# Design Basis Memorandum

for

# Exploration Place at the University of Lethbridge

Prepared for:

## The University of Lethbridge

Prepared by:

**Westhoff Engineering Resources, Inc.**
Land & Water Resources Management Consultants

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March, 2005
Revised to May, 2005

# Exploration Place
# Design Basis Memorandum (DBM)

Revisions

| Revision No. | Date | Revision Description | Design Engineer(s) | Reviewer |
|---|---|---|---|---|
| 0 | March 30, 2005 | Draft Issue for review | D. Westhoff<br>H. Karim<br>L. Paterson | B. Van Duin |
| 1 | April 20, 2005 | Add comments from EBA | D. Westhoff | |
| 2 | May 15, 2005 | Revise Section 2 and 3 following comments from Helen Henderson in email dated May 6, 2005 | D. Westhoff | |
| 3 | May 19, 2005 | Add Downspout Detail 10510M07.dwg | | |
| | | | | |
| | | | | |
| | | | | |
| | | | | |
| | | | | |

Design Engineers:

Dennis Westhoff for grading and stormwater management
Hassan Karim for deep and shallow utilities (excluding stormwater management)
Larry Paterson for landscaping design concepts

Visual Design:

Micheal O'Hagen

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## LIST OF EXHIBITS



## APPENDICES

## 1.0 INTRODUCTION

The University of Lethbridge retained Westhoff Engineering Resources, Inc. to undertake a grading design study for the Exploration Place. The grading design was to demonstrate an earth balancing for material from external and on-site excavations associated with future buildings. The assignment also included innovative approaches to stormwater management and to prepare preliminary servicing designs for sanitary, water distribution and shallow utilities.

The study required to quickly identify the placement of earthworks that were being generated from the Health and Wellness Centre, a new building for which the excavation contract was scheduled in April, 2005. A total volume of excavated material for placement was estimated at 25,000 $m^3$. Other forecasted volumes are presented in Section 2.0

It must be recognized that although the next building, i.e., Water & Environmental Science building, is being designed and construction is scheduled for the near future, the built-out timelines for the Exploration Place is expected to about 20 years. Therefore, certain changes may occur in this timeframe and this DBM can be kept up-to-date providing a historical tracking of the development of the Exploration Place.

The original assignment is in essence outlined in the proposal as presented in Appendix A

## 2.0 GRADING DESIGN

From the outset, the earthworks that were incorporated in the grading design considered the expected volumes from the development as per Table 1.

The first volumes to be placed on the Exploration Place site are that coming free from the Regional Health and Wellness Centre. The amount is estimated at about 25,500 $m^3$. The placement of this material is proposed to be at several locations as shown on Drawing C002.

The next expected excavation is associated with the Water & Environmental Science building. The generation of earthworks is relative small based on the conceptual plan and estimated at about 1000 $m^3$. Placement of this amount is proposed at any nearby fill area used for the placement of material from the Health & Wellness excavation site.

Fundamental to the placement of the above noted volumes is a layout and general grading design that is illustrated in Drawing C001. The following notes are presented related to the design shown on this drawing:

- The layout of the ring road is based on the conceptual plan and the future anticipated location of the traffic circle. The proposed grades are “linked” to the governing elevation for the spine road and accommodating relative flat slopes for access to buildings or parking lots.

- The existing road currently providing access to the CCNB building is left as the beginning of the spine road / utility right-of-way. The proposed grades are based on providing adequate cover for deep utilities.

- Minimum grading is to occur near the existing wetland and where existing vegetation is not interfering with future road, utility row, buildings, parking lots and pathway land uses.

- The existing tree cover in the northeast portion of the site may have to be moved at a point to make space for building EP 3 and EP 4. Note that there is a significant fill requirement (e.g., difference between original and finished grades) in this location. Excavation of organic soil in this location may exceed the average of 0.30 m used in the computation of stripping and grading.

- Consideration must be given to cover once placement of excavated material is completed at various stages. Erosion by wind and precipitation will be a concern otherwise. A sterile crop cover and/or a soil tackifier can be used for this purpose.

- The proposed grading design is has been reviewed by EBA Consulting for stability of fill and down-slope areas to the east of the future buildings. Their comments are:

    - Compaction shall be to 95 % standard proctor density
    - Topsoil quantities include B horizon soils (see footnote [1])

[1] The topsoil quantities as listed in Drawing C001 under Note 3 are based on 0.3m depth. At the time of this evaluation study, actual depth of topsoil at various locations was not determined. If a portion of this *assumed* depth is B horizon, say 0.15m, then the topsoil quantity to be removed is half of the quantity noted, i.e., 11250 $m^3$. Regardless, these quantities are to be confirmed once building footprints and/or extent of disturbance is determined at the planning and detailed design stages.

- Geotechnical input must be provided for bio-swales
- At the time of detailed design for EP3, basement elevation may have to be lowered to be in native fill or placed on engineered fill. It is recommended that a foundation design to be carried out to support decision at the time planning of the building is proceeding.

**TABLE 1: Estimate of Fill Generated by Future Buildings**

(Buildings within each zone are listed in their anticipated sequence of construction)

| Zone | Building | Gross Area | Floors | Footprint | | Basement | Fill | Source |
|---|---|---|---|---|---|---|---|---|
| | | | | Building | Basement | Depth | Volume | |
| | | $m^2$ | # | $m^2$ | $m^2$ | m | $m^3$ | |
| **Exploration Place** | | | | | | | | |
| | (EP6)Water & Environmental Science | 6,726 | 2+part bsmt | 3,199 | 328 | 3 | 984 | WESB concept plan |
| | EP2 | 9,600 | 2 | 4,800 | 4,800 | 2 | 9,600 | Core Campus Exp Plan |
| | EP3 | 7,900 | 2 | 3,950 | 3,950 | 2 | 7,900 | CCEP |
| | EP4 | 5,100 | 2 | 2,550 | 2,550 | 2 | 5,100 | CCEP |
| | EP5 | 5,100 | 2 | 2,550 | 2,550 | 2 | 5,100 | CCEP |
| | EP7 | 9,700 | 2 | 4,850 | 4,850 | 2 | 9,700 | CCEP |
| **Core Campus** | | | | | | | | |
| | Regional Health & Wellness Centre | 8,248 | 2 | 5,092 | 5,092 | 5 | 25,460 | Alan Storey |
| | A (Turcotte Hall addition) | 2,400 | 3 | 800 | 800 | 3 | 2,400 | CCEP |
| | B (Management) | 8,000 | 3 | 2,667 | 2,667 | 2 | 5,333 | CCEP |
| | C (South end of Quad) | 8,000 | 3 | 2,667 | 2,667 | 2 | 5,333 | CCEP |
| | D (South of CCBN) | 10,200 | 4 | 2,550 | 2,550 | 2 | 5,100 | CCEP |
| | E (South of Service Buildings) | 10,200 | 4 | 2,550 | 2,550 | 2 | 5,100 | CCEP |
| | Energy Centre #2 | 600 | 2 | 300 | 300 | 2 | 600 | CCEP |
| | Art Gallery | 1,900 | 2 | 950 | 950 | 2 | 1,900 | CCEP |
| | F (East of Anderson Hall) | 6,000 | 3 | 2,000 | 2,000 | 2 | 4,000 | CCEP |
| | G (West of Anderson Hall) | 8,000 | 4 | 2,000 | 2,000 | 2 | 4,000 | CCEP |
| | H (West of Management/South of G) | 7,300 | 3.5 | 2,086 | 2,086 | 2 | 4,171 | CCEP |
| | Lecture Hall | 750 | 1 | 750 | 750 | 2 | 1,500 | CCEP |
| | University Club | 1,400 | 1 | 1,400 | 1,400 | 2 | 2,800 | CCEP |
| | Parking Garage/Office/Commercial | 2,700 | 4 | 675 | 675 | 2 | 1,350 | CCEP |
| **Total Excavated Material Available for Exploration Place** | | | | | | | **107,432** | |
| | | | | | | | | |
| **Residences** | | | | | | | | |
| | Townhomes (16 bldgs) Phase 1 | 5,128 | 2 | 2,560 | 2,560 | 2.5 | 6,400 | Cohos Site Plan |
| | Phase 2 | 5,128 | 2 | 2,560 | 2,560 | 2.5 | 6,400 | Cohos Site Plan |
| | Apartments: Building 1 | 3,465 | 3 | 1,155 | 1,155 | 1.5 | 1,733 | Cohos Site Plan |
| | Building 2 | 3,465 | 3 | 1,155 | 1,155 | 1.5 | 1,733 | Cohos Site Plan |
| | Building 3 | 2,697 | 3 | 899 | 899 | 1.5 | 1,349 | Cohos Site Plan |
| **Service Buildings** | | | | | | | | |
| | Site A (West of Art Vault) | | | | | | 9,000 | EBA |
| **Total Excavated Material Available for south Campus** | | | | | | | **26,614** | |

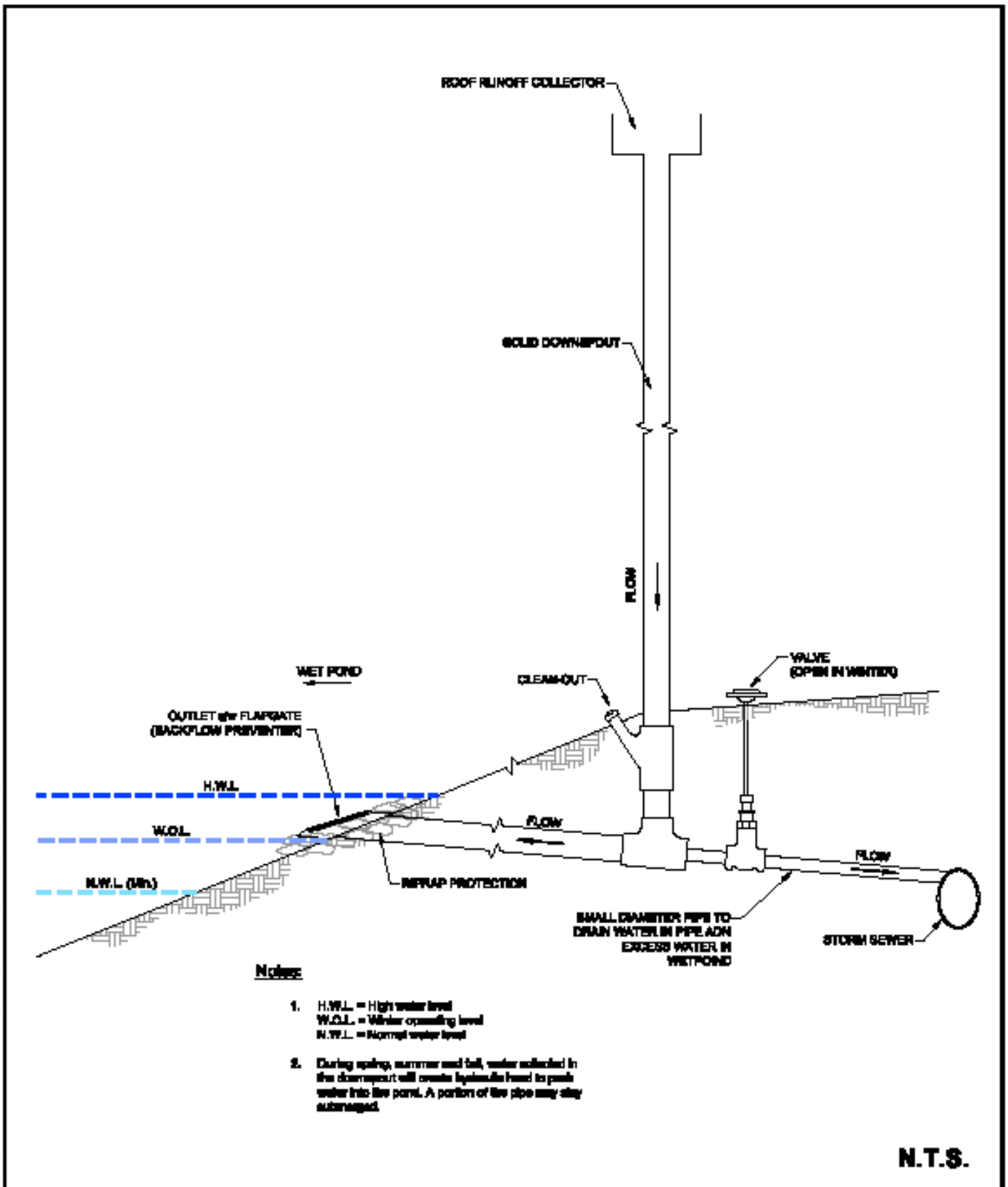
## 3.0 STORMWATER MANAGEMENT CONCEPTS

General

The grading plan was developed with innovation to stormwater management in mind. That is, catchment boundaries were delineated for the existing infrastructure that serves the CCBN building and the parking lots to the east and south-east thereof. The remainder of the Exploration Place site was therefore "freed" to implement innovative designs for stormwater management Best Management Practices (BMPs). In summary, they include:

- A central pond incorporated in the surroundings of the Water & Environment Science building with a future extension aside the EP 5 building.
- All roof drainage from buildings EP 2 to EP 7, inclusive to be drained into this central pond. Revision:May 2005: See Downspout Detail (10510M07.dwg) re creating a positive hydraulic head to push collected roof runoff against the grade. Detailed design, addressing pressure pipe flow and back flow preventers, is to be carried out by a qualified professional.
- Areas to the west comprising the parking lots west of the EP 5 and EP 7 building to slope towards the existing wetland.
- A re-circulation system that includes a wind mill to pump water from the pond into the wetland and return flow via drainage course carved through the existing trees.
- Bio-swales for drainage of green spaces and pathways.
- Grasspave reinforced swale / pathway for central spine road.
- Pervious pavement for parking lots (where appropriate).

A BMP concept for the pond adjacent to the building and other system components of the above noted strategy is illustrated in the exhibit on the next page.

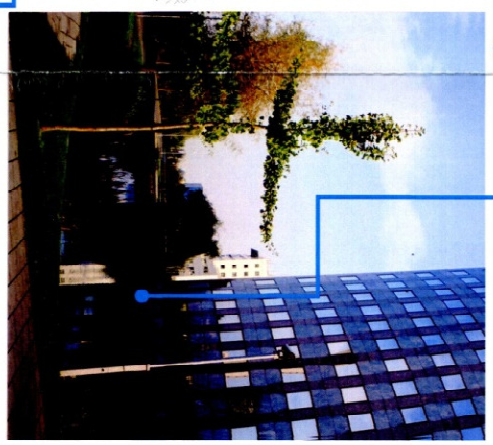

ROOF RUNOFF COLLECTOR
SOLID DOWNSPOUT
FLOW
WET POND
CLEAN-OUT
VALVE
(OPEN IN WINTER)
OUTLET c/w FLAPGATE
(BACKFLOW PREVENTER)
H.W.L.
W.O.L.
N.W.L. (Min.)
FLOW
FLOW
RIPRAP PROTECTION
SMALL DIAMETER PIPE TO
DRAIN WATER IN PIPE ADN
EXCESS WATER IN
WETPOND
STORM SEWER
Notes:
1. H.W.L. = High water level
W.O.L. = Winter operating level
N.W.L. = Normal water level
2. During spring, summer and fall, water collected in
the downspout will create hydraulic head to push
water into the pond. A portion of the pipe may stay
submerged.
N.T.S.
Client
UNIVERSITY OF LETHBRIDGE
Project:
EXPLORATION PLACE
Title:
DOWNSPOUT DETAIL
Weathoff Engineering Resources, Inc.
Land & Water Resources Management Consultants
Date: May, 2009
Job No.: WER105-10
Dwg File: 10510M07.dwg
Figure No.: 1
Rev.: A

10510M02.DWG

# Stormwater Management BMP Concepts

Index Legend:

1 - Windmill for re-circulation
2 - Soft edge next to the road
3 - Hard edge water at building
4 - Emergency outlet for pond
5 - Culvert (return flow into pond)
6 - Pervious pavement
7 - Outlet channel
8 - Discharge into tree area
9 - Emergency outlet for the wetland

Revision date: March, 2005



Land & Water Resources Management Consultants

### 3.1 Hydrology and Hydraulic Design Criteria

The climate normals for the City of Lethbridge are used to prepare preliminary design criteria for the pond. A summary spreadsheet is shown in Table 2 for which the following is noted:

- Total precipitation in the summer months is “balanced” to provide for augmentation water to the existing wetland.
- The wet pond adjacent to the Water and Environment Science building is sized for the 1:100 year event. That is, the net runoff from the tributary area (8.1 ha) is estimated at 90 % of the 1:100 year precipitation (106.5 mm), i.e. ~7800 $m^3$.
- The wet pond has a footprint of about 5800 m2; thus, an active storage depth of about 1.3 m must be provided in the detailed design of the pond.
- The micro-topography designs must take into consideration multi-functional aspects of the pond including, but not limited to water quantity, quality, water conservation, aesthetics, social and environmental criteria.
- For circulation, a wind mill or a pump is included to convey water from the lower lying wet pond to the existing wetland. The discharge pipe discharges into the existing treed area, thus providing moisture to this area en-route to the wetland. The estimated dynamic head is about 4 m.
- The return flow from the existing wetland is to be routed via another existing treed area, cross the future looped road and discharge into the wet pond south of the wind mill / pump station. This feature can be a bio-swale; however, infiltration to groundwater needs to be addressed by geotechnical specialist.
- The total area tributary to the wet pond and wetland is about 14.6 ha; while the wet pond and wetland area is about 1.2 ha, i.e., about 10 % of the tributary area.
- The water balance suggests that there will be surplus of captured water for other uses, e.g. irrigation of greenspaces within the Exploration Place complex. We recommend that this include drip irrigation.
- The water balance as presented in Table 2 is preliminary and shall be updated at the time of detailed design.
- The wet pond must be lined and a geotechnical design expert is to be consulted for this design aspect.
- The inlet/outlet control structure for the pond must take into consideration a maximum highwater level that may be controlled by the first level building opening. Hence, detailed designs of the building are to be considered.
- The outlet structure for the wetland is a piped emergency system to bypass the return flow pathway to the wet pond. Inlet elevation is to be set at spill elevation, which in turn is to be established by a detailed hydrologic analysis to determine the optimum

hydroperiod for the wetland. Preliminary designs allow for a evacuation rate of about 160L/s.

- The tributary area to the wetland is about 6.5 ha. The runoff from a 1:100 year storm event is estimated at about 4400 $m^3$, given the amount of green space and hard surface area as shown on Drawings C004. Hence, careful detailed designs are warranted when parking lots and capacity of bio-swales are shaped into the landscape.

**WATER BALANCE FOR EXPLORATION PLACE**

| Parameter | unit | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| month | | jan | feb | mar | apr | may | jun | jul | aug | sep | oct | nov | dec | year |
| Rain | mm | 0.5 | 0.1 | 2.3 | 17.4 | 46.2 | 53 | 37.2 | 47.4 | 37.3 | 9 | 1.6 | 0.8 | 252.8 |
| Snow | cm | 26.6 | 16.1 | 27.7 | 15.3 | 1.3 | 0 | 0 | 0 | 1.1 | 6.3 | 15.7 | 22.9 | 132.9 |
| Prec | mm | 20.1 | 12.2 | 27.5 | 32.5 | 48.3 | 53 | 37.2 | 47.4 | 38.3 | 15.1 | 14.8 | 18.6 | 365 |
| Lake Evaporation | mm | 0 | 6 | 30 | 72 | 117 | 140 | 167 | 133 | 70 | 32 | 7 | 1 | 775 |
| Supply area: catchment B & C totals 14.6 ha | $m^3$ | 2054 | 1247 | 2811 | 3322 | 4936 | 5417 | 3802 | 4844 | 3914 | 1543 | 1513 | 1901 | |
| Evaporation Pond and wetland area ~ 1.2 ha | $m^3$ | 0 | 72 | 360 | 864 | 1404 | 1680 | 2004 | 1596 | 840 | 384 | 84 | 12 | |
| Excess or spill into storm sewer or water supply for irrigation of green spaces | $m^3$ | 2054 | 1175 | 2451 | 2458 | 3532 | 3737 | 1798 | 3248 | 3074 | 1159 | 1429 | 1889 | |
| Potential irrigation area assuming the application of 1" per week or 100 mm per month | ha | | | | 2 | 4 | 4 | 2 | 3 | 3 | | | | |

Notes:
Rain, snow and precipitation data from climate normals for Lethbridge data span 1971 - 2000
Lake evaporation data are mean data for Lethbridge published by Alberta Environment

## 4.0 DEEP AND SHALLOW SERVICES CONCEPTS

Sanitary Sewer

- A 200 mm dia PVC sanitary pipe at minimum slope of 0.60% is adequate to service the proposed expansion.
- The preliminary sanitary sewer design is based on providing gravity servicing to the future buildings.
- The maximum spacing between manholes shall not exceed 120 m.
- The preliminary grades at the upstream areas can be increased based on final elevations of the future buildings.
- The preliminary sewer extension is included in Drawing T001

Water Distribution

- A 200 mm looped water main extension is recommended as part of the proposed expansion
- Hydrants are to be provided at maximum 90 m spacing.
- Adequate valving design is to be configured at the detailed design stage for isolation of hydrants and providing alternate flow route in case of main breaks
- The requirement for the water tie shall be confirmed at the detailed design stage based on water consumption requirements, fire flow requirements, confirmation of adequate water supply and fire risk analysis. It is recommended that the University of Lethbridge set up a water distribution model for facility sizing, fire flow analysis, reliability analysis and maintenance decision making.
- The preliminary water main extension is included in Drawing T001

Storm Water Management

- A storm sewer piped system is shown on Drawing T001 for which the following is noted:
- A piped overflow system is to run from the existing wetland and tied to the existing storm sewer.
- A control structure is needed to allow for runoff generated from rare (severe) events to be evacuated via the aforementioned piped storm sewer.
- A 250 mm dia PVC storm is extended along the spline road. This storm sewer is to intercept runoff from roof drainage during winter. It is thought that freeze-thaw cycles may pose a problem with conveyance of snowmelt to the wet pond in regards to ice forming at areas where there is pedestrian traffic.

Shallow Utilities

- Extensions of shallow utilities are to be done at time of detailed design, noting that all shallow utilities are extended to service the existing CCBN building.

- Care shall be taken to ensure that the existing cable to the satellite receiving station is not damaged during construction. A temporary protection measure may have to be installed.

## 5.0 LANDSCAPING CONCEPTS

A preliminary design for pathways is shown on Drawing C006

Conceptual design vignettes for pervious pavement and bio-swales are inserted as well

A conceptual cross-section for the spine road is presented by two options: dished or crowned. The crowned is preferred as it will allow for drainage to be adding moisture to green / treed boulevard.

Area of the windmill or pump station can be integrated to a multi-function place with seating benches and viewing platform integrated at wet pond shoreline. This area can also incorporated stormwater BMPs in terms of pervious pavement or include waterscaping features.

# Appendix A
# Copy of Proposal

**Westhoff
Engineering
Resources, Inc.**

Land & Water Resources Management Consultants
*Engineering Land and Waterscaping Urban and Rural Environments*

February 22, 2005
WERPP2005-09.101

University of Lethbridge
4401 University Drive
Lethbridge, Alberta
T2K 3M4

**Attention:** **Mr. Daryl Schacher**
Director, Materials Management

Dear Sir:

**RE:** **Provision of Site Design Services for Exploration Place**
Request for Proposal RFP S2005-1559

Westhoff Engineering Resources, Inc. in association with Cohos Evamy is pleased to submit this letter proposal to undertake the above noted project.

Project Understanding
The University of Lethbridge needs a consulting design team to prepare a detailed site plan for the north campus of the University, known as Exploration Place. The site plan will refine the conceptual plan for Exploration Place that was outlined in the *"Core Campus Plan"* approved by the University in 2001.

A balanced cut-and-fill plan and an integrated storm water management plan will be key deliverables of this project. It is understood that this information is required to facilitate the placement of fill materials that will be excavated to permit the construction of future buildings. The first building is to begin construction in early April 2005. Other important components include pad elevations for future buildings, preliminary design for surface features including the additional parking required to serve the growing university. The ultimate goal is to produce a comprehensive site grading and infrastructure plan with "layered" information on land features and buried utility services with sufficient detail to permit the placement of fill materials and sizing of utility services.

The design must reflect LEED goals for site development and must comply with all applicable provincial and municipal regulations and requirements, including the development setback policies of the City's River Valley Area Redevelopment Plan. It should provide wind sheltering for pedestrians and favorable microclimate conditions. Landscaping should preserve and enhance existing vegetation wherever possible and should help define the pedestrian spine, the sheltered courtyards, the 'Research Green,' the 'sacred sites,' and other open spaces.

Given the fact there is only 3.5 weeks between the start-up and the delivery date for a site design on April 1, 2005, we propose that the product will be a general site grading plan, utility corridors and sizing and general site landscape and stormwater management proposals. Detailed designs are proposed to be prepared after April 1, 2005 with separate timelines and budgets. Important to note is that the site plan will resolve the earthworks for the immediate, near future development activities with flexibility in the plan to deal with future developments in the completion of Exploration Place.

Project Approach
The project will commence with a kick-off meeting to confirm the proposed task and budgets. Immediately following and if possible, prior to this meeting, we will commence the data collection of the assignment. That is, all relevant mapping, surveys, topographic information, site servicing plans will be collected to compile a comprehensive base plan of the study area. We note that stormwater management boundaries



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of interest to this project will extent beyond the Exploration Place site and that this information be collected as well. It is assumed that the University of Lethbridge will provide us with all this information and that they will exhaust the sources at the University of Lethbridge, City of Lethbridge and Utility Companies to ensure that the information is complete and contains the most up to date as-built information. It is also assumed that this information will be made available in digital format.

The next phase of developing the site plan is to confirm the location of the future buildings and the "linkages" for vehicle access, parking, pedestrian movement, utility services and the functional aesthetic vision of the site as a holistic environment. These linkages will take into consideration the constraints of existing vegetation to be retained and access to the "sacred sites". Landscaping and stormwater management will be integrated to naturalized landforms that add visual and environmental value to buildings and to an urbanizing watershed.

An iterative process will follow once the aforementioned task is conceptually determined. This iterative process deals with optimizing the site to create a balanced cut-and-fill site plan. We recommend that the site grading plan and related geotechnical specifications must be developed in a fashion that is somewhat flexible for future developments, yet firm and detailed for areas that will see construction in the very near future, i.e., say 2005. A cautionary note here with placing this "balancing act" on the development area is the challenge to respect the poetic phrases included in the Erickson/Massey – Development Plan, University of Lethbridge – March 7, 1969: *"…Thus, to maintain harmony with the land, one must submit to its rules…Buildings must grow out of the ground…never sit blatantly on top of the ground… Forms must be simple and geometrically concise…Just as the prairie landscape has been reduced to essentials, so must its buildings be elemental"*. We will consult with EBA related to specifications for placement and compaction of fill as they are working for the University of Lethbridge currently and in the past.

The additional requirement to integrate LEED goals for the project will be explored to the fullest. In particular, the stormwater management aspects of the site have unique opportunities to not only meet LEED targets, but under the province wide "Water For Life Strategy" be integrated to become a showcase of water conservation on the landscape of this campus expansion. Rain harvesting, treatment (quantity and quality) and irrigation will be explored as theme elements for the detailed design of stormwater management systems and green space landscaping.

Bio-engineering elements and Best Management Practices (BMPs) will be integrated in the design where possible, recognizing the local climate conditions. Emphasis must be placed on the latter as there is very little experience with bio-swales, bio-retention areas, pervious pavement, etc. in Canada, particular in our region with very cold temperatures and freeze-thaw cycles in the winter and extreme hot weather during the summer. Similarly, it is recognized that soils and location of the campus is near the Oldman River escarpment and thus, BMPs that consider stormwater infiltration or have long detention times, may be inappropriate. The team brings to the project experiences with BMP systems designed, installed and performing well over the last several years.

The team will also confirm the servicing plan prepared in 2004 identifying a utility corridor from the CCBN to the IUNTUS satellite and will complement this plan by recommending the sizes of the deep sewers, the water distribution system and the shallow utilities according to the current programmed use and occupancy of the proposed buildings. The plan will include the alignments and size of each of the services and in addition, prepare a fire protection plan for the north campus. This sub-task will also include the preparation of a phasing plan. We note that it is assumed that the existing infrastructure is adequately sized to accommodate the proposed expansion.

The design of the site will be documented in a "Design Brief Memorandum" which will include pertinent information related to cut-and-fill, stormwater management analysis, and design criteria for BMPs, landscaping, etc. The DBM will be a valuable document for next phase when detailed designs are prepared.

Project Team

The shaping of the development site, in terms of landscaping, stormwater management and servicing requirements that complement their surroundings, will be achieved by a team that brings to the project a wealth of experience in leading-edge municipal engineering, bio-engineering, stormwater management and landscape architecture. Key team members include:

**Dennis R. Westhoff, M.Eng., P.Eng.** will be the team leader for this project. His extensive experience in urban watershed management and stormwater management is unique and has been credited with many "first time" developments including incorporating wetlands in urban subdivisions, "waterscaping" the Elbow Valley project (no storm sewers for a 1000 ha residential development), Best Management Practices (BMPs) for commercial and residential subdivisions, and a water recycling / wetland project for the College of Olds that is disguised in a botanical garden. His work expands in using stormwater management and hydraulic structures in "art-in-the-park" designs and themes for several projects in the heart of the City of Calgary.

**Hassan Karim, P.Eng.,** brings to the project a wealth of experience in municipal engineering and has worked on the Core Campus Expansion Plan. He and Dennis are working on the brown field development of 100 ha of the previous CFB lands in Calgary for Canada Lands Corporation where numerous BMPs are incorporated.

**Larry Paterson, AALA, FCSLA** (Cohos Evamy) will be responsible for the landscape architecture component of the project. He brings to the project extensive experience in landscape designs for educational institutions and has worked with Dennis on the SAIT Expansion project in 2000 – 2001. The project has similar design components as for the Exploration Place project.

Project Timelines
The project Kick-Off meeting is anticipated on March 7, 2005 will the data collection task to be completed by March 11. Design charrettes for building locations pathways, driveways, parking stalls, alignment for utilities and stormwater management requirements are to be completed during the week of March 14, 2005. A meeting with the Steering Committee is anticipated in the early part of the week of March 21 to confirm the design. Final design and drafting will be completed during the last week of March for delivery of the site grading and servicing plan and DBM on April 1, 2005.

Short project progress meetings will be held weekly in Calgary with telephone connection to the Steering Committee. Minutes of meetings will be distributed using email.

Westhoff Engineering Resources, Inc. is looking forward to working on a most challenging and interesting project. Should you have any questions on the contents of the above or the attached, please call the undersigned.

Yours sincerely,

**Westhoff Engineering Resources, Inc.**

Dennis R. Westhoff, M.Eng., P.Eng.