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Attachment 1

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Lansdowne Stair and Trail

Environmental Impact Assessment

City of Edmonton

December 07 2018

CP-6993 Lansdowne Stair Concept Design
Integrated Infrastructure Services
Building Great Neighbourhoods and Open Spaces
Open Space Planning and Design

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AECOM: 2015-04-13

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Revision History

Revision	Revision date	Details	Authorized	Name	Position
1	11 June 2018	DRAFT	BN	Brian Nolan	Project Manager
2	10 August 2018	FINAL DRAFT	BN	Brian Nolan	Project Manager
3	29 October 2018	FINAL	BN	Brian Nolan	Project Manager
4	07 December 2018	FINAL (signed)	BN	Brian Nolan	Project Manager

Refer to **Appendix G** for Circulation Comments.

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Table of Contents

1. Introduction

The Lansdowne Stair and Trail (the Project) is located approximately 10 kilometers (km) southwest of downtown Edmonton in the Whitemud Ravine North. Lansdowne Drive bounds the Project to the north, Whitemud Drive Right of Way to the South, Whitemud Park to the east and west. An existing informal earthen trail (goat track) connects Lansdowne Drive to the existing paved shared-use path running parallel to Whitemud Drive. The City of Edmonton (City) proposes to formalize the goat track using an asphalt trail and stairs. The Project was identified by Lansdowne Building Great Neighbourhoods stakeholder engagement feedback (BGN, City of Edmonton 2014, 2015, 2016), refer to **Section 7**.

The Project will connect Lansdowne Drive to the existing paved shared-use path adjacent Whitemud Drive and entails the installation of a formal 3.0 metre (m) wide shared-use asphalt path across the maintained grass area at the top of the slope and stairs on the non-maintained grassed slope. AECOM Canada Ltd. (AECOM) was retained by the City of Edmonton (City) to support the environmental review and preliminary design.

The grassed slope and the upland area at the top of the slope to Lansdowne Drive is within the North Saskatchewan River Valley Area Redevelopment Plan area. The Initial Project Review (IPR) and pre-consultation was completed by way of site meeting with City and AECOM staff to comply with the City of Edmonton Bylaw 7188 (North Saskatchewan River Valley Area Redevelopment Plan, City of Edmonton 2017). The City Project Team identified the Project Area as a potentially sensitive location and requested that an Environmental Impact Assessment (EIA) be completed for the Project.

The AECOM Project Team conducted geotechnical and landscape site reconnaissance as follows:

- October 12, 2017: Landscape Design Team site visit, pre-proposal site review.
- April 30, 2018: Geotechnical Team site visit, refer to **Appendix B**.
- May 04, 2018: Geotechnical Team site visit, refer to **Appendix B**.
- May 11, 2018: Geotechnical Team site visit, refer to **Appendix B**.
- May 18, 2018: Geotechnical Team site visit, refer to **Appendix B**.
- June 07, 2018: Landscape Design Team and City Project Team site visit, meeting to determine environmental scope.
- July 05, 2018: Landscape Design Team site visit, EIA site review.

2. The Property

2.1 Land ownership

- The Project land is owned by the City of Edmonton. Refer to **Appendix A** for land title information.

2.2 Location of the property

- Municipal address: 12511 Lansdowne Drive NW Edmonton Alberta/ Whitemud Park 13204 Fox Drive Edmonton, Alberta.
- The Project is located in Whitemud Creek Ravine North, a non-residential neighbourhood and part of the North Saskatchewan River Valley and Ravine urban parkland system.
- Legal address: Lot 15P, Block 23, Plan 1800NY. Refer to **Appendix A** for legal information.

- Alberta Township Survey (ATS) reference: 4;25;52;13;S. Refer to **Appendix A** for land title information.

2.3 Current zoning

- Metropolitan Recreation Zone (A). Refer to **Appendix A** for current zoning.
- North Saskatchewan River Valley and Ravine System Protection Overlay. Refer to **Appendix A** for current overlays.

2.4 Description of existing and historic land uses and reference to current and historic air photos

Existing: the grassed and lightly treed slope and the grassed upland area at the top of the slope to Lansdowne Drive is part of and protected under the North Saskatchewan River Valley and Ravine System Overlay. The toe of the slope and the existing paved shared-use path is also part of the Whitemud Drive Right of Way. The Project is located in Whitemud Park (Neighbourhood Interactive Map, City of Edmonton 2018). The Project is approximately 320 linear metres from the Whitemud Creek. The land cover in the Project Area is modified, non-maintained on the slope and maintained at the top (UPLVI, City of Edmonton 2018).

Bus stops within proximity to the Project are located at Rainbow Valley Road, 124 Street and Whitemud Drive on-ramp. The closet school is located at Lansdowne Park. The paved shared-use path running adjacent to Whitemud Drive is a bike route connecting 122 Street and 142 Street, this route is cleared in winter (City of Edmonton Maps, City of Edmonton 2018).

Historic: the Project is in the non-residential neighbourhood Whitemud Creek Ravine North, part of the North Saskatchewan River Valley and Ravine System. The earthen trail (goat track) is visible on historical Google Earth photography dating to 2004 (Google Inc. 2018). Energy Mines and Resource Canada aerial photography dating from 1924 depicts the north end of the Ravine and Lansdowne Neighbourhood, much of the land is not treed outside of the Ravine (Edmonton 1924, Energy Mines and Resources Canada 1924). Refer to **Appendix A** for aerial photography.

The Lansdowne Neighbourhood was developed on land annexed by the City of Edmonton in 1960 and was almost completely built out by 1970 (History, Lansdowne Community League 2018).

As far back as 1974, the City identified the intent to protect Whitemud Creek (City Position on River Valley Policy And Development Proposals, City of Edmonton 1974).

2.5 Summary of federal, provincial and municipal regulatory requirements that apply to the Project area

Federal: *Migratory Bird Convention Act* (Migratory Bird Convention Act, Government of Canada 1994) and *Species at Risk Act* (Species at Risk Act, Government of Canada 2002). No federal permits are required for the Project at time of EIA preparation.

Provincial: *Province of Alberta Wildlife Act* (Province of Alberta Wildlife Act, Government of Alberta 2018) *and Historic Resources Act* (Historic Resources Act 2000). No provincial permits are required for the Project at time of EIA preparation.

Municipal: the Project is part of the North Saskatchewan River Valley Area Redevelopment Plan Bylaw No. 7188. The Project is a Major Facility as it is a new piece of recreational infrastructure (ARP, City of Edmonton 2017). The City has advised a Development Permit is required.

3. Environmental Context

The Project is situated in the Central Parkland Subregion of the Parkland Natural Region (Natural Regions and Subregions of Alberta, Natural Regions Committee 2006).

In 1992, The Ribbon of Green Master Plan was published by the City of Edmonton. This award winning, visionary report outlined the goal of a linear park and trail system along the North Saskatchewan River, from Fort Saskatchewan through Edmonton. The Project is within the Ribbon of Green Study Area Boundary. Biological resource analysis formed part of the report; the Project is in an area identified as having a low sensitivity and for conservation. Refer to **Appendix A** (Ribbon of Green, City of Edmonton 1992).

3.1 Surface Water Management

Runoff characteristics: the Project highpoint (662.0 m) is at the Lansdowne Drive curb, the maintained grassed area falls towards a low point in the southeast corner of Lot 15P where the Project is located. The non-maintained slope falls (660.0 m to 641.5 m over ~75 m) towards the paved multi-use trail and is directed towards Rainbow Valley Road.

Depth of the water table: AECOM conducted an intrusive geotechnical investigation program in preparation for the Project. Groundwater levels were measured upon completion of drilling (May 4, 2018), on May 11, 2018, and again on May 18, 2018. No free groundwater was observed during drilling or during groundwater measuring; refer to **Appendix B.**

3.2 Geology/ Geomorphology and Soils

Refer to **Appendix B** Lansdowne Stair and Trail Project Geotechnical Investigation.

3.3 Vegetation

The area to be impacted by construction consists mainly of forb and grass species, with the most common species noted as:

- Smooth brome (*Bromus inermis*).
- Kentucky bluegrass (*Poa pratensis*).

Other vegetation found on the slope outside of the Project footprint includes:

- Buckbrush (*Symphorricarpos occidentalis*).
- Lodgepole pine (*Pinus contorta*).
- Saskatoonberry (*Amelanchier alnifolia*).
- Western larch (*Larix occidentalis*).
- Wolf willow (*Elaeagnus commutata*).

Canada thistle (*Cirsium arvense)* was also observed outside of the Project area. The area to the east of the earthen trail is a City of Edmonton 'Toad Flax Control Test Plot' and noted with signage. Yellow toadflax (*Linaria vulgaris)* and Canada thistle (*Cirsium arvense)* are designated as a noxious weed under the Alberta *Weed Control Act Weed Control Regulation* (Weed Control Act Weed Control Regulation, Government of Alberta 2010). The *Weed Control Ac*t specifies the legal responsibilities of landowners or occupants with respect to noxious and prohibited noxious weeds. In short, they are:

- Noxious – control.
- Prohibited noxious – destroy.

The test plot was established in 2005 and the monitoring program is ongoing. The test plot is also a long term monitoring site for bio release control agent, *Mecinus janthinus* (stem-boring weevil). The initial release was in 1999. In 2014, a bio release control agent called *Rhinusa pilosa* (stem gall weevil) was also released. The City completed final assessments in the fall of 2018.

Colorado Spruce (*Picea pungens) 'Blue'* and Sweet mountain pine (*Pinus mugo)* exist at the top of the slope and are listed on the City's Open Tree Map (Open Tree Map, City of Edmonton 2018). One Lodgepole pine (*Pinus contorta*) also exists on the grassed sloped area within five linear metres of the centre of the earthen trail. The design intent is for no tree clearing to construct the Project.

No plants that are rare or of concern were encountered during the site assessment at the Project area or in the Alberta Conservation Information Management System (ACIMS, Government of Alberta 2018), refer to **Appendix C**.

The non-wooded area (northeast) and wooded (east) is a Marsh wetland type according to the Alberta Merged Wetland Inventory (GeoDiscover Alberta, 2018), refer to **Appendix A**.

3.4 Wildlife

Species observed: no wildlife was observed/ heard during the Project site visits.

Wildlife trees: no wildlife trees were observed during the Project site visits.

Significant species: using the online Fish and Wildlife Management Information System (FWMIS, Government of Alberta 2018), a database search was conducted within a one kilometre (km) radius of the Project (inclusive of the Project sites itself), refer to **Appendix C**. From this search, 2 bird, and 7 fish species were identified. Provincially listed species within this 1 km radius include:

- Northern Leopard Frog (*Lithobates pipiens: '*At Risk').
- Barred Owl (*Strix varia:* 'Sensitive').

The Northern Leopard Frog is also listed under the Committee on the Status of Endangered Wildlife in Canada (COSEWIC, Government of Canada 2018) and the *Species at Risk Act* (Species at Risk Act, Government of Canada 2002) as 'Schedule 1' and a species of 'Special Concern'. The Northern Leopard Frog habitat is wetlands with water present until at least July with abundant aquatic and emergent vegetation. Potential for occurrence at the Project is low.

The location where the stair ties into the exiting Whitemud Drive paved shared-use path is approximately 320 linear metres from the Whitemud Creek, the Project will not impact the creek/ creek bank so aquatic species were not surveyed.

Significant wildlife habitat: the land cover is modified, non-maintained on the slope and maintained at the top upland area. An area of naturally non-wooded closed shrub exists approximately 12 linear metres (at the closet point) northeast of the site and an area that is naturally wooded exists approximately 10 linear metres (at the closet point) to the east (UPLVI, City of Edmonton 2018). The Project is identified as a Natural Area and a Biodiversity Core Areas in the City of Edmonton Wildlife Passage Engineering Design Guidelines (City of Edmonton, 2010). The environmental condition found in Core Areas could support entire populations of animals and plants and associated ecological functions. The Project is outside the City mapped Regional Biological Corridor, a critical wildlife movement corridor which follows the North Saskatchewan River. Coyotes and white-tailed deer are commonly-sighted large mammals moving through the River Valley and Core Areas (Biodiversity Report City of Edmonton 2008). The Project is located in the Provincial Key Wildlife and Biodiversity Zone. It is also in the Sensitive Raptor Range (Government of Alberta, Landscape Analysis Tool 2018).

3.5 Historical Resources

A Historical Resources Act Clearance application was completed by AECOM on August 14, 2018 through the Online Permitting and Clearance (OPAC, Government of Alberta 2018). The review of the Historic Resources Application was completed and the application was approved on October 26, 2018, refer **Appendix C**.

The Listing of Historic Resources was reviewed to identify any land with historical resources value which intersect the Project. The Project falls within lands identified as PV-21591 a and p (Listing of Historic Resources, Government of Alberta 2018).

3.6 Environmental Sensitivities Map

The Project is not classified as an Environmentally Significant Area (Environmentally Significant Areas in Alberta, Government of Alberta 2014).

Refer to **Appendix A** for Background Information and **Appendix D** for Project Environmental Sensitivities Map.

4. The Project

An existing informal earthen trail connects the Whitemud Drive paved shared-use path to Lansdowne Drive. The total length of the sloped earthen trail to be rehabilitated in the North Saskatchewan River Valley and Ravine System Protection Overlay is approximately 70 linear meters. The earthen trail is steep and presents access challenges for trail users. The existing alignment is not currently being regularly maintained by the City due to difficulties accessing the site with current maintenance equipment.

The Project will improve access from Lansdowne Drive to the Whitemud Drive paved shared-use path and the River Valley. The City is seeking a safer connection that is also easy to maintain. This Project presents the City an opportunity to rehabilitate the informal earthen trail, enhance the natural environment, and improve the recreation amenity for the community.

Members of the City of Edmonton and AECOM Project teams completed a walk of the existing earthen trail alignment at the Project site on June 07, 2018. The main drivers for the Project were discussed and include:

- Provide safe and convenient walking and bicycle access to the River Valley from Lansdowne Drive.
- Develop a design that improves access for routine maintenance.

The landscape design for the Project focuses on ease of maintenance and a high level of safety and sustainability in terms of costs, environment, and constructability. Based upon the site assessment, a number of opportunities and challenges have been identified for the Project:

- Maximize retention of existing vegetation.
- Utilize the topographical conditions of the site for the trail alignment and minimize disturbance.
- Utilize native planting.

The City of Edmonton Urban Parks Management Plan (UPMP) guides the design, construction, maintenance, and use of the River Valley. The Project will set out to reinforce the UPMP framework by:

- Connecting parks, other public open spaces and linking river valley experiences.
- Improving connectivity to the River Valley and Ravine Park system.
- Providing a combination of surfaces: asphalt and timber.
- Providing views and vistas into the River Valley.

The design for the Project has been developed with reference to the UPMP and the overall vision of the document: *Edmonton's parks, trails, river valley and natural areas connect Edmontonians to their community, to the environment and to one another* (UPMP, City of Edmonton 2006).

Site preparation: it is proposed to replace the earthen trail with a stair to the current City of Edmonton stair standard (2.5 m wide wooden step structure to City standard detail 5201, see **Appendix C**) (Roadways Design Standards and Construction Specifications, City of Edmonton 2015) and revegetate the earthen trail. A new paved asphalt shared-use trail will connect the top of the stairs to Lansdowne Drive (3.0 m wide asphalt trail to City standard detail 5160, see **Appendix C**) (Roadways Design Standards and Construction Specifications, City of Edmonton 2015). It is anticipated that access for construction will be off Lansdowne Drive with a small laydown area designated in the existing grassed upland area at the top of the slope. The existing earthen trail will be used to access and construct the new stair. Construction impacts to the existing shared-use path (running parallel to Whitemud Drive) should be minimal. Closure of the existing shared-use path will require approval by the City and shall adhere to the City of Edmonton trail closure procedure.

Construction: the construction schedule includes an expected spring 2019 tender with construction occurring during the summer of 2019. With a maintenance period of one year, the completion of the Project is anticipated to be in October 2020. Construction is dependent on funding approval.

Landscaping: all habitat loss will be compensated for by improving the vegetative community by planting native species.

Intended use: the Project will provide formal pedestrian and cycle access to the North Saskatchewan River Valley and Ravine System from the Lansdowne Neighbourhood. Refer to **Appendix D** for design options, the difference between each option is the number of landings.

Utilities: no existing utilities are identified within the Project area on Utility Mapping, refer to **Appendix A**. Alberta One-Call and Dig Shaw were contacted to identify underground utilities for the Geotechnical Investigation. A private locator was procured to verify testhole locations were clear of utilities, no utilities were identified. The bid documents will require the Construction Contractor to call Alberta One-Call at 1-800-242-3447, and all other utility providers, as required, to have existing utilities located prior to start of any construction.

Off-site works: no off-site works are required to complete the Project.

Erosion and sediment control: the construction Contractor is responsible to follow the City's Contactor's Environmental Responsibilities Package: Construction and Maintenance Activities, including Traffic Bylaw # 5590 (prohibits roadway mud tracking) (Traffic Bylaw 5590, City of Edmonton, 2018) and, Erosion and Sedimentation Guidelines and Field Manual (assists contractors to comply with regulatory requirements) (Erosion and Sedimentation Guidelines and Field Manual, City of Edmonton 2005). Erosion control blanket will be specified on slopes steeper than 3H: 1V.

Environmental Construction Operations (ECO) Plan: the Contractor will be required to submit an ECO Plan to meet the City's ECO Plan Framework (ECO Plan Framework, City of Edmonton 2017).

5. Impacts and Mitigation Measures

5.1 Assessing Impacts

The Project is planned in area of modified land cover; the land use where the stair and trail is planned is guided by the North Saskatchewan River Valley Area Redevelopment Plan. The Project will follow an existing earthen trail which is visible on Google Earth imagery from 15 years ago. The Ribbon of Green identified the Project lands as low sensitivity for wildlife and vegetation. The stair could be a barrier to wildlife passage; however the design will feature areas for passage. The assessment of impacts are based on the grassed slope area and maintained grass area at the top of the slope, part of the North Saskatchewan River Valley Area Redevelopment Plan area.

Nature of impact: the restoration of the earthen trail will be positive. The Project will restore a modified and disturbed land cover and prevent further vegetation loss. Not completing the Project could lead to an increase of informal trails as seen elsewhere in Edmonton's River Valley. All habitat loss will be compensated for by improving the vegetative community through planting native species. The stair could be a barrier for wildlife passage; however, the design will include measures for wildlife movement to mitigate negative impacts.

Magnitude: based on the low sensitivity of the Project lands for wildlife and vegetation, the magnitude of impact as a result of the Project is low.

Geographic extent: AECOM recently completed a Stair and Trail project for the Town of Devon (October 2015) on a very similar topography to Lansdowne. The Contractor used a small skid steer to transport materials and complete stair construction activities within a very small footprint. The area for the stair is approximately 200 m² with the restoration extending approximately 1 m on either side of the stair equaling 330 m² total area. The total upland Project area at the top of the slope to Lansdowne Drive is approximately 485 m², the asphalt area is approximately 150 m² and the restoration area is approximately 335 m² (1 m on either side of the trail and 8 m x 19 m laydown area).

Duration and timing: refer to **Section 4** Construction Schedule.

Likelihood of impacts: the positive impact of the Project is very likely.

5.2 Identifying Cumulative Impacts

Known past, present and future projects and activities in or near the Project area were reviewed for their potential to interact with Project environmental effect. Based on this information, the ravine is not materially affected by the Project as proposed. No significant cumulative impacts are expected to result from Project implementation.

5.3 Mitigation Measures

Pre-construction:

- Design of the trail and stair will be limited to areas which are already disturbed by human foot traffic as much as possible to avoid disturbing existing vegetation.
- The development and implementation of a Project-specific Weed Management Program (WMP) will be a requirement for the Contractor.
- Wildlife movement: crossings and a crossing area within the stair structure will be allowed for to provide connectivity of habitat. Low/ flush areas will be provided along the stair where ungulates like deer and moose are able to pass through unrestricted. The crossing will be high enough to allow for amphibians like toads/ frogs to pass under without issue. Small mammals like coyotes, rabbits and mice will likely pass in the same area as the ungulates and the stairs are raised enough such that they can fit under (Wildlife Passage Engineering Design Guidelines, City of Edmonton 2010).

Construction:

- Delineate and fence the Project work area to minimize the area of disturbance.
- All equipment and vehicles working on site shall be clean and free of contaminating material (soil, vegetative material, and chemicals).
- Provide signage and flag persons (if required) for construction traffic.
- The one existing tree within the Project area will be protected as per the City's tree protection details (Landscaping, City of Edmonton 2017).
- Restore and landscape all disturbed areas to its original condition after construction.
- It is recommended that the entire Project not be blocked off at one time to still allow for wildlife passage through the area.
- Timing of construction should be limited to daytime hours, when possible to avoid impacts during peak wildlife times.
- Schedule construction to avoid the migratory bird breeding and nesting period, if possible. For the Edmonton area (Nesting Zone B4), the nesting period specified by Environment and Climate Change Canada is between April 15 and August 31. If construction must occur during the migratory bird breeding and nesting period, initiate construction outside of the bird nesting period if possible. In the event that construction activities cannot be avoided during the migratory bird breeding and nesting period, qualified personnel will be required to systematically search all affected and nearby areas for active nests within a maximum of 7 days prior to the start of activities (i.e., nest sweep). Nest search information is valid for seven days from the survey date. As such, construction activities should commence as soon as possible in areas with no restrictions (i.e., areas where no nests were observed). If these activities do not commence by the survey date plus seven days, or if work is interrupted for seven consecutive days during the breeding period, a follow-up bird nest search is recommended. If an active nest is found, qualified personnel will determine an appropriate setback and the setback area will be flagged or marked. Construction will not occur within a setback area until nesting has concluded.
- Active animal dens or bird nests will not be disturbed. If a den or a bird nest is found during construction, mitigation (e.g., an appropriate setback buffer) will be implemented to protect the den/ nest based on the recommendations of a qualified biologist; additional consultation with Alberta Environment and Parks and/ or Environment and Climate Change Canada may be required.
- Construction vehicle speed limits should be implemented to minimize wildlife mortality in the area.
- Restoration should occur immediately after the completion of construction.
- Construction crews should be informed of the appropriate procedures to follow if they see wildlife.

- Food, food waste, and garbage should be stored and disposed of properly, as to not attract wildlife into the construction site.

Trees: the Project does not require the removal of trees. However, if any trees are removed for construction (subject to approval of by the Ecological Planner), they should be replaced with trees of similar or better habitat value under the Corporate Tree Management Policy (Corporate Tree Management Policy, City of Edmonton1989).

Rare plants: the stair and trail will follow the existing alignment; the Project footprint will be minimized. The adjacent and surrounding habitat will be protected; activities will be restricted to the planned disturbance area. The bid documents will include mitigation measures, including confining construction activities to within the proposed areas and reporting all rare plant occurrences to Alberta Conservation Information Management System to update element and tracking lists.

Weed management: in order to minimize the potential for the establishment of weeds during construction, the design minimizes construction activities that lead to the exposure of soil, minimises the area of impact, and requires that construction equipment are clean and free of dirt and any vegetative material including seeds.

In addition, post construction monitoring for weeds will occur during the maintenance period. Under *Alberta's Weed Control Act* (Government of Alberta 2008), species defined as "prohibited noxious" or "noxious" in the *Weed Control Regulation* (Government of Alberta 2010) will be removed or controlled.

Topsoil: the intent is to use site topsoil for restoration of disturbed areas. Topsoil should be salvaged, stockpiled, protected, tested and ameliorated to meet the Landscaping Design and Construction Standards (Landscaping, City of Edmonton 2017).

Restoration: vegetation cover helps reduce soil erosion and degradation at the site. The design will strive to minimize areas to be cleared or disturbed as much as possible and the site will be restored as per the Restoration Plan. The adjacent plant species composition and the pre-disturbance species composition will guide the restoration plant material specified. The Restoration Plan will be developed further as the design progresses; considerations will include erosion control matting in areas with slopes steeper than 3H: 1V.

6. Environmental Monitoring

After construction, all habitat loss will be compensated for by improving the vegetative community by planting native species, refer to **Section 5**. As the Project is on modified lands and follows an existing disturbed earthen trail environmental monitoring is not needed. Restored areas will be maintained to meet the Landscaping Design and Construction Standards (Landscaping, City of Edmonton 2017) until a Final Acceptance Certificate is received from the City of Edmonton. Maintenance will include: repairing slumped or eroded areas, watering, and controlling weed growth.

Compliance: monitoring as per current City of Edmonton Landscaping Design and Construction Standard. No additional monitoring.

Stage, schedule and duration: restored areas will be monitored by visual inspection during the establishment and maintenance periods. Maintenance will include all measures necessary to establish and maintain all plants in a vigorous and healthy growing condition. Maintenance activities include the repair and reseed of dead or bare spots, control weeds by mechanical means and watering the seeded area to maintain optimum soil moisture level for germination and continued growth of grass. Restored areas will be maintained from the time of installation until Construction Completion, and for period of one year from the issuance of a Construction Completion Certificate to the date of Final Acceptance Certificate. After the Final Acceptance Certificate has been approved, the City of Edmonton will be responsible for restored areas.

Thresholds or benchmarks: until Final Acceptance the Contractor will be responsible for re-seeding bare spots or thin areas. A satisfactory condition of seeded areas includes the following:

- Within 12 weeks, germination over 80% of the area sown with no single bare area greater than 100 cm².
- At time of acceptance, no bare spots greater than 15 cm².

Responsibilities: the Contractor will be responsible to monitor the Project to achieve the above criteria. Inspections will be as per the City of Edmonton Landscaping Design and Construction Standards.

Contingency plan: if seed fails to germinate within four growing months, the Contractor will be responsible to re-cultivate and re-seed until germination takes place and the above criteria are met.

7. Public Consultation

The need for this Project was identified during the Lansdowne Neighbourhood Renewal public engagement, the following is a summary from the Building Great Neighbourhoods events (BGN, City of Edmonton 2014, 2015, 2016):

Lansdowne Meeting One with Community League Executive October 14, 2014:

Lansdowne Community League comment: *We have no access to the river valley from the neighbourhood and would be interested in having stairs put in. We've tried in the past to get them put in but with no luck.*

City of Edmonton response: *Transportation Services and Community Services recently worked together to identify priority stair locations, including in Lansdowne. As of yet there is no funding available to complete the project. Community Services has put forward a budget request for the 2015- 18 budget cycle to renew or rehabilitate existing River Valley trails and parks.*

Lansdowne Meeting Two March 17, 2015:

Stakeholder comment: *I would like steps down the south hill (Lansdowne Dr and 42 ave) to the ravine walks. As a senior the hill is too steep and slippery/ice/mud.*

Stakeholder comment: *Stairs down from Lansdowne Drive (south end) down to snow valley Whitemud drive sidewalk.*

Stakeholder comment: *Please be mindful of quality. Better grade concrete. Better worker quality please. Stairs to ravine please.*

City of Edmonton response: *Thank you for your comments. We are currently assessing your suggestion on stairs from Lansdowne Drive to the shared use path along Whitemud.*

Lansdowne Meeting Three February 11, 2016

Stakeholder request: *Provide stairs from Lansdowne Drive down to snow valley and Whitemud drive sidewalk.*

City of Edmonton response: *Environmental review and geotechnical assessments will be done to determine how the area can be improved to connect top of bank to river valley trail below.*

Access to Lansdowne was also noted during public meetings as part of Whitemud and Blackmud Ravines Trails Development Plan (City of Edmonton 1990).

Public engagement in fall 2018 provided an opportunity for Lansdowne residents and users of the public space to provide feedback on two proposed concept plans. The overall response to the proposed concept plans was well received with a majority of the respondents indicating support for the staircase. When asked '*Which option do you prefer? Option A (1) or Option B (2)?'*, with the exception of a few responses, the majority of the respondents showed preference for the option with the fewer landings (Option B), refer **Appendix F** for a 'What We Head Report'. This process was guided by the City's Policy on Public Engagement (C593 – Public Engagement Policy, City of Edmonton 2017). An information session prior to the start of construction will be held for area residents. Information such as Project phasing, and stair usage access and impacts will be posted to the City's website.

8. Conclusions and Supporting Information

8.1 Opinion of Probable Costs

AECOM's preliminary Opinion of Probable Costs for the Project has been included in **Appendix E** with the overall cost provided below. The costs include anticipated construction items (consultant fees not included) and are based on installing the stair on the alignment of the existing earthen trail:

- $250,375 +/- 25% ($312,968 to $187,781, wooden stair and asphalt trail).

8.2 Conclusion

Option B will be developed during preliminary design. The positive impact of the Project is very likely. The Project will restore an existing earthen trail with native plant material and provide a safe link for the community to the River Valley.

8.3 Tasks and Responsibilities to Complete the Project

The following table outlines the tasks and responsibilities as the Project progress through design, construction and completion.

Table 1. Tasks and Responsibilities to Complete the Project

Task	City Representative	External Representative
Environmental Impact Assessment	Open Space Planning & Design	AECOM
Site Location Study	Open Space Planning & Design	AECOM
Preliminary Design	Open Space Planning & Design	AECOM
Development Permit	Open Space Planning & Design	
Detailed Design	Open Space Delivery	
Crossing Agreements	Open Space Delivery	
Topsoil testing	Open Space Delivery	
Tree Protection Plan	Open Space Delivery	
Tender and award	Open Space Delivery	
Pre-Construction: Public Engagement event and update	Open Space Delivery	
Pre-Construction: Neighbourhood Resource Coordinator/ Revit Coordinator notification	Open Space Delivery	
Pre-Construction: nest search should work occur in nesting period	Open Space Delivery	
Pre-Construction: Safety Plan	Open Space Delivery	Contractor
Pre-Construction: Trail Closure Plan	Open Space Delivery	Contractor
Pre-Construction: Construction Work Plan	Open Space Delivery	Contractor
Pre-Construction: Contractor's Environmental Responsibilities Acknowledgement Form	Open Space Delivery	Contractor
Pre-Construction: ECO Plan	Open Space Delivery	Contractor
Pre-Construction: Erosion and Sedimentation Plan	Open Space Delivery	Contractor

Task	City Representative	External Representative
Pre-Construction: Traffic Bylaw # 5590 Compliance Plan	Open Space Delivery	Contractor
Pre-Construction: Community Standards Bylaw # 14600 Compliance Plan	Open Space Delivery	Contractor
Pre-Construction: Weed Management Program	Open Space Delivery	Contractor
Pre-Construction: Resource Planning and Land Development inspection	Open Space Delivery	Contractor
Pre-Construction: Natural Areas and Urban Forestry inspections	Open Space Delivery	Contractor
Construction: Construction signage	Open Space Delivery	Contractor
Construction: Alberta One-Call and all other utility providers clearance	Open Space Delivery	Contractor
Construction: Construction Completion Inspection. Parks Operations, Forestry, Ecology	Open Space Delivery	Contractor
Post-Construction: Resource Planning and Land Development inspection	Open Space Delivery	Contractor
Post-Construction: Natural Areas Operations and Urban Forestry inspections	Open Space Delivery	Contractor
One-year warranty period and monthly monitoring from issuance of the Construction Completion Certificate	Open Space Delivery	
Final Acceptance Inspection. Parks Operations, Forestry, Ecology	Open Space Delivery	Contractor
Post Acceptance Maintenance	River Valley Operations	

9. References

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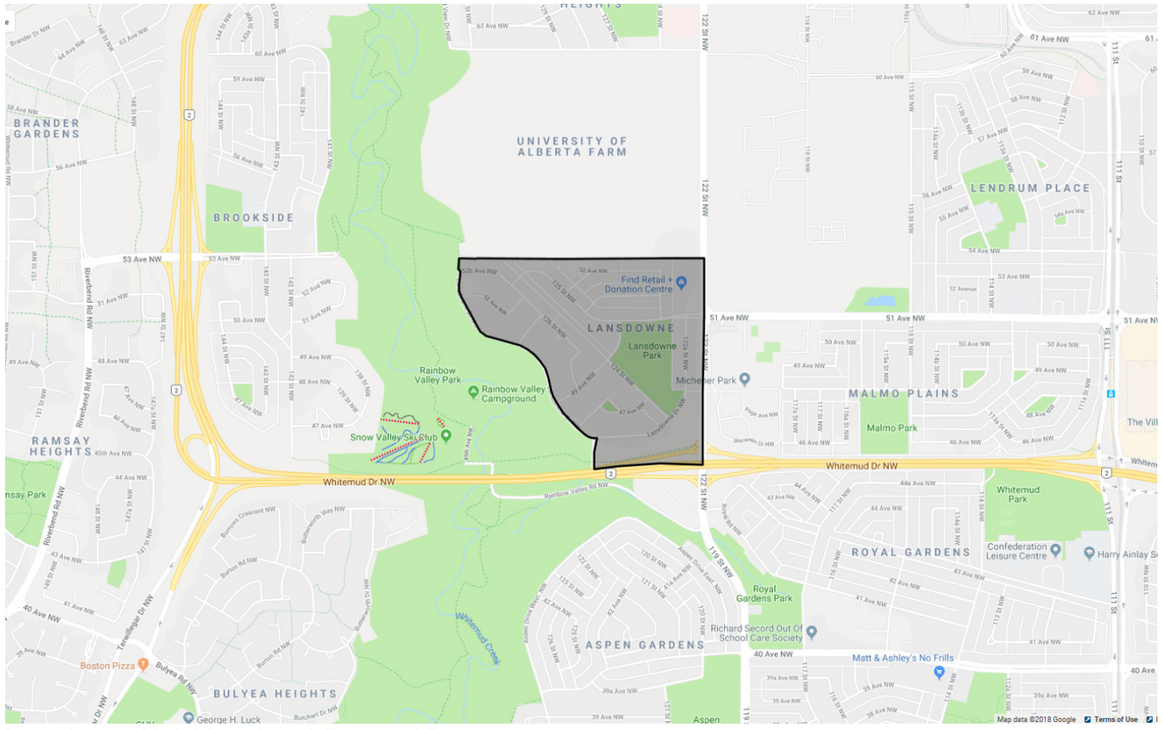
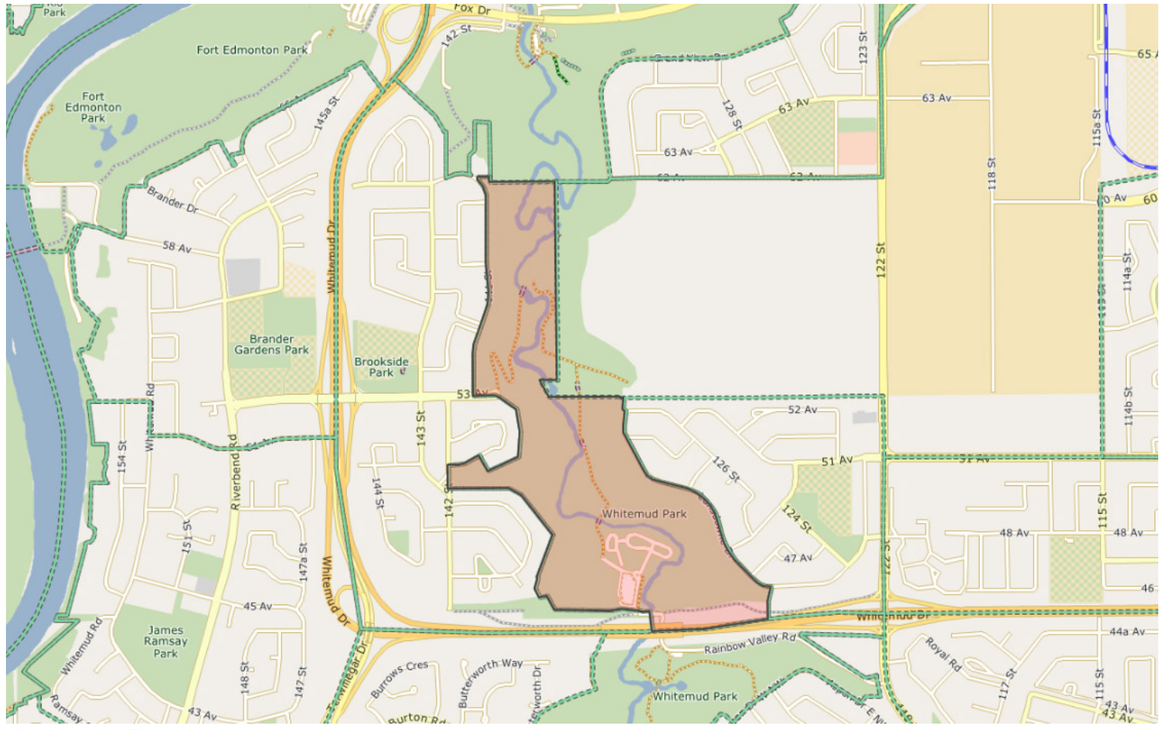
Appendix A **Background Information**

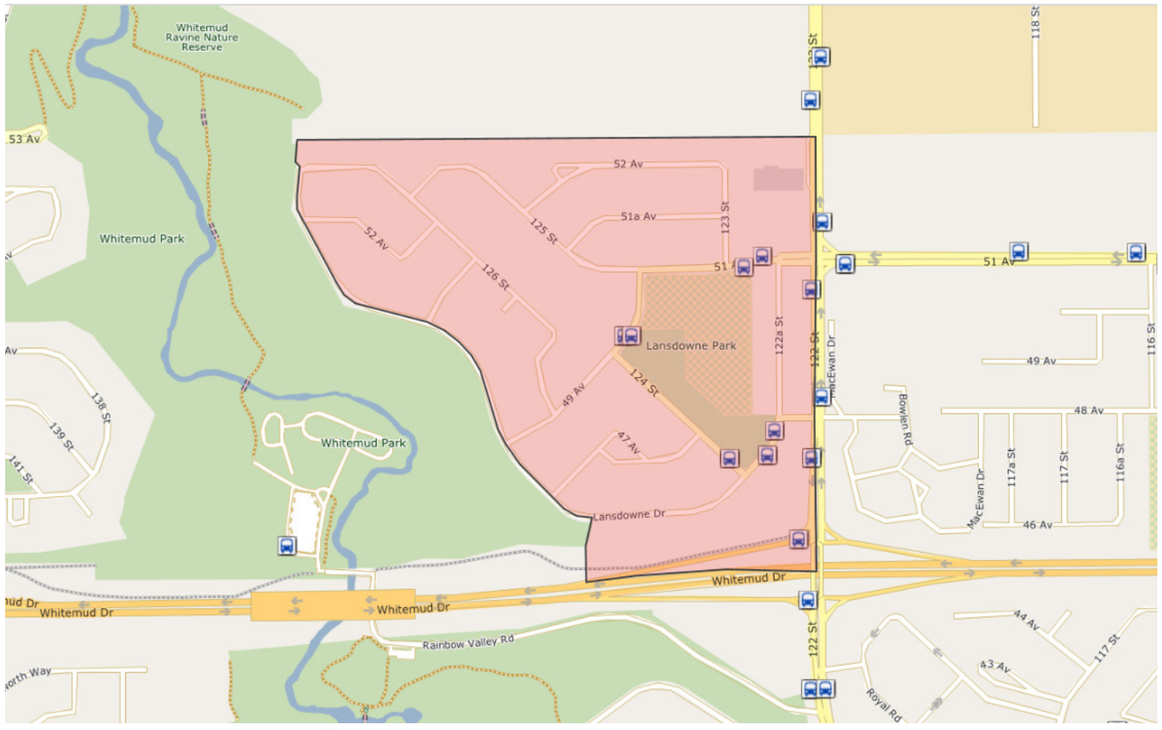
Neighbourhood Maps Source: http://maps.edmonton.ca/nim/



Lansdowne Neighbourhood Context View



Whitemud Ravine North

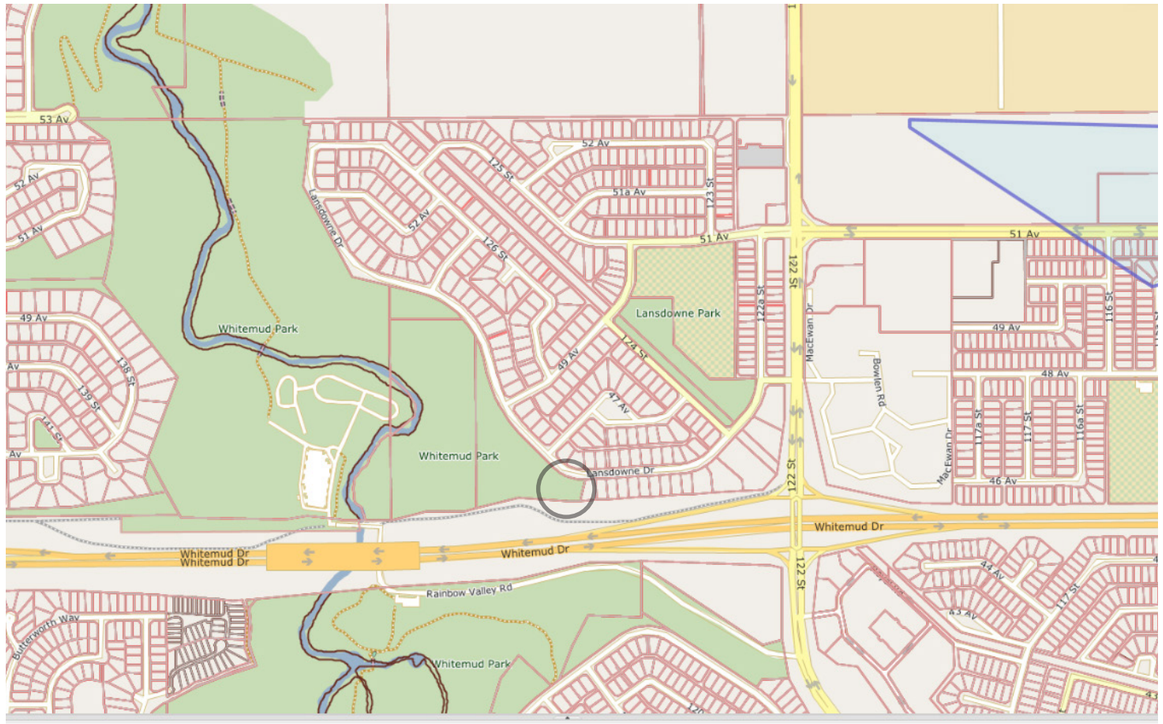


Lansdowne Neighbourhood Transit

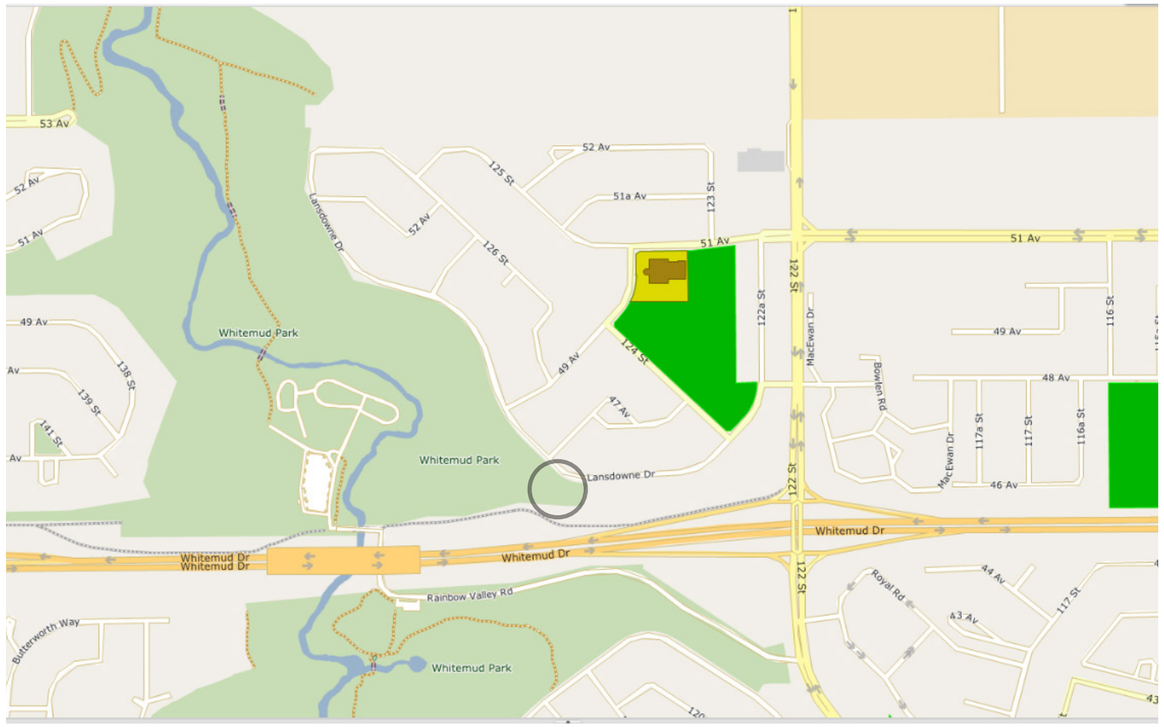
Lansdowne Neighbourhood City Projects

SLIM Maps Source: https://maps.edmonton.ca/map.aspx

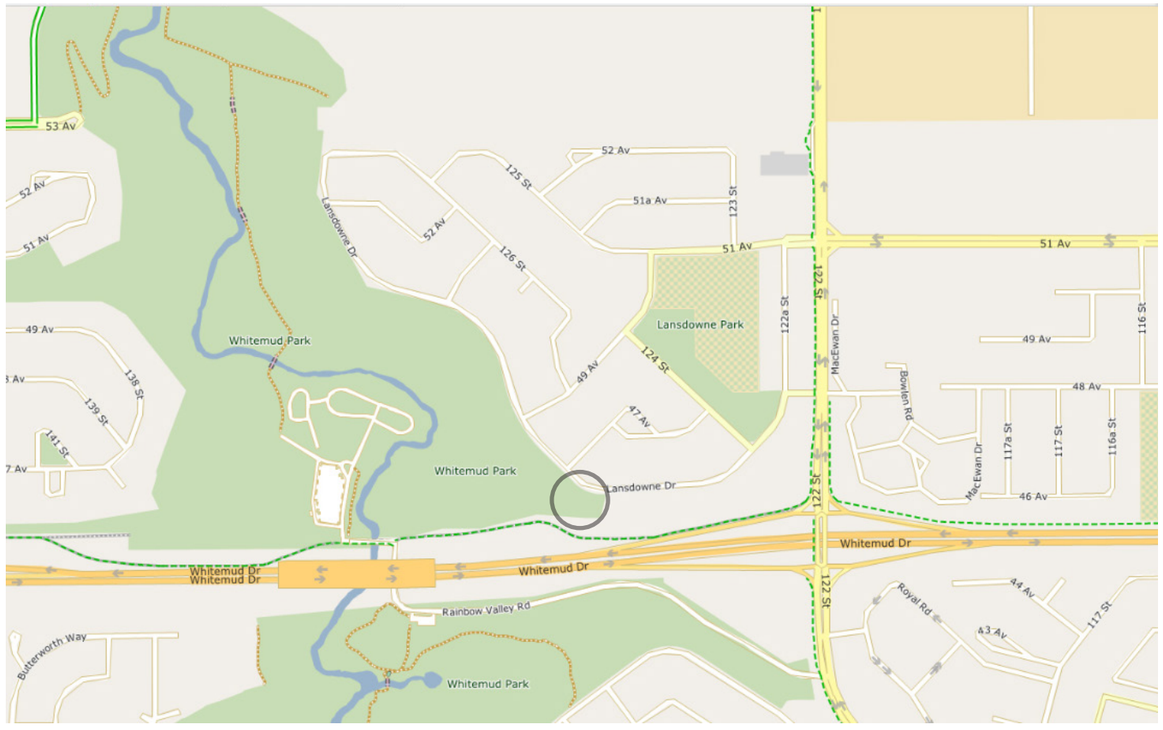
◯ Project Area



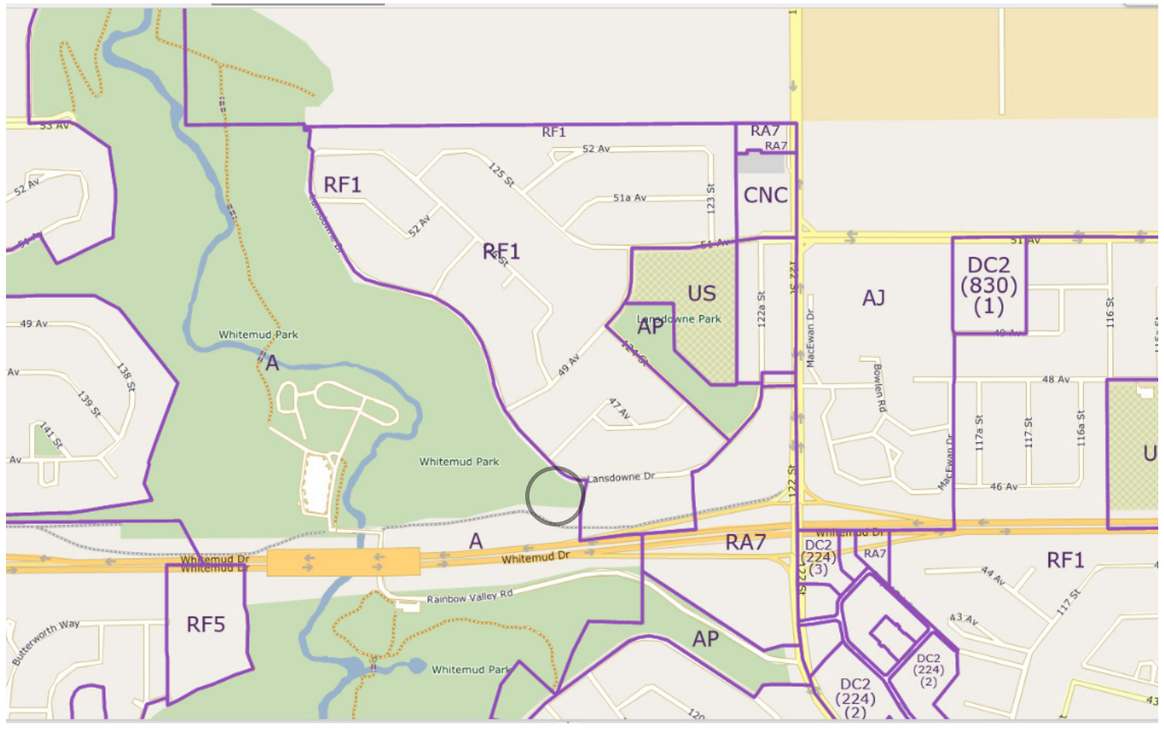
Parcels



School sites

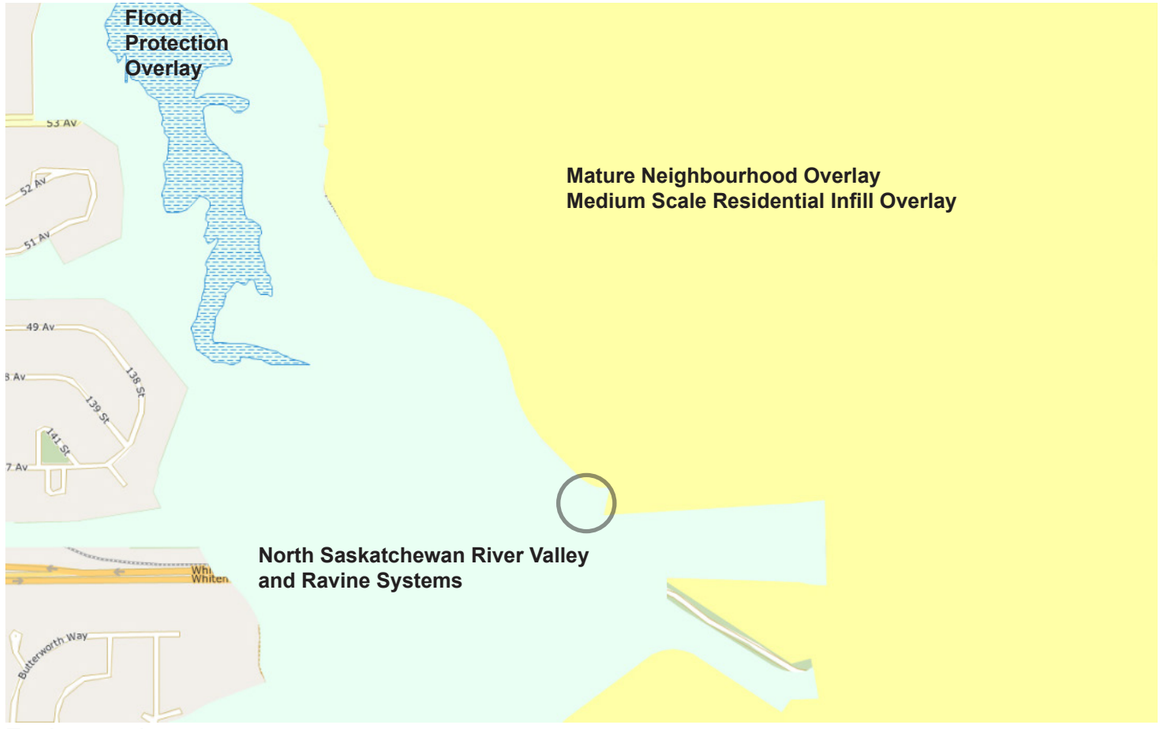


Bike routes



Zoning

SLIM Maps Source: https://maps.edmonton.ca/map.aspx



Zoning overlays

Project Area

AbaData Source: http://www.abacusdatagraphics.com/

Utilities

yegTreemap Source:https://www.opentreemap.org/edmonton/map/

Trees

Aerial Images Source: Google earth

Project Area

2004

2007

2008

2010

Aerial Images

Source: Google earth

Project Area

2012

2013

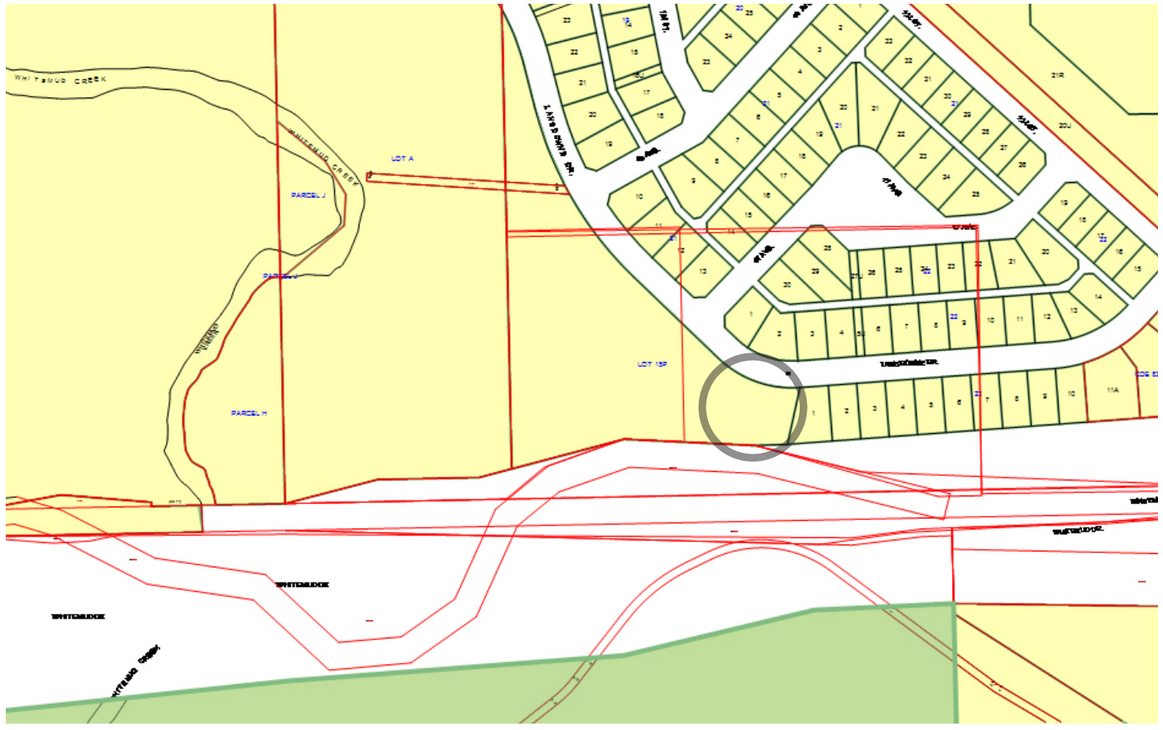
2015

2017

6

Land Titles Source: https://alta.registries.gov.ab.ca/spinii/legalnotice.aspx

Project Area



Parcels

S
LINC SHORT LEGAL TITLE NUMBER
0016 564 941 1800NY;23;15P 232Z210F

LEGAL DESCRIPTION

PLAN 1800NY
BLOCK TWENTY THREE (23)
LOT FIFTEEN-P (15-P) (RESERVE)
CONTAINING 2.83 HECTARES (7.01 ACRES) MORE OR LESS
EXCEPTING THEREOUT ALL MINES AND MINERALS

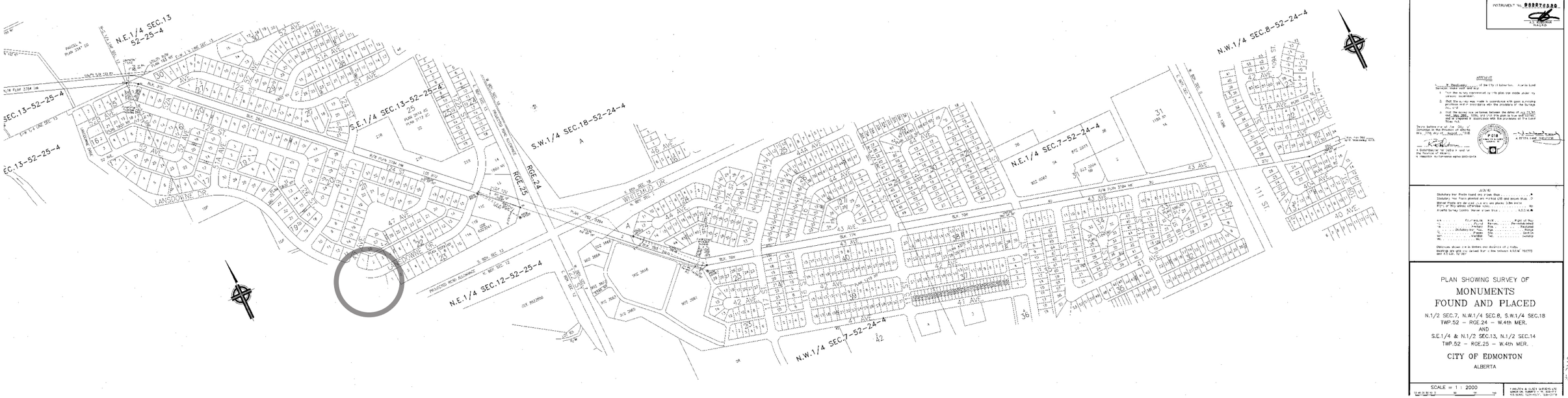
ATS REFERENCE: 4;25;52;13;S
ESTATE: FEE SIMPLE

MUNICIPALITY: CITY OF EDMONTON

REGISTERED OWNER(S)

REGISTRATION	DATE(DMY)	DOCUMENT TYPE	VALUE	CONSIDERATION
232Z210F	06/04/1965			

Title



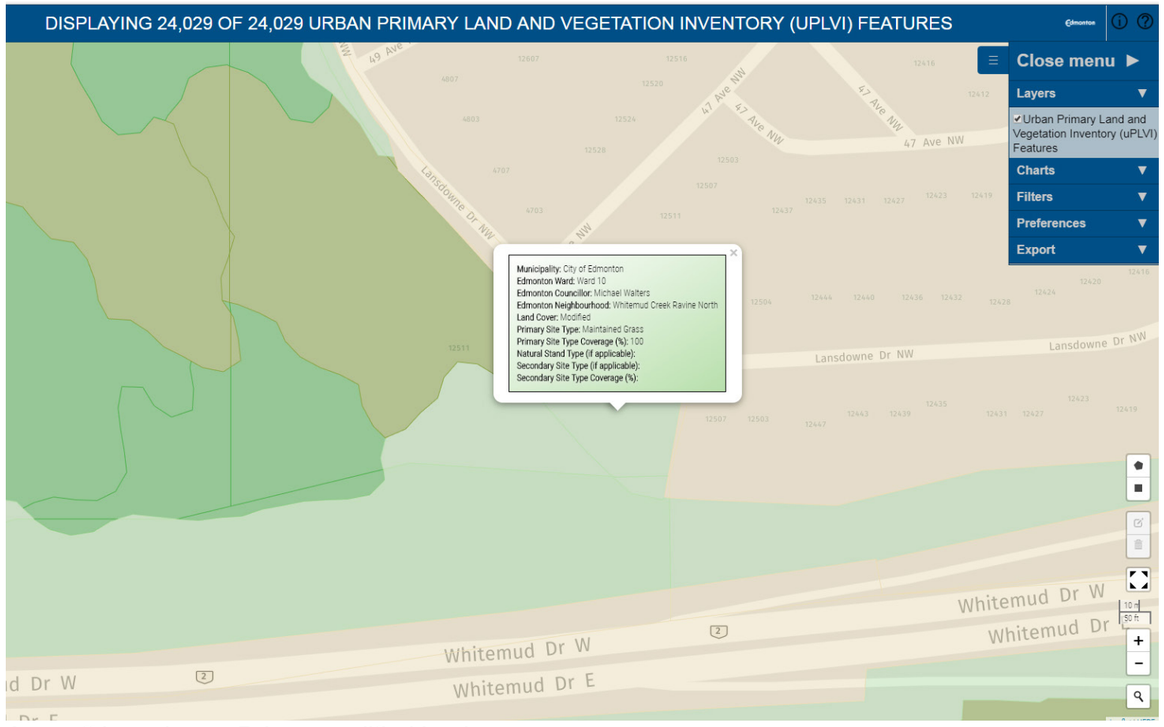
LAND TITLES OFFICE
ENTERED AND REGISTERED
PLAN No. 982 4485
ON SEP 11 1998
INSTRUMENT No. 982276580

PLAN SHOWING SURVEY OF
MONUMENTS
FOUND AND PLACED
N.1/2 SEC.7, N.W.1/4 SEC.8, S.W.1/4 SEC.18
TWP.52 – RGE.24 – W.4th MER.
AND
S.E.1/4 & N.1/2 SEC.13, N.1/2 SEC.14
TWP.52 – RGE.25 – W.4th MER.
CITY OF EDMONTON
ALBERTA

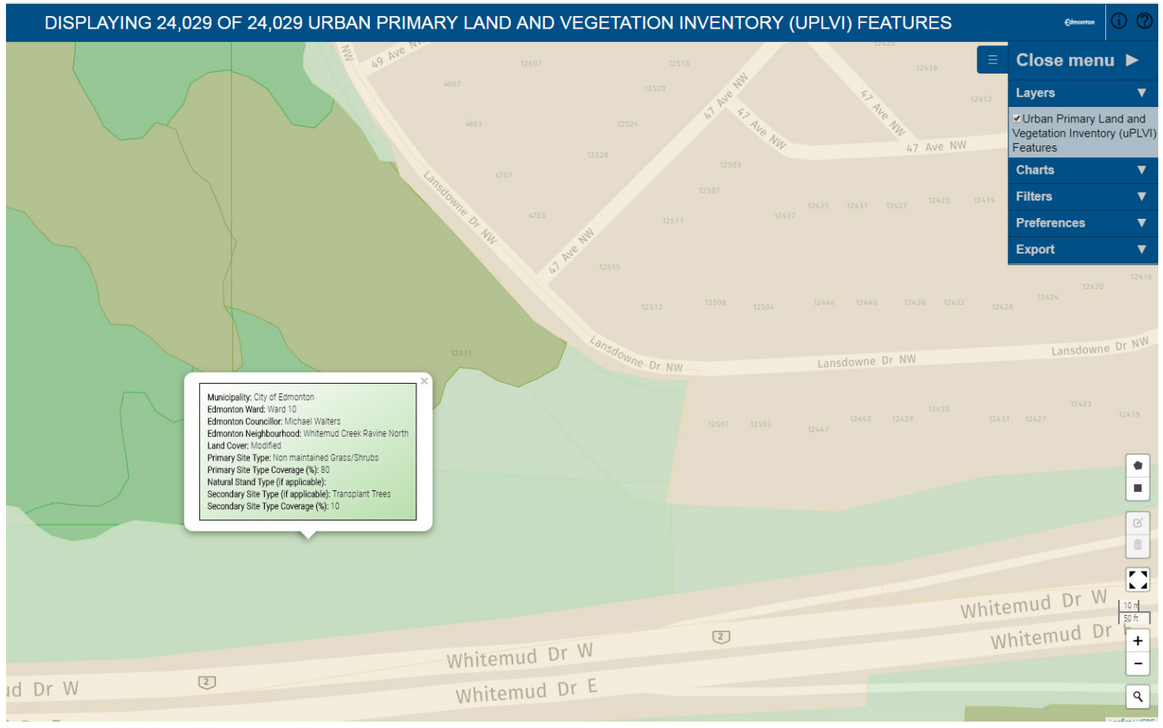
SCALE = 1 : 2000

Plan of survey

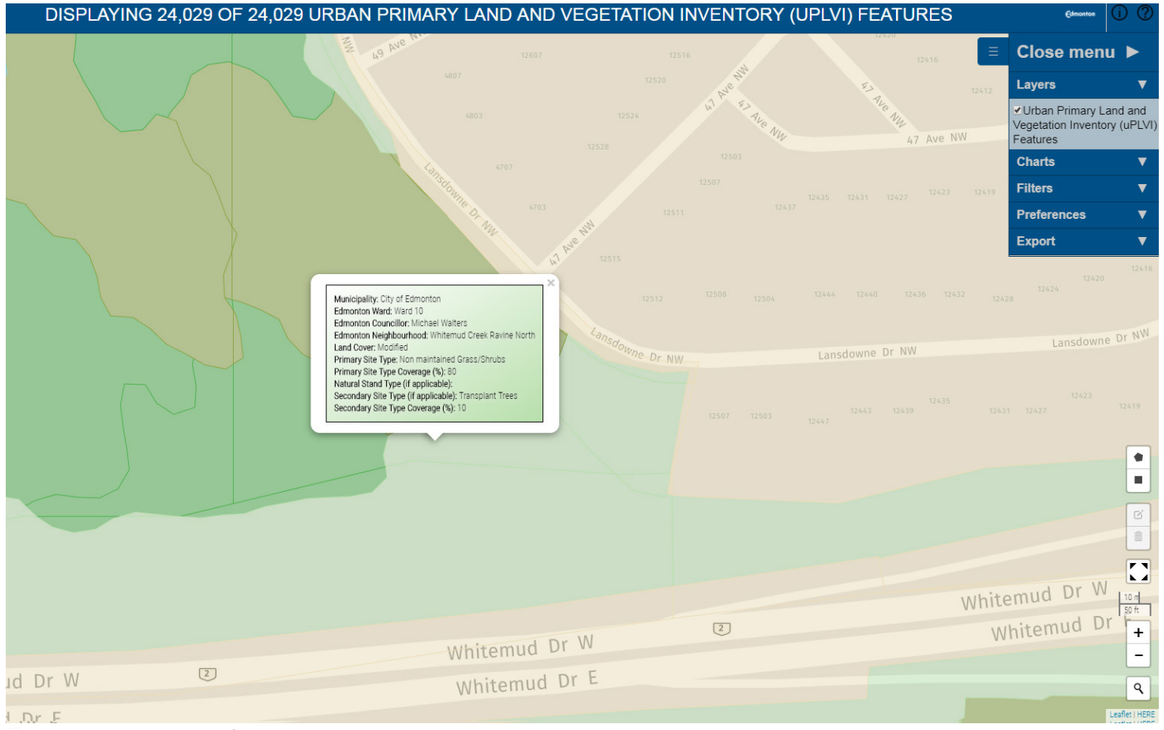
Urban Primary Land and Vegetation Inventory Source: https://data.edmonton.ca/stories/s/uzm8-jc7c



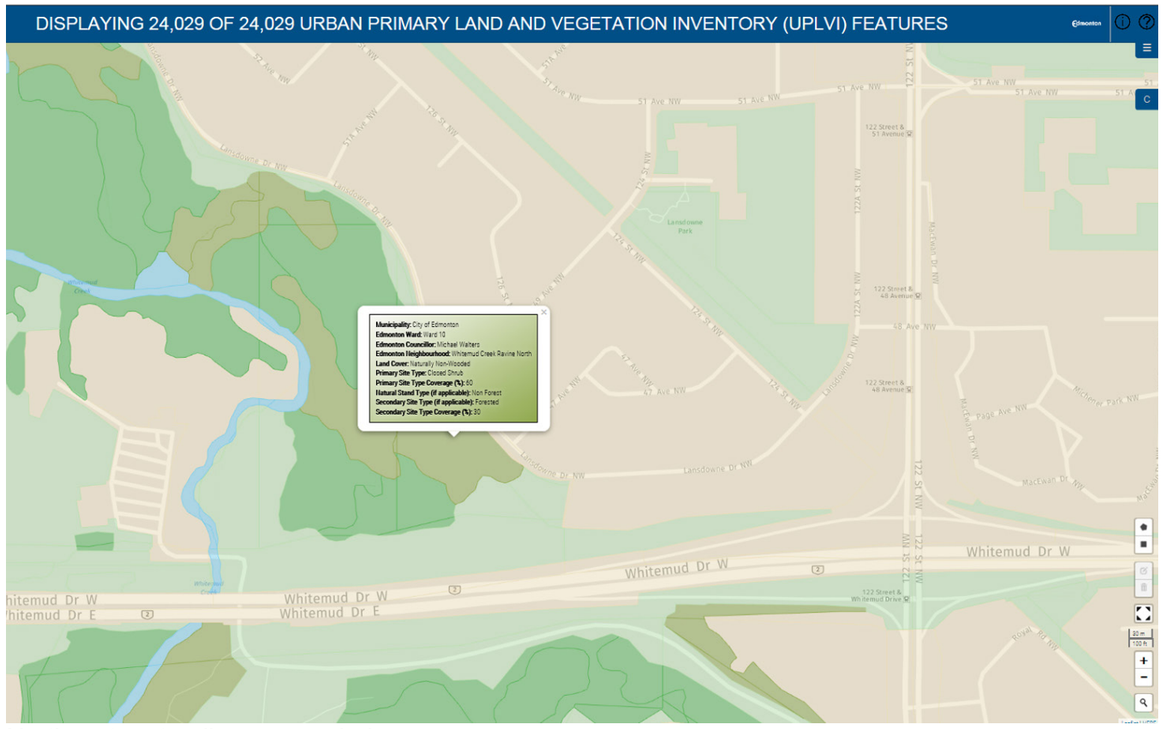
Area off Lansdowne Drive - modified land cover



Whitemud Drive Right of Way - modified land cover



Earthern trail - modified land cover

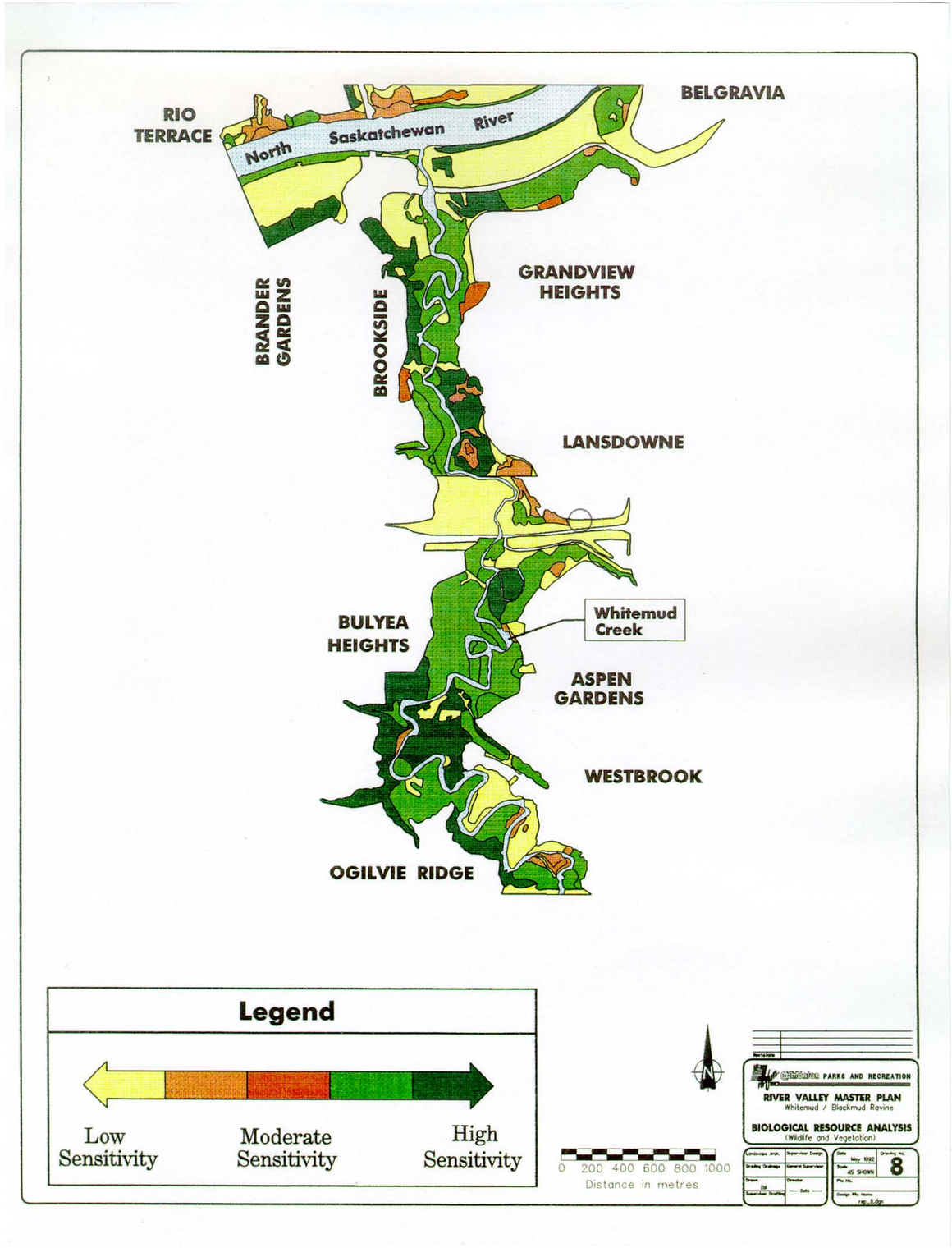


Northeast- naturally non-wooded

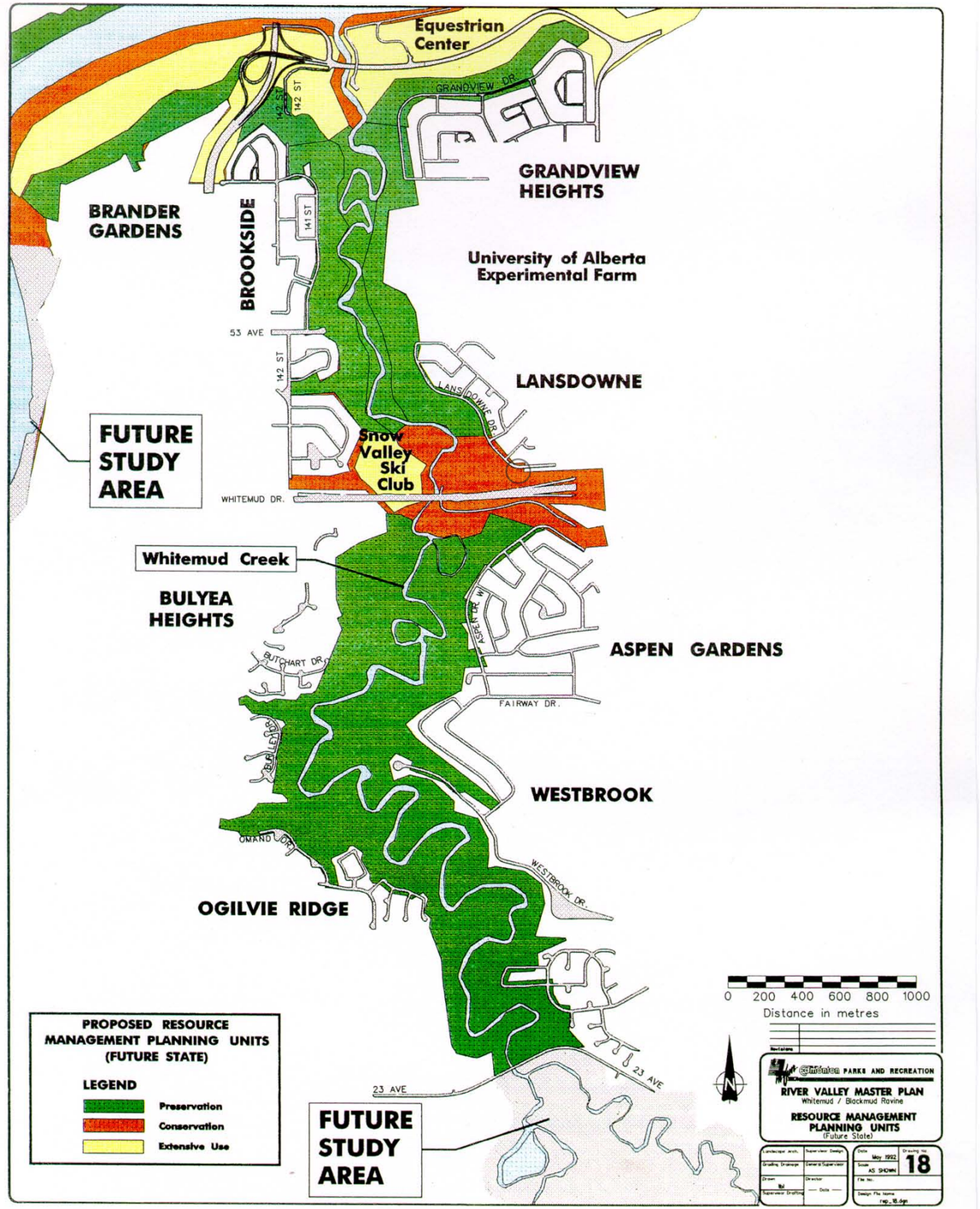
Edmonton 1924 Source: http://centennial.eas.ualberta.ca/files/misc/Edmonton_air_photo_1924.pdf

Aerial just north of Lansdowne Neighbourhood

Project Area

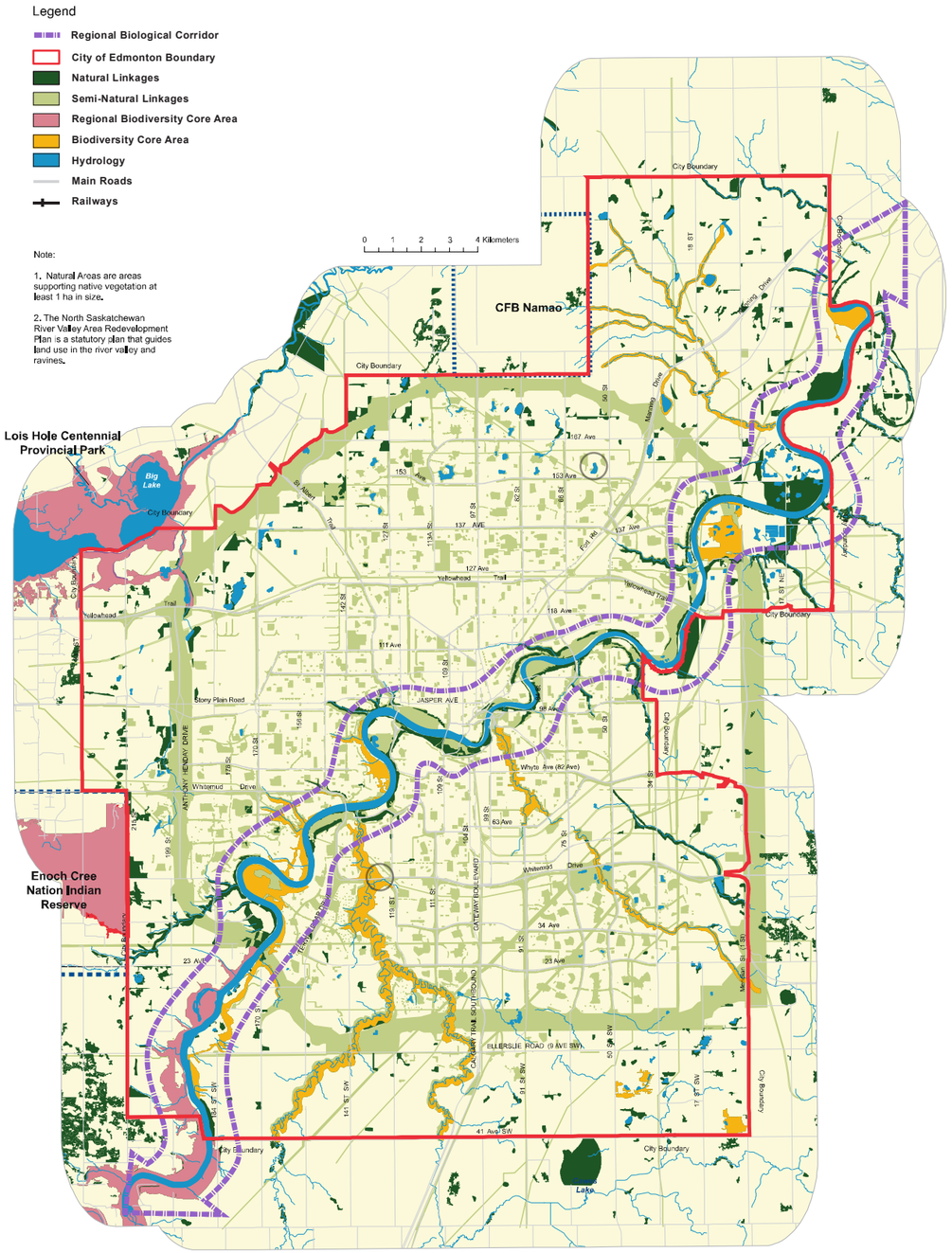


Biological Resource Analysis



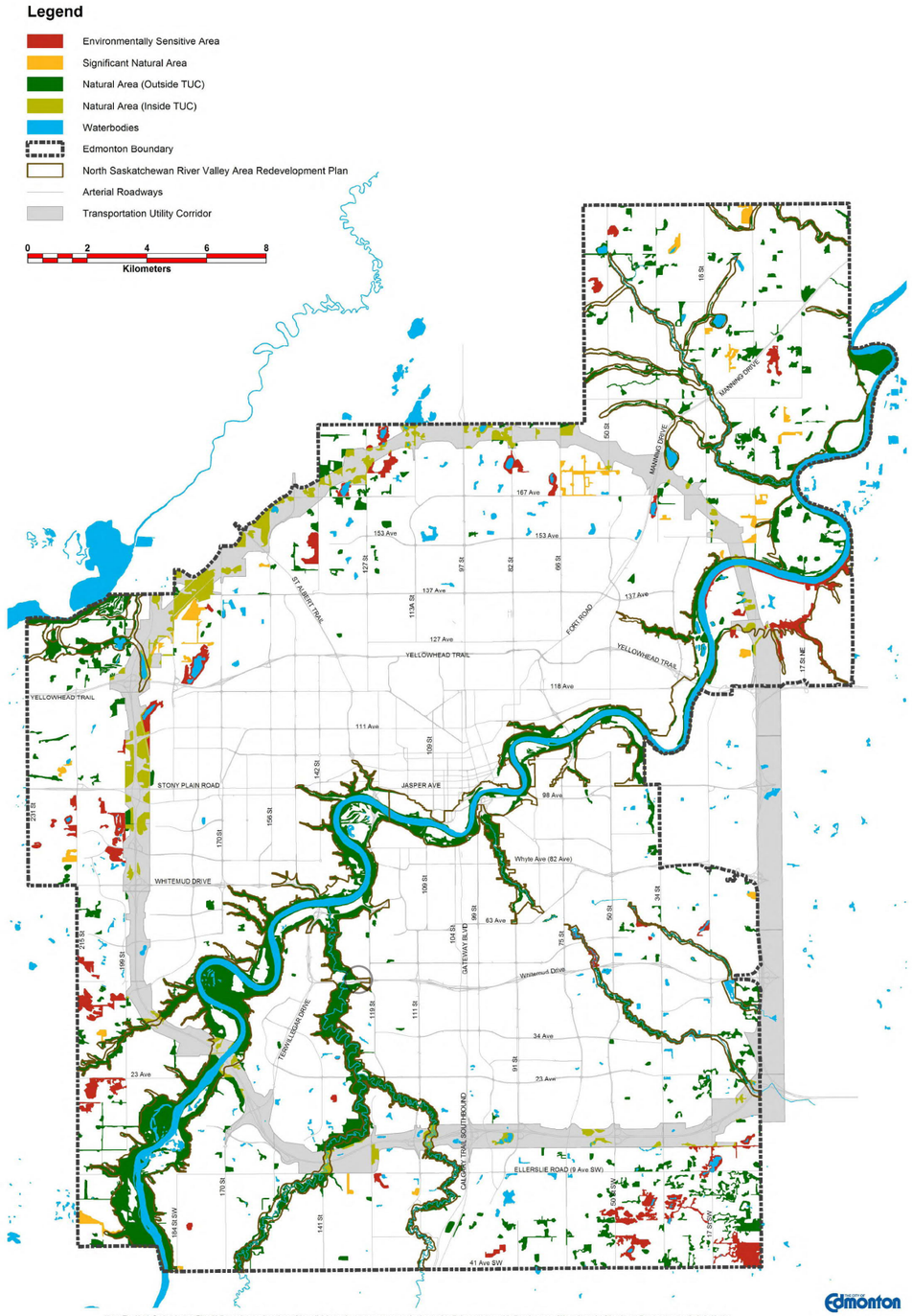
Resource Management Planning Units

Edmonton's Ecological Network



Ecological Network

City of Edmonton Natural Areas in 2007



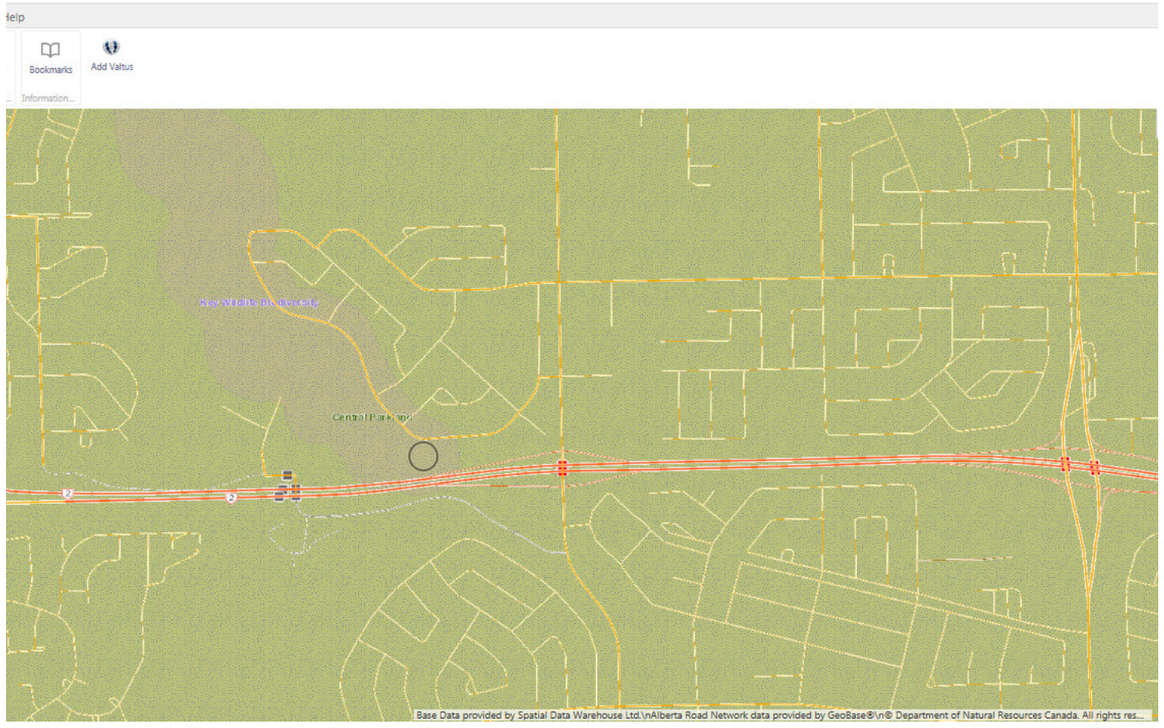
Natural Areas in 2007

Alberta Merged Wetland Inventory Source: https://geodiscover.alberta.ca

Alberta Merged Wetland Inventory

Key Wildlife and Biodiversity Zone Source: https://maps.alberta.ca/LAT

◯ Project Area



Alberta Key Wildlife and Biodiversity Zone

Site Photos

Existing goat track view from bottom of slope (2017)

Existing goat track view from top of slope (2017)

Maintained grass area at the top of slope (2017)

Grass cut on slope (2018)

Appendix B **Geotechnical Investigation**

Lansdowne Stair and Trail Project

Geotechnical Investigation

City of Edmonton

Project number: 60577232 (431)

July, 2018

CP-6993 Lansdowne Stair Concept Design
Integrated Infrastructure Services
Building Great Neighbourhoods and Open Spaces
Open Space Planning and Design

Statement of Qualifications and Limitations

The attached Report (the "Report") has been prepared by AECOM Canada Ltd. ("AECOM") for the benefit of the Client ("Client") in accordance with the agreement between AECOM and Client, including the scope of work detailed therein (the "Agreement").

The information, data, recommendations and conclusions contained in the Report (collectively, the "Information"):

- is subject to the scope, schedule, and other constraints and limitations in the Agreement and the qualifications contained in the Report (the "Limitations");
- represents AECOM's professional judgement in light of the Limitations and industry standards for the preparation of similar reports;
- may be based on information provided to AECOM which has not been independently verified;
- has not been updated since the date of issuance of the Report and its accuracy is limited to the time period and circumstances in which it was collected, processed, made or issued;
- must be read as a whole and sections thereof should not be read out of such context;
- was prepared for the specific purposes described in the Report and the Agreement; and
- in the case of subsurface, environmental or geotechnical conditions, may be based on limited testing and on the assumption that such conditions are uniform and not variable either geographically or over time.

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This Statement of Qualifications and Limitations is attached to and forms part of the Report and any use of the Report is subject to the terms hereof.

AECOM: 2015-04-13

Quality information

Prepared by

Alex Tam
Geotechnical Engineer-In-Training

Approved by

Seán MacEoin, M.Sc., P.Eng.
Senior Geotechnical Engineer - Lead

PERMIT TO PRACTICE
AECOM CANADA LTD.
Signature
Date July 27, 2018
PERMIT NUMBER: P 10450
The Association of Professional Engineers and Geoscientists of Alberta

Revision History

Revision	Revision date	Name	Details
0	June 5, 2018	Alex Tam	Draft
1	July 24, 2018	Alex Tam	Draft Rev1
2	July 27, 2018	Alex Tam	Final

Distribution List

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Tables

Appendices

1. Introduction

1.1 General

The City of Edmonton project proposed is the construction of a new Staircase and Trail in the Lansdowne area. AECOM Canada Ltd. (AECOM) was retained by the City of Edmonton to support the construction of the proposed Staircase and Trail project in the Whitemud Creek area.

AECOM conducted an intrusive geotechnical investigation program in preparation for the Lansdowne Staircase and Trail Project. The proposed staircase location is southwest of Lansdowne Drive and north of Whitemud Drive. The proposed staircase will connect Lansdowne Drive with the walking trail leading to Rainbow Valley Road. This report summarizes the investigation methodology and subsurface conditions encountered. Based on the results of the geotechnical investigation program, general recommendations are provided. The testhole location plan is included in Appendix A and testhole logs are included in Appendix B. Laboratory testing results are included in Appendix C.

1.2 Scope of work

The scope of work for this intrusive geotechnical investigation includes:

- Geotechnical Investigation Start-Up Meeting
- Background Documents Collection and Review
- Geotechnical Investigation
- Geotechnical Report

2. Methodology

2.1 Planning and Coordination

Alberta One Call and Dig Shaw were contacted to identify underground utilities. A private locator was procured to verify testhole locations were clear of utilities.

2.2 Desktop Study and Review of Existing Information

Review of existing information for the site was conducted to obtain information regarding the subsurface condition of the site. The project site is located in southwest Edmonton, between Lansdowne Drive and Whitemud Drive. Following a review of maps and cross sections from "Urban Geology of Edmonton" (Kathol C.P. and McPherson R.A. 1975), the expected stratigraphy consists of glaciolacustrine deposits of bedded sands, silts, and clays underlain by glacial till then bedrock. Surficial deposit thicknesses have been approximated by Kathol and McPherson (1975) and vary between 0 and 50 feet in thickness for the Whitemud Creek area.

The following documents were reviewed to determine subsurface geology:

- Quaternary Geology, Central Alberta map (Shetsen, 1990)
- Geological Map of Alberta (Alberta Geological Survey (AGS) and Alberta Energy Utilities Board (AEUB), 1999)
- Bedrock Geology of Alberta. Alberta Geological Survey (Prior G.J., et. al. 2013)
- Geological Map of Alberta (Green, 1970)
- Urban Geology of Edmonton. Alberta Research Council. (Kathol C.P. and McPherson R.A. 1975).

2.2.1 Quaternary Geology

Near-surface geology of the project area was compiled from the Quaternary Geology, Central Alberta map (Shetsen, 1990). Edmonton consists mainly of fine sediment silt and clay, with stream and slopewash eroded deposits near the North Saskatchewan River. The site location suggests fine sediment deposits of silt and clay with potential for eroded deposits due to its proximity to the North Saskatchewan River. Quaternary geology of the project area as mapped by Shetsen (1990) is shown on Figure 2 in Appendix A.

2.2.2 Bedrock Geology

Bedrock geology of the project area was compiled from the "Bedrock Geology Map of Alberta" (Prior G.J. et al. (2013)). The bedrock in the project area generally belongs to the non-marine to locally marginal marine Horseshoe Canyon Formation, consisting of grey feldspathic clayey sandstone, grey bentonitic mudstone and carbonaceous mudstone, concretionary sideritic layers and laterally continuous coal seams. This includes white, pedogenically altered sandstone and mudstone. Bedrock geology of the project area as mapped by Prior G.J. et al. (2013) is shown on Figure 3 in Appendix A.

2.3 Site Reconnaissance

A site reconnaissance was conducted by AECOM personnel to assess, identify, and mark testhole locations on April 30, 2018. AECOM field personnel met with private locators, IVIS Inc. and drilling subcontractor, Canadian Geological Drilling Ltd., to assess testhole locations and drill rig access.

2.4 Field Investigation

The geotechnical investigation conducted on May 4, 2018, included drilling three testholes and hand augering two testholes. Depths ranged from 2.0 to 10.4 metres below ground surface (mBGS). Alberta One-Call was contacted prior to drilling to locate underground utilities. Testholes were drilled by Canadian Geological Drilling, using a truck mounted solid stem auger drill rig and hand auger testholes

were augered by AECOM personnel. All testholes remained open upon completion and no groundwater was observed. Standpipe piezometers were installed in testholes TH18-02 and TH18-03.

During drilling, AECOM representatives logged and classified soils according to the Modified Unified Soil Classification System (MUSC). Standard Penetration Tests (SPTs) were performed in all drilled testholes. Disturbed samples were collected from the auger and split spoon sampler at regular intervals for laboratory testing. Testhole logs and laboratory testing results are included in Appendix B and Appendix C, respectively.

Flush mounted standpipe piezometers were installed to the termination depth in two testholes (TH18-02 and TH18-03). Standpipe piezometers were 50 millimetres (mm) in diameter and slotted to 1.5 metres (m) from the bottom of the testhole. Testholes without standpipe piezometers were backfilled with drill cuttings.

Table 2-1 below summarizes the drilling program.

Table 2-1 Summary of Drilling Program

Testhole	Location	Depth (mBGS)	Coordinates Northing*	Coordinates Easting*	Monitoring Well Installed (Y/N)
TH18-01	Start of proposed path, closest testhole to Lansdowne Drive	4.3	5927975.7	29989.3	N
TH18-02	Crest of slope, top of staircase	10.4	5927965.9	29964.5	Y
TH18-03	Toe of slope, bottom of staircase	10.1	5927923.9	29910.2	Y
HA18-01	One third way down slope	2.0	5927955.3	29948.6	N
HA18-02	Two thirds way down slope	2.0	5927938.4	29928.7	N

* Co-ordinates provided by the City of Edmonton

2.5 Laboratory Testing Program

Soil samples collected during the site investigation were tested in AECOM's materials testing laboratory in Calgary, Alberta (AB), except the chemical testing, which was performed by ALS Canada Limited. Laboratory testing consists of the following:

- Moisture Content
- Grain Size Analysis (Hydrometer)
- Atterberg Limits Testing
- Unconfined Compression Tests
- Chemical Testing for pH, sulphates, chlorides, and resistivity

The test results are shown on the testhole logs, and are presented in Appendix C.

3. Subsurface Conditions

3.1 General Subsurface Conditions

3.1.1 Organics

Organics were encountered at the surface in testholes TH18-01, TH18-02, TH18-03, HA18-01 and HA18-02. The thickness of the organics varied from 100 mm to 150 mm. The organics were silty and had some rootlets. The organics were noted to be humid and black in colour.

3.1.2 High Plasticity Clay

High plasticity clay was encountered in testholes TH18-01, TH18-02, TH18-03, and HA18-02. The clay was encountered at depths ranging from 0.1 mBGS to 8.4 mBGS. The thickness of the clay layers either varied from 1.2 m to 8.2 m, or extended to the termination depth of the testhole at 4.3 mBGS in TH18-01. The clay was silty, sandy grading to trace sand, trace gravel, and had trace to some oxidation. The clay was brown to dark brown in colour, and humid to moist. SPT N-values for the clay ranged from 7 to 39 blows per 300 mm of split spoon penetration, indicating that the clay was firm to hard. The average SPT N-value for the clay was 14. The moisture content of the clay samples varied from 17.5% to 35.2%. Atterberg Limits were determined for four samples and are summarized in Table 3-1.

Table 3-1: Atterberg Limits for the Clay Layers

Testhole	Sample Number	Depth (mBGS)	USC	Moisture (%)	Liquid Limit (%)	Plastic Limit (%)	Plasticity Index (%)
TH18-01	2	0.8 – 1.2	CH	22.6	61.1	22.2	38.9
TH18-02	2	0.8 – 1.2	CH	35.2	58.5	25.6	33.0
TH18-03	3	1.5 – 1.8	CH	25.7	53.2	19.4	33.7
TH18-03	10	6.1 – 6.4	CH	28.4	65.1	17.1	48.0

Based on the Atterberg Limits and observations during drilling, the clay was classified as highly plastic. Grain size analysis testing was also completed on the clay samples. Three grain size distribution tests were completed on the clay layer and are summarized in Table 3-2.

Table 3-2: Grain Size Analysis for High Plasticity Clay Layers

Testhole	Sample Number	Clay (%)	Silt (%)	Sand (%)	Gravel (%)
TH18-01	2	54.9	31.1	12.7	1.3
TH18-02	2	54.8	42.8	2.4	0.0
TH18-03	3	49.2	37.7	12.9	0.2

Unconfined compressive strength testing was also completed on two clay samples. The unconfined compressive strengths for the two clay samples are summarized in Table 3-3.

Table 3-3: Unconfined Compressive Strength Results for the Clay Layer

Testhole	Sample Number	Depths (mBGS)	Qu (kPa)	Su (kPa)
TH18-02	8	5.3 – 5.9	149	74.5
TH18-03	4	2.3 – 2.9	178	89

3.1.3 Low Plasticity and Low to Medium Plasticity Clay

Low plasticity and low to medium plasticity clay was encountered in testholes TH18-02 and HA18-01. The clay was encountered at depths ranging from 0.1 mBGS to 6.0 mBGS. The thickness of the clay layers varied from a minimum of 1.1 m and extended to the termination depth of the testholes at 2.0 and 10.4 mBGS in HA18-01 and TH18-02, respectively. The clay was silty, sandy to containing some sand, trace gravel, and had trace to some oxidation. The clay was brown in colour, and humid to damp. SPT N-values for the clay ranged from 26 blows per 300 mm of split spoon penetration to refusal, indicating that the clay was very stiff to hard. The moisture content of the clay samples varied from 11.9% to 22.9%. Atterberg Limits were determined for one sample and this is presented in Table 3-4.

Table 3-4: Atterberg Limits for Low and Low to Medium Plasticity Clay Layers

Testhole	Sample Number	Depth (mBGS)	USC	Moisture (%)	Liquid Limit (%)	Plastic Limit (%)	Plasticity Index (%)
TH18-02	10	6.4 - 6.7	CL	11.9	26.3	17.3	9.0

Based on the Atterberg Limits and observations during drilling, the clay was classified as highly plastic. Grain size analysis testing was also completed on the clay samples. One grain size distribution test was completed on the clay layer and is summarized in Table 3-5.

Table 3-5: Grain Size Analysis for Low and Low to Medium Plasticity Clay Layers

Testhole	Sample Number	Clay (%)	Silt (%)	Sand (%)	Gravel (%)
TH18-02	10	19.1	48.3	30.0	2.6

3.1.4 Sand

Sand was encountered in testhole TH18-03. The sand layer extended from 8.4 mBGS to the termination depth of the testhole. The sand was silty, contained some clay, and was fine-grained. The sand was dark grey colour, and humid to dry. SPT N-values for the sand ranged from 77 blows per 300 mm of penetration to refusal, indicating that the sand was very dense. The moisture content of the sand samples varied from 14.2% to 17.5%.

3.1.5 Silt

Silt was encountered in testhole HA18-02. The silt layer extended from 1.3 mBGS to the termination depth of the testhole. The silt was clayey, and contained trace sand and trace oxidation. The silt was light brown in colour, non-plastic, firm and humid. Moisture content of the silt sample was 12.4%.

Grain size analysis testing was completed on the silt sample. One grain size distribution test was completed on the silt layer and is summarized in Table 3-6.

Table 3-6: Grain Size Analysis for Clay Layers

Testhole	Sample Number	Clay (%)	Silt (%)	Sand (%)	Gravel (%)
HA18-02	3	22.1	70.7	7.2	0.0

3.2 Soil Chemical Analysis

Chemical testing was conducted on select samples to determine pH, resistivity, chloride content, water soluble sulphate ion content and total sulphate ion content. The degree of corrosiveness and corrosion potential for sulphate attack are provided in Table 3-7 below in accordance with the Handbook of Corrosion Engineering and the Canadian Standards Association Guidelines.

Table 3-7: Soil Chemistry Summary

Testhole	Depth (mBGS)	USCS Soil Classification	Resistivity (ohm-cm)	Chloride Content (mg/kg)	Total Sulphate Ion Content (%)	pH	Corrosion Potential	Sulphate Attack
TH18-02	1.5 – 1.8	CH	345	57	0.132	8.15	Extremely Corrosive	Moderate
TH18-02	5.9 – 6.4	CL	731	<8.9	0.389	7.61	Extremely Corrosive	Severe
TH18-03	3.4 – 3.7	CH	264	<20	1.25	8.24	Extremely Corrosive	Severe
HA18-02	1.7 – 2.0	ML	550	54	0.888	7.76	Extremely Corrosive	Severe

Based on the above test results, the degree of corrosivity is expected to be highly to extremely corrosive at this site. The potential for sulphate attack in concrete is expected to be severe at this site.

3.3 Groundwater

Groundwater levels were measured upon completion of drilling (May 4, 2018), on May 11, 2018, and again on May 18, 2018. No free groundwater was observed during drilling. The results of the groundwater measurements are summarized in Table 3-8.

Table 3-8: Summary of Groundwater Measurements

Testhole	Depth of Standpipe (mBGS)	Upon Completion of Drilling May 4, 2018 (mBGS)	Groundwater Monitoring May 11, 2018 (mBGS)	Groundwater Monitoring May 18, 2018 (mBGS)
TH18-02	9.9	Dry	Dry	Dry
TH18-03	9.9	Dry	8.9	8.1

Measured groundwater depths are also shown on the testhole logs in Appendix B. It should be noted that the groundwater levels in Table 3-8 are relatively short term and may not be representative of stable groundwater conditions. Groundwater levels can vary in response to seasonal factors and precipitation. The groundwater conditions at the time of construction may vary from those recorded in this investigation.

3.4 Frost Susceptibility

The surficial soils encountered at the site consist of clay (CL, CI, CH). The qualitative frost susceptibility of a soil is typically assessed using guidelines developed by Casagrande (1932) on the basis of the percentage by weight of the soil finer than 0.02 mm and plasticity index. This classification system has been adapted by the U.S. Army Corps of Engineers and the Canadian Foundation Engineering Manual (CFEM, 2006). Soils are classified as F1 through F4 in order of increasing frost susceptibility and loss of strength during thaw. The soil units encountered at the site and their frost group classifications are summarized in Table 3-9.

Table 3-9: Frost Susceptibility

Soil Unit	USC	Finer than 0.02 mm (%)	Plasticity Index (%)	Frost Group
Clay	CL, CH	-	PI > 12	F3
Silt	ML, MH	-	-	F4
Sand	SM, SP-SM	3 -15	-	F2

Generally, the surficial soils at this site were classified in the F3 and F4 frost group, which indicates the surficial soils are highly susceptible to frost.

3.5 Frost Penetration

The clay deposits in the Edmonton area are highly susceptible to frost action. The depth of frost penetration for soils can be determined using the Canadian Foundation Engineering Manual (CFEM 4th Edition) guidelines. The depth of frost penetration for a 50 year return period corresponds to an estimated Design Freezing Index of 1750 degree Celsius days (°C-days). The depths of frost penetration for the soils encountered on site are summarized in Table 3-10.

Table 3-10: Frost Penetration Depth

Soil Unit	Frost Penetration Depth (m)
Clay	2.3
Silt	2.4

The frost penetration depths provided above are based on a uniform soil type with no insulation cover. In areas covered with turf or snow cover, the depth of frost penetration will be less. Conversely, if well graded granular backfill is used, the depth of frost penetration will be greater. The depth of frost penetration is dependent on the in situ moisture content, relative density, grain and pore sizes, and permeability of the soil. As a result, frost penetration is expected to vary across the site as the subsurface materials and temperatures vary. The depth of frost penetration will also increase in snow-cleared paved areas such as trails.

4. General Site Recommendation

4.1 General site suitability

The site is generally considered suitable for the proposed trail and staircase work. A visual inspection was completed during the drilling investigation and no obvious signs of recent slope movements were observed (e.g. slope failure scars, or sloping trees). There were some areas with exposed soil observed which may indicate localized small slope instabilities and/or erosion. The current hillside should not be loaded with additional fill or heavy structures without review by a geotechnical engineer, as this will increase the risk of slope instabilities. The soils encountered at the site were fine-grained (mainly clay and silt) and moderately to lightly covered with vegetation growth, making the soil susceptible to erosion. Disturbing the existing vegetation will increase the soil's susceptibility to erosion and/or slope instability. Areas traversed by pedestrians down the slope have reduced vegetation and exposed soil and may require erosion protection prior to staircase construction.

The native soils are susceptible to erosion; therefore, exposed soils should be protected against erosion before and after construction. In areas where heavy erosion may occur, erosion protection measures should be taken. Erosion protection measures that could be considered include rip rap placed on a medium weight, non-woven geotextile, and erosion protection mats. Erosion protection mats and silt fences may be required during construction to reduce erosion in the short term.

4.2 Shallow Foundations - Stairs

High plasticity clay was encountered near the ground surface and extended to a depth of 8.4 mBGS. The expansive nature of these soils translates into significant volume changes upon interaction with moisture. Absorption of moisture in expansive soils results in volume increases, and loss of moisture results in shrinkage of the soil. Volume changes resulting from expansion (swelling) and contraction (shrinkage) are known to generate forces capable of causing damage to structures. These forces translate into uplifting forces in the case of expansion and loss of support and subsidence in the case of shrinkage. The potential for soils to swell or shrink is dependent on a variety of environmental factors and on the swell potential of the soil. The environmental factors include moisture content variation, stress change, and chemistry change. The swell potential is however, dependent on the geologic structure layering, mineral constituents, and pressure history. In general, compaction of a soil to a high density will increase the amount of swelling upon wetting, and compaction of soil at a water content above the Optimum Moisture Content (OMC) will reduce the amount of swelling upon wetting (CFEM 2006). The potential for swelling and shrinkage of the near surface soils should be addressed during the design of structures. One method of addressing the potential for swell and shrinkage is to support structures on deeper soils that are not expected to experience swell/shrinkage and to place a void form between the ground surface and structures.

The wooden staircase should meet City of Edmonton design Standards. Foundations should be installed below the frost penetration depth (Section 3.5) and designed to resist adfreeze/uplift forces within the frost penetration depth. Foundations above the frost penetration depth are susceptible to movement due to frost action.

If the structures are founded on footings then the base of the footing should be below the maximum frost penetration depth. This depth can be reduced with the use of insulation. Consideration may be given to using rigid polystyrene insulation (Styrofoam HI-40 or equivalent). The insulation should be applied vertically to the outside of the foundation from ground surface to the base of the footing, and should extend horizontally outwards away from the footing a minimum distance of 2.5 m. Horizontal insulation should be constructed with protective layers of sand below and above the insulation. Each protective layer should be 75 mm thick. Horizontal insulation should be constructed at a depth not exceeding 0.5 m measured to the top of the rigid insulation. The horizontal insulation should be sloped downward away from the foundation at a minimum of 2 %. The insulation should be at least 150 mm thick and installed in a manner that is consistent with the manufacturer's recommendations.

Adfreeze/uplift pressure acting on the sides of foundations and piles can be reduced by placing non-frost susceptible soil (well graded gravel) around structures, and providing good drainage. Because of the stabilizing effect of vegetation on the slope, this should be disturbed as little as possible. Any damage caused to the vegetation must be repaired as soon as reasonably practicable.

Good surface drainage should be provided during and after construction to reduce ponding. Ponding may result in lower foundation capacities, premature pavement failure, and slope instabilities. Surface water should be directed away from the trail and from foundations.

4.3 Deep Foundations - Stairs

4.3.1 Introduction

The stairs may be founded on piles. Driven piles and cast-in-place piles are unsuitable for the stairs. Both piling systems require relatively heavy plant which could not operate on the slope without substantial temporary support. The vibration from driving piles poses a risk to the stability of the slope. The plant required for screw pile installation is much lighter, and may successfully operate on the slope. The installation of screw piles does not cause significant vibration.

4.3.2 Screw Piles

Screw piles are best suited for firm to very stiff clay soils free of large cobbles and boulders. Screw piles are considered suitable for use at the site to support the proposed stairs. Screw piles have a steel shaft with helical plates welded to the outside of the shaft near the base of the pile and/or at selected points on the shaft. The pile is advanced into the ground by a torque drive head. Bearing capacity is developed by compression bearing resistance from the soil below the helix/ helices and / or cylindrical shear resistance developed between multiple helices. The first helix (top helix) should be located at a minimum depth of 2.4 m (the frost penetration depth of the soil). Actual pile size and helix details vary from supplier to supplier. Helical screw piles are a proprietary system and their long term performance is highly dependent on the contractor's experience, installation methodology, and workmanship in construction. Design recommendations should come from an experienced helical pile contractor.

The skin friction resistance within the frost penetration depth and within one helix diameter of the uppermost helix should be neglected when designing helical piles. Cylindrical shaft resistance between helices and resistance along the shaft above the helices should generally be neglected during the design of the piles. In designing the piles, close consideration must be given to the variability of ground conditions on the site. In general, the design of screw piles for lightly loaded structures (such as stairs) in Edmonton is governed by the requirement to resist uplift forces from frost and not by the load bearing requirement to support the structure.

Recommended parameters based on soils encountered on site are presented in **Table 4-1** below.

Table 4-1: Estimated Soil Parameters

Depth (mBGS)	Undrained Shear Strength (kPa)	Internal Angle of Friction (degrees)	Bulk Unit Weight (kN/m^3)	Effective Unit Weight (kN/m^3)
0 to 2.4	N/A[1]	N/A[1]	18	8
2.4 to 7	50	22	18	8
Below 7	200	27 to 34	18	8

[1] The maximum frost depth is anticipated to be 2.4 mBGS. Because it is anticipated that adfreeze forces will be acting on the pile within this frost zone, the benefit of resistance from the soil in this area should not be considered in the design. The adfreeze bond stress values to be utilized, range from 65 kPa (fine grained soils frozen to wood or concrete) to 100 kPa (fine grained soils frozen to steel) (CFEM).

4.3.3 Pile Caps

Pile caps are usually required to transfer the loads onto the tops of the piles. If the bases of the pile caps are located within the frost penetration depth, precautions should be taken to prevent heaving of the pile cap due to frost heaving. The recommended construction procedure for reducing heave effect under the pile cap involves placement of crushable non-degradable void filler (such as Beaver Plastic Frost Cushion or equivalent) of at least 150 mm thickness under the pile cap.

4.4 Slope Stability

A basic model of the slope at the proposed stairway location was created using SlopeW software by Geostudio. Subsurface conditions were modelled using the information gathered during the geotechnical investigation. Upon computing the analysis, the achieved Factor of Safety (FOS) indicated that the current slope will be stable, given that the existing quality of vegetation is maintained (if not improved).

It should be noted that given the practical and cost limitations, the level of detail of information required to carry out a detailed slope stability analysis, was not attained. Therefore, a simplistic subsurface stratigraphy model with limited survey information was used for the analysis.

4.5 Subgrade Preparations for Trail

The subgrade conditions are potentially favourable for the construction of the trail at most locations. The subgrade is expected to be firm to very stiff high plasticity clay from 0.15 to 4.3 mBGS. High plasticity clays may be unfavorable due to increased frost susceptibility, greater swelling potential and greater compressibility. At some locations silt and low plastic clays may be encountered for the trail construction.

All surficial organics or topsoil, and deleterious materials should be stripped and removed from within the proposed paved areas. Excavation depths for trail subgrade preparation should be similar to the total pavement structure thickness provided in Section 4.5.

The prepared areas should then be proof-rolled to identify loose or soft areas. If soft or unstable areas, or areas of high plastic clay that give rise to the risk of damage due to swelling and frost heave are encountered, these areas should be over excavated to a firm base of suitable material or to a maximum of 600 mm below the design subgrade elevation. A layer of BX 1200 geogrid or equivalent, should be placed directly on the bottom of the subgrade when the soft deposit or high plastic deposits extends deeper than 600 mm below the design subgrade elevation. Areas that are over excavated should be replaced with select native, low to medium plastic clay material, imported granular fill of appropriate gradation or imported low to medium plastic clay, compacted to a minimum of 98% Standard Proctor Maximum Dry Density (SPMDD) at OMC, and in accordance with City of Edmonton specifications. Backfill should be free from gravel sizes larger than 200 mm in diameter and frozen, organic, or other deleterious materials. If coarse material is used as backfill, this must be drained. Subgrade soils should be inspected and evaluated by a geotechnical engineer during construction to confirm their suitability.

Alternatively, cement stabilization or biaxial geo-grid reinforcement may be used instead of the sub-cut if approved by the geotechnical engineer. The subgrade, subgrade improvements and final proof roll should be inspected by a qualified geotechnical engineer prior to placement of the granular base course.

Fill placed to raise the subgrade elevation to design grade should be moisture conditioned to within ±2% of OMC and compacted to 98% of SPMDD. The fill should be placed in lifts not greater than 150 mm in compacted thickness. Proof rolling should be performed prior to placement of granular base course to confirm that the subgrade below the pavement structure is adequately prepared.

The final 150 mm layer of the subgrade should be compacted to 100% of the SPMDD.

4.6 Pavement structure – Trail

It is understood that there is a new trail proposed for connecting Lansdowne Drive to the proposed staircase location. The trail is expected to service light foot and bicycle traffic. Table 4-2 and Table 4-3 are pavement and trail recommendations in accordance with the City of Edmonton engineering standards, shared use path drawings.

Table 4-2: Asphalt Pavement Design Recommendation

Description	Pavement Structure Material	Pavement Structure Thickness (mm)	Remarks
New Trails throughout Lansdowne Drive	Asphalt Concrete Pavement	75	Asphalt should be placed in one layer
	Crushed Granular Base Course	150	Compacted to 100% of SPMDD within ±2% of OMC
	Prepared Subgrade	(150)	Refer to Section 4.5 for Subgrade Preparation
Total Pavement Structure (above prepared subgrade)		**225**	

Table 4-3: Concrete Pavement Design Recommendation

Description	Pavement Structure Material	Pavement Structure Thickness (mm)	Remarks
New Trails throughout Lansdowne Drive	Concrete Pavement	120	30 MPa concrete, c/w 10M reinforcing steel as per the City of Edmonton Specifications
	Crushed Granular Base Course	150	Compacted to 100% of SPMDD within ±2% of OMC
	Prepared Subgrade	(150)	Refer to Section 4.5 for Subgrade Preparation
Total Pavement Structure (above prepared subgrade)		**225**	

The subgrade for the trail should be prepared in accordance with Section 4.5.

The Crushed Granular Base Course should be Designation 3, Class 20 granular material in accordance with City of Edmonton Engineering design standards. Note that the drawings in the design standards refer to this material as “3-20A Gravel”.

A non-woven filter fabric should be provided between the base of the granular fill and subgrade to prevent migration of fine materials into the granular fill.

If the walkway is designated as an emergency access route by the Engineer, design requirements must be in accordance with City of Edmonton design and construction standards and pavement recommendations must be reassessed for suitability.

5. References

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Livneh, M. (1989). Validation of Correlations between a Number of Penetration Tests and In Situ California Bearing Ratio Tests. Transportation Research Board.

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Appendix A

Figures

LEGEND:

- TESTHOLE (WITH MONITORING WELL)
- TESTHOLE (NO MONITORING WELL)
- HAND AUGER

0 25 50 m

1:1000

SITE LOCATION PLAN

0 625 1250 m

1:25 000

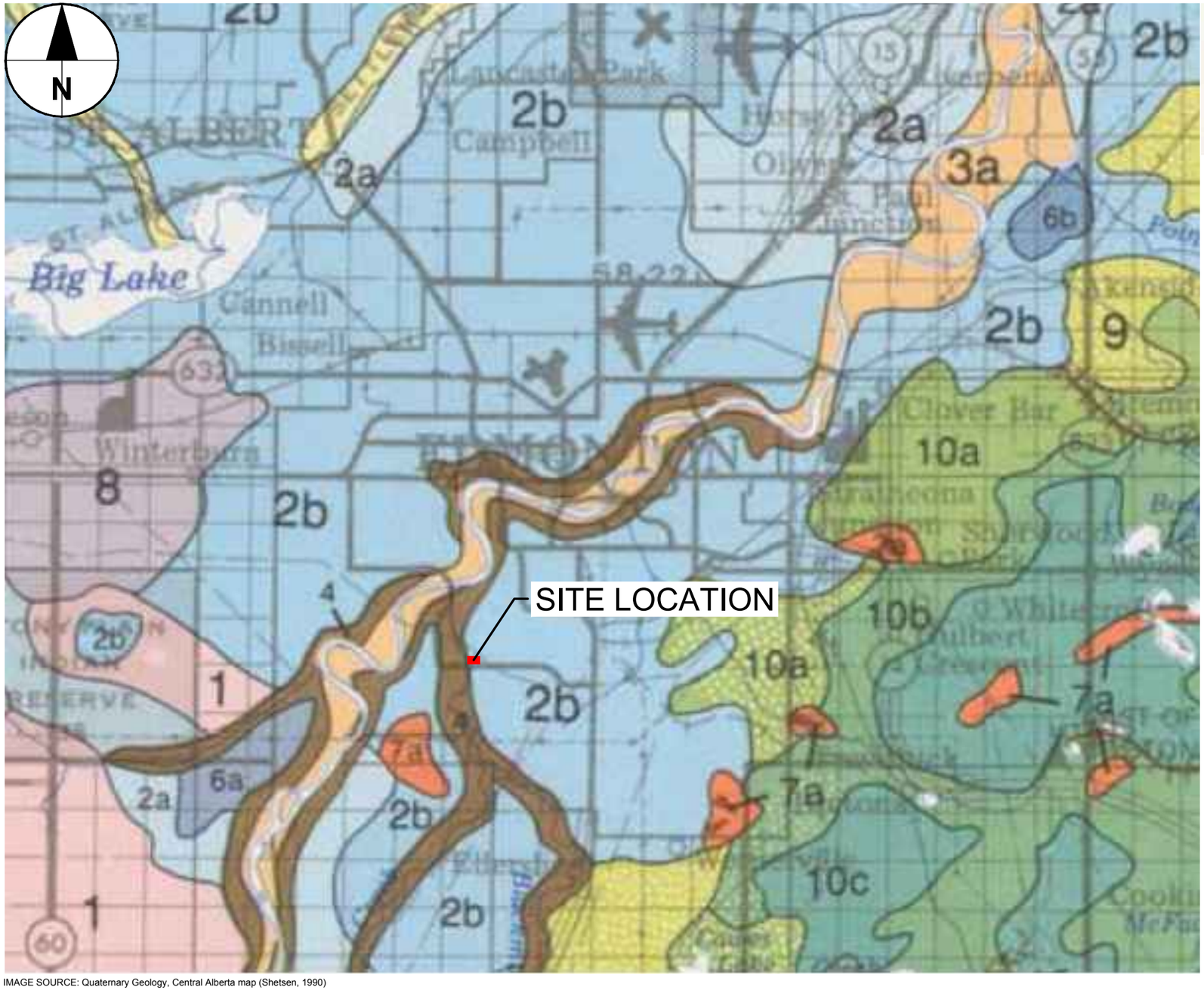
Issue Status: FINAL

Lansdowne Staircase and Trail
Geotechnical Investigation
City of Edmonton
Project No.: 60577232 Date: 2018-05-10

Site Location Plan and
Testhole Location Plan

AECOM

Figure 1



2a Coarse sediment: sand and silt; undulating surface in places modified by wind.

2b Fine sediment: silt and clay; flat to gently undulating surface.

FLUVIAL DEPOSIT: gravel, sand, silt and clay, includes local till and bedrock exposures; up to 20 m thick; present on floors and terraces of river valleys and meltwater channels, and in deltas; flat to undulating topography.

3a Coarse sediment: gravel, gravel and sand, fine to coarse-grained sand, minor silt beds.

3b Fine sediment: fine sand, silt and clay, minor gravel beds.

4 STREAM AND SLOPEWASH ERODED DEPOSIT: exposed till and bedrock, local slump material; slopes of river valleys and meltwater channels, in places badland type terrain.

0 3750 7500 m

1:150 000
*APPROXIMATE

IMAGE SOURCE: Quaternary Geology, Central Alberta map (Shetsen, 1990)

Issue Status: FINAL

Lansdowne Staircase and Trail
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Project No.: 60577232 Date: 2018-05-09

Quaternary Geology Map

AECOM

Figure 2

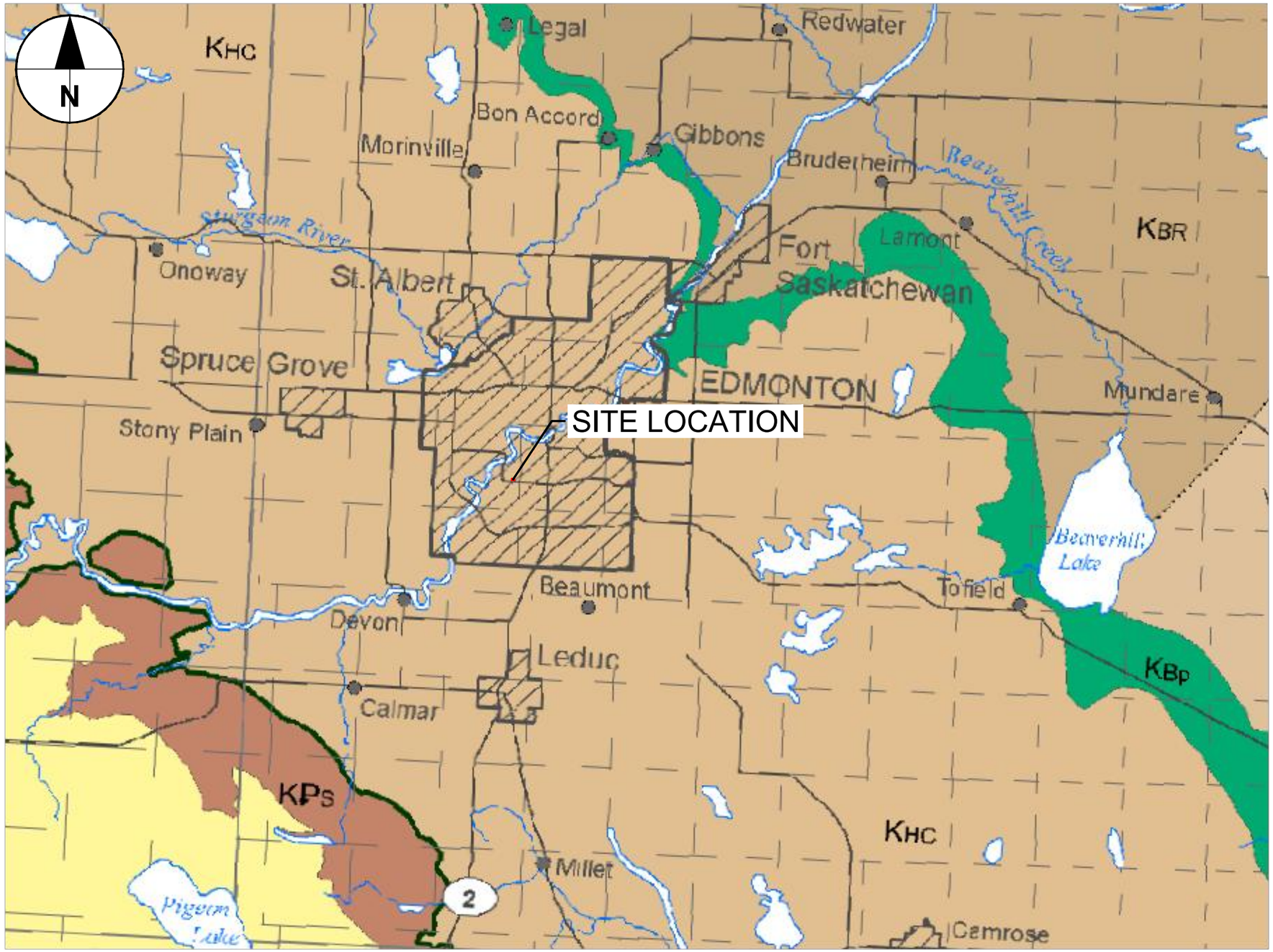

IMAGE SOURCE: Bedrock Geology of Alberta. Alberta. Geological Survey (Prior G.J., et. al. 2013)

KPS **SCOLLARD FORMATION:** generally fine-grained, commonly cross-stratified, light grey to buff sandstone and pale to dark grey, sandy to silty mudstone; thick coal seams and carbonaceous mudstone intervals in upper part; nonmarine

UPPER CRETACEOUS

KB **BATTLE FORMATION:** dark grey to purplish-black silty mudstone with thin, pale grey, siliceous beds in upper part; discontinuous due to erosion; nonmarine

KHC **HORSESHOE CANYON FORMATION:** pale grey, fine- to very fine grained, feldspathic sandstone interbedded with siltstone, bentonitic mudstone, carbonaceous mudstone, concretionary sideritic layers, and laterally continuous coal seams; includes white, pedogenically altered sandstone and mudstone interval at top (formerly assigned to the Whitemud Formation); nonmarine to locally marginal marine

KBp **BEARPAW FORMATION:** dominantly dark grey to brown-grey mudstone with concretionary sideritic and bentonite concretionary layers; concretions locally yield ammonites; marine to marginal marine

Belly River Group

KBR **BELLY RIVER GROUP (undivided):** fine- to coarse-grained sandstone; grey to brown carbonaceous siltstone; coal; marginal marine to nonmarine

0 12 500 25 000 m

1:500 000
*APPROXIMATE

Issue Status: FINAL

Lansdowne Staircase and Trail
Geotechnical Investigation
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Bedrock Geology Map

AECOM

Figure 3

Appendix B

Testholes

- Testhole Logs
- Modified Unified Soil Classification Chart
- Explanation of Field and Laboratory Test Data
- General Statement; Normal Variability of Subsurface Conditions

PROJECT: Lansdowne Staircase	CLIENT: City of Edmonton	TESTHOLE NO.: **HA18-01**
LOCATION: Closer to top	COORDINATES: Local N 5927955.3 E 29948.6	PROJECT NO.: 60577232
CONTRACTOR:	METHOD: Hand Auger	ELEVATION (m): 655.48

SAMPLE TYPE ■ GRAB ▥ SHELBY TUBE ▩ SPLIT SPOON ▤ BULK ▨ NO RECOVERY ◧ CORE

DEPTH (m)	mUSC	SOIL SYMBOL	SOIL DESCRIPTION	SAMPLE TYPE	SAMPLE #	PLASTIC 12.5 / M.C. 25.0 / LIQUID 37.5	COMMENTS	ELEVATION (m)
0	OR		TOPSOIL (100 mm) - silty, some clay, some rootlets, brown, humid					655
			CLAY - silty, sandy, trace gravel, trace oxidation, low plastic, stiff, brown, humid	■	1	17.2		
1	CL							654
				■	2	19.3		
			- increasing clay content	■	3	22.9		
2			END OF TESTHOLE at 2.00 mBGS - hand augered to scheduled depth - testhole open and dry upon completion					653
3								652
4								651
5								650
6								649
7								648
8								647
9								646
10								

LOG OF TESTHOLE 60577232 LANSDOWNE STAIRCASE.GPJ UMA_COC.GDT PRINT: 7/24/18 By:alex.tam2@aecom.com

AECOM

LOGGED BY: BN	COMPLETION DEPTH: 2.00 m
REVIEWED BY: FA	COMPLETION DATE: 5/4/2018
PROJECT MANAGER: Sean MacEoin	Page 1 of 1

PROJECT: Lansdowne Staircase	CLIENT: City of Edmonton	TESTHOLE NO.: **HA18-02**
LOCATION: Closer to bottom	COORDINATES: Local N 5927938.4 E 29928.7	PROJECT NO.: 60577232
CONTRACTOR:	METHOD: Hand Auger	ELEVATION (m): 647.5

SAMPLE TYPE ■ GRAB ▥ SHELBY TUBE ▩ SPLIT SPOON ▤ BULK ▨ NO RECOVERY ◧ CORE

DEPTH (m)	mUSC	SOIL SYMBOL	SOIL DESCRIPTION	SAMPLE TYPE	SAMPLE #	PLASTIC / M.C. / LIQUID (12.5 / 25.0 / 37.5)	COMMENTS	ELEVATION (m)
0	OR		TOPSOIL (130 mm) - silty, some rootlets, dark brown, humid					647
	CH		CLAY - silty, sandy, trace gravel, trace oxidation, high plastic, firm, dark brown, humid	■	1	30.7		
1								646
				■	2	22.9		
	ML		SILT - clayey, trace sand, trace oxidation, non plastic, firm, light brown, humid					
2				■	3	12.4	**Sample 3:** Gravel - 0.0% Sand - 7.2% Silt - 70.7% Clay - 22.1% Resistivity - 550 ohm cm Sulphate - 0.888% Chloride - <0.0054% pH - 7.76	645
			END OF TESTHOLE at 2.00 mBGS - hand augered to scheduled depth - testhole open and dry upon completion					
3								644
4								643
5								642
6								641
7								640
8								639
9								638
10								

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LOGGED BY: BN	COMPLETION DEPTH: 2.00 m
REVIEWED BY: FA	COMPLETION DATE: 5/4/2018
PROJECT MANAGER: Sean MacEoin	Page 1 of 1

LOG OF TESTHOLE 60577232 LANSDOWNE STAIRCASE.GPJ UMA_COC.GDT PRINT: 7/24/18 By:alex.tam2@aecom.com

PROJECT: Lansdowne Staircase	CLIENT: City of Edmonton	TESTHOLE NO.: **TH18-01**
LOCATION: Near Lansdowne Drive	COORDINATES: Local N 5927975.7 E 29989.3	PROJECT NO.: 60577232
CONTRACTOR: Canadian Geological Drilling	METHOD: Solid Stem	ELEVATION (m): 660.99

SAMPLE TYPE: GRAB | SHELBY TUBE | SPLIT SPOON | BULK | NO RECOVERY | CORE

BACKFILL TYPE: BENTONITE | GRAVEL | SLOUGH | GROUT | CUTTINGS | SAND

DEPTH (m)	BACKFILL DETAILS	mUSC	SOIL SYMBOL	SOIL DESCRIPTION	SAMPLE TYPE	SAMPLE #	SPT (N)	SPT (Standard Pen Test) (Blows/300mm) 25 50 75	COMMENTS	ELEVATION (m)
0		OR		TOPSOIL (150 mm) - silty, some rootlets, black, humid				PLASTIC M.C. LIQUID 12.5 25.0 37.5		
				CLAY - silty, trace sand, trace black layering, high plastic, stiff, brown, humid		1		18.8		
1				- trace gravel, trace rootlets, some oxidation		2	13	22.6	**Sample 2:** Liquid Limit - 61.1% Plastic Limit - 22.2% Plasticity Index - 38.9% Gravel - 1.3% Sand - 12.7% Silt - 31.1% Clay - 54.9%	660
						3		28.4		
2		CH								659
				- decreasing gravel content, decreasing rootlets content, very stiff		4	17	24.6		
3						5		26.4		658
4				- stiff, trace seepage		6	15	31.2		657
				END OF TESTHOLE at 4.27 mBGS - drilled to scheduled depth - testhole open and dry upon completion - backfilled with drill cuttings and then 0.9 m of bentonite at ground surface						
5										656
6										655
7										654
8										653
9										652
10										

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LOGGED BY: AT	COMPLETION DEPTH: 4.27 m
REVIEWED BY: FA	COMPLETION DATE: 5/4/2018
PROJECT MANAGER: Sean MacEoin	Page 1 of 1

LOG OF TESTHOLE 60577232 LANSDOWNE STAIRCASE.GPJ UMA_COC.GDT PRINT: 7/24/18 By:alex.tam2@aecom.com

PROJECT: Lansdowne Staircase	CLIENT: City of Edmonton	TESTHOLE NO.: **TH18-02**
LOCATION: Top of Slope	COORDINATES: Local N 5927965.9 E 29964.5	PROJECT NO.: 60577232
CONTRACTOR: Canadian Geological Drilling	METHOD: Solid Stem	ELEVATION (m): 660.36

SAMPLE TYPE: GRAB | SHELBY TUBE | SPLIT SPOON | BULK | NO RECOVERY | CORE

BACKFILL TYPE: BENTONITE | GRAVEL | SLOUGH | GROUT | CUTTINGS | SAND

DEPTH (m)	SLOTTED PIEZOMETER	mUSC	SOIL SYMBOL	SOIL DESCRIPTION	SAMPLE TYPE	SAMPLE #	SPT (N)	SPT (Standard Pen Test) (Blows/300mm) 25 50 75 PLASTIC M.C. LIQUID 12.5 25.0 37.5	COMMENTS	ELEVATION (m)
0		OR		TOPSOIL (150 mm) - silty, some rootlets, black, humid						660
				CLAY - silty, sandy, some rootlets, trace to some oxidation, trace gravel, high plastic, firm, brown, humid		1		17.8		
1				- some sand, trace ice up to 10 mm diameter, no rootlets, firm, damp		2	7	35.2	**Sample 2:** Liquid Limit - 58.5% Plastic Limit - 25.6% Plasticity Index - 33.0% Gravel - 0.0% Sand - 2.4% Silt - 42.8% Clay - 54.8%	659
				- decreasing sand content		3		33.2	**Sample 3:** Resistivity - 345 ohm cm Sulphate - 0.132% Chloride - 0.0057% pH - 8.15	
2						4	11	30.9		658
3		CH		- some oxidation, some silt pockets, trace to some black pockets 20 mm diameter		5		29.8		657
4						6	13	29.5		
						7		34.7		656
5						8			**Sample 8:** Q_u - 149 kPa C_u - 74.5 kPa	655
6				CLAY - silty, sandy, trace gravel, trace oxidation, low plastic, very stiff, brown, humid to damp		9	26	17.1	**Sample 9:** Resistivity - 731 ohm cm Sulphate - 0.389% Chloride - <0.00089% pH - 7.61	
		CL				10		11.9	**Sample 10:** Liquid Limit - 26.3% Plastic Limit - 17.3% Plasticity Index - 9.0% Gravel - 2.6% Sand - 30.0% Silt - 48.3% Clay - 19.1%	654
7				- hard CLAY - silty, some sand, trace gravel, some oxidation, some black inclusions, low to medium plastic, hard, brown, damp		11	46	20.5		653
				- sandy, trace white inclusions, some oxidation, very hard		12		16.8		
8										652
		CL-CI		- some sand pocket 20 mm diameter, some sand layering 1 to 2 mm thick, very hard, dark brown		13	73/ 254mm	17.7 >>		
9						14		18.1		651
10										

LOG OF TESTHOLE 60577232 LANSDOWNE STAIRCASE.GPJ UMA_COC.GDT PRINT: 7/24/18 By:alex.tam2@aecom.com

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LOGGED BY: AT	COMPLETION DEPTH: 10.36 m
REVIEWED BY: FA	COMPLETION DATE: 5/4/2018
PROJECT MANAGER: Sean MacEoin	Page 1 of 2

PROJECT: Lansdowne Staircase	CLIENT: City of Edmonton	TESTHOLE NO.: **TH18-02**
LOCATION: Top of Slope	COORDINATES: Local N 5927965.9 E 29964.5	PROJECT NO.: 60577232
CONTRACTOR: Canadian Geological Drilling	METHOD: Solid Stem	ELEVATION (m): 660.36

SAMPLE TYPE: GRAB | SHELBY TUBE | SPLIT SPOON | BULK | NO RECOVERY | CORE

BACKFILL TYPE: BENTONITE | GRAVEL | SLOUGH | GROUT | CUTTINGS | SAND

DEPTH (m)	SLOTTED PIEZOMETER	mUSC	SOIL SYMBOL	SOIL DESCRIPTION	SAMPLE TYPE	SAMPLE #	SPT (N)	SPT (Standard Pen Test) (Blows/300mm) 25 50 75 PLASTIC M.C. LIQUID 12.5 25.0 37.5	COMMENTS	ELEVATION (m)
10		CL-CI			X	15	83	18.3		650
				END OF TESTHOLE at 10.36 mBGS - drilled to scheduled depth - testhole open and dry upon completion - 50 mm diameter monitoring well installed upon completion - testhole dry on May 11, 2018 - testhole dry on May 18, 2018					
11										649
12										648
13										647
14										646
15										645
16										644
17										643
18										642
19										641
20										

AECOM

LOGGED BY: AT	COMPLETION DEPTH: 10.36 m
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PROJECT MANAGER: Sean MacEoin	Page 2 of 2

LOG OF TESTHOLE 60577232 LANSDOWNE STAIRCASE.GPJ UMA_COC.GDT PRINT: 7/24/18 By:alex.tam2@aecom.com

PROJECT: Lansdowne Staircase	CLIENT: City of Edmonton	TESTHOLE NO.: **TH18-03**
LOCATION: Bottom of Slope	COORDINATES: Local N 5927923.9 E 29910.2	PROJECT NO.: 60577232
CONTRACTOR: Canadian Geological Drilling	METHOD: Solid Stem	ELEVATION (m): 641.61

SAMPLE TYPE: GRAB | SHELBY TUBE | SPLIT SPOON | BULK | NO RECOVERY | CORE

BACKFILL TYPE: BENTONITE | GRAVEL | SLOUGH | GROUT | CUTTINGS | SAND

DEPTH (m)	SLOTTED PIEZOMETER	mUSC	SOIL SYMBOL	SOIL DESCRIPTION	SAMPLE TYPE	SAMPLE #	SPT (N)	SPT (Standard Pen Test) (Blows/300mm)	COMMENTS	ELEVATION (m)
0		OR		TOPSOIL (150 mm) - silty, some rootlets, black, humid						
				CLAY - silty, some sand, some rootlets, some grey mottling, some black layering, some sand and silt laminations, high plastic, stiff, brown, humid		1		25.4		641
				- no rootlets						
1				- decreasing silt and sand layering		2	9	26		
						3		25.7	**Sample 3:** Liquid Limit - 53.2%; Plastic Limit - 19.4%; Plasticity Index - 33.7%; Gravel - 0.2%; Sand - 12.9%; Silt - 37.7%; Clay - 49.2%	640
2									**Sample 4:** Q_u - 178 kPa; C_u - 89 kPa	
						4				639
3						5	12	25.9		
				- some oxidation, some light brown silt pockets		6		26.2	**Sample 6:** Resistivity - 264 ohm cm; Sulphate - 1.25%; Chloride - <0.0020%; pH - 8.24	638
4		CH				7	11	26.9		
				- moist		8		25.6		637
5										
				- sandy, firm		9	8	28.4		636
6				- increasing plasticity		10		28.4	**Sample 10:** Liquid Limit - 65.1%; Plastic Limit - 17.1%; Plasticity Index - 48.0%	635
						11		32.2		
7				- some black mottling, some sand pockets, hard		12	39	24.3		634
8				- grey sand pockets up to 75 mm diameter		13		17.5		
				SAND - silty, some clay, fine grained, very dense, dark grey, humid to dry		14	77	17.5		633
9		SM				15		15		
										632
10							50/			

SPT (Standard Pen Test) (Blows/300mm): 25 50 75; PLASTIC M.C. LIQUID; 12.5 25.0 37.5

LOG OF TESTHOLE 60577232 LANSDOWNE STAIRCASE.GPJ UMA_COC.GDT PRINT: 7/24/18 By:alex.tam2@aecom.com

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LOGGED BY: AT	COMPLETION DEPTH: 10.36 m
REVIEWED BY: FA	COMPLETION DATE: 5/4/2018
PROJECT MANAGER: Sean MacEoin	Page 1 of 2

PROJECT: Lansdowne Staircase	CLIENT: City of Edmonton	TESTHOLE NO.: **TH18-03**
LOCATION: Bottom of Slope	COORDINATES: Local N 5927923.9 E 29910.2	PROJECT NO.: 60577232
CONTRACTOR: Canadian Geological Drilling	METHOD: Solid Stem	ELEVATION (m): 641.61

SAMPLE TYPE: GRAB | SHELBY TUBE | SPLIT SPOON | BULK | NO RECOVERY | CORE

BACKFILL TYPE: BENTONITE | GRAVEL | SLOUGH | GROUT | CUTTINGS | SAND

DEPTH (m)	SLOTTED PIEZOMETER	mUSC	SOIL SYMBOL	SOIL DESCRIPTION	SAMPLE TYPE	SAMPLE #	SPT (N)	SPT (Standard Pen Test) (Blows/300mm) 25 50 75	PLASTIC	M.C.	LIQUID	COMMENTS	ELEVATION (m)
10				END OF TESTHOLE at 10.11 mBGS - drilled to scheduled depth - testhole open and dry upon completion - 50 mm diameter monitoring well installed upon completion - groundwater was at 8.9 mBGS on May 11, 2018 - groundwater was at 8.1 mBGS on May 18, 2018		16	50mm		12.2	25.0	37.5		631
11													630
12													629
13													628
14													627
15													626
16													625
17													624
18													623
19													622
20													

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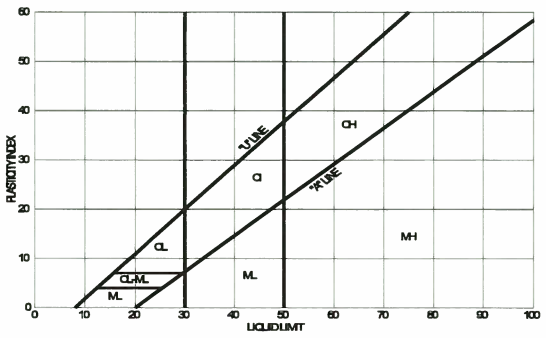
LOGGED BY: AT	COMPLETION DEPTH: 10.36 m
REVIEWED BY: FA	COMPLETION DATE: 5/4/2018
PROJECT MANAGER: Sean MacEoin	Page 2 of 2

LOG OF TESTHOLE 60577232 LANSDOWNE STAIRCASE.GPJ UMA_COC.GDT PRINT: 7/24/18 By:alex.tam2@aecom.com

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



SOIL COMPONENTS

FRACTION		SIEVE SIZE (mm) PASSING	SIEVE SIZE (mm) RETAINED	DEFINING RANGES OF PERCENTAGE BY WEIGHT OF MINOR COMPONENTS PERCENT	IDENTIFIER
GRAVEL	COARSE	75	19	50 - 35	AND
	FINE	19	4.75	35 - 20	___Y
SAND	COARSE	4.75	2.00	20 - 10	SOME
	MEDIUM	2.00	0.425	10 - 1	TRACE
	FINE	0.425	0.080		
SILT (non plastic) or CLAY (plastic)		0.080			

OVERSIZE MATERIALS

ROUNDED OR SUBROUNDED	ANGULAR
COBBLES 75 mm to 200 mm BOULDERS > 200 mm	ROCK FRAGMENTS > 75 mm ROCKS > 0.75 m^3 IN VOLUME

NOTE:
1. BOUNDARY CLASSIFICATION POSSESSING CHARACTERISTICS OF TWO GROUPS ARE GIVEN GROUP SYMBOLS, E.G. GW-GC IS A WELL GRADED GRAVEL MIXTURE WITH CLAY BINDER BETWEEN 5% AND 12%

MODIFIED UNIFIED CLASSIFICATION SYSTEM FOR SOILS

JUNE, 1995

1. Explanation of Field and Laboratory Test Data

The field and laboratory test results, as shown on the logs, are briefly described below.

1.1 Natural Moisture Content and Atterberg Limits

The relationship between the natural moisture content and depth is significant in determining the subsurface moisture conditions. The Atterberg Limits for a sample should be compared to the natural moisture content and should be on the Plasticity Chart in order to determine their classification.

1.2 Soil Profile and Description

Each soil stratum is classified and described noting any special conditions. The Modified Unified Soils Classification System (MUSCS) is used. The soil profile refers to the existing ground level. When available, the existing ground elevation is shown. The soil symbols used are shown in detail on the soil classification chart.

1.3 Tests on Soil Samples

Laboratory and field tests on the logs are identified by the following:

N (Standard Penetration Test (SPT) Blow Count) - The SPT is conducted in the field to assess the in situ consistency of cohesive soils and the relative density of non-cohesive soils. The N value recorded is the number of blows from a 63.5 kg hammer dropped 760 mm which is required to drive a 51 mm split spoon sampler 300 mm into the soil.

SO_4 (Water Soluble Sulphate Content) - Conducted primarily to determine requirements for the use of sulphate resistant cement. Further details on the water soluble sulphate content are given in Section 1.6.

γ_D (Dry Unit Weight) kN/m^3 and γ_T (Total Unit Weight) kN/m^3.

Q_U (Unconfined Compressive Strength) kPa - May be used in determining allowable bearing capacity of the soil.

C_U (Undrained Shear Strength) kPa - This value is determined by an unconfined compression test and may also be used in determining the allowable bearing capacity of the soil.

C_{PEN} (Pocket Penetrometer Reading) kPa - Estimate of the undrained shear strength as determined by a pocket penetrometer.

The following tests may also be performed on selected soil samples and the results are given on the borehole logs: Grain Size Analysis; Standard or Modified Proctor Compaction Test; California Bearing Ratio; Unconfined Compression Test; Permeability Test; Consolidation Test; Triaxial Test

1.4 Soil Density and Consistency

Table 1.1 Cohesive Soils		
N	**Consistency**	**C_U (kPa) (approx.)**
0 - 1	Very Soft	<10
1 - 4	Soft	10 - 25
4 - 8	Firm	25 - 50
8 - 15	Stiff	50 - 100
15 - 30	Very Stiff	100 - 200
30 - 60	Hard	200 - 300
>60	Very Hard	>300

The SPT test described above may be used to estimate the consistency of cohesive soils and the density of cohesionless soils. These approximate relationships are summarized in the following tables:

Table 1.2 Cohesionless Soils	
N	**Density**
0 - 5	Very Loose
5 - 10	Loose
10 - 30	Compact
30 - 50	Dense
>50	Very Dense

1.5 Sample Condition and Type

The depth, type, and condition of samples are indicated on the borehole logs by the following symbols:

1.6 Water Soluble Sulphate Concentration

The following table from CSA Standard A23.1-94 indicates the requirements for concrete subjected to sulphate attack based upon the percentage of water soluble sulphate as presented on the borehole logs. CSA Standard A23.1-94 should be read in conjunction with the table.

Table 1.3
Requirements for Concrete Subjected to Sulphate Attack

Class of Exposure	Degree of Exposure	Water-Soluble Sulphate (SO_4) in Soil Sample %	Sulphate (SO_4) in Groundwater Samples mg/L	Minimum Specified 28 d Compressive Strength MPa†	Maximum Water/ Cementing Materials Ratio†	Portland Cement to be Used‡
S-1	Very severe	over 2.0	over 10,000	35	0.40	50
S-2	Severe	0.20 - 2.0	1,500 - 10,000	32	0.45	50
S-3	Moderate	0.10 - 0.20	150 - 1,500	30	0.50	20§,40, or 50

* For sea water exposure see Clause 15.4
† See Clause 15.1.4
‡ See Clause 15.1.5
§ Type 20 cement with moderate sulphate resistance (see Clause 3.1.2)

1.7 Groundwater Table

The groundwater table is indicated by the equilibrium level of standing water in a standpipe installed in a borehole. This level is generally taken at least 24 hours after installation of the standpipe. The groundwater level is subject to seasonal variations and its highest level usually occurs in spring. The symbol on the borehole logs indicating the groundwater level is an inverted solid triangle (▼).

AECOM Canada Ltd.

General Statement; Normal Variability Of Subsurface Conditions

The scope of the investigation presented herein is limited to an investigation of the subsurface conditions as to suitability of the site for the proposed project. This report has been prepared to aid in the general evaluation of the site and to assist the design engineer in the conceptual design for the area. The description of the project presented in this report represents the understanding by the geotechnical engineer of the significant aspects of the project relevant to the design and construction of the subdivision, infrastructure and similar. In the event of any changes in the basic design or location of the structures, as outlined in this report or plan, AECOM should be given the opportunity to review the changes and to modify or reaffirm in writing the conclusions and recommendations of this report.

The analysis and recommendations represented in this report are based on the data obtained from the test holes drilled at the locations indicated on the site plans and from other information discussed herein. This report is based on the assumption that the subsurface conditions everywhere on the site are not significantly different from those encountered at the test locations. However, variations in soil conditions may exist between the test holes and, also, general groundwater levels and condition may fluctuate from time to time. The nature and extent of the variations may not become evident until construction. If subsurface conditions, different from those encountered in the test holes are observed or encountered during construction or appear to be present beneath or beyond the excavation, AECOM should be advised at once so that the conditions can be observed and reviewed and the recommendations reconsidered where necessary.

Since it is possible for conditions to vary from those identified at the test locations and from those assumed in the analysis and preparation of recommendations, a contingency fund should be included in the construction budget to allow for the possibility of variations which may result in modifications of the design and construction procedures.

Appendix C

Laboratory Testing Results

WATER CONTENT (ASTM D2216)

AECOM
AECOM Canada Ltd.
Materials Testing Lab
Bay#14-1511 Highfield Cres.SE
Calgary, Alberta T2G 5M4

CLIENT:	City of Edmonton							
PROJECT:	Lansdowne Staircase							
JOB No.:	60577232							
DATE :	May 11, 2018					TECHNICAN :	GU/CK	
HOLE No.	TH18-01						TH18-02	
DEPTH								
SAMPLE No.	1	2	3	4	5	6	1	2
TARE No.								
WT. SAMPLE WET + TARE	508.5	623.7	527.5	656.0	547.2	766.3	593.4	531.3
WT. SAMPLE DRY + TARE	429.9	511.2	413.5	529.1	435.6	586.9	505.7	396.2
WT. TARE	12.7	12.7	12.7	12.7	12.7	12.7	12.7	12.7
WATER CONTENT W%	**18.8%**	**22.6%**	**28.4%**	**24.6%**	**26.4%**	**31.2%**	**17.8%**	**35.2%**
HOLE No.	TH18-02							
DEPTH								
SAMPLE No.	3	4	5	6	7	9	10	11
TARE No.								
WT. SAMPLE WET + TARE	301.3	355.1	597.7	576.9	558.9	328.8	389.6	484.1
WT. SAMPLE DRY + TARE	229.3	274.2	463.4	448.5	418.1	282.7	349.5	403.6
WT. TARE	12.7	12.7	12.7	12.7	12.7	12.7	12.7	12.7
WATER CONTENT W%	**33.2%**	**30.9%**	**29.8%**	**29.5%**	**34.7%**	**17.1%**	**11.9%**	**20.6%**
HOLE No.	TH18-02				TH18-03			
DEPTH								
SAMPLE No.	12	13	14	15	1	2	3	5
TARE No.								
WT. SAMPLE WET + TARE	423.6	627.1	565.3	612.0	699.2	676.5	649.5	360.6
WT. SAMPLE DRY + TARE	364.4	534.8	480.6	519.5	560.0	539.5	519.2	289.1
WT. TARE	12.7	12.7	12.7	12.7	12.7	12.7	12.7	12.7
WATER CONTENT W%	**16.8%**	**17.7%**	**18.1%**	**18.3%**	**25.4%**	**26.0%**	**25.7%**	**25.9%**
HOLE No.	TH18-03							
DEPTH						22.5'		
SAMPLE No.	6	7	8	9	10	11	12	13
TARE No.								
WT. SAMPLE WET + TARE	372.5	478.4	605.2	555.7	604.4	560.2	631.4	563.8
WT. SAMPLE DRY + TARE	297.7	379.7	484.4	435.6	473.6	426.7	510.6	481.8
WT. TARE	12.7	12.7	12.7	12.7	12.7	12.7	12.7	12.7
WATER CONTENT W%	**26.2%**	**26.9%**	**25.6%**	**28.4%**	**28.4%**	**32.2%**	**24.3%**	**17.5%**

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Calgary, Alberta T2G 5M4

WATER CONTENT (ASTM D2216)

CLIENT:	City of Edmonton							
PROJECT:	Lansdowne Staircase							
JOB No.:	60577232							
DATE :	May 11, 2018					TECHNICAN :	GU/CK	
HOLE No.	TH18-03							
DEPTH								
SAMPLE No.	14	15	16					
TARE No.								
WT. SAMPLE WET + TARE	563.8	636.8	597.1					
WT. SAMPLE DRY + TARE	481.8	555.5	524.3					
WT. TARE	12.7	12.7	12.7					
WATER CONTENT W%	**17.5%**	**15.0%**	**14.2%**					
HOLE No.	HA18-01			HA18-02				
DEPTH								
SAMPLE No.	1	2	3	1	2	3		
TARE No.								
WT. SAMPLE WET + TARE	586.8	538.3	469.4	211.4	165.3	209.7		
WT. SAMPLE DRY + TARE	502.6	453.3	384.3	164.7	136.9	188.0		
WT. TARE	12.7	12.7	12.7	12.7	12.7	12.7		
WATER CONTENT W%	**17.2%**	**19.3%**	**22.9%**	**30.7%**	**22.9%**	**12.4%**		
HOLE No.								
DEPTH								
SAMPLE No.								
TARE No.								
WT. SAMPLE WET + TARE								
WT. SAMPLE DRY + TARE								
WT. TARE								
WATER CONTENT W%								
HOLE No.								
DEPTH								
SAMPLE No.								
TARE No.								
WT. SAMPLE WET + TARE								
WT. SAMPLE DRY + TARE								
WT. TARE								
WATER CONTENT W%								

ATTERBERG LIMITS (ASTM D4318)

AECOM
AECOM Canada Ltd.
Materials Testing Lab
Bay#14-1511 Highfield Cres.SE
Calgary, Alberta T2G 5M4

CLIENT :	City of Edmonton		
PROJECT :	Lansdowne Staircase		
JOB No. :	60577232		
LOCATION :		SAMPLE:	2
TESTHOLE:	18-01	DEPTH :	
DATE :	May 15, 2018	TECHNICIAN :	GU

LIQUID LIMIT

Trial No.	1					
Number of Blows	20					
Container Number						
Wt. Sample (wet+tare)(g)	53.12					
Wt. Sample (dry+tare)(g)	38.89					
Wt. Tare (g)	16.22					
Wt. Dry Soil (g)	22.7					
Wt. Water (g)	14.2					
Water Content (%)	62.8%					

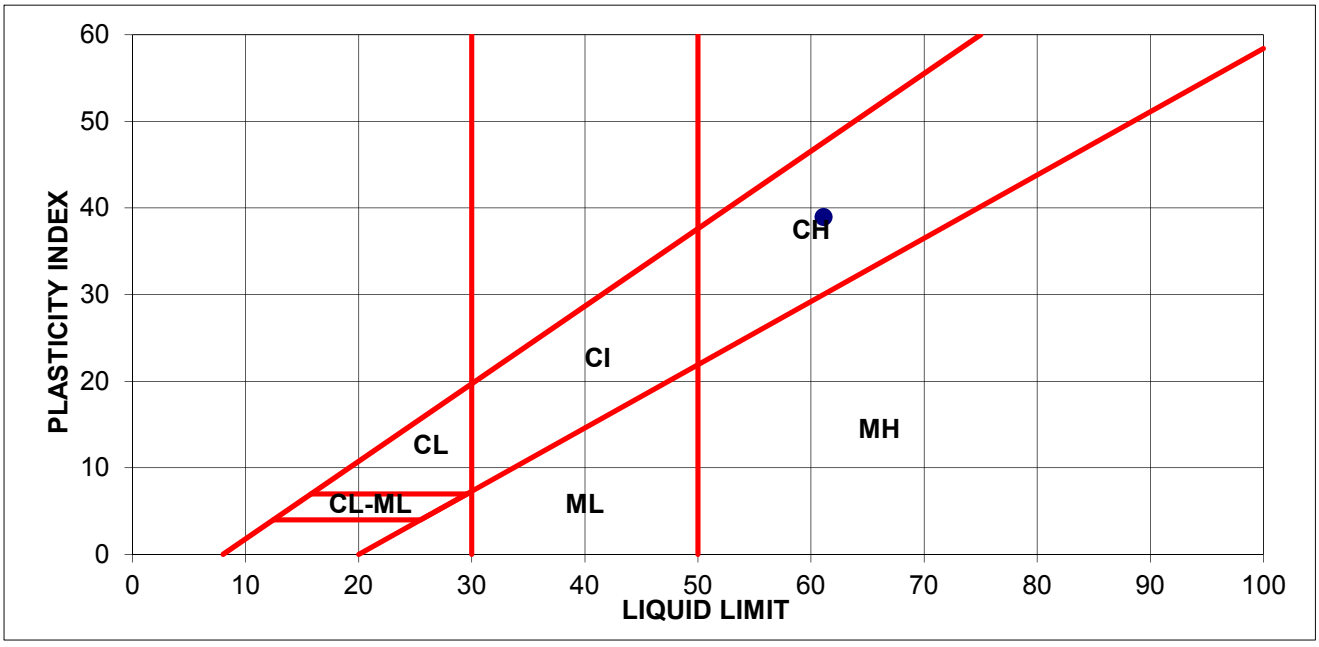
AVERAGE VALUES	
Liquid Limit	61.1
Plastic Limit	22.2
Plasticity Index	38.9

SAMPLE DESCRIPTION

Classification: **CH**

PLASTIC LIMIT

Trial No.	1		
Container Number			
Wt. Sample (wet+tare)(g)	32.16		
Wt. Sample (dry+tare)(g)	28.52		
Wt. Tare (g)	12.09		
Wt. Dry Soil (g)	16.4		
Wt. Water (g)	3.6		
Water Content (%)	22.2%		



FORM: CoE Lansdowne 18-01 #2 Atterberg.xls
DATE: 5/16/2018

GRAIN SIZE ANALYSIS (ASTM D422)

AECOM
AECOM Canada Ltd.
Materials Testing Lab
Bay#14-1511 Highfield Cres.SE
Calgary, Alberta T2G 5M4

CLIENT :	City of Edmonton		
PROJECT :	Lansdowne Staircase		
JOB No. :	60577232		
LOCATION :		SAMPLE:	2
TESTHOLE:	18-01	DEPTH :	
DATE :	May 14, 2018	TECHNICIAN :	GU

TOTAL DRY WEIGHT OF SAMPLE		SIEVE NO. (μm)	SIZE OF OPENING APPROX. INCHES	SIZE OF OPENING mm	WEIGHT RETAINED (g)	PERCENT RETAINED	PERCENT FINER THAN	REMARKS
Before Washing		150,000	6	150.0		0%	100%	
Wet + Tare		75,000	3	75.0		0%	100%	
Dry+Tare	603.8	50,000	2	50.0		0%	100%	
Tare	100.0	40,000	1 1/2	40.0		0%	100%	
Wt. Dry	503.8	25,000	1	25.0		0%	100%	
Moisture Content		20,000	3/4	20.0		0%	100%	
Wet + Tare		16,000	5/8	16.0		0%	100%	
Dry+Tare		12,500	1/2	12.5		0%	100%	
Tare		10,000	3/8	10.0		0%	100%	
MC (%)		5,000	0.185	5.0	6.7	1%	98.7%	
	Passing							
After Washing		2,000	0.0937	2.0	12.6	3%	97.5%	
Wt. Dry+Tare		1,250	0.0469	1.25	18.5	4%	96.3%	
Tare		630	0.0234	0.63	26.4	5%	94.8%	
Wt. Dry		315	0.0116	0.315	38.1	8%	92.4%	
Tare No.		160	0.0059	0.160	59.8	12%	88.1%	
		75	0.00295	0.075	70.6	14%	86.0%	
		PAN						

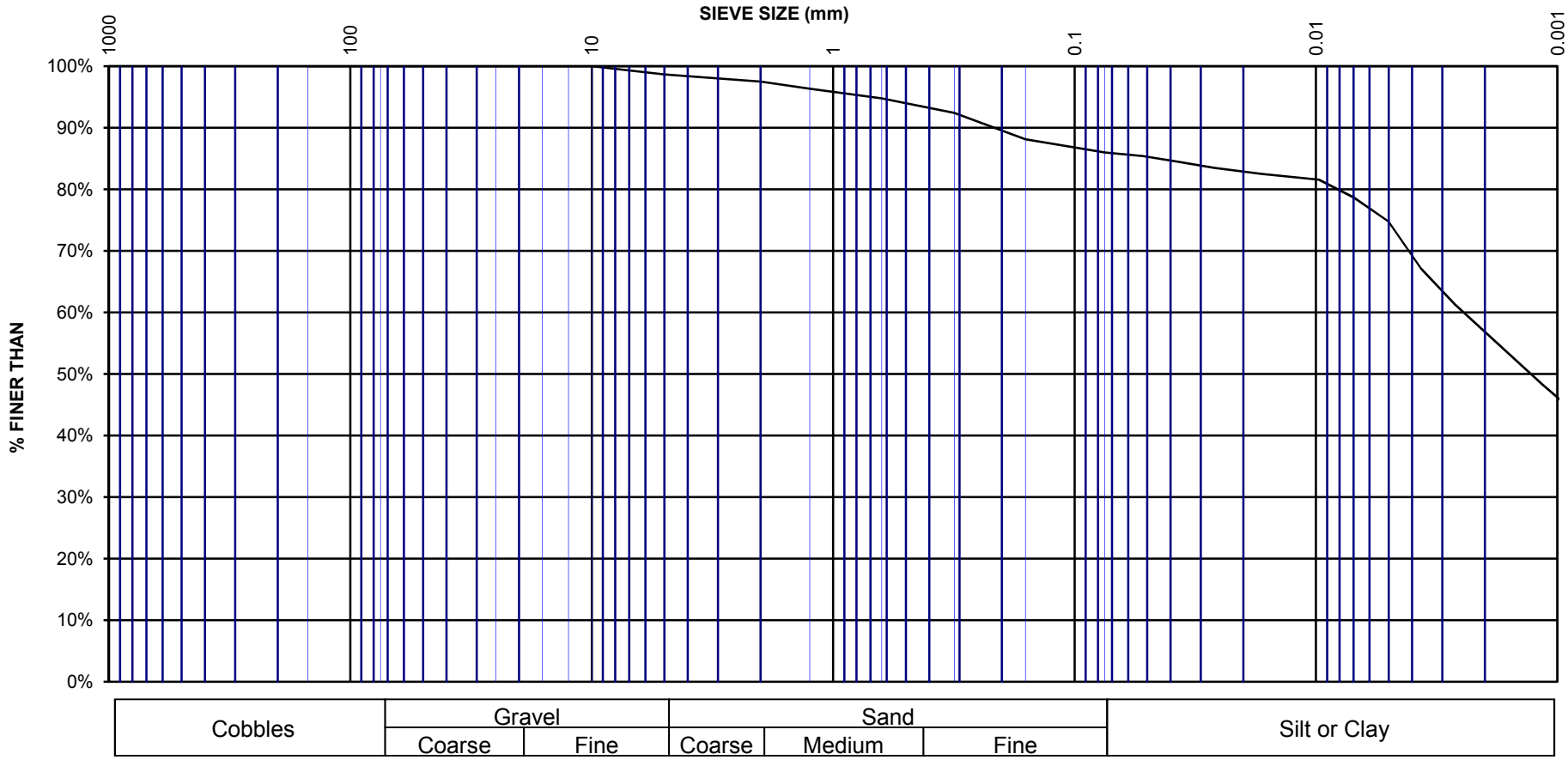
HYDROMETER DATA		READING	TIME (min)	DIAMETER (mm)	TEMP. (°C)	CORR. READING	PERCENT FINER THAN	REMARKS
Wt Dry+Tare	603.8	48	0.5	0.052	25	44	85.4%	
Wt Tare	100.0	47	1	0.037	25	44	84.5%	
Wt Dry	503.8	47	2	0.026	25	43	83.5%	
Sample Size :	50	46	5	0.017	25	43	82.5%	
Wt Retained 2 mm:	12.6	46	15	0.010	25	42	81.6%	
% Passing 2 mm:	97.5%	44	30	0.007	25	41	78.7%	
Specific Gravity :	2.70	42	60	0.005	25	39	74.8%	
Hydrometer No.:	43-9856	38	120	0.004	25	35	67.1%	
Solution (g/L) :	40	35	240	0.003	25	32	61.3%	
		29	1440	0.001	24	25	48.3%	
		26	2880	0.001	24	23	43.4%	

GRAIN SIZE ANALYSIS (ASTM D422)

AECOM
AECOM Canada Ltd.
Materials Testing Lab
Bay#14-1511 Highfield Cres.SE
Calgary, Alberta T2G 5M4

CLIENT :	City of Edmonton		
PROJECT :	Lansdowne Staircase		
JOB No. :	60577232		
LOCATION :		SAMPLE:	2
TESTHOLE:	18-01	DEPTH :	
DATE :	May 14, 2018	TECHNICIAN :	GU

Gravel = 1.3% **Sand = 12.7%** **Silt = 31.1%** **Clay = 54.9%**



FORM: CoE Lansdowne 18-01 #2 Hydro.xls
DATE: 5/16/2018

ATTERBERG LIMITS (ASTM D4318)

AECOM
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Materials Testing Lab
Bay#14-1511 Highfield Cres.SE
Calgary, Alberta T2G 5M4

CLIENT :	City of Edmonton		
PROJECT :	Lansdowne Staircase		
JOB No. :	60577232		
LOCATION :		SAMPLE:	2
TESTHOLE:	18-02	DEPTH :	
DATE :	May 15, 2018	TECHNICIAN :	GU

LIQUID LIMIT

Trial No.	1					
Number of Blows	23					
Container Number						
Wt. Sample (wet+tare)(g)	53.71					
Wt. Sample (dry+tare)(g)	39.83					
Wt. Tare (g)	16.36					
Wt. Dry Soil (g)	23.5					
Wt. Water (g)	13.9					
Water Content (%)	59.1%					

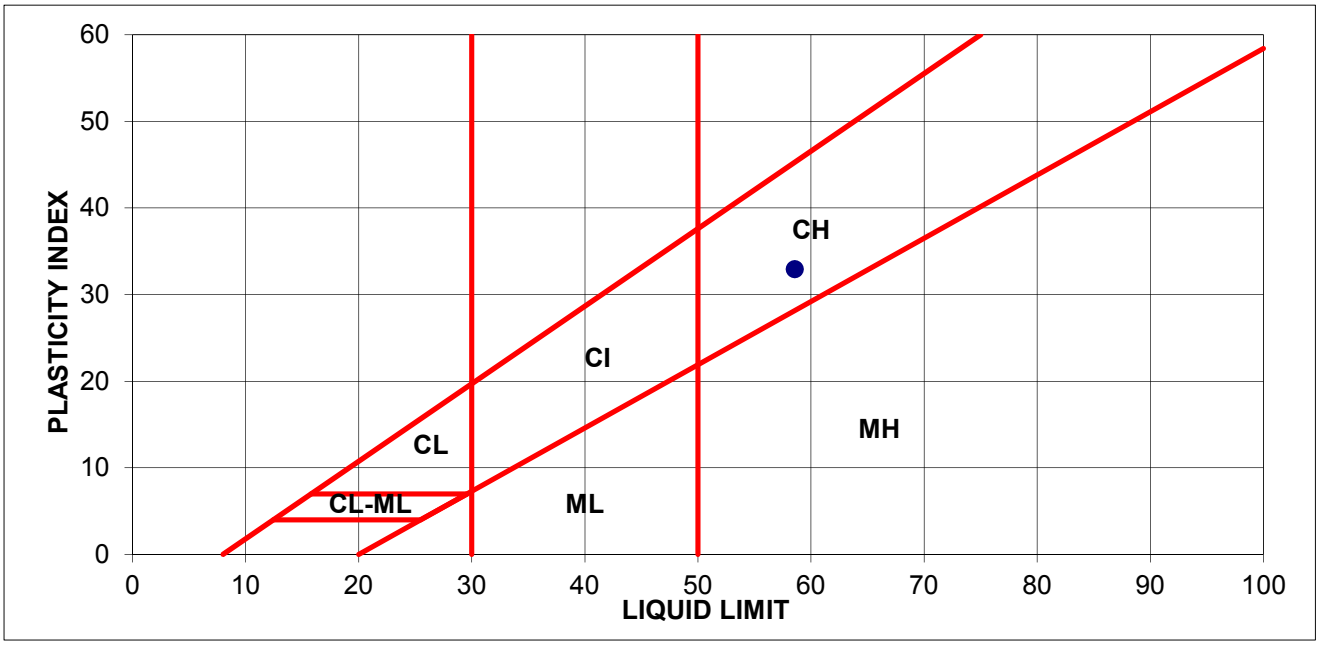
AVERAGE VALUES	
Liquid Limit	58.5
Plastic Limit	25.6
Plasticity Index	33.0

SAMPLE DESCRIPTION

Classification: **CH**

PLASTIC LIMIT

Trial No.	1		
Container Number			
Wt. Sample (wet+tare)(g)	31.90		
Wt. Sample (dry+tare)(g)	27.91		
Wt. Tare (g)	12.32		
Wt. Dry Soil (g)	15.6		
Wt. Water (g)	4.0		
Water Content (%)	25.6%		



FORM: CoE Lansdowne 18-02 #2 Atterberg.xls
DATE: 5/16/2018

GRAIN SIZE ANALYSIS (ASTM D422)

AECOM
AECOM Canada Ltd.
Materials Testing Lab
Bay#14-1511 Highfield Cres.SE
Calgary, Alberta T2G 5M4

CLIENT :	City of Edmonton		
PROJECT :	Lansdowne Staircase		
JOB No. :	60577232		
LOCATION :		SAMPLE:	2
TESTHOLE:	18-02	DEPTH :	
DATE :	May 14, 2018	TECHNICIAN :	GU

TOTAL DRY WEIGHT OF SAMPLE		SIEVE NO. (μm)	SIZE OF OPENING APPROX. INCHES	SIZE OF OPENING mm	WEIGHT RETAINED (g)	PERCENT RETAINED	PERCENT FINER THAN	REMARKS
Before Washing		150,000	6	150.0		0%	100%	
Wet + Tare		75,000	3	75.0		0%	100%	
Dry+Tare	488.4	50,000	2	50.0		0%	100%	
Tare	100.0	40,000	1 1/2	40.0		0%	100%	
Wt. Dry	388.4	25,000	1	25.0		0%	100%	
Moisture Content		20,000	3/4	20.0		0%	100%	
Wet + Tare		16,000	5/8	16.0		0%	100%	
Dry+Tare		12,500	1/2	12.5		0%	100%	
Tare		10,000	3/8	10.0		0%	100%	
MC (%)		5,000	0.185	5.0		0%	100%	
	Passing							
After Washing		2,000	0.0937	2.0		0%	100%	
Wt. Dry+Tare		1,250	0.0469	1.25	0.8	0%	99.8%	
Tare		630	0.0234	0.63	1.6	0%	99.6%	
Wt. Dry		315	0.0116	0.315	2.3	1%	99.4%	
Tare No.		160	0.0059	0.160	5.4	1%	98.6%	
		75	0.00295	0.075	9.3	2%	97.6%	
		PAN						

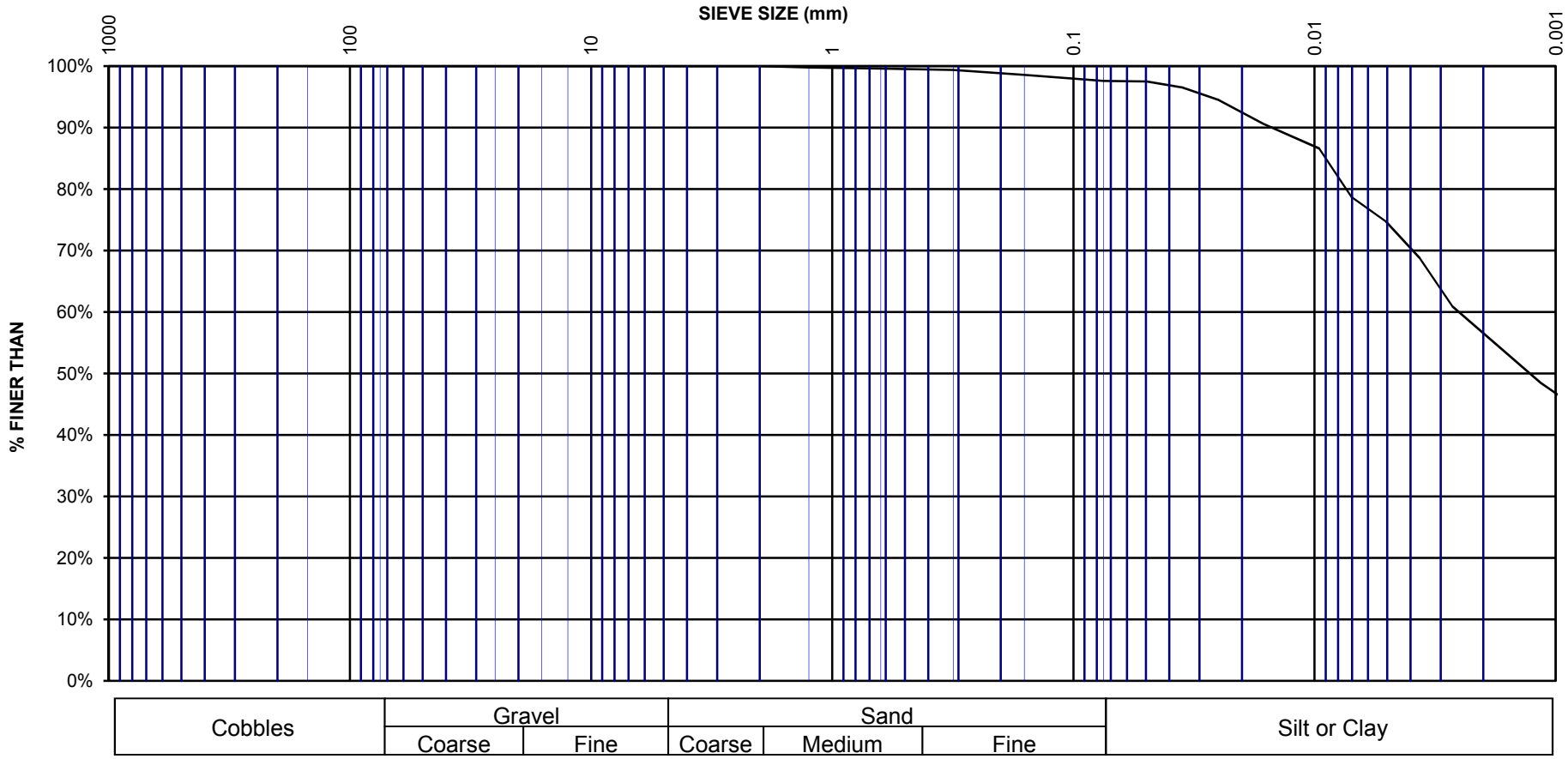
HYDROMETER DATA		READING	TIME (min)	DIAMETER (mm)	TEMP. (°C)	CORR. READING	PERCENT FINER THAN	REMARKS
Wt Dry+Tare	488.4	53	0.5	0.050	25	49	97.5%	
Wt Tare	100.0	52	1	0.035	25	49	96.5%	
Wt Dry	388.4	51	2	0.025	25	48	94.5%	
Sample Size :	50	49	5	0.016	25	46	90.6%	
Wt Retained 2 mm:	0.0	47	15	0.010	25	44	86.6%	
% Passing 2 mm:	100.0%	43	30	0.007	25	40	78.7%	
Specific Gravity :	2.70	41	60	0.005	25	38	74.7%	
Hydrometer No.:	43-9856	38	120	0.004	25	35	68.8%	
Solution (g/L) :	40	34	240	0.003	25	31	60.9%	
		28	1440	0.001	24	25	48.5%	
		26	2880	0.001	24	23	44.6%	

GRAIN SIZE ANALYSIS (ASTM D422)

AECOM
AECOM Canada Ltd.
Materials Testing Lab
Bay#14-1511 Highfield Cres.SE
Calgary, Alberta T2G 5M4

CLIENT :	City of Edmonton		
PROJECT :	Lansdowne Staircase		
JOB No. :	60577232		
LOCATION :		SAMPLE:	2
TESTHOLE:	18-02	DEPTH :	
DATE :	May 14, 2018	TECHNICIAN :	GU

Gravel = 0.0% **Sand = 2.4%** **Silt = 42.8%** **Clay = 54.8%**



FORM: CoE Lansdowne 18-02 #2 Hydro.xls
DATE: 5/16/2018

UNCONFINED COMPRESSION TEST (ASTM-D2166)

AECOM
AECOM Canada Ltd.
Materials Testing Lab
Bay#14-1511 Highfield Cres.SE
Calgary, Alberta T2G 5M4

CLIENT :	City of Edmonton		
PROJECT :	Lansdowne Staircase		
JOB No. :	60577232.0000		
LOCATION :		SAMPLE:	8
BOREHOLE:	TH18-02	DEPTH :	17.5'
DATE :	May 14, 2018	TECHNICIAN :	CK

DENSITY DETERMINATION		WATER CONTENT		SAMPLE DESCRIPTION
Wt. Sample (g)	1007.6	Tare Number		CLAY - silty, trace sand, stiff, yellowish orange
Initial Length (mm)	147.7	Wt. Sample (wet+tare) (g)	916.6	
Initial Diameter (mm)	72.5	Wt. Sample (dry+tare)(g)	793.8	
Wet Unit Weight (kN/m³)	16.2	Wt. Tare (g)	198.5	
Dry Unit Weight (kN/m³)	13.4	Water Content (%)	20.6%	

LOAD DATA		FAILURE DATA		FAILURE MODE
Ring #	3491	Load (N)	645	45^0 crack in middle with some vertical cracking
Gears Used	Humbolt	% Strain :	4.6%	
Loading Rate	.055"/min	Corrected Q_U (kPa)	149	

Time (min)	Load Dial (0.0001")	Load (N)	Strain Dial (0.001")	Strain (%)	Area (mm²)	Q_U (kPa)	Comments
0	0	0	1000	0.0%	4128	0.0	
0.25	9.5	27	987	0.2%	4137	6.6	
0.5	14	41	972	0.5%	4148	9.8	
0.75	18	51	957	0.7%	4159	12.3	
1	23	65	943	1.0%	4169	15.5	
1.5	37	102	915	1.5%	4189	24.3	
2	59	161	889	1.9%	4209	38.3	
2.5	91	248	863	2.4%	4228	58.7	
3	130	351	838	2.8%	4247	82.6	
3.5	175	470	812	3.2%	4266	110.1	
4	210	564	787	3.7%	4285	131.5	
4.5	237	637	761	4.1%	4305	147.9	
5	240	645	731	4.6%	4328	149.0	
5.5	208	558	695	5.2%	4357	128.1	

AECOM
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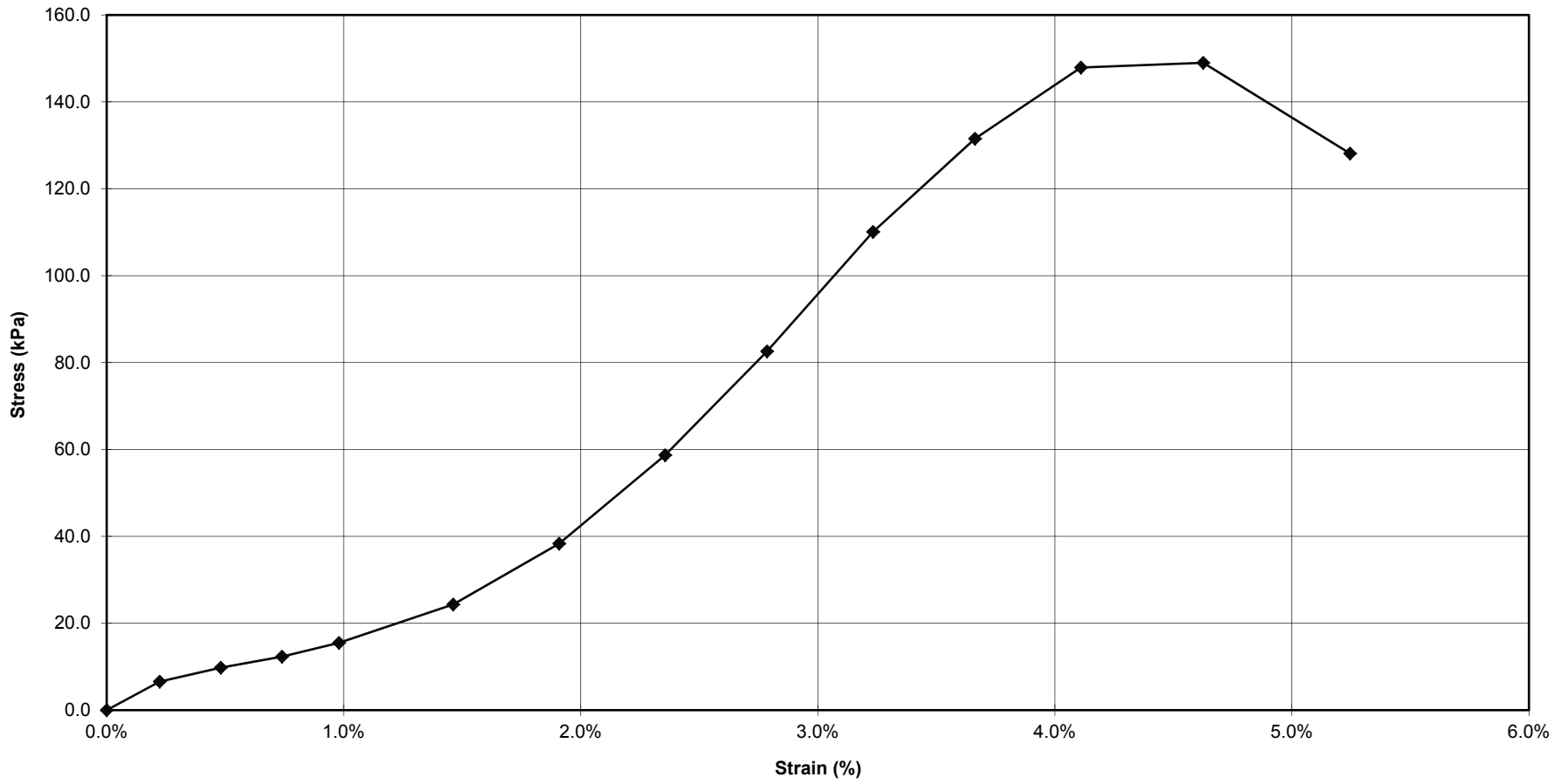
Bay#14-1511 Highfield Cres.SE
Calgary, Alberta T2G 5M4

UNCONFINED COMPRESSION TEST (ASTM D2166)

CLIENT :	City of Edmonton		
PROJECT :	Lansdowne Staircase		
JOB No. :	60577232		
LOCATION :		SAMPLE:	8
BOREHOLE:	TH18-02	DEPTH :	17.5'
DATE :	14-May-18	TECH. :	CK



FORM : CoE Lansdowne 18-02 #8 UCS.xls
DATE: 5/15/2018

ATTERBERG LIMITS (ASTM D4318)

AECOM
AECOM Canada Ltd.
Materials Testing Lab
Bay#14-1511 Highfield Cres.SE
Calgary, Alberta T2G 5M4

CLIENT :	City of Edmonton		
PROJECT :	Lansdowne Staircase		
JOB No. :	60577232		
LOCATION :		SAMPLE:	10
TESTHOLE:	18-02	DEPTH :	
DATE :	May 15, 2018	TECHNICIAN :	CK

LIQUID LIMIT

Trial No.	1					
Number of Blows	31					
Container Number						
Wt. Sample (wet+tare)(g)	50.43					
Wt. Sample (dry+tare)(g)	42.62					
Wt. Tare (g)	12.16					
Wt. Dry Soil (g)	30.5					
Wt. Water (g)	7.8					
Water Content (%)	25.6%					

AVERAGE VALUES

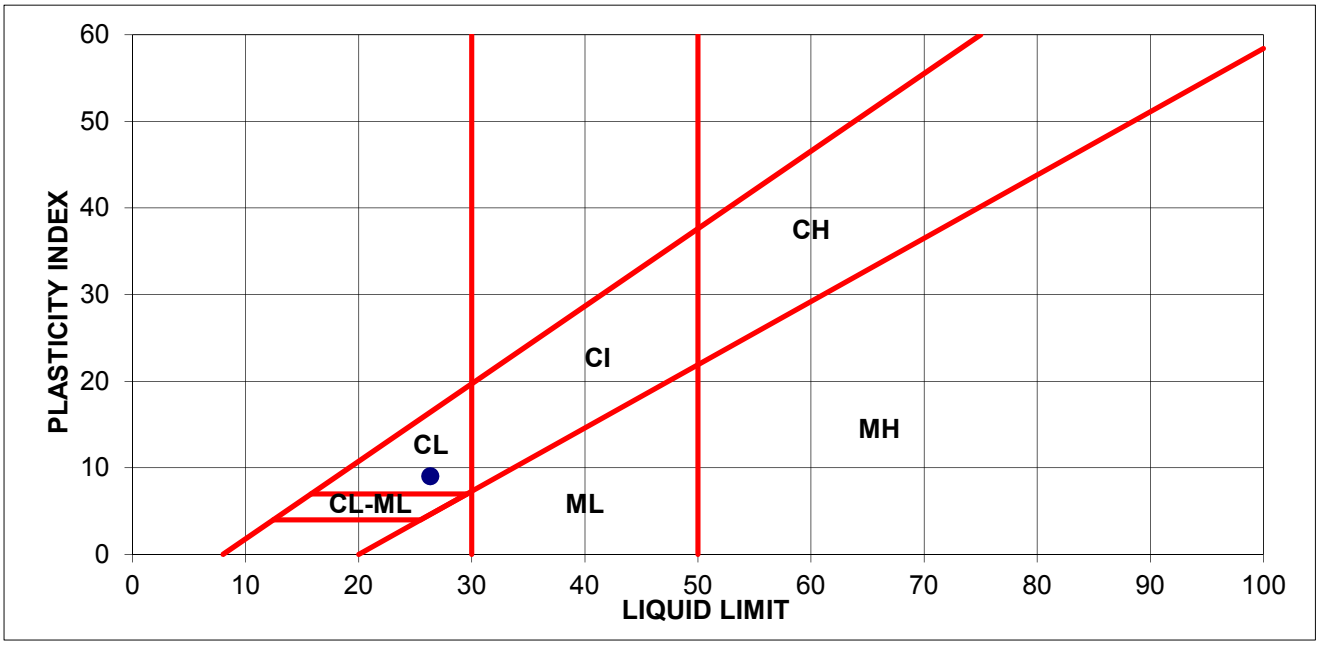
Liquid Limit	26.3
Plastic Limit	17.3
Plasticity Index	9.0

SAMPLE DESCRIPTION

Classification: **CL**

PLASTIC LIMIT

Trial No.	1		
Container Number			
Wt. Sample (wet+tare)(g)	33.45		
Wt. Sample (dry+tare)(g)	30.71		
Wt. Tare (g)	14.85		
Wt. Dry Soil (g)	15.9		
Wt. Water (g)	2.7		
Water Content (%)	17.3%		



FORM: CoE Lansdowne 18-02 #10 Atterberg.xls
DATE: 5/16/2018

GRAIN SIZE ANALYSIS (ASTM D422)

AECOM
AECOM Canada Ltd.
Materials Testing Lab
Bay#14-1511 Highfield Cres.SE
Calgary, Alberta T2G 5M4

CLIENT :	City of Edmonton		
PROJECT :	Lansdowne Staircase		
JOB No. :	60577232		
LOCATION :		SAMPLE:	10
TESTHOLE:	18-02	DEPTH :	
DATE :	May 14, 2018	TECHNICIAN :	GU

TOTAL DRY WEIGHT OF SAMPLE		SIEVE NO. (μm)	SIZE OF OPENING APPROX. INCHES	SIZE OF OPENING mm	WEIGHT RETAINED (g)	PERCENT RETAINED	PERCENT FINER THAN	REMARKS
Before Washing		150,000	6	150.0		0%	100%	
Wet + Tare		75,000	3	75.0		0%	100%	
Dry+Tare	439.9	50,000	2	50.0		0%	100%	
Tare	100.0	40,000	1 1/2	40.0		0%	100%	
Wt. Dry	339.9	25,000	1	25.0		0%	100%	
Moisture Content		20,000	3/4	20.0		0%	100%	
Wet + Tare		16,000	5/8	16.0		0%	100%	
Dry+Tare		12,500	1/2	12.5	7.3	2%	97.9%	
Tare		10,000	3/8	10.0	7.3	2%	97.9%	
MC (%)		5,000	0.185	5.0	8.8	3%	97.4%	
	Passing							
After Washing		2,000	0.0937	2.0	9.7	3%	97.1%	
Wt. Dry+Tare		1,250	0.0469	1.25	11.0	3%	96.8%	
Tare		630	0.0234	0.63	15.0	4%	95.6%	
Wt. Dry		315	0.0116	0.315	54.6	16%	83.9%	
Tare No.		160	0.0059	0.160	96.2	28%	71.7%	
		75	0.00295	0.075	110.7	33%	67.4%	
		PAN						

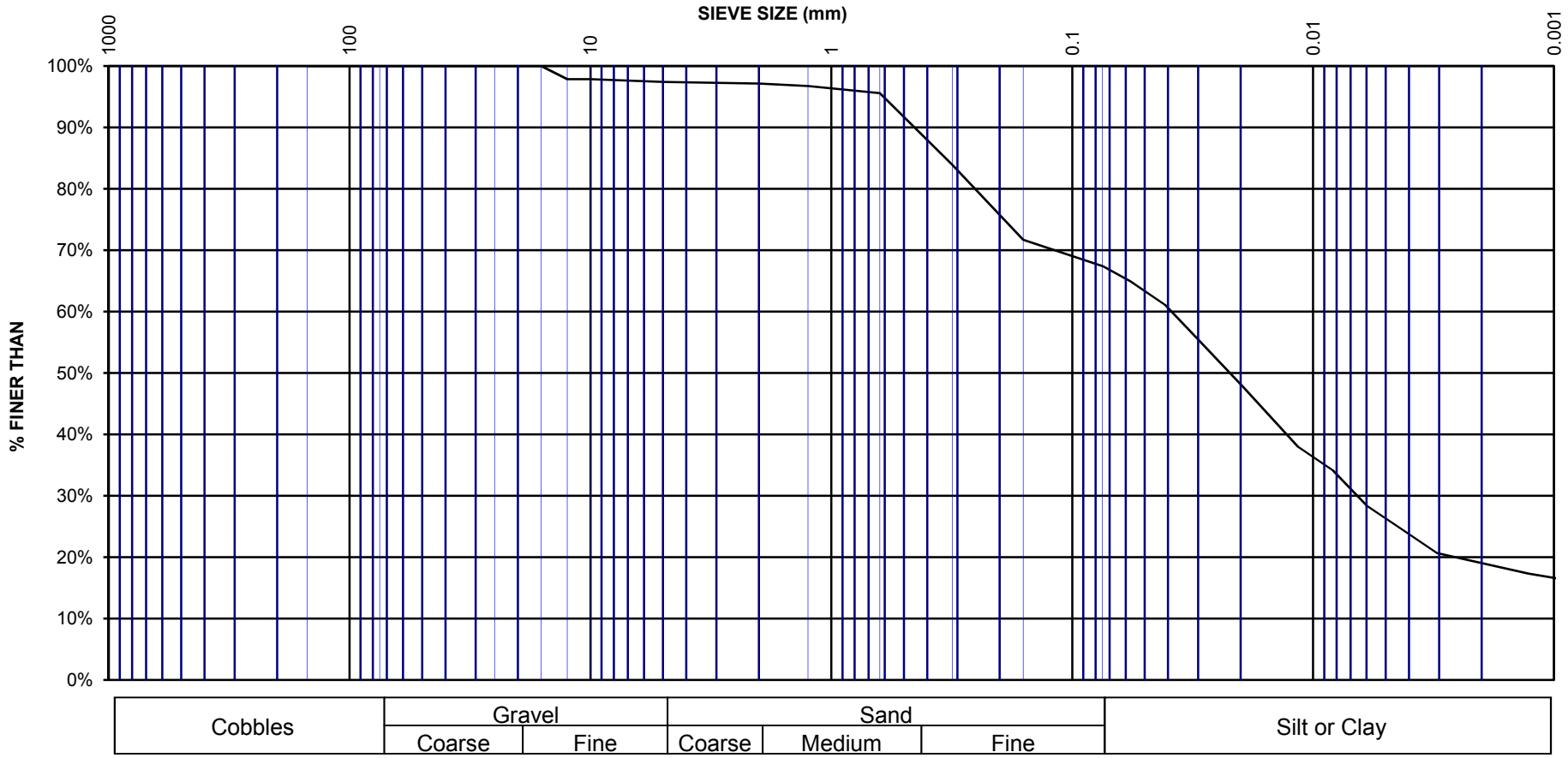
HYDROMETER DATA		READING	TIME (min)	DIAMETER (mm)	TEMP. (°C)	CORR. READING	PERCENT FINER THAN	REMARKS
Wt Dry+Tare	439.9	37	0.5	0.057	25	34	64.9%	
Wt Tare	100.0	35	1	0.041	25	32	61.1%	
Wt Dry	339.9	32	2	0.030	25	29	55.3%	
Sample Size :	50	28	5	0.019	25	25	47.6%	
Wt Retained 2 mm:	9.7	23	15	0.012	25	20	38.0%	
% Passing 2 mm:	97.1%	21	30	0.008	25	18	34.1%	
Specific Gravity :	2.70	18	60	0.006	25	15	28.4%	
Hydrometer No.:	43-9856	16	120	0.004	25	13	24.5%	
Solution (g/L) :	40	14	240	0.003	25	11	20.7%	
		13	1440	0.001	24	9	17.3%	
		12	2880	0.001	24	9	16.3%	

GRAIN SIZE ANALYSIS (ASTM D422)

AECOM
AECOM Canada Ltd.
Materials Testing Lab
Bay#14-1511 Highfield Cres.SE
Calgary, Alberta T2G 5M4

CLIENT :	City of Edmonton		
PROJECT :	Lansdowne Staircase		
JOB No. :	60577232		
LOCATION :		SAMPLE:	10
TESTHOLE:	18-02	DEPTH :	
DATE :	May 14, 2018	TECHNICIAN :	GU

Gravel = 2.6% **Sand = 30.0%** **Silt = 48.3%** **Clay = 19.1%**



FORM: CoE Lansdowne 18-02 #10 Hydro.xls
DATE: 5/16/2018

ATTERBERG LIMITS (ASTM D4318)

AECOM
AECOM Canada Ltd.
Materials Testing Lab
Bay#14-1511 Highfield Cres.SE
Calgary, Alberta T2G 5M4

CLIENT :	City of Edmonton		
PROJECT :	Lansdowne Staircase		
JOB No. :	60577232		
LOCATION :		SAMPLE:	3
TESTHOLE:	18-03	DEPTH :	
DATE :	May 15, 2018	TECHNICIAN :	GU

LIQUID LIMIT

Trial No.	1					
Number of Blows	20					
Container Number						
Wt. Sample (wet+tare)(g)	59.86					
Wt. Sample (dry+tare)(g)	44.47					
Wt. Tare (g)	16.29					
Wt. Dry Soil (g)	28.2					
Wt. Water (g)	15.4					
Water Content (%)	54.6%					

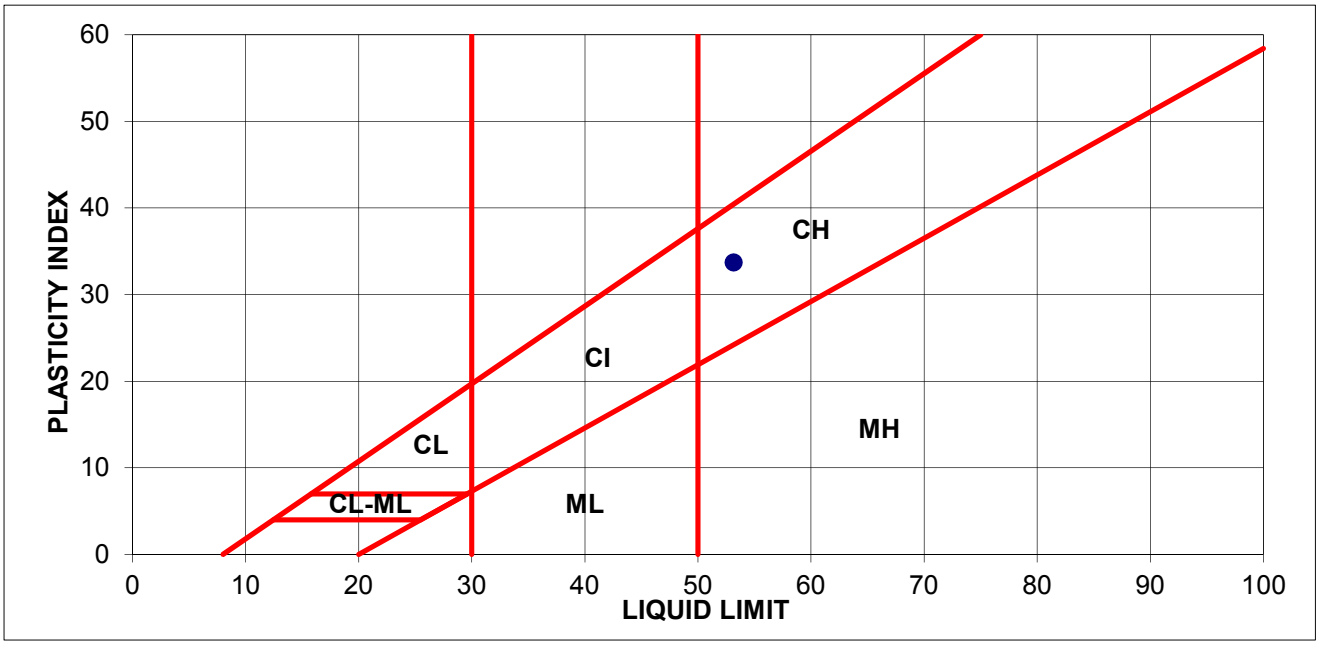
AVERAGE VALUES	
Liquid Limit	53.2
Plastic Limit	19.4
Plasticity Index	33.7

SAMPLE DESCRIPTION

Classification: **CH**

PLASTIC LIMIT

Trial No.	1		
Container Number			
Wt. Sample (wet+tare)(g)	30.49		
Wt. Sample (dry+tare)(g)	27.50		
Wt. Tare (g)	12.12		
Wt. Dry Soil (g)	15.4		
Wt. Water (g)	3.0		
Water Content (%)	19.4%		



FORM: CoE Lansdowne 18-03 #3 Atterberg.xls
DATE: 5/16/2018

GRAIN SIZE ANALYSIS (ASTM D422)

AECOM
AECOM Canada Ltd.
Materials Testing Lab
Bay#14-1511 Highfield Cres.SE
Calgary, Alberta T2G 5M4

CLIENT :	City of Edmonton		
PROJECT :	Lansdowne Staircase		
JOB No. :	60577232		
LOCATION :		SAMPLE:	3
TESTHOLE:	18-03	DEPTH :	
DATE :	May 14, 2018	TECHNICIAN :	GU

TOTAL DRY WEIGHT OF SAMPLE		SIEVE NO. (μm)	SIZE OF OPENING APPROX. INCHES	SIZE OF OPENING mm	WEIGHT RETAINED (g)	PERCENT RETAINED	PERCENT FINER THAN	REMARKS
Before Washing		150,000	6	150.0		0%	100%	
Wet + Tare		75,000	3	75.0		0%	100%	
Dry+Tare	613.1	50,000	2	50.0		0%	100%	
Tare	100.0	40,000	1 1/2	40.0		0%	100%	
Wt. Dry	513.1	25,000	1	25.0		0%	100%	
Moisture Content		20,000	3/4	20.0		0%	100%	
Wet + Tare		16,000	5/8	16.0		0%	100%	
Dry+Tare		12,500	1/2	12.5		0%	100%	
Tare		10,000	3/8	10.0		0%	100%	
MC (%)		5,000	0.185	5.0	1.2	0%	99.8%	
	Passing							
After Washing		2,000	0.0937	2.0	2.1	0%	99.6%	
Wt. Dry+Tare		1,250	0.0469	1.25	4.1	1%	99.2%	
Tare		630	0.0234	0.63	8.2	2%	98.4%	
Wt. Dry		315	0.0116	0.315	13.3	3%	97.4%	
Tare No.		160	0.0059	0.160	36.8	7%	92.8%	
		75	0.00295	0.075	67.5	13%	86.8%	
		PAN						

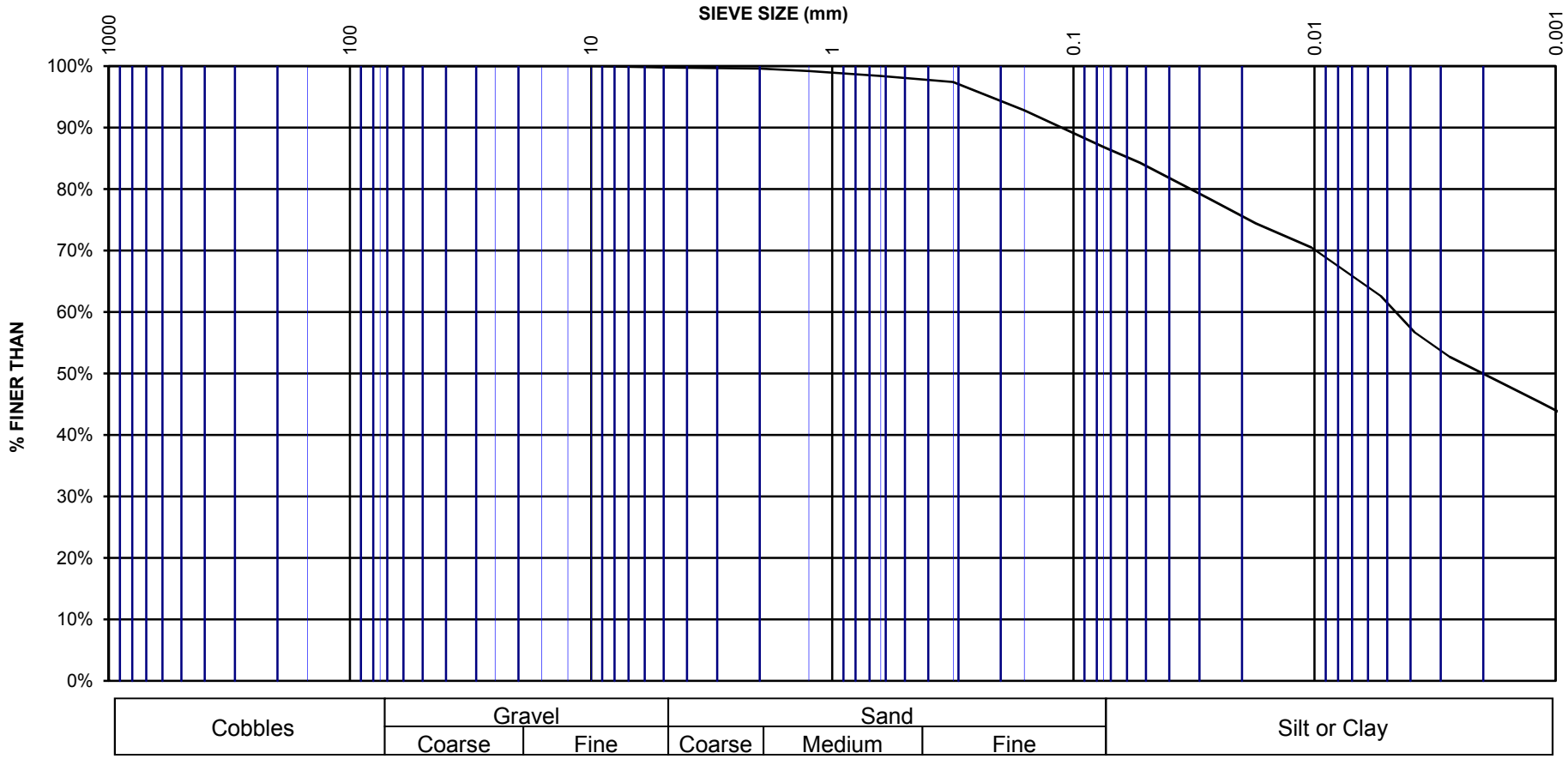
HYDROMETER DATA		READING	TIME (min)	DIAMETER (mm)	TEMP. (°C)	CORR. READING	PERCENT FINER THAN	REMARKS
Wt Dry+Tare	613.1	46	0.5	0.053	25	43	84.3%	
Wt Tare	100.0	45	1	0.038	25	41	81.3%	
Wt Dry	513.1	43	2	0.027	25	40	78.4%	
Sample Size :	50	41	5	0.018	25	38	74.4%	
Wt Retained 2 mm:	2.1	39	15	0.010	25	36	70.5%	
% Passing 2 mm:	99.6%	37	30	0.007	25	34	66.6%	
Specific Gravity :	2.70	35	60	0.005	25	32	62.6%	
Hydrometer No.:	43-9856	32	120	0.004	25	29	56.7%	
Solution (g/L) :	40	30	240	0.003	25	27	52.7%	
		27	1440	0.001	24	23	45.4%	
		25	2880	0.001	24	22	42.4%	

GRAIN SIZE ANALYSIS (ASTM D422)

AECOM
AECOM Canada Ltd.
Materials Testing Lab
Bay#14-1511 Highfield Cres.SE
Calgary, Alberta T2G 5M4

CLIENT :	City of Edmonton		
PROJECT :	Lansdowne Staircase		
JOB No. :	60577232		
LOCATION :		SAMPLE:	3
TESTHOLE:	18-03	DEPTH :	
DATE :	May 14, 2018	TECHNICIAN :	GU

Gravel = 0.2% **Sand = 12.9%** **Silt = 37.7%** **Clay = 49.2%**



FORM: CoE Lansdowne 18-03 #3 Hydro.xls
DATE: 5/16/2018

UNCONFINED COMPRESSION TEST (ASTM-D2166)

AECOM
AECOM Canada Ltd.
Materials Testing Lab
Bay#14-1511 Highfield Cres.SE
Calgary, Alberta T2G 5M4

CLIENT :	City of Edmonton		
PROJECT :	Lansdowne Staircase		
JOB No. :	60577232.0000		
LOCATION :		SAMPLE:	4
BOREHOLE:	TH18-03	DEPTH :	7.5'
DATE :	May 14, 2018	TECHNICIAN :	CK

DENSITY DETERMINATION		WATER CONTENT		SAMPLE DESCRIPTION
Wt. Sample (g)	1201.8	Tare Number		CLAY - trace silt, trace gravel, trace oxidized inclusions, coal, alkalines, medium stiff, dark grey
Initial Length (mm)	146.9	Wt. Sample (wet+tare) (g)	1403.6	
Initial Diameter (mm)	72.7	Wt. Sample (dry+tare)(g)	1157.4	
Wet Unit Weight (kN/m³)	19.3	Wt. Tare (g)	204.5	
Dry Unit Weight (kN/m³)	15.4	Water Content (%)	25.8%	

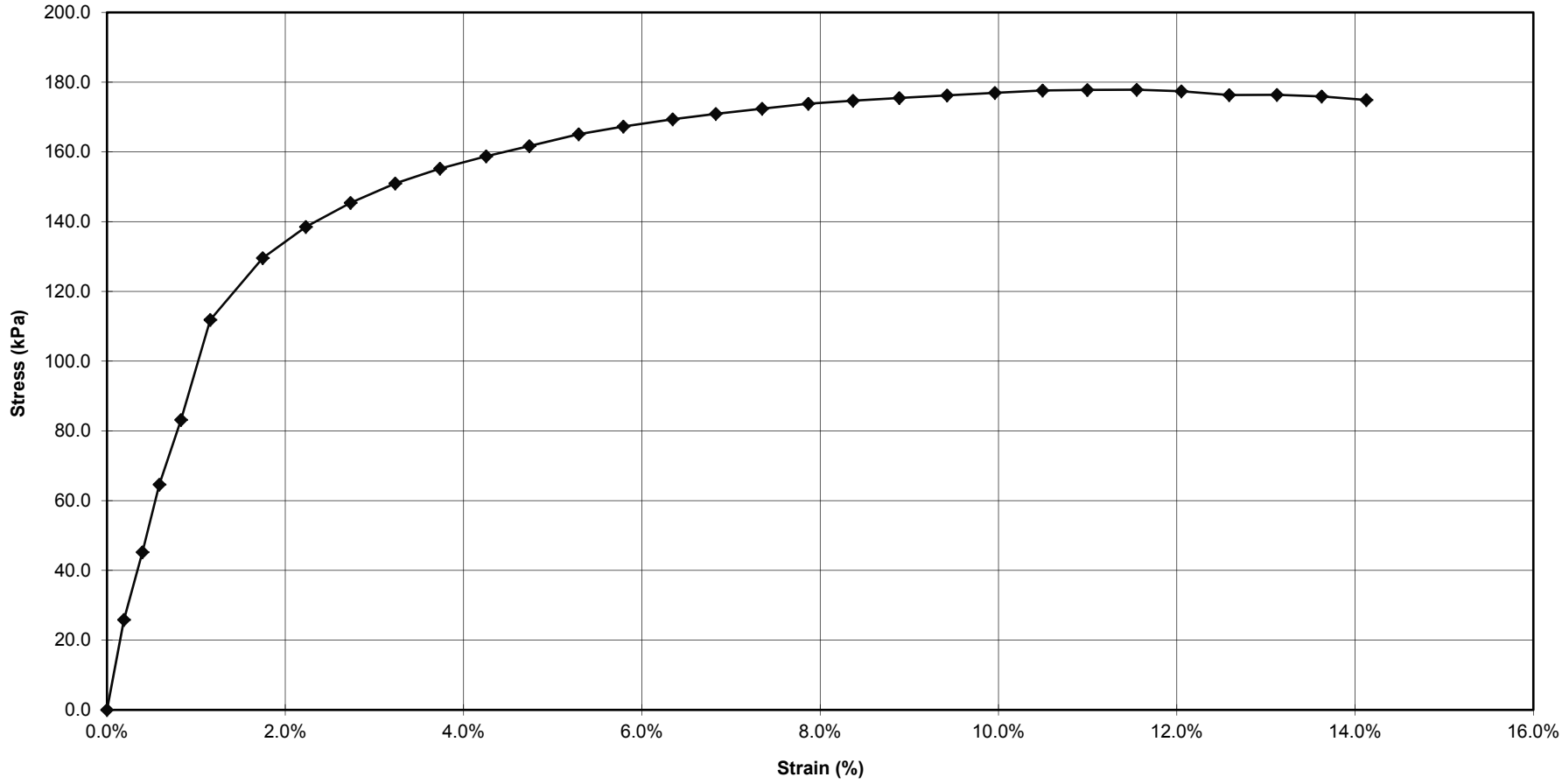
LOAD DATA		FAILURE DATA		FAILURE MODE
Ring #	3491	Load (N)	845	45^0 crack from top to bottom corner with bulging in the middle
Gears Used	Humbolt	% Strain :	13.6%	
Loading Rate	.055"/min	Corrected Q_U (kPa)	178	

Time (min)	Load Dial (0.0001")	Load (N)	Strain Dial (0.001")	Strain (%)	Area (mm²)	Q_U (kPa)	Comments
0	0	0	1000	0.0%	4151	0.0	
0.25	39	107	989	0.2%	4159	25.8	
0.5	69	188	977	0.4%	4168	45.2	
0.75	99	270	966	0.6%	4176	64.6	
1	129	348	952	0.8%	4186	83.2	
1.5	175	470	933	1.2%	4200	111.8	
2	204	547	899	1.7%	4225	129.6	
2.5	219	588	871	2.2%	4246	138.5	
3	231.5	621	842	2.7%	4268	145.4	
3.5	241	648	813	3.2%	4290	151.0	
4	249	669	784	3.7%	4312	155.2	
4.5	256	688	754	4.3%	4335	158.8	
5	262.5	705	726	4.7%	4357	161.7	
5.5	269	724	694	5.3%	4383	165.1	
6	274	737	665	5.8%	4406	167.3	
6.5	279	751	633	6.3%	4432	169.4	
7	283	761	605	6.8%	4455	170.9	
7.5	287	772	575	7.3%	4480	172.4	
8	291	783	545	7.9%	4506	173.8	
8.5	294	791	516	8.4%	4530	174.7	
9	297	799	486	8.9%	4556	175.5	
9.5	300	808	455	9.4%	4583	176.2	
10	303	816	424	10.0%	4610	176.9	
10.5	306	824	393	10.5%	4638	177.6	
11	308	829	364	11.0%	4664	177.8	
11.5	310	835	332	11.6%	4693	177.8	
12	311	837	303	12.1%	4720	177.4	
12.5	311.5	837	272	12.6%	4749	176.3	
13	313.5	843	241	13.1%	4778	176.4	
13.5	314	845	212	13.6%	4806	175.9	
14	314	845	183	14.1%	4834	174.9	

AECOM
AECOM Canada Ltd.
Materials Testing Lab
Bay#14-1511 Highfield Cres.SE
Calgary, Alberta T2G 5M4

UNCONFINED COMPRESSION TEST (ASTM D2166)

CLIENT :	City of Edmonton		
PROJECT :	Lansdowne Staircase		
JOB No. :	60577232		
LOCATION :		SAMPLE:	4
BOREHOLE:	TH18-03	DEPTH :	7.5'
DATE :	14-May-18	TECH. :	CK



FORM : CoE Lansdowne 18-03 #4 UCS.xls
DATE: 5/15/2018

ATTERBERG LIMITS (ASTM D4318)

AECOM
AECOM Canada Ltd.
Materials Testing Lab
Bay#14-1511 Highfield Cres.SE
Calgary, Alberta T2G 5M4

CLIENT :	City of Edmonton		
PROJECT :	Lansdowne Staircase		
JOB No. :	60577232		
LOCATION :		SAMPLE:	10
TESTHOLE:	18-03	DEPTH :	
DATE :	May 15, 2018	TECHNICIAN :	CK

LIQUID LIMIT

Trial No.	1					
Number of Blows	33					
Container Number						
Wt. Sample (wet+tare)(g)	44.58					
Wt. Sample (dry+tare)(g)	31.89					
Wt. Tare (g)	11.77					
Wt. Dry Soil (g)	20.1					
Wt. Water (g)	12.7					
Water Content (%)	63.1%					

AVERAGE VALUES

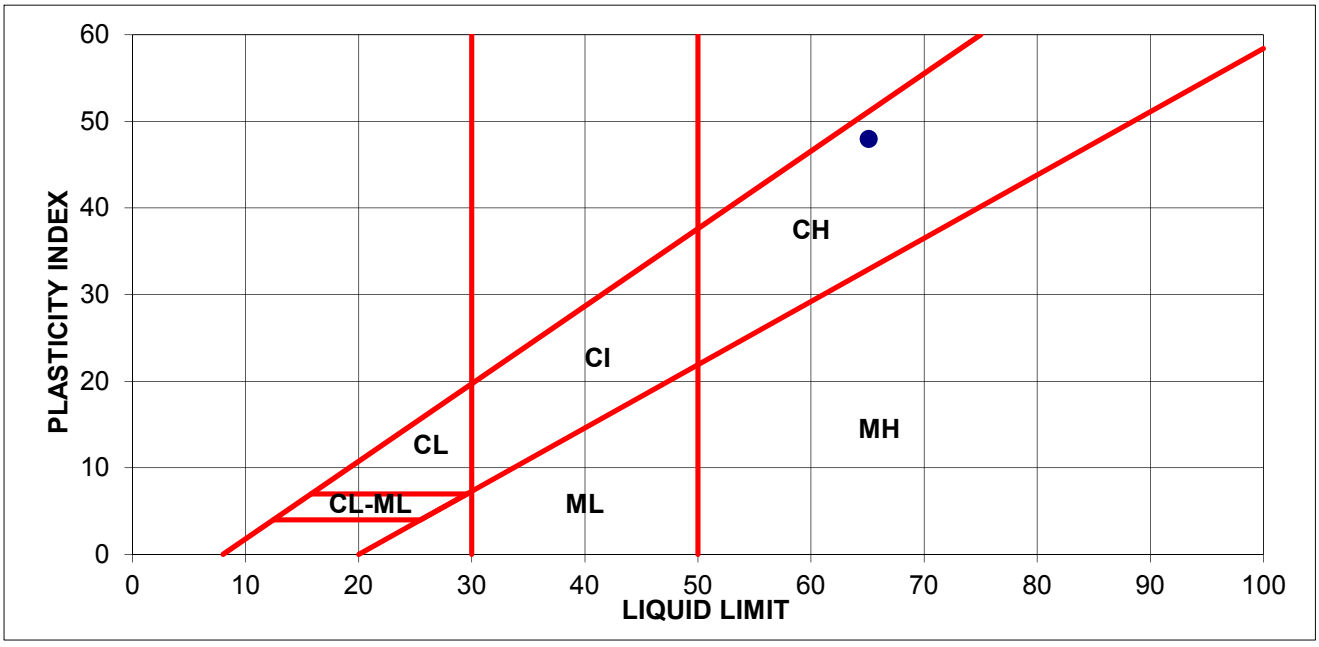
Liquid Limit	65.1
Plastic Limit	17.1
Plasticity Index	48.0

SAMPLE DESCRIPTION

Classification: **CH**

PLASTIC LIMIT

Trial No.	1		
Container Number			
Wt. Sample (wet+tare)(g)	32.80		
Wt. Sample (dry+tare)(g)	30.37		
Wt. Tare (g)	16.19		
Wt. Dry Soil (g)	14.2		
Wt. Water (g)	2.4		
Water Content (%)	17.1%		



FORM: CoE Lansdowne 18-03 #10 Atterberg.xls
DATE: 5/16/2018

GRAIN SIZE ANALYSIS (ASTM D422)

AECOM
AECOM Canada Ltd.
Materials Testing Lab
Bay#14-1511 Highfield Cres.SE
Calgary, Alberta T2G 5M4

CLIENT :	City of Edmonton		
PROJECT :	Lansdowne Staircase		
JOB No. :	60577232		
LOCATION :		SAMPLE:	3
TESTHOLE:	HA18-02	DEPTH :	
DATE :	May 14, 2018	TECHNICIAN :	GU

TOTAL DRY WEIGHT OF SAMPLE		SIEVE NO. (μm)	SIZE OF OPENING APPROX. INCHES	SIZE OF OPENING mm	WEIGHT RETAINED (g)	PERCENT RETAINED	PERCENT FINER THAN	REMARKS
Before Washing		150,000	6	150.0		0%	100%	
Wet + Tare		75,000	3	75.0		0%	100%	
Dry+Tare	277.5	50,000	2	50.0		0%	100%	
Tare	100.0	40,000	1 1/2	40.0		0%	100%	
Wt. Dry	177.5	25,000	1	25.0		0%	100%	
Moisture Content		20,000	3/4	20.0		0%	100%	
Wet + Tare		16,000	5/8	16.0		0%	100%	
Dry+Tare		12,500	1/2	12.5		0%	100%	
Tare		10,000	3/8	10.0		0%	100%	
MC (%)		5,000	0.185	5.0		0%	100%	
	Passing							
After Washing		2,000	0.0937	2.0		0%	100%	
Wt. Dry+Tare		1,250	0.0469	1.25	0.4	0%	99.8%	
Tare		630	0.0234	0.63	1.8	1%	99.0%	
Wt. Dry		315	0.0116	0.315	4.6	3%	97.4%	
Tare No.		160	0.0059	0.160	9.2	5%	94.8%	
		75	0.00295	0.075	12.8	7%	92.8%	
		PAN						

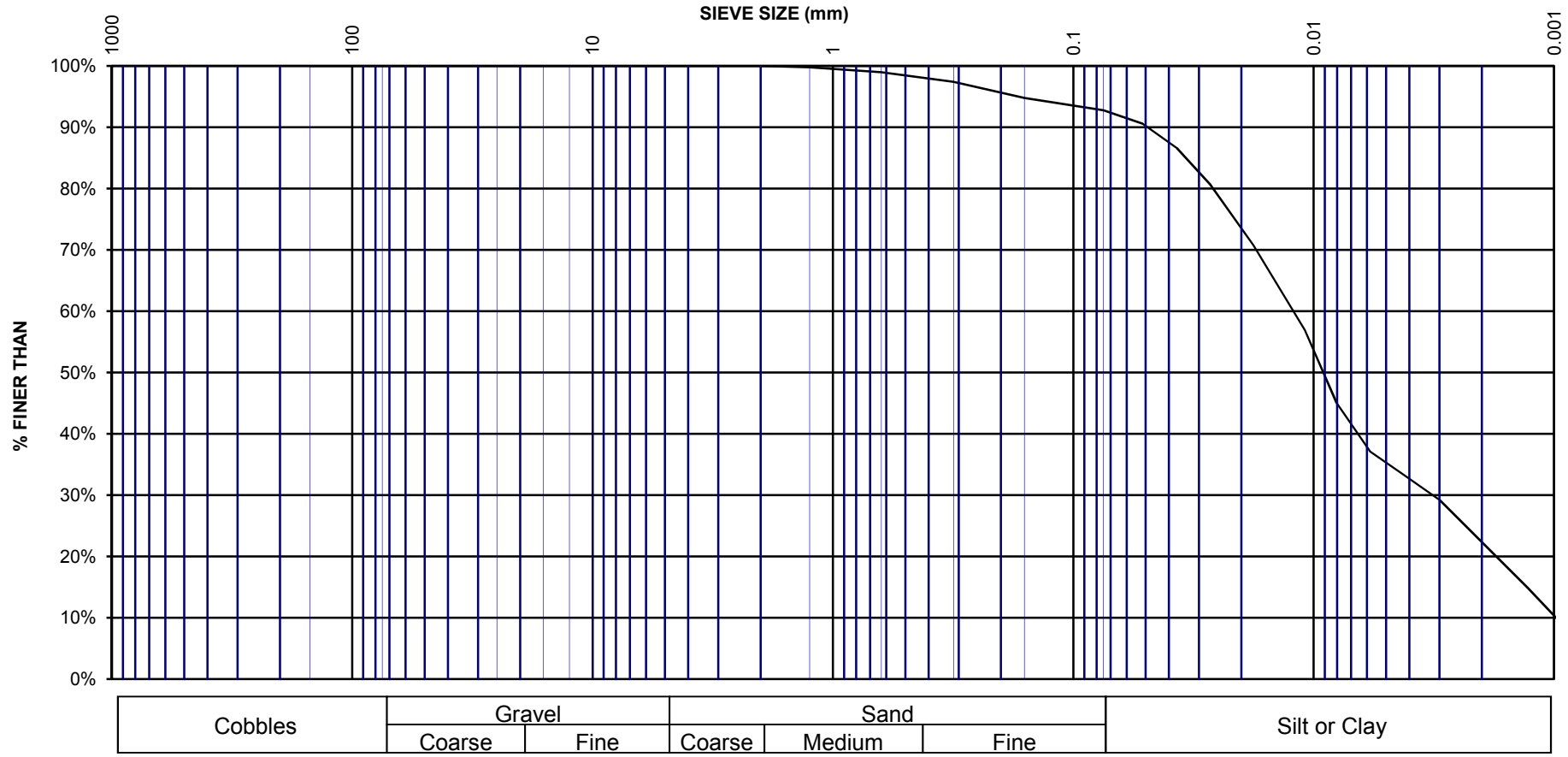
HYDROMETER DATA		READING	TIME (min)	DIAMETER (mm)	TEMP. (°C)	CORR. READING	PERCENT FINER THAN	REMARKS
Wt Dry+Tare	277.5	49	0.5	0.051	25	46	90.6%	
Wt Tare	100.0	47	1	0.037	25	44	86.6%	
Wt Dry	177.5	44	2	0.027	25	41	80.7%	
Sample Size :	50	39	5	0.018	25	36	70.8%	
Wt Retained 2 mm:	0.0	32	15	0.011	25	29	56.9%	
% Passing 2 mm:	100.0%	26	30	0.008	25	23	45.0%	
Specific Gravity :	2.70	22	60	0.006	25	19	37.1%	
Hydrometer No.:	43-9856	20	120	0.004	25	17	33.2%	
Solution (g/L) :	40	18	240	0.003	25	15	29.2%	
		11	1440	0.001	24	8	14.9%	
		8	2880	0.001	24	5	8.9%	

GRAIN SIZE ANALYSIS (ASTM D422)

AECOM
AECOM Canada Ltd.
Materials Testing Lab
Bay#14-1511 Highfield Cres.SE
Calgary, Alberta T2G 5M4

CLIENT :	City of Edmonton		
PROJECT :	Lansdowne Staircase		
JOB No. :	60577232		
LOCATION :		SAMPLE:	3
TESTHOLE:	HA18-02	DEPTH :	
DATE :	May 14, 2018	TECHNICIAN :	GU

Gravel = 0.0% **Sand = 7.2%** **Silt = 70.7%** **Clay = 22.1%**



FORM: CoE Lansdowne HA18-02 #3 Hydro.xls
DATE: 5/16/2018

AECOM Canada Ltd.
ATTN: Chris Keeley
Suite 300, 48 Quarry Park Blvd SE
Calgary AB T2C 5P2

Date Received: 10-MAY-18
Report Date: 30-MAY-18 11:40 (MT)
Version: FINAL

Client Phone: 403-254-3301

Certificate of Analysis

Lab Work Order #: L2093578

Project P.O. #: NOT SUBMITTED
Job Reference: CITY OF EDMONTON-LANSDOWN STAIRCASE-60577232 LAB TESTING
C of C Numbers:
Legal Site Desc:

Comments: Note: Total Sulphate Ion Content (SO4-T-CSA-A23-ED) results were <0.2% for all samples except -2,-3,-4, therefore Water Soluble Sulphate Ion Content (SO4-S-CSA-A23-ED) not required for analysis on -1.

Nelson Kwan, B.Sc.
Account Manager

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L2093578-1 CITY OF EDMONTON-LANSDOWN STAIRCASE - TH18-02 #3							
Sampled By: CLIENT on 10-MAY-18							
Matrix: SOIL							
Miscellaneous Parameters							
% Saturation	100		1.0	%		13-MAY-18	R4042895
Chloride (Cl)	57		20	mg/L		14-MAY-18	R4043349
Resistivity	345		1.0	ohm cm		14-MAY-18	R4043288
Sulfur (as SO4)	2770		6.0	mg/L		13-MAY-18	R4042270
Total Sulphate Ion Content	0.132		0.050	%	24-MAY-18	24-MAY-18	R4059660
pH in Saturated Paste	8.15		0.10	pH		13-MAY-18	R4042895
Salinity in mg/kg							
Chloride (Cl)	57		20	mg/kg		15-MAY-18	
Sulfur (as SO4)	2770		6.0	mg/kg		15-MAY-18	
L2093578-2 CITY OF EDMONTON-LANSDOWN STAIRCASE - TH18-02 #9							
Sampled By: CLIENT on 10-MAY-18							
Matrix: SOIL							
Miscellaneous Parameters							
% Saturation	44.3		1.0	%		13-MAY-18	R4042895
Chloride (Cl)	<20		20	mg/L		14-MAY-18	R4043349
Resistivity	731		1.0	ohm cm		14-MAY-18	R4043288
Chloride (Cl)	<8.9		8.9	mg/kg		15-MAY-18	
Sulfur (as SO4)	2680		6.0	mg/L		28-MAY-18	R4059807
Total Sulphate Ion Content	0.389		0.050	%	24-MAY-18	24-MAY-18	R4059660
Water Soluble Sulphate Ion Content	0.341		0.050	%	29-MAY-18	29-MAY-18	R4061811
pH in Saturated Paste	7.61		0.10	pH		13-MAY-18	R4042895
L2093578-3 CITY OF EDMONTON-LANSDOWN STAIRCASE - TH18-03 #6							
Sampled By: CLIENT on 10-MAY-18							
Matrix: SOIL							
Miscellaneous Parameters							
% Saturation	100		1.0	%		13-MAY-18	R4042895
Chloride (Cl)	<20		20	mg/L		14-MAY-18	R4043349
Resistivity	264		1.0	ohm cm		14-MAY-18	R4043288
Chloride (Cl)	<20		20	mg/kg		15-MAY-18	
Sulfur (as SO4)	5860		6.0	mg/L		28-MAY-18	R4059807
Total Sulphate Ion Content	1.25		0.050	%	24-MAY-18	24-MAY-18	R4059660
Water Soluble Sulphate Ion Content	1.18	DLHC	0.50	%	29-MAY-18	29-MAY-18	R4061811
pH in Saturated Paste	8.24		0.10	pH		13-MAY-18	R4042895
L2093578-4 CITY OF EDMONTON-LANSDOWN STAIRCASE - HA18-02 #3							
Sampled By: CLIENT on 10-MAY-18							
Matrix: SOIL							
Miscellaneous Parameters							
% Saturation	63.3		1.0	%		13-MAY-18	R4042895
Chloride (Cl)	85		20	mg/L		14-MAY-18	R4043349
Resistivity	550		1.0	ohm cm		14-MAY-18	R4043288
Chloride (Cl)	54		13	mg/kg		15-MAY-18	
Sulfur (as SO4)	2470		6.0	mg/L		28-MAY-18	R4059807
Total Sulphate Ion Content	0.888		0.050	%	24-MAY-18	24-MAY-18	R4059660
Water Soluble Sulphate Ion Content	0.675		0.050	%	29-MAY-18	29-MAY-18	R4061811
pH in Saturated Paste	7.76		0.10	pH		13-MAY-18	R4042895

* Refer to Referenced Information for Qualifiers (if any) and Methodology.

Reference Information

Sample Parameter Qualifier Key:

Qualifier	Description
DLHC	Detection Limit Raised: Dilution required due to high concentration of test analyte(s).

Test Method References:

ALS Test Code	Matrix	Test Description	Method Reference**
CL-PASTE-COL-CL	Soil	Chloride in Soil (Paste) by Colorimetry	CSSS, APHA 4500-Cl E
A soil extract produced by the saturated paste extraction procedure is analyzed for Chloride by Colourimetry.			
PH-PASTE-CL	Soil	pH in Saturated Paste	CSSS Ch. 15
A soil extract produced by the saturated paste extraction procedure is analyzed by pH meter.			
RESISTIVITY-PASTE-CL	Soil	PASTE RESISTIVITY	ASTM G57-95A
This analysis is carried out using procedures adapted from ASTM G57-95a (2001) "Standard Test Method for Field Measurement of Soil Resistivity Using the Wenner Four-Electrode Method". In summary, 200 to 500 grams of sample is mixed with deionized water as required to create a saturated paste. The sample is then placed directly into a four electrode resistivity soil box and measured for resistivity using a resistivity meter.			
SAL-MG/KG-CALC-CL	Soil	Salinity in mg/kg	Manual Calculation
SAT-PCNT-CL	Soil	% Saturation	CSSS 18.2-Calculation
Saturation Percentage (SP) is the total volume of water present in a saturated paste (in mL) divided by the dry weight of the sample (in grams), expressed as a percentage, as described in "Soil Sampling and Methods of Analysis" by M. Carter.			
SO4-PASTE-ICP-CL	Soil	Sulphate (SO4)	CSSS CH15/EPA 6010B
A soil extract produced by the saturated extraction procedure is analyzed for sulfate by ICPOES.			
SO4-S-CSA-A23-ED	Soil	Water Soluble Sulphate Ion Content	CSA INTERNATIONAL A23.2
Soluble sulphate ion content is determined by agitating the soil with water at a specific ratio determined by a preceding total sulphate ion content test, for 6 hours. Analysis by ion chromatography follows. NOTE: the CSA-A23 method states that for a total sulphate ion content greater than 0.2%, soluble sulphate ion content shall be determined on the basis of a water extraction. This water extraction requires the total sulphate ion content result to calculate the correct ratio for the water extraction.			
SO4-T-CSA-A23-ED	Soil	Total Sulphate Ion Content	CSA INTERNATIONAL A23.2
Total sulphate content is determined by mixing soil with water then hydrochloric acid, and digesting just below boiling point, for 15 minutes. Analysis by ion chromatography follows. NOTE: the CSA-A23 method states that for a total sulphate ion content greater than 0.2%, soluble sulphate ion content shall be determined on the basis of a water extraction. This water extraction requires the total sulphate ion content result to calculate the correct ratio for the water extraction.			

** ALS test methods may incorporate modifications from specified reference methods to improve performance.

The last two letters of the above test code(s) indicate the laboratory that performed analytical analysis for that test. Refer to the list below:

Laboratory Definition Code	Laboratory Location
ED	ALS ENVIRONMENTAL - EDMONTON, ALBERTA, CANADA
CL	ALS ENVIRONMENTAL - CALGARY, ALBERTA, CANADA

Chain of Custody Numbers:

Reference Information

Test Method References:

ALS Test Code	Matrix	Test Description	Method Reference**

GLOSSARY OF REPORT TERMS

Surrogates are compounds that are similar in behaviour to target analyte(s), but that do not normally occur in environmental samples. For applicable tests, surrogates are added to samples prior to analysis as a check on recovery. In reports that display the D.L. column, laboratory objectives for surrogates are listed there.
mg/kg - milligrams per kilogram based on dry weight of sample
mg/kg wwt - milligrams per kilogram based on wet weight of sample
mg/kg lwt - milligrams per kilogram based on lipid-adjusted weight
mg/L - unit of concentration based on volume, parts per million.
< - Less than.
D.L. - The reporting limit.
N/A - Result not available. Refer to qualifier code and definition for explanation.

Test results reported relate only to the samples as received by the laboratory.
UNLESS OTHERWISE STATED, ALL SAMPLES WERE RECEIVED IN ACCEPTABLE CONDITION.
Analytical results in unsigned test reports with the DRAFT watermark are subject to change, pending final QC review.

Quality Control Report

Client: AECOM Canada Ltd.
Suite 300, 48 Quarry Park Blvd SE
Calgary AB T2C 5P2
Contact: Chris Keeley

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
CL-PASTE-COL-CL	Soil							
Batch R4043349								
WG2771264-15 DUP		**L2093578-4**						
Chloride (Cl)		85	85		mg/L	0.0	30	14-MAY-18
WG2771264-14 IRM		**SAL-STD9**						
Chloride (Cl)			106.1		%		70-130	14-MAY-18
WG2771264-13 LCS								
Chloride (Cl)			99.9		%		70-130	14-MAY-18
WG2771264-11 MB								
Chloride (Cl)			<20		mg/L		20	14-MAY-18
PH-PASTE-CL	Soil							
Batch R4042895								
WG2771264-15 DUP		**L2093578-4**						
pH in Saturated Paste		7.76	7.80	J	pH	0.04	0.3	13-MAY-18
WG2771264-14 IRM		**SAL-STD9**						
pH in Saturated Paste			7.49		pH		7.23-7.83	13-MAY-18
RESISTIVITY-PASTE-CL	Soil							
Batch R4043288								
WG2771904-4 DUP		**L2093578-4**						
Resistivity		550	575		ohm cm	4.4	20	14-MAY-18
WG2771904-1 IRM		**SAL-STD9**						
Resistivity			91.2		%		70-130	14-MAY-18
WG2771904-3 IRM		**SAL-STD9**						
Resistivity			84.0		%		70-130	14-MAY-18
SAT-PCNT-CL	Soil							
Batch R4042895								
WG2771264-15 DUP		**L2093578-4**						
% Saturation		63.3	64.0		%	1.0	20	13-MAY-18
WG2771264-14 IRM		**SAL-STD9**						
% Saturation			94.9		%		80-120	13-MAY-18
SO4-PASTE-ICP-CL	Soil							
Batch R4042270								
WG2771264-14 IRM		**SAL-STD9**						
Sulfur (as SO4)			106.4		%		70-130	13-MAY-18
WG2771264-11 MB								
Sulfur (as SO4)			<6.0		mg/L		6	13-MAY-18

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
SO4-PASTE-ICP-CL	Soil							
Batch R4059807								
WG2771264-15 DUP		**L2093578-4**						
Sulfur (as SO4)		2470	2460		mg/L	0.7	30	28-MAY-18
SO4-S-CSA-A23-ED	Soil							
Batch R4061811								
WG2782851-4 DUP		**L2093578-2**						
Water Soluble Sulphate Ion Content		0.341	0.367		%	7.4	30	29-MAY-18
WG2782851-3 IRM		**SALINITY_SOIL5**						
Water Soluble Sulphate Ion Content			112.4		%		70-130	29-MAY-18
WG2782851-2 LCS								
Water Soluble Sulphate Ion Content			99.4		%		70-130	29-MAY-18
WG2782851-1 MB								
Water Soluble Sulphate Ion Content			<0.050		%		0.05	29-MAY-18
SO4-T-CSA-A23-ED	Soil							
Batch R4059660								
WG2779217-3 CRM		**ED-634A_CEMENT**						
Total Sulphate Ion Content			99.6		%		80-120	24-MAY-18
WG2779217-4 DUP		**L2093578-1**						
Total Sulphate Ion Content		0.132	0.103		%	24	30	24-MAY-18
WG2779217-1 MB								
Total Sulphate Ion Content			<0.050		%		0.05	24-MAY-18

Legend:

Limit	ALS Control Limit (Data Quality Objectives)
DUP	Duplicate
RPD	Relative Percent Difference
N/A	Not Available
LCS	Laboratory Control Sample
SRM	Standard Reference Material
MS	Matrix Spike
MSD	Matrix Spike Duplicate
ADE	Average Desorption Efficiency
MB	Method Blank
IRM	Internal Reference Material
CRM	Certified Reference Material
CCV	Continuing Calibration Verification
CVS	Calibration Verification Standard
LCSD	Laboratory Control Sample Duplicate

Sample Parameter Qualifier Definitions:

Qualifier	Description
J	Duplicate results and limits are expressed in terms of absolute difference.

Hold Time Exceedances:

All test results reported with this submission were conducted within ALS recommended hold times.

ALS recommended hold times may vary by province. They are assigned to meet known provincial and/or federal government requirements. In the absence of regulatory hold times, ALS establishes recommendations based on guidelines published by the US EPA, APHA Standard Methods, or Environment Canada (where available). For more information, please contact ALS.

The ALS Quality Control Report is provided to ALS clients upon request. ALS includes comprehensive QC checks with every analysis to ensure our high standards of quality are met. Each QC result has a known or expected target value, which is compared against pre-determined data quality objectives to provide confidence in the accuracy of associated test results.

Please note that this report may contain QC results from anonymous Sample Duplicates and Matrix Spikes that do not originate from this Work Order.

Chain of Custody (COC) / Analytical Request Form

ALS Environmental

www.alsglobal.com

Canada Toll Free: 1 800 668 9878

L2093578-COFC

COC Number: 14 -

Page 1 of 1

Report To		Report Format / Distribution		Select Service Level Below (Rush Turnaround Time (TAT) is not available for all tests)
Company:	AECOM Canada Ltd.	Select Report Format:	☑ PDF ☐ EXCEL ☐ EDD (DIGITAL)	R ☑ Regular (Standard TAT if received by 3 pm - business days)
Contact:	Chris Keeley	Quality Control (QC) Report with Report	☑ Yes ☐ No	P ☐ Priority (2-4 bus. days if received by 3pm) 50% surcharge - contact ALS to confirm TAT
Address:	48 Quarry Park Blvd. SE, Suite 300 Calgary, AB T2C 5P2	☐ Criteria on Report - provide details below if box checked		E ☐ Emergency (1-2 bus. days if received by 3pm) 100% surcharge - contact ALS to confirm TAT
		Select Distribution:	☑ EMAIL ☐ MAIL ☐ FAX	E2 ☐ Same day or weekend emergency - contact ALS to confirm TAT and surcharge
Phone:	403.254.3301	Email 1 or Fax	chris.keeley@aecom.com	Specify Date Required for E2,E or P:
		Email 2	brian.nguyen@aecom.com	

Invoice To		Invoice Distribution	
	Same as Report To ☐ Yes ☑ No	Select Invoice Distribution:	☑ EMAIL ☐ MAIL ☐ FAX
	Copy of Invoice with Report ☐ Yes ☑ No	Email 1 or Fax	kristen.tackney@aecom.com
Company:	AECOM Canada Ltd.	Email 2	
Contact:	Kristen Tackney		

Project Information		Oil and Gas Required Fields (client use)	
ALS Quote #:		Approver ID:	Cost Center:
Job #:	City of Edmonton-Lansdown Staircase-60577232 Lab Testing	GL Account:	Routing Code:
PO / AFE:		Activity Code:	
LSD:		Location:	

ALS Lab Work Order # (lab use only): 3576 **ALS Contact:** Nelson Kwan **Sampler:** N/A

Analysis Request — Indicate Filtered (F), Preserved (P) or Filtered and Preserved (F/P) below

ALS Sample # (lab use only)	Sample Identification and/or Coordinates (This description will appear on the report)	Date (dd-mmm-yy)	Time (hh:mm)	Sample Type	SULPHATE via paste, salinity package	SULPHATE - T/S CSA Method	pH	Resistivity	Chloride Content	Number of Containers
	City of Edmonton-Lansdown Staircase - TH18-02 #3	10-May-18	-	Soil	R	R	R	R	R	1
	City of Edmonton-Lansdown Staircase - TH18-02 #9	10-May-18	-	Soil	R	R	R	R	R	1
	City of Edmonton-Lansdown Staircase - TH18-03 #6	10-May-18	-	Soil	R	R	R	R	R	1
	City of Edmonton-Lanscown Staircase - HA18-02 #3	10-May-18	-	Soil	R	R	R	R	R	1

Drinking Water (DW) Samples[1] (client use)

Are samples taken from a Regulated DW System? ☐ Yes ☐ No

Are samples for human drinking water use? ☐ Yes ☐ No

Special Instructions / Specify Criteria to add on report (client Use)

Please report sulphate results in % for SO4-T/S CSA method and results in mg/L for SO4 via paste, salinity package. Please report resistivity in ohm-cm. Please report chlorides in mg/kg & mg/L

SAMPLE CONDITION AS RECEIVED (lab use only)

Frozen ☐ SIF Observations Yes ☐ No ☐

Ice packs Yes ☐ No ☐ Custody seal intact Yes ☐ No ☐

Cooling Initiated ☐

INITIAL COOLER TEMPERATURES °C			FINAL COOLER TEMPERATURES °C		
14					

SHIPMENT RELEASE (client use)			INITIAL SHIPMENT RECEPTION (lab use only)			FINAL SHIPMENT RECEPTION (lab use only)		
Released by:	Date: May 10 18	Time: 14:30	Received by:	Date: 5/10	Time: 2:20	Received by:	Date:	Time:

REFER TO BACK PAGE FOR ALS LOCATIONS AND SAMPLING INFORMATION WHITE - LABORATORY COPY YELLOW - CLIENT COPY

NA-FM-0328e v08 Front/04 January 2014

Failure to complete all portions of this form may delay analysis. Please fill in this form LEGIBLY. By the use of this form the user acknowledges and agrees with the Terms and Conditions as specified on the back page of the white - report copy.

1. If any water samples are taken from a **Regulated Drinking Water (DW) System** please submit using an **Authorized DW COC form**

Alex Tam
Geotechnical Engineer-In-Training

AECOM Canada Ltd.
101-18817 Stony Plain Road NW
Edmonton, AB T5S 0C2
Canada

T: 780.486.7000
F: 780.486.7070
aecom.com

Appendix C **Environmental Scans**

Alberta Environment and Parks

Fish and Wildlife Internet Mapping Tool (FWIMT)

(source database: Fish and Wildlife Management Information System (FWMIS))

Species Summary Report

Report Created: 8-Jul-2018 16:16

Species present within the current extent :

Fish Inventory	Wildlife Inventory	Stocked Inventory
BURBOT	BARRED OWL	No Species Found in Search Extent
LONGNOSE DACE	NORTHERN LEOPARD FROG	
LONGNOSE SUCKER		
PEARL DACE		
RIVER SHINER		
SPOTTAIL SHINER		
WHITE SUCKER		

Buffer Extent

Centroid (X,Y):	Projection	Centroid: (Qtr Sec Twp Rng Mer)	Radius or Dimensions
596206, 5924664	10-TM AEP Forest	SE 13 52 25 4	1 kilometers

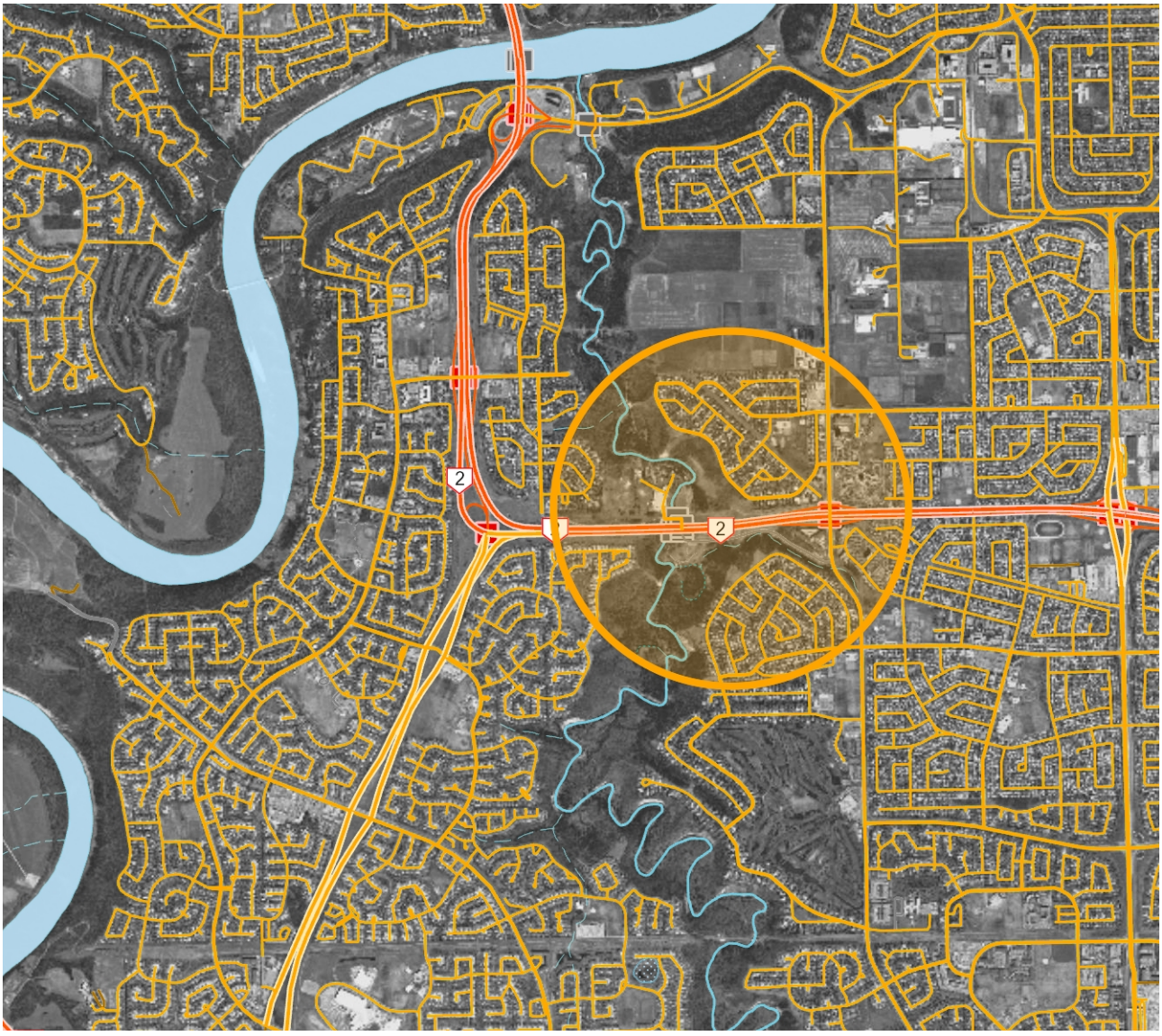
Contact Information

For contact information, please visit:

http://aep.alberta.ca/about-us/contact-us/fisheries-wildlife-management-area-contacts.aspx

8-Jul-2018 16:16

Map Results



Search ACIMS Data

Date: 8/7/2018
Requestor: Consultant
Reason for Request: Environmental Reporting
SEC: 13 **TWP:** 052 **RGE:** 25 **MER:** 4

Non-sensitive EOs: 4 (*Data Updated:October 2017*)

M-RR-TTT-SS	EO_ID	ECODE	S_RANK	SNAME	SCOMNAME	LAST_OBS_D
4-25-052-13	5541	NLT0018380	S1	Micarea melaena	dot lichen	1961-04-29
4-25-052-13	5642	NLT0023840	S2	Pseudevernia consocians	lichen	1963-05-21
4-25-052-13	5985	NLTEST5080	S2S4	Peltigera horizontalis	flat fruited pelt lichen	2011-06-09
4-25-052-13	3676	NBMUS2N100	S2S3	Entodon schleicheri	Schleicher's silk moss	2002-12-01

Next Steps: See FAQ

Sensitive EOs: 0 (*Data Updated:October 2017*)

M-RR-TTT	EO_ID	ECODE	S_RANK	SNAME	SCOMNAME	LAST_OBS_D

No Sensitive EOs Found: Next Steps - See FAQ

Protected Areas: 0 (*Data Updated:October 2017*)

M-RR-TTT-SS	PROTECTED AREA NAME	TYPE	IUCN

M-RR-TTT-SS	PROTECTED AREA NAME	TYPE	IUCN
No Protected Areas Found			

Crown Reservations/Notations: 0 (*Data Updated:October 2017*)

M-RR-TTT-SS	NAME	TYPE
No Crown Reservations/Notations Found		

.

Historic Resources Application

Application Number: 014779122
Revision Number: 00
Submitted Date:
Status: New

Application Type

◉ New/First Time Project Submission
○ Amendment/Supplementary Submission (applicant must provide HRM Project Number)

HRM Project Number: 4725 - - *(if known)*

***Project Category:** Recreation and Tourism (4725)

Application Purpose:

***Purpose:**

- ☑ Requesting HRA Approval / Requirements
- ☐ Amendment or Update to Project Submitted Previously
- ☐ Requesting Response to Baseline Proposal
- ☐ Requesting Response to Baseline Study
- ☐ Submission of Final Project Plans
- ☐ Submission of Historic Resource Avoidance Plan
- ☐ Update to Project Name and/or Ownership
- ☐ Submission of As-Built Plans
- ☐ Notification of Project Cancellation

***Lands Affected:**

- ☑ All New Lands
- ☐ Additional Lands
- ☐ No New Lands

Application Purpose Comments:

Development Information

***Project Type:**

- ☐ **Campground**
- ☐ **Golf Course**
- ☐ **Sports / Recreation Facility**
- ☐ **Cultural / Entertainment Facility**
- ☐ **Hotel / Resort / Clubhouse**
- ☐ **Park Development**
- ☐ **Boat Launch**
- ☑ **Trail**
- ☐ **Other Recreational Development**
- ☐ **Parking Lot**
- ☐
- ☐ 0.033ha. 110 lin.m. lenght x 3.0m width
- ☐ 0.6m to 2.0m at post locations
- ☐ **Waste Management**
- ☑ **Other**

Other Project Type Description:
Wooden stair along a trail

***Project Identifier:** Lansdowne Stair and Trail
Project Name

***Anticipated commencement of land development:** May 2019
***Anticipated termination of land development:** June 2019

Key Contact

Title:
First Name: Brian
Initials:
Last Name: Nolan
Affiliation: AECOM
Email: brian.nolan@aecom.com
Work Number: (780) 486-7000
Cell Number: ( ) -
Fax Number: ( ) -
Applicant Ref. #:

***Address:** 101, 18817 Stony Plain Road NW
***City:** Edmonton
***Province/State:** AB ***Country:** Canada
***Postal Code/Zip:** T5S0C2

Proponent

☐ **The Proponent is the same as the Key Contact.**

Please complete the details below, if the Proponent is not the same as the Key Contact.

Company Name:	City of Edmonton			**Address:**	12th Floor, Edmonton Tower 10111-104 Avenue NW Edmonton
Contact Title:	Ms.				
Contact First Name:	Heather	**Initials:**	HZ	**City:**	Edmonton
Contact Last Name:	Ziober			**Province/State:**	AB **Country:** Canada
Contact Position:	Program Manager Integrated Infrastructure Services | Open Space Planning and Design			**Postal Code/Zip:**	T5J 0J4
Phone Number:	(780) 496-4790				
Fax Number:	( ) -				
Email:	heather.ziober@edmonton.ca				
CC Email:	joe.ebeid@wsp.com				

*Proposed Development Area

	MER	RGE	TWP	SEC	LSD List
☐	4	25	52	13	2

Listed Lands Affected

MER	RGE	TWP	SEC	LSD	HRV	Category
4	25	52	13	2	5	a
4	25	52	13	2	5	p

*Attachments

Illustrative material is required prior to submittal of the application. If available, also supply Justification and Action Matrix documents.

Upload/Created Date	Type	Description

Emails

Description	Sent	From

Additional Information

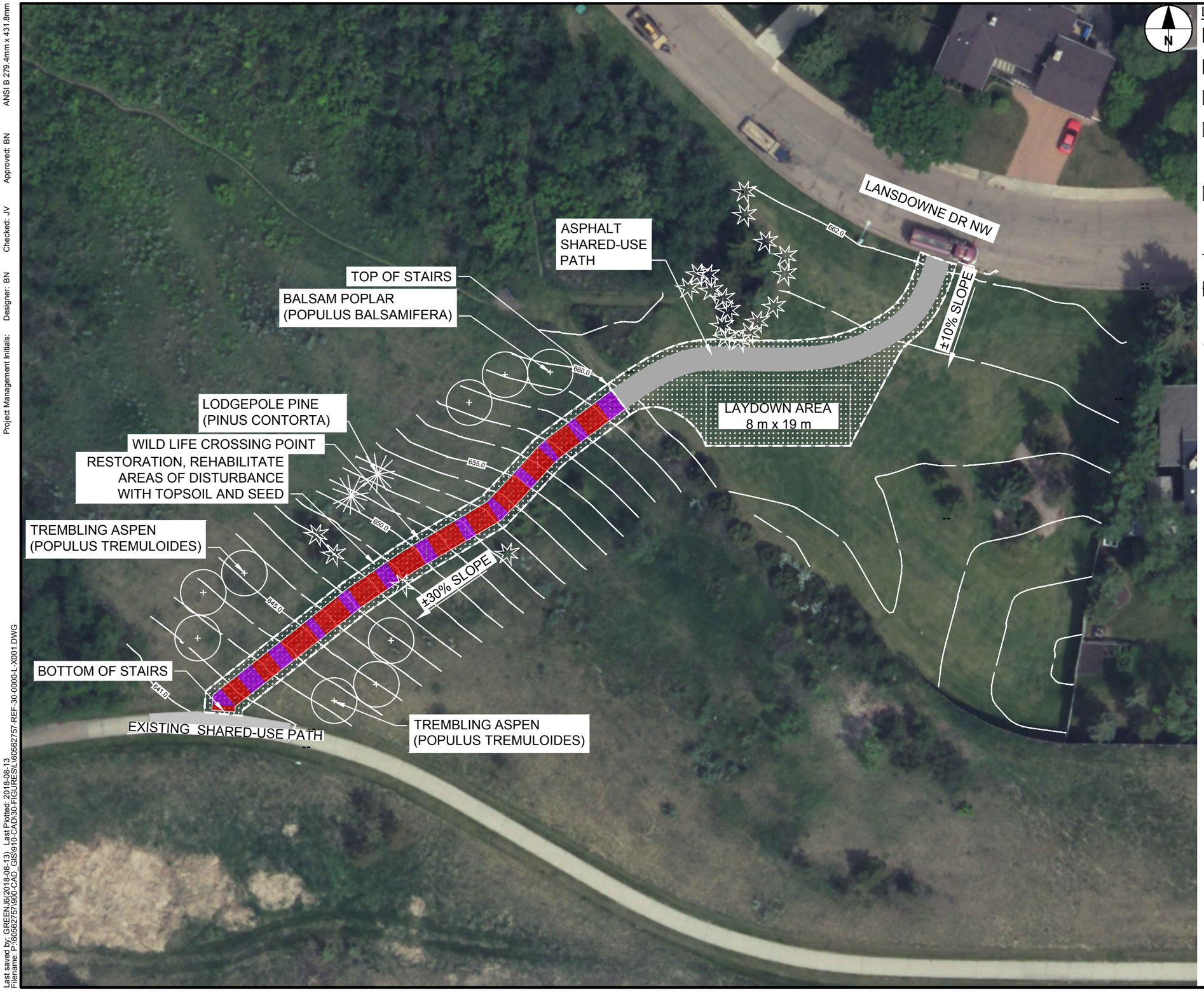
Comments:

☐ **An Archaeological Permit application has been submitted and studies are pending - requesting HRA Requirements.**

☐ **An Archaeological Permit Report is being submitted in conjunction with this application.**
If so, provide the Permit Number:

☐ **A Palaeontological Permit application has been submitted and studies are pending - requesting HRA Requirements.**

☐ **A Palaeontological Permit Report is being submitted in conjunction with this application.**



Project Management Initials: Designer: BN Checked: JV Approved: BN ANSI B 279.4mm x 431.8mm

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Figure: 02

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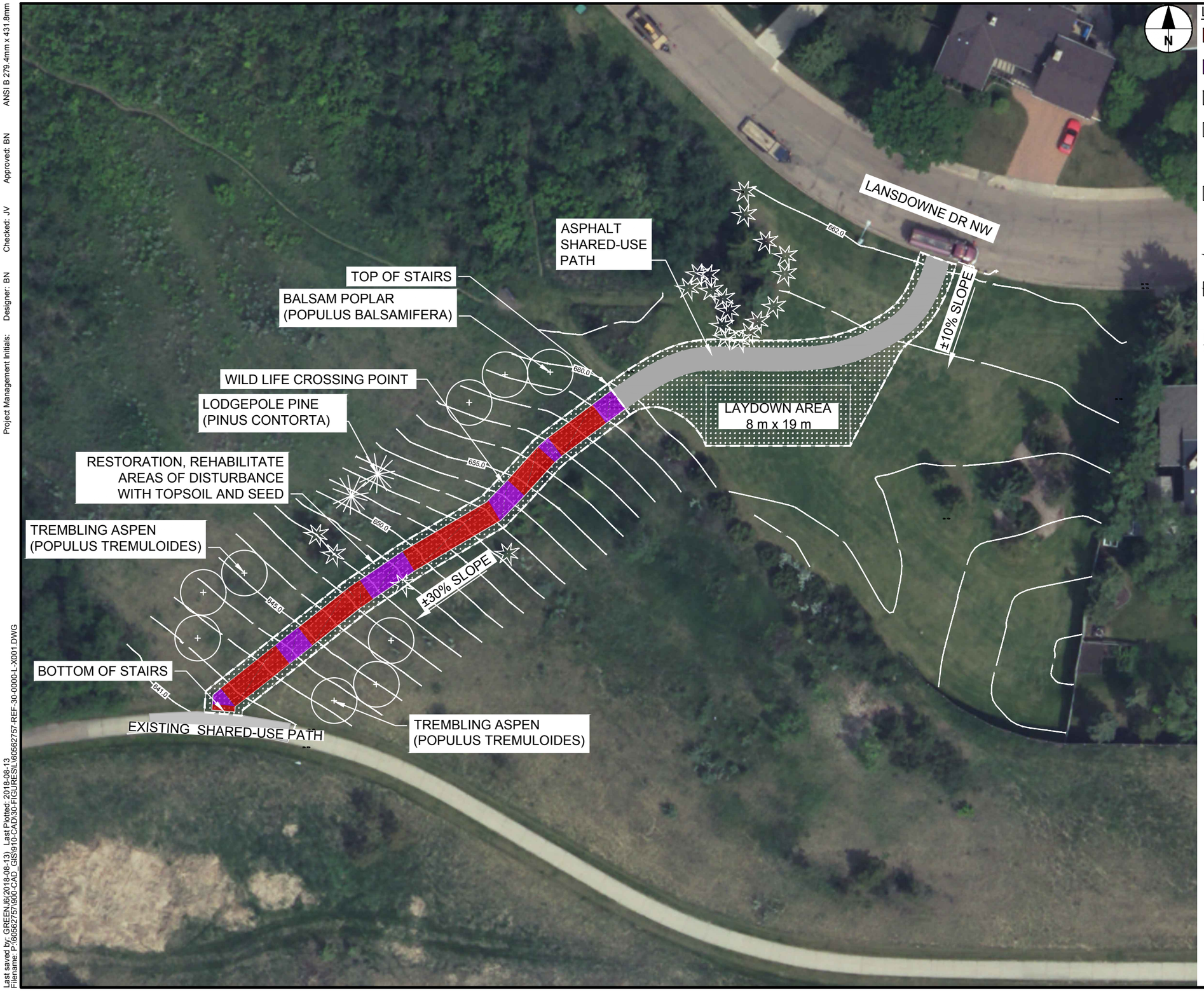
ALIGNMENT AND RESTORATION OPTION 1

LANSDOWNE STAIR AND TRAIL

CITY OF EDMONTON
Project No.: 60562757 Date: 2018-08-10



LEGEND

- STAIRS
- LANDINGS
- ASPHALT
- RESTORATION, TOPSOIL AND SEED PARKS MAINTENANCE #1 SEED MIX
- RESTORATION, TOPSOIL AND SEED NATIVE CENTRAL PARKLAND SEED MIX
- EXISTING TREES
- EXISTING CONTOURS SPACED AT 1.0 m

NOTES

1. FINAL LOCATION OF TRAIL TO BE DETERMINED AND APPROVED ON SITE WITH THE CITY OF EDMONTON REPRESENTATIVE.
2. CONTRACTOR TO MINIMIZE DISTURBANCE DURING CONSTRUCTION. ONLY DISTURBED AREAS TO BE RESTORED.

0 12.5 25 m

1:500

AECOM

Figure: 03

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ALIGNMENT AND RESTORATION OPTION 2

LANSDOWNE STAIR AND TRAIL

CITY OF EDMONTON
Project No.: 60562757 Date: 2018-08-10

Project Management Initials: Designer: BN Checked: JV Approved: BN ANSI B 279.4mm x 431.8mm

Last saved by: GREENJ6 (2018-08-13) Last Plotted: 2018-08-13
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Alberta Culture and Tourism

HRA Number: 4725-18-0037-001
October 26, 2018

Historical Resources Act Approval

Proponent: City of Edmonton
12th Floor, Edmonton Tower, 10111-104 Avenue NW, Edmonton, AB T5J 0J4
Contact: Ms. Heather Ziober

Agent: AECOM
Contact: Brian Nolan

Project Name: Lansdowne Stair and Trail

Project Components: Trail
Other - Wooden stair and asphalt trail

Application Purpose: Requesting HRA Approval / Requirements

Historical Resources Act approval is granted for the activities described in this application and its attached plan(s)/sketch(es) subject to Section 31, "a person who discovers an historic resource in the course of making an excavation for a purpose other than for the purpose of seeking historic resources shall forthwith notify the Minister of the discovery." The chance discovery of historical resources is to be reported to the contacts identified within Standard Requirements under the *Historical Resources Act*: Reporting the Discovery of Historic Resources.

Martina Purdon
Head, Regulatory Approvals &
Information Management

Lands Affected: All New Lands

Proposed Development Area:

MER	RGE	TWP	SEC	LSD List
4	25	52	13	2

Documents Attached:

Document Name	Document Type
Layout options for stair and trail	Illustrative Material

Alberta Culture and Tourism

STANDARD REQUIREMENTS UNDER THE *HISTORICAL RESOURCES ACT*: REPORTING THE DISCOVERY OF HISTORIC RESOURCES

If development proponents and/or their agents become aware of historic resources during the course of development activities, they are required, under Section 31 of the *Historical Resources Act*, to report these discoveries to the Heritage Division of Alberta Culture and Tourism. This requirement applies to all activities in the Province of Alberta.

1.0 REPORTING THE DISCOVERY OF ARCHAEOLOGICAL RESOURCES

The discovery of archaeological resources is to be reported to Eric Damkjar, Head, Archaeology, at 780-431-2346 (toll-free by first dialing 310-0000) or eric.damkjar@gov.ab.ca.

2.0 REPORTING THE DISCOVERY OF PALAEONTOLOGICAL RESOURCES

The discovery of palaeontological resources is to be reported to Dan Spivak, Head, Resource Management, Royal Tyrrell Museum of Palaeontology, at 403-820-6210 (toll-free by first dialing 310-0000) or dan.spivak@gov.ab.ca.

3.0 REPORTING THE DISCOVERY OF HISTORIC PERIOD SITES

The discovery of historic structures to be reported to Rebecca Goodenough, Manager, Historic Places Research and Designation Program, at 780-431-2309 (toll-free by first dialing 310-0000) or rebecca.goodenough@gov.ab.ca. Please note that some historic structure sites may also be considered Aboriginal traditional use sites.

4.0 REPORTING THE DISCOVERY OF ABORIGINAL TRADITIONAL USE SITES

The discovery of any Aboriginal traditional use site that is of a type listed below is to be reported to Valerie Knaga, Director, Aboriginal Heritage Section, at 780-431-2371 (toll-free by first dialing 310-0000) or valerie.k.knaga@gov.ab.ca.

Aboriginal Traditional Use sites considered by Alberta Culture and Tourism to be historic resources under the *Historical Resources Act* include:

Historic cabin remains;
Historic cabins (unoccupied);
Cultural or historical community camp sites;

Ceremonial sites/Spiritual sites;
Gravesites;
Historic settlements/Homesteads;
Historic sites;
Oral history sites;
Ceremonial plant or mineral gathering sites;
Historical Trail Features; and,
Sweat/Thirst/Fasting Lodge sites

5.0 FURTHER SALVAGE, PRESERVATIVE OR PROTECTIVE MEASURES

If previously unrecorded historic resources are discovered, proponents may be ordered to undertake further salvage, preservative or protective measures or take any other actions that the Minister of Alberta Culture and Tourism considers necessary.

Appendix D **Design Information**

AECOM

Figure: 01

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ENVIRONMENTAL SENSITIVITIES MAP

LANSDOWNE STAIR AND TRAIL

CITY OF EDMONTON

Project No.: 60562757 Date: 2018-08-10

ANSI B 279.4mm x 431.8mm

Project Management Initials: Designer: BN Checked: JV Approved: BN

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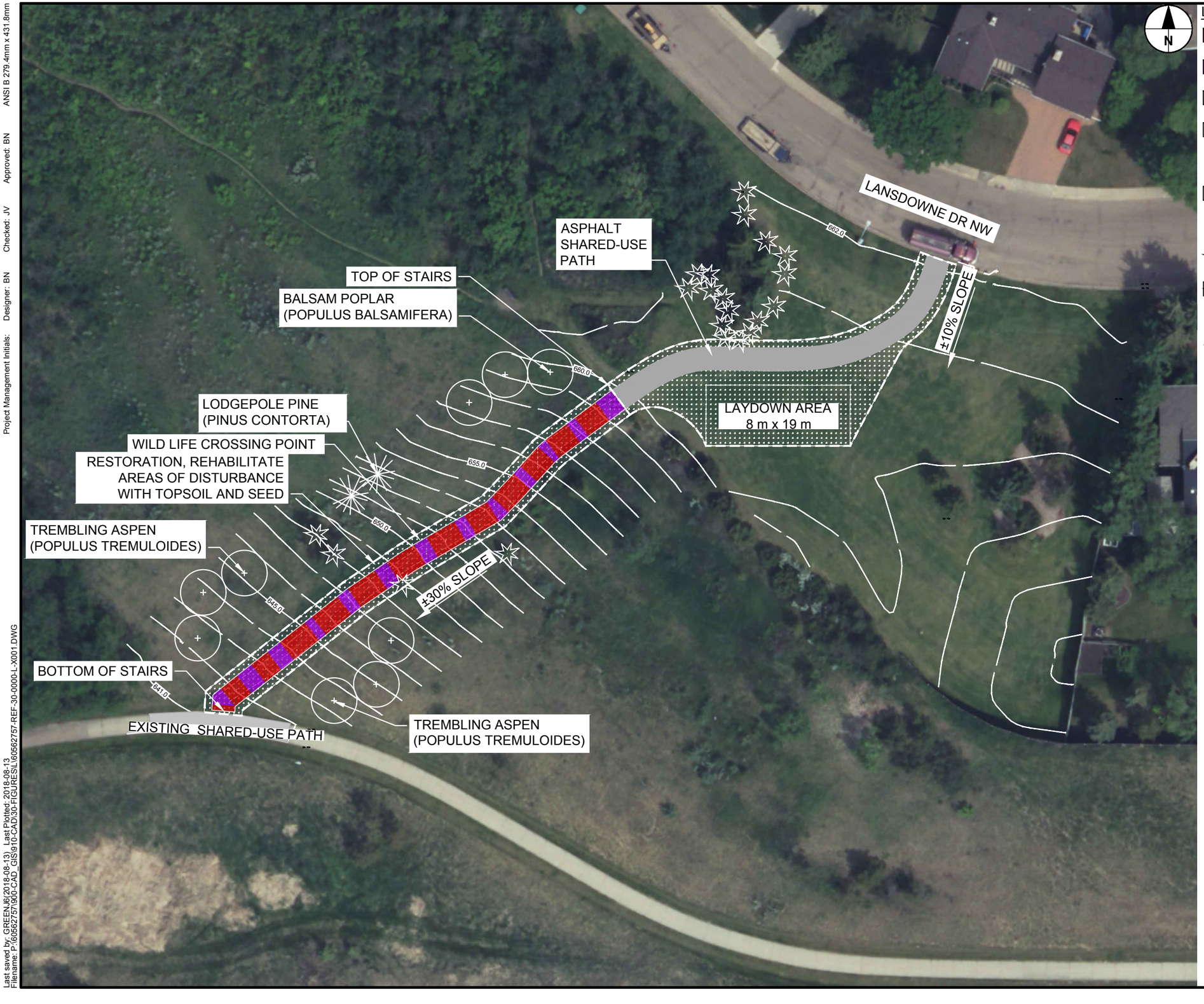

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AECOM

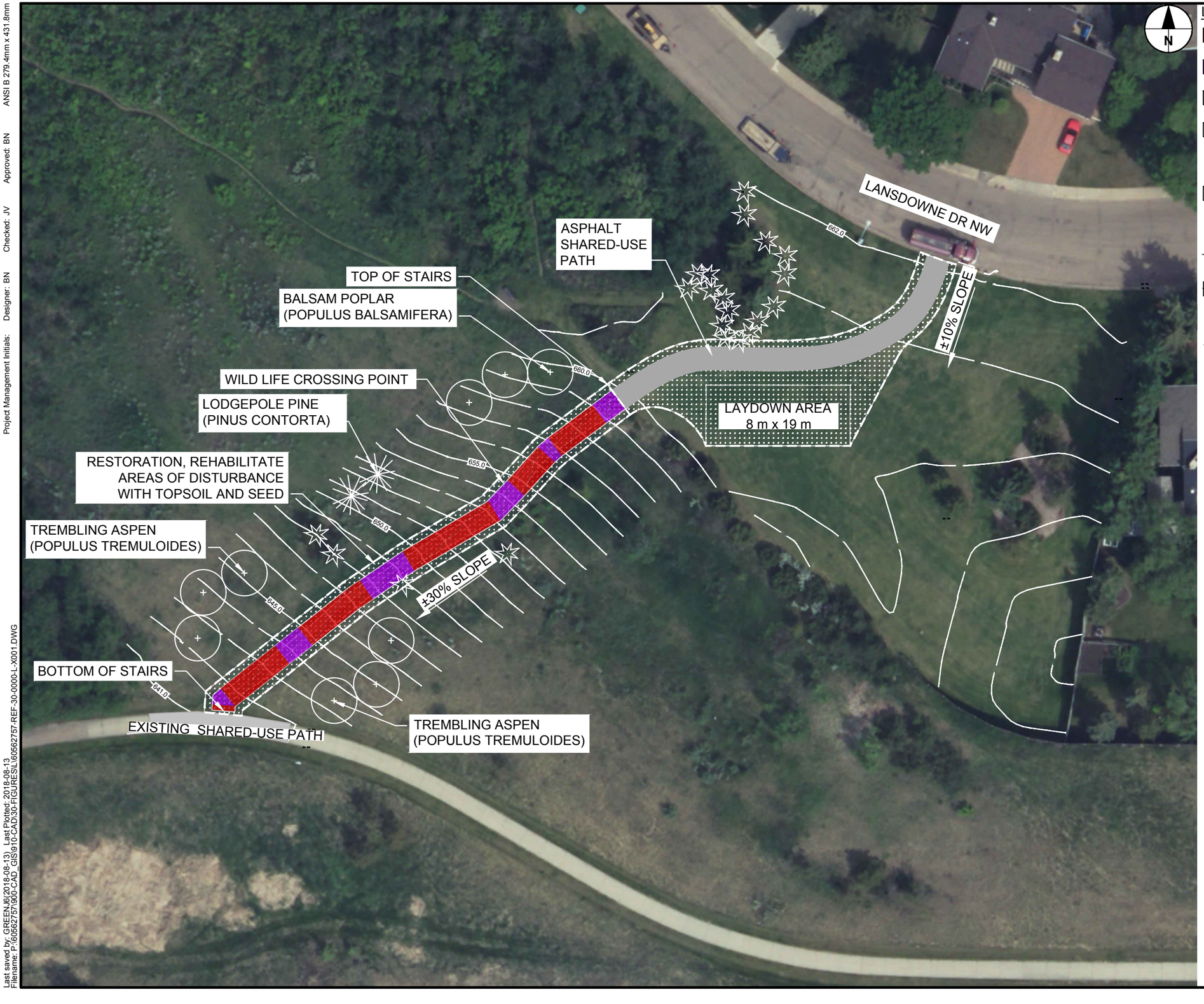
Figure: 02

DRAFT

ALIGNMENT AND RESTORATION OPTION 1

LANSDOWNE STAIR AND TRAIL

CITY OF EDMONTON
Project No.: 60562757 Date: 2018-08-10



LEGEND

- STAIRS
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- RESTORATION, TOPSOIL AND SEED NATIVE CENTRAL PARKLAND SEED MIX
- EXISTING TREES
- EXISTING CONTOURS SPACED AT 1.0 m

NOTES

1. FINAL LOCATION OF TRAIL TO BE DETERMINED AND APPROVED ON SITE WITH THE CITY OF EDMONTON REPRESENTATIVE.
2. CONTRACTOR TO MINIMIZE DISTURBANCE DURING CONSTRUCTION. ONLY DISTURBED AREAS TO BE RESTORED.

0 12.5 25 m

1:500

AECOM

Figure: 03

DRAFT

ALIGNMENT AND RESTORATION OPTION 2

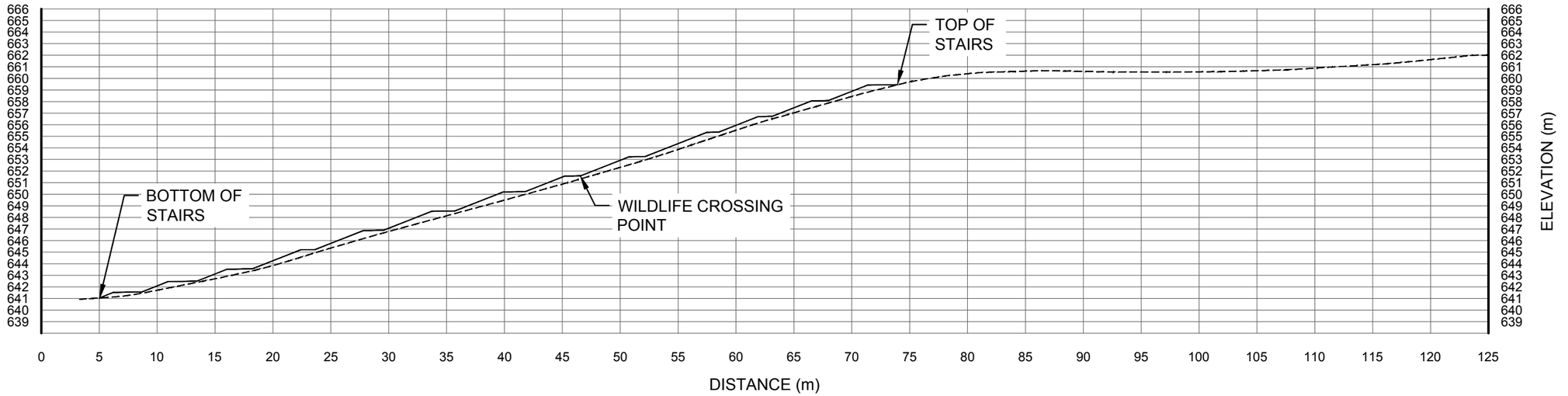
LANSDOWNE STAIR AND TRAIL

CITY OF EDMONTON
Project No.: 60562757 Date: 2018-08-10

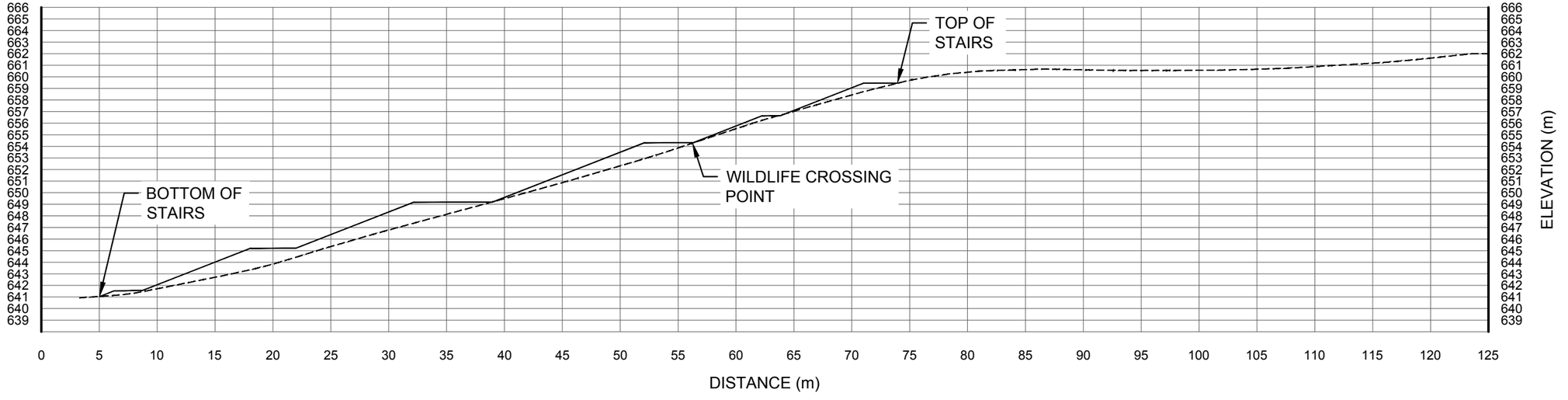
Project Management Initials: Designer: BN Checked: JV Approved: BN ANSI B 279.4mm x 431.8mm

Last saved by: GREENJ6 (2018-08-13) Last Plotted: 2018-08-13
Filename: P:\60562757\900-CAD_GIS\10-CAD\30-FIGURES\L60562757-REF-30-0000-L-X001.DWG

Profile View of Lansdowne Option 1



Profile View of Lansdowne Option 2



0 10 20 m

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AECOM

Figure: 04

DRAFT

PROFILES

LANSDOWNE STAIR AND TRAIL

CITY OF EDMONTON
Project No.: 60562757 Date: 2018-08-10

Project Management Initials: Designer: BN Checked: JV Approved: BN ANSI B 279.4mm x 431.8mm

GENERAL NOTES:

SITE WORK

1. CONTRACTOR TO CALL ALBERTA ONE CALL AT 1-800-242-3447, AND ALL OTHER UTILITY PROVIDERS, AS REQUIRED, TO HAVE EXISTING UTILITIES LOCATED PRIOR TO START OF ANY CONSTRUCTION.
2. CONTRACTOR TO VISIT THE SITE TO CONFIRM ALL SITE CONDITIONS PRIOR TO SUBMITTING BIDS. ANY DISCREPANCIES ARE TO BE REPORTED TO THE CITY OF EDMONTON REPRESENTATIVE FOR CLARIFICATION.
3. CONTRACTOR IS RESPONSIBLE FOR MAINTAINING EXISTING DRAINAGE PATTERNS AND REQUIREMENTS OF THE CITY OF EDMONTON EROSION AND SEDIMENTATION GUIDELINES AND FIELD MANUAL.
4. CONTRACTOR TO MINIMIZE THE DISTURBANCE TO EXISTING PLANT MATERIAL AND IS RESPONSIBLE FOR THE HOARDING OF ALL TREES WITHIN OR ADJACENT TO CONSTRUCTION AREAS, TO THE SATISFACTION OF THE CITY OF EDMONTON REPRESENTATIVE. "TREE" GRAPHICS DEPICT TREE CANOPY LOCATIONS ONLY.
5. CONTRACTOR IS RESPONSIBLE FOR THE ADJUSTMENT OF ALL EXISTING CATCHBASINS, CATCHBASIN MANHOLES, MANHOLES, WATER VALVES, HYDRANTS ETC. TO MATCH PROPOSED GRADES.
6. CONTRACTOR IS RESPONSIBLE FOR HAULING OF ALL EXCESS MATERIALS OFF THE SITE TO A LOCATION APPROVED BY THE THE CITY OF EDMONTON REPRESENTATIVE. ALL WORKS SHALL ADHERE TO THE CITY OF EDMONTON TRAFFIC BYLAW #5590.
7. CONTRACTOR IS RESPONSIBLE FOR GENERAL SITE CLEANUP.
8. CONTRACTOR IS RESPONSIBLE FOR ANY DAMAGE TO LANDSCAPED AREAS AND MUST MAKE ALL NECESSARY RESTORATIONS AND REPAIRS, TO THE SATISFACTION OF THE CITY OF EDMONTON REPRESENTATIVE.
9. THE CITY OF EDMONTON WILL PROVIDE SURVEY FOR GENERAL LAYOUT OF TRAIL. TWO (2) SURVEYS WILL BE PROVIDED TO THE CONTRACTOR. ANY ADDITIONAL SURVEY REQUIRED BY THE CONTRACTOR WILL BE THE CONTRACTORS RESPONSIBILITY.
10. CONTRACTOR RESPONSIBLE FOR ALL REHABILITATION REQUIRED DUE TO THE REMOVAL OF EXISTING TRAIL SURFACE AND ANY OTHER FEATURES TO BE REMOVED. REHABILITATION OF TOP AND BOTTOM OF STAIRS, AND GRASSED AREAS TO MEET THE CITY OF EDMONTON DESIGN AND CONSTRUCTION STANDARDS FOR LANDSCAPE CONSTRUCTION (CURRENT EDITION).
11. MATERIALS AND COMPACTION TESTING TO BE COMPLETED BY THE CITY OF EDMONTON.
12. FINAL LAYOUT OF THE STAIRS AND TRAIL TO BE REVIEWED AND APPROVED BY THE LANDSCAPE CONSULTANT AND CITY OF EDMONTON REPRESENTATIVE.
13. TRAIL SIGNAGE TO BE PROVIDED BY THE CITY OF EDMONTON REPRESENTATIVE. REFER TO PLANS FOR LOCATION.
14. PROJECT SIGNAGE AND FENCING: CONTRACTOR TO PROVIDE 'DETOUR' AND 'TRAIL CLOSED' SIGNAGE, AS WELL AS CONSTRUCTION FENCE AS REQUIRED BY THE CITY OF EDMONTON. LOCATION OF SIGNS TO BE CONFIRMED ON SITE WITH THE CITY OF EDMONTON REPRESENTATIVE. TRAIL CLOSURES SHALL ADHERE TO THE CITY OF EDMONTON TRAIL CLOSURE PROCEDURE.
15. ONE YEAR WARRANTY AND MAINTENANCE PERIOD ON CONSTRUCTION.

MATERIALS

1. THE CONTRACTOR SHALL SUPPLY ALL MATERIAL IN QUANTITIES SUFFICIENT TO COMPLETE THE WORK SHOWN ON THE DRAWINGS. ANY DISCREPANCIES IN QUANTITIES SHALL BE REPORTED TO THE CITY OF EDMONTON REPRESENTATIVE DIRECTION.
2. NO SUBSTITUTION OF MATERIAL, PRODUCTS OR QUANTITIES SHALL BE PERMITTED WITHOUT PRIOR CONSENT OF THE CITY OF EDMONTON REPRESENTATIVE.

GENERAL

1. ALL LANDSCAPE CONSTRUCTION TO MEET CITY OF EDMONTON DESIGN AND CONSTRUCTION STANDARDS (CURRENT EDITION).
2. THIS DRAWING IS TO BE READ IN CONJUNCTION WITH THE WRITTEN SPECIFICATIONS, DRAWINGS AND DETAILS FOR THIS PROJECT.
3. UNDER GROUND UTILITIES ARE SHOWN ON THESE LANDSCAPE DRAWINGS FOR INFORMATION ONLY. RECORD ENGINEERING DESIGN DRAWINGS SHOULD BE REFERRED TO FOR SIZE AND LOCATION OF ALL SANITARY, STORM, WATER, GAS CABLE AND ELECTRICAL U.G. SERVICING, KIOSKS, AND R.O.W'S.
4. ANY AMBIGUITY IN THIS DRAWING OR ACCOMPANYING DETAILS IS TO BE REPORTED TO THE CITY OF EDMONTON REPRESENTATIVE FOR DIRECTION. THE CONTRACTOR IS NOT TO PROCEED IN UNCERTAINTY.
5. LIMITS OF THE WORK ARE TO BE CLEARLY UNDERSTOOD BY THE CONTRACTOR PRIOR TO ANY WORK TAKING PLACE ON SITE. THE CONTRACTOR IS TO CONTACT THE CITY OF EDMONTON REPRESENTATIVE FOR CLARIFICATION IF REQUIRED.
6. THE CONTRACTOR IS TO VERIFY ALL DIMENSIONS AND REPORT ANY DISCREPANCIES TO THE CITY OF EDMONTON REPRESENTATIVE.
7. ON-SITE LAYOUT IS TO BE APPROVED BY THE CITY OF EDMONTON REPRESENTATIVE PRIOR TO START OF CONSTRUCTION.
8. ALL MEASUREMENTS ARE IN MILLIMETRES UNLESS OTHERWISE SPECIFIED.
9. ALL SITE ACCESS TO BE OFF LANSDOWNE DRIVE.

PLANTING NOTES:

1. THE CITY OF EDMONTON REPRESENTATIVE MAY REQUEST RANDOM SOIL TESTS FOR ANY AND/OR ALL SOIL TYPES AND MIXES INSTALLED WITHIN THE PROJECT. THIS MAY BE REQUESTED AT ANY TIME DURING THE PROJECT UNTIL CONSTRUCTION COMPLETION CERTIFICATE IS RECEIVED FROM THE APPROVING AUTHORITY. SOIL SAMPLE LOCATIONS TO BE SELECTED BY THE CITY OF EDMONTON REPRESENTATIVE. THE CONTRACTOR WILL BE REQUIRED TO REPLACE OR AMEND DEFICIENT SOILS/SOIL MIXES TO MEET SPECIFICATIONS SHOULD THE TEST RESULTS INDICATE DEFICIENCIES. THE CITY OF EDMONTON REPRESENTATIVE TO SELECT SOIL SAMPLE LOCATIONS AFTER REPLACEMENT/AMENDMENTS OCCUR AND CONTRACTOR TO PROVIDE SOIL TESTING TO CONFIRM SPECIFICATIONS HAVE BEEN MET. ALL SOIL TESTING COSTS TO BE BORNE BY THE CONTRACTOR.
2. CONTRACTOR RESPONSIBLE FOR VERIFYING ALL QUANTITIES AND NOTIFYING THE CITY OF EDMONTON REPRESENTATIVE OF ANY OMISSIONS.
3. SEED MIXES:

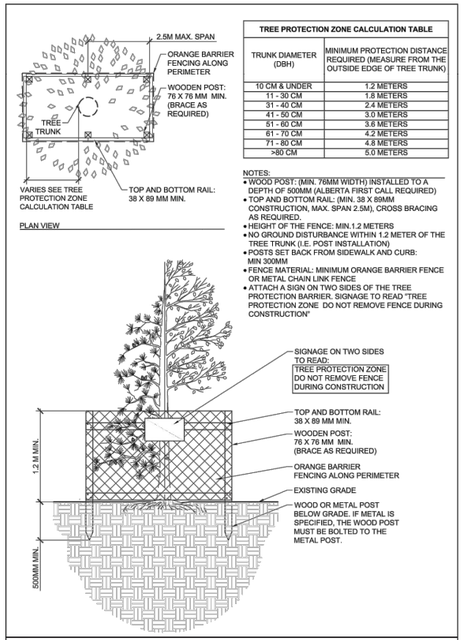
PARKS MAINTENANCE #1 MIX - ## m²

30%	TOUCHDOWN KENTUCKY BLUEGRASS
20%	BANFF KENTUCKY BLUEGRASS
30%	CREEPING RED FESCUE
20%	FIESTA II PERENNIAL RYE GRASS

CENTRAL PARKLAND SEED MIX - ## m²

15%	AWNED WHEATGRASS	AGROPYRON TRACHYCAULUM VAR. UNILATERALE
15%	SLENDER WHEATGRASS	AGROPYRON TRACHYCAULUM VAR. TRACHYCAULUM
15%	WESTERN WHEATGRASS	AGROPYRON SMITHII
5%	SLOUGHGRASS	BECKMANNIA SYZIGACHNE
5%	IDAHO FESCUE	FESTUCA IDAHOENSIS
5%	ALKALI BLUEGRASS	POA SECUNDA SSP. JUNCIFOLIA
5%	JUNEGRASS	KOELERIA MACRANTHA
5%	SANDBERG BLUEGRASS	POA SECUNDA
20%	GREEN NEEDLEGRASS	STIPA VIRIDULA
10%	ROCKY MOUNTAIN FESCUE	FESTUCA SAXIMONTANA

4. CONTRACTOR TO ENSURE ADEQUATE SEED GERMINATION FOR CONSTRUCTION COMPLETION CERTIFICATE AND NATURALIZED TURF SHOULD BE ESTABLISHED BY FINAL ACCEPTANCE CERTIFICATE INSPECTIONS WITH THE CITY OF EDMONTON.
5. TRAIL EDGE REHABILITATION TO USE CLASS 'B' TOPSOIL FROM WEED FREE SOURCE AS PER THE CITY OF EDMONTON STANDARDS. TOP DRESS AND SEED ANY AND ALL DAMAGE CAUSE BY CONSTRUCTION ACTIVITIES.
6. LANDSCAPE MAINTENANCE TO INCLUDE 1 YEAR WARRANTY AND MAINTENANCE PERIOD ON REHABILITATION.

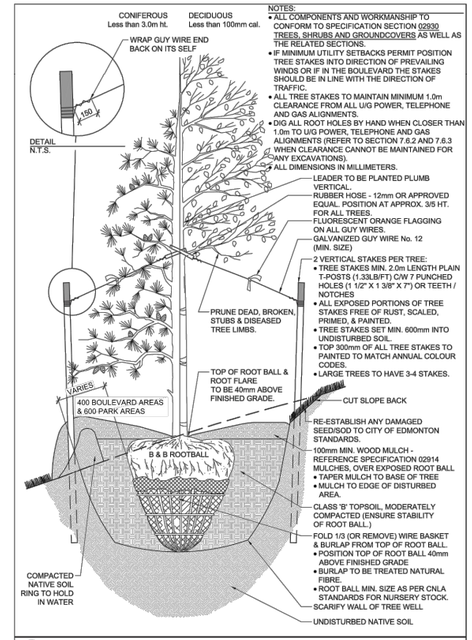


TREE PROTECTION ZONE CALCULATION TABLE	
TRUNK DIAMETER (DBH)	MINIMUM PROTECTION DISTANCE REQUIRED (MEASURE FROM THE OUTSIDE EDGE OF TREE TRUNK)
10 CM & UNDER	1.2 METERS
11 - 30 CM	1.8 METERS
31 - 40 CM	2.4 METERS
41 - 50 CM	3.0 METERS
51 - 60 CM	3.6 METERS
61 - 70 CM	4.2 METERS
71 - 80 CM	4.8 METERS
>80 CM	5.0 METERS

NOTES:
- WOOD POST: (MIN. 76MM WIDTH) INSTALLED TO A DEPTH OF 500MM (ALBERTA FIRST CALL REQUIRED)
- TOP AND BOTTOM RAIL: (MIN. 38 X 89MM CONSTRUCTION, MAX. SPAN 2.5M), CROSS BRACING AS REQUIRED.
- HEIGHT OF THE FENCE: MIN.1.2 METERS
- NO GROUND DISTURBANCE WITHIN 1.2 METER OF THE TREE TRUNK (I.E. POST INSTALLATION)
- POSTS SET BACK FROM SIDEWALK AND CURB: MIN 300MM
- FENCE MATERIAL: MINIMUM ORANGE BARRIER FENCE OR METAL CHAIN LINK FENCE
- ATTACH A SIGN ON TWO SIDES OF THE TREE PROTECTION BARRIER. SIGNAGE TO READ "TREE PROTECTION ZONE DO NOT REMOVE FENCE DURING CONSTRUCTION"

THE CITY OF EDMONTON — TREE PROTECTION ZONE

Date Approved: JUNE 2017	Drawn By: PARKS PLANNING	Approved: MC	Revision	Drawing No.: LA101
Scale: N.T.S.	Checked By: PARKS PLANNING			CAD Drawing No.: SP403a

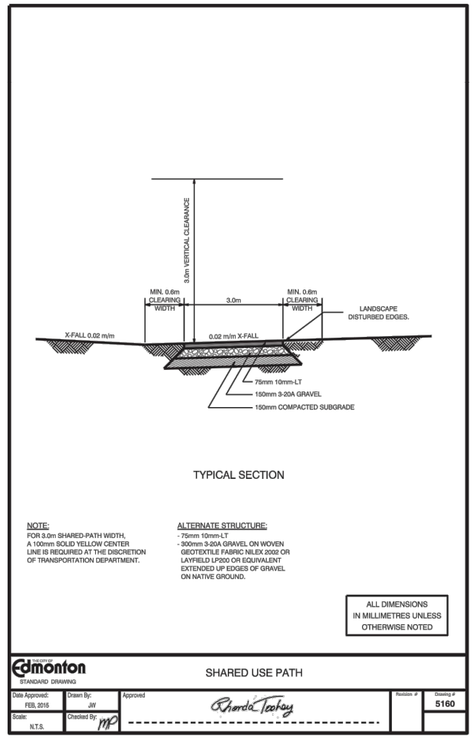


NOTES:
- ALL COMPONENTS AND WORKMANSHIP TO CONFORM TO SPECIFICATION SECTION 02930 TREES, SHRUBS AND GROUNDCOVERS AS WELL AS THE RELATED SECTIONS.
- IF MINIMUM UTILITY SETBACKS PERMIT POSITION TREE STAKES INTO DIRECTION OF PREVAILING WINDS OR IF IN THE BOULEVARD THE STAKES SHOULD BE IN LINE WITH THE DIRECTION OF TRAFFIC.
- ALL TREE STAKES TO MAINTAIN MINIMUM 1.0m CLEARANCE FROM ALL U/G POWER, TELEPHONE AND GAS ALIGNMENTS.
- DIG ALL ROOT HOLES BY HAND WHEN CLOSER THAN 1.0m TO U/G POWER, TELEPHONE AND GAS ALIGNMENTS (REFER TO SECTION 7.6.2 AND 7.6.3 WHEN CLEARANCE CANNOT BE MAINTAINED FOR ANY EXCAVATIONS).
- ALL DIMENSIONS IN MILLIMETERS.

2 VERTICAL STAKES PER TREE:
- TREE STAKES MIN. 2.0m LENGTH PLAIN T-POSTS (1.33LB/FT) O/W 7 PUNCHED HOLES (1 1/2" X 1 3/8" X 7") OR TEETH / NOTCHES
- ALL EXPOSED PORTIONS OF TREE STAKES FREE OF RUST, SCALED, PRIMED, & PAINTED.
- TREE STAKES SET MIN. 600mm INTO UNDISTURBED SOIL.
- TOP 300mm OF ALL TREE STAKES TO PAINTED TO MATCH ANNUAL COLOUR CODES.
- LARGE TREES TO HAVE 3-4 STAKES.

THE CITY OF EDMONTON — TYPICAL TREE PLANTING ON SLOPE

Date Approved: JUNE 2016	Drawn By: PARKS PLANNING	Approved: MC	Revision	Drawing No.: LA107
Scale: N.T.S.	Checked By: PARKS PLANNING			CAD Drawing No.: SP400i



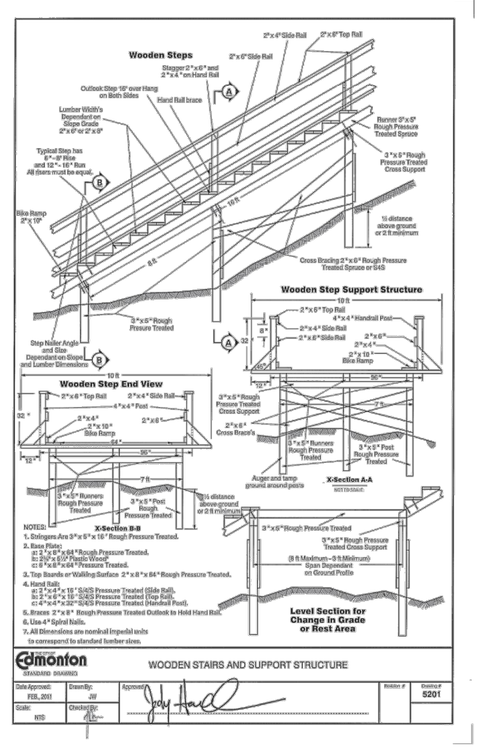
NOTE:
FOR 3.0m SHARED-PATH WIDTH, A 100mm SOLID YELLOW CENTER LINE IS REQUIRED AT THE DISCRETION OF TRANSPORTATION DEPARTMENT.

ALTERNATE STRUCTURE:
- 75mm 10mm LT
- 300mm 3-20A GRAVEL ON WOVEN GEOTEXTILE FABRIC NILEX 2002 OR LAYFIELD LP200 OR EQUIVALENT EXTENDED UP EDGES OF GRAVEL ON NATIVE GROUND.

ALL DIMENSIONS IN MILLIMETRES UNLESS OTHERWISE NOTED

THE CITY OF EDMONTON STANDARD DRAWING — SHARED USE PATH

Date Approved: FEB, 2015	Drawn By: JW	Approved: Rhonda Tookey	Revision #	Drawing # 5160
Scale: N.T.S.	Checked By: MD			



THE CITY OF EDMONTON STANDARD DRAWINGS — WOODEN STAIRS AND SUPPORT STRUCTURE

Date Approved: FEB, 2011	Drawn By: JW	Approved: Jay Hall	Revision #	Drawing # 5201
Scale: NTS	Checked By:			

LANSDOWNE STAIR AND TRAIL

NOTES AND DETAILS

CITY OF EDMONTON
Project No.: 60562757 Date: 2018-08-10

AECOM

DRAFT

Figure: 05

Last saved by: GREEN,I6 (2018-08-13) Last Plotted: 2018-08-13
Filename: P:\60562757\900-CAD_GIS\910-CAD\30-FIGURES\L60562757-REF-30-0000-L-X001.DWG

Appendix E **Opinion of Probable Cost**

	Lansdowne Stair and Trail Project	Unit	Quantity	Unit Rate	Total
1.0	**Mobilization and De-mobilization**				
	a) Initial mobilization and de-mobilization - including but not limited to - 2 trail closed signs - to City of Edmonton Standards, laydown area, fencing	l.s.	1.0	$10,000	$10,000
	b) Allowance for Occupational Health and Safety	l.s.	1.0	$5,000	$5,000
	c) Allowance for Tree Protection Methods and Procedures Plan	l.s.	1.0	$500	$500
2.0	**Removals**				
	a) Remove and dispose off site existing earthen trail (goat track) material	l.m.	75.0	$80	$6,000
3.0	**Grading and Earthwork**				
	a) Grading and rototill of areas to be rehabilitated	l.s.	1.0	$10,000	$10,000
	b) Miscellaneous earthwork - including but not limited to ensuring drainage patterns remain during construction, ensuring all earthworks at tie-ins to existing trails and roads are handled	l.s.	1.0	$13,250	$13,250
4.0	**Trail Rehabilitation and Stair Construction**				
	a) Trail restoration (slope) - existing informal earthen trails (goat track) rehabilitate any and all damage caused by construction activities. Erosion control blanket to slopes steeper than 1 in 3	m2	330.0	$30	$9,900
	b) Restoration (upland) - rehabilitate any and all damage disturbed area caused by construction activities. Erosion control blanket to slopes steeper than 1 in 3	m2	335.0	$20	$6,700
	c) Asphalt trail - to tie into elevations at top of stairs and back of curb - based on 3.0 m average trail width (including excavation, 150 mm compacted subgrade preparation, minimum 150 mm depth 20 mm dia. crush gravel, 75 mm asphalt, geotextile fabric) (Detail 5160)	m2	150.0	$300	$45,000
	d) Stair construction - City of Edmonton Wooden Stairs and Support Structure (price per linear metre including all materials incidental to the work) (Detail 5201)	l.m.	70.0	$1,600	$112,000
	e) 70 mm caliper deciduous tree	each	9.0	$625	$5,625
	f) 3.5 m in height coniferous tree	each	2.0	$750	$1,500
5.0	**Fences and Signage**				
	a) Project sign - 1.2m x 4m City of Edmonton and Consultant sign	l.s.	2.0	$2,650	$5,300
	b) Silt fence and general erosion control - to City of Edmonton Standards	l.s.	1.0	$5,000	$5,000
	c) Compost filter sock	l.m.	35.0	$160	$5,600
6.0	**Maintenance**				
	a) Landscape maintenance - to include 1 year maintenance and warranty period on landscape rehabilitation, 1 year maintenance on trail and site furnishings	month	6.0	$1,000	$6,000
	b) Stair maintenance - to include 1 year maintenance and warranty period on stairs	month	6.0	$500	$3,000
			Total - Lansdowne Stair and Trail Project		**$250,375**

NOTES:
1) Prices do not include GST.
2) Estimate does not include design and construction contingency.
3) Estimate does not include City of Edmonton Project Administration.
4) Estimate does not include any further Public Engagements.
5) Site remediation is not in Contract.
6) Estimate accuracy range - 30% to + 50%.

Appendix F **Public Consultation**

Involving Edmonton Public Plan

Project:	Lansdowne Stair & Trail
Department/Branch Responsible:	IIS Open Space Planning & Development
Project Manager:	Heather Ziober / OPSD Kevin Brygidyr
Consultant:	AECOM
Draft or Final:	Draft
Other city participants or partners:	River Valley Operations

Background:

DESCRIPTION OF THE OVERALL PROJECT OR INITIATIVE:	The Lansdowne neighbourhood residents provided input on March 17, 2015 at the Building Great Neighbourhoods Lansdowne Public Engagement Meeting Two. Part of the comments were several requests to add a trail and stairs from SW Lansdowne Drive down to the shared use path along Whitemud Drive. OSPD has engaged a consultant to provide feasibility study, concept planning, and preliminary design to add a stair and trail at this location. Intent is to proceed to detailed design through to construction upon confirmation of design and available funds.
THE DECISION BEING MADE IS:	OSPD will use the first event to have the residents provide input on their preferred concept design. OSPD will use a second event to have the residents provide input on the preliminary design for any further comments.
DECISION MAKERS	The OSPD Project Team will select the preferred concept designs created by the consultant AECOM. The OSPD Project Team will approve the final preliminary designs created by the consultant AECOM.
THE SCOPE (IMPACT, AND COMPLEXITY) OF THIS DECISION IS:	There are limited options on how these stairs can be constructed due to the location and technical requirements. The project team will use public engagement to understand the impact of installing these stairs and use their input to choose a preferred concept plan. The preferred option will then proceed into further preliminary design.
THE TIMELINE FOR THIS DECISION IS:	Concept plans will be available for view end of September 2018 and input from public engagement will be used to develop Preliminary drawings by November 2018 for distribution.
THE PUBLIC IS BEING INVOLVED IN BECAUSE:	The project team requires their input to understand needs and provide an appropriate design. The project team would also like to understand any possible impacts of installation of the stairs and trail will have for the adjacent residents, to determine what mitigation can be included in design.

ROLES OF THE PUBLIC:	The role of the public will be: to REFINE the two concept options to one plan and to ADVISE on the preliminary designs.
	
THE SPECIFIC INFORMATION BEING SOUGHT IS:	How do you currently use this hill to access the river valley? What opportunities are there to consider when designing this stairway? What possible impacts will this have to you as an adjacent landowner / resident / user? Is there any final input we need to consider when finalizing the preliminary design?
HOW WILL INFORMATION BE USED IN THE DECISION MAKING?	The input gathered will be used to REFINE from two concept plans to one concept plan. ADVICE from the public will be used to finalize the preliminary plan.

Public Involvement Methods Strategy

Potential Participants	Proposed Level of Involvement	Involvement Strategy
Lansdowne neighbourhood	Refine / Advise	public engagement event and referral to website Community conversation at public event and / or online survey.
Community League	Refine / Advise	Attendance at a community league board meeting.
Surrounding users	Refine / Advise	public engagement event and referral to website

		Community conversation at public event and / or online survey.

Special Outreach Strategy

Public Requiring Outreach	Strategy
Adjacent homeowners/residents	There may need to be an onsite meeting with adjacent owners to discuss strong concerns should they arise.
Cycling enthusiasts	There may be cycling enthusiasts that wish to provide input on this development. This may arise during the initial public engagement event.
Nature / environment enthusiasts	There may be nature / environment enthusiasts that wish to provide input on this development. This may arise during the initial public engagement event.

Resource Strategy

Public Involvement Budget

Staff/Contractors	OSPD PM and PC (WSP)
Technical information and materials	Part of AECOM's design scope
Communication	Communication Advisor OSPD PM and PC (WSP)
Logistics	OSPD PM and PC (WSP)
Participant Expenses	
Total Expenses	

Staff time for

Event planning and participation	OSPD PM
Special meetings	OSPD PM Communication Advisor Public Engagement Advisor

Communication with stakeholders	Claire
Display preparation	Part of AECOM's design scope

Data Management Strategy

Information collected is to be stored/recorded in Consultation Manager. Contact the Office of Public Involvement to add this Public Involvement Project.

Information gathered	How it will be recorded/managed/integrated into planning considerations
Input from public engagement event and online survey	The same input questions will be asked at both the public engagement event and the online survey. This input will be considered alongside technical requirements and city policy to create the final preliminary plan for development.
If required, stakeholder conversation input from onsite gathering and / or special stakeholder meeting	This input will be considered alongside technical requirements and city policy to create the final preliminary plan for development.

Communications Strategy

Communication Tactics Outline - Lansdowne Staircase and Trail Project

Target Audience	Key Messages and Timing	Information Sharing Tool
Lansdowne neighbourhood		Mail drop / community newsletter
Surrounding users		Outdoor signs
Neighbourhood Resource Coordinator		WSP has contacted NRC Michael Goth via phone and email.
City Councillor		Ward Councillor - notification via email from PM's Director
Parks Operations		PM
River Valley Operations		PM

Evaluation Strategy

What are the indicators of success for the public involvement process?	High attendance with active participation and constructive feedback.
What will we measure or evaluate about the public involvement process?	Participant evaluation ● % understand how their input will be used ● % had enough information to participate in the conversation ● % felt respected ● % felt views were heard ● % felt input was adequately captured and recorded ● % felt input will be considered by the City ● % felt was a good use of time Standard PE Event evaluation
When and how?	Feedback form at public engagement events / and stakeholder meetings Online survey PE questions for those who access feedback in this manner.
What will we do with the results of the evaluation?	Use feedback information from initial event to identify gaps in stakeholders and adjust future engagement on preliminary plan.

You're invited to provide your feedback and help us adjust our approach to design the **Lansdowne Staircase and Trail Project**

REFINE

Public Engagement Session

SEPT 25 2018

6:30 to 8:00 p.m.
Lansdowne Community Hall
(4915 124 Street NW, Edmonton)

Learn more about this project at **edmonton.ca/??** or Call **311**

SHARE YOUR VOICE
SHAPE OUR CITY

Edmonton

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REFINE

Edmonton

SHARE YOUR FEEDBACK

LANSDOWNE STAIRCASE & TRAIL

SEPT 25, 6:30-8:30 PM

FOR MORE INFO *call* 311

EDMONTON.CA/LANSDOWNESTAIRS

Lansdowne Project Website Update

The City is beginning the process of conceptual design to add a stair and trail from SW Lansdowne Drive down to the shared use path along Whitemud Drive.

As part of the Building Great Neighbourhoods Meetings held in 2014 - 2016, Lansdowne residents had the opportunity to provide their input about the neighbourhood preliminary design and pose questions and suggestions to City representatives. During the March 11, 2015 Meeting Two, several requests to add a trail and stairs from SW Lansdowne Drive down to the shared use path along Whitemud Drive were raised.

The City of Edmonton, Integrated Infrastructure Services has engaged a consultant to provide geotechnical investigation reporting, feasibility and environmental impact assessment study, concept planning, and preliminary design to add a stair and trail at this location. The status of this project is currently at the end of the feasibility study. The hill and existing goat trail separating Lansdowne Drive and the shared use path has been deemed feasible for the proposed enhancements of a stair and trail.

We will be engaging the residents and users of the public space in a public engagement meeting in late September 2018. At this point, two concept plans will be created by the consultant and presented welcoming participants to provide input on their preferred concept design. We will also be looking for a better understanding on how this trail is currently being used, what the stairs will be used for, understand needs, and provide an appropriate solution. This information will be used to further refine the preferred concept design and provide the basis for preliminary design.

Summer 2018

- Consultant procurement for feasibility and design.
- Geotechnical investigation
- Feasibility Environmental Impact Assessment Study

Fall 2018

- Concept Options Planning
- Public Engagement Event for Preferred Concept Option
- Concept Design

Winter 2018

- Preliminary Design
- Public Engagement: Distribution and update of Preliminary Design with email provided for feedback.

2019 – 2022

- Detailed design and construction – currently unfunded

Lansdowne Staircase and Trail Project

You are invited to provide feedback and help us make adjustments to the two concept design options for the proposed Lansdowne Staircase and Trail.

REFINE

Learn more by going to: edmonton.ca/LansdowneStairs

SHARE YOUR VOICE
SHAPE OUR CITY

Edmonton

Lansdowne Staircase and Trail Project

+ The Lansdowne Staircase and Trail Project was initiated based on feedback gathered during public engagement for Lansdowne Neighbourhood Renewal.

+ This project proposes development of an asphalt path connecting Lansdowne Drive to the existing paved path adjacent to Whitemud Drive, as well as a new staircase on the slope.

+ Your feedback today will help us to confirm one preferred concept design for this project. Future construction is dependent on funding approval.

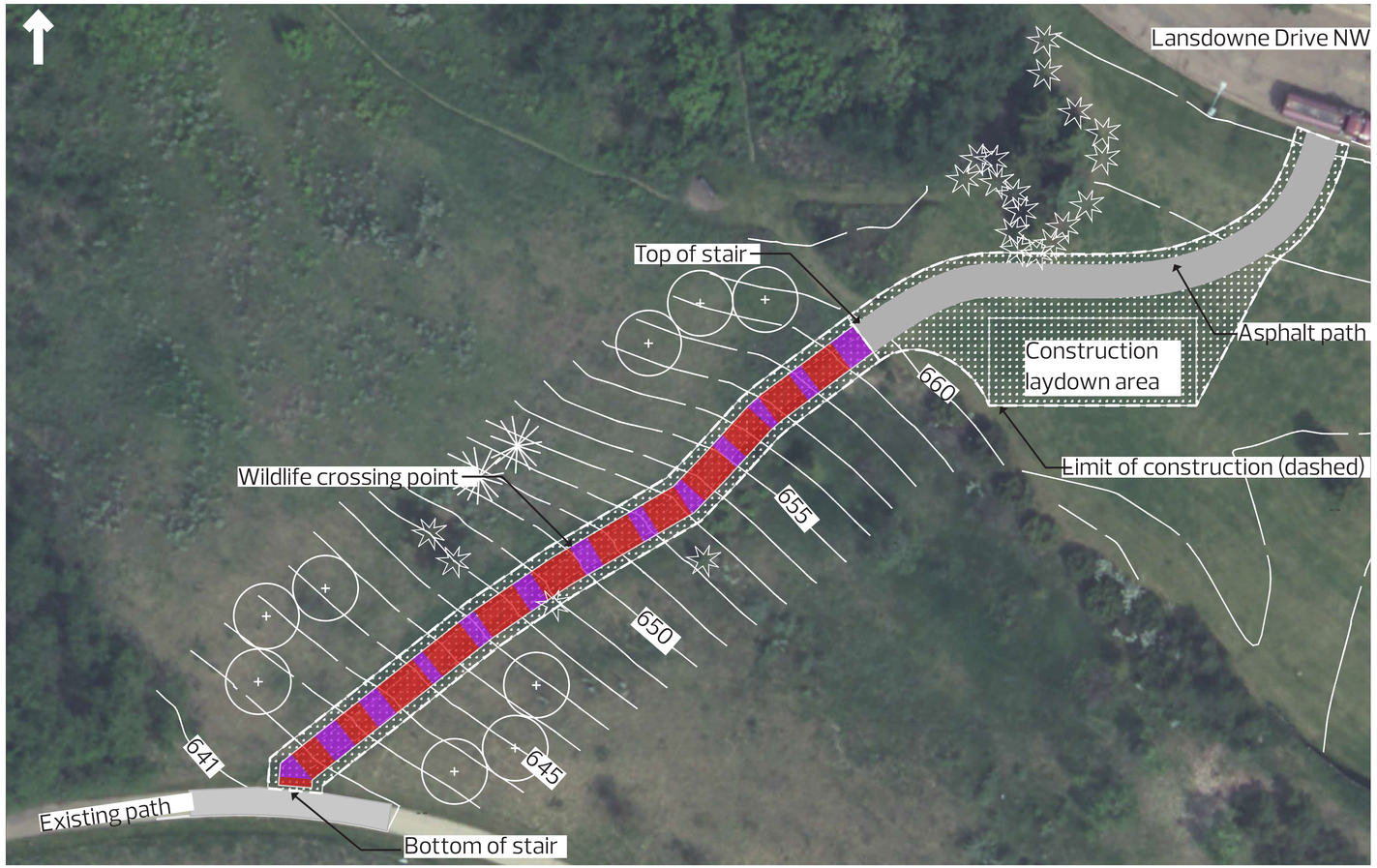
Learn more by going to: edmonton.ca/LansdowneStairs

SHARE YOUR VOICE
SHAPE OUR CITY

REFINE

Edmonton

Option A



Stair

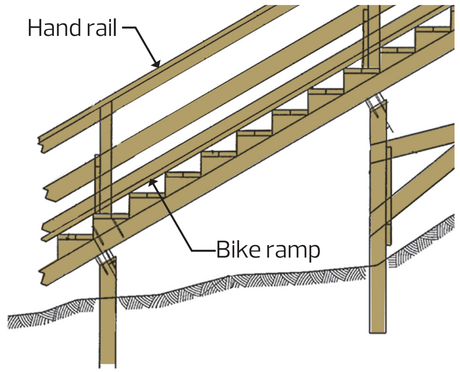
Landing (13)

Asphalt

Restoration

Proposed trees

Existing trees



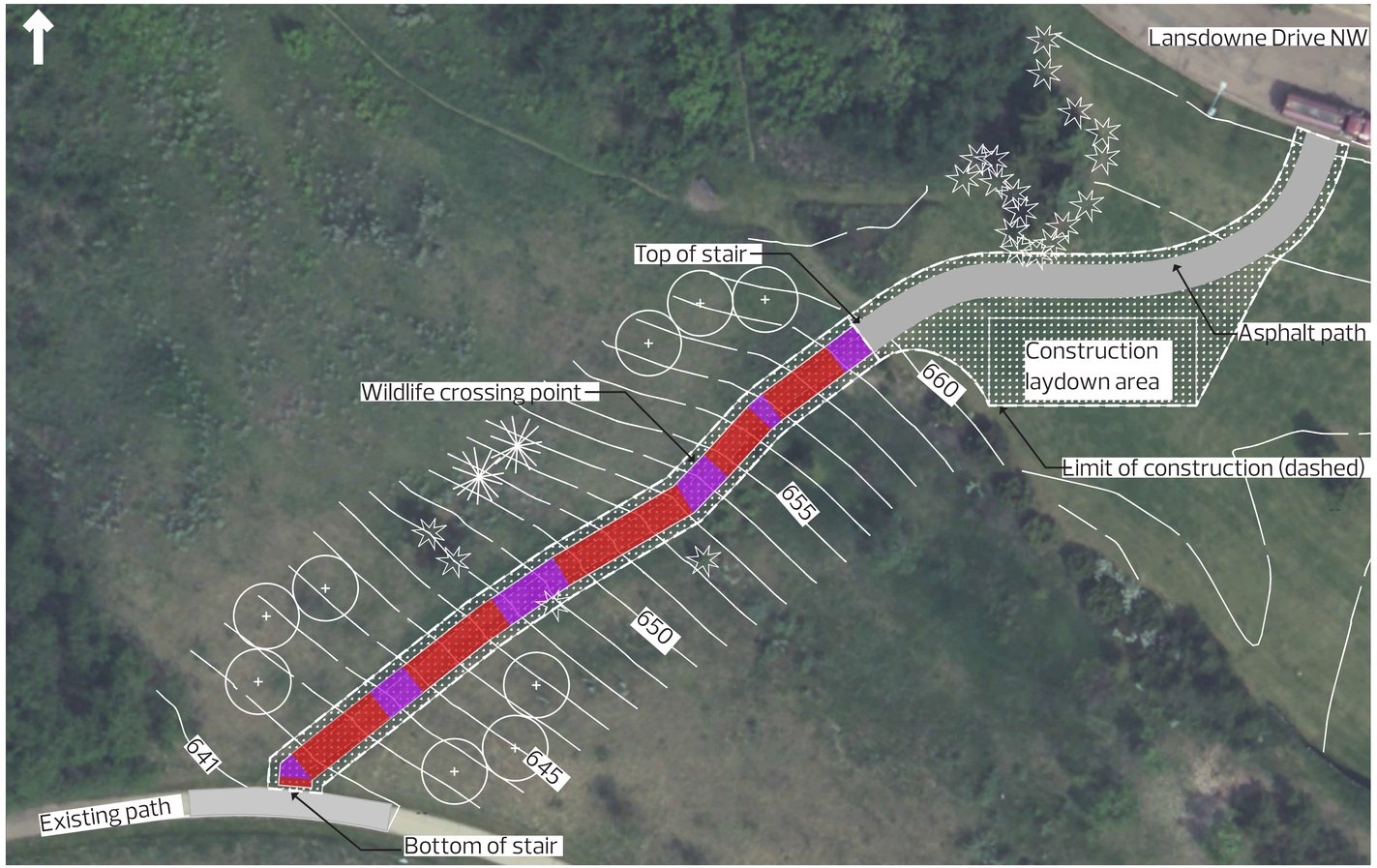
REFINE

Learn more by going to: edmonton.ca/LansdowneStairs

SHARE YOUR VOICE
SHAPE OUR CITY

Edmonton

Option B



Stair

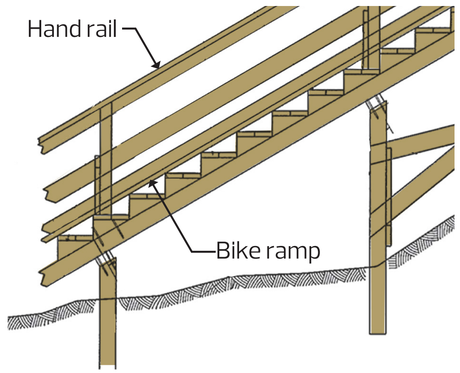
Landing (6)

Asphalt

Restoration

Proposed trees

Existing trees



REFINE

Learn more by going to: edmonton.ca/LansdowneStairs

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Project Timeline

STRATEGY | **CONCEPT** | DESIGN | BUILD | OPERATE

2014

Project identified at Lansdowne Neighbourhood Renewal public engagement.

2018

September Open House.

2018

Preliminary design completion. Plans will be provided on Project website for community review.

Future

Construction is dependent on funding approval.

REFINE

Learn more by going to: edmonton.ca/LansdowneStairs

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What We Heard

Lansdowne Staircase & Trail Project

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What We Heard

Concept Phase

PROJECT BACKGROUND

Residents of the Lansdowne neighbourhood provided input in Spring 2015 at a public engagement meeting for the Building Great Neighbourhoods Program. Feedback gathered indicated the community's need for a formalized trail and staircase connecting South West Lansdowne Drive down to the shared-use-path along Whitemud Drive.

The City of Edmonton heard from residents that the existing 'goat trail', which had formed from frequent use of the hill, was unsafe. This project was initiated, beginning with concept design.

An external consultant was hired to provide geotechnical investigation reporting, feasibility and environmental impact assessment study, concept planning and preliminary design for a staircase and trail at this location. Through testing, the hill and existing 'goat trail' separating Lansdowne Drive and the shared-use-path was deemed feasible for this proposed enhancement project.

Public engagement in Fall 2018 provided an opportunity for Lansdowne residents and users of the public space to provide feedback on two proposed concept plans.

CONCEPT PHASE ENGAGEMENT

Who: General Public, Lansdowne Residents/Businesses, Edmonton Mountainbike Alliance and Councillor Walters

What: Drop-in Public Engagement Session

Where: Lansdowne Community Hall, 4915 124 Street NW

When: Tuesday, September 25, 2018 6:30 – 8:30 p.m.

Why: The engagement event was held to gather public feedback to inform the finalized concept plan and bring the project to the next phase of design.

The engagement event was promoted with a mailout and email invitations, and was advertised on the City of Edmonton website. Approximately 30 members of the public attended, with the majority identifying as residents of the Lansdowne Community.

WHAT WE HEARD

RESPONSE – COMMENT FORM, CONVERSATIONS AND INQUIRIES

The overall response to the proposed concept plans was well received with a majority of the respondents indicating support for the staircase.

When asked "What are your thoughts on the information provided", feedback was mostly positive with some of the following points or questions raised:

- **Benches** – attendees at the public engagement session were very interested in the inclusion of benches as part of the design. Comments varied from benches at the top to benches on the various landings. Final design may include a combination of options. Furthermore, some comments inquired whether an existing bench in close proximity to the top of the proposed stair would be removed.
- **Lightin**g – addition of lighting close to top and bottom of trail was raised by multiple participants.
- **Grandview Staircase** – multiple comments inquired whether the proposed Lansdowne Staircase was comparable to the Grandview Staircase.
- **Whitemud Ravine** – concerns were expressed that the proposed bike rail was promoting biking in the Whitemud Nature Reserve area. Clarification was provided that the proposed staircase would connect to an existing shared-use-path. The plan for this project respects Whitemud Creek as a nature reserve and does not encourage biking in restricted areas. Mitigation measures will be considered as the project progresses.
- **Switchbacks vs. Stairs** – a few attendees inquired whether switchbacks instead of a staircase was considered. Current slope is too steep for switchbacks to be feasible. Additionally, switchbacks would have a greater impact environmentally.

When asked "Which option do you prefer? Option A or Option B?" With the exception of a few responses, the majority of the respondents showed preference for the option with the fewer landings (Option B).

WHAT'S NEXT

Conclusion of Concept Phase

- Input from public engagement will be reviewed and considered in potential adaptations of the design.
- Technical and Operational input will be reviewed and incorporated.
- Project cost estimate will be updated accordingly.

Transition to Design Phase

- Preliminary Design will reflect input from the Concept Phase and further define project details and cost.
- Project updates and information will be available on the project website.

MORE INFORMATION

Please visit the project website: **edmonton.ca/LansdowneStairs**


Learn more by going to:
edmonton.ca/**Lansdownestairs**
or call 311
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Appendix G **Circulation Comments**

OS18-049 Lansdowne Staircase Project

Circulation Range: August 14, 2018 - August 28, 2018

Timestamp	Name	Email Address	Responding On Behalf Of	Do you support this projec	Comments	OSPD Response
8/14/2018 9:30:42	achyut adhikari	achyut.adhikari@edmonton.ca	Parks & Biodiversity	Support with conditions (as outlined in comments)	This project will require EIA and SLS for environmental review fulfilling River Valley ARP (Bylaw 7188). The project team is now working on preparing both documents after consultation with River Valley Team. We will support this project upon the completion of both report as well as council approval.	EIA will be circulated in the near future for further Envirnomntal Review.
8/14/2018 13:24:22	Kari Zral	kari.zral@edmonton.ca	River Valley & Horticulture	Support with conditions (as outlined in comments)	Need more details regarding impacts to the trail during the construction and to ensure there will be a detour and signage plan. Naturalized area on the hill side will need to be managed appropriately.	We reviewed this comment in coordination with the Design Consultant on this project and our response is as follows: 1. It is anticipated that access for construction will be off of Lansdowne Drive with a small laydown area designated in the existing grassed upland area at the top of the slope. Construction impacts to the existing shared-use path (running parallel to Whitemud Drive) should be minimal. Limits of work will be added to the Drawing. If required, closure of the existing shared-use path will require approval by the City and shall adhere to the City of Edmonton trail closure procedure including appropriate detour and signage plan. 2. Restored areas will be maintained to meet the Landscaping Design and Construction Standards

TF18-67 Lansdowne Stair and Trail EIA and SLS

Circulation Range: November 7, 2018 - November 23, 2018.

Timestamp	Name	Email Address	Responding On Behalf Of	Do you support this project?	Comments	OSPD Response
11-16-2018 11:08:00	Courtney Teliske	courtney.teliske@edmonton.ca	Natural Areas	Support with conditions (as outlined in comments)	1) Please be advised that all prohibited noxious and noxious weeds are to be controlled by the proponent within the project limits for the duration of the construction period, as well as the maintenance period (Weed Control Act 2008). Prohibited noxious weeds (Schedule 1) are to be removed and noxious weeds (Schedule 2) are to be controlled.	Noted and will be required as part of the Contract Documents.
11-16-2018 11:08:00	Courtney Teliske	courtney.teliske@edmonton.ca	Natural Areas	Support with conditions (as outlined in comments)	2) Please work with Natural Areas Operations and Urban Forestry to assess the area and determine any tree protection requirements. The tree identified as 'to be retained' is in close proximity to the landing area and the root structure will need to be assessed. Please try to remain 5 meters from any trees to mitigate the potential of damage during construction and reduce future maintenance.	Noted. Inspection with Natural Areas Operations and Urban Forestry has been identified in the EIA Table: *Tasks and Responsibilities* to Complete the Project.
11-16-2018 11:08:00	Courtney Teliske	courtney.teliske@edmonton.ca	Natural Areas	Support with conditions (as outlined in comments)	3) Please send construction and landscape drawings for review prior to approval. Option 2 is preferred.	Option B will be developed during preliminary design. Construction Drawings are not complete at this time - the Open Space team will circulate to Natural Areas when available. The Limit of Project disturbance shown dashed on Environmental Sensitivities Map is the construction footprint for this project.
11-16-2018 11:08:00	Courtney Teliske	courtney.teliske@edmonton.ca	Natural Areas	Support with conditions (as outlined in comments)	4) A pre and post construction inspection will be conducted by Natural Areas. Please contact Erin Belva at erin.belva@edmonton.ca to make arrangements for the inspection prior to accessing the site.	Noted. Inspection with Natural Areas has been identified in the EIA Table: *Tasks and Responsibilities* to Complete the Project.
11-29-2018 11:08:00	Achyut Adhikari	achyut.adhikari@edmonton.ca	Network Integration | City Planning | Urban Form and Corporate Strategic Development	Support with conditions (as outlined in comments)	My major comments would be around the development of monitoring plan that includes future action, timeline and responsible party for execution. This project is still at conceptual stages so there are couple of items that required clear direction at the preliminary design, detailed design, and construction stages attention for consideration. You have to create a clear chart showing details on roles and responsibilities defined for next stages e.g. preliminary drawings, landscaping plan and drawings review and approval, CCC and FAC, Eco Plan, ESC Measures etc.	*Tasks and Responsibilities* to Complete the Project have been added to the EIA.
12-4-2018 15:38:00	Trevor Thistle	trevor.thistle@edmonton.ca	Parks Operations	Support with conditions (as outlined in comments)	According to the Environmental Impact Assessment, tree clearing is not within the scope of this project. However, construction activity is proposed within 5 m of a city tree(s). Therefor, a site meeting with a urban forester will be required prior to start up, in order to discuss tree protection requirements. As per The Corporate Tree Management Policy, Forestry will require equitable compensation for the value of removed trees, or for the post construction treatment of any trees that are negatively impacted by construction activities.	Noted. Inspection with Urban Forestry has been identified in the EIA Table: *Tasks and Responsibilities* to Complete the Project.

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