<table>
<thead>
<tr>
<th>Version No.</th>
<th>Date</th>
<th>Summary of Changes</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.0</td>
<td>April 1, 2016</td>
<td>Release of Hybrid Cadastre Standards Version 1.0</td>
</tr>
</tbody>
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Operations Division  
Provincial Programs Branch  
Surveys Section  
Oxbridge Place – 15th Floor  
9820 – 106 Street NW  
Edmonton, Alberta  T5K 2J6

Telephone: (780) 422-0020  
Fax: (780) 427-1493

Email: Hybrid.Cadastre@gov.ab.ca
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1. SCOPE

1.1. Hybrid Cadastre applies to all public land disposition surveys on surveyed and unsurveyed Crown lands to support new applications, renewals, and amendments issued by the Alberta Energy Regulator (AER) or Alberta Environment and Parks (AEP).

1.2. Only practicing Alberta Land Surveyors are permitted to submit a Plan of Survey under Hybrid Cadastre.

1.3. All current disposition procedures other than those noted in this document remain in effect.

1.4. In the event of a conflict between the Alberta Land Surveyors' Association (ALSA) Manual of Standard Practice (MSP) and these Hybrid Cadastre Standards, these Hybrid Cadastre Standards shall prevail.

1.5. This document supersedes previous versions of Hybrid Cadastre Pilot Project Guidelines. A six month transitioning (grand-fathering) period is permitted that will end on September 30, 2016.

1.6. During the transition, plans will be examined pursuant to applicable guidelines effective on the date of signing the plan. In the event that the plan is not fully compliant, and as a result, resubmission is required, efforts must be made during resubmission to update the plan to reflect these Standards.

2. DEFINITIONS

2.1. **Hybrid Cadastre** means a cadastre where the positions of the boundaries are determined by a blend of monuments in the ground and coordinates referenced to a network of control points of defined datum and projection.

2.2. **Establishment Coordinate (EC)** is a coordinate that governs the location of a new disposition boundary until such time as a physical monument is placed to demarcate that point on the ground. In the case of establishing curvilinear boundaries, governing locations should be labeled as either Point on Curve (PC) or Point of Tangent (PT) even though they are Establishment Coordinates.

2.3. **Re-establishment Coordinate (RC)** is a coordinate created by a Land Surveyor for a lost monument position, and as such is the opinion of the Surveyor as to the location of the original monument and does not govern that location.

2.4. **Observed Coordinate (OC)** is a coordinate that is obtained for existing (or placed) monuments and is only included on the plan for informational purposes. In the case of natural boundaries, Observed Coordinates provide evidence of the bank location at the time of survey. These coordinates do not create or govern any boundaries.
3. **CONCEPT OF HYBRID CADASTRE & GOVERNING COORDINATES**

3.1. Monuments and coordinates co-exist in a Hybrid Cadastre. At any instant either a coordinate or a physical monument shall govern a position, but not both. A coordinate is deemed to be a monument for the purposes of determining disposition boundaries on public lands.

3.2. Unlike a survey monument, an *Establishment Coordinate* can never be lost, but can lose its governing status upon replacement with a statutory iron post. The following parameters will define the relationship between coordinates and physical monuments:

   a) A new Hybrid Cadastre boundary is created by using *Establishment Coordinates*, statutory iron posts or a combination thereof, each having equivalent governing status in defining the boundary location.

   b) *Observed Coordinates* cannot replace an existing monument in good condition, but may be used as corroborating evidence of its undisturbed location.

   c) *Re-establishment Coordinates* derived for a lost monument cannot alter its original position, similar to the role of a re-established monument.

   d) If a new disposition boundary intersects with, terminates upon or is coincident to an existing boundary, any subsequent *Establishment Coordinates* cannot alter the existing boundary.

   e) In the case of a lost monument, the *Re-establishment Coordinates* shall have an equivalent evidentiary weight as a re-established physical monument. In both cases, the same rules for evidence assessment (hierarchy of evidence) are applied.

   f) Regardless of the author of the original Hybrid Cadastre survey plan, any practicing Alberta Land Surveyor may subsequently replace one or more *Establishment Coordinates* with a statutory iron post at any time.

   g) When placed, the statutory iron post will govern that position so long as it complies with the accuracy requirement of Section 4.1 below and a *Statutory Declaration (Appendix B)* is filed with AEP and its change of status is reflected in the AEP/Director of Surveys online database.

3.3. All locations (section, quarter section, center of section, LSD corners etc.) that are defined within Part 2 of the *Surveys Act* can only be physically established using monuments placed under “Official Plans”. It is not permitted to use *Establishment or Re-establishment Coordinates* to define Part 2 locations. If those locations are unsuitable for posting, coordinates will not be shown at those locations and a remark must be added as to why the monument was not posted.

3.4. With the exception of Section 3.3 above, it is not necessary to physically re-establish lost monuments as defined under Part 3 of the *Surveys Act*. The Land Surveyor may determine, using best evidence, the *Re-establishment Coordinate* values for the lost monument and reflect same in the Table of Coordinates.
3.5. Due diligence must be exercised while accepting Re-establishment Coordinates from other surveyors. Any discrepancy beyond the accuracy specified in Section 4.1 below must be resolved with the other surveyor to avoid a double monumentation issue.

3.6. For a riparian boundary, an Establishment Coordinate is to be created at either the intersection of the rectilinear and riparian boundaries, or at a reference point along the rectilinear boundary at a stated distance from the aforementioned intersection. For all surveyed points along the bank, other than an intersection point, the surveyor will create Observed Coordinates to depict the bank at the time of survey. Please see Appendix A.2 for a sample plan.

3.7. When public land is transferred to private ownership, the Establishment Coordinate values are expected to continue to govern until a governing physical monument is placed. AEP will maintain a public, on-line database which will track governing Establishment Coordinates and the physical monuments superseding them.

3.8. Pursuant to the Director of Surveys’ policy on Dual Registration of Public Land Surveys, any plan showing re-established physical monuments placed in accordance with these Standards must be filed at AEP and need not be registered with the Land Titles Office.

4. REFERENCE DATUM, MAPPING PROJECTION & ACCURACY

4.1. All coordinated points must be accurate to:

- 0.05m relative at 95% confidence; and
- 0.10m absolute at 95% confidence.

4.2. The reference frame shall be NAD83 (CSRS) Epoch 2002. It is obligatory to reflect the entire reference frame name in the plan Legend only and nowhere else.

4.3. The permitted projection is UTM having its Zone identified in the plan Legend only and nowhere else. Any UTM derivatives such as 10TM and 3TM are not permitted.

5. PLAN STANDARDS

5.1. Disposition survey plans submitted under the Hybrid Cadastre must state in the title block: “Plan Showing Survey (Hybrid) of”.

5.2. Notes within the plan Legend shall first contain five standard bullets in the following order. They will not be restated elsewhere in the plan. Any deviation must be pre-approved by the Director of Surveys in writing.

- This plan contains governing coordinates.
- Coordinates and bearings are referred to UTM Zone XX NAD83 (CSRS) Epoch 2002.
- Bearings are Grid, derived at geo-reference point #X using … (identify a source as approved under Section 6 of this document).
- Distances are ground in metres and decimals thereof.
- Combined Scale factor: 0.999### (show six decimal places)
5.3. In addition to standard abbreviations and symbols referred to in the Land Titles Procedures Manual (SUR-1), the following abbreviations and symbols are permitted in the Hybrid Cadastre. Symbol scale must correspond to plotting scale.

<table>
<thead>
<tr>
<th>Coordinate Type</th>
<th>Abbreviation</th>
<th>Symbol</th>
</tr>
</thead>
<tbody>
<tr>
<td>Establishment Coordinate</td>
<td>EC</td>
<td>△</td>
</tr>
<tr>
<td>Re-establishment Coordinate</td>
<td>RC</td>
<td>▽</td>
</tr>
<tr>
<td>Observed Coordinate</td>
<td>OC</td>
<td>⨍, ⨤, ⨥, ⨦, ⨧,</td>
</tr>
<tr>
<td>Point on Curve</td>
<td>PC</td>
<td>△</td>
</tr>
<tr>
<td>Point of Tangent</td>
<td>PT</td>
<td>△</td>
</tr>
<tr>
<td>Observed Coordinate (Geo-Reference Point)*</td>
<td>RP</td>
<td>○RP</td>
</tr>
</tbody>
</table>

*Note: The geo-reference points are abbreviated as RP on the plan, but in the Table of Coordinates, the coordinate type will be OC.

5.4. Legend must contain and explain only those abbreviation/symbols used in the main body and/or details on the plan. Any unused symbol must be removed from the Legend.

5.5. The table of coordinates shall show incremental point identifiers (commencing from #1), their northing and easting (rounded to two decimal places), coordinate type, and point description. Missing numbers or inserts (such as 7-A, 7-B or 7.1, 7.2) are not permitted.

5.6. In the case of accepting governing coordinates (ECs) from previous plans,
   a) point identifier shall always correspond to the new plan,
   b) its coordinate values (northing and easting) shall be left blank, and
   c) the original point # and the original plan # will be cross referenced in the Point Description column.
   d) In the case of practitioner’s own unrecorded plan, the Job Reference will be acceptable in lieu of the plan # provided the previous plan gets recorded prior to submitting the new plan.
5.7. On the body of the plan, point numbers must be drawn within an ellipse and their sequence shall flow through in the ascending order as follows:
   a) first, all geo-referenced points (minimum two geo-reference points are obligatory),
   b) next, show incremental points along the new boundary. For example, this could encompass OCs and RCs along the abutting boundaries, ECs, PTs, PCs and OCs along the new boundaries, and ECs along the intersections. Typically, they all fall along the solid line depicting the affected area.
   c) finally, sequentially show all points along previously surveyed boundaries not included within (a) or (b) above.

5.8. In the case of natural boundaries, not all OCs need to be labelled on the body of the plan to avoid cluttering. Skipping of a few numbers at a regular interval is acceptable.

5.9. Any changes to coordinate values due to typographical errors will be dealt with as if it were a plan or survey error, in accordance with policies to be developed.

5.10. Plans will include the Land Surveyor’s Statutory Declaration as per the current requirements for disposition survey plans.
   - Alberta Land Surveyor’s Statutory Declaration

5.11. All curvilinear boundaries shall be depicted with circular arcs having constant radius. The new boundaries will be defined with coordinates at the beginning (PT/PC) and end of the curve (PT/PC) and a point approximately midway (PC) between them. In the case of new curvilinear boundaries, ECs are designated as PTs and PCs (refer Appendix A.2). In addition, curve parameters such as radius, Δ, arc-length etc. shall be shown.

5.12. Intersections shall be made in accordance with the Surveys Act. Previously surveyed boundaries defined by iron spikes, iron bars and statutory iron posts, etc., shall be intersected; a new Establishment Coordinate or a statutory iron post shall be placed at those intersections.

5.13. Calculated points or temporary points are not permitted under the hybrid regime. All cut offs must be shown by Establishment Coordinates or statutory iron posts.

5.14. Under the Hybrid regime, placement of new iron spikes or iron bars (to establish, restore or re-establish a physical monument) is not permitted.

5.15. All other existing disposition plan standards shall apply.

5.16. Please see Appendix A.1 and A.2 for sample plans.

6. GEO-REFERENCING

   Geo-reference points facilitate field survey operations and are not intended to be used to create new governing coordinates. While it may be appropriate and acceptable to use real time kinematic (RTK) methods to perform stakeout activities for development purposes, all surveys intended to create governing coordinates must be surveyed using acceptable methodology (i.e., RTK and/or post-
processed GNSS surveying techniques with appropriate redundancy) that meets or exceeds the accuracy requirements (see Section 4.1 above). Acceptable methodology includes use of the Natural Resources Canada Precise Point Positioning (NRCAN PPP) service, ties to provincially integrated GNSS base stations, and ties to appropriate ASCMs. For geo-referencing of Hybrid Cadastre survey plans, the following requirements must be met:

6.1. Unless specifically exempted by the Director of Surveys in writing, there must be a minimum of two geo-referenced points on every plan, preferably near the limits of the disposition.

6.2. No surveyed point on the plan may be further than 10km from a geo-referenced point.

6.3. Geo-referenced points must be found or placed statutory iron posts, standard post/brass cap or appropriate Alberta Survey Control Markers (ASCMs) – including Canadian Base Network (CBN) pillars. In the case of ASCMs, the Surveyor will derive UTM NAD83 (CSRS) Epoch 2002 coordinates to be shown on the plan unless the ASCM has published UTM NAD83 (CSRS) Epoch 2002 coordinates as shown in the subset listing available on the Director of Surveys - Geodetic Control Unit webpage. In this case the published coordinates must be used and shown on the plan.

6.4. Geo-referenced points may be located on legal boundaries, but it is not mandatory.

6.5. As previously noted, Observed Coordinates of the geo-referenced points are to be included in the Table of Coordinates.

6.6. Geo-referenced monuments from prior surveys in the vicinity of new disposition boundaries can be used as new geo-referenced monuments provided they are field validated.

7. FOLLOW UP

8.1. During the transition period ending on September 30, 2016, the Director of Surveys will be developing Frequently Asked Question (FAQs), and/or issue clarification notes from time to time. If any part of this Hybrid Cadastre Standards document needs further explanation, please contact the Director of Surveys Office at: Hybrid.Cadastre@gov.ab.ca

8.2. A Community of Practice (CoP) on Hybrid Cadastre has been established to facilitate knowledge sharing. Anyone who has interest in Hybrid Cadastre can join the mailing list by emailing CoP.HybridCadastre@gov.ab.ca, or simply asking a question or clarification.
Appendix A.1 – Hybrid Cadastre Sample Plan

(Note: Double click on plan to enlarge)
Appendix A.2 – Hybrid Cadastre Sample Plan - Riparian Boundary

(Note: Double click on plan to enlarge)
Appendix B – Statutory Declaration for Monumenting Hybrid Cadastre Establishment Coordinate Positions

I, __________________________, Alberta Land Surveyor, solemnly declare

1) that the monument(s) placed by me at each Establishment Coordinate position were placed under my personal supervision between the dates of __________ and __________;

2) that the survey was made in accordance with good surveying practices;

3) that I replaced the following Establishment Coordinate point(s) with monument(s) on the ground affecting plan #__________, in accordance with the Hybrid Cadastre Standards document.

(Note: If required, please append a separate listing of the Establishment Coordinate points.)

4) and I make this solemn declaration conscientiously believing it to be true and knowing that it is of the same force and effect as if made under oath.

Declared before me at __________________________

this ___ day of _________________________, 20___.

Alberta Land Surveyor

Commissioner of Oaths

in and for Alberta

Commission expires on __________, 20__.