SURVEY CONTROL NETWORKS: RE-ESTABLISHMENT & INTEGRATION

GEOMATICS ENGINEERING DEPARTMENT

Team SAG Surveys

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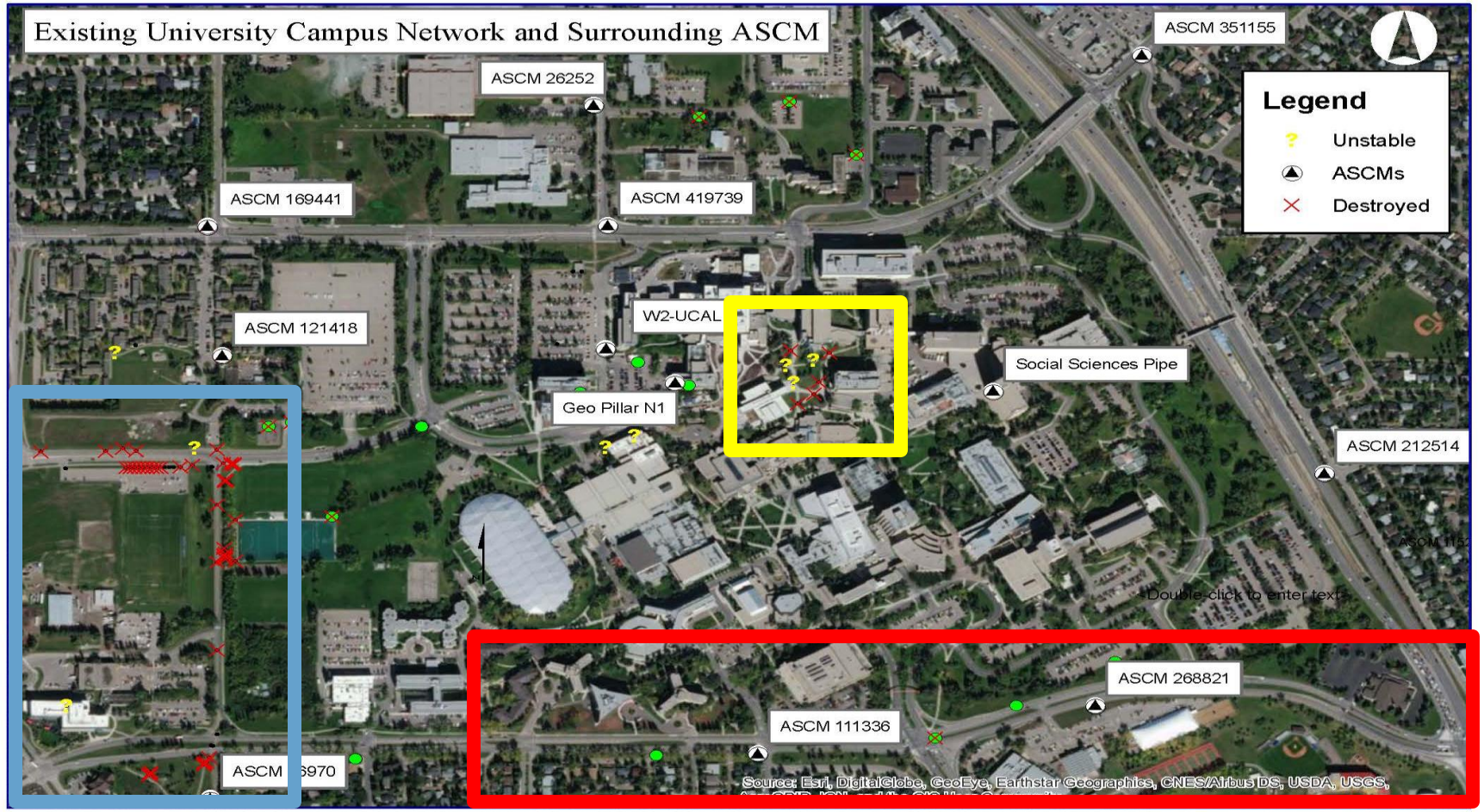
THE PROBLEM: CURRENT NETWORK

- Inconsistent Control
- Changing Landscape
- Unutilized Portions
- Piecework Networks



THE OPPORTUNITY

Create an integrated network tied to ASCM and HPN geodetic control that can be used to adapt to the different needs of the department and students over time.

THE NEED

Scalable	Modular	Maintainable
• Growing Geomatics Department	• Adaptable to changes	• Inter-visibility • Redundancy

WHO IS INVOLVED

Proponent

- Team ASG Surveys – Geomatics Engineering Students

Client

- Dr. Elena Rangelova – Geomatics Engineering

Collaborator

- James Durant, ALS – Element Land Surveys Inc.

WHY US?

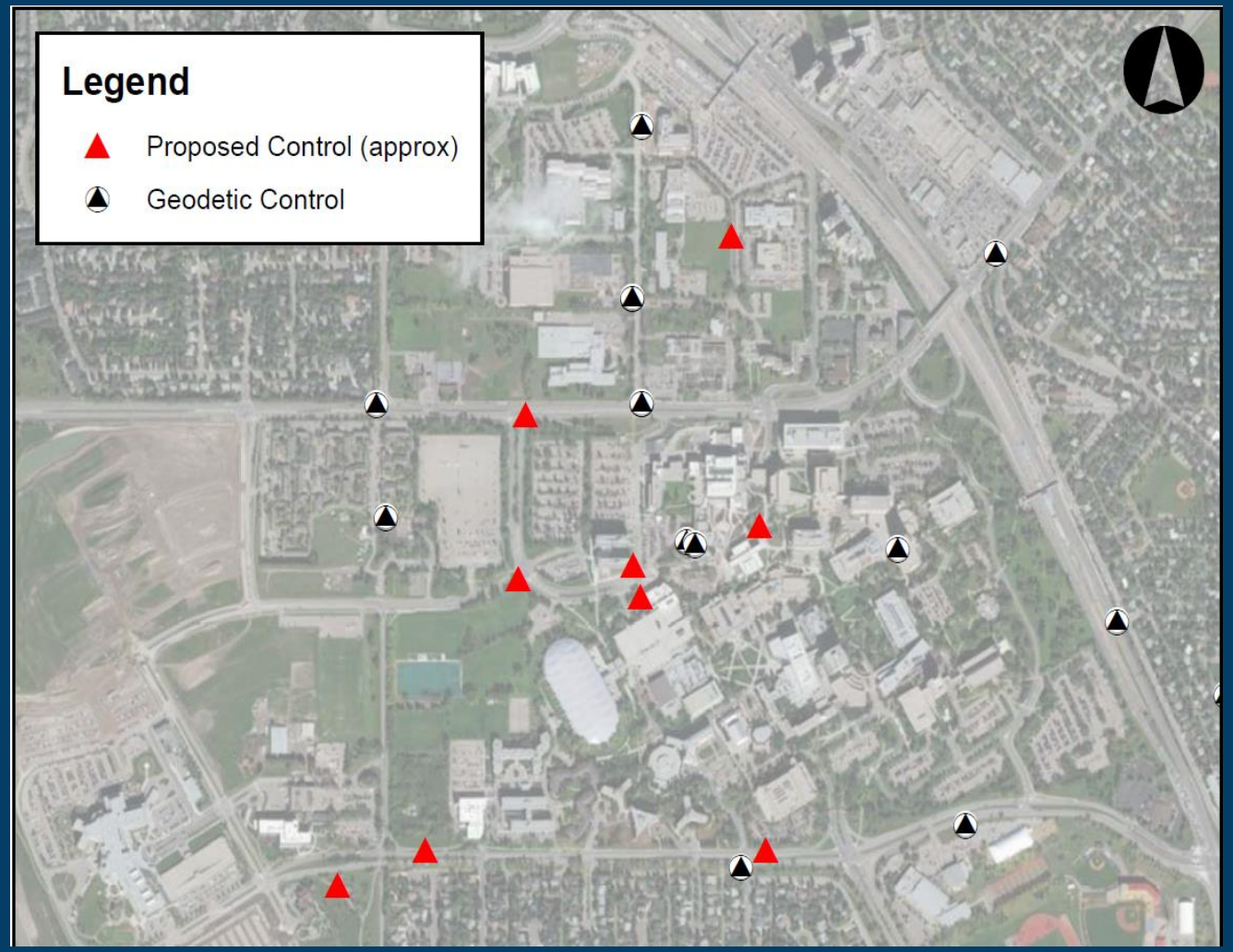
- Technically competent
- Previous field surveying experience
- Possess the necessary field training certificates
- Availability and low cost
- Familiarity with the area

PROJECT OBJECTIVES

1. Create an integrated campus network with new and existing control.

2. Establish tutorial and practical project networks to be used for the 2019-2020 school year and onward.

OBJECTIVE 1: CONTROL NETWORK ESTABLISHMENT



Proposed:

3 Salvageable control

6-10 New control

OBJECTIVE 1: CONTROL NETWORK ESTABLISHMENT

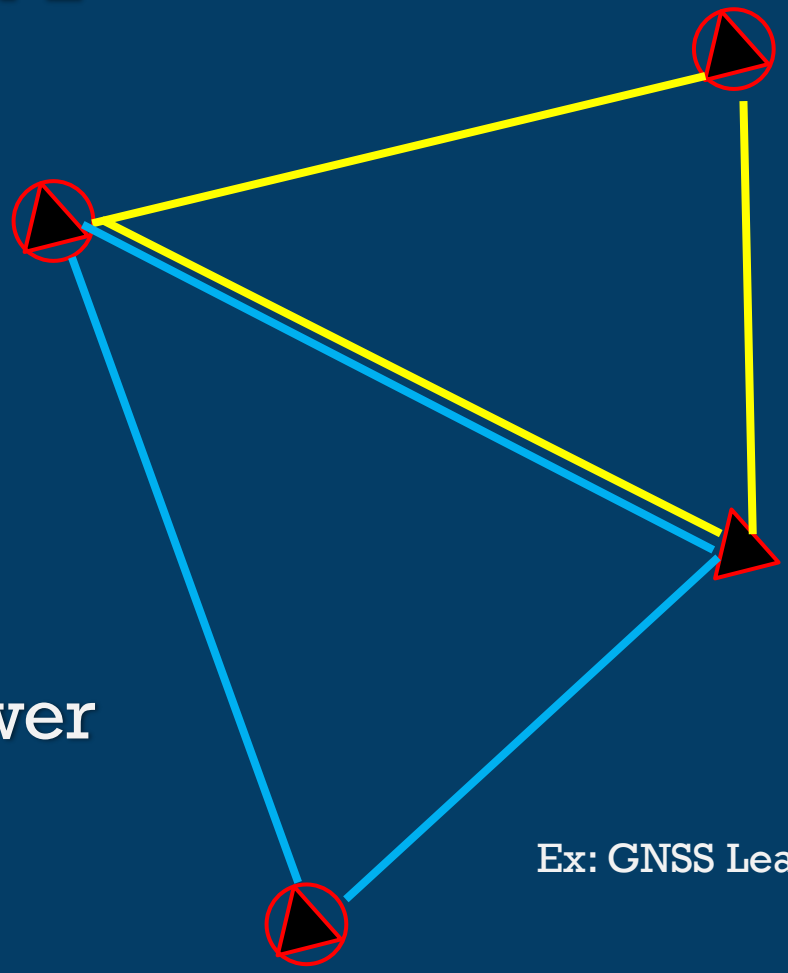
Observed by GNSS static survey

- Verified by conventional/levelling

Completed using leap-frog method

- Limited receiver availability & manpower
- Able to observe in pieces

Compliant: Alberta Control GNSS surveys[1]

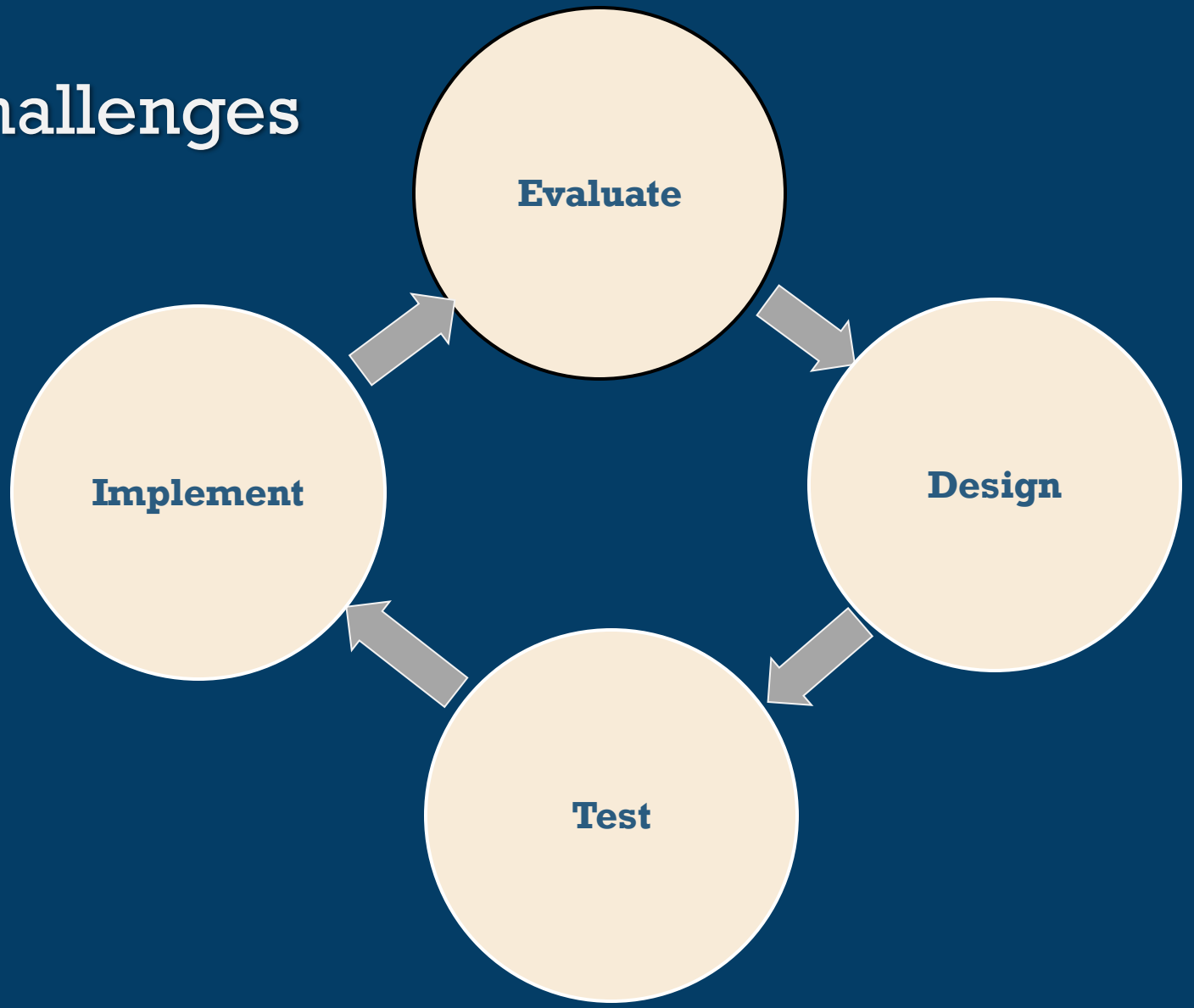


Ex: GNSS Leap-frog

OBJECTIVE 2: PRACTICAL PROJECT AREAS

Unique requirements & challenges based on:

- Resection
- Precise Traversing
- Precise Levelling
- Cadastral / Legal
- Calibration
- Topographic



SUCCESS CRITERIA & CRITICAL SUCCESS FACTORS

Geodetic network design

- Sufficient control & precision
- Safely & on time

Sustainability

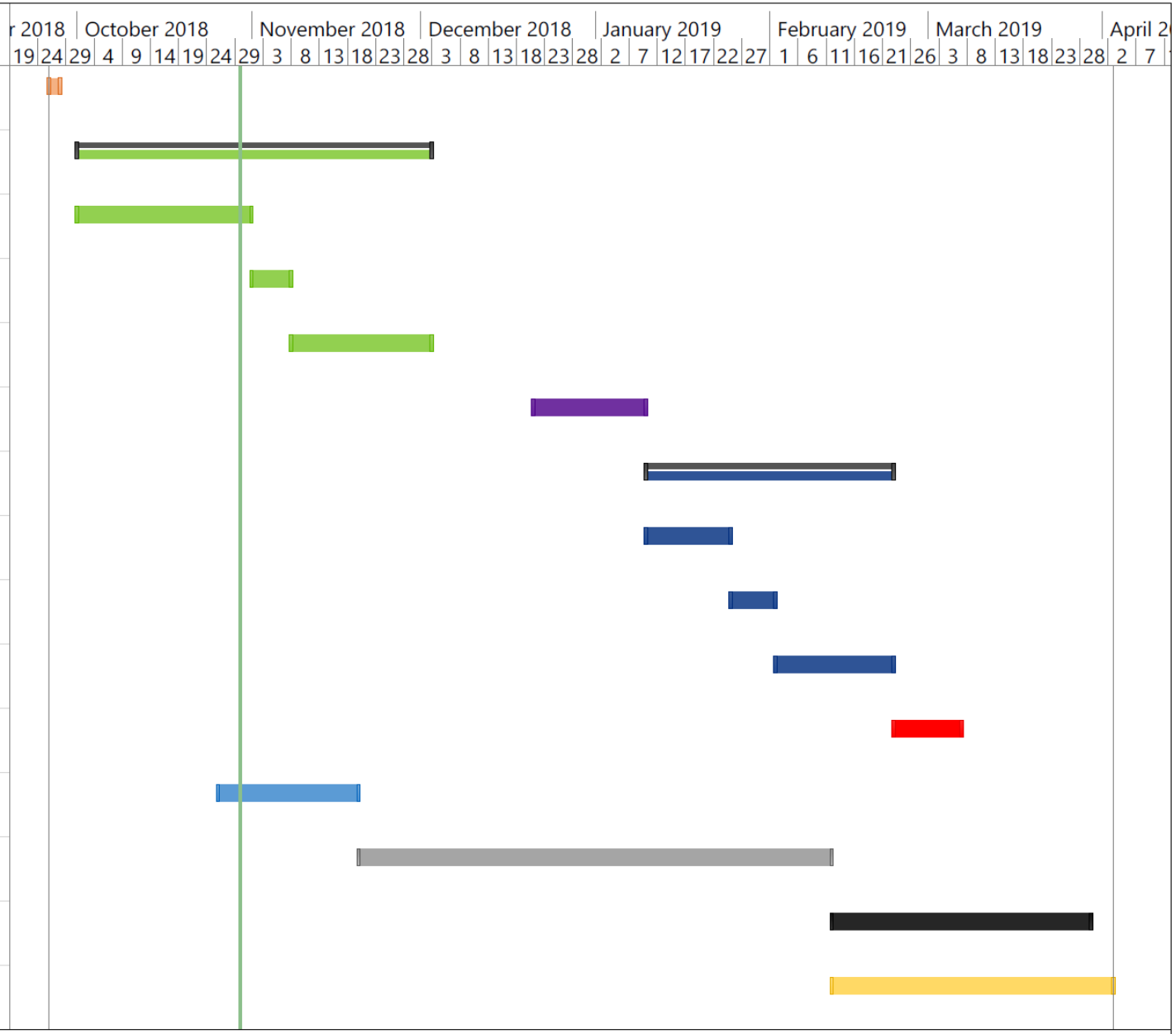
- Future maintenance
- Self sustainable

Establish practical project networks

- Adaptable
- Accessible

WBS AND GANTT CHART

ID	Task Name	Duration	Start
1	**1 Total Station Calibratio**	**2 days**	**Wed 9/26/18**
2	**2 GNSS Survey**	**46 days**	**Mon 10/1/18**
3	2.1 Network Design	23 days	Mon 10/1/18
4	2.2 Instalation	5 days	Thu 11/1/18
5	2.3 Network Observatic	18 days	Thu 11/8/18
6	**3 Break**	**14 days**	**Fri 12/21/18**
7	**4 Local Network Surveys**	**32 days**	**Thu 1/10/19**
8	4.1 Local Network Desi	11 days	Thu 1/10/19
9	4.2 Installation	6 days	Fri 1/25/19
10	4.3 Network Observatic	16 days	Sat 2/2/19
11	**5 Contingency**	**9 days**	**Sat 2/23/19**
12	**6 First Progress Report**	**17 days**	**Fri 10/26/18**
13	**7 Second Progress Report**	**60 days**	**Tue 11/20/18**
14	**8 Capstone Fair**	**34 days**	**Tue 2/12/19**
15	**9 Final Report**	**36 days**	**Tue 2/12/19**



PROPOSED EXECUTION PLAN I

1. Site Scouting

- Install control in the most optimal locations

2. Establish Control Network

- Run static on 2+ ASCMs at all times

PROPOSED EXECUTION PLAN II

3. Verify Control: Conventional Methods

- Precise traversing and levelling

4. Establish New Practical Project Networks

- ICT, G-Block, North Campus, 24th Ave.

5. Post-Process & Reporting

- Official Coordinate Lists
- Generate Maps

RISK ASSESSMENT

High	- U of C Approval	- Survey Errors	- Construction
Medium	- Weather	- Equipment availability	- Safety
Low	-Data Compatibility	- GNSS Precisions	- Client Approval
Probability vs Severity	Low	Medium	High

MITIGATION

1. **Survey Errors**
    - Technical expertise of team including industry standard procedures. eg calibration and optimal network design [1].
2. **Construction**
    - Communication and coordination with ongoing projects
3. **Safety**
    - Follow safety protocols

BUDGET SUMMARY

- Survey equipment and software provided by the Geomatics Department free of charge
- Monument installation tools provided by the Industry Sponsor

Item Description	Related Portions of WBS	Cost
5/8” rebar	Control installation	~$4 /m.
Brass Caps	Control installation	~$2 per cap.
Total (6 new) 0.5m length		~$24

WHO BENEFITS?

Students & Faculty

- Undergraduates
- Graduate Program: Research calibration

Geomatics Department

- Modernized & Sustainable Network

CONCLUSION

A practical project that directly benefits the Department.

9 new controls, several new tutorials, and a whole bunch of fun

"By the Department, For the Department."

QUESTIONS?

REFERENCES

[1] STANDARDS, SPECIFICATIONS & GUIDELINES FOR GPS SURVEYS OF ALBERTA SURVEY CONTROL, 2010, DIRECTOR OF SURVEYS & TECHNICAL SERVICES BRANCH, GOVERNMENT OF ALBERTA