortality event and water erosion has played a significant role in exposing the fossils.

### **Human Factors**

- i. **Temporary:** the fluctuating and various numbers of visitors and scientists will create a unique expression in the landscape in terms of how they move through and within the site.
- ii. **Shift:** the transfer from scientific exploration to tourism/exploration for the general public.

- i. **History:** the prehistoric landscape and the settlement of the Pipestone Creek area influenced the development and formation of the Pipestone Creek park and its surroundings.

## Endnotes

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<sup>1</sup> Lippard, Lucy R.. The Lure of the Local: senses of place in a multicentered society. New York: The New Press, 1997, 7.

<sup>2</sup> Ibid, 8.

<sup>3</sup> Ibid, 9.

<sup>4</sup> Ibid, 8.

<sup>5</sup> Potteiger, Matthew and Purinton, Jamie. Landscape Narratives: Design Practices for Telling Stories. Toronto: John Wiley & Sons Inc., 1998, 19.

<sup>6</sup> Benedikt, Michael. For an Architecture of Reality. New York: Lumen Books, 1987, 38.

<sup>7</sup> Potteiger, Matthew and Purinton, Jamie. Landscape Narratives: Design Practices for Telling Stories. Toronto: John Wiley & Sons Inc., 1998, 11.

<sup>8</sup> Ibid, 11.

<sup>9</sup> Ibid, 11.

<sup>10</sup> Ibid, 18.

<sup>11</sup> Ibid, xi.

<sup>12</sup> Ibid, xi, 5&6.

# 3

## Pipestone Creek's Record

### Site History

#### i. Geological History

The science of studying geographic environments, with the goal of trying to model and interpret them on the basis of climatic and geologic evidence is known as paleogeography<sup>1</sup>. Integral to this realm of science is an understanding of the earth's geological history. Each era and period of Earth's approximate 4.6 billion year history has a unique paleogeography, which is reflected by the shifts in land and sea, the modifying climatic regions, and the evolving plant and animal distribution<sup>2</sup>. The time period which represents the condition of the environment when the Pipestone Creek *Pachyrhinosaurus* would have inhabited the Peace River Region is the Late Cretaceous period, within the Late Mesozoic Era. The Late Cretaceous period is believed to have lasted 79 million years and the Mesozoic Era ended 65 million years ago<sup>3</sup>. If one were to use a 24-hour time period to represent the Earth's history, only 26 minutes of this representative time frame would be consumed by the Mesozoic Era and roughly 11 1/2 minutes would correspond to the Late Cretaceous period of the *Pachyrhinosaurus* (see to figure 3.0).

ERA	PERIOD	EPOCH	DISTINCTIVE FEATURES	MILLIONS OF YEARS AGO	PERCENT OF EARTH'S HISTORY
Cenozoic	Quaternary	Holocene	Modern humans	.01	.04%
		Pleistocene	Early humans; glaciation	2.4	
	Tertiary	Pliocene	Large carnivores	5	1.3%
		Miocene	Abundant grazing mammals	24	
		Oligocene	Large running mammals	37	
		Eocene	Modern types of mammals	58	
		Paleocene	First placental mammals	65	
Mesozoic	Cretaceous		First flowering plants; climax of dinosaurs, followed by extinction	144	3.6%
	Jurassic		First birds, first true mammals; many dinosaurs	208	
	Triassic		First dinosaurs; abundant cycads and conifers	245	
Paleozoic	Permian		Extinction of many kinds of marine animals including trilobites; continental glaciation in Southern Hemisphere	286	8.0%
	Carboniferous	Pennsylvanian	Great coal swamps, conifers; first reptiles	320	
		Mississippian	Sharks and amphibians; large-scale trees and seed ferns	360	
	Devonian		First amphibians; fishes very abundant	408	
	Silurian		First terrestrial plants	440	
	Ordovician		First fishes; marine invertebrates	505	
	Cambrian		First abundant record of marine life; trilobites and brachiopods dominant	570	
PROTEROZOIC	Precambrian		Limited evidence of abundant algae	2.5 Billion	87.0%
ARCHEOZOIC			Oldest rocks	4 Billion	

Fig. 3.0 Earth's Geologic Timeline

base image source: Parker, Steve. (Bernor, Raymond L., Editor). The Practical Palaeontologist: A Step-By-Step Guide to Finding, Studying, and Interpreting Fossils, From Searching For Sites To Extracting, Cleaning, And Restoring Finds. Toronto: Simon & Schuster Inc., 1990.

The Pipestone Creek Pachyrhinosaurus fossils are dated roughly to 73 million years ago, when the physical geography of north-western Alberta would have been significantly different. Scientific evidence suggests that during the Mesozoic Era the continents were uniting to create the super-continent Pangaea (Pangaea meaning 'all lands')<sup>4</sup>. The area which is present-day Alberta "rose and fell as Pangaea drifted about, building land mass when submerged, losing it to erosion during periods of uplift"<sup>5</sup>. When the Mesozoic Era commenced approximately 245 millions years ago, large amounts of muddy water began to filter into the coastal waters, and with time the once clear Paleozoic seas disappeared and Alberta's coastline evolved into one of "muddy deltas and inland swamps"<sup>6</sup>. As the landscape evolved from the Jurassic Period into the Cretaceous Period a polar sea, significantly warmer than the present-day Arctic Ocean, extended over northern Alberta<sup>7</sup> (see Figures 3.1 & 3.2). Barbara Huck and Doug Whiteway describe Alberta's Mesozoic landscape as being:

*"fertilised by volcanic ash and nourished by abundant rainfall, lush forests of magnolias, sycamores, figs and ferns, conifers and chestnuts covered the new slopes and the swampy coastal margins of the Bearpaw Sea, which lay inland over the south-eastern part of the province. Rotting vegetation was quickly buried in these swamps, to be transformed into the coal that would one day fuel a province"*<sup>8</sup>.

This changing prehistoric climate allowed for an array of vegetation and animals to flourish, and the presence and evolution of the first flowering plants became characteristic of the Cretaceous landscape<sup>9</sup>. There is evidence to suggest that it was during the Late Cretaceous Period that flowering plants began to use the plant-eating dinosaurs as a medium for reproduction and seed dispersal<sup>10</sup>.

In the Mesozoic Era, unlike previous Eras, the rivers that traversed the region that would one day become Alberta, flowed eastward, shaping the landscape while depositing sediment from the emerging Rocky mountains in the west towards the easterly retreating Bearpaw Sea, and it was these deposits that laid the foundation of what would become Alberta's plains<sup>11</sup>. By the end of the Late Cretaceous period a Florida Everglades-like climate prevailed in the deltas, although the structure of the present-day Alberta landscape was in place<sup>12</sup>.

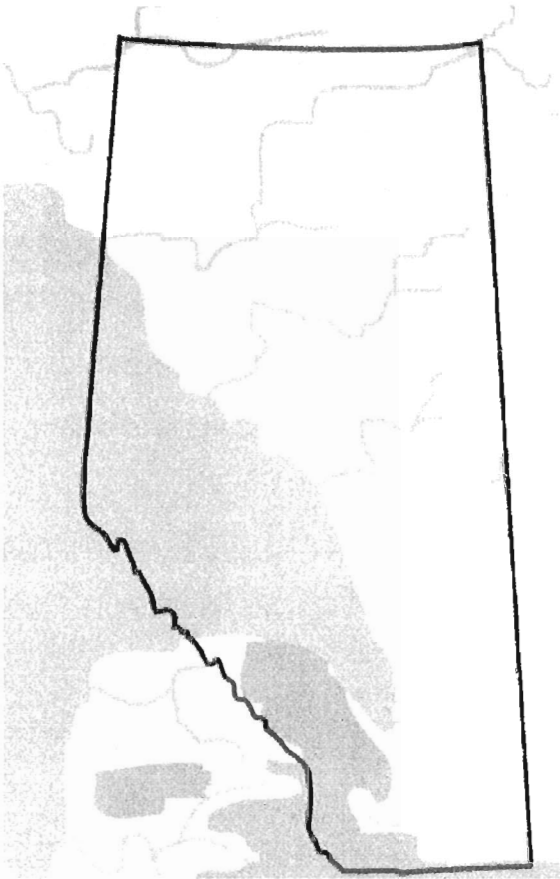


Fig. 3.1 Jurassic Alberta

Source: Huck, Barbara, Whiteway, Doug. In Search of Ancient Alberta. Winnipeg: Heartland Publications. 1998. 24.



Fig. 3.2 Cretaceous Alberta

Source: Huck, Barbara, Whiteway, Doug. In Search of Ancient Alberta. Winnipeg: Heartland Publications. 1998. 24.



Fig. 3.3 & 3.4 Vegetation of the Late Cretaceous Period is thought to be similar to present-day Florida Everglades.

Source: photo by author January 28, 2005.

Roughly 13,500 years ago, the glaciers retreated from the present-day Grande Prairie region, and as this occurred meltwaters flooded 30,000 square kilometres of the Peace River District<sup>13</sup>. This vast reservoir (five times the size of Prince Edward Island) of icy water which covered the majority of Northwestern Alberta, was known as Glacial Lake Peace<sup>14</sup>. Glacial Lake Peace, would have been frigid, forbidding and littered with icebergs, the shorelines shifted with time, however the lake is believed to have existed for approximately 3,000 years<sup>15</sup>. Over these years, a thick blanket of silt had been laid, and this is the legacy of Glacial Lake Peace, the deep fertile alluvial soils, which established this region of Alberta as a breadbasket and Canada's most northerly agricultural zone<sup>16</sup>. Saskatoon Mountain

emerged as an island around 12,000 years ago as the lake began to drain. Glacial Lake Peace continued to dissipate and disappeared 10,700 years ago, however what remains of this grand body of water is the present-day drainage system<sup>17</sup>. The authors of In Search of Ancient Alberta described the formation of the contemporary land form found within Northwestern Alberta as

*"once the water was gone, fine-grained sediments that had been deposited on the bottom and shores of the lake were exposed to the eroding force of the wind. ...the layers of sand are a natural archive, retaining a record of climate change and evidence of the forest fires that repeatedly swept the area until about 5,000 years ago, when at last the landform stabilised"*<sup>18</sup>.

## **ii. County of Grande Prairie No. 1**

In 1879, the region which encompasses the present day County of Grande Prairie, within the Peace River Region of Alberta, was extensively explored and mapped by George Mercer Dawson for the Geological Survey of Canada<sup>19</sup>. Dawson's exploration was initiated by Alexander Mackenzie's acquisition of the Pacific Ocean route in 1792, and his impression of the area were as follows:

*"...the so called 'grande prairie' is a tract of country forty miles in extreme length in a Northeast and Southwest direction...it is not monotonously undulating like that described to the north, but may be rather described as a series of gently sloping ridges...the soil is almost everywhere exceedingly fertile and is often for miles together of deep rich loam which it would be impossible to surpass in excellence"*<sup>20</sup>.

However, it was not until 1951 that the landscape Dawson documented officially became Alberta's first recognised county<sup>21</sup>. The County of Grande Prairie, particularly the sloping ridges of the 'grande prairie', is home to various eco-regions. There is the mixed wood boreal forest of the Saddle Hills in the north, the mixed wood forest of the lower foothills of the Rockies in the west, the balsam poplar parklands in the eastern section and the boreal highland forests of the south<sup>22</sup>.

Approximately forty percent of the land within the county boundaries is farmland, and these agricultural districts have been proclaimed as being the most fertile and northerly in the world<sup>23</sup>. It was at the onset of the 20<sup>th</sup> Century that pioneers began to settle not only the area surrounding Pipestone Creek but the entire County of Grande Prairie<sup>24</sup>. Pioneers migrated towards this area of the Peace River region to take advantage of the bountiful agricultural land. Between 1907 and 1914 the 'grande prairie' experienced the greatest influx of settlers, (Fig. 3.5), however those pioneers who arrived after 1912 had to be content with inferior homesteads found between Saskatoon mountain and the Wapiti River<sup>25</sup>. Evidence of the county's rich soils can be traced back to the long history of local farmers producing award-winning crops, such as Pipestone Creek district resident J.B. LaPlace who received second place for wheat at the 1933 World Exhibition in Regina, despite being within the area of the County that was understood to having second-rate soil<sup>26</sup>. By 1914, homesteaders had formed a band of settlement on the rich and vast Peace River region, and when the First World War broke out, this region had a population of approximately eight thousand, in which Grande Prairie the main town, was home to about three hundred pioneers<sup>27</sup>.

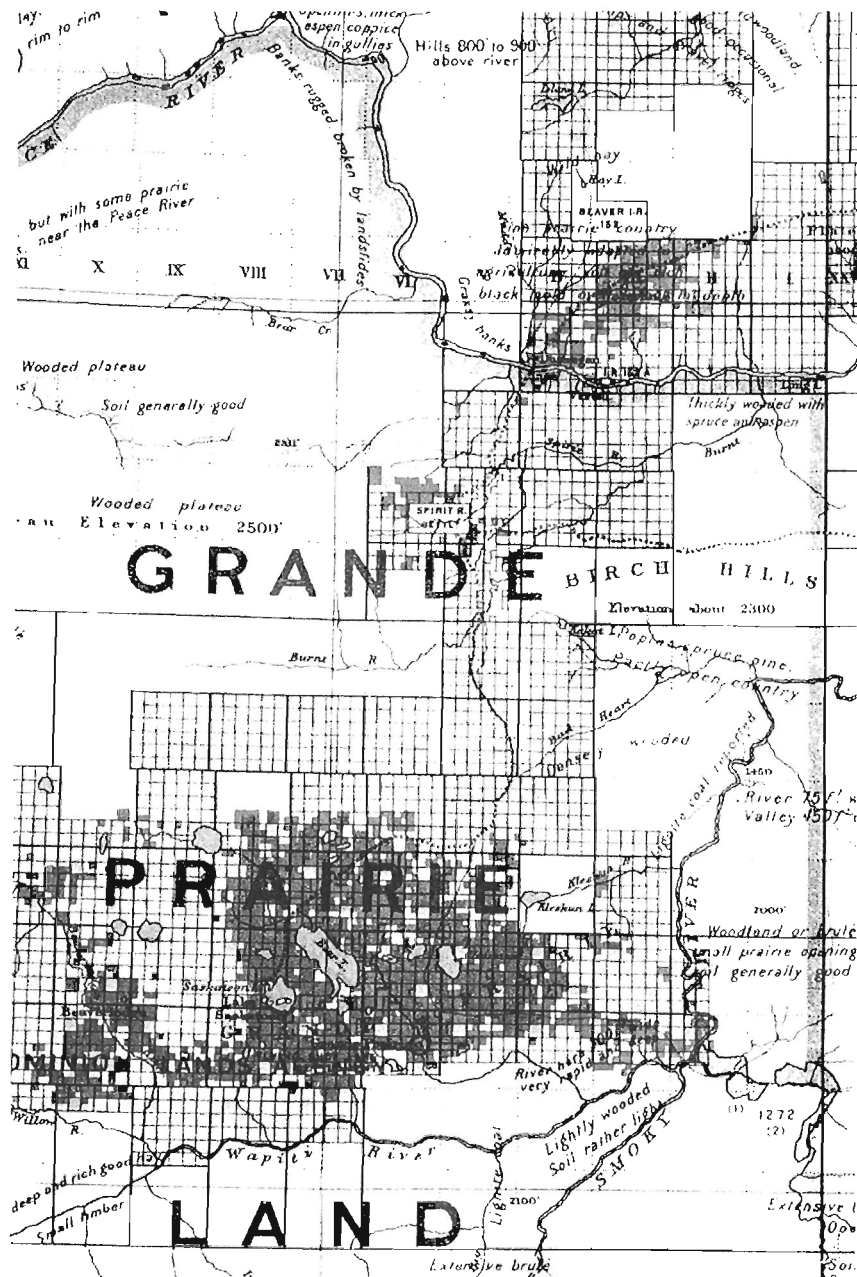


Fig. 3.5 "La Grande Prairie" Settlement Pattern

Yellow – School lands & patented lands  
 Red – Land reserved in 1913 (unpatented)  
 Blue – Land reserved prior to 1913 (unpatented)

Base image source: Leonard, David W., Lemieux, Victoria L. The Lure of the Peace River Country. Calgary: Detselig Enterprises Ltd., 1992, 190.

### iii. Pipestone District

Prior to the establishment of the day-use park and campground there was a settlement near the junction of Pipestone Creek and the Wapiti River. In 1926, a second wave of settlers came by train to "la grande prairie", aptly named by Catholic missionary Father Grouard, and hence to the Pipestone area<sup>28</sup>. The Pipestone Creek District quickly developed into a small community, where nearly all the land had been settled by the 1920s<sup>29</sup>. This area proved to be conducive to agriculture and the lumber industry<sup>30</sup>. Farmers found the soil condition to be well suited for legume crops and grasses. Mixed farming ventures could also be found in the region. This included the raising of cattle, hogs, horses and sheep<sup>31</sup>. Another business venture

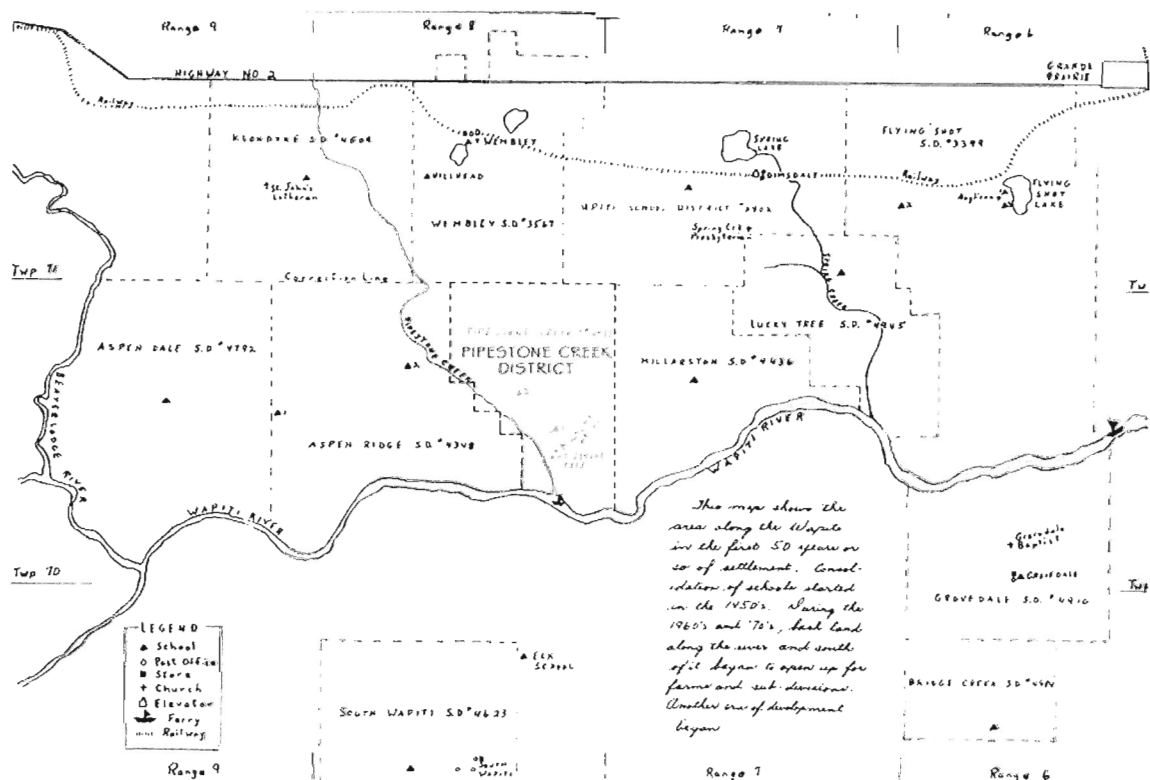


Fig. 3.6 Map Showing the first 50 years of development along the Wapiti, Pipestone Creek District Highlighted in yellow

source: base image from *Along The Wapiti*. Grande Prairie: Wapiti River Historical Society, 1981.

that gave Pipestone Creek notoriety was the two guide and outfitter operations run by A.L. Osborne and Carl Brooks. Both Mr. Brooks and Mr. Osborne attracted hunters from Europe as well as the United States, and employed numerous locals with their endeavours, especially the Aborigines in the area who were skilful with life in the wilderness<sup>32</sup>.

It was the Pipestone Creek Store and Post Office (dates of operation 1933-1972), owned and operated by

Alan and Sela Watts, that supplied local settlers with groceries and mail service. As well, they traded furs and hides with the Aboriginal and local trappers<sup>33</sup>. In 1930 a ferry was built to cross the Wapiti river near the convergence of Pipestone Creek. This ferry crossing facilitated trade and movement between the South Wapiti (Grovedale area) and North Wapiti (Pipestone and Wembley area)<sup>34</sup>. This ferry was in operation until 1958 when a bridge was opened at O'Brien Park, located 11km

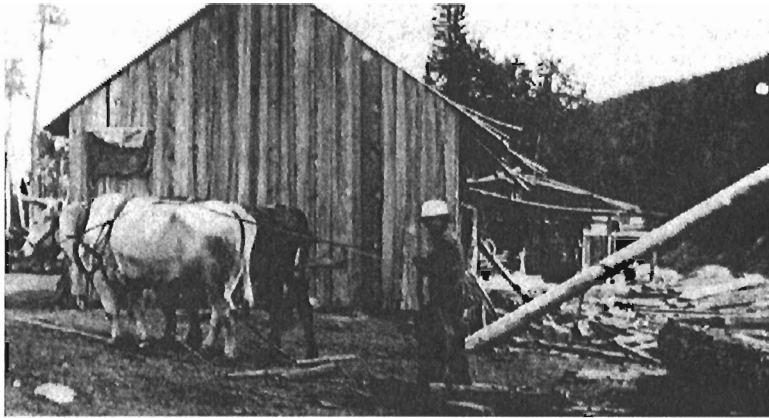


Fig. 3.7 VanHorne Sawmill near the confluence of Pipestone Creek and the Wapiti River

Source: Along the Wapiti. Grande Prairie: Wapiti River Historical Society, 1981, 283.



Fig. 3.8 Carl Brooks Outfitter and Guide Preparing to go on a Hunting Trip

Source: Along the Wapiti. Grande Prairie: Wapiti River Historical Society, 1981, 262.

south of Grande Prairie. The remnants of the old ferry crossing can still be seen at Pipestone Creek Park<sup>35</sup>.

Over the years, schools were established at various locations, and in various forms throughout the Pipestone Creek area. Despite the schoolhouses being moved around the district, education was consistently provided to the children of Pipestone Creek between 1938 and 1957<sup>36</sup>.

The primary attraction or meeting

point of the community, which is still in operation today, is the Pipestone Creek park. The Wembley Chamber of Commerce formally developed this site in the 1950s, however prior to the formal intervention this open space was widely used by the Pipestone Creek community for picnics, swimming, stampedes etc...<sup>37</sup>.

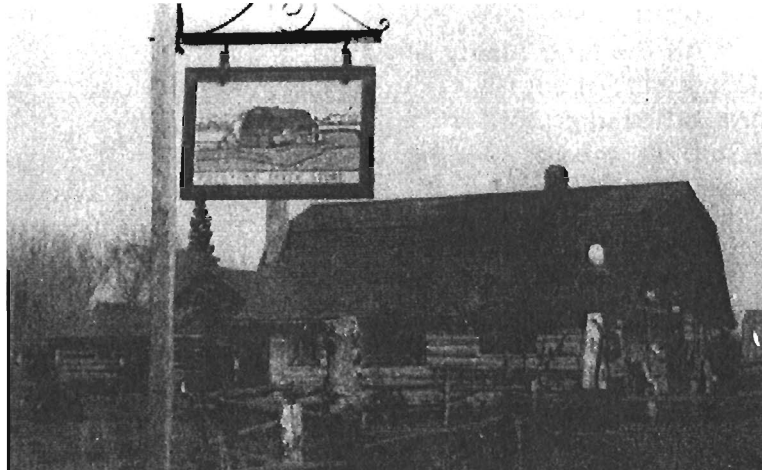


Fig 3.9. The Pipestone Creek Store & Post Office, circa 1938

Source: *Along the Wapiti*. Grande Prairie: Wapiti River Historical Society, 1981, 256.

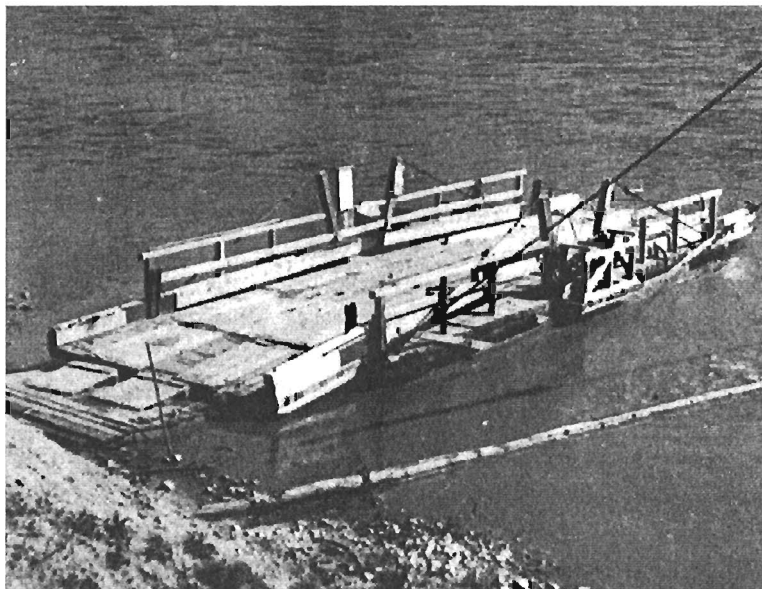


Fig. 3.10 Wapiti-Pipestone Ferry

Source *Along the Wapiti*. Grande Prairie: Wapiti River Historical Society, 198, 18.

#### iv. First Nation Presence

There has been a documented First Nations presence at Pipestone Creek Park as far back as the 19<sup>th</sup> Century. This location was used by the Beaver First Nation and later the Cree as a camp and meeting place along the



Fig. 3.11 Community Picnic  
Source *Along the Wapiti*. Grande Prairie: Wapiti River Historical Society, 1981, 207.

original Lake Saskatoon–Jasper settlement trail<sup>38</sup>. This settlement trail was a trade route between Jasper and the Hudson Bay Post at Lake Saskatoon<sup>39</sup>. Additionally, the Pipestone Creek site was used as a camp when the First Nations would travel into the district to receive remuneration from the Treaty No. 8 agreements, which were signed in 1899, 1900 and 1910<sup>40</sup>. In the early settlement years of the Pipestone Creek District, presence at the First Nations camp, such as the beating of tom-toms in camp, could be heard for miles as the First Nations people gathered to trade before deep snow prevented travel towards the Rocky mountains<sup>41</sup>. Many decorated wigwams and ritual activity, such as tea dances, could be discovered at this camp along the banks of the Pipestone Creek and the Wapiti River<sup>42</sup>. Pipestone Creek, similar to other camp areas within the Peace River Region, has a small grave site within the park grounds. It is also understood, that the Beaver came to the Pipestone area to harvest saskatoon berries<sup>43</sup>.

The names found within this unique site are also rooted in First Nation tradition. 'Wapiti', meaning elk, is derived from the Cree language, and is one of the primary waterways within the Peace River region. Equally, the name 'Pipestone' evolved from the act of the First Nations people using the river clay, or argillite, found along the shores of the Pipestone Creek in their pipe making process<sup>44</sup>.

It is believed by the 18<sup>th</sup> Century, the Peace River Country, and therefore the County of Grande Prairie, was occupied by the people of the Beaver First Nation. The Beaver First Nation are an Athapaskan-speaking people from the Peace River region of British Columbia and Alberta<sup>45</sup>. The early explorers of this region labelled these Aborigines 'Beaver', after a local group known as *tsa-dunne*<sup>46</sup>. In B.C, this First Nation group referred to themselves as *Dunneza*, "real people", and in Alberta they were known as *Dene dhá*<sup>47</sup>. The Beaver believe "they have always been on the land of their ancestors, put there at the beginning of the world by 'Heaven Sitter' the creator"<sup>48</sup>.

The Beaver people are closely related to the Chipewyan to the north-east, the Sekani to the west and the Slavey to the north<sup>49</sup>. Algonquian Cree occupied the eastern portions of their territory and by the 1760s bands of the Cree began to move westward, further encroaching on the Peace River Region<sup>50</sup>. In the winter of 1842 famine hit the Grande Prairie area, and many of the Beaver First Nation perished. Some families only managed to survive by consuming their horses<sup>51</sup>. By 1901 the Alberta First Nations, north of the Athabasca River, still had not experienced the complete impact of the European presence and continued to live in a manner that upheld their traditions<sup>52</sup>. Traditionally, the Beaver culture was based on hunting and gathering. They lived in nomadic hunting bands of 25-30 people and their settlement patterns were based upon mobility and often they would gather along the

watercourses for summer ceremonies where dancing, singing and games occurred<sup>53</sup>. This First Nation group developed an intricate understanding of the land they inhabited. Each season brought a range of food sources, but to take advantage of the bounties found in the northern forest, it was required to have a detailed understanding of when, where and how to do so<sup>54</sup>. Their primary food source was large game hunting; bear, caribou near the mountain ranges, bison in the prairie country and moose in the muskeg and forests regions<sup>55</sup>. Prior to the introduction of firearms, the Beaver participated in communal hunts, which were lead by the "Dreamers". These individuals were the band's prophets or religious leaders<sup>56</sup>. Similar to the other hunters of the north, the Beaver First Nation lived in harmony rather than in opposition to their environment<sup>57</sup>. It was not until the Klondikers began moving through the area that unrest came between the Cree and Beaver First Nations in the Peace River Region. In fact the first documented disruptive force on the Beaver was actually exerted by the Cree<sup>58</sup>. By 1915 a reserve for the Beaver Indians was established in the western end of the County of Grande Prairie, around Horse Lake<sup>59</sup>. In 1996, 2250 Beaver First Nation people were registered in Canada, however it is speculated that, before contact with Europeans, their numbers may have only been slightly more than 1000 in an area of about 194 250 square kilometres <sup>60</sup>.

#### **v. Pipestone Creek Park**

The County of Grande Prairie officially took over maintenance and development of Pipestone Creek Park, from the Wembley Chamber of Commerce, in 1981. It was at that time that the County upgraded the facilities which had been put in place in the 1950s. This work included improvements to the picnic areas and providing camping bays. Modern washrooms, recreation facilities and additional camping loops were added around 1986. Although the ferry on site was utilized up

to 1958, it wasn't until shortly after the County of Grande Prairie assumed responsibility for the park that it was dragged out of the Wapiti River onto the north bank, where it remains today in disrepair.

There is a short nature trail associated with the park, which was developed by the County and a local resident, Frank Stoll, in the 1970s. At one time the trail was marked with wooden woodland creatures, however over the years, they have disappeared<sup>61</sup>.

## Endnotes

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<sup>1</sup> Gabler, Robert E., Sager, Robert J., Wise, Daniel L., and Petersen, James F. Essentials of Physical Geography: sixth edition. Toronto: Saunders College Publishing, 1999, 395.

<sup>2</sup> Ibid, 395.

<sup>3</sup> Parker, Steve. (Bernor, Raymond L., Editor). The Practical Palaeontologist: A Step-By-Step Guide to Finding, Studying, and Interpreting Fossils, From Searching For Sites To Extracting, Cleaning, And Restoring Finds. Toronto: Simon & Schuster Inc, 1990, 110.

<sup>4</sup> Huck, Barbara, Whiteway, Doug. In Search of Ancient Alberta. Winnipeg: Heartland Publications, 1998, 24.

<sup>5</sup> Ibid, 24.

<sup>6</sup> Ibid, 24.

<sup>7</sup> Royal Tyrrell Museum of Palaeontology. Reading the Rocks: A Biography of Ancient Alberta. Red Deer: Discovery Books, 2003, 80.

<sup>8</sup> Huck, Barbara, Whiteway, Doug. In Search of Ancient Alberta. Winnipeg: Heartland Publications, 1998, 26.

<sup>9</sup> Gabler, Robert E., Sager, Robert J., Wise, Daniel L., and Petersen, James F. Essentials of Physical Geography: sixth edition. Toronto: Saunders College Publishing, 1999, 394, 395.

<sup>10</sup> Royal Tyrrell Museum of Palaeontology. Reading the Rocks: A Biography of Ancient Alberta. Red Deer: Discovery Books, 2003, 78.

<sup>11</sup> Huck, Barbara, Whiteway, Doug. In Search of Ancient Alberta. Winnipeg: Heartland Publications, 1998, 26 & 210.

<sup>12</sup> Museum Notes – From Grande Prairie Museum Heritage (August 2 2004)

<sup>13</sup> Huck, Barbara, Whiteway, Doug. In Search of Ancient Alberta. Winnipeg: Heartland Publications, 1998, 282.

<sup>14</sup> Ibid, 280.

<sup>15</sup> Ibid, 280.

<sup>16</sup> Ibid, 275.

<sup>17</sup> Ibid, 282.

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- <sup>18</sup> Ibid, 282.
- <sup>19</sup> Grande Prairie Regional Tourism Association. "Touring The County of Grande Prairie No. 1", Grande Prairie & Region Visitor Guide 2004: Northern Trails Hold Secret Tales. Alberta: Grande Prairie Regional Tourism Association, 2003, 11.
- <sup>20</sup> Ibid, 10.
- <sup>21</sup> Ibid, 10.
- <sup>22</sup> Ibid, 10.
- <sup>23</sup> Ibid, 10.
- <sup>24</sup> Joan Yates and Audrey Lowe, ed., Along The Wapiti. (Grande Prairie: Wapiti River Historical Society, 1981), 255.
- <sup>25</sup> Ibid, 16.
- <sup>26</sup> Ibid, 255.
- <sup>27</sup> MacGregor, James G. A History of Alberta. Edmonton: Hurtig Publishers, 1972, 206.
- <sup>28</sup> Grande Prairie Regional Tourism Association. "Northern Trails Hold Secret Tales", Grande Prairie & Region Visitor Guide 2004: Northern Trails Hold Secret Tales. Alberta: Grande Prairie Regional Tourism Association, 2003, 6. & Joan Yates and Audrey Lowe, ed., Along The Wapiti. (Grande Prairie: Wapiti River Historical Society, 1981), 17.
- <sup>29</sup> Joan Yates and Audrey Lowe, ed., Along The Wapiti. (Grande Prairie: Wapiti River Historical Society, 1981), 255.
- <sup>30</sup> Ibid, 256.
- <sup>31</sup> Ibid, 255.
- <sup>32</sup> Ibid, 256.
- <sup>33</sup> Ibid, 256.
- <sup>34</sup> Ibid, 256.
- <sup>35</sup> Connors, Ken. Discover the Peace Country.com: Visitors Guide, "Pipestone: Feature Page". <http://www.discoverthepeacecountry.com/htmlpages/pipestone.html>. Date accessed: April 21, 2004
- <sup>36</sup> Joan Yates and Audrey Lowe, ed., Along The Wapiti. (Grande Prairie: Wapiti River Historical Society, 1981), 256.
- <sup>37</sup> Ibid, 257.
- <sup>38</sup> Connors, Ken. Discover the Peace Country.com: Visitors Guide, "Pipestone: Feature Page". <http://www.discoverthepeacecountry.com/htmlpages/pipestone.html>. Date accessed: April 21, 2004
- <sup>39</sup> Joan Yates and Audrey Lowe, ed., Along The Wapiti. (Grande Prairie: Wapiti River Historical Society, 1981), 279.
- <sup>40</sup> Ibid, 257 & Ridington, Robin. "Beaver (Native Group)" The Canadian Encyclopedia. Historica Foundation of Canada, 2005. <http://www.thecanadianencyclopedia.com>
- <sup>41</sup> Information Sign – Pipestone Creek Park. County of Grande Prairie No. 1: 1975
- <sup>42</sup> Joan Yates and Audrey Lowe, ed., Along The Wapiti. (Grande Prairie: Wapiti River Historical Society, 1981), 279.
- <sup>43</sup> Huck, Barbara, Whiteway, Doug. In Search of Ancient Alberta. Winnipeg: Heartland Publications, 1998, 283.
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- <sup>45</sup> Ridington, Robin. "Beaver (Native Group)" The Canadian Encyclopedia. Historica Foundation of Canada, 2005. <http://www.thecanadianencyclopedia.com>

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- <sup>46</sup> Ibid.
- <sup>47</sup> Ibid.
- <sup>48</sup> Burley, David V., Hamilton, J.Scott and Fladmark, Knut R. Prophecy of the Swan: The Upper Peace River Fur Trade of 1794-1823. Vancouver: UBC Press, 1996, 13.
- <sup>49</sup> Leonard, David W. The County of Grande Prairie No. 1, "Chronology of Grande Prairie to 1951: Developed for and copyrighted to the Heritage Resource Management Branch of Alberta Community Development".  
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- <sup>52</sup> MacGregor, James G. A History of Alberta. Edmonton: Hurtig Publishers, 1972, 160.
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- <sup>56</sup> Ibid.
- <sup>57</sup> Burley, David V., Hamilton, J.Scott and Fladmark, Knut R. Prophecy of the Swan: The Upper Peace River Fur Trade of 1794-1823. Vancouver: UBC Press, 1996, 14.
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<http://www.countygp.ab.ca/municipal/countygp/countygp-website.nsf/AllDoc/5DF0BFDB0CC6523087256D8E006A62C2?OpenDocument> Date accessed: November 17, 2004. Date Updated June 1, 2004.
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- <sup>61</sup> Joan Yates and Audrey Lowe, ed., Along The Wapiti. (Grande Prairie: Wapiti River Historical Society, 1981), 257.

## Site Palaeontological Significance

### i. The Bonebed

In September 1972 Al Lakusta, a Grande Prairie school teacher, discovered a unique dinosaur fossil within the Pipestone Creek while hiking along the banks with family friends<sup>1</sup>. Mr. Lakusta had previously found plant fossils in this area as well in other streambeds within the Grande Prairie region. Often he led field trips exploring these locations and hoped that he may find similar fossils that autumn afternoon<sup>2</sup>. However, it was over a decade later that the value of the fossil he found was fully understood. In June 1983 major investigation into the fossil resource that Lakusta had come upon began, as Darren Tanke and Phil Currie from the Royal Tyrrell Museum and local volunteers began to excavate the site<sup>3</sup>. These initial and subsequent excavations revealed that the fossil Mr. Lakusta spotted was part of an ancient dinosaur bonebed, which dates back to the Late Cretaceous period<sup>4</sup>. This discovery validated its uniqueness as it was the first significant fossil finding, beyond dinosaur bone fragments and a lizard jaw, within the geological order known as the Wapiti Formation in this area of Alberta<sup>5</sup>.

Bonebeds are layers of rock that contain disordered fossil bones of numerous animal skeletons<sup>6</sup>. Thousands of bonebeds are found in Alberta. The Pipestone Creek bonebed, however, has proved to be

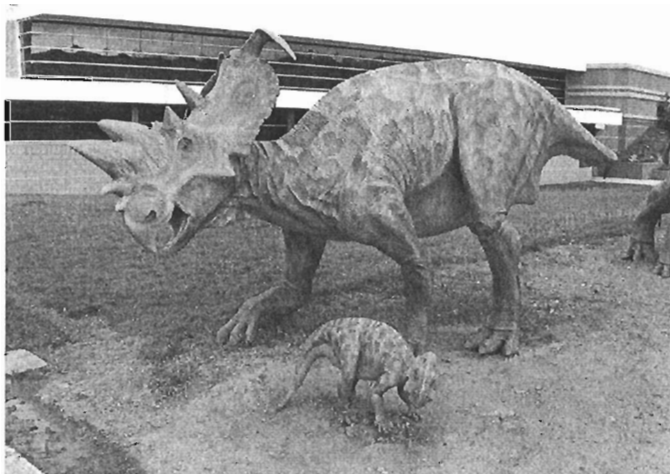


Fig. 3.12 *Pachyrhinosaurus* reconstruction outside the Royal Tyrrell Museum, Drumheller AB.

Source: Photo by author, August 9, 2004

palaeontologically significant and unequalled in various ways. This bonebed has been found to contain fossils representing four size classes of a 'new dinosaur species'<sup>7</sup>. Currently, this new *Pachyrhinosaurus* (Pak-ee-Rhino-Saw-rus) species has not been officially named, but is unofficially known as the Pipestone Creek Pachyrhinosaurus (See figure 3.12)<sup>8</sup>. The Pipestone Creek Pachyrhinosaurus was a horned dinosaur and is believed to be a 'un-identified species', as the skulls collected from the bonebed have a unique cranial characteristic which has never been seen on previously collected specimens<sup>9</sup>. Pachyrhinosaurines have been found in other North American locations, however the Pipestone Pachyrhinosaurus is unusual because of these cranial features and the fact it is the northernmost occurrence of Pachyrhinosaurus in Canada<sup>10</sup>. The research conducted thus far has also revealed that this site is a monospecific vertebrate bonebed, which is dominated by thousands of disarticulated *Pachyrhinosaurus* bones<sup>11</sup>. The description of the bonebed being 'monospecific' is a bit misleading as teeth and bones of theropod (carnivorous) dinosaur species have also been recovered, however they comprise less than 5% of the retrieved fossils<sup>12</sup>. Currently, this bonebed is the northernmost occurrence of *Pachyrhinosaurus* in Canada as well as the most northerly monospecific dinosaur bonebed in Alberta<sup>13</sup>.

It is believed that this bonebed represents a mass mortality event. It is speculated that the site is the outcome of a herd of *Pachyrhinosaurus* being caught in the flood waters of a fast-flowing river, though it has been impossible to conclude if any transportation occurred after their death<sup>14</sup>. Similar drowning sites exist throughout the province, however it is the astronomical number of bones present that makes the Pipestone site stand out from its southern counterparts. By 2002 staff from the Royal Tyrrell Museum collected approximately 3500 fossils<sup>15</sup>. In certain locations of the bonebed, paleontologists uncovered upwards of 200 bones per

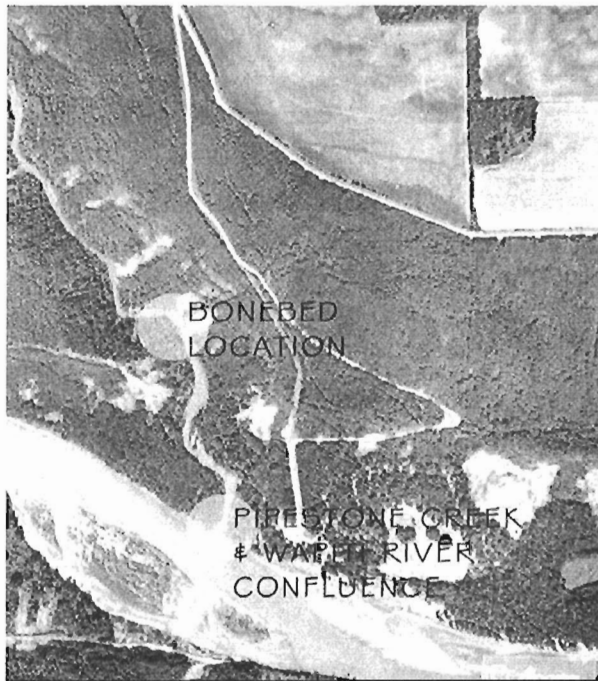


Fig 3.13 Pipestone Creek Bonebed Location

base image Alberta Sustainable Resource Development. Air Photo Distribution Service, "Plate AS4298-56", 1992.)



Fig. 3.14 Pipestone Creek Bed

Source: photo by author, August 27, 2004

square meter, on average, adult skulls which were 50-75% complete were found every 1.5 to 2.0 square meters<sup>16</sup>. In addition, the presence of the remains of the carnivorous species suggests that the *Pachyrhinosaurus* carcasses had been scavenged prior to the burial process and subsequent fossilization<sup>17</sup>.

Another distinct characteristic of the Pipestone bonebed is that it is the first finding of insects within amber concurrently with dinosaur bones<sup>18</sup>. But it is ultimately the extensive quantity and quality of fossils of the predominant species which characterizes this fossil finding as the world's largest dinosaur bonebed and the finest horned dinosaur bonebed in North America<sup>19</sup>.

In March 2005, the Steering Committee for the proposed Pipestone Creek Dinosaur Museum announced that during recent coring studies performed on the

fossil site (see Figure 3.15), bone fragments were found up to sixty meters from the original fossil deposit, thereby increasing the estimated size of the bonebed from approximately that of a swimming pool (3m x 30m) to that of a football field (50m x 110m)<sup>20</sup>. The bonebed is located approximately ten metres above the creek bed level of Pipestone Creek and is about 1.1 kilometre upstream from the confluence of Pipestone Creek and the Wapiti River (see Figure 3.13)<sup>21</sup>.



Fig. 3.15 Effects of Coring Study on Site

Source: photo by author, January 7, 2005

The Pipestone Creek bonebed is only one among many fossil discoveries within the north-western Alberta and north-eastern British Columbia region of Canada (see to Figure 3.17). These various findings range from trackways found in Grande Cache to the discovery of Western Canada's oldest



Fig. 3.16 Pipestone Creek

Source: photo by author, September 14, 2005

dinosaur in Tumbler Ridge (see Figure 3.18)<sup>22</sup>. However, the Pipestone Creek site has been found to be the most palaeontologically significant and rich in this area<sup>23</sup>. Since the importance of the *Pachyrhinosaurus* fossil discovery has been revealed, the County of Grande Prairie has recognised the potential for dinosaur related tourism in the region. Therefore, the economic development officer within the County of Grande Prairie has initiated the design and development of a dinosaur museum. The goal of the County is to establish a world class destination for northern Alberta that is comparable to the Royal Tyrrell Museum in southern Alberta. Creating a tourist destination and locating the proposed museum at or near Pipestone Creek becomes a viable option as it is only, 37 kilometres south-west, of Grande Prairie, one of the primary agricultural, forestry, gas and oil centres of the Peace River region. Grande Prairie already has the infrastructure in place to support the tourist who could be moving through the area in response to the new museum<sup>24</sup>. Also, there is already a flow of tourists visiting the area during the summer months as Grande Prairie is en-route from central Alberta to Mile 0 of the Alaska Highway<sup>25</sup>.

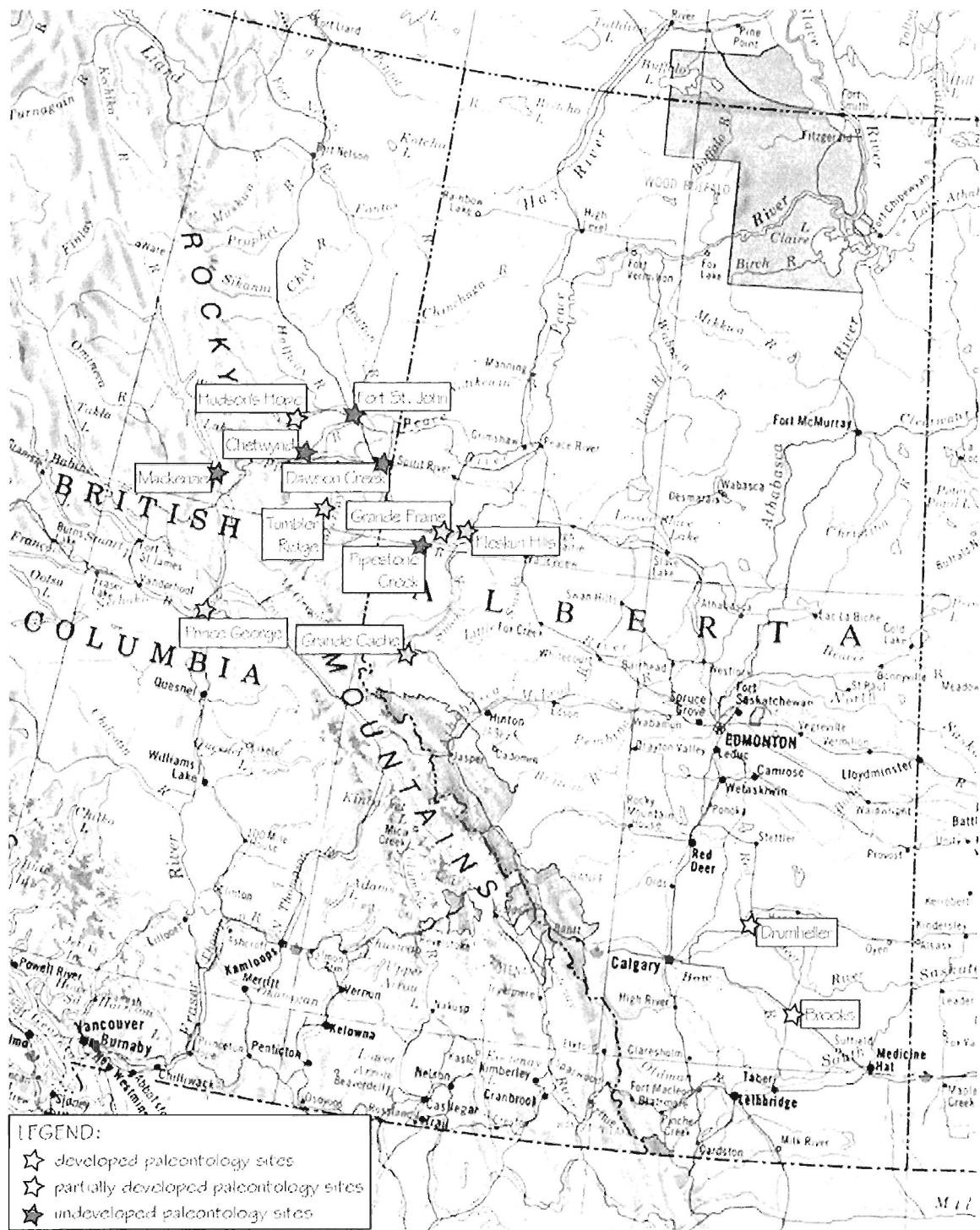


Fig. 3.17 Fossil discoveries in NW Alberta & NE B.C.

Source: base image, Department of Energy, Mines and Resources. North of Latitude 80°. Her Majesty the Queen in Right of Canada, 1982.

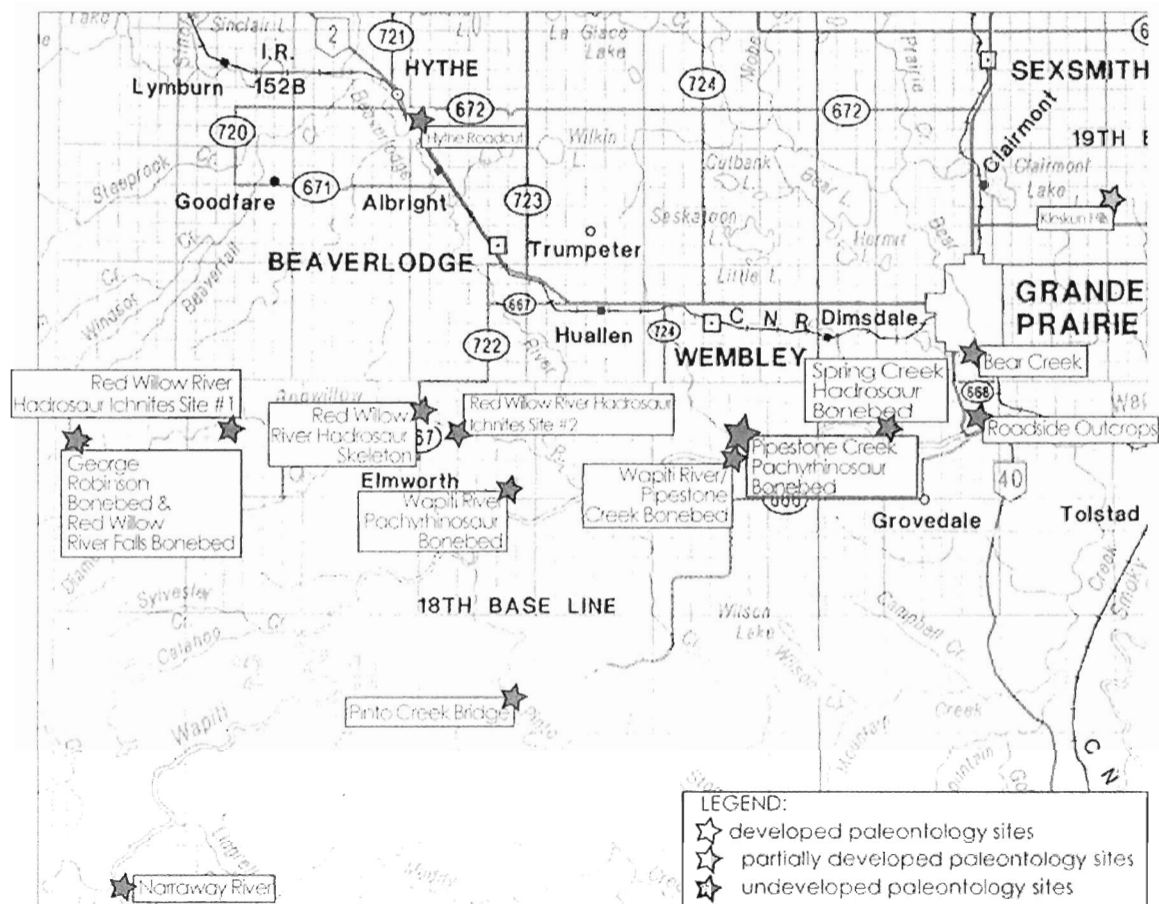


Fig. 3.18 Fossil discoveries sites in the Grande Prairie Area

Source: Tanke, Darren H. "Mosquitoes and Mud" the 2003 Royal Tyrrell Museum of Palaeontology Expedition to the Grande Prairie Region (Northwestern Alberta, Canada)" *APS Bulletin*, June 2004, 4.

## ii. The Dinosaur

The fossil finds at Pipestone Creek have proven to be scientifically important as they will allow palaeontologists to gain a more comprehensive awareness of the dinosaurs found in the Late Cretaceous environment of northern Alberta. When the bonebed was first examined in 1983, by Darren Tanke, the identity of the dinosaur was

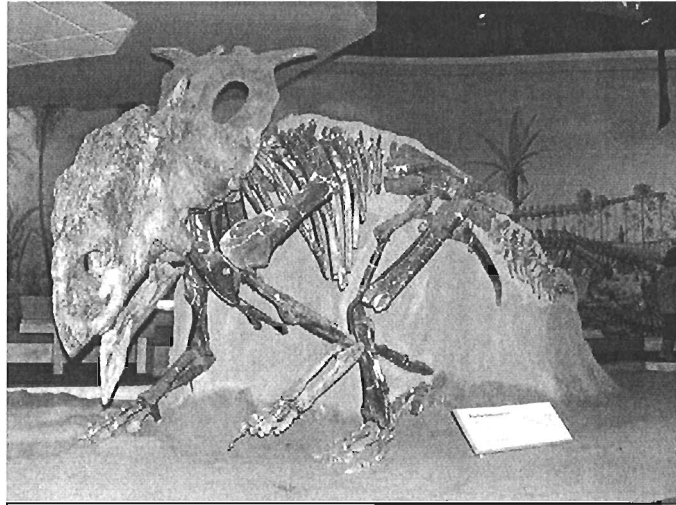


Fig. 3.19 Cast of the *Pachyrhinosaurus* fossil found at the Pipestone bonebed – Royal Tyrrell Museum interior display  
Source: Photo by author, August 9, 2004

unknown. It was not until 1985 that the fossils were identified as '*Pachyrhinosaurus*'<sup>26</sup>. The *Pachyrhinosaurus*, which means "thick-nosed reptile", is a part of the *Ceratopsian* sub order, which includes the *Triceratops*, the most notorious dinosaur of this group<sup>27</sup>. The *Ceratopsians* were the last known dinosaurs to evolve and they were a plentiful group of which more than half of the known species are speculated to have been in Alberta during the Late Cretaceous period<sup>28</sup>. However, the reason for the delay in identification of this *Pachyrhinosaurus* was lack of information regarding this lesser known member of the *Ceratopsians*<sup>29</sup>. The *Ceratopsians* are a family of horned dinosaurs which is comparable to the modern rhinoceros, in that they are believed to have eaten plant material with the assistance of a horny beak and strong teeth<sup>30</sup>. Also, when threatened by predators, presumably large theropods (meat eating dinosaurs) such as *Tyrannosaurus Rex*, the *Pachyrhinosaurus* may have charged into its opponent in a similar way to a rhinoceros<sup>31</sup>. Most species of the *Ceratopsian* family have a variety of horns and a

large bony frill which extends from the skull over the neck<sup>32</sup>. The horns of the *Pachyrhinosaurus* are not highly developed over its nose and eyes, like its famous relative the *Triceratops*<sup>33</sup>. Instead the *Pachyrhinosaurus* has a horn core, or nasofrontal boss, which spreads across the top of the nose to form a massive buttress of bone rather than distinct horn projections<sup>34</sup>. As noted earlier, four different sizes of fossils have been unearthed within the Pipestone bonebed. It has been theorised that this size variation indicates that the *Pachyrhinosaurus* was a

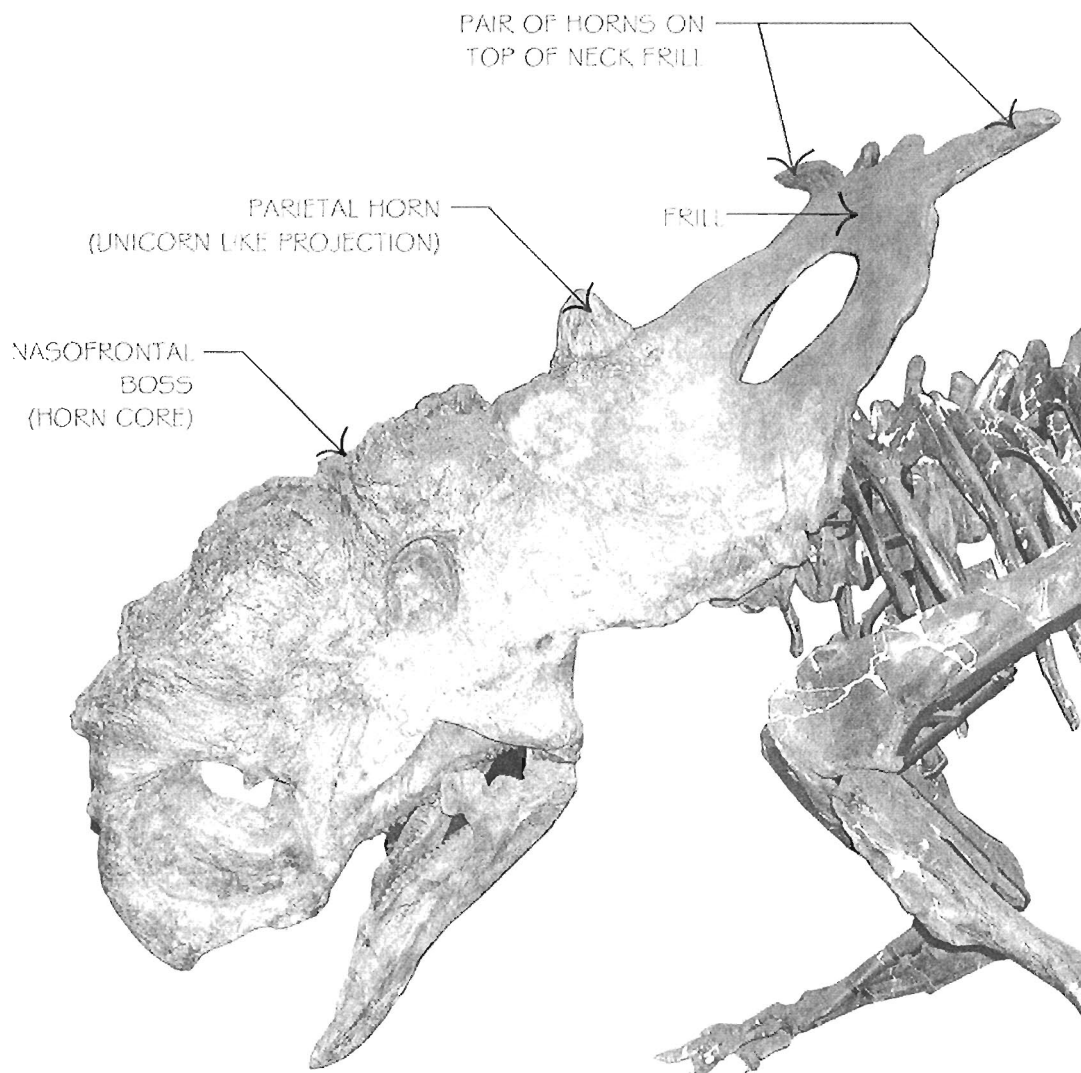


Fig. 3.20 Cranial Characteristic of Pipestone Creek Pachyrhinosaurus  
Source: Base Photo by author, August 9, 2004

dinosaur that lived in extended families which migrated in large herds in which, similar to elephant herds, the older reptiles protected the young<sup>35</sup>. The presence of the elaborate frills further supports the herd notion, as the frills may be indicative of behavioural patterns, such as being used for sexual display, to attract females and to intimidate rival males<sup>36</sup>. The Pipestone Creek *Pachyrhinosaurus* is unique among *Ceratopsians* in that they are the only species found thus far to have a unicorn like projection, or parietal horn, from the frill of its neck<sup>37</sup> (see Figure 3.20).

The study of dinosaur trackways also gives invaluable insight to the anatomy, posture, speed, behavioural and walking patterns of these reptiles<sup>38</sup>. However, finding fossilised trackways is not common and locating front foot prints, or the manus print, is rare because of the typical weight distribution of most dinosaur species<sup>39</sup>. As the Grande Prairie region is being explored trackways as well as fossils, are being found. The patterns, spacing, size, shape and depth of these trackways are the clues that give palaeontologist understanding into what species the prints belong to<sup>40</sup>. The Pipestone *Pachyrhinosaurus* is a quadruped, and typically they walk diagonally where the rear prints, the pes print, is larger and broader than the manus print. The manus print normally does not show obvious toes, whereas the pes has a distinct three-toed form<sup>41</sup>.



Fig. 3.21 Quadruped Trackways  
Sketch by author

The habitat of the *Pachyrhinosaurus* was believed to have been a sub-tropical climate with shrubs and sedges conceivably being the staple of their diet<sup>42</sup>. Clues to the flora and fauna present during the Late Cretaceous era has been derived from the study of fossil specimens found at the Dinosaur Provincial Park<sup>43</sup>. Seventy-three millions years ago the plant eating *Pachyrhinosaurus* would have thrived in this sub-tropical environment. The fossil discovery suggests that an adult *Pachyrhinosarus* would grow to be approximately 2 metres high and 5.5 – 7 metres long nose to tail, and weigh roughly three tonnes<sup>44</sup>.

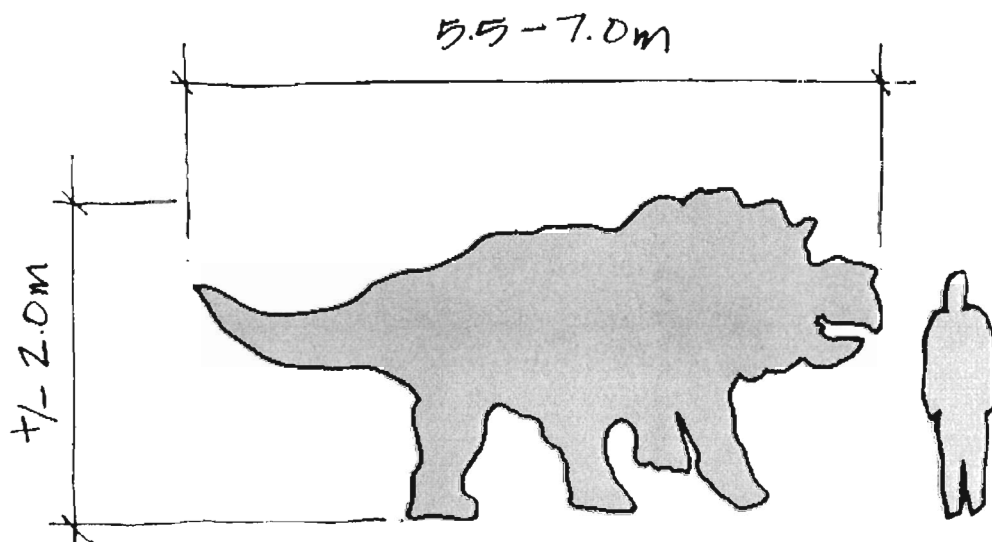


Fig. 3.22 Size of Pipestone Creek Pachyrhinosaurus  
Sketch by author

### iii. Fossilisation

The process of fossilisation is a rare event as earth's natural processes tend to recycle all organic material. The age of the rock in which the fossil is found affects the preservation condition, the older the rock the more likely it has undergone geological alteration and the less likely good fossils are contained within it<sup>45</sup>. Typically after plants and animals die, they decompose or are scavenged upon. All organic matter, including hard material such as bones, wood and shells inevitably breakdown with the help of insects, bacteria, soil conditions, the sun and the nutrients are recycled back into the ecosystem. Therefore, in order for the process of fossilisation to occur, unique conditions must exist. It has been found that the most likely scenario for the fossilisation of land organisms is where the setting for decomposition is poor, such as locations where there is no moisture, heat and oxygen, or in which there are lethal toxins or extreme heat or pressure<sup>46</sup>. It is speculated that, during the Cretaceous Period, conditions in western Canada were favourable for fossilisation, which is why palaeontologists in Alberta are successful at hunting fossils<sup>47</sup>. Furthermore, the death site or burial of the organism would be in hot, dry sand or within river mouths or inland waters where the carcasses could be buried rapidly by wet earth<sup>48</sup>. Following the quick burial of the organism, the soft tissue will eventually decompose leaving the hard remains which progressively sink into the soil while sediments collect on top and slowly turn into rock<sup>49</sup>. The spaces created by the disappearing organic tissue are gradually filled by minerals which precipitate from water seeping through the rock. This is known as permineralization<sup>50</sup>. It takes over one million years for the bones of an organism to begin to be replaced by minerals that create the fossils. The coloration of the fossil depends and relates to the type of minerals which have replaced the bone matter in the permineralization process<sup>51</sup>.

Typically, there are a number of stages a fossil undergoes as it is prepared for exhibit and there are two general methods for gathering fossils. Surface collection of fossils involves searching for isolated specimens that lie on the ground plane<sup>52</sup>. In contrast, "excavating the fossils involves digging, prying or attempting to extract a fossil that is buried or embedded in the ground or in a rock face<sup>53</sup>. Sometimes in the fossil collection process molds and casts are made. This is done because *"sometimes the original object dissolves completely, leaving only a cavity that retains the shape of the original fossil in the rock. The cavity is known as a Natural Mold<sup>54</sup>".* Furthermore, *"when Natural Molds are filled in by minerals carried in the ground water a Natural Cast is formed. Natural Casts preserve only the external details of a fossil<sup>55</sup>.* To protect fossils from erosion, after they are collected they are placed in a field jacket, plastered, catalogued and stored in a warehouse until they are cleaned and prepared for display and research<sup>56</sup>. In the preparation laboratory, the field jacket is removed and the fossils are removed or partially removed from the rock they inlay. The type of tools used depend on the rock which surrounds the fossils, often glue is used to strengthen the fossils when surrounding the specimen with the field jacket and removing it from the rock base<sup>57</sup>. Frequently, plaster or resin casts of fossils are made because the originals are used and kept for research and the casts allow for the specimens to be sent around the globe to other museums. Furthermore, because castings are lighter and have an internal framework, they allow for more 'realistic' and 'natural' displays and exhibits<sup>58</sup>.

Dinosaur fossils have only ever been found below the layer of earth known as the "Cretaceous-Tertiary Boundary"<sup>59</sup>. This layer within the earth's geological history is a thin grey layer of clay which separates rock formed during the Cretaceous period and rock formed during the Tertiary period<sup>60</sup>. The Pachyrhinosaurus fossils uncovered

by the staff of the Royal Tyrell Museum were “*preserved in a damp/wet and mostly soft carbonaceous grey siltstone, which usually separated fairly cleanly from the bone*”<sup>61</sup>. In his article “Mosquitoes and Mud”, Darren Tanke describes how the fossils were extracted, “*once the damp rock dries out, it just flakes off the bone. Patches of harder rock are easily removed with an air scribe followed by an air abrasive unit loaded with commercial grade sodium bicarbonate (baking soda). Specimens are easily extracted, prepared and can be made into research specimens and/or display quality items in short time*”<sup>62</sup>. Tanke goes on to describe how a ‘good’ adult pachyrhinosaur skull could be fully prepared in a month by an experienced preparator, whereas with the suitable tools the smaller specimens could be finished in a few hours or in as little as fifteen minutes<sup>63</sup>. Despite the fossil removal process presenting few problems, getting to discovery sites in northern Alberta has been a challenge. Tanke describes this task “*we are having to fight rain, hail, mud and mosquitoes while searching the area for dinosaur remains – a far cry from locations like the dusty, dry Badlands...I even ran into problems with bears eating our casting glue. It’s a different world out here, but that’s part of what makes it so special*”<sup>64</sup>.

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# 4 Potential and Learning from Others

## Tourism

*"Tourism both depends upon, and affects the quality of the natural environment. Tourism also represents a potentially valuable instrument for sustainable development, combining economic opportunities with environmental conservation and enhancement activities, and promoting environmentally and socially responsible attitudes and behaviour".*

The city of Grande Prairie has a population of approximately 42,000 and supports a trading market of over 250,000 people within a 200 kilometre radius<sup>2</sup>. Tourism is playing a regularly increasing role in this region of Alberta. This is visible from the newly constructed 'Centre 2000', the local tourist facility and the 'Heritage Discovery Centre', one of the museums located in Grande Prairie<sup>3</sup>. The building of these facilities is largely a response to the increased volume of visitors moving through the area. A few of the

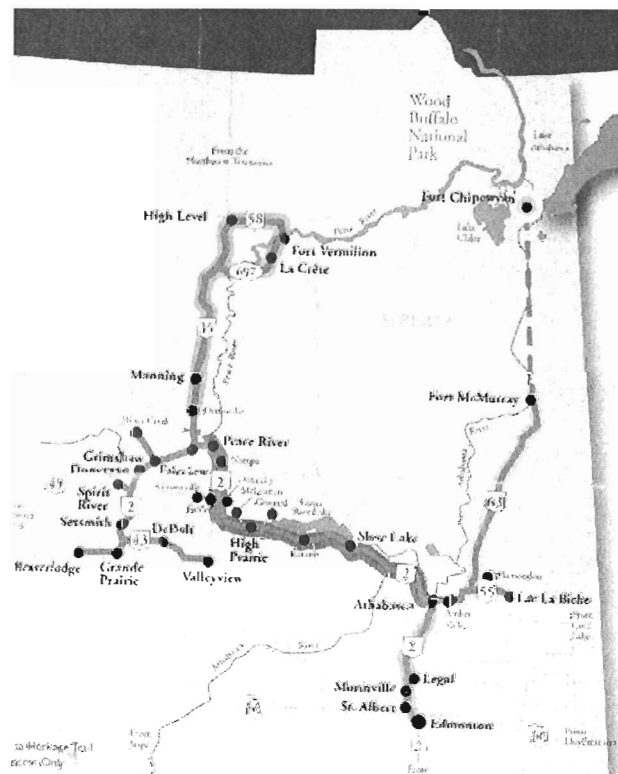


Fig. 4.0 The Northern Alberta Heritage Trail  
Source: Travel Alberta North, "Northern Alberta Heritage Trail" Tourist Brochure, Alberta: Travel Alberta North, 2005.

tourist destinations in the Grande Prairie region include Saskatoon Island Provincial Park, a bird watching sanctuary and nesting area for the endangered Trumpeter Swans, the Kleskun Hills recreation area, the location of the northern most badlands in Alberta and one of the most extensive areas of native upland grasslands remaining in the Peace River Parkland<sup>4</sup>. In terms of tourism connections, at a provincial scale, the Grande Prairie region is a part of numerous 'self-drive' tours that are promoted throughout the province. These routes include the *Grande Alberta Trail*, a route that

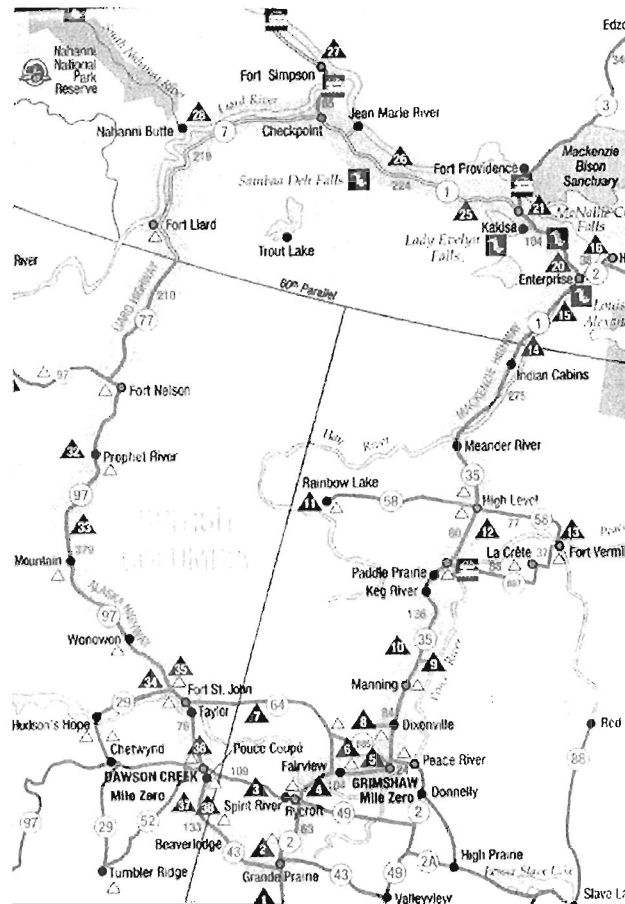


Fig. 4.1 The Deh Cho Travel Connection  
Source: Travel Alberta North. "The Deh Cho Travel Connection" Tourist Brochure. Alberta: Travel Alberta North, 2005.

brings the visitor from Grande Prairie to Jasper National Park, via the Bighorn Highway, then joining the Yellowhead Route to connect with Edmonton, the provincial capital<sup>5</sup>. The *Northern Alberta Heritage Trail*, a history themed-discovery tour that allows visitors to 'take a step back in time and experience the pioneer life, Francophone culture and Aboriginal activities' uses Edmonton as a starting point<sup>6</sup>. And finally, *The Deh Cho Travel Connection*, which follows the historic corridors through Alberta, British Columbia and the Northwest Territories, that were travelled by Canada's early explorers and traders<sup>7</sup>. Another significant draw for tourists to this area is the fact that Grande Prairie is along one of the gateways to Alaska. Mile 0 of the Alaska Highway, is ninety minutes travel time west of the city<sup>8</sup>. There is also

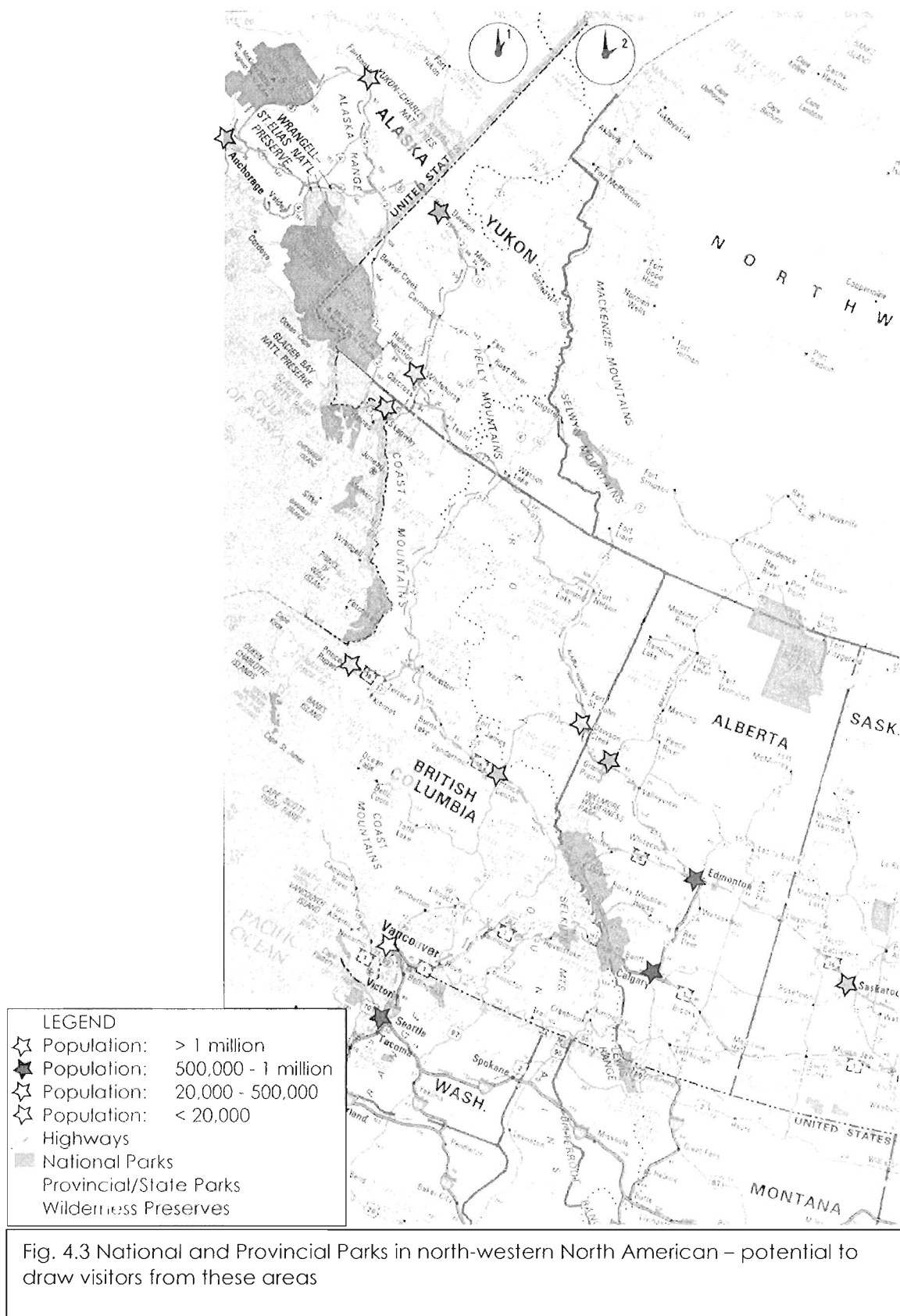
existing tourism at a macro scale, where visitors on multi-day trips, to western Canada and the United States, may be attracted to the Peace River country in search of a particular experience not available in other regions. The notion of tourist 'catchment' areas is also possible. Promoting the site in other locations such as National and Provincial Parks or major metropolitan cities will capitalise on tourists already in the relative vicinity of the site and draw more visitors to the new Pipestone Creek Museum.

The County of Grande Prairie intends to join forces with the Drumheller Regional Chamber of Development and Tourism to attract visitors to both dinosaur museums. Initially the Pipestone Creek museum was being described as a 'rival' to the Royal Tyrell Museum, however *"together they can attract more customers than they can separately"* and it is expected *"the new-found partnership will benefit not only the communities, but all of Alberta"*<sup>9</sup>. Working in collaboration and using the experience of the Drumheller Regional Chamber of Development and Tourism, Walter Paszkowski, the County of Grande Prairie Economic Development Officer, believes they may be able to *"turn the province into one of the world's top dinosaur destinations"*<sup>10</sup>. By combining efforts, the ability to advertise at an international level in order to increase awareness of Alberta's dinosaur resources could offer great benefits. Currently only 14% of Alberta's "dino-tourists" come from international locations<sup>11</sup>. Plans are in hand to create a ten-community, cross-provincial dinosaur trail that would link the northern palaeontological sites<sup>12</sup>. The northern dinosaur tour would *'begin in Grande Cache, run through Grande Prairie, travel across the B.C. border into Pouce Coupe, Dawson Creek, Fort St. John, Hudson's Hope, Chetwynd, Tumbler Ridge, Mackenzie and end in Prince George'*<sup>13</sup>. The highlights of the proposed northern tour would be the thousands of dinosaur trackways found in Grande Cache, Pipestone's *Pachyrhinosaurus* bonebed and the fossil finds in Tumbler

Ridge<sup>14</sup>. It has been suggested the increased interest in the Peace Country's fossil resources has caught the attention and support of Alberta's Economic Development Minister, Mark Norris, who is anticipating evolving the '*world-renowned Alberta Dinosaur Trail from its three current locations – Drumheller, Brooks and East Coulee – throughout the entire province and end in Grande Prairie*<sup>15</sup>. Incorporating the Pipestone Creek site with the existing Dinosaur Trail will help to further integrate the proposed museum with the wider, macro-scale tourism in the province.

Tourism Distance Chart (via primary highways)														
	Anchorage, AK	Banff, AB	Brooks, AB	Calgary, AB	Dawson Creek, BC	Drumheller, AB	Edmonton, AB	Fairbanks, AK	Grande Prairie, AB	Jasper, AB	Lake Louise, AB	Waterton Park, AB	Whitehorse, YT	Vancouver, BC
Anchorage, AK	-	3,551	3,604	3,422	2,539	3,420	3,219	576	<b>2,736</b>	3,068	3,446	3,691	1,136	1,136
Banff, AB	3,551	-	312	128	819	263	401	3,364	<b>682</b>	287	55	376	2,318	851
Brooks, AB	3,604	312	-	185	1,064	139	418	3,417	<b>874</b>	596	363	292	2,468	1,158
Calgary, AB	3,422	128	185	-	846	138	294	3,235	<b>720</b>	412	180	266	2,286	975
Dawson Creek, BC	2,539	819	1,064	846	-	876	587	2,352	<b>132</b>	528	756	1,404	1,404	1,191
Drumheller, AB	3,420	263	139	138	876	-	279	3,234	<b>735</b>	547	315	398	2,280	1,120
Edmonton, AB	3,219	401	418	294	587	279	-	2,941	<b>456</b>	366	452	560	1,993	1,160
Fairbanks, AK	576	3,364	3,417	3,235	2,352	3,234	2,941	-	<b>2,484</b>	2,881	3,259	3,504	949	3,496
<b>Grande Prairie, AB</b>	<b>2,736</b>	<b>682</b>	<b>874</b>	<b>720</b>	<b>132</b>	<b>735</b>	<b>456</b>	<b>2,484</b>	<b>-</b>	<b>397</b>	<b>628</b>	<b>975</b>	<b>1,536</b>	<b>1,341</b>
Jasper, AB	3,068	287	596	412	528	547	366	2,881	<b>397</b>	-	233	662	1,928	797
Lake Louise, AB	3,446	55	363	180	756	315	452	3,259	<b>628</b>	233	-	429	2,306	792
Waterton Park, AB	3,691	398	283	277	1,151	401	563	3,504	<b>1,022</b>	683	451	-	2,557	1,234
Whitehorse, YT	1,136	2,318	2,468	2,286	1,404	2,280	1,993	949	<b>1,536</b>	1,928	2,306	2,557	-	2,549
Vancouver, BC	3,683	851	1,158	975	1,191	1,120	1,160	3,496	<b>1,341</b>	797	792	1,234	2,549	-

Fig. 4.2 Distance Chart – Grande Prairie to tourist destinations



The Peace Country, which was at one time written-off, by Albertan palaeontologists, as a dinosaur wasteland, because no major fossil discoveries occurred during most of the 20<sup>th</sup> Century, has now emerged as a hot-spot, because the increasing fossil finds and this has raised international interest<sup>16</sup>. In addition to the Pachyrhinosaurus bonebed, there are at least fourteen other fossil discovery sites of significance in the Grande Prairie area. These includes a 75-million year-old duck-billed dinosaur which could possibly be determined to be a another unidentified species<sup>17</sup>. Veteran palaeontologist Phil Currie has described the area to offering *'tremendous potential for finding new information about the lives of dinosaurs and even the potential of unearthing new*

*species'*<sup>18</sup>. This region is new to the palaeontological community and less than 1% of it has been searched for the evidence of dinosaur remains. The potential for scientific

## CANADA'S TOP DINOSAUR LOCATIONS

- **GRANDE PRAIRIE** -- A multimillion-dollar museum in the works, the world's largest pachyrhinosaurus fossil site, recent tyrannosaurus finds and excavated skeletons displayed in museum exhibits and college hallways have Grande Prairie set to become Alberta's next prehistoric power.

- **DRUMHELLER** -- The self-proclaimed Dinosaur Capital of the World is the centre for dinosaurs in Alberta. It is home to the world-renowned Royal Tyrrell Museum of Palaeontology which houses more than 200 dinosaur specimens and is enhanced by slide shows, video mini-theatres, computer stations and hands-on scientific experiments. The town also offers the world's largest dinosaur and tours of its bone-filled Badlands.

- **BROOKS** -- Dinosaur Provincial Park lies only 40 kilometres northeast of Brooks. The area -- designated a World Heritage Site in 1979 by the United Nations -- offers an interpretive centre, research facility and guided tours. The park contains the remains of 35 species of dinosaurs from 75 million years ago. It is one of the top five dinosaur fossil sites on the globe.

- **EAST COULEE** -- Devil's Coulee is the first dinosaur-nesting site discovered in Canada and the second in the world with dinosaur embryos in the eggs. Paleontologists uncovered fossil fragments of eggshell in 1987 and later found Hadrosaur nests, eggs and embryos embedded in the coulee banks. Regular tours of the area are offered and there is an interpretive centre in the nearby town of Warner.

Fig. 4.4 Promotion of Alberta's Dinosaur Sites

Source: Tailbot, Neal. "Fossil finds abound: Almost overnight, Grande Prairie has become a top dinosaur destination", *Daily Herald-Tribune*, 23 July 2004.

work in the area is therefore almost limitless and is attracting international palaeontologists in search of a 'new discovery'<sup>19</sup>.

With current levels of tourist and scientific, it is feasible that the County of Grande Prairie could build a dinosaur museum to highlight further the palaeontological richness of the region. The Economic Impact Study predicts that approximately eighty full-time positions and twenty-five seasonal positions will be established at the interpretative centre, when it is initially opened<sup>20</sup>. Furthermore, according to the Preliminary Pipestone Creek Concept package, spear-headed by the County of Grande Prairie, it is estimated that the proposed Pipestone Creek Dinosaur

## What they have to offer

- **Grande Cache** – Having had its thousands of dinosaur footprints and trackways featured in *National Geographic* (March 2003), the town has quickly become a dinosaur hot spot. Its Interpretive Centre also has a section devoted to tracks and other fossils.
- **Grande Prairie** – A potential multi-million-dollar museum, the world's largest pachyrhinosaurus fossil site and excavated skeletons displayed in museum exhibits and college hallways have Grande Prairie marked for the tour's centre.
- **Tumbler Ridge** – The recent discovery of Western Canada's oldest dinosaur has jump-started the community's dino tourism. Local fossils and tracksites have led to the development of summer dinosaur camps for children and the construction of local dino-based exhibits.
- **Hudson's Hope** – Home to the famous Peace Canyon trackways and a museum with displays of dinosaur footprints, ichthyosaurus and other fossils.
- **Chetwynd** – A monument made of local undocumented fossils located in its town centre has been catching the attention of tourists and other exhibits are expected to soon follow.
- **Prince George** – Home to a museum with dinosaur exhibits featuring material found in several regions from northeastern and southeastern B.C.
- **Dawson Creek, Fort St. John, Pouce Coupe and Mackenzie** – All currently offer limited dinosaur sites, but provide important transportation, accommodation and visitor services needed by tourists.

Fig. 4.5 Promotion of fossil findings in the Peace River Region.

Talbot, Neal. "Dino tour in the works: Northern communities in B.C. and Alberta eyeing tourism draw", *Daily Herald-Tribune*, 23 December 2003.

museum will attract 4,240 to 6,650 visitors per month, from April to October, as a base figure per season<sup>21</sup>. This translates into 140-220 visitors per day during the summer months. During the 'off season' the estimated visitor numbers would be from 1,600 to 2,150 per month, or 53-75 visitors per day<sup>22</sup>. There would be the potential, after the museum is established, for it to draw from 35,000 to 55,000 visitors annually<sup>23</sup>. This projected tourism base is not as significant as the average 400,000 tourists per year that visit The Royal Tyrrell Museum. It is however, a starting point and the numbers would be likely to increase as the true palaeontological value of the region is revealed with time and exploration<sup>24</sup>.

Drumheller's estimated income from dino-tourism is \$15 million annually, and understandably the County of Grande Prairie would like to take advantage of this market by developing the Pipestone Creek Bonebed site<sup>25</sup>. From the point of view of site designer, the target audience or target tourists for the site interventions would be those individuals who have an inherent interest in palaeontology and the mysterious creatures that once occupied this part of the earth so long ago. By drawing upon imagery that the tourists may or may not be familiar with an attempt will be made to create spaces and develop the site in a way which is educational, yet creates a seamless connection with the natural landscape, especially in the sensitive areas surrounding the bonebed. By promoting the site as an 'education centre and museum' rather than a 'dinosaur theme park', the intent is to provide a passive, educational experience. This site will be advocated at a local, regional and international level thereby aiming to attract 'dinosaur-bound' tourists, but there is also the opportunity to connect this site with the existing tourist sites within the tourist context of Grande Prairie and thereby attracting 'drive-by' tourists. These connections or links between the site and surrounding attractions may manifest in the form of 'parkways'. Conceptually the parkways, (see Figures 4.8-4.11), could link

the multi-day and day-use areas in the Grande Prairie area, creating a tourism connectivity at a regional scale.

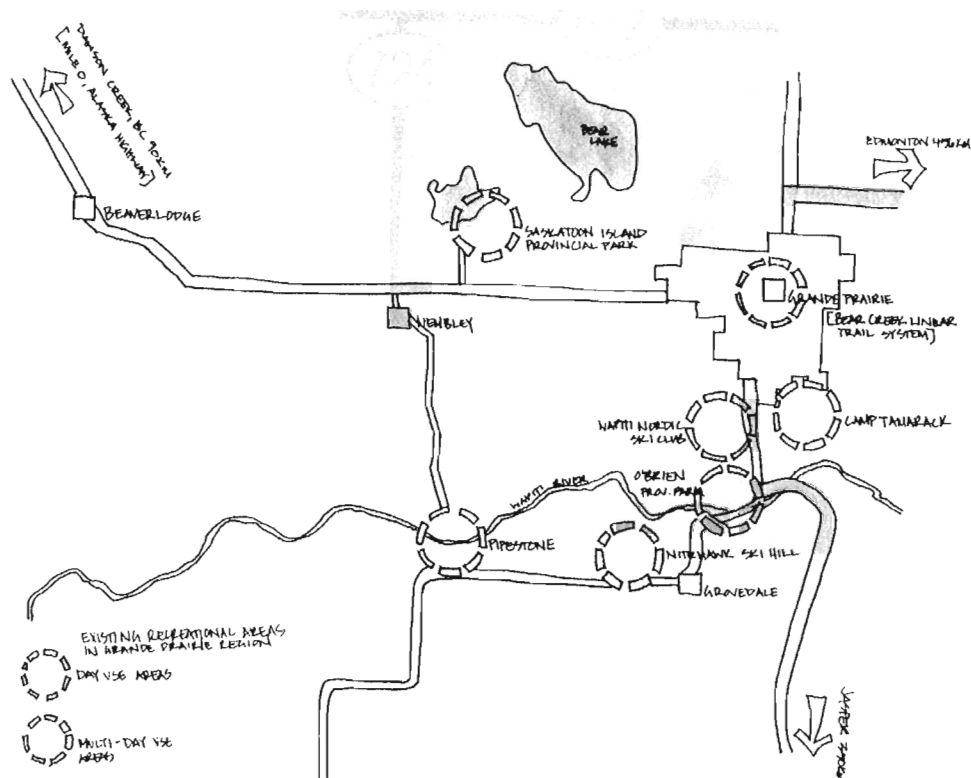


Fig. 4.8 Existing Recreational Areas In the Grande Prairie Area

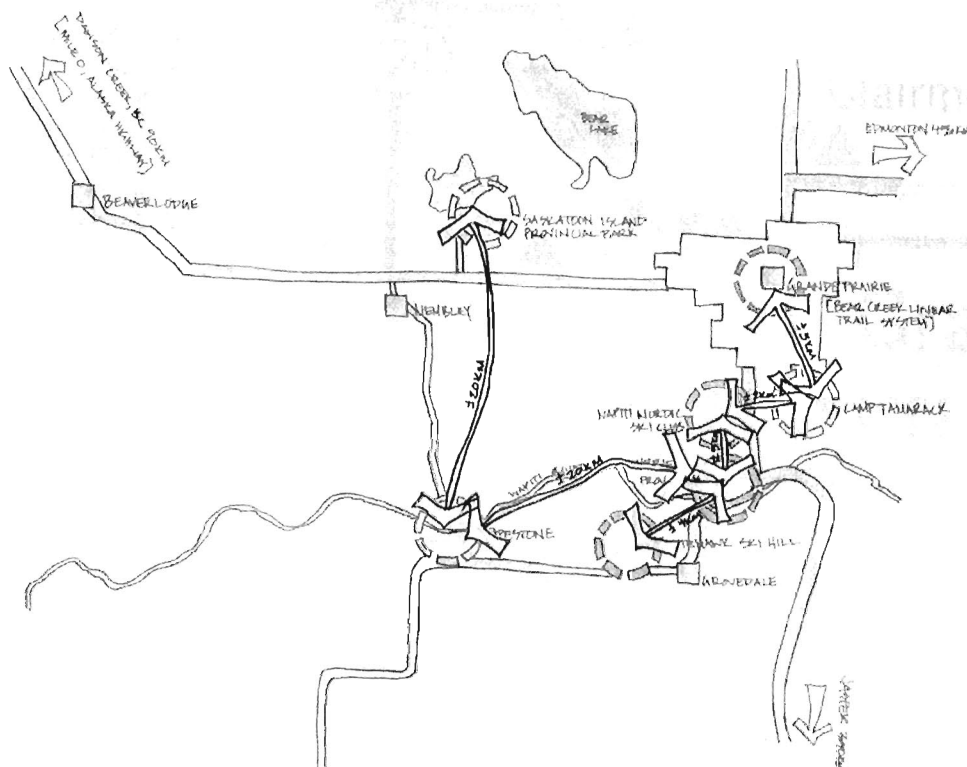


Fig. 4.9 Distances Between Existing Recreation Areas

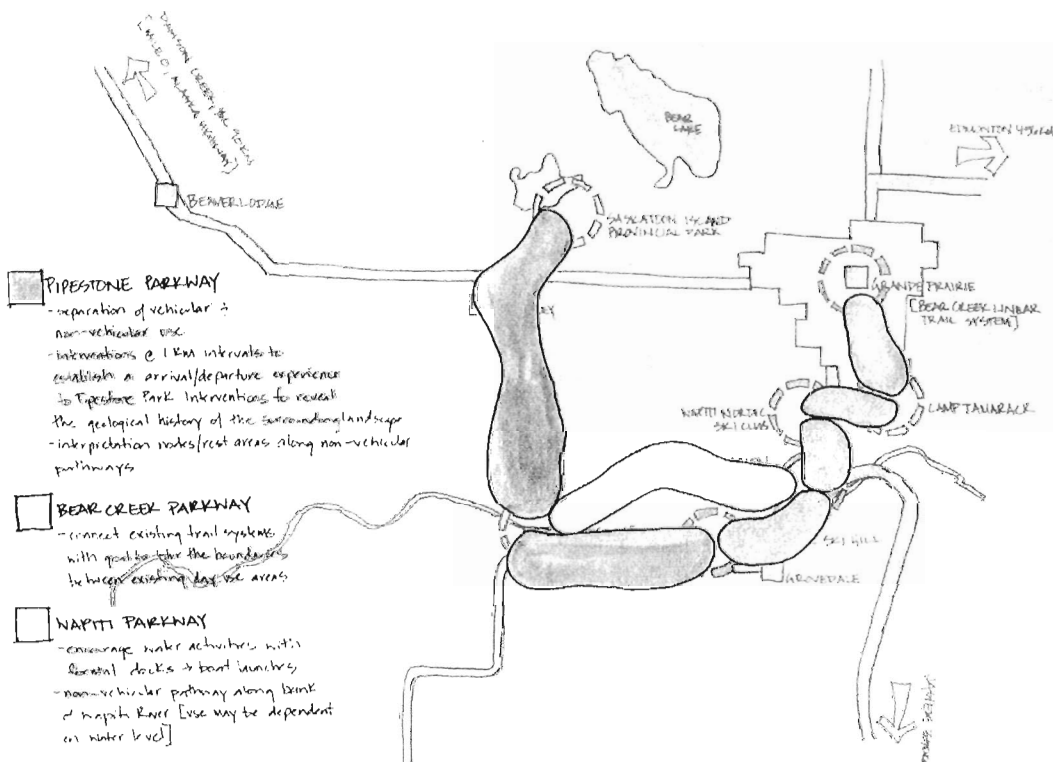


Fig. 4.10 Potential Parkway In the Grande Prairie Area



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## Precedent Analysis

Throughout this practicum investigation, three general precedent categories have been studied to establish a context for the development of the Pipestone Creek site. The regional, provincial, national and international precedents analyzed are primarily interpretative centres and recreation areas. The purpose of investigating these palaeontological, archaeological and recreation precedents is to explore how the various issues related to dinosaur tourism, resource security and site accessibility have been addressed previously. The three precedent categories are, palaeontology interpretative areas, archaeology interpretative areas and recreation areas.

## Palaeontology Interpretative Areas

### Dinosaur Provincial Park – UNESCO World Heritage Site

**Location:** This provincial park is located in 48 kilometres north-east of Brooks Alberta, 250 kilometres east of Calgary and 500 kilometres south-east of Edmonton<sup>1</sup>. This site became a World Heritage Site in 1979<sup>2</sup>.

**Description:** The Dinosaur Provincial Park is an

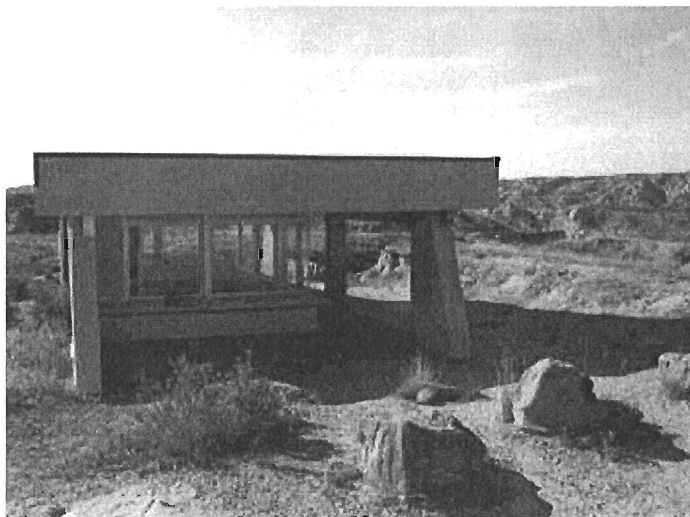


Fig. 4.12 Fossil Enclosure Structures  
Source: photo by author, August 12, 2004

interpretative area that allows park users to engage with the fossil resources in a variety of ways. On site there are self-guided walking and driving routes. A visitor centre that presents information about the present-day landscape, the pre-historic

environment and the various dinosaurs that would have lived in this region. A unique feature of the Provincial Park is the guided walking and bus tours. These tours bring the visitor to restricted areas within the park where on-going research is proceeding, allowing tourists to view and interact with past dig



Fig. 4.13 Fossil Left In-Situ  
Source: photo by author, August 12, 2004

sites, active dig sites and fossil resources left in-situ. Beyond the protection of the prehistoric resources found throughout the site, the Dinosaur Provincial Park assists in the preservation of a part of Alberta's Grassland Natural Region<sup>3</sup>. The size of this park is 19,980.12 acres (hectares: 8,085.96)<sup>4</sup>.

#### **Elements Examined:**

- ☐ Fossil Interpretation methods.
- ☐ Fossil protection methods – use and none use of enclosures.
- ☐ Guided tours of site and park interpreters.



Fig. 4.14 Park Interpreter  
Source: photo by author, August 12, 2004

## Royal Tyrrell Museum

**Location:** This museum is located in Drumheller, Alberta. Within the Canadian Badlands.

**Description:** The Royal Tyrrell Museum is a natural history museum which connects *"Canadians to their nation's scientific activities, facilitates the understanding of current issues, and creates tourism opportunities"*<sup>45</sup>. One of the focuses of the RTM is the prehistoric past of the Canadian Badlands and the numerous fossil resources

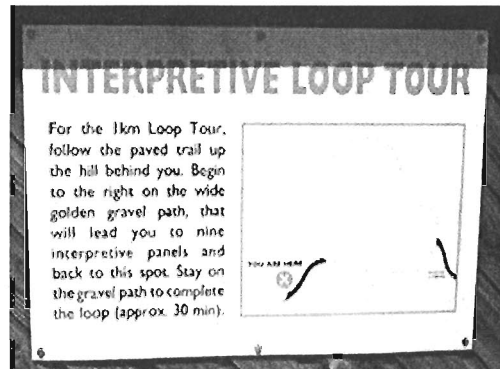


Fig. 4.15 Trail Signage at RTM  
Source: photo by author, August 9, 2004

uncovered in this region of the world. Beyond the various interior exhibits, a variety of programs and tours are offered at RTM to allow the visitors to engage in the 'act' of palaeontology through exploration and hands on activities. Examples of these programs are,

*"Fossil Casting"* – visitors make a cast of a authentic fossil

*"Excavate It"* – visitors work in the badlands, learning about the process of palaeontology

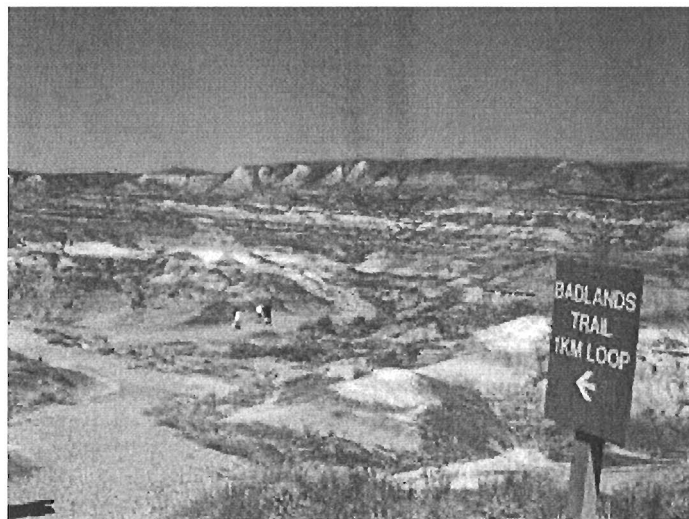


Fig. 4.16 Exploration Trail  
Source: photo by author, August 9, 2004



Fig. 4.17 "Dinosite" Tour at RTM  
Source: photo by author, August 9, 2004

"Dinosite" – a journey into the past to learn what it is like to prospect for fossils

"Day Digs" – visitors spend a full day digging up dinosaur bones in an authentic quarry and contribute their finds to RTM research projects<sup>6</sup>.

#### Elements Examined:

- ☐ Expression of how visitors may interact with the fossils (e.g. fossil interpretation scenarios)
- ☐ Use of pathways to encourage exploration of the site.

## Dinosaur National Monument - National Park Service

**Location:** This National Monument is a 480 sq. kilometre wilderness area on the border of north-western Colorado and north-eastern Utah<sup>7</sup>.

**Description:** The Dinosaur Quarry Visitor Centre is found at the Dinosaur National Monument. The primary interpretation at this centre is the enclosed rock exhibit wall, or dinosaur 'quarry', which contains 1500 fossils which are believed to be 150 million years old<sup>8</sup>. Hiking trails allow visitors to explore the landscape, bring visitors to the Outdoor Visitor Centre, where fossil left in situ may be viewed. The trails also link the visitor to the Museum of Ancient Life, which is the first major museum in the US

devoted solely to dinosaurs and houses multi-media exhibit that displays the fossils of the site<sup>9</sup>. There numerous trails on site, vary in degrees of accessibility and length<sup>10</sup>.

**Elements Examined:**

- ☐ Exhibit of fossil resource.
- ☐ Separation of visitor centres.
- ☐ Diversity of hiking trails.

## **Archaeology Interpretative Areas**

### **Angkor Archaeological Park – UNESCO World Heritage Site**

**Location:** This UNESCO site is located in Angkor Cambodia. This site was inscribed on the World Heritage List in 1992.

**Description:** Angkor stretches over 400 sq. kilometres and is one of the most important archaeological sites in south-east Asia<sup>11</sup>. Angkor Archaeological Park *"contains the magnificent remains of the different capitals of the Khmer Empire, from the 9th to the 15th century. These include the famous Temple of Angkor Wat and, at Angkor Thom, the Bayon Temple with its countless sculptural decorations"*<sup>12</sup>. UNESCO and the APSARA (the sites managing authority) has set up a wide range of programs and safeguards to protect this symbolic site and its surroundings<sup>13</sup>.

**Elements Examined:**

- ☐ Resource security and separation between visitor and artefact.

## Pueblo Grande Museum and Archaeological Park

**Location:** This archaeological park is located in Phoenix, Arizona, USA.

**Description:** The Pueblo Grande Museum collects, preserves and interprets archaeological and ethnographic material from the Greater Southwest<sup>14</sup>. It is located in the Hohokam village, a 1,500 year-old ruin that is in the city of Phoenix<sup>15</sup>.

*"For over 70 years the museum has been dedicated to the study and interpretation of the Hohokam culture. On the 102 acre park grounds, visitors explore the ruin of an 800 year-old platform mound possibly used by the Hohokam for ceremonies or as an administrative centre. An excavated ballcourt, and to full-scale reproductions of prehistoric Hohokam homes can be viewed along the ruin trail. The site also includes some of the last remaining intact Hohokam irrigation canals"*<sup>16</sup>.

### Elements Examined:

- ❑ Full-size replicas of the artefacts.
- ❑ Integration of the trails and resources – 'interpretative' walks.

## Head-Smashed-In Buffalo Jump Interpretative Centre – UNESCO World Heritage Site

**Location:** This UNESCO site is located in south-west Alberta. Specifically, it is 18 kilometres north and west of Fort Macleod or 160 kilometres south of Calgary<sup>17</sup>. Head-Smashed-In Buffalo Jump Interpretative Centre was inscribed on the World Heritage List in 1981<sup>18</sup>.

**Description:** This site marks the remains of one of the “oldest, largest and best preserved buffalo jump on the western plains of North America”<sup>19</sup>. Head-Smashed-In is evidence of this hunting custom that was practised by North American plains aboriginal, for nearly 6,000 years<sup>20</sup>. The museum and walking trails describe and illustrate “the rich oral traditions of the Blackfoot Nation, journal accounts of the early European explorers to the region and the sciences archaeology and geology”<sup>21</sup>. The walking tours brings the visitors to the buffalo kill site beneath the cliff then to the butchering site on the lower prairie,



Fig. 4.18 Interior Exhibit  
Source: photo by author, June 30, 2006

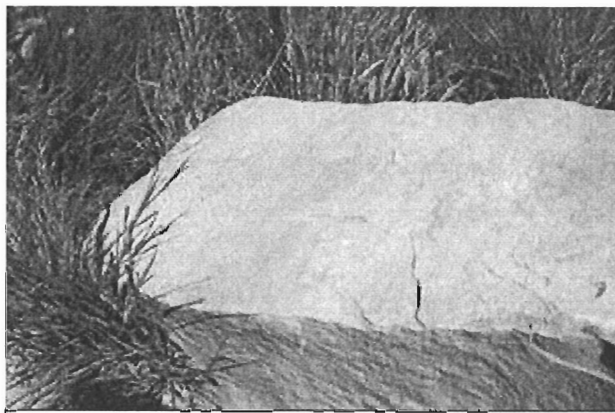


Fig. 4.19 Engraved Trail Markers  
Source: photo by author, June 30, 2006

as well to the top of the cliff where the animals plunged to their death<sup>22</sup>. Along the base walking tour the location of other site landmarks are illustrated to the visitor .

**Elements Examined:**

- ❑ Use of subtle wayfinding markers, to mark stops along the self-guided walking tours.
- ❑ Allowing the visitor to interact with the death site, and grasp the magnitude of the site.
- ❑ Providing diverse trail types to allow for different levels of site interpretation.
- ❑ Temporary nature of interior information panels.



Fig. 4.20 Approach to Death Site  
Source: photo by author, June 30, 2006

## Recreation Areas

### Kleskun Hills Park

**Location:** The Kleskun Hill Park access road is located 20 kilometres east of Grande Prairie, Alberta.

**Description:** Kleskun Hill Park is a protected natural area. Alberta's northernmost badlands as well as the largest parcel of native grasslands, in the Grande Prairie Region, are located in the park boundaries<sup>23</sup>. The Kleskun Hills rise over 100 metres above the surrounding plains, and the 93

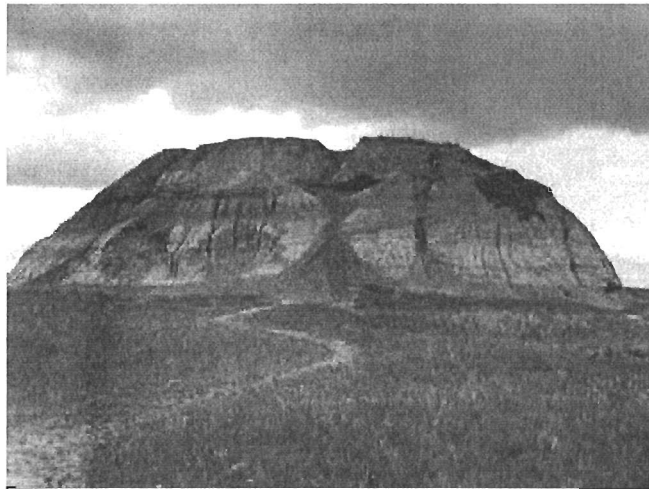


Fig. 4.21 Trail through park  
Source: photo by author, August 5, 2004

hectare park was designated as a provincial Natural Area in 1979, to protect the unique geological features and native grasslands<sup>24</sup>. In 1992, the County of Grande Prairie was granted a recreation lease for the adjacent campground and museum site<sup>25</sup>. The museum site consist of local buildings and machinery



Fig. 4.22 Native Grassland  
Source: photo by author, August 5, 2004

which have been restored by the Museum Society and one of the hills within the protected area is known as 'Dinosaur Hill', because dinosaur fossils were found at this site<sup>26</sup>. The Kleskun Hill Natural Area and the Kleskun Hill Museum continue to preserve the natural and human heritage of this unique area by creating a 'pedestrian only' doctrine within the Natural Area<sup>27</sup>.

### Elements Examined:

- ❑ Trail system and passive interpretation of the site.
- ❑ Park developed as a 'pedestrian only' zone.

## Saskatoon Island Provincial Park

**Location:** This Provincial Park is near Grande Prairie, Alberta. To access the park the visitor must travel 19 kilometres west of Grande Prairie on Highway 43, then 3 kilometres north on the park access road<sup>28</sup>.

**Description:** Saskatoon Island Provincial Park is 1.1 square kilometres and it preserves one

of the few remaining native shrub communities in the Peace River Parkland<sup>29</sup>. This park has been a federal migratory bird sanctuary since 1948 and is home to numerous grassland, forest and lakeside bird species, the most infamous of these species being the threatened Trumpeter Swan<sup>30</sup>. The park offers a broad range of nature-based outdoor activities, camping area and summer amphitheatre programs<sup>31</sup>. There are approximately 7 kilometres of trails within the park



Fig. 4.23 Approach to Bird Viewing Platform  
Source: photo by author, August 29, 2004



Fig. 4.24 Interpretive Signage  
Source: photo by author, August 29, 2004

that are for summer and winter use, including a paved pathway to the wildlife viewing platform<sup>32</sup>.

**Elements Examined:**

- ❑ Integration of seasonal, multi-use trails.
- ❑ Integration of recreation and protected resources.

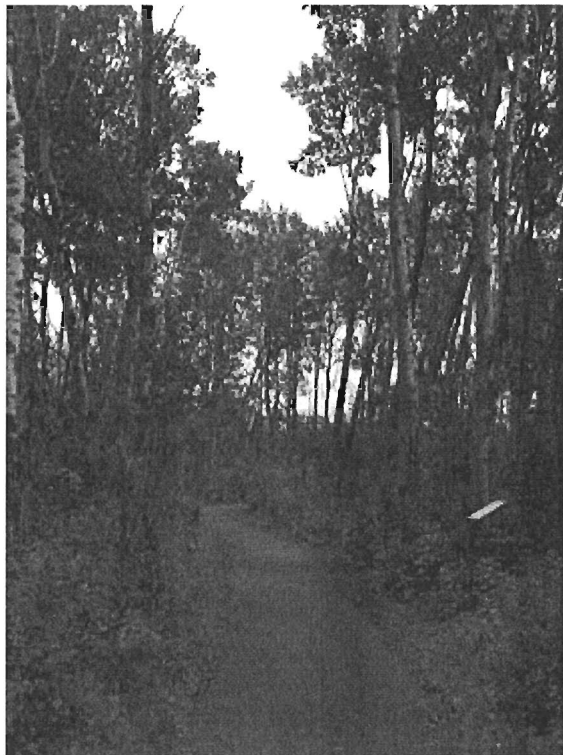


Fig. 4.25 Universal Accessible Trail  
Source: photo by author, August 29, 2004

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- <sup>17</sup> Head-Smashed-In Buffalo Jump. "Head-Smashed-In Buffalo Jump Interpretative Centre". <http://www.head-smashed-in.com/centre.html>. Date accessed: June 29 2006.

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- <sup>18</sup> UNESCO World Heritage Centre. "Head-Smashed-In Buffalo Jump" World Heritage List. <http://whc.unesco.org/en/list/158>, date accessed: June 29 2006, updated: June 29 2006.
- <sup>19</sup> Government of Alberta. Head-Smashed-In Buffalo Jump: Trail Guide. Friends of Head-Smashed-In Buffalo Jump Society: 2006, 1.
- <sup>20</sup> UNESCO World Heritage Centre. "Head-Smashed-In Buffalo Jump" World Heritage List. <http://whc.unesco.org/en/list/158>, date accessed: June 29 2006, updated: June 29 2006.
- <sup>21</sup> Government of Alberta. Head-Smashed-In Buffalo Jump: Trail Guide. Friends of Head-Smashed-In Buffalo Jump Society: 2006, 1.
- <sup>22</sup> Ibid.
- <sup>23</sup> Hervieux, Margot. Kleskun Hill: A Discovery Guide. Grande Prairie: Peace Parkland Naturalist, 2002, 4.
- <sup>24</sup> Ibid.
- <sup>25</sup> Ibid.
- <sup>26</sup> Connors, Ken. "Kleskun Hill Park" Discover The Peace Country.com Visitor Guide. <http://www.discoverthepeacecountry.com/htmlpages/kleskunhills.html>, date accessed: January 2005.
- <sup>27</sup> Hervieux, Margot. Kleskun Hill: A Discovery Guide. Grande Prairie: Peace Parkland Naturalist, 2002, 4.
- <sup>28</sup> Alberta Community Development. Attractions and Touring: Saskatoon Island Provincial Park. Grande Prairie: Alberta Community Development, 2003.
- <sup>29</sup> Government of Alberta. "Provincial Parks", Land Reference Manual: Alberta Community Development. <http://www.cd.gov.ab.ca/preserving/parks/lrm/provpark/provpark.asp>. Date Accessed: October 5, 2005, date updated: April 22, 2005.
- <sup>30</sup> Alberta Community Development. Attractions and Touring: Saskatoon Island Provincial Park. Grande Prairie: Alberta Community Development, 2003.
- <sup>31</sup> Ibid.
- <sup>32</sup> Ibid.

# 5

## The Influences

### Palaeontology Approach

A generalised definition of *artefact* is 'a product of human art and workmanship'<sup>1</sup>. But what does this mean from the perspective of an archaeologist or palaeontologist? Traditionally the technocentric archaeological view is that *artefacts* are merely tools. Tools that have a utilitarian function, are used and then set aside once the task at hand is completed<sup>2</sup>. The *meaning* of these artefacts lies in and is derived from the functional fruition of said tool<sup>3</sup>. From my understanding, research and correspondence with members at Royal Tyrell Museum, the *artefacts* of palaeontology are the *fossils* and the *meaning* is not obtained from the function of the fossil but from the resulting scientific information obtained. The advancement of science is the utmost goal, and it is through the discovery and assessment of the fossil that the *scientific value* or *meaning* of the *fossil* (artifact) is realised. However, common threads between archaeology and palaeontology are the questions, *What knowledge can be drawn from this finding? What new knowledge is derived?*. There has been documented conflict between the *science* and *experience* of palaeontology. Generally, the dividing line between tourism (the experience) and science (the knowledge) is a fine one. When can the experience for non-palaeontologists begin? Is it when the resource base is no longer considered to have a high 'scientific' value? And if the fossil resource base is no longer viewed as significant from the perspective of the palaeontologist, will it still be 'valued' as a tourist attraction or experience? When does this transition or transfer of 'value' occur? How is the 'tourism value' derived? In order for both to occur simultaneously, attention and care must be made

to be inclusive of the paleontological perspective and tourist perspective of the meaning behind 'fossils'. How can the scientific and economic approaches both result in a acquisition of knowledge from both parties?

## First Nation Understanding

The Beaver First Nation, are a Dene people, call themselves the *real people* and believe they have always been on the land of their ancestors, being put there at the beginning of the world by the creator, *Heaven Sitter*<sup>4</sup>. The Dene world view of their ancestors was "*based upon the natural world of animals, ecology, aquatic beings and the natural elements: fire, wind, sky and water*"<sup>5</sup>. The Dene "*elders teach to be sensitive to the land, water, sky or universe and animals and plants because they offer life. Man and woman are not directors in that environment but an integrated part of a whole system. The Dene rely on the environment and its species. We do not abuse what the creator has loaned to us to protect*"<sup>6</sup>. It is the duty of the Dene storytellers to hold in memory the knowledge that has been handed down from generation to generation<sup>7</sup>. Dene stories are divided into two categories, reality and spiritual/myths. These stories can be revealed or told over days, each tale or 'days end' was complete in itself and it is the putting together of these accounts or short tales that composed the complete stories<sup>8</sup>. This is why the Dene storytelling tradition is so complete, it started "*as far back as the days when Nacácho – the giant now extinct animals – roamed the world*", but unfortunately stopped fifty years ago<sup>9</sup>. According to Dene legends the world needed to adapt to the new creation and its parts, there are many different ancient stories relating to creation among the First Nation's people and the common element is our natural environment<sup>10</sup>. The Dene people also believed individuals had a 'destined' animal and it was the powerful secrets of medicine that provided them the ability to communicate with their

'destined' animal<sup>11</sup>. However, *"because people were too afraid to talk about medicine power openly, they held a strong belief that medicine power was secret, that it belonged only to its owner, who did not talk about it. Each medicine person had this communication, but in a different way and with a different animal...if this person had a strong enough medicine, he could transfer himself into a raven and stay with the raven for a while"*<sup>12</sup>.

## Landscape Values

### UNESCO Criteria

Prior to a site being accepted onto UNESCO'S World Heritage List, it must meet a list of criteria, including being placed on the particular country's "Tentative List" for nomination. In the early 2000s, the World Heritage Committee asked the 182 State Party Countries to update their Tentative Lists to reflect UNESCO's Global Strategy and the revised criteria for inscription, and in addition resubmit these lists every five to ten years<sup>13</sup>. The UNESCO Global Strategy is an action plan which identifies the discontinuity of the type of sites currently on the World Heritage List and has the goal to *"increase the types of heritage inscribed on the World Heritage List, as well as the regional and bio-geographical representation of this heritage"*<sup>14</sup>. In order even to be placed upon Canada's Tentative List, it is necessary that a site has the properties and potential to fulfil World Heritage criteria for 'outstanding universal value'<sup>15</sup>. Canada's previous list was created in 1980, and at the commencement of Parks Canada determining Canada's revised list, (see Appendix C: Selecting Tentative List), the sites assessed were those suggested by Canadians during the past two decades as well as those sites that appeared to have met UNESCO's criteria for outstanding universal value<sup>16</sup>. Numerous sites across Canada were considered and short listed for the Tentative List, including the Kleskun Hill

Natural Area near Grande Prairie Alberta. Ultimately, however, only eleven sites were chosen to be included on the Tentative List and put forward to UNESCO for nomination<sup>17</sup>.

There are ten criteria listed by UNESCO in the “assessment of outstanding universal value” (see to Appendix A), and to be determined a site of ‘outstanding value’, the nominated property is required to satisfy one or more of the criteria<sup>18</sup>. These criteria were previously categorised under two separate sets, one for cultural heritage and the other as natural heritage<sup>19</sup>. Beyond a property qualifying by virtue of ‘outstanding universal value’ it is imperative that the nominated property also meet the conditions of integrity and/or authenticity. Moreover, it is required that a suitable management and protection system is in place for the nominated site, and is administered by an approved municipal, provincial or national body<sup>20</sup>.

The Dinosaur Provincial Park, a UNESCO World Heritage Site, near Brooks Alberta is an exemplary case study in how tourism and the science of palaeontology co-exist in a functional and educational manner. Similarly, the Pipestone Creek site has the potential to become a working palaeontology centre that may inform as well as delight visitors. However, for the Pipestone site to be considered for World Heritage standing it must conform with at least two of the criteria and tests of authenticity outlined by UNESCO<sup>21</sup>. The Pipestone Creek bonebed site currently meets criteria (viii), which states:

*“nominated properties shall therefore be outstanding examples representing major stages of earth’s history, including the record of life, significant on-going geological processes in the development of landforms or significant geomorphic or physiographic features”<sup>22</sup>*

It can be argued that Pipestone currently also falls under UNESCO's definition of a '**relict (or fossil) landscape**' within the cultural landscape category as well as being a '**natural heritage property**'. When Parks Canada began to rework the 'Tentative List', knowledge of various authorities from across the country, from the International Council on Monuments and Sites (ICOMOS) and the World Conservation Union (IUCN) were drawn upon. In this process expert reports were produced. One of these reports, *Towards a Revised Canadian Tentative List for World Heritage – Natural Properties*, describes how nominated natural properties which concentrate on a fossil resource

*relict (or fossil) landscape:*  
is one in which an evolutionary process came to an end at some time in the past, either abruptly or over a period. Its significant distinguishing features are, however, still visible in material form

**natural heritage property:** natural sites or precisely delineated natural areas of outstanding universal value from the point of view of science, conservation or natural beauty

require a "*specialised knowledge and a clear understanding of how they compare to similar deposits found elsewhere*" and to obtain an understanding of a deposit's scientific value the IUCN has created a 'Fossil Site Evaluation Checklist' (see Appendix B)<sup>23</sup>. Meeting the criteria on this checklist further highlights the significance of the Pipestone Creek resource and how the protection and interpretation of this site would heighten the understanding of life during the Late Cretaceous period.

## Parks Canada Principles

One of the objectives of this practicum is to find the balance between the science of palaeontology, the protection of a fossil resource, and dinosaur related tourism. In an attempt to achieve this goal the end result of this investigation will be a series of design guidelines and standards that will lead to a potential treatment of

the landscape. The existing conditions on site will provide a 'baseline' for development. The guiding principles of Parks Canada as well as the American National Park Services work relating to historic landscapes are used to help establish the design guidelines and standards to be employed at the Pipestone Creek Park Fossil Site. The principles and ideas expressed in these documents serve as the backbone from which the Pipestone Creek design guidelines, interventions and implementations will express themselves on site.

The primary Parks Canada document studied was the Standards and Guidelines for the Conservation of Historic Places in Canada. Key words and descriptions were drawn from this document. They are:

#### **preserve**

*"...importance in defining the overall heritage value of the place*

*...land patterns that are important in defining the overall heritage value of the landscape"*<sup>24</sup>

#### **protect & maintain**

*"...retain the associated scientific and research information for the site...*

*...identify, evaluate, and treat the causes of deterioration, such as environmental erosion or tourism-generated traffic*

*...provide proper drainage for terrestrial sites to ensure water does not damage or destroy site*

*...minimise disturbance of the terrain, thus reducing the possibility of damaging or destroying the site*

*...protect site against unauthorised activity before work begins"*<sup>25</sup>

## **retain**

*"...features, such as ground cover that help protect site"<sup>26</sup>*

## **monitor**

*"...sites to maintain a stable environment"<sup>27</sup>*

## **balance**

*"...the scientific and research knowledge that may be gained from excavating sites and the preservation of resources in place"<sup>28</sup>*

## **identify**

*"...the intangible values that contribute to the meaning of land patterns"<sup>29</sup>*

Beyond the context of Parks Canada's standards and guidelines, the notions of **reversibility** and **flexibility** are drawn upon. Ultimately this site is about the Pipestone Pachyrhinosaurus dinosaurs that were apart of the environment 73 millions years ago. This investigation is about interpretation and presentation of their time and domain in the landscape. Therefore it may not be appropriate to **replace** the significant marks left by the process of fossil collection on the landscape, with interventions that reflect the present-day prairie landscape. However, it is necessary to design with an underlying principle of **reversibility** and **flexibility** because of the evolving nature and malleable boundaries of this site and resource. This is appropriate because these principles are a means to provide protection of the fossil resource while permitting interpretation, scientific research and recreational use of the site.

## American National Park and Heritage Preservation Services

Charles Birnbaum, of the American National Park Service and Heritage Preservation Service, describes how ultimately a **cultural landscape** is a unique place which exhibits an evolving alliance that humans have with the natural realm. However, as defined by the National Park Services Preservation Brief 36, **a cultural landscape** is *"a geographic area, including both cultural and natural resources and the wildlife or domestic animals therein, associated with a historic event, activity, or person or exhibiting other cultural or aesthetic values"*<sup>30</sup>. Within the notion of cultural landscapes the denotation can be subsequently divided into categories, which include *historic designed landscapes, historic vernacular landscape, historic site and ethnographic landscapes* (see Appendix D for comprehensive NPS & HPS definitions). American National Park Service Preservation Brief 36, *"provides a framework and guidance for undertaking projects to ensure a successful balance between historic preservation and change"*<sup>31</sup>. This framework describes a method in which to approach the development of a cultural landscape like Pipestone and highlights key ideas of preservation, change and balance. Ultimately, the staging plan, design guidelines and standards for Pipestone Creek will not be from the perspective of 'historic preservation' as described by the American National Park Service. Nevertheless, the approach is applicable and will be drawn upon in this investigation. As described by Birnbaum, *"preservation planning involves the following steps:*

- 1. historical research*
- 2. inventory and documentation of existing conditions*
- 3. site analysis and evaluation of integrity and significance*
- 4. development of a cultural landscape preservation approach and treatment plan*

5. *development of a cultural landscape management plan and management philosophy*
6. *the development of a strategy for ongoing maintenance*
7. *preparation of a record of treatment and future research recommendations*<sup>32</sup>”

**Ethnographic Landscape:** a landscape containing a variety of natural and cultural resources that associated people define as heritage resources.

**Rehabilitation:** is defined as the act or process of making possible a compatible use for a property through repair, alterations, and additions while preserving those portions or features which convey its historical or cultural values.

Applying the American National Park Service and the Heritage Preservation Service, approach to Pipestone Creek, the bonebed site would be described as an **'ethnographic landscape'**, and the appropriate treatment method for the site as a cultural landscape would embrace the definition of **'rehabilitation'**<sup>33</sup>.

## 2005 Alberta Centennial Legacy Program

In 2005, the province of Alberta celebrated its Centennial. To commemorate this event an "Alberta Centennial Legacies Grant Program" was initiated. The legacy program, which has been established at a municipal and provincial level, provided over one quarter of a billion dollars to be invested by the "provincial government to support partnership, community-owned, and government-owned and operated capital projects"<sup>34</sup>. The goal of this endeavour was to celebrate the Centennial in meaningful ways which would leave lasting legacies throughout the province<sup>35</sup>.

On September 30, 2004 the Centennial Legacies program announced that both the ATCO Learning Centre at the Royal Tyrrell Museum and the Dinosaur Provincial Park Field Station would be provided funding for improvements and expansion under the grant program<sup>36</sup>. This support demonstrates a government doctrine that Alberta's prehistoric heritage is an important resource to preserve and develop for public benefit and research. Therefore there is the potential, that similar to the association the government has with the Royal Tyrrell Museum and the Dinosaur Provincial Park, the Alberta government will take on the role of custodian for the management of the proposed Pipestone Creek dinosaur museum development.

## Endnotes

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<sup>1</sup> Student's Oxford Canadian Dictionary. Toronto: Oxford University Press, 2004, 47.

<sup>2</sup> Whitley, David S. Reader in Archaeological Theory: Post-Processual and Cognitive Approaches. New York: Routledge, 1998, 99.

<sup>3</sup> Ibid.

<sup>4</sup> Burley, David V., Hamilton, J. Scott and Fladmark, Knut R. Prophecy of the Swan: The Upper Peace River Fur Trade of 1794-1823. Vancouver: UBC Press, 1996, 13.

<sup>5</sup> Saskatchewan Indian Cultural Centre. *The Dene World View* Heritage Website - Ethnography .

<http://www.Sicc.sk.ca/heritage/ethnography/dene/beliefs/worldview.html> Date accessed: November 8 2005.

<sup>6</sup> Saskatchewan Indian Cultural Centre. *The Dene World View* Heritage Website - Ethnography .

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<http://www.Sicc.sk.ca/heritage/ethnography/dene/beliefs/worldview.html> Date accessed: November 8 2005.

<sup>7</sup> Blondin, George. *When the World was New: Stories of the Sahtú Dene*. Yellowknife: Outcrop, The Northern Publishers, 1990, i.

<sup>8</sup> Ibid.

<sup>9</sup> Ibid.

<sup>10</sup> Saskatchewan Indian Cultural Centre. *The Dene World View Heritage Website - Ethnography* .

<http://www.Sicc.sk.ca/heritage/ethnography/dene/beliefs/worldview.html> Date accessed: November 8 2005.

<sup>11</sup> Blondin, George. *When the World was New: Stories of the Sahtú Dene*. Yellowknife: Outcrop, The Northern Publishers, 1990, ii.

<sup>12</sup> Ibid.

<sup>13</sup> Parks Canada. "Updating Canada's Tentative List", *World Heritage: Canada's Tentative List for World Heritage Sites*. [http://www.pc.gc.ca/progs/spm-whs/index\\_E.asp](http://www.pc.gc.ca/progs/spm-whs/index_E.asp). Last updated: June 29, 2004. Date accessed: June 6, 2005.

<sup>14</sup> Parks Canada. "A Global Strategy for World Heritage", *World Heritage: Canada*. [http://www.pc.gc.ca/progs/spm-whs/page6\\_e.asp](http://www.pc.gc.ca/progs/spm-whs/page6_e.asp). Last updated: July 28, 2004. Date accessed: June 27, 2005.

<sup>15</sup> Parks Canada. "Preparing Canada's Tentative List for World Heritage Sites", *World Heritage: Canada's Tentative List for World Heritage Sites*. [http://www.pc.gc.ca/progs/spm-whs/itm3-/page2\\_E.asp](http://www.pc.gc.ca/progs/spm-whs/itm3-/page2_E.asp). Last updated: June 28, 2004. Date accessed: June 6, 2005.

<sup>16</sup> Parks Canada. "Updating Canada's Tentative List", *World Heritage: Canada's Tentative List for World Heritage Sites*. [http://www.pc.gc.ca/progs/spm-whs/index\\_E.asp](http://www.pc.gc.ca/progs/spm-whs/index_E.asp). Last updated: June 29, 2004. Date accessed: June 6, 2005.

<sup>17</sup> Parks Canada. "The Result: Updating Canada's Tentative List", *World Heritage: Canada's Tentative List for World Heritage Sites*. [http://www.pc.gc.ca/progs/spm-whs/index\\_E.asp](http://www.pc.gc.ca/progs/spm-whs/index_E.asp). Last updated: June 29, 2004. Date accessed: June 6, 2005.

<sup>18</sup> Parks Canada. "Criteria for determining Outstanding Universal Value: Updating Canada's Tentative List", *World Heritage: Canada's Tentative List for World Heritage Sites*. [http://www.pc.gc.ca/progs/spm-whs/index\\_E.asp](http://www.pc.gc.ca/progs/spm-whs/index_E.asp). Last updated: June 29, 2004. Date accessed: June 6, 2005.

<sup>19</sup> UNESCO. *Operational Guidelines for the Implementation of the World Heritage Convention*. Paris: UNESCO, 2005, 19.

<sup>20</sup> Ibid, 20.

<sup>21</sup> UNESCO. "Establishment of the World Heritage List". <http://whc.unesco.org/toc/mainf8.htm>

<sup>22</sup> UNESCO. *Operational Guidelines for the Implementation of the World Heritage Convention*. Paris: World Heritage Centre, 2005.

<sup>23</sup> Thorsell, Jim. "Towards a Revised Canadian Tentative List for World Heritage – Natural Properties", *World Heritage: Canada*. [http://www.pc.gc.ca/progs/spm-whs/itm4-/page9\\_E.asp](http://www.pc.gc.ca/progs/spm-whs/itm4-/page9_E.asp). Last updated: June 28, 2004. Date accessed: June 6, 2005.

<sup>24</sup> Parks Canada. "Guidelines for Landscapes", *Standards and Guidelines for the Conservation of Historic Places in Canada*. Her Majesty the Queen in Right of Canada, 2003, 1.

<sup>25</sup> Parks Canada. "Guidelines for Archaeological Sites", *Standards and Guidelines for the Conservation of Historic Places in Canada*. Her Majesty the Queen in Right of Canada, 2003, 3.

<sup>26</sup> Ibid, 4.

<sup>27</sup> Ibid.

<sup>28</sup> Ibid.

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<sup>29</sup> Parks Canada. "Guidelines for Landscapes", Standards and Guidelines for the Conservation of Historic Places in Canada. Her Majesty the Queen in Right of Canada, 2003, 1.

<sup>30</sup> Birnbaum, Charles A., Madigan, Kathleen J. The Secretary of the Interior's Standards for the Treatment of Historic Properties: With Guidelines for the Treatment of Cultural Landscapes. Washington D.C.: U.S. Department of the Interior, National Park Service, Cultural Resource Stewardship and Partnerships, Heritage Preservation Services, Historic Landscape Initiative, 1996.  
<http://www.cr.nps.gov/hps/hli/introguid.htm>. Date accessed: August 15, 2005.

<sup>31</sup> Ibid, 7.

<sup>32</sup> Ibid.

<sup>33</sup> Ibid.

<sup>34</sup> Government of Alberta. News release "Grants For Alberta 2005 Centennial Legacy Projects Announced: September 30, 2004".  
[http://www.albertacentennial.ca/news/news\\_releases/legacy\\_projects.asp](http://www.albertacentennial.ca/news/news_releases/legacy_projects.asp). Date accessed: November 17 2004

<sup>35</sup> Ibid.

<sup>36</sup> Ibid.

## Site Analysis

### Location of Site

The site for this practicum investigation is Pipestone Creek Park. This recreation area is located in the County of Grande Prairie, which is within the Peace River Region of north-western Alberta. The legal land description of this site is NE 11 70-8-6 and SE 11 70-8-6, west of the 6° meridian. The geographic description of Pipestone Creek is 55.10N (latitude) and 118.53W (longitude). The altitude at Environment Canada's station point in closest proximity to the site is 669 metres<sup>1</sup>. This station point is at the Grande Prairie Regional Airport which is approximately 35 kilometres from the site access road. The park lies at the junction of the Wapiti River, one of the main arteries in the Peace River Region, and the Pipestone Creek. Pipestone Creek flows

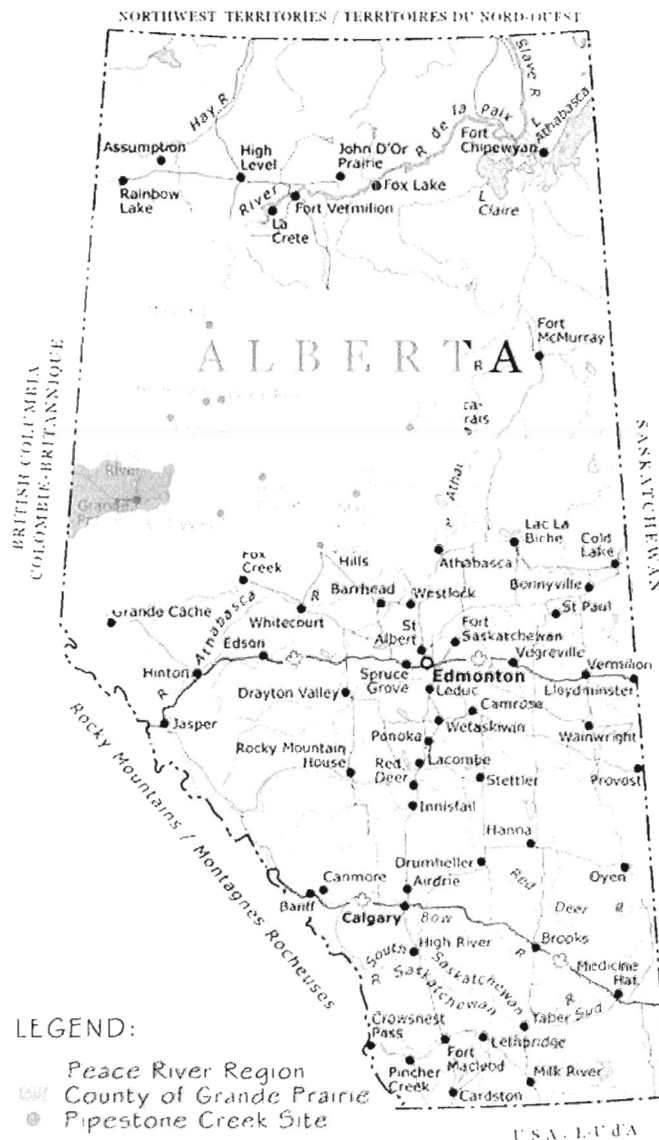


Fig 5.0 Map of Alberta with Peace River Region, County of Grande Prairie & Site Highlighted.  
source: base image, 'Alberta' Natural Resources Canada.  
Her Majesty the Queen in Right of Canada, 2001.

southward into the Wapiti River and the Wapiti River flows eastward into the Smoky River<sup>2</sup>.

The specific site of the Pipestone Creek Pachyrhinosaurus bonebed is located on an elevated bench approximately 10 metres above the creek bed level of Pipestone Creek and about 1.1 kilometres upstream from the confluence of the Wapiti River and Pipestone Creek<sup>3</sup>. The creek valley at the location of the bonebed is about 700 metres wide from crest to crest and 100 metres deep, with a narrow bottom consisting of the creek bed and a discontinuous floodplain<sup>4</sup>.

## **Site Access**

The primary access road to Pipestone Park is located 37 kilometres south west of the Grande Prairie city limits along Highway #43. Highway #43 becomes the Alaska Highway just across the British Columbia/Alberta border in Dawson Creek, BC which is 130 kilometres from Grande Prairie. To reach the primary park entrance one must travel approximately 17 kilometres south of Wembley, along a gravel township road<sup>5</sup>. The gravel access down the river valley to the park site is approximately 2.1 kilometres. From 1933-1958 a ferry crossing was located at the Pipestone Creek Park site which connected and encouraged trade and travel between the south and north side of the Wapiti River. This ferry crossing also provides a potential secondary access to the site. The old ferry access road is approximately 4 kilometres from a secondary highway – Highway #666. Highway #666 connects with Highway #40, otherwise known as the Bighorn Highway, in two locations. The first junction is at Wapiti river bridge, adjacent to O'Brien Provincial Park, roughly 28 kilometres from the old ferry road. The secondary access route is to travel 27 kilometres from the old ferry road, through the hamlet of Grovedale to approach the Bighorn Highway. The

Bighorn Highway is the main route from Jasper National Park to the Grande Prairie area. The town of Jasper is roughly 400 kilometres from the city of Grande Prairie<sup>6</sup>.

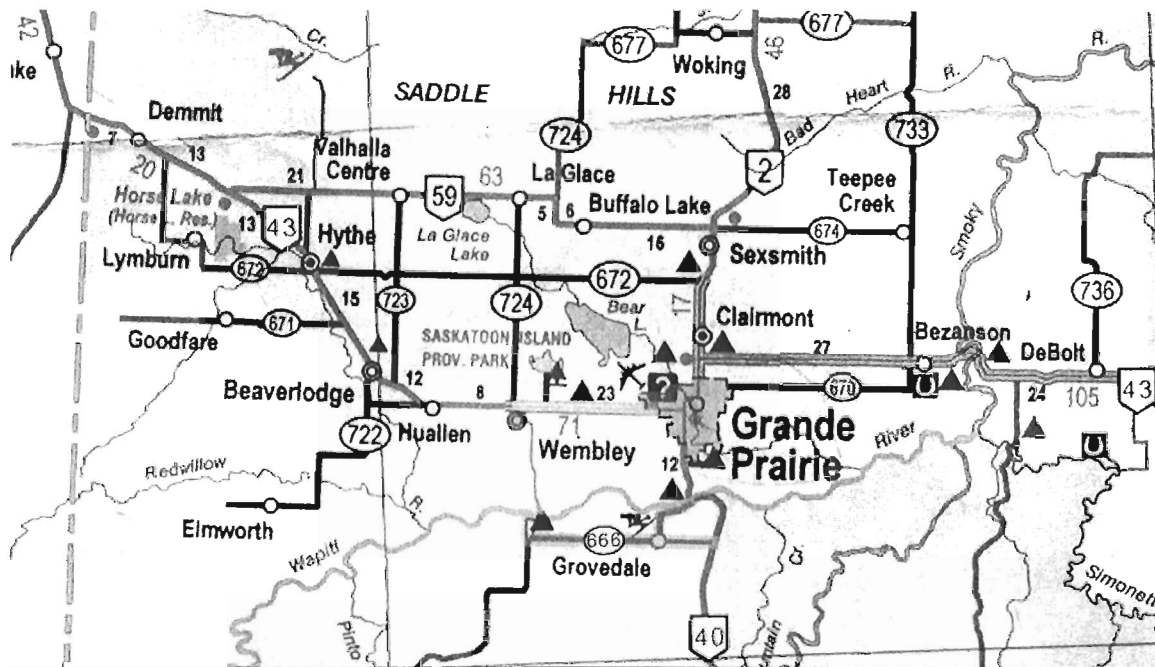


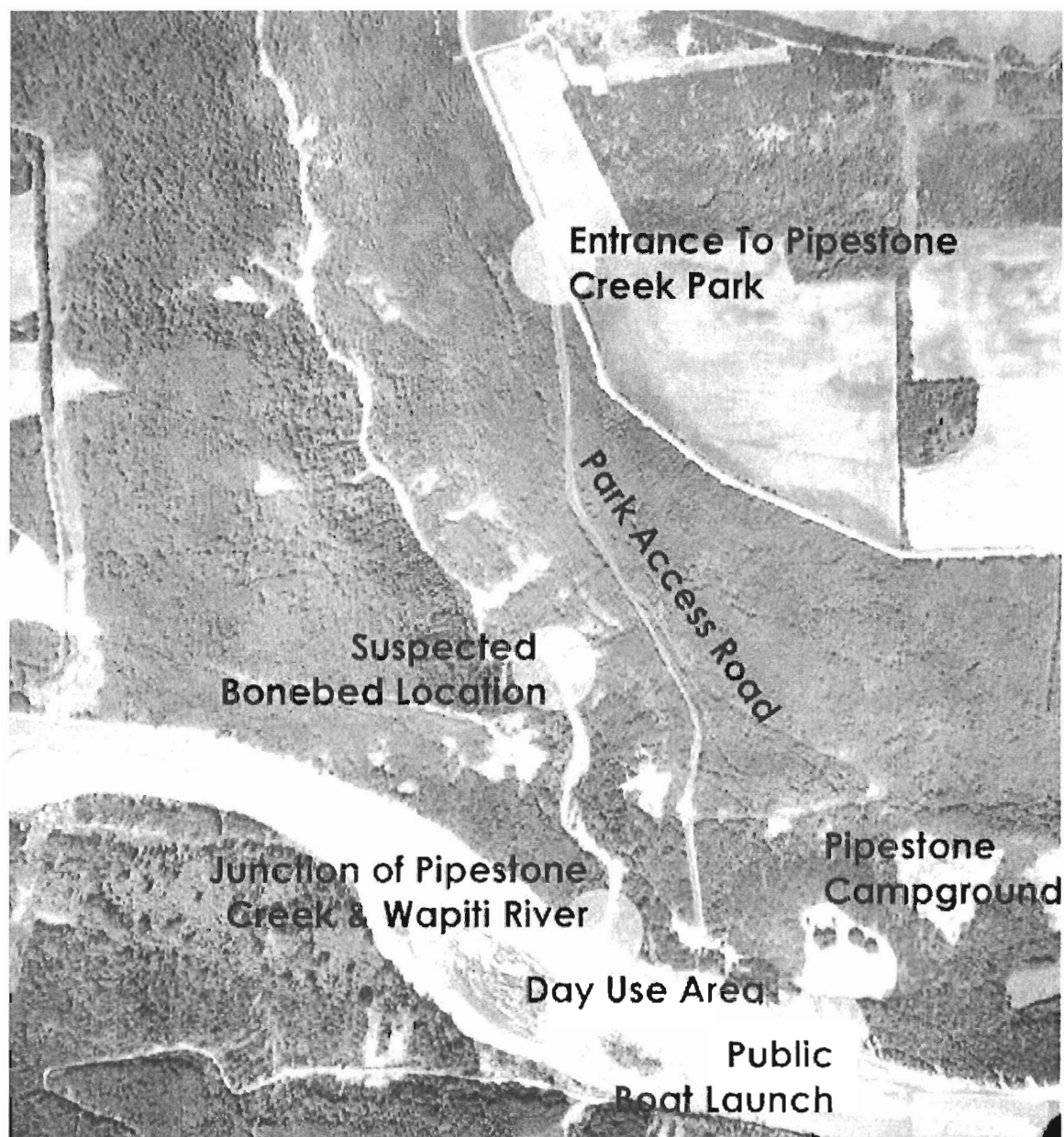
Fig 5.1 Vehicular Access to Pipestone Creek from the City of Grande Prairie.

Source: base image Alberta Motor Association. Alberta Motor Association 2004 Official Road Map. Alberta Sustainable Resource Development: 2004)

## Existing Landmarks and Conditions

Currently, Pipestone Creek Park is used as a recreation site and there exists day-use and multi-day use areas. The features of the park include playstructures, a picnic area, fire pits, free play areas, a campground, a golf-frisbee course, a 'fitness' circuit, horseshoe pits and an informal boat launch. Within the campground there are modern washroom and shower facilities, 96 un-serviced lots and one group camping area. Other landmarks within the park include the current Pipestone Creek Dinosaur Museum and Pipestone Creek settlement & First Nation cemetery. In close proximity, 5 kilometres from the existing park entry, is the Pipestone Golf course and another un-serviced campground.

The first field observations of the Pipestone Creek Park site, from the perspective of a landscape designer, occurred in August 2004. At this time it was noted there are numerous existing pathways on site, marked by dinosaur-themed signs. The majority of the signs are in poor condition and/or displaced, and with the signs that remain intact the wayfinding throughout the park is difficult, particularly along the creek bank. The majority of the trails, in the day-use area, would not be considered 'accessible' by current design standards. The multi-use trails appear to begin, end and join in haphazard ways, trail braiding is evident. One could assume that these trails were not formally constructed, but user derived. There is no formal surfacing on the trails, typically it is irregular, and a mixture of soil and riverstone.



**Fig 5.2 Existing Pipestone Creek Park Features**

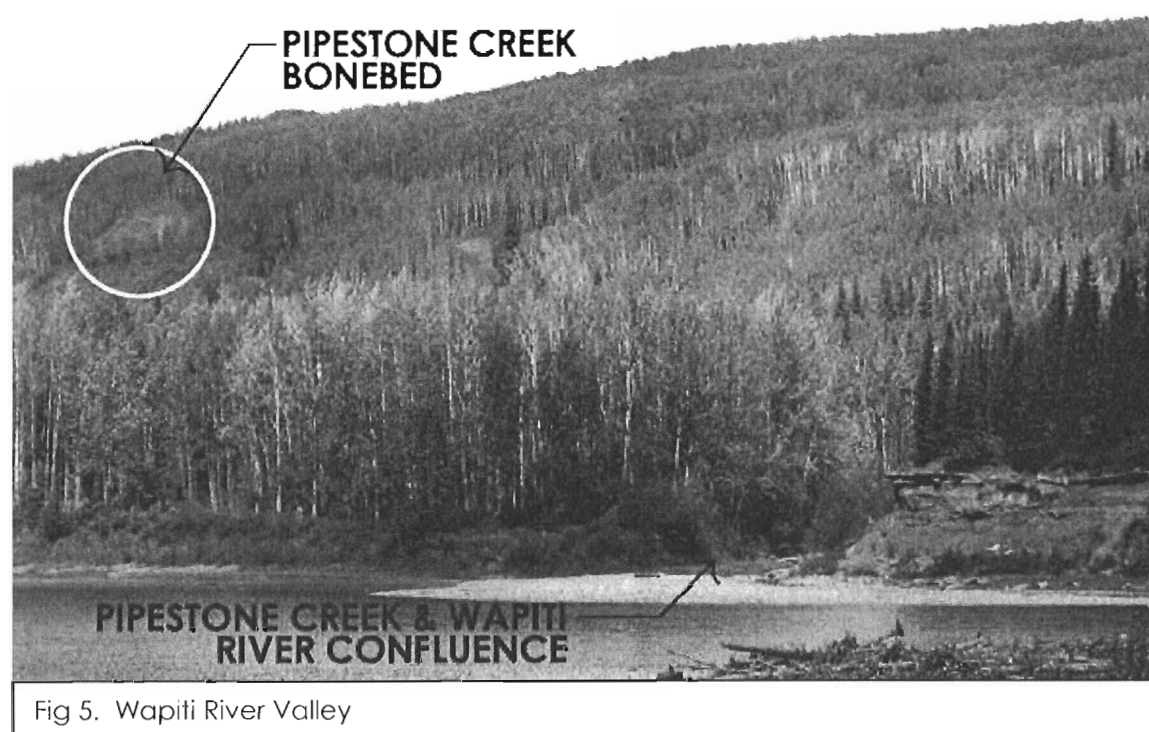
Source: base image, Alberta Sustainable Resource Development, Air Photo Distribution Service, "Plate AS51968-179", 2001

## Provincial Classification and Biophysical Characteristics

In an effort to characterise and understand the regional variations and complexities within the Canadian Boreal Forest, numerous classification schemes have been developed to describe this biome<sup>7</sup>. Alberta's Natural Regions and Subregions is an example of one of these regional classifications systems. Based on this classification system, the Pipestone Creek site is located within the 'Parkland Natural Region' and is further classified as being part of the 'Peace River Parkland Subregion'<sup>8</sup>. As well, the Grande Prairie area is classified as being in the "Southern Alberta Uplands" one of the eleven physiographic regions of Alberta<sup>9</sup>. The average elevation of the Peace River Parkland Subregion is 625 metres above sea level and the elevation range is 300 metres along the Peace River, near the Peace River townsite to 800 metres in the Grande Prairie area<sup>10</sup>.

The size of the Peace River Parkland Subregion is currently 3,120 sq. kilometres, this is a moderate change from 1994 when the determined size was 4,657 sq. kilometres<sup>11</sup>. The size of this subregion is considered to be the smallest in the province, it represents only 0.5% of the province, and the total Parkland Natural Region represents 9.0%<sup>12</sup>. By comparison the largest subregion, 'Central Mixedwood', has a size of 167,856 sq. kilometres and represents 25.3% of the province<sup>13</sup>. The Peace River Parkland Subregion lies considerably north of the other Parkland Natural Subregions<sup>14</sup>. The foremost portion of the Peace River Parkland Subregion surrounds Peace River and Grande Prairie however smaller areas occur far as north as Fort Vermilion<sup>15</sup>. The Peace River Parkland Subregion is "*characterised by broad, gently rolling plains with scattered upland and deeply-incised, steep-sided river valleys*"<sup>16</sup>. Marshes and wetlands cover 6% of the subregion, whereas lakes and streams cover 2%<sup>17</sup>. Currently there are only small, scattered remnants of the native

grasslands cover within this subregion as nearly all of the grasslands have been cultivated<sup>18</sup>. Cretaceous shales, siltstones and sandstones outcrop are often found along the major rivers of this subregion<sup>19</sup>. Yet, because of "extensive slumping, outcrops are not common since most of the valleys are covered with colluvial, slumped materials and the surficial deposits are predominantly glaciolacustrine silts and clays" <sup>20</sup>.



This Natural Subregion is determined by areas where Chernozemic soils are dominant, as these type of soils represent the core Parkland condition<sup>21</sup>. The major soils found are Dark Gray to Black Chernozems, (which are often Solenetzic), Luvisolic soils and Gleysols. The Solentzic soils are characteristic of the grasslands,

the Luvisolic are found in the forested portions and the Gleysols are typical of the wetland areas<sup>22</sup>. The Solonetzic soils are an important factor in maintaining the grasslands while fire and climate playing a secondary role<sup>23</sup>. These soils are fine textured, typically imperfectly drained and show signs of surface gleying<sup>24</sup>. The Black soils are an indicator of the extent of the native grasslands, pre-settlement and cultivation<sup>25</sup>.

Canada is divided up into seventeen geological provinces, each are characterised by the varying types, age and structure of rocks<sup>26</sup>. A geological province is described as being *"an extensive region with distinctive characteristics that differentiate it from surrounding areas"*<sup>27</sup>. The Pipestone Creek site is classified under the geological province name "Interior Platform", and the rock type of this category is sedimentary<sup>28</sup>. Sedimentary rocks are

*"the product of the consolidation of loose sediment that has accumulated in beds. Such sediment may be produced by the disintegration of previously existing rock or the precipitation of dissolved minerals, or it may consist of plant and animal remains. Regardless of origin, these deposits settle gradually under the weight of overlying beds and are transformed into solid sedimentary rock by cementation"*<sup>29</sup>.

Classification of sedimentary rocks are classified occurs according to grain size and composition<sup>30</sup>. Sandstone rocks are formed by the compression of sand grains. If the grains that are under compression are very small, the rock is referred to as a siltstone and the finest sediments, such as clays, produce shales<sup>31</sup>. Chemical compounds (e.g. calcium carbonate) are often found in fresh and salt water, under

the right chemical conditions, these compounds can precipitate and form deposits that harden into rock<sup>32</sup>. The most common sedimentary rock formed in this manner is limestone<sup>33</sup>.

## Pipestone Creek Drainage and Flooding

As previously stated, Pipestone Creek Park and the Pipestone Creek bonebed is within a river valley. Therefore inherently, there are significant topography issues. There is an approximate 130 metre elevation change from the crest of the river valley down to the banks of Pipestone Creek and in some areas the slope exceeds 60%. There have two been flood events observed by Alberta Environment at the Wapiti River adjacent to the Pipestone Creek Park, these were in July 1982 and June 1990.

*"For the Wapiti River, there are two high water marks that were surveyed by River Engineering at Pipestone Creek Park in 1982 and 1990. The surveys were run from a temporary benchmark with an assumed elevation of 104.65. The temporary benchmark is a spike in a power pole located in the park.*







*In July 1982, there was a major flood event along the Wapiti River. The maximum instantaneous discharge for the event at the WSC gauge on the Wapiti River was 6300 cms on July 15. A highwater mark with an elevation of 100.30 metres was surveyed at Pipestone Creek Park following the peak.*

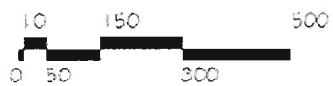
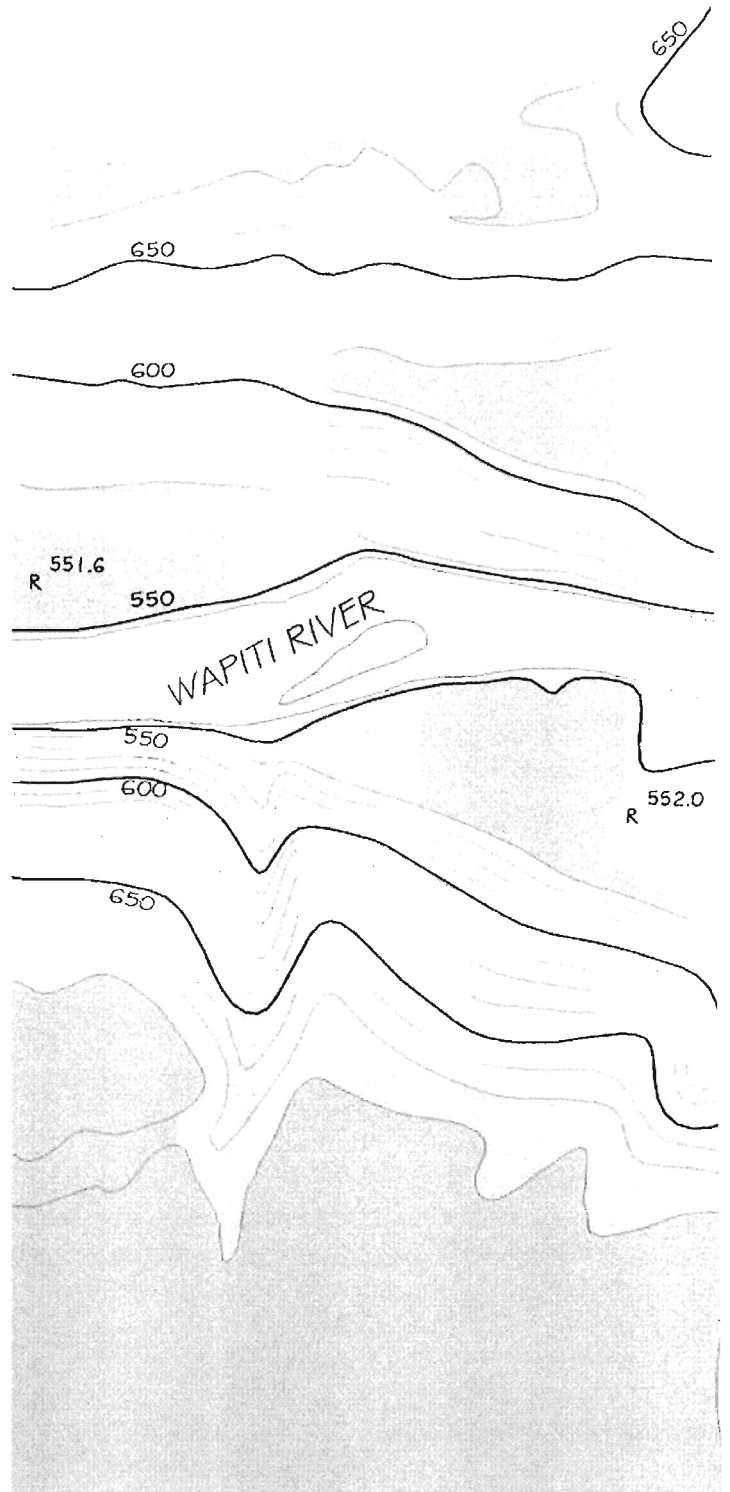
*In June 1990, following another flood event, a highwater mark with an elevation of 99.72 metres was surveyed using the same temporary benchmark. The June 12 1990 maximum instantaneous discharge was 5440 cms. The information this provides is that the 1982 flood stage was .58 m higher than the 1990 flood"<sup>34</sup>.*

Table 5.0: Slope Conditions and Development Issues	
	development issues
slopes 0-5%	drainage may become an issue if slope is less than 2% suitable slopes for structures and roads
slopes 5-15%	limitations on certain types of development without significant re-grading or stepping, such as playing fields & campsites
slopes >15%	inaccessible to vehicles without significant grading or land alterations overuse could cause landslides and/or erosion development could be costly

source: Canadian Government, Office of Tourism. Planning Canadian Campgrounds. Hull: Minister of Supply and Services Canada, 1980.

**Legend:**

-  0%-5% slope
-  5%-15% slope
-  15%-30% slope
-  30-45% slope
-  45%-60% slope
-  > 60% slope



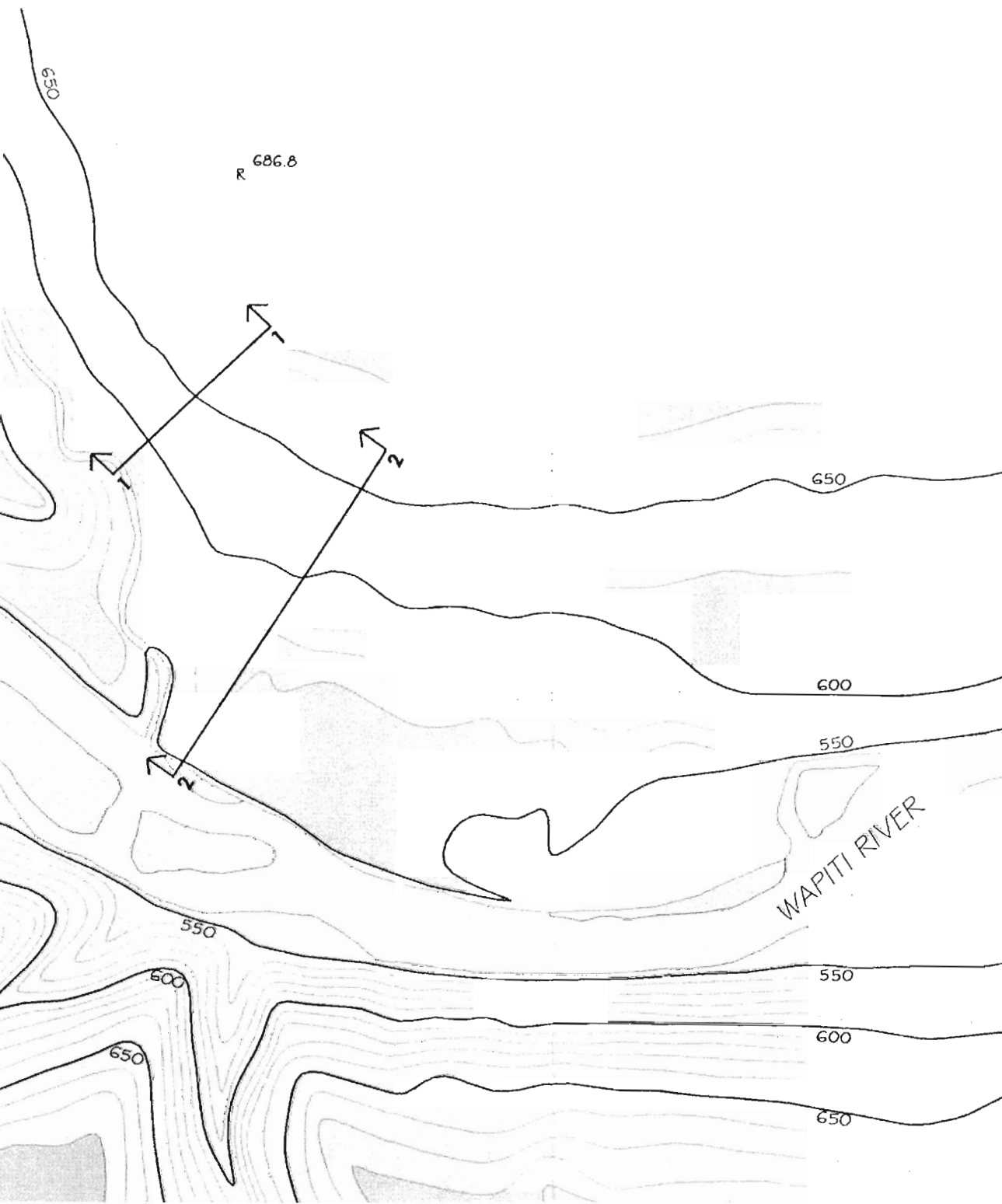
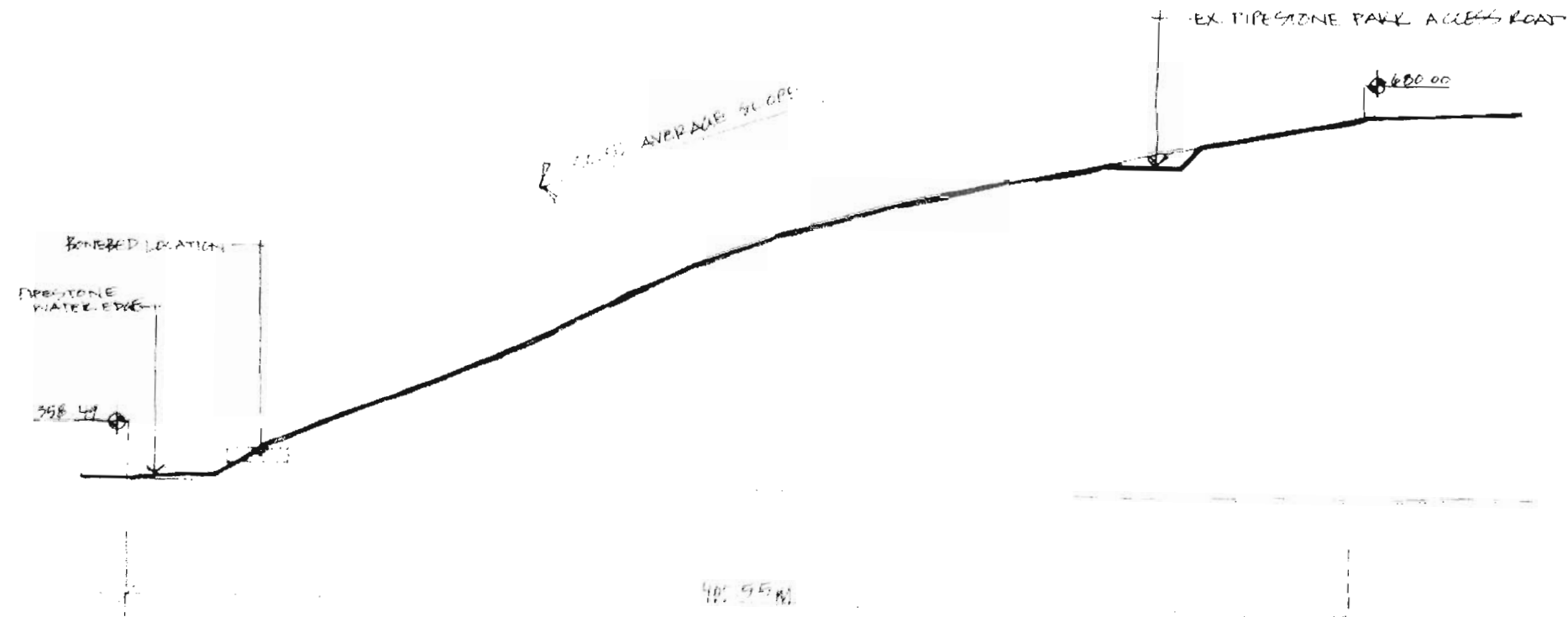
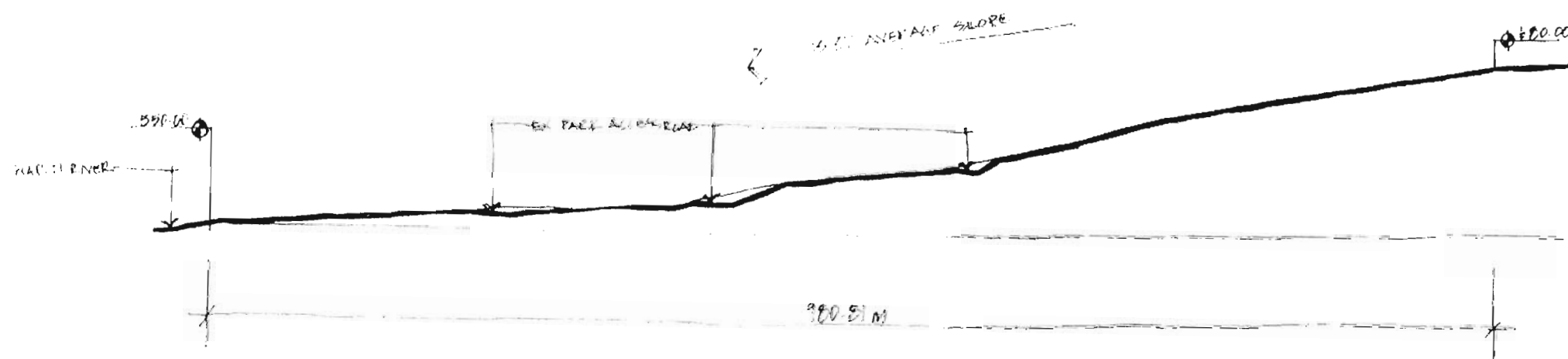


FIG. 5.3 Existing Slope Analysis



Profiles 1 - N.T.S.



Profiles 2 - N.T.S.



FIG. 5.4 Flood Lines

## Climatic Conditions

The climate of the Peace River Parkland comprises shorter and cooler summers with longer, colder winters than the other parkland subregions within Alberta<sup>35</sup>. This subregion also has a lower wind frequency, and less evaporation and higher annual precipitation than the other parkland subregions. Based upon Environment Canada's data, mean annual precipitation in the Peace River Parkland is 447mm and the mean temperature for the months of May-September is 13°C<sup>36</sup>. There is an average of approximately ninety-five frost-free days throughout the year<sup>37</sup>.

The weather statistics tables which follow present data recorded by Environment Canada at the Grande Prairie meteorological station, located at the Grande Prairie airport. The data is from a period of thirty years from 1971 to 2000. This information has been used to formulate the climate averages<sup>38</sup>.

Table 5.1: Temperature (°C)												
	Jan	Feb	Mar	April	May	June	July	Aug	Sept	Oct	Nov	Dec
daily avg.	-15	-12	-4.9	4.1	10.3	14.1	15.9	14.9	10.1	4	-6.6	-13
daily max	-9.5	-5.8	0.6	10.1	16.9	20.2	22.1	21.4	16.4	9.6	-1.8	-7.2
daily min.	-21	-17	-10	-2	3.7	8	9.6	8.3	3.7	-1.7	-11	-18
# of days temp .<°C	31	28	30	22	5	0	0	0	5	20	29	30

Table 5.2: Humidity												
	Jan	Feb	March	April	May	June	July	Aug	Sept	Oct	Nov	Dec
average vapour pressure (kPa)	0.21	0.3	0.3	0.5	0.7	1	1.2	1.1	0.8	0.6	0.3	0.2
average relative humidity (%)	76.61	78.1	78.5	75.3	72.2	77.7	83.6	85.9	84.8	80.8	81.3	77.4

Table 5.3: Wind												
	Jan	Feb	March	April	May	June	July	Aug	Sept	Oct	Nov	Dec
speed (km/h)	9.25	9.5	10.5	12.4	14.2	14	12	11.2	11.4	12	9.2	9.5
most frequent direction	SW	NW	SW	SW	W	W	SW	W	W	SW	SW	SW
maximum hourly speed	80	80	68	71	80	89	74	68	77	74	74	72
direction of max. hourly speed	W	SW	W	W	SW	W	SW	SW	SW	W	SW	W
max.gust speed	121	120	105	109	122	105	108	109	120	111	106	104
direction of max. gust	W	SW	W	W	SW	W	SW	W	W	SW	W	W

Table 5.4: Wind Chill												
	Jan	Feb	March	April	May	June	July	Aug	Sept	Oct	Nov	Dec
extreme wind chill	-63.0	-55.0	-53.1	-46.7	-16.1	-4.3	-2.4	-6.2	-15.3	-33.9	-56.1	-56.3
days wind chill < -20	19.5	14.7	7.8	0.9	0.0	0.0	0.0	0.0	0.0	0.6	8.3	16.8
days wind chill < -30	10.8	7.4	2.1	0.1	0.0	0.0	0.0	0.0	0.0	0.1	2.3	8.3
days wind chill < -40	3.9	2.2	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.2	2.8

**Table 5.5: Precipitation (mm)**

	Jan	Feb	March	April	May	June	July	Aug	Sept	Oct	Nov	Dec
rainfall	1.8	1.0	1.0	9.6	35.2	76.5	70.4	61.1	40.1	15.1	5.4	0.7
snowfall	363.9	225.0	186.0	87.0	20.0	0.0	0.0	7.0	28.0	94.0	255.0	320.0
precipitation	30.7	18.5	15.5	17.3	36.9	76.5	70.4	61.8	42.6	23.8	26.2	26.4
average snowdepth	279.7	310.0	230.0	60.0	0.0	0.0	0.0	0.0	0.0	0.0	60.0	170.0
median snow depth	281.8	300.0	220.0	50.0	0.0	0.0	0.0	0.0	0.0	0.0	60.0	170.0
snow depth at month-end	316.1	280.0	160.0	0.0	0.0	0.0	0.0	0.0	0.0	10.0	100.0	210.0

**Table 5.6: Bright Sunshine**

	Jan	Feb	March	April	May	June	July	Aug	Sept	Oct	Nov	Dec
total hours	78.8	107	171	235	275	295	308	272	168	137	83.1	72.9
days with sunshine	21.9	23.1	28.4	28.1	29.4	28.1	29.9	29.1	26.5	26.9	21.3	21.1
possible daylight	32.5	39.5	46.5	55.4	55	56.8	59.2	58.5	43.9	42.1	32.8	32.4
daily sunshine	8.1	10.4	11.9	14.3	16.1	17	16.4	15.1	13.2	10.1	8.9	7.2

## Vegetation

In the broad term the Pipestone Creek site is found within Canada's Western Boreal Forest. The Boreal Forests of North America represent the most extensive vegetation formation on the continent<sup>39</sup>. In Canada,

*"the boreal forest is characteristic of recently deglaciated lands, with a humid climate, low evaporation rate, low elevation, and many wetland areas...The Boreal zone actually encompasses many ecoclimates, but in every case the climate favours the success of conifers over broadleaf deciduous or broadleaf evergreen species"*<sup>40</sup>.

Despite regional variations, this expansive Boreal zone has been found to have consistent characteristics, including a relatively low plant species diversity, in relation to the area it covers<sup>41</sup>. There are scarce areas of grassland or shrub-grassland within the Boreal Forest, however in the drier and warmer parts of the region they may be more extensive<sup>42</sup>. These localized grasslands communities, which are speculated to have succeeded fires, are typically found on dry, south-facing slopes atop many of the regions major rivers<sup>43</sup>. The limited diversity of Canada's Boreal Forest suggests that few, if any native plant species, could endure large-scale commercial harvest<sup>44</sup>. However, the First Nation People of northern Canada have a long tradition of supplementing their main food source, wild game, with bush foods<sup>45</sup>. A wide variety of wild fruits are available for consumption and preserving, they include: chokecherries, pincherries, saskatoons, rosehips, strawberries, raspberries, cloudberry, currants, gooseberries, buffalo berries, high-bush cranberries, mountain cranberries, bog cranberries, blueberries, and hazelnuts<sup>46</sup>.

As described in Provincial Classification and Biophysical Characteristics section, Pipestone Creek is part of the Peace River Parkland and plant material in this

geographic area would have a plant hardiness rating of Zone 2A. The vegetation of this subregion is described as "*remnant aspen clones and continuous forest, interspersed with sedge- California oat grass – porcupine grass, Jack pine on sands. Graminoid wetlands, fringed by willow*"<sup>47</sup>. Documented vegetation in the Peace River Parkland include:

**Tree Layer:** Trembling Aspen, Balsam Poplar, White Spruce, Jack Pine, Black Spruce

**Shrub Layer:** Beaked Willow, Prickly Rose, Western Snowberry, Saskatoons, Chokecherry, Red-Osier Dogwood,

**Grasses and Forbs:** Western Porcupine Grass, June Grass, Sedges, Slender Wheat Grasses, Brittle Prickly-Pear, California Oat Grass, Horsetail, Bluejoint, Labrador Tea, Richardson's Needle Grass, Columbia Needle Grass, Groundsel

The following is field observations of the plant material at Pipestone Creek Park which occurred in August 2004.

**Tree Layer:** Poplar, Aspen, Spruce

**Shrub Layer :** Wild Roses, Saskatoons.

**Riparian Zone:** Asters, Wild Roses, Mosses, Aspen, Mushrooms

## Wildlife

Wildlife of the Peace River Parkland Subregion is similar to rich the fauna of the adjacent Boreal Forest Mixedwood subregions (e.g. deer, hares, black bear, moose, squirrels, Warblers, Song Sparrow) . However, the remnant native grasslands of the Peace River Parkland support nine species of butterflies usually associated with prairie habitats<sup>48</sup>. The lakes and ponds of the Peace River Parkland also constitute a major nesting area for the 'Threatened' Trumpeter Swan and the

species of fish found in the Peace River system include Redside Shiner, Northern Squawfish and the Longscale Sucker<sup>49</sup>. Site observations made in August 2004 and January 2005 include various songbirds, squirrels, deer, hare and deer tracks and large mammal droppings.

## Analysis diagrams

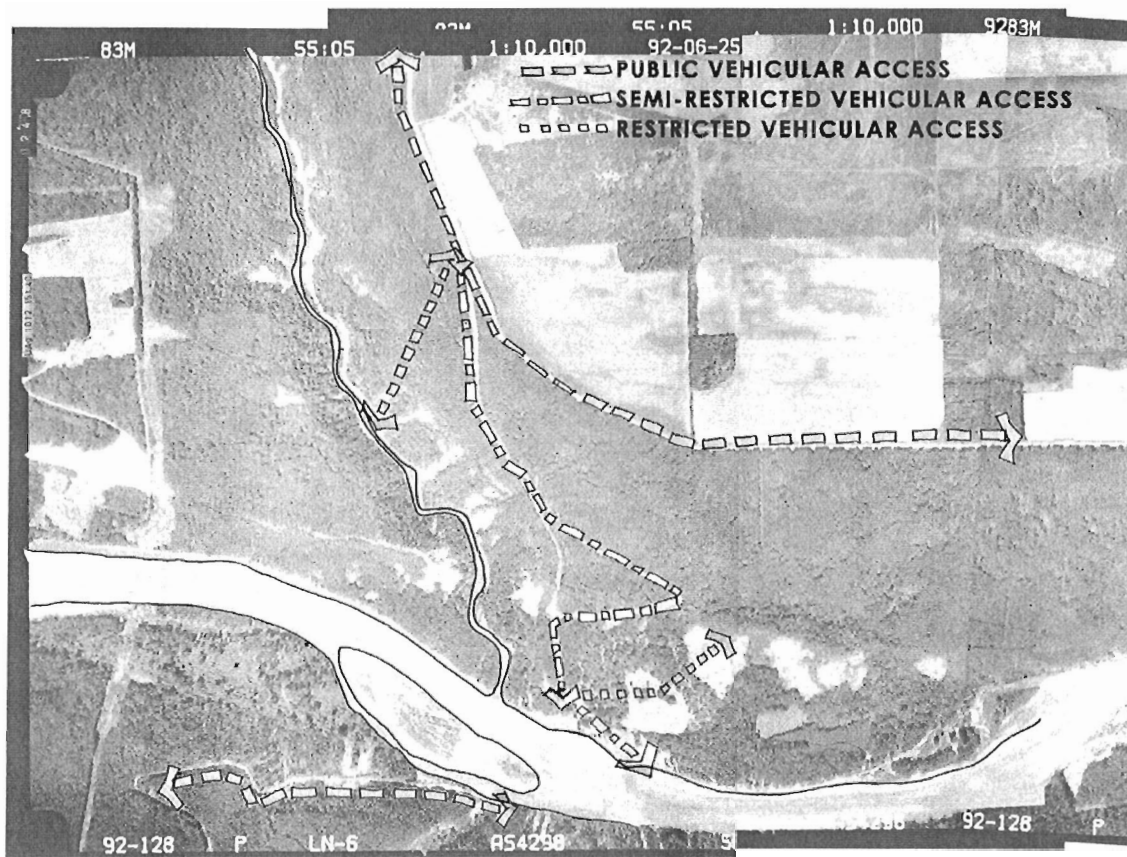


Fig. 5.6: Potential Vehicular Links Access

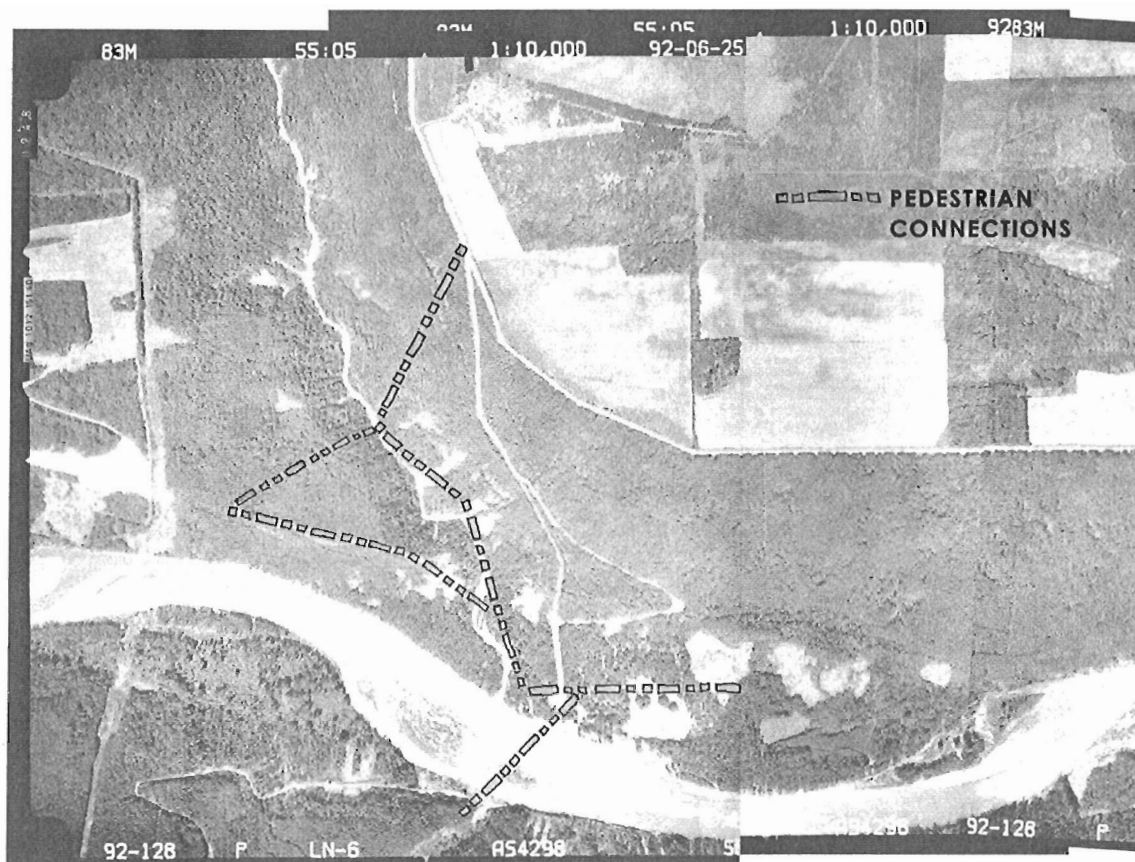


Fig. 5.7: Potential Pedestrian Connections

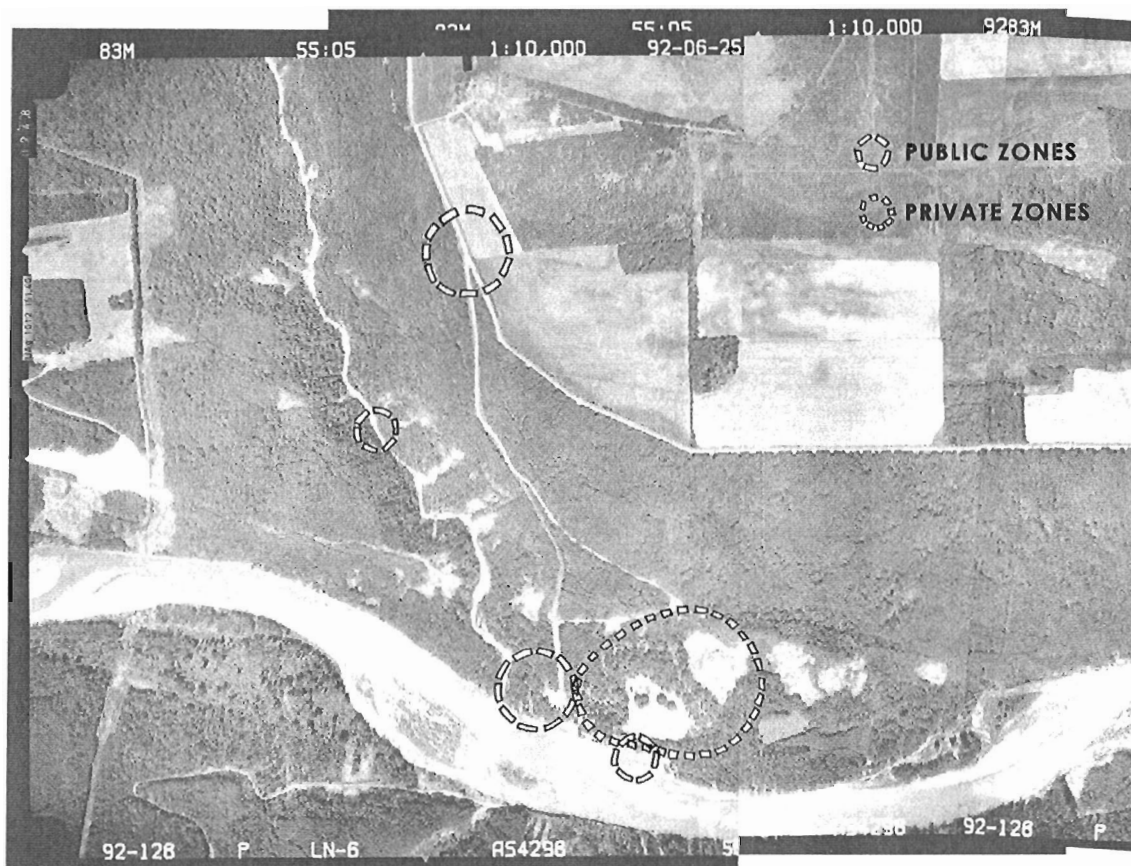


Fig. 5.8: Public and Private Development Zones

## Endnotes

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- <sup>10</sup> Ibid, 43 & 118.
- <sup>11</sup> Ibid, 12.
- <sup>12</sup> Ibid, 43.
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- <sup>14</sup> Ibid, 118.
- <sup>15</sup> Government of Alberta, Community Development. "Peace River Parkland Subregion" Alberta Natural Heritage Information Centre: Member of NatureServe- a network connecting science with conservation.  
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- <sup>16</sup> Ibid.
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# 6 Pipestones' Skeleton

## Character and Design Imagery

The character and imagery for the proposed Pipestone Creek Dinosaur Park, is derived from the inherent natural processes and human forces within the site. Personal reflections on the site, have also been a source of inspiration. It has been important to recognize these qualities and to absorb their properties in the spatial planning and design interventions. The overlying design concepts for the proposed Pipestone Creek park may be broadly divided into two categories of *non-human* and *human qualities*. The *non-human qualities* include reveal/erosion, layering, time, geomorphology and hydrology. The *human qualities* reflect the temporary, shifting and historic nature of the site.

Erosion exposes portions of the *Pachyrhinosaurus* fossils that have mineralized over the span of 73 million years, and it is the force of further erosion that will further reveal fossils embedded within the creek valley. The layering reflects the patterns of pre-historic sediments that helped create the conditions for the uncommon occurrence of fossilization, the layering vegetative characteristic of the Peace River Parkland and the Late Cretaceous landscape. Time is an essential element of the fossilization process. Time inherently influences how this site is experienced, viewed and revealed. Whereas, the geomorphology and hydrology of the site, is the *how* of the creation of the Pipestone Creek landscape. The bonebed has been speculated to be the result of a mass mortality event. Therefore water not only carved the prehistoric and present-day Alberta landscape, it was the catalyst for

natural process found within the Pipestone Creek bonebed. The temporary *human qualities* of the site will also be drawn upon. The fluctuating and various number of visitors and scientists will create a unique expression within the landscape. Their actions and traces will alter the visual text of the landform. The shifting quality of the site and fossil boundaries will also influence how the scientific and tourist activity will materialize and be shaped. The final quality is the history of the site. By examining the prehistoric landscape, the historic use and settlement of Pipestone Creek will help configure the development of the proposed Pipestone Creek Dinosaur Park and its surroundings.

When the project has been described and contemplated it is dissected into three generalized categories of *the site*, *the science* and *the people*. It is from this standpoint that reflections and interpretations have been forged. The collage (Figure 6.0) includes personal observations and imagery that has influenced the character and expression of the proposed elements found within the Pipestone Creek Dinosaur Park.

One means of revealing a character on site is by unifying it through the creation of vistas. By shaping views across and to significant areas within the Pipestone Creek site, visual connections are created and the notion of progression for the users may be conceived. Conceptually, various vistas will be incorporated at Pipestone Creek (see Figure 6.1).

The notion of 'site character' may be developed by the interventions introduced. By examining the opportunities and constraints of the design vocabulary found at the precedent sites, motifs in how to establish an experience for the

Pipestone Creek users may be explored (see Figures 6.2 & 6.3). The development of interventions for Pipestone Creek applies the characteristics of the *human* and *non-human qualities*, previously described. Interventions that strive to produce an experiential quality for the users and that may be used for wayfinding, signage, seating and fencing are expressed conceptually in the following sketches.



(the site)...(the science)...(the people)

(site) from which the bones came...erosion's artistry...**a language of time**...rolling prairies...**leaving traces** behind...landscape of the past...landscape of the

present...water as **eroding agent**...peeling away...weathering...reflection of past...seaway carving the landscape...evolution of place, of **context**

(paleontology) analytical...exploring...revealing...discovery of past organisms and environments...**unveiling** of myth...finding truths...**scientific understanding** the

outmost goal...identifying the value...chipping away...dinosaur's domain (beaver first nations) storytelling... **imprinting** generations with knowledge...tradition...

**interpretation of language**...interpretation of nature and human's inter-relationship...deeply **rooted** to the natural environment... all things are **held** in

**memory**... **piecing** and layering **short tales** together for the complete stories. imagery quotes from readings:

"bizarre **water-sculpted** landforms" "you watch as **the bone carver**..." "from which the bones came" "visitor passes through reconstructed

alley" "erosion's artistry sculpts rilled patterns on the faces of the hills" "chain that drips pearls of rain" "narrative is ultimately a language of time"

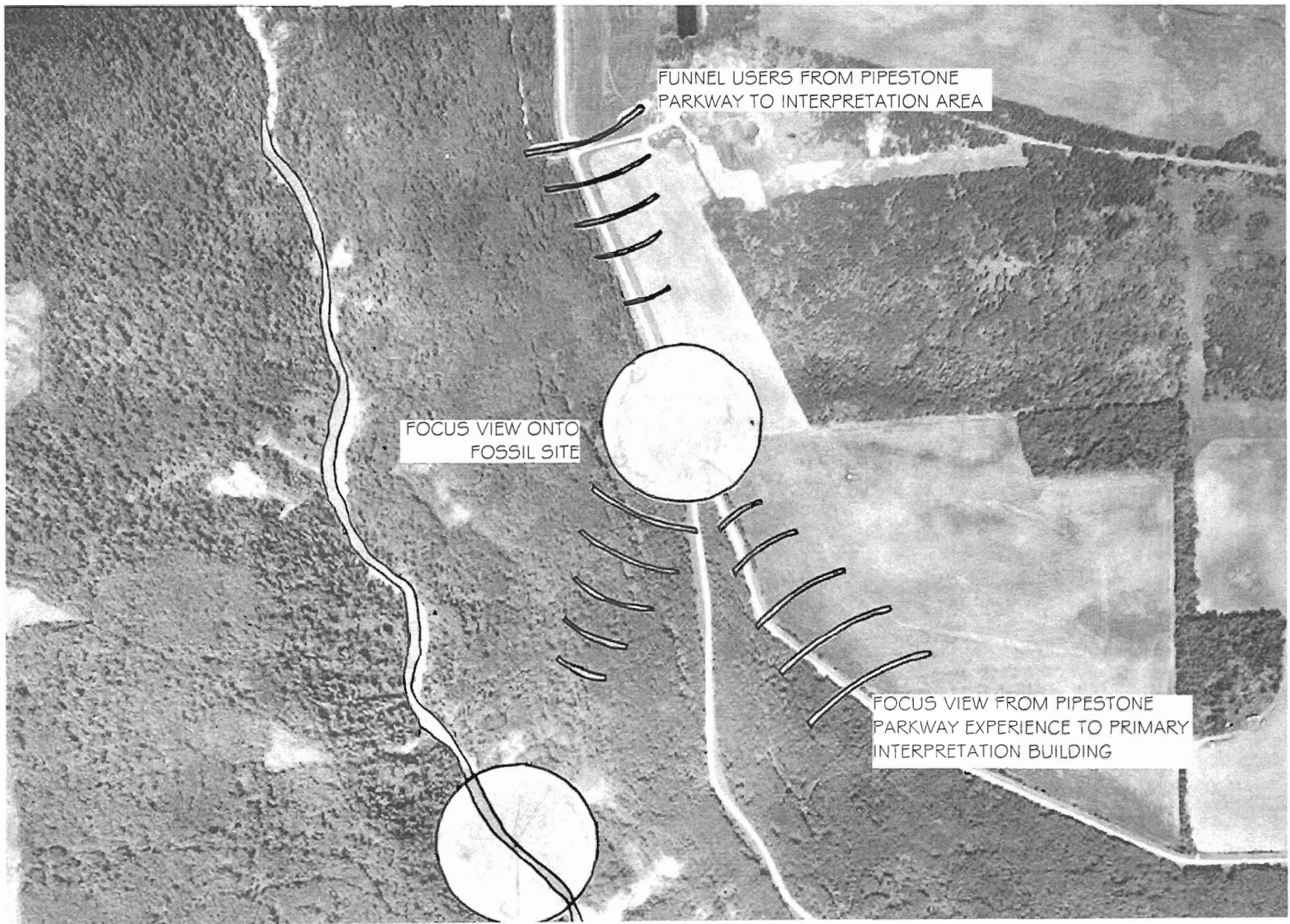
"rolling prairies of the Peace Country" "the stories of geologist tell are not short stories. They are stories that take millions of years to develop and never reach an end.

But **the events** of these stories leave traces behind – in the **shape** of **mountains**, in the **layers of rock**, in the sand that blows in the wind"

Unearthing Pipestone

Chapter Six: Pipestones' Skeleton

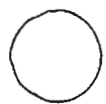
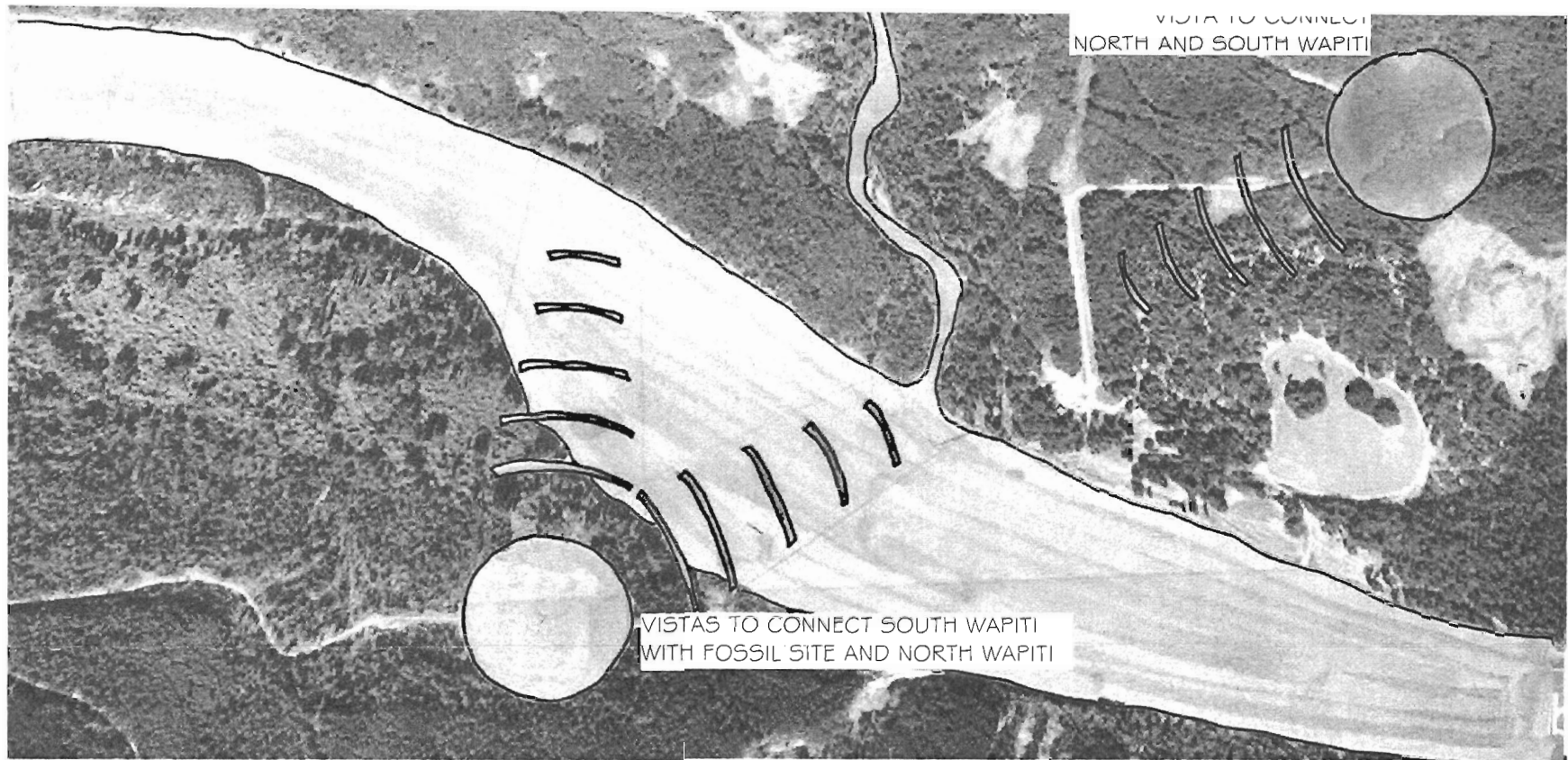
Fig. 6.0 Imagery Collage



FUNNEL USERS FROM PIPESTONE  
PARKWAY TO INTERPRETATION AREA

FOCUS VIEW ONTO  
FOSSIL SITE

FOCUS VIEW FROM PIPESTONE  
PARKWAY EXPERIENCE TO PRIMARY  
INTERPRETATION BUILDING

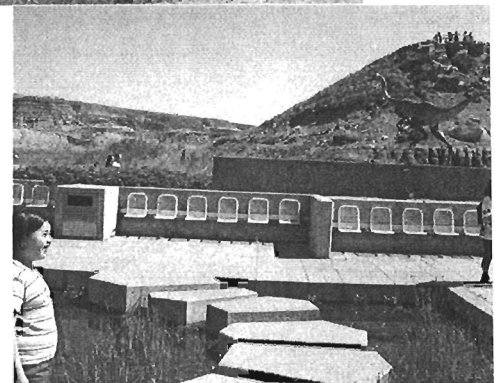
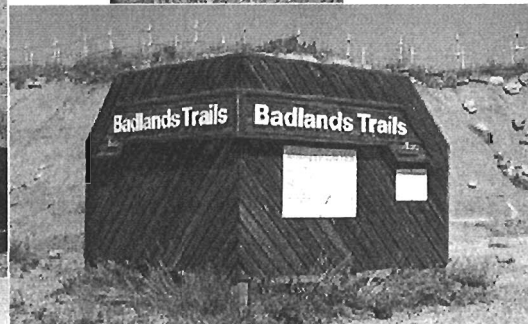
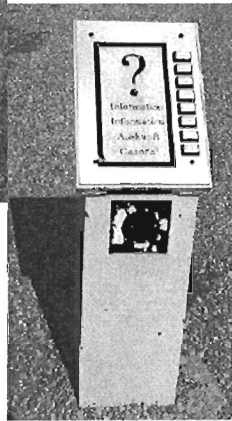
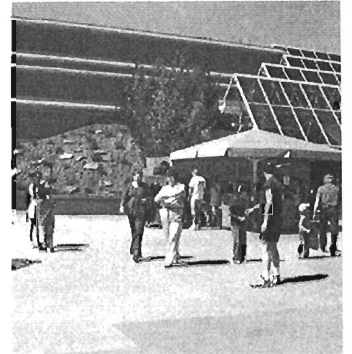
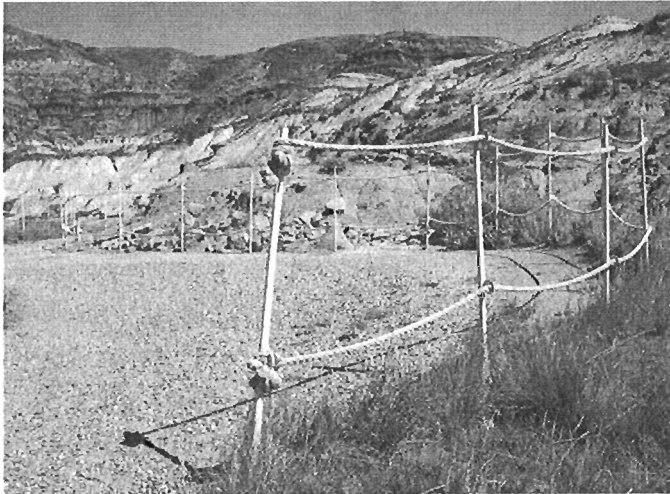


PRIMARY DEVELOPMENT AREAS



SECONDARY DEVELOPMENT AREAS

**Fig. 6.1 Potential 'Vista Development'**  
**N.T.S.**



Unearthing Pipestone

Chapter Six: Pipestones' Skeleton

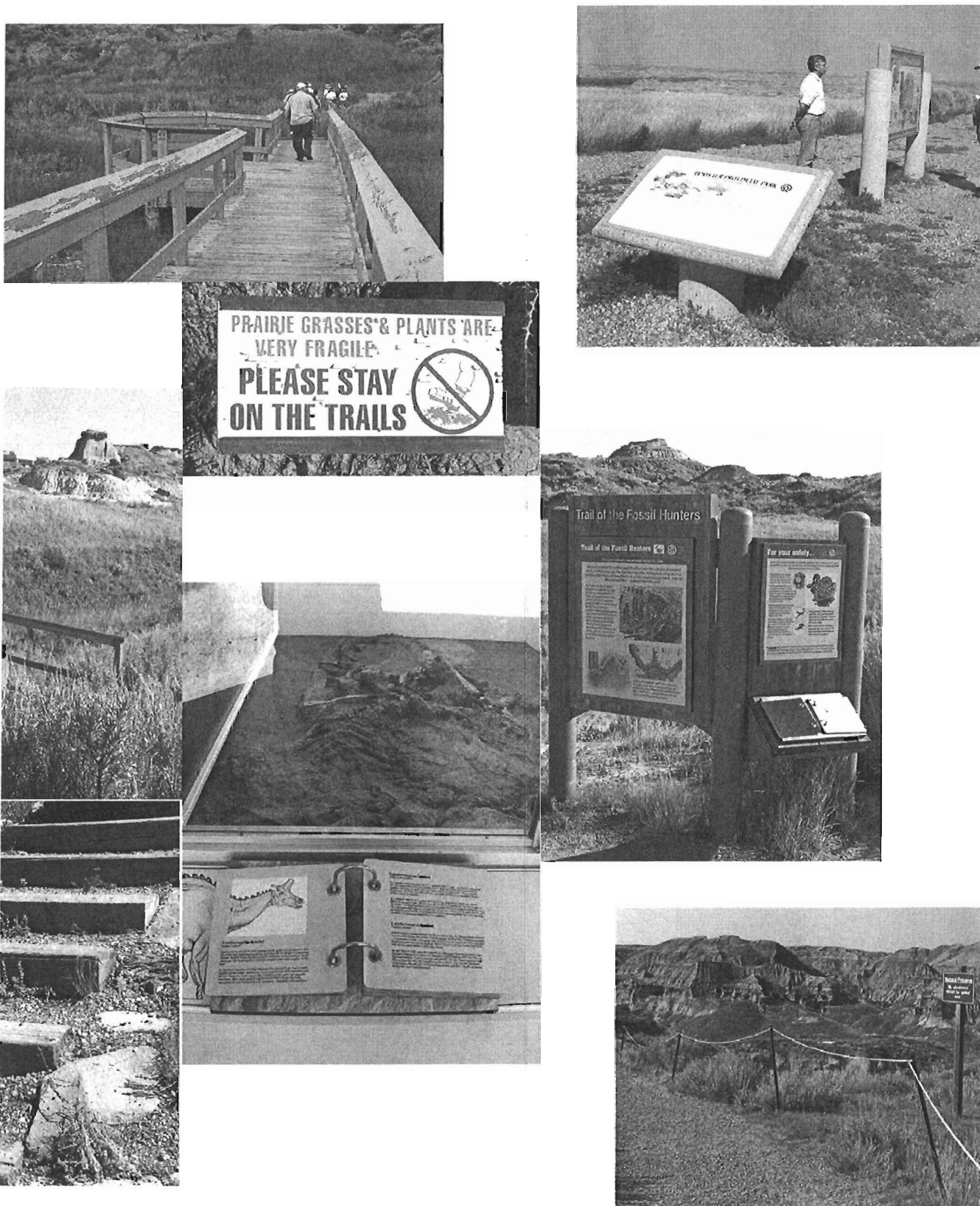
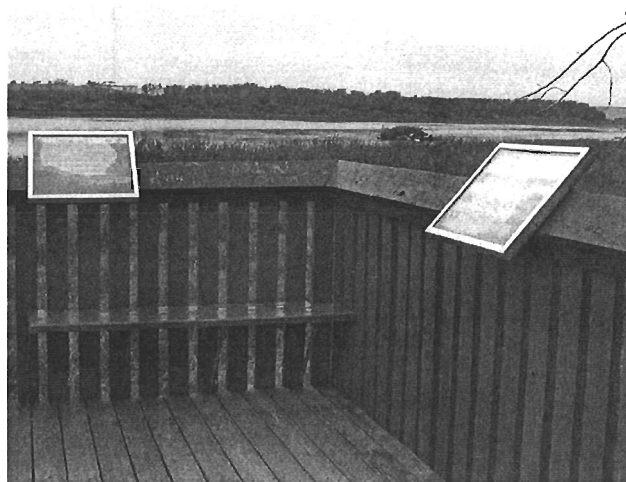
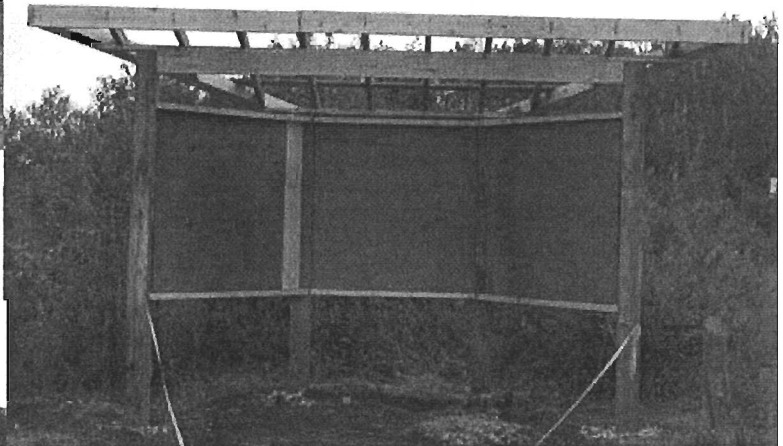
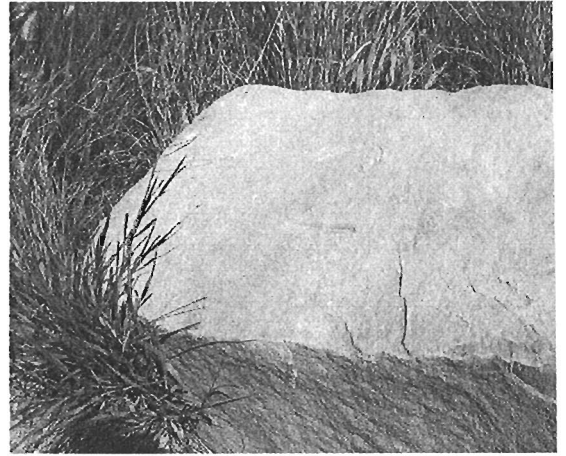


Fig. 6.2 Precedent Design Vocabulary



Unearthing Pipestone

Chapter Six: Pipestones' Skeleton

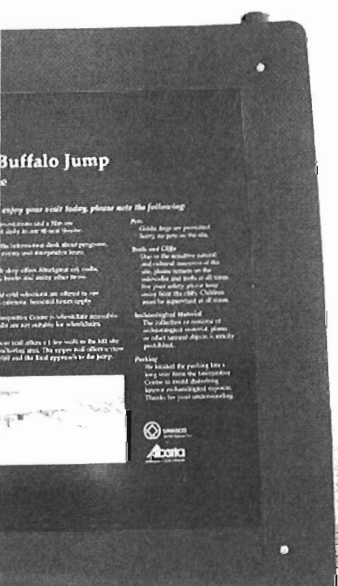
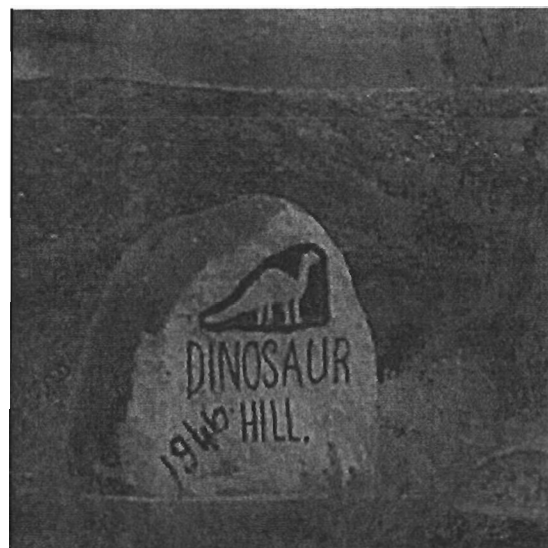
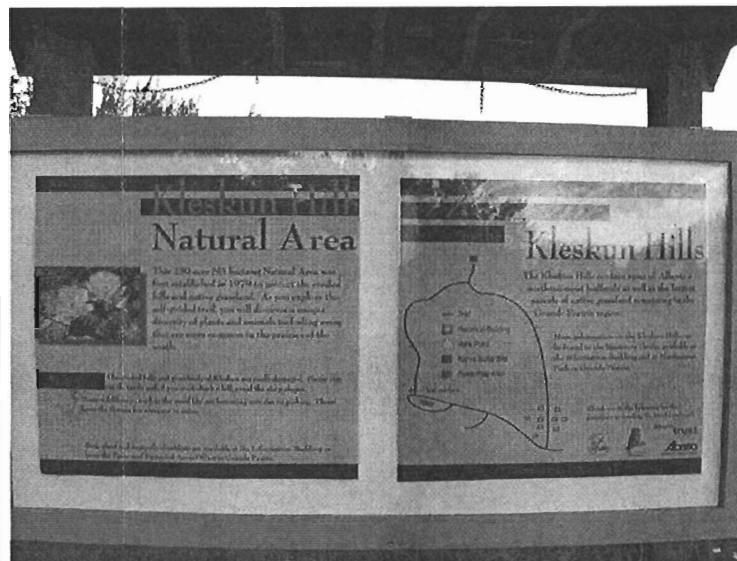
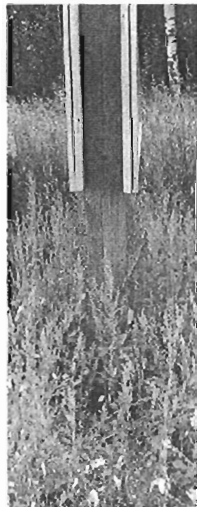
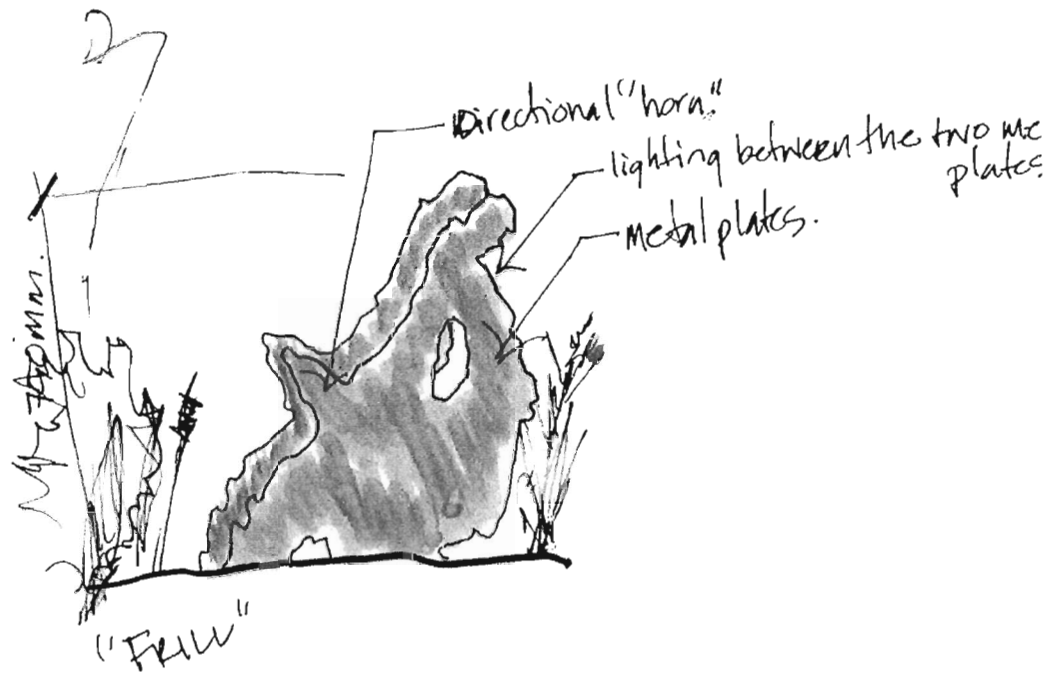
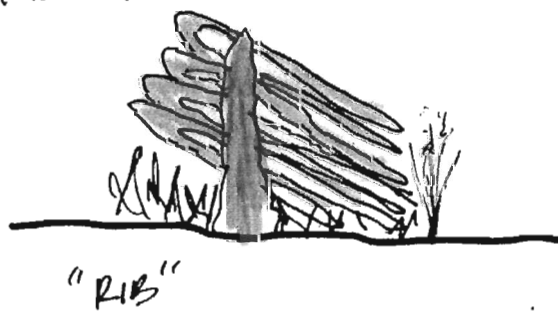


Fig. 6.3 Precedent Design Vocabulary



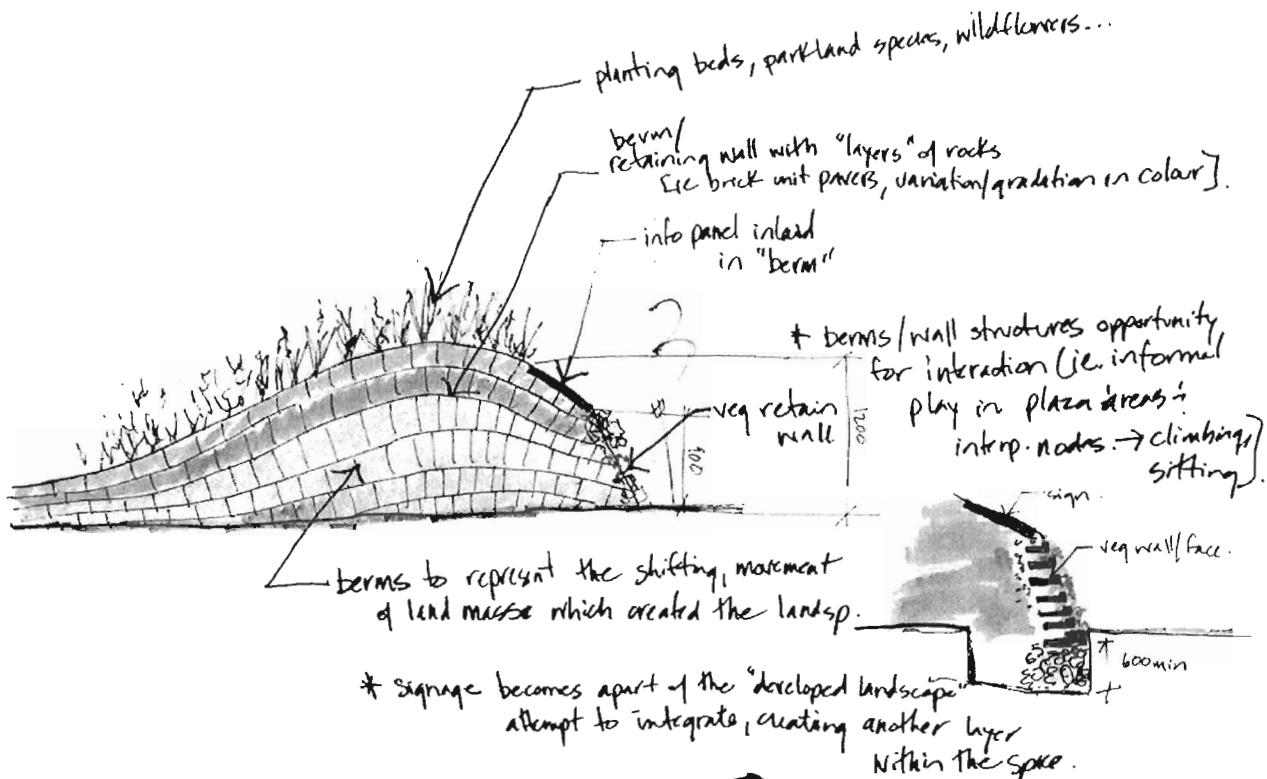
"FRILL" ROUTE MARK

\* each marker is used to designate a particular type or direction of path.  
 i.e. all "Frills" ~~are~~ are accessible pathways,  
 all "Ribs" lead to dry use area etc...

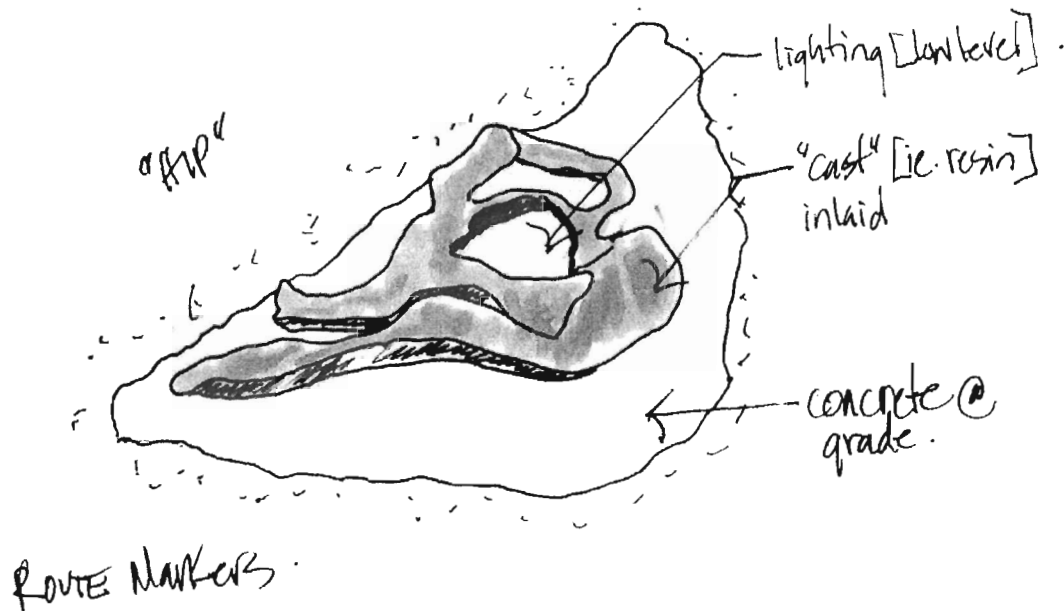


"RIB" R

\* geoformation "folding".

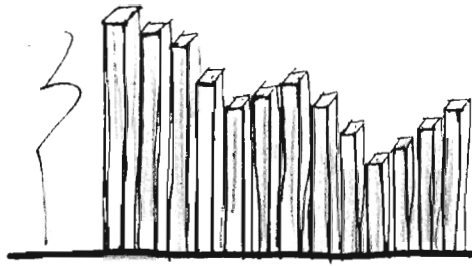


"LANDFORM" SIGNAGE



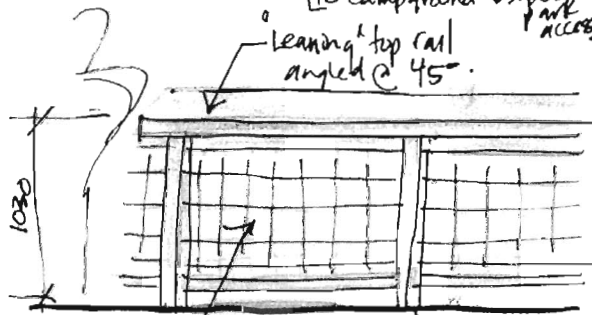
"HIP" ROUTE MARKERS

Fig. 6.4 Wayfinding Design Concepts



varying heights to create visual rhythm → rolling landscape of site.

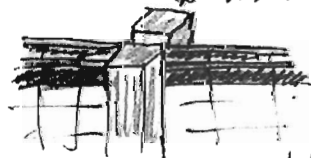
potential use: delineate boundaries between functions of use.  
[to campground vs. public park access]



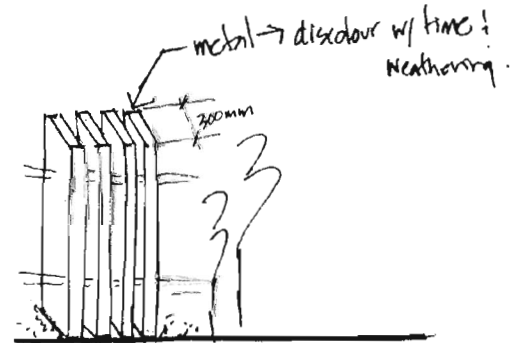
mesh panels

allow for max. visual  
typ 1800mm o.c. connectivity.

~~DATA~~  
potential use: active digs, where separation is required but vis. link is subtle.



panels sandwich between posts.



variation on picket fence.

- create less visual connectivity  
potential use: areas with no public access,  
high security areas,  
more permanent.

play with perspective of user.



## Areas of Development

The fluid character of Pipestone Creek Park and its paleontological resource create the opportunity for a variety of potential development within the site. For the purpose of this practicum, the site was divided into seven distinct categories based upon existing conditions and activity zones. Additionally, the areas of development were determined by considering the activities that could occur as a result of promoting this site as a dinosaur based attraction. The proposed zones are identified on Figure 1 and they are as follows:

- a) Primary Park Entry
- b) Pedestrian Connections
- c) Pipestone Creek Pachyrhinosaur Bonebed
- d) Day-Use Area
- e) Multi-day-use Area
- f) Wapiti River Link
- g) Secondary Park Entry

In order for the existing site to be appropriately transformed and experienced, a sequence of development is proposed. Prioritising the areas of development and sequencing the interventions within each area will facilitate the notion of establishing a comprehensive site design and experience. For each **area of development** identified, the existing conditions will be described and illustrated and the opportunities will be identified and summarised. The priority and staging of the development will be specified and detailed in the Pipestone Creek Park Staging Plan (see Appendix E). However, the broad priority list would be as follows:

- Priority #1    Category A: Primary Park Entry
- Category B: Pedestrian Connections

Category C: Pipestone Creek Pachyrhinosaur Bonebed

Priority #2      Category D: Day-use Area

Priority #3      Category F: Wapiti River Link

Category G: Secondary Park Entry



Fig. 6.7: Pipestone Creek Baseline Drawing with Potential Development Areas Identified

## Area A: Primary Park Entry

### Existing Conditions:

The existing entrance to Pipestone Creek Park is off Secondary Highway #202. Site users travel down the Wapiti River valley to reach the existing Pipestone Creek day-use area, campground and to access the Pipestone Creek Bonebed. The gravel entry road is approximately two kilometres long and has an average slope of 6.41%. At the top of the hill, the topography is relatively flat and the land is used as agricultural fields by the adjacent landowners. Along the entry road there is old-growth Peace River Parkland vegetation. Clearings in the vegetation create vistas along the entry drive.



Fig. 6.7: Agricultural land adjacent to existing park entry.

source: photo by author, August 27<sup>th</sup> 2004



Fig. 6.8: Clearing along entry drive to existing Pipestone Creek Park.

source: photo by author, August 27<sup>th</sup> 2004



Fig. 6.9: Entry drive

source: photo by author, December 30<sup>th</sup> 2004



Fig. 6.10: Vista along entry drive

source: photo by author, September 14<sup>th</sup>, 2005

**Proposed development:**

- ❑ Re-design the existing park entry road to reflect the new use of the site and to provide increased infrastructure to support the projected number of visitors and users on site.
- ❑ Create a primary park entry experience at the top of the Wapiti River valley by developing a formal entry plaza/gathering area. This intervention is to serve as staging and interpretation areas for the various user groups arriving on site.
- ❑ Develop a parking area that responds to various user needs at the top of the river valley. The intent here is to breakdown the area into a series of smaller parking lots is to create a sense of pedestrian scale, to frame views and to influence pedestrian and vehicular flow through interventions such as planting, berms and visual screens. Furthermore, by designing a series of lots versus one large parking lot the effect of an 'asphalt-scape' will be avoided. Additionally, the construction of the proposed lots may be sequenced to reflect the fluctuating need for parking space over time. By developing a series of lots versus one large lot, issues of erosion and run-off at the top of the river valley may be more suitably dealt with.
- ❑ Program space for the primary education and research building. By placing this centre at the crest of the valley it centralises the traditional interior museum activities and scientific work, thereby reducing impact on the bonebed location.
- ❑ Re-examine and establish new park boundaries and buffer zones to protect and more adequately reflect the extent of the resources on site.

#### **Additional Opportunities:**

- ❑ Take advantage of the natural vistas along the entry drive. This will connect users visually to the site and beyond the Pipestone Creek Park boundaries.
- ❑ Use of the existing topography to create a dynamic education area at the crest of the river valley.

### **Area B: Pedestrian Connections**

#### **Existing Conditions:**

The only pedestrian links that currently exist are informal apparently multi-purpose trails. These trails are within dense Peace River Parkland vegetation. They have various and inconsistent grade changes. There does not appear to be any purpose-built surfacing or delineation throughout the site. It appears as though the majority of the trails were unplanned and created by various users and their activities on site. Existing trail signage is in disrepair and does not express the uniqueness of the site or the scientific context.



Fig. 6.11: Example of existing signage.  
source: photo by author, August 25<sup>th</sup> 2004

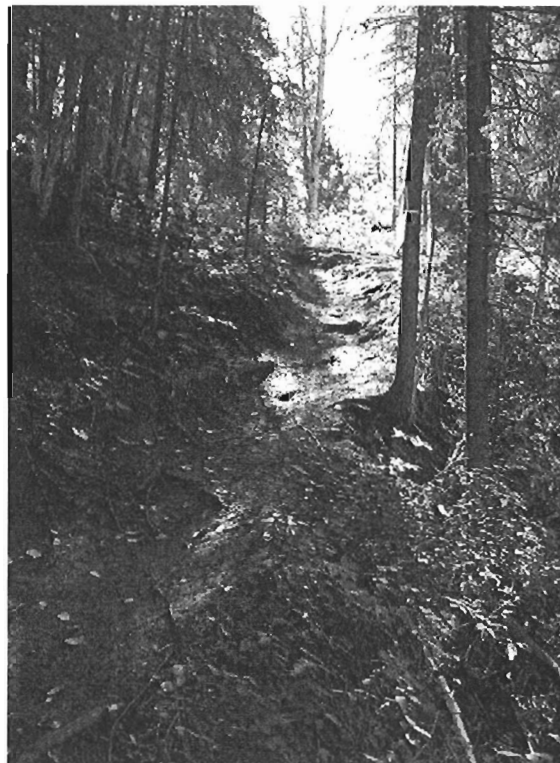


Fig. 6.12: Existing grading.  
source: photo by author, August 25<sup>th</sup> 2004



Fig. 6.13: Existing trail to creek.

source: photo by author, August 25<sup>th</sup> 2004



Fig. 6.14: Typical surfacing

source: photo by author, August 25<sup>th</sup> 2004

#### **Proposed Development:**

- ❑ Unify the two principal development areas of the site by creating a connection between the proposed education centre/park entry at the crest of the valley and the existing bonebed area. This connection would provide access both for exploration and interpretation of the site and would manifest itself as a pathway system and terraced walkways.
- ❑ Establish pedestrian links between the bonebed area and the existing developed areas within the site. Establishing these connections would encourage movement throughout the entire Pipestone Creek site.

- ❑ Develop multi-use trails that are accessible to the various users throughout the site. Create different Pipestone Creek Pathway Types, which relate to trail classifications and which respond to the undulating topography.
- ❑ Minimise cumulative impact on the site by re-developing the existing paths to strengthen the existing and proposed links between the activity zones within the sites.
- ❑ Use low impact pathway construction methods to minimise destruction of the existing vegetation and allow for reversibility of the construction.
- ❑ Implement rest areas and interpretation nodes along the various pathway schemes. These nodes have the opportunity to create a balance between the scientific objectives and tourism objectives on the site.
- ❑ Begin to establish a Pipestone Creek design typology through the introduction of wayfinding and site furnishings.
- ❑ Create a 'passive' pedestrian experience by creating meandering paths that capture vistas throughout the site.

**Additional Opportunities:**

- ❑ The primary pedestrian link between the park entry and bonebed area has the potential to move beyond a pathway system. There is potential to use a form of pedestrian lift such as an inclined elevator or a tourist rail.
- ❑ Pedestrian connections within the site have the potential to reach beyond the park boundaries and to create connections with possible recreational parkways in the surrounding area (e.g. Wapiti River Parkway, see Chapter 4, Tourism and Target Markets).
- ❑ There is the potential to incorporate a small scale shuttle bus system to move individuals and provide another means of universal access within the site. Establishing pedestrian shuttle stops throughout the site will connect the

various activity zones of the park (e.g. linking the multi-day area with the day-use areas).

- ❑ Another potential pedestrian link is the re-establishment of the Wapiti River crossing. This may occur through the revival of the ferry crossing or the construction of a pedestrian bridge to connect the north and south sides of the Wapiti River.

## Area C: Pipestone Creek Pachyrhinosaur Bonebed

### Existing Conditions:

Areas of the bonebed have begun to be excavated, however no formal security measures have been implemented and no formal interpretation of the significance of the site has been made available. Since the discovery of the Pipestone Pachyrhinosaurus, skulls and bones to complete five composite juvenile and adult pachyrhinosaur have been removed from the site for the purpose of scientific study<sup>1</sup>.

In the Spring of 2005, soil stability testing was undertaken on the slopes supporting the bonebed, and it has been

determined that development on the creek bank is feasible<sup>2</sup>. This bonebed also marks one of the first significant findings of dinosaur fossils within a geologic formation, known as the non-marine Late Cretaceous Wapiti Formation<sup>3</sup>. There has not



Fig. 6.15: Affects of slope stability test adjacent to bonebed.

source: photo by author, September 14<sup>th</sup>, 2005

been significant fossil study of this geological formation and excavation, investigation and interpretation of this bonebed therefore allows a new view into the lives of dinosaurs in the Late Cretaceous period in the Peace River Region of north-western Alberta.

**Proposed Development:**

- ❑ Provide a gathering spaces or plaza areas for the users. This space may act as a nucleus for the various existing and proposed pathways throughout the site. These areas offer the opportunity for the visitors to interact with the fossil site and to begin to grasp the significance of the bonebed.
- ❑ Create a boundary surrounding the estimated limits of the bonebed, providing a fifty-metre buffer around the resource. Development of permanent interventions should be restricted within this buffer zone.
- ❑ Provide scientists with temporary but full access to dig sites with the use of low impact and reversible road systems. These road systems will have the ability to be re-aligned within the bonebed, as new dig sites present themselves.

**Additional Opportunities:**

- ❑ Development of the bonebed offers the opportunity for visitors to explore and understand what occurred in this environment during the Mesozoic Era.

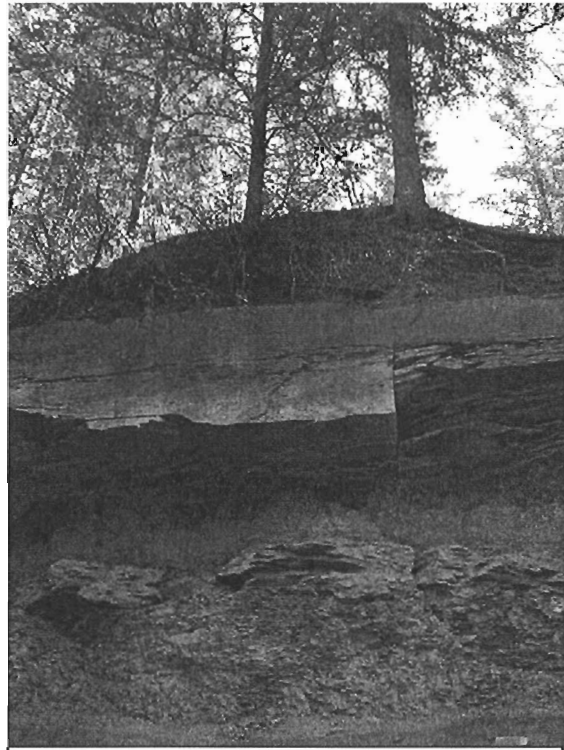


Fig. 6.16: Layers of sedimentary rock along creek bank.

source: photo by author, August 25<sup>th</sup> 2004

- ❑ Reference to the vegetation of the Late Cretaceous Period may occur through the design of interior landscaped areas (e.g. greenhouses) or through the use of descendant vegetation from that which would have been present in the Mesozoic environment.
- ❑ Potential to create various ***interpretation scenarios*** not only within the Pipestone bonebed, but also throughout the site. These ***interpretation scenarios*** allow for the palaeontological and environmental context of the site to be illustrated to visitors. These ***interpretation scenarios*** may include the following:
  - i. **'Active' paleontological digs:** provide the appropriate security measures to allow visitors to interact with the site, to view the palaeontologist 'in action' but still maintain the paleontological integrity. The implementation of a system of temporary field stations offers flexibility in the development of the site and reflects the notion of time and how the location of the various fossil excavation sites will affect the movement of users through the site.
  - ii. **'Active' tourist dig sites:** there is potential in the areas of the bonebed which have fragmented fossils, or fossils that are of not of 'high' scientific value, to create an 'active dig site' for interactive interpretation of the process for visitors. This type of scenario may provide for a hands-on approach/experience of the site and its resources.
  - iii. **Exposed fossils left in situ:** preserve the existing resources in situ, and retain their features for interpretation and discovery. But, provide adequate security and conservation measures for their.
  - iv. **Fossil casts:** post paleontological removal, replace the fossils with casts to help visitors identify the conditions in which fossils are

found and created. This allows for a complete non-restricted interaction and interpretation of the processes within the site.

- v. **Fossils removed for research:** expose and reveal to the visitors the impact that the collection of specimens for scientific value may leave on the landscape.

## Area D: Day-Use Area

### Existing Conditions:

The existing features and conditions within the day-use area include the current dinosaur museum on site, which is similar in size and construction to a residential freestanding two car garage. Within this museum, there are displays of fossils found in the Pipestone Creek bonebed and also from surrounding discovery sites in north-western Alberta and north-eastern British Columbia. The Pipestone Creek First Nation cemetery is adjacent to the day-use picnic area and ageing playground structures. This is currently fenced off and there is a marker to



Fig. 6.17: Existing Pipestone Creek museum.  
source: photo by author, August 25<sup>th</sup> 2004



Fig. 6.18: Day use area playground.  
source: photo by author, August 25<sup>th</sup> 2004

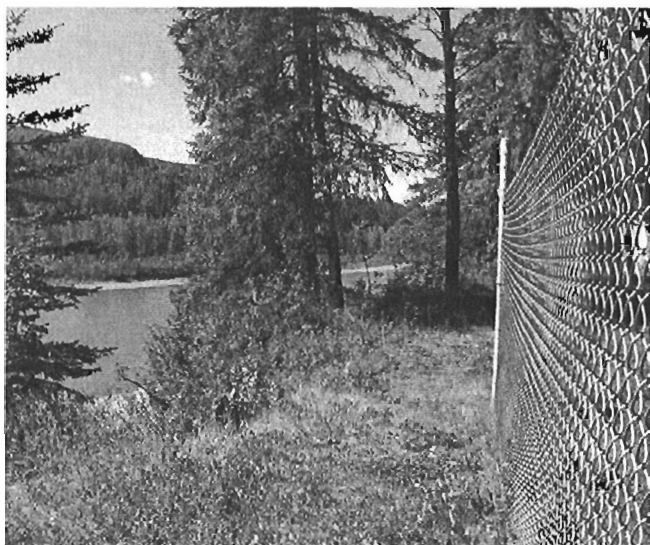


Fig. 6.19: Fencing as safety barrier.

source: photo by author, August 25<sup>th</sup> 2004



Fig. 6.20: Access point to pipestone creek.

source: photo by author, August 25<sup>th</sup> 2004

commemorate its significance. Currently, a pathway network leads to one primary access point at Pipestone Creek. The access has an approximately two-metre drop at the creek bank. Beyond the informal trails, there does not appear to be an explicit pedestrian connection between the day-use and multi-day-use areas. There is a chain link fence within the day-use area, it is assumed it is used as a safety barrier as there is a significant topographic change of approximately four metres, at the convergence of the Wapiti River and the Pipestone Creek adjacent to a portion of the day-use area.

**Proposed Development:**

- ❑ Strengthen the existing pathways and create a network of additional pathways to provide clear wayfinding and access for visitors.
- ❑ Ensure any new features within the documented flood zones of the day-use area are constructed using materials and methods that can withstand flood conditions.
- ❑ Do not disturb the First Nation cemetery and ensure adjacent design development is compatible with this cultural feature.
- ❑ Upgrade and expand the existing playground and picnic areas to meet current CSA standards.
- ❑ Develop a formal parking lot for the day-use area, which responds to various user needs at the river edge. Again, use a series of small parking lots is to create a sense of pedestrian scale, frame views and influence pedestrian and vehicular flow through interventions such as planting, berms and visual screens.
- ❑ Relocate the fossil resources in the existing Pipestone Creek Museum to the primary education centre. Existing building to be retained as campground office.

**Additional Opportunities:**

- ❑ There is an opportunity to provide an informal outdoor learning centre, gathering or amphitheatre space similar to other national and provincial parks in the country. This allows for another connection between education and tourism, where issues related to the site beyond the palaeontological context may be discussed and presented. Furthermore, this type of programmed space further establishes a tie between the day-use and multi-day-use zones.

## Area E: Multi-Day-Use Area

### Existing Conditions:

Features within the multi-day-use area or campground area of the park include ninety-nine unserviced campsites, washroom facilities, ageing playstructures, a free/open play area, a baseball diamond, a golf-frisbee course,



Fig. 6.21: Camp site in multi-day-use area.

source: photo by author, August 25<sup>th</sup> 2004

horseshoe pits, and a fitness circuit. The Pipestone Creek Park on-site manager has a dwelling at the fringe between the day-use and multi-day-use area. The existing campground office consists of a registration drop off-box at the campground access road.

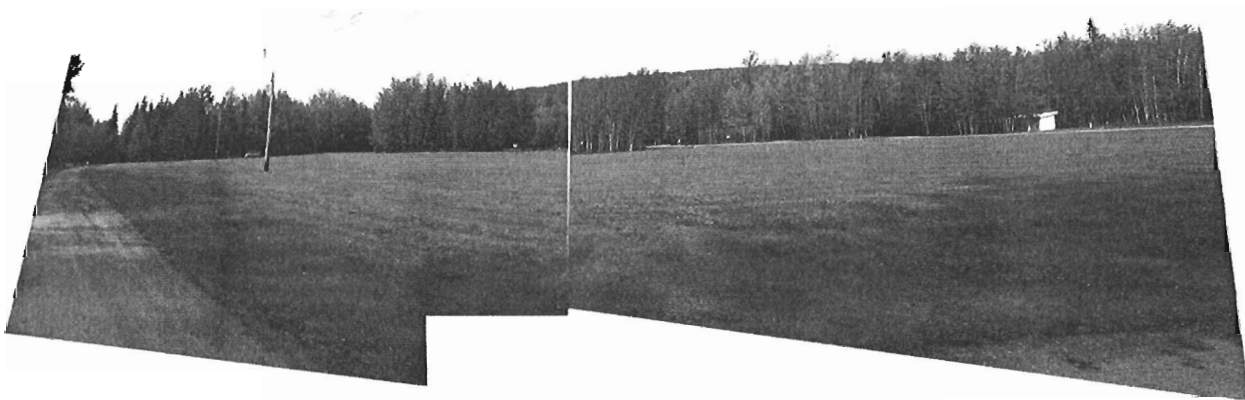


Fig. 6.22: Open play area in multi-day-use area.

source: photo by author, August 27<sup>th</sup> 2004

### Proposed Development:

- ❑ Renovate the existing Pipestone Creek Park Museum to provide a formal campground office.
- ❑ Upgrade the campground sites to accommodate contemporary camping vehicles and campsite standards.



Fig. 6.23: Recreation space and view towards Wapiti River.

source: photo by author, August 25<sup>th</sup> 2004

- ❑ Heighten the overnight experience by drawing from the Pipestone Creek design topology as established in the primary park entry and bonebed areas.
- ❑ Upgrade the existing recreational areas.

### Additional Opportunities:

- ❑ Program space for campground expansion in response to potential increase in multi-day activity on site.
- ❑ This area provides the opportunity for seasonal employee and researcher accommodations on site. There is the potential to provide a 'home' base for the fluctuating number of scientists and students who may be working or studying at the Pipestone site or on the various other discovery sites within the area. This may manifest itself into designated bays for recreational vehicles or cabin units within the campground.

## Area F: Wapiti River Link

### Existing Conditions:

Day-use park visitors and the campground users access the Wapiti River from an informal boat launch. The Wapiti River, which offers abundant recreational opportunities. The ferry landing, which was used as a commercial link prior to the O'Brien bridge being built down stream in 1958, is also located adjacent to the day-use parking lot.



Fig. 6.24: View towards boat launch area from south banks of Wapiti River.

source: photo by author, August 28<sup>th</sup> 2004

### Proposed Development:

- ☐ Provide a formal dock and boat launch system for motorised and non-motorised watercraft. This would increase and encourage the existing recreation movement along the Wapiti River.
- ☐ Re-create and identify the previous commercial link between the south and north side of the Wapiti River. This re-established link or 'ferry crossing' would allow tourist movement between north and south Wapiti, thereby providing the opportunity for a second Pipestone Creek Park entry point.

**Additional Opportunities:**

- ❑ Establishing a link to the Wapiti River offers the opportunity to connect the Pipestone Creek Park to surrounding recreational areas, through potential water based parkway system. This is a natural connection as it was the water erosion that revealed the bonebed, and water which initiated this bonebed as the mass mortality event was caused by drowning.



Fig. 6.25: Pedestrian access to Wapiti River.  
source: photo by author, August 25<sup>th</sup> 2004

## Area G: Secondary Park Entry

### Existing Conditions:

The presence of the Old Ferry crossing trail is the only evidence of use from the southern banks of the Wapiti River. By examination of the trail, it is evident that there is some form of vehicular traffic. Perhaps this dirt trail is currently used as river access. This access point offers unique views of the topography of the area, the existing park and the *Pachyrhinosaurus* bonebed.



Fig. 6.26: Topography along old ferry road.  
source: photo by author, August 25<sup>th</sup> 2004

### Proposed Development:

- ☐ Provide a pedestrian crossing between the north and south banks of the Wapiti River.
- ☐ Provide a small parking area for visitors and employees that may be arriving from the Old Ferry access point.
- ☐ Emphasise the vistas and frame views of the park from the south banks of the Wapiti River.

#### Additional Opportunities:

- ❑ Potential to develop a secondary park entry and gathering area which will support the notion of a secondary 'gateway' into the Pipestone Creek park.



Fig. 6.27: View towards the pipestone bonebed from south banks of the Wapiti River.

source: photo by author, August 28<sup>th</sup> 2004

## Endnotes

<sup>1</sup> Tanke, Darren H. "Mosquitoes and Mud" the 2003 Royal Tyrrell Museum of Paleontology Expedition to the Grande Prairie Region (Northwestern Alberta, Canada)" APS Bullentin. June 2004, 18.

<sup>2</sup> Palaeontological Society of the Peace. "*River of Death and Discovery*" – *Planning for the Museum, Pipestone Creek Bonebed: America's Largest Horned Dinosaur Bonebed*. <http://www.gprc.ab.ca/community/pipestone/>. Date accessed: September 13, 2005. Last updated June 17, 2005.

<sup>3</sup> Tanke, Darren H. "Mosquitoes and Mud" the 2003 Royal Tyrrell Museum of Palaeontology Expedition to the Grande Prairie Region (Northwestern Alberta, Canada)" APS Bullentin. June 2004, 4.

## Design Guidelines

Ideas explored within the *landscape values* section of Chapter 5 provide the framework for the following design guidelines for Pipestone Creek Park. Design guidelines have been established for the different components that will be developed on site. General guidelines are outlined for each component highlighted in the areas of development. These guidelines, together with the Pipestone Creek Park (P.C.P) Staging Plans and the P.C.P. Programme and Standards (Appendices E & G), will lead to a proposed design solution for the site.

### Recreation Access Roads

1. Integrate the existing Wapiti River valley topography and site features in the placement of temporary and permanent road systems.
2. Use road construction methods that reduce impact on the existing landscape. See Detail: Pipestone Creek Permanent Road (Chapter 7).
3. Maintain the existing character of the area, by minimising the clearing of vegetation in the upgrading or placement of new roads. When clearing is required, cut irregular treelines along road edges to heighten visual variety.
4. Where appropriate provide space for mixed use of roadway by providing a 2.0 metre width multi-use aisle.

### Permanent Access Roads

1. Road width (8.25m) and design speed of 40km/hr is consistent with national recommendations for recreation sites with heavy vegetation.
2. In order to achieve required grade (maximum 8%) and to capture vistas within and beyond the site, roads are to meander down the river valley.

### **Temporary Access Roads**

1. The use of temporary road systems will allow for the removal and relocation of these non-permanent road systems on site. The intent is to be able to rehabilitate the areas once used for the temporary roads. . See Detail: Pipestone Creek Temporary Road (Chapter 7).
2. A 50 metre buffer zone is to be established around the Pachyrhinosaurus bonebed, the temporary road systems should only be applied within this buffer zone.
3. Temporary roads must withstand the heavy loads associated with site equipment used in the development stages and in the fossil collection process.
4. Minimum width of roads must be able to accommodate the large equipment necessary for fossil extraction.
5. If vegetation rehabilitation is not possible when temporary roads are removed, ensure abandoned access may be converted into multi-use pathway for site exploration and interpretation.

### **Parking Lots**

1. Create a series of small parking lots, which are connected by Pipestone Creek Pathway Type 1. The goal in creating a series of lots is to reduce the scale for the pedestrian, to prevent a sense of an asphalt-scape within this rural landscape, and be conducive to the proposed phasing plan. Parking provision within the proposed smaller lots will be limited to a maximum of thirty automobile stalls or fifteen recreational vehicle/bus stalls per lot.
2. Organise and designate parking lots according to the different types of vehicular users in order to establish hierarchy and flow within the parking area. Provide overflow parking in response to the potential seasonal transition in visitor

numbers and allocate lots not used during peak times for seasonal use (e.g. winter snow removal storage).

3. Shield parking lots through dense planting and visual screens to capture views and to direct pedestrian movement.
4. Within parking lots provide planting areas to provide both shade and a sense of scale.
5. Provide a drop-off zone, adjacent to or near the primary education centre and plaza area. This is to assist in universal access and to manipulate the arrival and departure of large visitor groups movement (e.g. school and tour groups).
6. Use porous paving technologies to help deal with drainage issues and to avoid the further creation of a asphalt-scape. Products such as eco-stone, turfstone, enviro-pavers, biopavers or combinations of these products are suitable.

## **Plaza Area**

1. Provide diverse outdoor seating areas that are accessible to the various user groups. Approximately 50% of the outdoor seating should be informal (e.g. planter edges, stairs, berms). This will ensure the plaza areas do not appear vacant or under-utilised with the fluctuating number of users moving through the space.
2. Provide formal and informal outdoor seating for the various users by incorporating universal access, and appropriately dimensioned facilities for adults and children.
3. Provide staging and gathering areas for visitors by programming space and activities through design interventions. These interventions may include but are not limited to story boarding the 'life of the Pachyrhinosaurus', demonstrating the scale and proportions of the Pachyrhinosaurus, providing 'dig sites' for tourist interaction or providing site history post Mesozoic Era.

The intent of providing such interventions is to avoid lull-waiting time for the visitors.

4. Avoid rigid treatment of the plaza. Blend edges into the landscape through material choice and avoid hard edges by using plant material.
5. Introduce site furnishings and elements of a variety of scales to establish a sense of drama. Relate the treatments to the pedestrian scale, and introduce the notion of the *Pachyrhinosaurus* scale.

### **Pedestrian Connections**

1. Establish different types of pedestrian connections throughout the site which respond to the various user groups and the existing topography. The Pipestone Creek Pathways are to be categorised as Type 1, Type 2 and Type 3.
2. Pipestone Creek Pathway Type 1, to be located in areas where complete accessibility is required, such as connections within universal accessible parking lots and the public plaza areas. See Detail: Pipestone Creek Pathway Type 1 (Chapter 7).
3. Pipestone Creek Pathway Type 2 to be used in connections that allow for a moderate level of accessibility. Such as the connection between the primary education centre and the bonebed area of development. See Detail: Pipestone Creek Pathway Type 2 & 3 (Chapter 7).
4. Pipestone Creek Pathway Type 3 to be used in pedestrian connections that cannot provide accessibility to all individuals with limited mobility (e.g. because of steepness of natural topography). See Detail: Pipestone Creek Pathway Type 2 & 3 (Chapter 7).
5. With all Pipestone Creek Pathway Types, ensure there is adequate site furniture and rest zones incorporated into the design where necessary and

pertinent. These areas will heighten the accessibility of the pathways as well as allowing visitors opportunities to be merged into the site context.

6. For wayfinding and interpretation purposes, provide information at the pathway heads, regarding trail type, length, surface type and location of rest areas along the path.
7. Maintain the heavy vegetation quality of the area by minimising clearance in the upgrading and/or placement of new pedestrian connections. Allow for irregular tree lines along trail edges to heighten visual variety and maintain the naturalised vegetative quality of the site.
8. Use pathway systems that have low impact construction methods. This includes systems, which use geogrids for reinforcement and reduction of surfacing depth. Drainage tubes to provide adequate water management and to protect the existing vegetation, as well as geotextiles to increase the life span of the surface material and protect the root zones of existing vegetation. See Detail xx.
9. The pathway systems shall re-utilize temporary access roads to the greatest extent possible over creating new corridors through the existing vegetation.

### **Soft Landscape**

1. Use plant material as a means to:
  - i. To capture and create visual links throughout the site.
  - ii. Protect users from the natural elements.
  - iii. Provide visual screens to eyesores such as commercial-size garbage bins and parking lots.
2. Retain and protect as much of the herbaceous, shrub and tree layer wherever possible, in order to preserve the vegetative character of the site.

3. Any new mass plantings should be planted in an irregular pattern to integrate with the existing vegetation.
4. Use plant material as a means reinforce the history of the site, linking its use to the paleontological history of the site.
5. Any new plantings that are not reflective of the paleontological site history shall be native to the Peace River Parkland area.
6. Preference should be made to the Parkland species that link to the First Nations presence that was once on site.

### **Materials**

1. Primary consideration is to use local materials to describe the Peace River region visual and contextual vocabulary.
2. In order to reference the cultural resource and context of the site, utilise typical materials from palaeontological processes and apply in non-traditional methods (e.g. base material for site furniture and signage).
3. Use materials to create visual homogeneity of elements on site to establish the Pipestone Creek theme and support the wayfinding. Be conscious to integrate all materials with the existing landscape to avoid designed elements that are not site sensitive.
4. Where possible and appropriate, use native ground covers as an alternative to hard landscape materials.

### **Site Accessories**

#### **Site Furnishings**

1. Avoid the use of mixed furniture typologies in order to create a unified design standard and visual concept for the site.

2. All garbage enclosures shall be visually integrated with the building design or harmonised with the landscape plan.
3. Waste receptacles shall be pest resistant while accommodating universal access needs.
4. Design seating at various scales for the diverse child and adult users.
5. Arrange and design seating in clusters in order to heighten social interaction along pedestrian connections and within plaza spaces
6. Provide seating along pathways, planters edges, stairs, at the top and bottom of significant grade changes, adjacent to key amenities and interpretation areas in order to increase interaction with the site. Provide seating at the appropriate intervals as outlined in the programme and standards, for accessible routes.
7. Provide picnic tables that are suitable for the various users in order to increase accessibility within the day-use area.

### **Signage**

1. Integrate all Pipestone Creek Park signage visually with the landscape, do not block site views with intrusive signage.
2. Pathway markers, information signage and wayfinding devices to become a part of the developed landscape, creating another layer within the space.
3. Provide and develop signage that relates to the vehicular and pedestrian scales. Place signage adjacent to, but set back from, the pedestrian flow in order to avoid obstructions.
4. Signage shall be clear and describe its function in a simple manner in order to provide clear wayfinding throughout the site. This may be done

through the use of strong contrast in design and detail, as well as placement at key nodes and route intersections.

5. Size ratios and information text height should be based upon the Pipestone Creek Park Standards.

### **Lighting**

1. Light standards shall be scaled appropriately to their intended use and surroundings. See P.C.P. Standards.
2. Lighting should provide the minimum necessary light levels for security and safety. This is in order to prevent light-pollution and help maintain the rural character of the site.
3. Place light standards on the boundary of the pedestrian flow.
4. All proposed ramps and stairs shall be illuminated.

### **Fencing**

1. Establish different fencing typologies to relate to the intended use of the fencing on site (e.g. security, temporary and visual connections).
2. To minimise impact on the existing landscape, use materials and construction methods that may be reversed or relocated on site.

# 7 Unearthing Pipestone

## Conceptual Design

As described in Chapter 1, the intent of this practicum is to establish a design strategy for the development of Pipestone Creek Park. Pipestones' Skeleton establishes the staging plan for the site and sets the framework from which the design process within the site may evolve. For the purpose of this practicum, the components of Pipestones' Skeleton were used to present the conceptual design of two of the identified areas of development. The two areas explored in the design process are "Area A: Primary Park Entry" and "Area C: Pipestone Creek Pachyrhinosaurus Bonebed". Prior to the conceptual and detailed design of these areas, three phases of development were established in the staging plan and the conceptual design of Areas A and C, reflect the conditions established in Phase One of the Pipestone Creek Park Staging Plan.

For each of the investigated areas, plazas, interpretation scenarios and circulation systems were designed that incorporate the concepts of reveal, erosion, layering, time, hydrology, shift, history, preserve, protect and maintain, retain, monitor, balance, identify and reversibility. However, inherently water is the root to this site. As it was water that helped carve this site as the Bearspaw Sea was expanding, water was the cause of the mass mortality event, and ultimately water has eroded the sandstone and earth away to unearth the fossils. But in the design

process, each element and intervention presented on site draw from different aspects of the above mentioned concepts.

The plazas for “Area A” and “Area C” serve as the primary gathering and interpretation spaces. Here the visitors may interact with the fossil resource in both a obvious and subtle manner. The surface treatments of the plaza areas link the user to the prehistory of the site while at the same time displaying how the fossil resource is revealed over time. The fern leaf impressed concrete, makes reference to the Late Cretaceous environment of the Pachyrhinosaurus. The eroding nature of the concrete surface with inlaid resin fossil casts exhibit how time, friction (from the users) and water (surface drainage) begin to reveal the resource. This surface treatment also illustrates the density and quantity of fossils found in the Pachyrhinosaurus Bonebed. The serpentine pathways and drainage channels is influenced by the coursing water that helped form and unearth the site. The irregular, layered, sandstone planting edges provide a variety of seating choices while at the same time mirroring the geology of the creek bank and organic character of the site. The use of Peace River Parkland vegetation and method of mass irregular planting reflects the present-day character of the site.

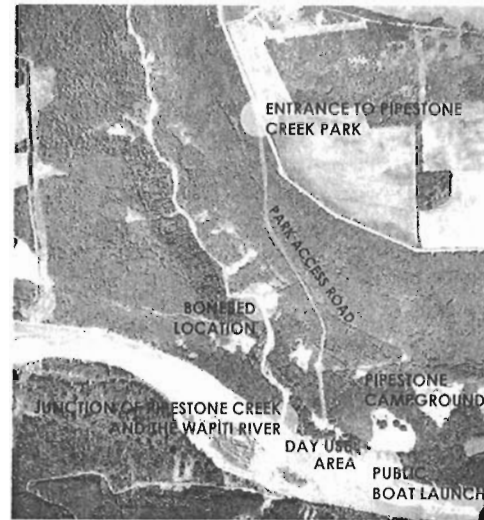
The interpretation elements, such as the Water Erosion Wall and the Timeline Wall offer the users a means to understand how the bonebed developed and how it may continue to be unearthed. With the Water Erosion Wall a life-size adult Pipestone Pachyrhinosaurus begins to be revealed from a sandstone wall. As the user moves along the wall the boulders change from rough cut to smooth cut and slowly the fossil cast, first seen as a relief, begins to emerge from the wall. Water is used in this feature as it trickles over the wall face to imply how this natural element can erode a rough cut rock to a smooth and non-existent surface. The water then flows

to the paver edge/drainage channel and it carried off the main plaza area. The Timeline Wall, located in the Bonebed Plaza, unveils the history of the dinosaurs. As the visitor moves along the wall, deeper into the plaza and closer to the bonebed, the annotated timeline describes the story of the not only the Pipestone Pachyrhinosaurus but all the creatures that would have inhabited the north-western region of Alberta through pre-history.

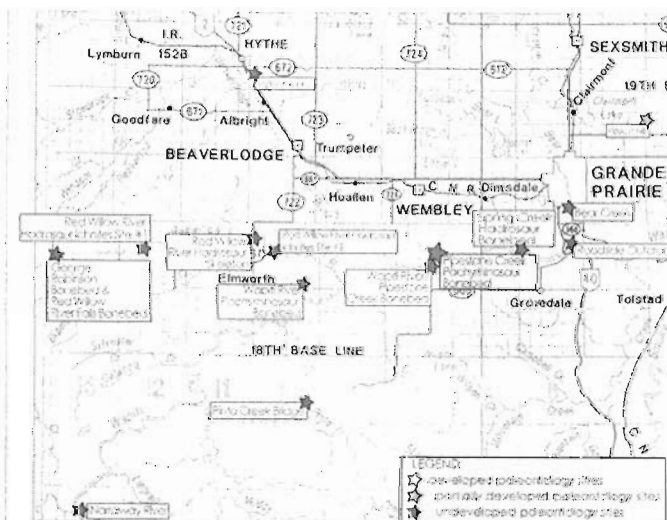
The fossil interpretation scenarios vary throughout the site. Some occur within the plazas and some are along the Pipestone Creek pathways. Each of the four fossil interpretation scenarios allow the tourist to interact with the fossil in a unique manner. The Active Dig Berm give visitors hands interaction with the resource. Pachyrhinosaurus fossil casts are placed in the concrete berm and tourists can use palaeontology tools to begin to chip away at the berm to reveal and extract the resin casts. This type of interaction is a means for the users to leave their impression, their trace on the site, as it is their activity that begins to erode the berm and expose the fossils. The Pachyrhinosaurus Burial Berm displays how a group or 'herd' of dinosaurs begin to be buried and covered by earth prior to fossilisation. As the visitor moves from the Bonebed Plaza toward the actual bonebed, full size sculptures of Pachyrhinosaurus are being covered and enveloped by the landscape. At the Fossil Extraction scenario, the impact of the act of palaeontology is displayed. It is only by bringing the visitors to a site within the bonebed where fossils have been removed that the user may truly grasp the impact this scientific process leaves on the existing landscape. Finally, by allowing the visitors to see the fossils left in-situ they are begin to see what palaeontologists are presented with when they begin the removal process.

The detailed design of the Pipestone Creek Pathway Types and road systems, display how un-conventional construction methods may be incorporated into a rural setting with lower impact, (than conventional construction methods), on the existing topography and vegetation. By using geotextiles and reinforcement technologies, less disruption to the existing topography occurs. The use of Pipestone Creek Pathway Markers at the pathway heads establishes wayfinding throughout the site while at the same time begins to create a Pipestone character and typology. Through these visual and textural cues, the markers connect the various areas within the entire Pipestone Creek Park site.

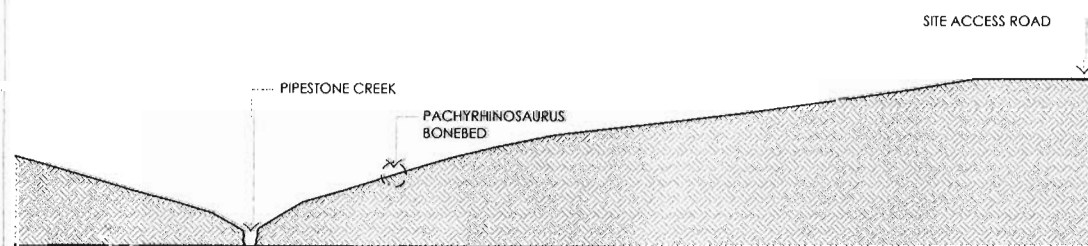
Ultimately, it is the designed interventions, the materiality and experiential quality of the interpretation scenarios that establishes the Pipestone Creek character and experience. The inspiration for the design of each proposed intervention and detail was taken from the fossil resource, the existing landscape and the values which lead the design guidelines. The following reductions of the presentation boards reflect the synthesis of the design strategy for Pipestone Creek Park.



EXISTING SITE FEATURES  
N.T.S.



FOSSIL DISCOVERY SITES IN THE GRANDE PRAIRIE AREA  
N.T.S.



SECTION AA - EXISTING TOPOGRAPHY  
SCALE 1:3,000

## UNEARTHING PIPESTONE: A DESIGN STRATEGY FOR THE PROPOSED PIPESTONE CREEK DINOSAUR MUSEUM

### FINAL PRACTICUM PRESENTATION

KATHRYN GLENDYNSING

AUGUST 17, 2006

#### C PIPESTONE CREEK PACHYRHINOSAURUS BONEBED



PIPESTONE CREEK BANK

AFFECT OF SOIL STABILITY TESTING  
ADJACENT TO BONEBED

#### D DAY USE AREA



EXISTING PIPESTONE CREEK MUSEUM

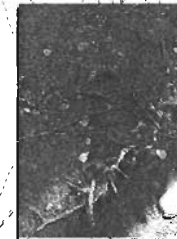


EXISTING FENCING ADJACENT TO  
JUNCTION OF THE WAPITI RIVER  
AND PIPESTONE CREEK

#### B PEDESTRIAN CONNECTIONS



EXISTING TOPOGRAPHY



EXISTING PATHWAY  
SURFACING

#### A PRIMARY PARK ENTRY



AGRICULTURAL LAND ADJACENT TO EXISTING PARK ENTRY



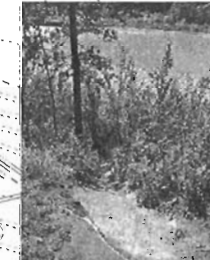
VISTA ALONG ENTRY DRIVE

#### E MULTI-DAY USE AREA



OPEN PLAY SPACE

#### F WAPITI RIVER LINK



EXISTING PEDESTRIAN  
ACCESS TO WAPITI RIVER



EXISTING CAMP SITE

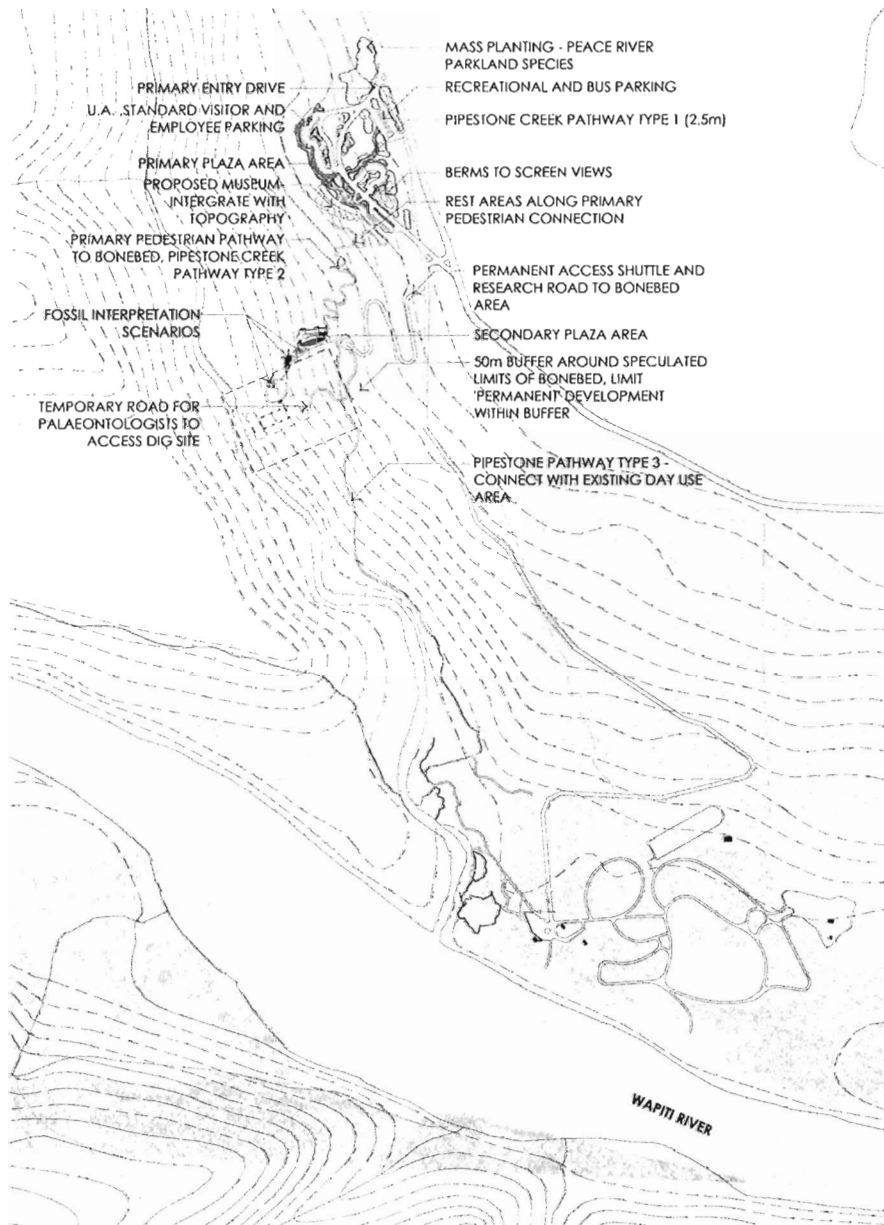


VIEW OF EXISTING BOAT LAUNCH FROM  
SOUTHERN BANKS OF THE WAPITI RIVER

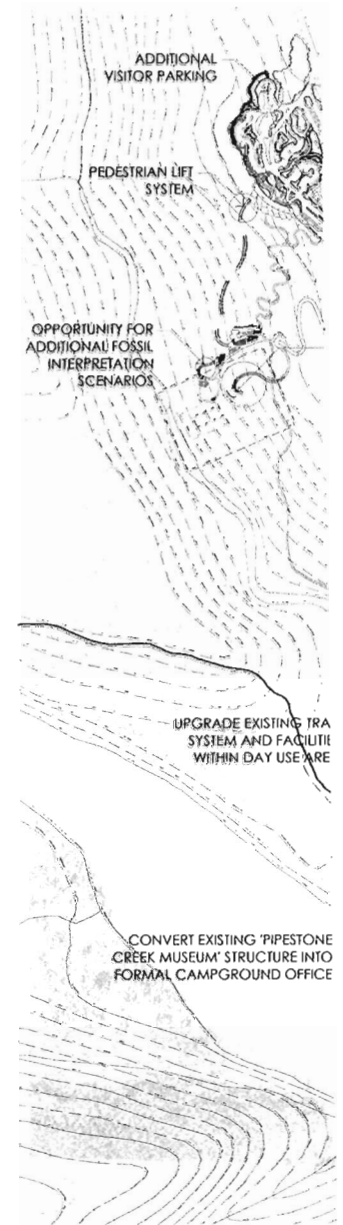
#### G SECONDARY PARK ENTRY



VIEW TOWARDS PACHYRHINOSAURUS BONEBED FROM SOUTHERN BANKS



PIPESTONE CREEK DEVELOPMENT PHASING PLAN - PHASE ONE  
SCALE 1:6,000



PIPESTONE CREEK DEVELOPMENT PHASING PLAN - PHASE TWO  
SCALE 1:6,000

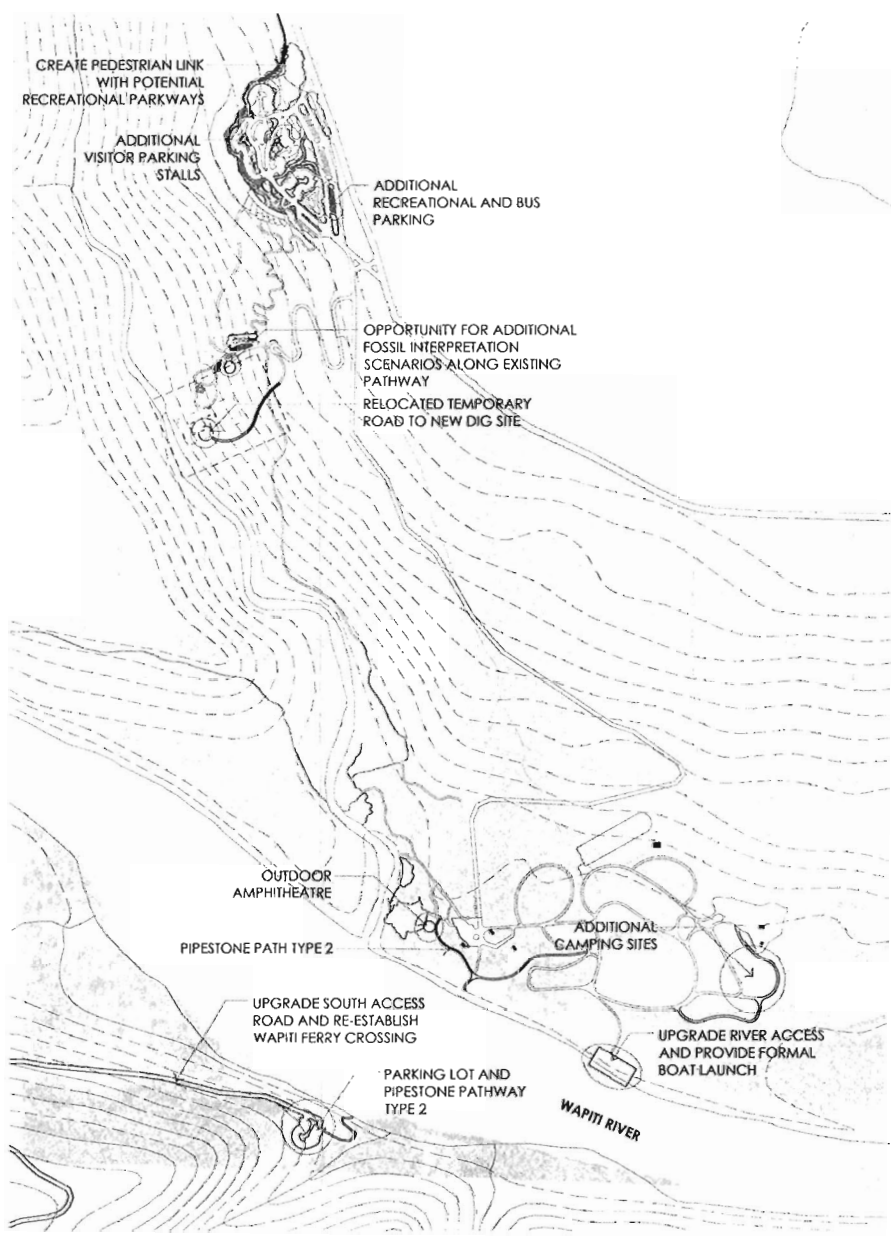
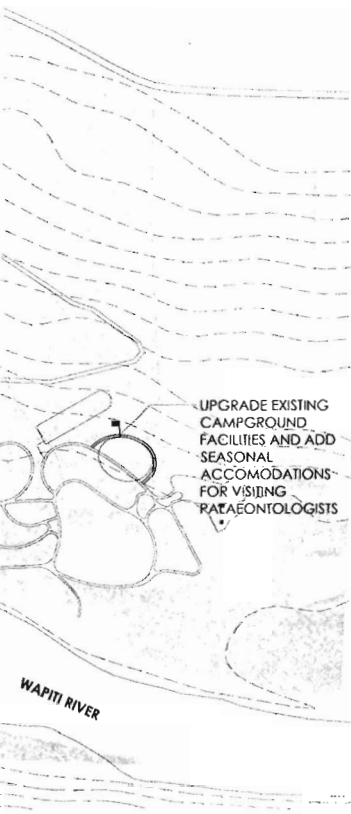
## UNEARTHING PIPESTONE: A DESIGN STRATEGY FOR THE PROPOSED PIPESTONE CREEK DINOSAUR

### FINAL PRACTICUM PRESENTATION

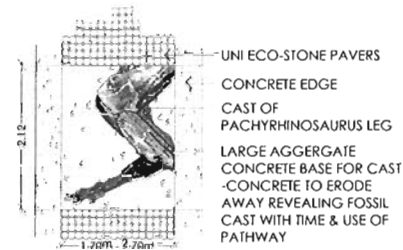
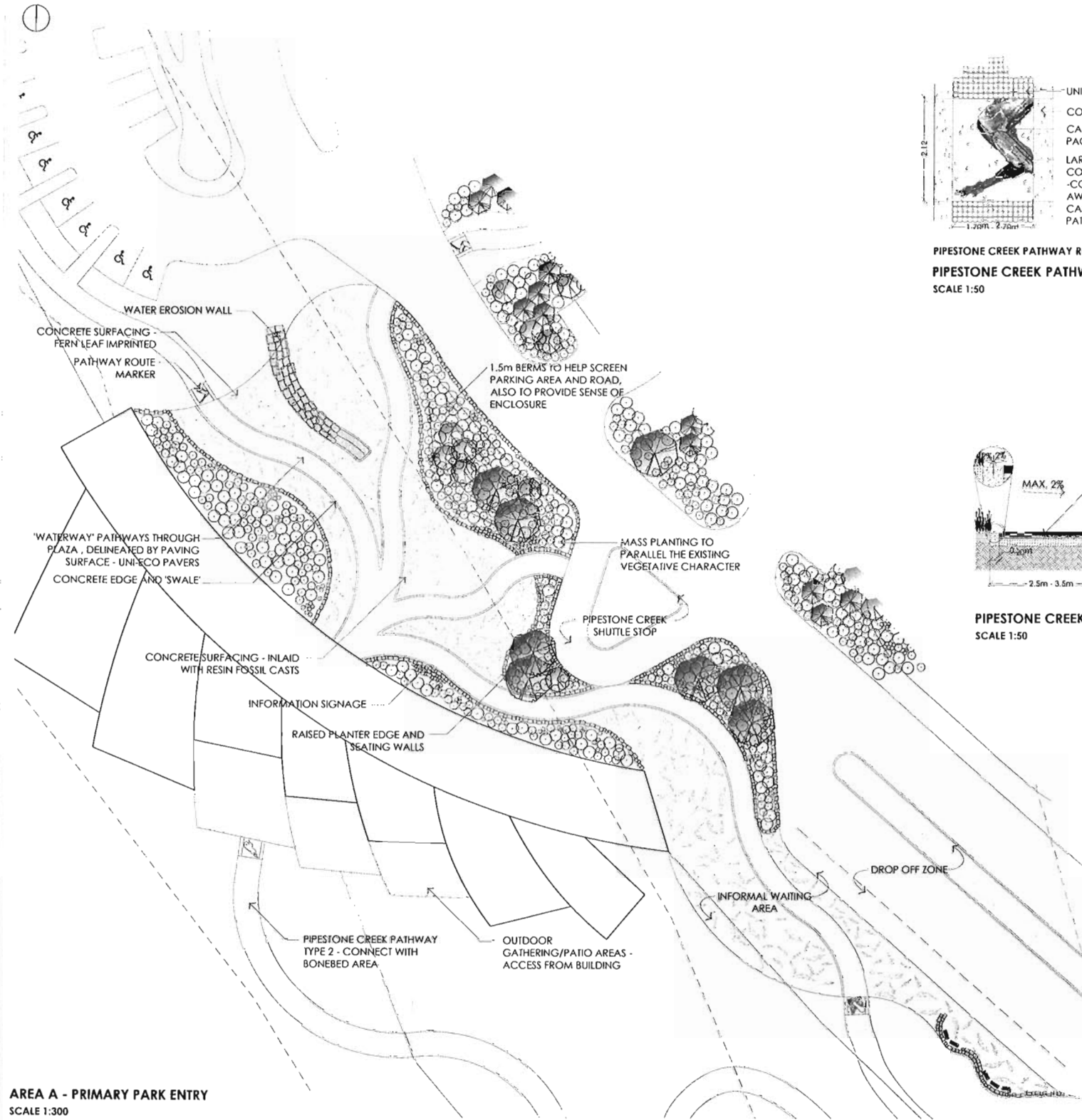
KATHRYN GLENDINNING

AUGUST 17, 2006

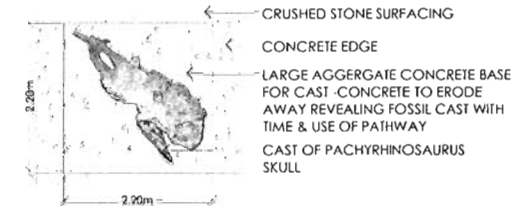
NAL  
NG



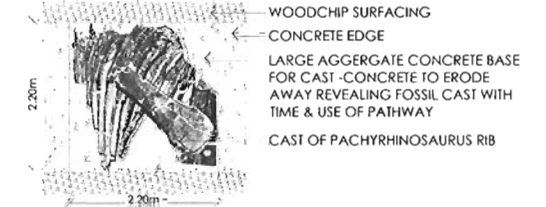
PIPESTONE CREEK DEVELOPMENT PHASING PLAN - PHASE THREE  
SCALE 1:6,000



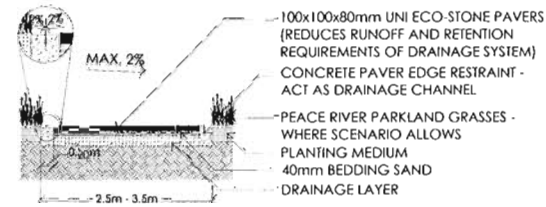
PIPESTONE CREEK PATHWAY ROUTE MARKER - TYPE 1  
PIPESTONE CREEK PATHWAY MARKERS  
SCALE 1:50



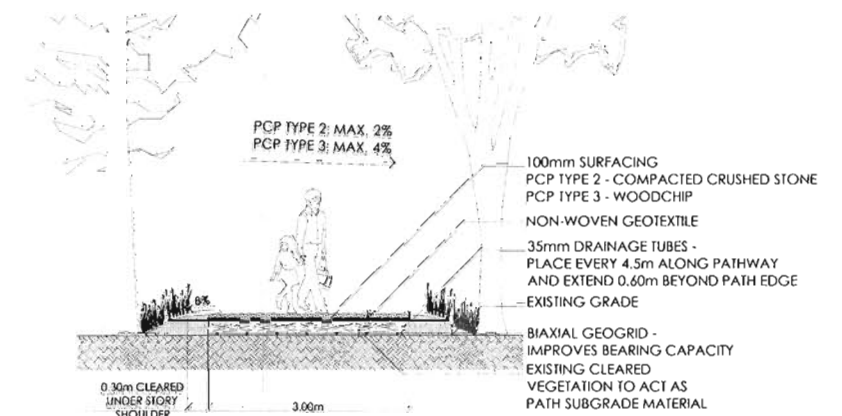
PIPESTONE CREEK PATHWAY ROUTE MARKER - TYPE 2



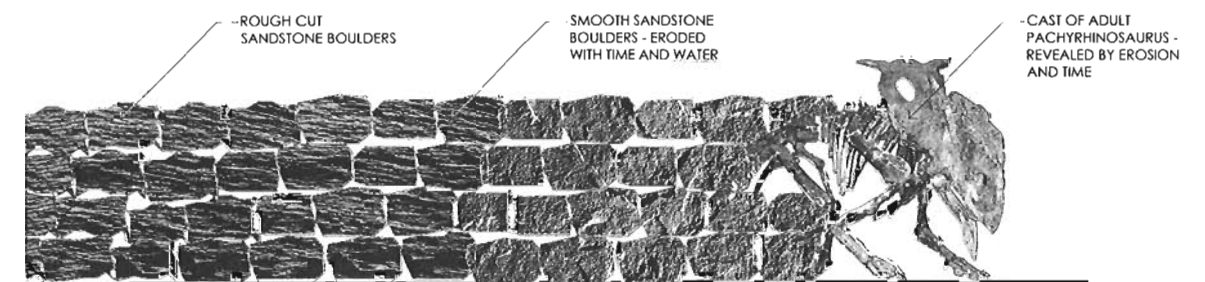
PIPESTONE CREEK PATHWAY ROUTE MARKER - TYPE 3



PIPESTONE CREEK PATHWAY TYPE 1  
SCALE 1:50



PIPESTONE CREEK PATHWAY TYPE 2 & 3  
SCALE 1:50



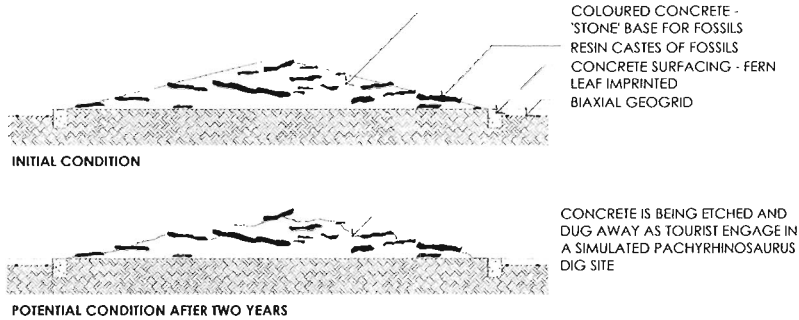
ELEVATION OF WATER EROSION WALL  
SCALE 1:50

## UNEARTHING PIPESTONE: A DESIGN STRATEGY FOR THE PROPOSED PIPESTONE CREEK DINOSAUR MUSEUM

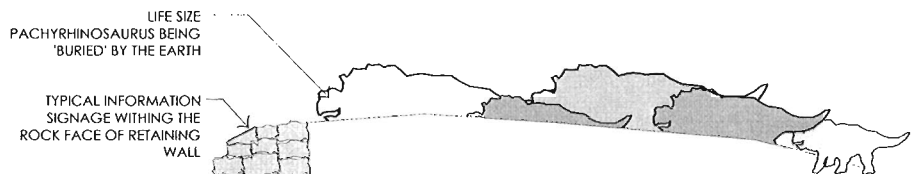
### FINAL PRACTICUM PRESENTATION

KATHRYN GLENDINNING

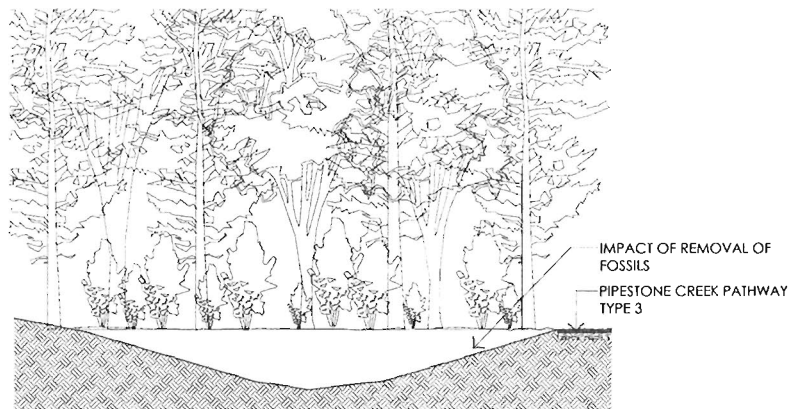
AUGUST 17, 2006



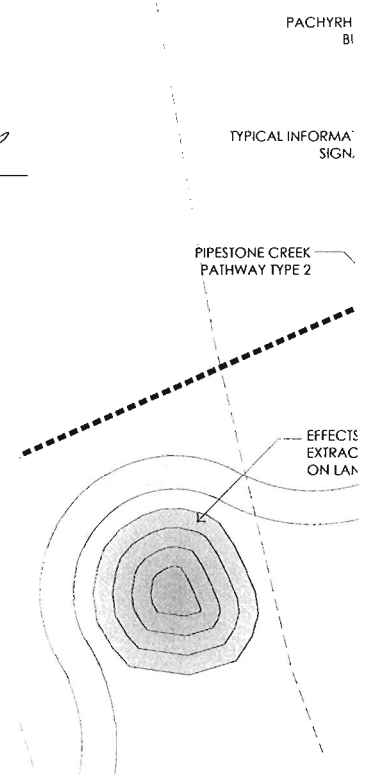
**SECTION BB ACTIVE DIG BERM**  
SCALE 1:50



**PACHYRHINOSAURUS BURIAL BERM**  
SCALE 1:100



**FOSSIL EXTRACTION**  
SCALE 1:100



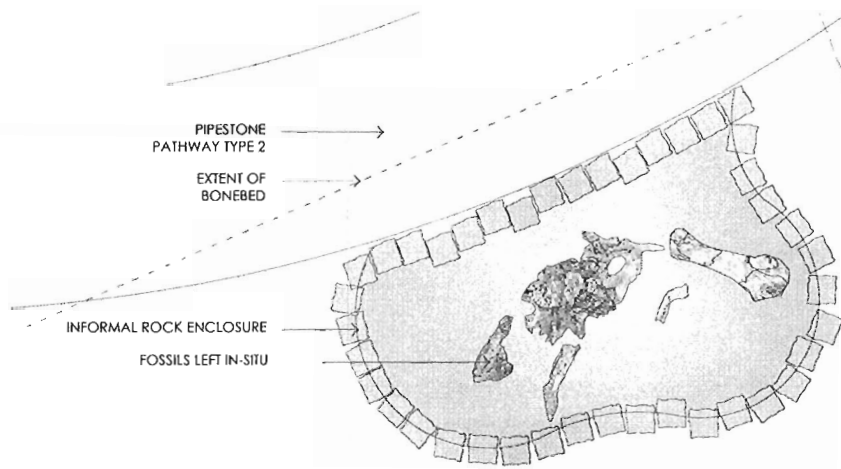
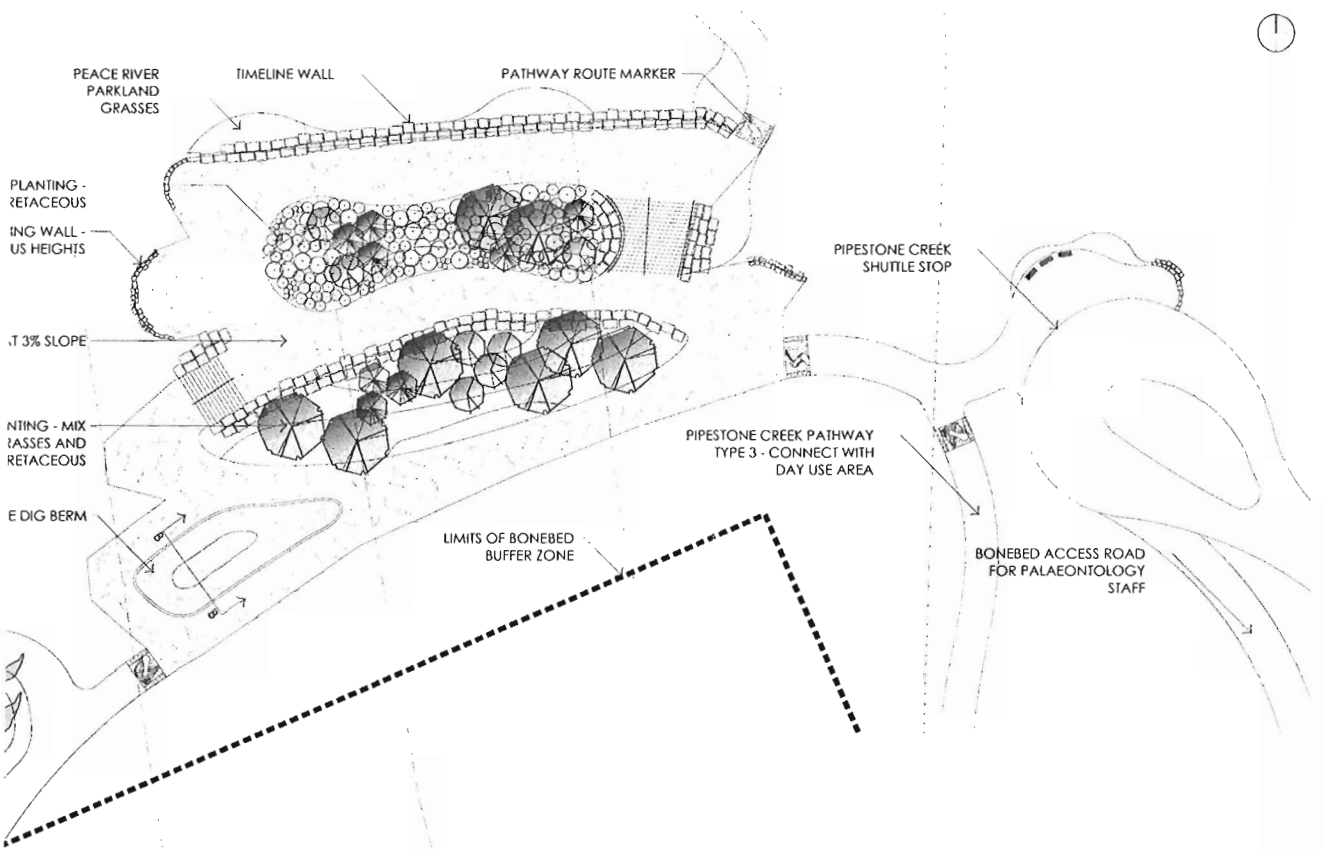
**AREA C - PIPESTONE CREEK PACHYRHINOSAURUS**  
SCALE 1:300

## UNEARTHING PIPESTONE: A DESIGN STRATEGY FOR THE PROPOSED PIPESTONE CREEK DINOSAUR

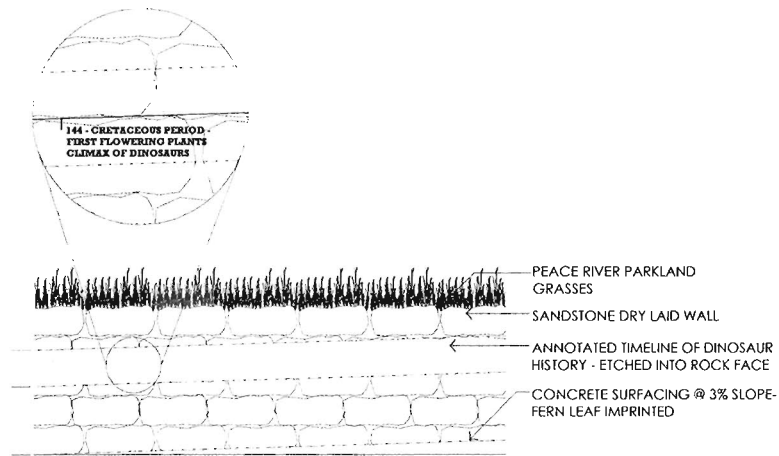
### FINAL PRACTICUM PRESENTATION

KATHRYN GLENNING

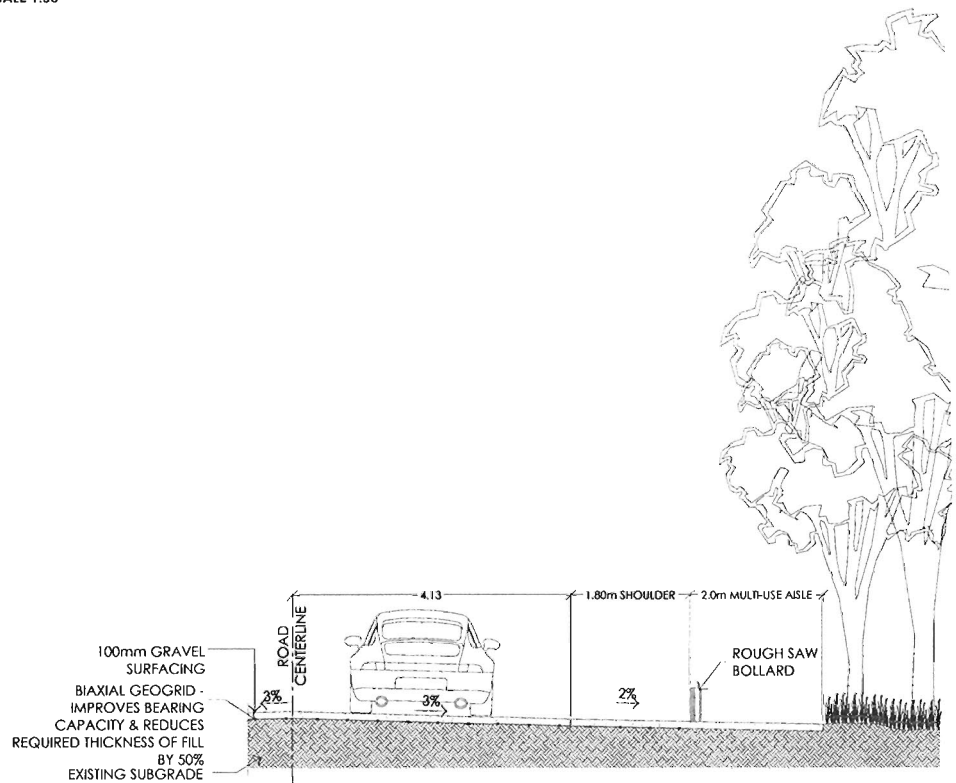
AUGUST 17, 2006



**FOSSILS LEFT IN SITU**  
SCALE 1:50



**TIMELINE WALL**  
SCALE 1:50



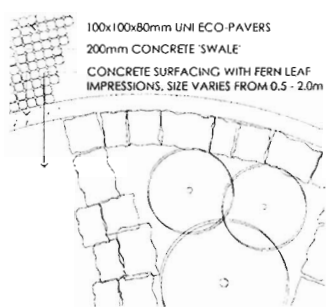
**PIPESTONE CREEK PERMANENT ROAD**  
SCALE 1:50

## UNEARTHING PIPESTONE: A DESIGN STRATEGY FOR THE PROPOSED PIPESTONE CREEK DINOSAUR

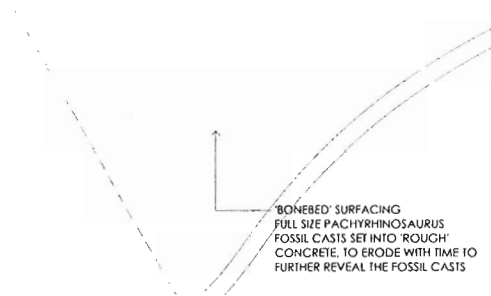
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KATHRYN GLENNING

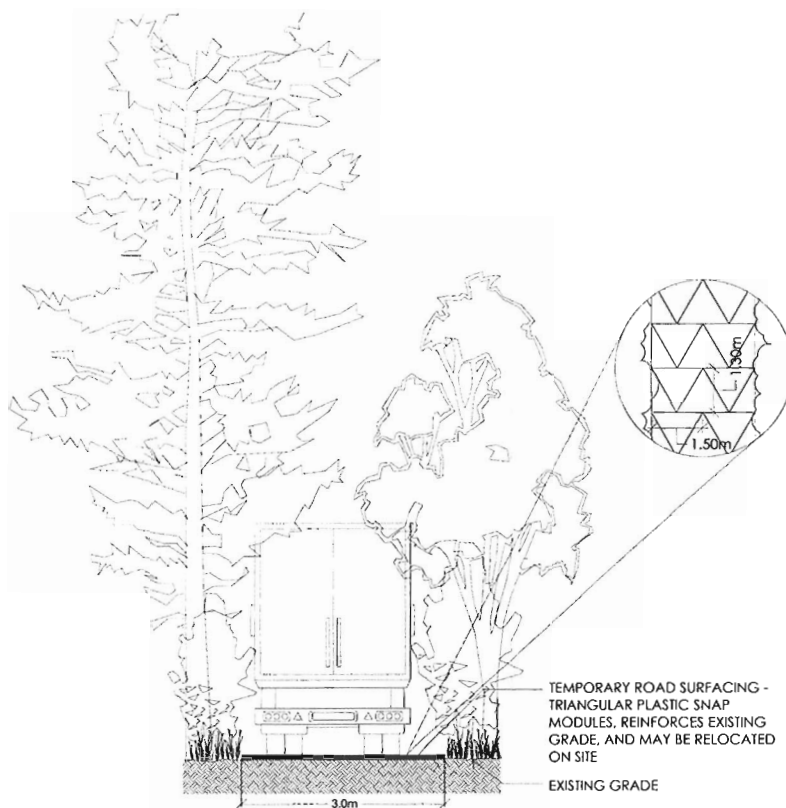
AUGUST 17, 2006



LAZA PAVING PATTERNS



PIPESTONE CREEK PLAZA 'BONEBED' PAVING PATTERN  
SCALE 1:40



PIPESTONE CREEK TEMPORARY ROAD  
SCALE 1:50

# A

## Appendix

### The World Heritage Convention and Outstanding Universal Value

The *Convention* provides for the identification and protection of cultural and natural heritage of “outstanding universal value”. One of its distinguishing aspects is the inclusion of both cultural and natural heritage in the same legal document, in a world where their separation has been extensively practised. The “combined works of nature and man”, in Article 1, link cultural and natural heritage as a fundamental principle of the *Convention*. The Natural and Cultural Heritage Expert Meeting held in Amsterdam in March 1998 described the *Convention* as “an outstanding response to the universal nature of heritage - for natural heritage in its biological and geographical diversity and for cultural heritage in its geo-diversity” (*Report Amsterdam*:14). Universal value may be seen to lie in its concept of common heritage shared by all humankind.

The *Convention* does not define the concept of “outstanding universal value”, but it has been variously interpreted to mean the “most exceptional places in the world”, the best examples of places “without doubt, of true international value” or, alternatively, the “threshold of value” which places must reach to be accepted as World Heritage Sites (Titchen 1995:4,70-72,96,109-110). In 1977, the first version of the *Operational Guidelines for the Protection of the World Cultural and Natural Heritage* explained the intent of the term “universal” in the phrase “outstanding universal value”: “Some properties may not be recognized by all people, everywhere, to be of great importance and significance .... As far as cultural property is concerned, the term ‘universal’ must be interpreted as referring to a property which is highly representative of the culture of which it forms part” (para.I.5A). As Titchen explains, “in a remarkable coexistence, or nexus, of the local or national, and the international, universal or global, the Convention aims to protect unique and outstanding expressions of cultural production and natural heritage often very localized, in time and space” (Titchen 1995:243-244). In 1999, the Twelfth General Assembly of States Parties to the *Convention* saw it as intended to reflect “the diversity of all cultures and ecosystems of all regions” (Resolution 1999:2).

## Criteria for determining Outstanding Universal Value

A property which is nominated for inclusion on the World Heritage List will be considered to be of outstanding universal value when the World Heritage Committee finds that it meets one or more of the following criteria:

- i. represent a masterpiece of human creative genius;
- ii. exhibit an important interchange of human values, over a span of time or within a cultural area of the world, on developments in architecture or technology, monumental arts, town-planning or landscape design;
- iii. bear a unique or at least exceptional testimony to a cultural tradition or to a civilization which is living or which has disappeared;
- iv. is an outstanding example of a type of building, architectural or technological ensemble or landscape which illustrates (a) significant stage(s) in human history;
- v. is an outstanding example of a traditional human settlement, land-use, or sea-use which is representative of a culture (or cultures) or human interaction with the environment especially when it has become vulnerable under the impact of irreversible change;
- vi. be directly or tangibly associated with events or living traditions, with ideas, or with beliefs, with artistic and literary works of outstanding universal significance. The Committee considers that this criterion should preferably be used in conjunction with other criteria;
- vii. contain superlative natural phenomena or areas of exceptional natural beauty and aesthetic importance;
- viii. be outstanding examples representing major stages of earth's history, including the record of life, significant on-going geological processes in the development of landforms, or significant geomorphic or physiographic features;
- ix. be outstanding examples representing significant ongoing ecological and biological processes in the evolution and development of terrestrial, fresh water, coastal and marine ecosystems and communities of plants and animals;
- x. contain the most important and significant natural habitats for in-situ conservation of biological diversity, including those containing threatened

species of outstanding universal value from the point of view of science or conservation.

### **Qualifying conditions — authenticity and integrity**

Properties nominated for inclusion on the World Heritage List must satisfy the qualifying conditions of authenticity and/or integrity.

### **Legal/Management Requirements**

All properties inscribed on the World Heritage List must have adequate long-term legislative, regulatory, institutional, management and/or traditional protection to ensure that their condition at the time of inscription will be maintained or enhanced in the future.

These criteria, adopted in 2004, correspond to the pre-2004 criteria as follows: i = C i; ii = C ii; iii = C iii; iv = C iv; v = C v; vi = C vi; vii = N iii; viii = N i; ix = N ii; x = N iv.

**source:** Parks Canada. "World Heritage Global Strategy and Canadian Cultural Sites of Outstanding Universal Value", World Heritage: Canada.

[http://www.pc.gc.ca/progs/spm-whs/itm4-/page5\\_E.asp](http://www.pc.gc.ca/progs/spm-whs/itm4-/page5_E.asp) . Last updated: July 28, 2004. Date accessed: June 25, 2005.

# B Appendix

## IUCN Fossil Site Evaluation Checklist

- (1) Does the site provide fossils which cover an extended period of geological time: i.e. how wide is the geological window?
- (2) Does the site provide specimens of a limited number of species or whole biotic assemblages: i.e. how rich is the species diversity?
- (3) How unique is the site in yielding fossil specimens for that particular period of geological time: i.e. would this be the 'type locality' for study or are there similar areas that are alternatives?
- (4) Are there comparable sites elsewhere that contribute to the understanding of the total 'story of that point in time/space: i.e. is a single site nomination sufficient or should a serial nomination be considered?
- (5) Is the site the only main location where major scientific advances were (or are) being made that have made a substantial contribution to the understanding of life on Earth?
- (6) What are the prospects of ongoing discoveries at the site?
- (7) How international is the level of interest in the site?
- (8) Are there other features of natural value (e.g. scenery, landform, vegetation) associated with the site: i.e. does there exist within the adjacent area modern geological or biological processes that relate to the fossil resource?
- (9) What is the state of preservation of specimens yielded from the site?
- (10) Do the fossils yielded provide an understanding of the conservation status of contemporary taxa and/or communities: i.e. how relevant is the site in documenting the consequences to modern biota of gradual change through time?

\* A condition for granting World Heritage status should include provision for curation, study and display of any site/fossils.

**source:** Parks Canada. "Towards a Revised Canadian Tentative List for World Heritage – Natural Properties", World Heritage: Canada.  
[http://www.pc.gc.ca/progs/spm-whs/itm4-/page14\\_E.asp](http://www.pc.gc.ca/progs/spm-whs/itm4-/page14_E.asp). Last updated: July 28, 2004. Date accessed: June 25, 2005.

# Appendix

## A Framework for Selecting Sites for the Tentative List

To complement the procedure for preparing the Tentative List, a decision-making framework for preparing the Tentative List is suggested. This is based on the rationale underlying the Convention's requirement for "outstanding universal value" and attempts to help assess the relative significance of a site. Four levels of significance can be used when assessing the importance of a natural site for inclusion on the Tentative List:

- **International Significance:** Natural landscapes or features that are clearly unique and are not duplicated or surpassed anywhere in the world.
- **Regional Significance:** Natural landscapes or features that are of limited distribution or the best examples of a feature in a biogeographic region.
- **National Significance:** Natural landscapes or features that are of limited distribution or are the best examples of a feature within a country.
- **Provincial Significance:** Natural landscapes or features that are of limited distribution at a provincial level or are the best examples of a feature in a province, state or territory.

Sites to include on the revised Tentative List should only be those that are considered significant at the international level. The rationale for determining the level of significance that a site meets can be gauged by reviewing one primary and four secondary quality indicators:

- **Distinctiveness:** Does the site contain species/ habitats/physical features not duplicated elsewhere? For example, there is no other Precambrian fossil site on earth that matches the Burgess Shales, which is part of the justification for the Canadian Rocky Mountain Parks WHS. This indicator is the primary one for identification of potential World Heritage Sites and is the main determinant of "outstanding universal value." Should a Tentative List candidate be advanced to the nomination stage, a more rigorous comparative analysis of this key indicator would be required.

Four secondary indicators also can assist in determining the level of significance and help to determine whether a site would be a solid candidate at this time:

- **Integrity:** Does the site function as a reasonably self-contained unit? Do the boundaries encompass all the key elements of the area's natural values? This is a key feature for biologically focussed areas, though it is recognized that no protected area has perfectly adequate boundaries. Nevertheless, the "St. Elias complex" (Kluane / Wrangell - St. Elias / Glacier Bay / Tashenshini - Alsek WHS) with 10 million ha is one site, which does encompass most all of the main natural values of the region.
- **Naturalness:** To what extent has the site been affected by human activities? Although sustainable human use is consistent with World Heritage status,

natural processes should be a dominant consideration when reviewing which criterion applies. Certainly the Nahanni National Park Reserve of Canada site is a good example of a landscape where nature dominates and where human impact has been minimal.

- **Dependency:** How critical is the site for key species and/or the understanding of geological history and/or ecosystems? Are there other alternative habitats or places that can also “tell the story”? For sites nominated under natural criterion N (iv) [new criteria (x)] - and to a lesser degree to N (i) [now criterion (viii)] and N (ii) [now criterion (viii)] this is an important indicator. The whooping crane nesting ground in Wood Buffalo National Park of Canada serves as an example.
- **Diversity:** What diversity of species, habitat types and natural features (i.e., geodiversity) does a site contain? Although a site can be focussed on one main feature such as the Devonian fossils in Miguasha, a site that displays a combination of heritage values (including historical and cultural ones) would be an especially strong candidate.

Except for “distinctiveness”, none of the above quality indicators would be a determinant, but, when viewed together, they provide a frame of reference for judging the approximate level of significance of a candidate site. The next phase in preparing this report will use this framework in examining sites that would be suitable for Canada’s revised Tentative List.

## The Result

The result of this approach is a short revised Tentative List that is well researched and has broad public support. The eleven sites on Canada’s Tentative List have the best potential over the next decade to be inscribed on the World Heritage List as sites of outstanding universal value.

### List of Sites:

- Áísínai’pi (Writing-On-Stone)
- Atikaki/Woodland Caribou/Accord First Nations
- Grand-Pré
- Gwaii Haanas
- Ivvavik/Vuntut/Herschel Island (Qikiqtaruk)
- Joggins
- The Klondike
- Mistaken Point
- Quttinirpaaq
- Red Bay
- Rideau Canal

**source:** Parks Canada. “Towards a Revised Canadian Tentative List for World Heritage – Natural Properties”, World Heritage: Canada.  
[http://www.pc.gc.ca/progs/spm-whs/itm4-/page5\\_E.asp](http://www.pc.gc.ca/progs/spm-whs/itm4-/page5_E.asp) . Last updated: July 28, 2004. Date accessed: June 25, 2005.

# D

## Appendix

### National Park Service and Heritage Preservation Services

#### Defining Landscape Terminology

**Character defining feature** - a prominent or distinctive aspect, quality, or characteristic of a cultural landscape that contributes significantly to its physical character. Land use patterns, vegetation, furnishings, decorative details and materials may be such features.

**Component landscape** - A discrete portion of the landscape that can be further subdivided into individual features. The landscape unit may contribute to the significance of a National Register property, such as a farmstead in a rural historic district. In some cases, the landscape unit may be individually eligible for the National Register of Historic Places, such as a rose garden in a large urban park.

**Cultural Landscape** - a geographic area (including both cultural and natural resources and the wildlife or domestic animals therein), associated with a historic event, activity, or person or exhibiting other cultural or aesthetic values. There are four general types of cultural landscapes, not mutually exclusive: historic sites, historic designed landscapes, historic vernacular landscapes, and ethnographic landscapes.

**Ethnographic landscape** - a landscape containing a variety of natural and cultural resources that associated people define as heritage resources. Examples are contemporary settlements, sacred religious sites, and massive geological structures. Small plant communities, animals, subsistence and ceremonial grounds are often components.

**Feature** -The smallest element(s) of a landscape that contributes to the significance and that can be the subject of a treatment intervention. Examples include a woodlot, hedge, lawn, specimen plant, allée, house, meadow or open field, fence, wall, earthwork, pond or pool, bollard, orchard, or agricultural terrace.

**Historic character**- the sum of all-visual aspects, features, materials, and spaces associated with a cultural landscape's history, i.e. the original configuration together with losses and later changes. These qualities are often referred to as character defining.

**Historic designed landscape** - a landscape that was consciously designed or laid out by a landscape architect, master gardener, architect, engineer, or horticulturist according to design principles, or an amateur gardener working in a recognized style or tradition. The landscape may be associated with a significant person, trend, or event in landscape architecture; or illustrate an important development in the theory

and practice of landscape architecture. Aesthetic values play a significant role in designed landscapes. Examples include parks, campuses, and estates.

**Historic vernacular landscape** - a landscape that evolved through use by the people whose activities or occupancy shaped it. Through social or cultural attitudes of an individual, a family, or a community, the landscape reflects the physical, biological, and cultural character of everyday lives. Function plays a significant role in vernacular landscapes. This can be a farm complex or a district of historic farmsteads along a river valley. Examples include rural historic districts and agricultural landscapes.

**Historic site** - a landscape significant for its association with a historic event, activity or person. Examples include battlefields and presidential homes and properties.

**Integrity**- the authenticity of a property's historic identity, evinced by the survival of physical characteristics that existed during the property's historic or prehistoric period. The seven qualities of integrity as defined by the National Register Program are location, setting, feeling, association, design, workmanship, and materials

**Significance** - the meaning or value ascribed to a cultural landscape based on the National Register criteria for evaluation. It normally stems from a combination of association and integrity.

**Treatment** - work carried out to achieve a particular historic preservation goal.

**source:** Birnbaum, Charles A., Madigan, Kathleen J. The Secretary of the Interior's Standards for the Treatment of Historic Properties: With Guidelines for the Treatment of Cultural Landscapes. Washington D.C.: U.S. Department of the Interior, National Park Service, Cultural Resource Stewardship and Partnerships, Heritage Preservation Services, Historic Landscape Initiative, 1996.

<http://www.cr.nps.gov/hps/hli/introguid.htm>. Date accessed: August 15, 2005.

# E Appendix

## Pipestone Creek Dinosaur Park Staging Plan

	Proposed Development	Rationale
<b>Phase 1</b>		
	temporary road access to bonebed	allow scientists to access dig sites fully, and have the ability to relocate road system on site
	permanent road access to extent of bonebed buffer zone	access to site for scientific study and resource protection
	primary education and research building	construct formal interpretation, education and research centre at the crest of hill
	permanent road access to proposed education and research building	allow/encourage visitors to site
	gathering area at primary education centre	provide gathering spaces for users to heighten initial interpretation and experience
	primary park entry parking lots	provide parking for the minimum required stalls for initial development (67 visitor, 25 employee, 15 recreation vehicle/bus)
	primary park drop-off zone	provide appropriate accesible drop-off zone at primary education building
	P.C. Pathway Type 1	create a connection between parking areas and primary gathering area adjacent to proposed education and research building

	P.C. Pathway Type 2: primary park entry to bonebed	unify the two principal areas of development, through pedestrian access for exploration and interpretation
	gathering area adjacent to bonebed buffer zone	provide gathering space and a pedestrian conversion point for park visitors
	fossil resource interpretation scenarios	allows for illustration of the palaeontological and environmental context of the site
	P.C. Pathway Type 3: bonebed to day use area	establish link between day use and bonebed areas to encourage movement throughout the entire site
	shuttle stops	create non-pedestrian connection with multi day users and primary building for universal access
<b>Phase 2</b>		
	additional fossil resource interpretation scenarios	to reflect the evolving nature of this site design and construct additional interpretation areas within and adjacent to the bonebed area
	pedestrian access to new fossil resource interpretation scenarios	allow pedestrian movement to change throughout the site in relation to new or additional development areas
	temporary road access to new dig site within bonebed	if required, provide scientists with a new temporary access road to a localised dig site
	pedestrian lifts	offer a unique vantage point of the site and provide another means of universal access down to the bonebed
	upgrade existing picnic and playground areas within the day use area	upgrade to meet contemporary design standards and integrate into the new Pipestone Creek Dinosaur Park design vocabulary
	formal campground office within the multi day use area	provide formal office for efficient management of campground
	additional parking lots	provide additional parking lots in order, to meet proposed stall recommendations

	vistas along entry drive	visually connect users to the site and beyond the Pipestone Creek Park boundaries.
	seasonal employee and researcher accommodations within the multi day use area	provide accommodation and a base to work from for the influx of individuals studying and working within the various discovery sites in the region in spring and summer
	upgrade the recreational facilities within the multi day use area	to provide a heightened multi day stay for users
<b>Phase 3</b>		
	additional fossil resource interpretation scenarios	to reflect the evolving nature of this site design and construct additional interpretation areas within and adjacent to the bonebed area
	pedestrian access to new fossil resource interpretation scenarios	allow pedestrian movement to change throughout the site in relation to new or additional development areas
	temporary road access to new dig site within bonebed	if required, provide scientists with new temporary access roads to localised dig sites
	informal outdoor amphitheatre within the day use area	create another venue for education and tourism to co-exist, a means to link the day and multi-use areas
	formal floating dock and boat launch	encourage and increase recreation along the Wapiti River
	campground expansion	expand campground in response to anticipated influx of multi-day use on site
	secondary park entry access road (permanent road)	upgrade the Old Ferry Road access to design requirements
	secondary park entry	re-establish the pedestrian connection between north and south Wapiti (pedestrian bridge or ped. Ferry system)
	secondary park entry parking lots	provide car and recreational parking lots, to reflect users coming from the south entry point

	vistas along Old Ferry road	visually connect users to the bonebed from the south side of the Wapiti River
	P.C. Pathway Type 2&3: surrounding recreation areas	depending on conditions, establish connections through P.C Pathway Type 2 and/or 3, beyond the limits of Pipestone Creek Park to other recreation sites
	parking lots	if required, provide additional parking lots to exceed proposed stall recommendations

# F

## Appendix

### Pipestone Creek Park Programme & Standards

The purpose of creating a programme and standards guide for this practicum is to establish pragmatic support for the design interventions on site. “Programme” is defined as being *a descriptive notice or list of a series of planned events*<sup>1</sup>, therefore the intent of the following is to provide the designer with a comprehensive design standards inventory for the various design problems or situations which may present themselves as the Pipestone Creek site is fully develop. The information presented has been adapted from a variety of sources. In addition, any standards directly applied on the Pipestone Creek site in the proposed design solution as expressed in Chapter 6 has been highlighted and summarised in Appendix D: Pipestone Creek Park Programme & Standards Applied in the Proposed Design Solution.

#### Museum Buildings (as proposed by the County of Grande Prairie's feasibility study)

- a) upper building 653m<sup>2</sup> (7,029 s.f.)
- b) lower building 1,198m<sup>2</sup> (12,895 s.f.)
- c) total 1,851m<sup>2</sup> (19,924 s.f.)

## Users

Table F.1: Projected User Ratios	
users	projected numbers
high season visitors – april to october	140-220 per day
low season visitors – november to march	53-75 per day
full time employees	80
additional seasonal employees	25

source: Strategy Plus. "Pipestone Creek Dinosaur Interpretative Centre: The River of Death and Discovery, Preliminary Concept". Grande Prairie: County of Grande Prairie, 2004.

## Parking

Table F.2: Parking Ratios	
type of parking for use of site and/or building	min. stalls
public buildings (i.e. museums & libraries)	1.0/300 s.f
employee parking - urban context	1.0/two employees
bicycle	10% of required car stalls
accessible parking: 51-75 total # of stalls	3
accessible parking: 76-100 total # of stalls	4
accessible parking: 101-150 total # of stalls	5
accessible parking: 151-200 total # of stalls	6

sources: Harris, Charles W., Dines, Nicholas T. "Table 210-4 Parking Spaces Required For Various Land Uses", Time-Saver Standards For Landscape Architecture, 2<sup>nd</sup> Edition. Toronto: McGraw-Hill Inc., 1998, pg. 210-24.

Childs, Mark C. Parking Spaces: A Design, Implementation And Use Manual For Architects, Planners And Engineers. Toronto: McGraw-Hill, 1999, pg 244.  
 Architecture and Engineering for Parks Canada, Public Works and Government Services Canada. Access Series: Design Guidelines for Accessible Outdoor Recreation Facilities. Ottawa: Minister of Canadian Heritage, 1994, pg. 4.

**Table F.3: Vehicular Dimension**

vehicle type	widths (m)	turning radius (m)	drop off zone length (m)
compact car	1.675 – 1.725	6.555	4.570
large car	1.725 – 2.030	7.010	4.470
large pick-up truck	1.955 – 2.060	7.620	5.610
city bus	2.590	16.305	9.145
school bus	2.440	13.260	9.145
fire truck	2.440	14.630	9.145
industrial vehicles	2.44-2.590	10.365	
recreation vehicles		12.19	
note: 1. typical radius of parking lots 6.1m (outer) & 4.5m (inside) 2. typical radius of islands 3.6m (outer) & 1.5m (inside) 3. min. turning radius for boat launch area min. 6.096m			

source: Harris, Charles W., Dines, Nicholas T. Time-Saver Standards For Landscape Architecture, 2<sup>nd</sup> Edition. Toronto: McGraw-Hill Inc., 1998. Pg. 210-8 & 210-9.  
 Canadian Government, Office of Tourism. Planning Canadian Campgrounds. Hull: Minister of Supply and Services Canada, 1980, pg 79.

Table F.4: Parking								
parking type	min. stalls required	proposed stalls	proposed max. stalls per lot	proposed min. lot	stall size (m)	aisle widths (m)	min. lot spatial requirement (based on single aisle pull through)	min. total spatial requirement (m <sup>2</sup> )
visitor parking: car & truck	66	90	30	3	2.75x5.5	8.25 4 (two way)	± 819m <sup>2</sup>	± 2,457
visitor parking: recreational & bus	n/a	45	15	3	3.0x12.5	4 (one way)	± 990m <sup>2</sup>	± 2,970
employee parking	53	60	30	2	2.75x5.5	8.25	± 819m <sup>2</sup>	± 1,638
visitor parking: u.a. <sup>2</sup>	5	8	n/a	n/a	3.5x5.5	1.5 (access aisle)	n/a	± 327
						<b>total vehicular parking area:</b>		<b>± 7,392</b>
boat launch	n/a	15	15	1	3.0x12.5	4 (one way)	± 990m <sup>2</sup>	± 990m <sup>2</sup>
bicycle	3	12			0.76x1.83	1.52 (adjacent to row of stalls)	n/a	± 31
notes: 1. lots within 90m of building should be designated for short-term, beyond the 90m for long term or high volume/use days 2. where possible provide accessible parking within 60m from main facilities or accessible routes 3. provide shuttle service where accessible parking is beyond 500m from main facilities								

sources: Childs, Mark C. *Parking Spaces: A Design, Implementation And Use Manual For Architects, Planners And Engineers*. Toronto: McGraw-Hill, 1999. Pg. 235.  
 Harris, Charles W., Dines, Nicholas T. *Time-Saver Standards For Landscape Architecture*. 2<sup>nd</sup> Edition. Toronto: McGraw-Hill Inc., 1998. Pg. 210-24..  
 National Capital Commission. *Barrier-Free Site Design Manual*. Ottawa: 1992. Pg. 3.1.3.

## Roadways

**Table F.5: Vehicular Access Routes**

use type	min. pavement widths (m)	design speed (km/h)	max. grade	min. radius in relation to design speed (m)		min. spacing along major routes (m)
recreation site: heavy vegetation	5.4 - 6.6	25-40	8%	25km/hr	15.0	
				32km/hr	32.6	
				40km/hr	50.9	
recreation site: rough terrain	5.4 - 6.6	25-40	8%	as above		
recreation site: scenic drives	6.0 - 7.2	25-40	8%	as above		
rural highways: rolling terrain	3.66 (single lane)	80-90	8%	230.43 - 279.5		
local streets: level terrain	6.7-11.0	50 (max.)	4%	76.2		152-305
local streets: rolling terrain	6.7-11.0	40 (max.)	8%	50.9		152-305
local streets: hilly terrain	8.2-11.0	30 (max.)	15%	32.6		152-305
single-lane road	3.0-4.2					
two-lane road	6.0-7.2					
four-lane road	12.0-14.4					
heavy equipment and fire access	3.5 (single lane)					

source: Harris, Charles W., Dines, Nicholas T. *Time-Saver Standards For Landscape Architecture*, 2<sup>nd</sup> Edition. Toronto: McGraw-Hill Inc., 1998. Pg 342-3, 342-5, 342-7, 342-4  
 Childs, Mark C. *Parking Spaces: A Design, Implementation And Use Manual For Architects, Planners And Engineers*. Toronto: McGraw-Hill, 1999. Pg. 236.

**Table F.6: Loading Zones**

min. size	8.4m width, 37.0m length
stopping area	10.0m minimum length, including 2.0m access aisle at rear.
access aisle	parallel and adjacent to stopping area minimum 6.0m long and 1.5m wide

source: National Capital Commission. Barrier-Free Site Design Manual. Ottawa: 1992. Pg. 3.1.5.

**Table 7: Intersection Curves**

design speed (km/hr)	max. radius (m)
24	15
32	27
40	45
48	69
56	93
64	129
notes: min. distance to offset intersections 45.72m (150 ft.)	

source: Harris, Charles W., Dines, Nicholas T. Time-Saver Standards For Landscape Architecture, 2<sup>nd</sup> Edition. Toronto: McGraw-Hill Inc., 1998. Pg 342-23 & 342-24

**Table F.8: Sight To Stopping Distances**

design speed (km/hr)	min. distance (m)
wet pavement	
50	54
65	80
80	112
dry pavement	
50	48
65	72
80	100

source: Harris, Charles W., Dines, Nicholas T. Time-Saver Standards For Landscape Architecture, 2<sup>nd</sup> Edition. Toronto: McGraw-Hill Inc., 1998. Pg 342-8.

**Table F.9: Vertical Curve Lengths For Sight To Stopping Distances**

design speed (km/hr)	min. distance (m)
32	33.0
40	45.0
48	60.0
64	90.0
72	112.5
80	135.0

source: Harris, Charles W., Dines, Nicholas T. Time-Saver Standards For Landscape Architecture, 2<sup>nd</sup> Edition. Toronto: McGraw-Hill Inc., 1998. Pg 342-19.

**Table F.10: Recommended Shoulder Widths**

type of roadway	width of shoulder (m)
heavily travelled	3.0 min. – 3.6
low-speed travelled	1.2 min., 1.8-2.4 rec.
difficult terrain	1.8-2.4

source: Harris, Charles W., Dines, Nicholas T. "Table 342-28 Recommended Shoulder Widths", Time-Saver Standards For Landscape Architecture, 2<sup>nd</sup> Edition. Toronto: McGraw-Hill Inc., 1998. Pg. 340-4.

Table F.11: Recommended Shoulder Cross-Slopes		
surface type	mm/m	% slope
<b>no pavement edge curbs</b>		
asphalt	31.7-42.3	3-4%
gravel	10.6-63.5	1-6%
plant mix/turf	84.7	8%
<b>with shoulder curbs at pavement edge</b>		
asphalt	21.2	2%
gravel	21.2-42.3	2-4%
plant mix/turf	31.7-42.3	3-4%

source: Harris, Charles W., Dines, Nicholas T. "Table 342-29 Recommended Shoulder Cross-Slopes", Time-Saver Standards For Landscape Architecture, 2<sup>nd</sup> Edition. Toronto: McGraw-Hill Inc., 1998. Pg. 342-29.

## Grading

Table F.12: Recommended Cross-Slopes For Various Types Of Pavement		
surface type	mm/m	% slope
concrete	10.7-21.3	1-2%
asphalt	10.7-21.3	1%-2%
untreated surface	21.3-42.3	2-4%
plant mix	16.0-31.7	1-3%

source: Harris, Charles W., Dines, Nicholas T. "Table 210-4 Parking Spaces Required For Various Land Uses", Time-Saver Standards For Landscape Architecture, 2<sup>nd</sup> Edition. Toronto: McGraw-Hill Inc., 1998. "Table 342-24", pg. 340-4.

Table F.13: Detailed Parking Lot Grades	
grade	condition
6% max.	continuous slope in parking lot.
12% max., 30ft. long	non-parking automobile ramps with pedestrians allowed
15% max.	non-parking automobile ramps with signs banning pedestrians
> 6% change	a vertical curve transition is required (change grade by a maximum of 10° increments with 3.05m minimum between changes of grade.)
1% min., 2% rec. <sup>3</sup>	slope to drain asphalt
0.5% min., 2% rec.	slope to drain concrete
2% max.	x-slope within accessible stalls
5% max.	x-slope for recreational vehicle parking

source: Childs, Mark C. *Parking Spaces: A Design, Implementation And Use Manual For Architects, Planners And Engineers*. Toronto: McGraw-Hill, 1999. Pg. 240.  
 Canadian Government, Office of Tourism. *Planning Canadian Campgrounds*. Hull: Minister of Supply and Services Canada, 1980, pg 55.

Table F.14: General Recommended Gradients			
type of area	max. %	min. %	preferred %
<b>streets &amp; parking areas</b>			
crown of improved streets	3	1	2
crown of unimproved streets	3	2	2.5
longitudinal slope of streets	20	0.5	1-10
longitudinal slope of parking areas	5	0.25	2-3
cross slope of parking area	10	0.5	1-3
boat launch	15		10
<b>hardsurfaced pathways</b>			
longitudinal slope	10	0.5	1-5
cross slope	4	1	2
approach, platforms	8	0.5	2
service areas	10	0.5	2-3
<b>sitting areas</b>			
concrete	2	0.5	1
flagstone, slate, brick	2	0.75	1
<b>soft landscape</b>			
recreation games	51	2-3	
athletic fields	2	0.5	1
lawns/open areas	25	1	5-10
berms & mounds	20	5	10
mowed slopes	33		20
un-mowed slopes	angle of repose		25
planted slopes and beds	10	0.5	3-5

source: Harris, Charles W., Dines, Nicholas T. "Time-Saver Standards For Landscape Architecture, 2<sup>nd</sup> Edition. Toronto: McGraw-Hill Inc., 1998. Pg. 320-13.  
 Canadian Government, Office of Tourism. Planning Canadian Campgrounds. Hull: Minister of Supply and Services Canada, 1980, pg. 55.

## Pedestrian Access

**Table F.15: Pedestrian Catchment Distances**

distance (m)	walking activity
60	Max. distance between u.a. parking and main facilities
150	max. distance between rest areas for individuals with limited mobility
275	average length of walk to plaza
305	average length of walk from parking lot to work
457-610	max. walking distance in park-in-rides
610	"comfortable" walking distance
805	max. length of walk to bus stop
1610	max. length of walk to work

sources: Childs, Mark C. *Parking Spaces: A Design, Implementation And Use Manual For Architects, Planners And Engineers*. Toronto: McGraw-Hill, 1999. Pg. 91.  
 Transport Canada. "Access to transport systems and services – an international review", *Transportation Development Centre*.  
<http://www.tc.gc.ca/tdc/summary/12900/12927e.htm>. Last updated: August 20, 2003. Date accessed: October 1, 2005.

**Table F.16: Pedestrian Average Walking Rates**

user type	rate: m/min	rate: km/hr
average adult	78	4.3
elderly (75 yrs)	64.5	4
pedestrian groups	60	3.7
stairs – going down	45.6	2.8
stairs – going up	33.9	2
adults with limited mobility	30	

**note:** average walking distance decreases as the pedestrian density on a pathway increases or if the clear space directly in front of the pedestrian is less than 4.5m

sources: Harris, Charles W., Dines, Nicholas T. "Table 210-4 Parking Spaces Required For Various Land Uses", *Time-Saver Standards For Landscape Architecture*, 2<sup>nd</sup> Edition, Toronto: McGraw-Hill Inc., 1998. Pg. 340-4..

Transport Canada, "Access to transport systems and services – an international review", *Transportation Development Centre*.  
<http://www.tc.gc.ca/tcdc/summary/12900/12927e.htm>. Last updated: August 20, 2003. Date accessed: October 1, 2005.

**Table F.17: Typical Viewing Distances In Relation To Social Communication**

description	distances (m)
the figure of a seated person may be distinguished	3.0 to 6.0
typical max. distance in which conversation is still possible	3.6
the figure of a standing person may be distinguished	6.0 to 12
typical distance in which facial expressions may be distinguished	6.0
max. distance in which facial expressions may be recognised	24.0
max. distance in which a face may be recognised	135
max. distance in which an individuals motion may be recognised	1200

sources: Harris, Charles W., Dines, Nicholas T. "Table 210-4 Parking Spaces Required For Various Land Uses", *Time-Saver Standards For Landscape Architecture*, 2<sup>nd</sup> Edition, Toronto: McGraw-Hill Inc., 1998. Pg. 340-9.

**Table F.18: Pedestrian Physiological Comfort Zones**

pedestrian activity	distances (m)
public event	1.8
shopping	2.8 to 3.6
normal walk	4.5 to 5.4
pleasure walk	10.5 +

source: Harris, Charles W., Dines, Nicholas T. "Table 210-4 Parking Spaces Required For Various Land Uses", Time-Saver Standards For Landscape Architecture, 2<sup>nd</sup> Edition. Toronto: McGraw-Hill Inc., 1998. Pg. 340-5.

**Table F.19: Pedestrian Line Distances**

situation	single side profile (mm)	in line profile based on 4 individual line (mm)
single individual	330	-
packed line	470	1 880
waiting in line, with gear	763	3 050
normal line	534	2 135
walking	635	2 540
striding	876	3 505

source: Harris, Charles W., Dines, Nicholas T. "Table 210-4 Parking Spaces Required For Various Land Uses", Time-Saver Standards For Landscape Architecture, 2<sup>nd</sup> Edition. Toronto: McGraw-Hill Inc., 1998. Pg. 210-4

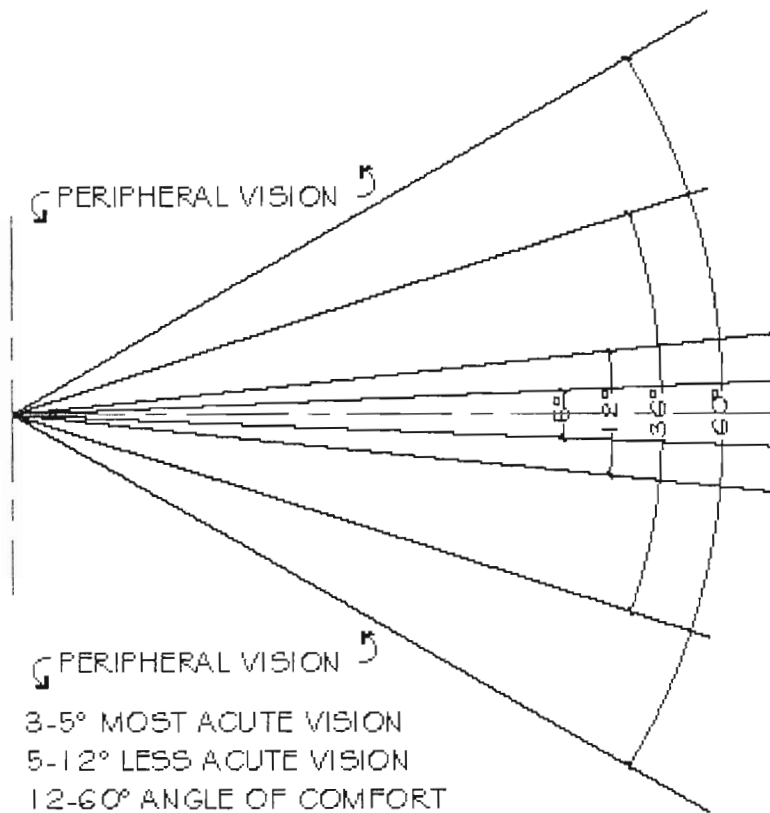
Table F.20: Ranking Of Walkway/Pathway Amenities		
amenity	recreational	work trip
shade	1	3
drinking fountains	2	2
restroom	3	1
benches	4	5
newsstand	5	4
1=most preferred, 5= least preferred		

sources: Childs, Mark C. Parking Spaces: A Design, Implementation And Use Manual For Architects, Planners And Engineers. Toronto: McGraw-Hill, 1999. Pg. 99.

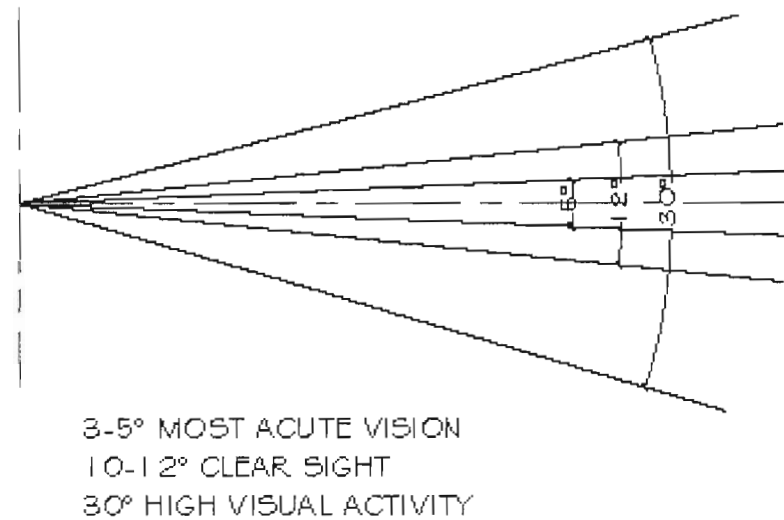
**Table F.21: Typical Pedestrian Spatial Standards**

	child		adult	u.a.
seating height (mm)	age	height	455	450-500
	5	316.1		
	7	353.8		
	9	382.8		
seating depth (mm)			375-450	360-450
table surface height (mm)	age	height	760	600-750
	5	468.7		
	7	524.6		
	9	567.6		
railing height (mm)	610-680		800-1050	800-920
eye levels (mm)	age	height	1500-1650, standing 750, seating	750-1300 (wheelchair)
	5	981		
	7	1098		
	9	1188		
note: average eye level in a vehicle is 1150mm				

sources: Harris, Charles W., Dines, Nicholas T. "Table 210-4 Parking Spaces Required For Various Land Uses", Time-Saver Standards For Landscape Architecture, 2<sup>nd</sup> Edition, Toronto: McGraw-Hill Inc., 1998. Pg.210-5,340-7&342-6  
 National Capital Commission, Barrier-Free Site Design Manual, Ottawa: 1992. Pg. 3.2.6  
 Architecture and Engineering for Parks Canada, Public Works and Government Services Canada, Access Series: Design Guidelines for Accesible Outdoor Recreation Facilities, Ottawa: Minister of Canadian Heritage, 1994, pg. 26.



**Fig. F.0: Horizontal Cone of Vision**



**Fig. F.1: Vertical Cone of Vision**

Table F.22: Spatial Allowance For Various Pathway Users				
user type/situation	min. width (mm)	min. height clearance (mm)	min. length clearance (mm)	min. turning radius (mm)
<b>single users</b>				
individual	900-1200	2100	470	n/a
individual, with crutches	920	2100		
individual, with cane for visual impairment	750-1050	2100	920-1525	
individual with guide dog	1200			
individual in a wheelchair	750		1220	1500
individual in a motorised wheelchair	750		2030	3182
individual in a scooter	810		1750	3222
bicyclists	1500	2100		
<b>multiple users</b>				
two individuals	1500	2100	940	
single individual, individual in a wheelchair	1220			
two individuals in wheelchairs	1525			
two bicyclists	2400	2100		

sources: Architecture and Engineering for Parks Canada, Public Works and Government Services Canada. Access Series: Design Guidelines for Accessible Outdoor Recreation Facilities. Ottawa: Minister of Canadian Heritage, 1994, pg. 9 & 10.  
Harris, Charles W., Dines, Nicholas T. "Time-Saver Standards For Landscape Architecture", 2<sup>nd</sup> Edition. Toronto: McGraw-Hill Inc., 1998, pg. 210-4, 210-5 & 341-4.  
National Capital Commission. Barrier-Free Site Design Manual. Ottawa: 1992. Pg. 1.4.  
Hogan, Timothy P. Universal Design of Trail Systems and Outdoor Recreational Areas a Redesign of Camp Manitou, Manitoba. MLA Practicum, University of Manitoba, 2001, pg. 21-25.

Table F.23: Pedestrian Trails								
trail type	length (km)	width (mm) (one way)	min. width (mm) (two way)	shoulder (mm)	x-slope	grade/slope	rest area interval (m)	surfacing
u.a. (easy)		1200 min.	1500		2% max., (60cm interval)	1:12 / 8%max 1:33 / 3% rec. (9.0m max. distance), 5% running grade	120 max.	continuous, firm <sup>4</sup> , slip resistant <sup>5</sup>
u.a (moderate)		900 min.			3%,max, (60cm interval)	10%max (15.0m max. distance), 5% running grade	270 max.	
Class 1	0-0.4		1800	450 grass to trail	none	1:50 / 2%	30-45	concrete, asphalt
Class 2	0.4-1.6		1200- 1500	300 clear understory brush, slope either direction	2%, vary sides every 9m	1:20 / 5% (1.5m level space every 30m)	60-90	asphalt, wood planking, fine crushed rock
Class 3	1.6-4.8		900-1200	300 clear understory brush, no abrupt drop-off adjacent	4%,vary sides every 15m	1:12 / 8% (1.5m level space every 9m)	150-180	well- compacted surface
<b>note:</b> no more than 20% of trail should exceed the running grade								

source: National Capital Commission. Barrier-Free Site Design Manual. Ottawa: 1992. Pg. 3.5.4.

Harris, Charles W., Dines, Nicholas T. "Time-Saver Standards For Landscape Architecture. 2<sup>nd</sup> Edition. Toronto: McGraw-Hill Inc., 1998. pg. 240-4, 240-17.

## Pathway Surfacing

**Table F.24: Trail Surface Preferences In Forest Environments**

user group	desirable		un-desirable	
	1 <sup>st</sup> choice	2 <sup>nd</sup> choice	1 <sup>st</sup> choice	2 <sup>nd</sup> choice
hikers & walkers	woodchips	dirt	asphalt	crushed stone
cyclists	dirt	woodchips	asphalt	woodchips
individuals in wheelchairs & scooters	asphalt	dirt	woodchips	dirt
individuals with visual impairment	asphalt	crushed stones	grass	boardwalk
parents of young children	woodchips	asphalt	asphalt	crushed stone & grass
seniors	woodchips	asphalt	dirt	crushed stone

source: Koenker, K.M. User Preference For Trail Surface Material. MLA Practicum, University of Manitoba, 2002, pg. 70

**Table F.25: Surface Material Accessibility**

level of accessibility	surface material
<b>highly accessible</b>	
	concrete, asphalt, brick or paving stone set in concrete
<b>accessible</b>	
	wood planking, stabilised soil, brick or paving stone set in sand
	very fine & well compacted crushed rock
<b>challenging</b>	
	flagstones, grass, packed soil, bound woodchips
	well compacted coarse gravel
<b>difficult</b>	
	soft dirt, engineered wood fibre, coarse gravel, sand, pea gravel
	unbound woodchips, rock

source: Hogan, Timothy P. Universal Design of Trail Systems and Outdoor Recreational Areas a Redesign of Camp Manitou, Manitoba. MLA Practicum, University of Manitoba, 2001, pg. 31.

## Conditions For Universal Access

**Table F.26: U.A. Curbs, Ramps & Stairs**

<b>curb ramps</b>	
	surfacing to be slip resistant, continuous surface, textured & coloured
	should have a min. width of 1200mm
	the ideal slope to provide for a curb ramp is between 5 and 8%, the max. recommended slope is 10%
	locations with pedestrian volume, provide flared sides on the curb, 5-8% ideal slope, 10% max.
<b>raised curbs</b>	
	provide raised curb edge or rail where drop is greater than 75mm to adjacent grade
	curb edge 75mm min. height
	where required, use guard or wheelstop edging to prevent wheelchairs from rolling into hazardous areas
	ensure guards or wheel stops are contrasting colour to surfacing
	if drop to adjacent grade is greater than 600mm, guard must be 1070mm high
<b>stairs</b>	
	920mm min. width, 1200mm clear width preferred
	1500mm width allows for two way pedestrian flow
	riser should be placed perpendicular to pedestrian flow
	stairs should have a min. of 3 risers

	consistent riser height and tread depth to be used within a flight of stairs
	outdoor riser/tread ratio should be $2 \text{ rise} + \text{tread} = 660 \text{ to } 685\text{mm}$ , with a 300mm min. tread depth and a riser height between 125-180mm.
	max. 38mm nosing projection and 13mm max. radius
	a tactile, colour contrasting, non-slip and cane detectable warning surface should be provided at the top and bottom of stairs, extending for a min. depth of 900mm
<b>ramps</b>	
	surfacing should be well-drained and slip resistant
	1500mm min. level surface to be provided at the top and bottom of the ramp
	recommended slope of ramp between landings, varies with proposed vertical rise (refer to table 12)
	cross slope, max. 2%
	min. clear width of 920mm, ideal is to be the same width of the pathway leading to the ramp
	provide landings min. every 9.0m & at each turn. Landings to have max. slope of 2%, min. 1500mm length.
	provide curb with min. height of 75mm
	provide a min. 900mm tactile, colour contrasting, non-slip and cane detectable warning surface at ramp ends.

source: National Capital Commission. Barrier-Free Site Design Manual. Ottawa: 1992. Pg. 3.2.4, 3.2.5, 3.2.7, 3.2.8, 3.2.9

**Table F.27: Recommended Slopes For Universal Accessibility**

max. vertical rise between landings (mm)	rec. slope (%)
760	5-6.6
600	6.7-8.3
150	8.3-10

source: National Capital Commission, Barrier-Free Site Design Manual, Ottawa: 1992. Pg. 3.2.8

## Site Furnishings

**Table F.28: Site Furnishings – General Design Standards**

handrails	
	required on one side of stairs/ramp, when rise is greater than 150mm
	required both sides of stairs/ramp, when rise is greater than 150mm, and ramp/stairs has a width greater than 1100mm
	provide intermediate handrail, where width of ramp/stairs is greater than 2200mm, with max. 1650mm between handrails
	for non-continuous rails, extend min. 300mm horizontally beyond top or bottom of stairs/ramp
	provide continuous gripping surface, being 30-40mm in diameter/section
	provide space between handrail and the adjoining plane, min. 35-40mm or 60mm with rough surfaces
	material to be free of sharp or abrasive elements, it should be non-slip and not susceptible to extreme or retaining heat

<b>guards</b>	
	provide railing guards or walls where drop adjacent to grade is greater than 600mm
	provide guards greater than 1500mm in height in areas that are 10m above the adjacent grade
	to accommodate viewing, provide openings between 800 and 1500mm above pedestrian grade
	openings shall not be greater than 100mm
<b>vertically mounted signs</b>	
	tactile information to be between 1100-1500mm high
	C/L of interpretation signs to be 1100-1500mm high
<b>benches</b>	
	align front of benches minimum of 600mm off of the pedestrian pathway
	provide, min. 850x1200mm level ground surface adjacent to bench locations for wheelchairs. Extend surface 300mm beyond bench alignment
	surface materials should not be susceptible to retaining heat or cold
	pitch seating surface to shed water

<b>boardwalk</b>	
	gaps between the deck boards should be a max. of 13mm
	boards should run perpendicular to the direction of travel
	min. width 1200mm, except in situations where two wheelchairs may be required to pass (min. width 1500mm)
	running slope to not exceed 1:20/5%
	cross slope to not exceed 1:50/2%
	guards to be provided if boardwalk is 600mm above grade or water
	floating boardwalks may be unstable, provide rails
<b>amphitheatres</b>	
	min. number of wheelchair spaces to be provide for seating under 100 is 2, seating between 101-400 is 4
	each accessible viewing area should be a min. of 850x1200mm, with a min. 920mm access aisle
	min. aisle clearance adjacent to spectator aisle is 920mm, preferred is 1200mm
<b>benches</b>	
	min. 600mm set back from circulation routes

sources: National Capital Commission, Barrier-Free Site Design Manual. Ottawa: 1992. Pg. 3.3.3, 3.3.4, 3.2.6, 3.4.3, 3.4.6, 3.5.4.

Architecture and Engineering for Parks Canada, Public Works and Government Services Canada. Access Series: Design Guidelines for Accesible Outdoor Recreation Facilities. Ottawa: Minister of Canadian Heritage, 1994, pg. 26,37,38,44,67.

Harris, Charles W., Dines, Nicholas T. "Table 210-4 Parking Spaces Required For Various Land Uses", Time-Saver Standards For Landscape Architecture, 2<sup>nd</sup> Edition. Toronto: McGraw-Hill Inc., 1998. Pg. 240-22.

Table F.29: Site Furnishing			
	height (mm)	width (mm)	spacing (mm)
<b>lighting</b>			
low level lighting	less than 1800	n/a	provide no glare
pedestrian lighting	3000 - 4500	n/a	overlap @ height 2100
vehicular lighting	6000 - 9000	n/a	overlap @ ??
<b>miscellaneous</b>			
bollards	600-900 (u.a. 675 max.)		2400 min.
waste receptacles	750-900	n/a	750x1200 clear area
cantilevered fountains	750 min., 900 max. 680 min. knee clearing	1200 (ground clearing) 750 min. knee clearing	
gates	n/a	810	n/a
viewing scopes	1100-1300	750 wide by 480min. deep by 680min. knee clearing	750x1200 clear area
u.a. picnic tables (min. 10% of total)	680-860	980 (table surface) 750min. opening for wheelchair users 480min. deep by 680min. knee clearing	min. 2000 clear accessible space around table
<b>note:</b> picnic areas are typically in clusters of 10-100 tables, with 10.7m between units. 50 units/ha is desirable <sup>6</sup> .			

source: National Capital Commission, Barrier-Free Site Design Manual, Ottawa: 1992. Pg. 3.3.5, 3.4.5, 3.4.8. &????

Architecture and Engineering for Parks Canada, Public Works and Government Services Canada, Access Series: Design Guidelines for Accesible Outdoor Recreation Facilities, Ottawa: Minister of Canadian Heritage, 1994, pg. 43,66, 72.

National Capital Commission, Barrier-Free Site Design Manual, Ottawa: 1992. Pg. 3.5.15.

## Miscellaneous

**Table F.30: Water Circulation**

<b>boat launch</b>	
	length to be 22.5m from water level, to a point where @ least 1.2m below the lowest water elevation
	min. width of 4.5m
	slope: 12-15%, reinforced
	min. 60m backing distance
	min. spatial area of $\pm 100\text{m}^2$
<b>floating docks</b>	
	min. two courtesy docks per launching facility
	min. width, 1800mm
	max. slope of dock 1:12/8.3%
	have no horizontal or vertical joints wider than 13mm, provide edge protection
	provide 30-40mm in diameter grab bar
	grab bar height to between 750-850mm above dock surface and extend 450mm beyond the edge
	min. spatial area $\pm 800\text{m}^2$

sources: Architecture and Engineering for Parks Canada, Public Works and Government Services Canada. Access Series: Design Guidelines for Accessible Outdoor Recreation Facilities. Ottawa: Minister of Canadian Heritage, 1994, pg.60.  
Harris, Charles W., Dines, Nicholas T. "pg???" 520-16

**Table F.31: Campground**

proposed expansion area	
	expand to accommodate 75 to 100 additional sites
	expansion area would be 14-16.5ha, 14,000-16,500m <sup>2</sup>
	designed as per contemporary design standards
	a minimum of 2% of existing and proposed sites shall be accessible, however the minimum number of required accessible sites is 2 <sup>7</sup> .

**Table F.32: Low Impact Construction Methods**

product description	materiality	size (m)	size (ft)	application
triangular pads: modular snap in place	plastic	1.5x1.5x1.5	5x5x5	temporary roads, pathways
rectangular pads: set in place	recycled tire	2.13x4.27	7x14	temporary roads, pathways
biaxial geogrids	plastic	n/a	n/a	Driving surfaces, non u.a. pathways
Vmax Permanent geotextile	Stable polypropylene & coconut fibre matrix	n/a	n/a	1:1 & greater slopes, 24 month grow-in period
Bionet Biodegradable geotextile	Leno woven & Coconut fibre matrix	n/a	n/a	2:1 – 1:1 slopes

**Table F.33: Non-Traditional Paving**

product description	materiality	unit size (cm)	unit size (in)	application
Uni Eco-stone pavers: segmented system	Stone	10 x 10 x 8	4 x 4 x 3	Permeable paving for residential and commercial applications.
Biopaver: units adaptable to any open cell paver	precast concrete units with plant cells	30 x 30 x 8	12 x 12 x3	parking stalls and edges – internal plant cell can be customised
Turfstone pavers: interlocking units	Dry-cast concrete	40 x 60 x 8	16 x 24 x 3	parking stalls and edges – internal plant cell can be customised
Murarosy: paving spacer	cylindrical plastic spacers	Various – depending on running bond, stack bond or stack cross.		Provides drainage between any laid pavers

## Endnotes

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<sup>1</sup> Oxford Paperback Dictionary 4<sup>th</sup> Edition. Toronto: Oxford University Press, 1994, pg.637.

<sup>2</sup> **u.a.**, abbreviation used for **universal access** throughout the programme standards

<sup>3</sup> **rec.** , abbreviation used for **recommended** throughout the programme standards

<sup>4</sup> **firm** refers to surfaces that are highly resilient to distortion under concentrated loads.

Architecture and Engineering for Parks Canada, Public Works and Government Services Canada. Access Series: Design Guidelines for Accesible Outdoor Recreation Facilities. Ottawa: Minister of Canadian Heritage, 1994, pg.12.

<sup>5</sup> **slip resistant** refers to surfaces that are not slippery under wet or dry conditions.

Architecture and Engineering for Parks Canada, Public Works and Government Services Canada. Access Series: Design Guidelines for Accesible Outdoor Recreation Facilities. Ottawa: Minister of Canadian Heritage, 1994, pg.12.

<sup>6</sup> Harris, Charles W., Dines, Nicholas T.. Time-Saver Standards For Landscape Architecture, 2<sup>nd</sup> Edition. Toronto: McGraw-Hill Inc., 1998, pg. 520-20

<sup>7</sup> Architecture and Engineering for Parks Canada, Public Works and Government Services Canada. Access Series: Design Guidelines for Accesible Outdoor Recreation Facilities. Ottawa: Minister of Canadian Heritage, 1994, pg. 40.

# Appendix

## **Pipestone Creek Park Programme and Standards Applied in the Proposed Design Solution**

### **Pedestrian Connections:**

1. Pipestone Creek Pathway Type 1: 2.5m wide in parking lots, 3.5m wide in other locations, maximum cross slope of 2% and running grade of 3% (1:33).  
Surfacing shall be hard surfaced. Rest intervals, except in parking areas, every 100m. See Detail: Pipestone Creek Pathway Type 1 (Chapter 7).
2. Pipestone Creek Pathway Type 2: 3.0m wide, with a maximum 8% cross-sloped 300mm cleared under storey shoulder. Path to have a maximum 2% cross slope and maximum 5% (1:20) running grade with rest areas every 90m. Surfacing to be fine and compacted crushed stone. See Detail: Pipestone Creek Pathway Type 2 & 3 (Chapter 7).
3. Pipestone Creek Pathway Type 3: 3.0m width, with a maximum 8% cross-sloped 300mm clear understory shoulder. Path to have a maximum 4% cross slope and 8% (1:12) running grade with rest areas every 180m. If required, the maximum slope of 10% (1:10) may be used, however no more than 20% of the pathway is to be at the maximum slope. The surfacing is to be woodchip. See Detail: Pipestone Creek Pathway Type 2 & 3 (Chapter 7).
4. Furniture zones to be set back minimum 600mm from circulation routes.

5. Pedestrian vistas on pathways, (e.g. between bends in pathways) not to exceed 12.0 linear meters.
6. Use slope stabilising products (e.g. Nilex Sierra System) to achieve required grades.

### **Permanent Park Entry Roads:**

1. Width to be 8.25m with maximum slope of 8%. Preferred slope 5% and crowned at 3%.
2. Entry roads to be gravel surfaced with 1.8m shoulders and no curbs.
3. 2.0m width multi-use aisle, on one edge of road, where appropriate.  
Delineation between aisle and road to occur with bollards, aisle to have 2% cross slope. See Detail: Pipestone Creek Permanent Road (Chapter 7).
4. Design speed to be 40km/hr, with maximum radius for intersection curves to be 45.0m.
5. Use biaxial geogrids in construction.

### **Permanent Bonebed Buffer Access Road:**

1. Width to be 6.0m with maximum slope of 8%. Preferred slope 5% and crowned at 3%.
2. Roads to be gravel surfaced, no shoulder and no curbs.
3. Use biaxial geogrid in construction.
4. Use slope retention products (e.g. Nilex Sierra System) along road edge to achieve required grades.

### **Temporary Access Roads:**

1. Minimum 3.5m one way width.
2. Use 2.12x4.27m recycled tire set in place pads, for temporary road surface.  
See Detail: Pipestone Creek Temporary Road (Chapter 7).
3. Maximum slope of access roads to be determined by site equipment capacity, in order to minimise clearing of existing vegetation.

### **Parking Lots:**

1. Connect lots with 2.5m Pipestone Creek Pathway Type 1.
2. Lot access roads to be 8.25m wide, maximum 8% slope, preferred 5% slope.  
Design speed of 25km/hr with maximum radii for intersection curves at 15.0m.
3. A 3% longitudinal slope within the parking bays is preferred, however in areas where this is not achievable, a maximum of 6% may be applied.
4. Accessible stalls, to have maximum cross slope of 2%, recreational vehicle/bus stalls to have maximum 5% cross slope.
5. Limit stall numbers to maximum of 45 (2.75 x 5.5m) automobile stalls or 15 (3 x 12.5m) recreational vehicle/bus stalls per lot.
6. Aisles within employee and visitor parking are to be two way at 8.25m wide.
7. Aisle within recreational vehicle/bus lots to be one way at 4.0m wide.
8. Universal access stalls to be 3.5 x 5.5m with a 1.5m wide access aisle parallel to every second stall.
9. Use porous paving system in parking lots, with a 75mm raised curb.

### **Loading and Drop off Zone:**

1. Use 4.0m median to separate loading and drop off zone from main vehicular circulation.
2. Zone adjacent to primary education centre and plaza area to be total of 11m wide, 8m for two-way road access and 3.0m wide drop lane. Zone to have preferred continuous stopping length of 50m, (37m minimum), to provide room for four city buses/coaches.
3. Parallel to stopping lane, a 2.0m access aisle is to be provided in addition to standard Pipestone Creek Pathway Type 1.
4. Universal access waiting area adjacent to drop-off zone. Set back bench 900mm from circulation route, with two 850mm x 1200mm wheelchair areas. Extend wheelchair areas 300mm beyond bench alignment.

### **Shuttle Stops:**

1. Shuttle stops to be 4.5m in width for one way vehicular circulation, 8.0m for two-way circulation.
2. 10m continuous stopping area is required for both 'circular' (e.g. Loops) or 'straight' stop locations.
3. Maximum distance between universal access stops and main facilities and interpretative areas is 60m.
4. Maintain 65m 'comfortable distance' between non-universal accessible designated shuttle stops and plaza areas and/or interpretation areas.

## Plaza Areas

1. Adult seating dimensions to be conducive to universal accessibility.  
Dimensions: 500mm height, 400mm depth.
2. Provide two levels of child seating. Dimensions: 315mm and 360mm heights, 300mm depth.
3. Size of primary plaza area to be initially a minimum of 450m<sup>2</sup>, this is based upon a 3.6m<sup>2</sup>/individual comfort zone and the potential of 120 individuals in the plaza at a given time (e.g. 3 bus loads of individuals arriving on site).  
Total area of secondary plaza areas or staging areas to be a minimum of 150m<sup>2</sup>.
4. Maximum of 3.6m between 'conversation' zones, (e.g. bench groupings).
5. Furniture zones to be set back minimum 600mm from circulation paths.
6. Provide 900 x 1600mm level ground surface adjacent to bench locations for wheelchairs.
7. Provide ample shade areas, the highest ranked public amenity.
8. Surfacing to be concrete, asphalt, brick or paving stone to allow for high level of accessibility throughout primary plazas and staging areas.

## Ramps and Stairs:

1. Any ramps to be 1600mm, to accommodate two individuals in wheelchairs side by side or same width as the approaching pathway, depending on circumstance.
2. Slope of ramps to be maximum of 6%, cross slope of 2%.
3. Landings to be provided every 10m and at each turn of ramp. 2% maximum slope on landings and 1600mm length.

4. Tactile surface stripe or change in materiality to be provided at beginning and ending of all ramps and stairs, 1000mm in depth.
5. Stairs to have 1600mm clear width, 160mm riser height and 350mm tread depth.
6. Provide handrails on all stairs and ramps, height for adult and accessible use 900mm, where appropriate child rail height is 650mm.

### **Soft Landscape:**

1. Use native Peace River Parkland species. Plant list includes, but is not limited to the following, (see Chapter 5, Site Analysis section for complete plant list):  
June Grass, Pale Comandra, Richardson's Needle Grass, Inland Bluegrass, Old Man's Whiskers, Western Snowberry, Woods Rose, Willows, Trembling Aspen, White Spruce, Balsam Poplar
2. Integrate Late Cretaceous species appropriate for exterior interpretative scenarios: ferns, conifers.
3. Integrate Late Cretaceous species appropriate for interior or enclosed interpretative scenarios: magnolias, sycamores, figs, chestnuts, cycads.

### **Vertical Elements:**

1. Signage to be within pedestrian angle of comfort. Horizontal 12° to 60°, vertical 3° to 5°.
2. Average standing child eye line and universal access sitting level to be 1040mm. Adult standing eye level to be 1580mm.
3. Tactile information to be between 1100-1500mm high.
4. Low level lighting to be maximum 1000mm above ground level, spacing at 2.5m on centre.

5. Pedestrian lighting to be at 3.0m height and 5.0m on centre.
6. Bollards with lighting or without lighting to be a height of 650mm and spaced at 2.5m.
7. Guardrails, where adjacent drop is between 600mm and 10m is to have a height of 1.1m. In areas where adjacent drop is greater than 10m, guard-rail height is to be 1.6m.

# B

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