



51st Annual Great Northern Concrete Toboggan Race

Table of Contents

Hello From Montréal	5
Key Changes in the 2025 GNCTR Rulebook	6
Table 1: Changes to the Rulebook.....	6
1. General.....	11
2. Communication & Logistics	14
2.1. Before the Competition	14
2.2. During the Competition	15
3. Code of Conduct	17
4. Registration	19
5. Competition Deliverables	22
5.1. Deliverable Due Dates	22
Table 2: Deliverable Due Dates for Competing Teams	22
Table 3: Deliverable Due Dates for Non-Competing Teams	23
5.2. Required Formats for Competition Deliverables	23
5.3. Project Schedule and Budget	24
5.4. Safety Reports.....	25
5.4.2. Safety Report 1	25
5.4.3. Safety Report 2	26
5.5. Job Hazard Analysis and Field Level Hazard Analysis forms.....	28
5.6. Technical Report.....	29
5.7. Concrete Test Cylinders	31
5.8. Technical Exhibition Deliverables	32
5.8.1. Booth Display	32
5.8.2. Technical Presentations	33
6. Toboggan Specifications	34
6.1. General Specifications	34

6.1.1. Toboggan Weight.....	34
6.2. Sliding Surface	36
6.3. Superstructure.....	37
6.4. Mechanical Systems	38
6.4.1. Braking System.....	38
6.4.2. Steering System.....	39
6.4.3. Ski Mount System	39
6.4.4. Other Mechanical Systems.....	40
6.5. Construction	40
6.6. Safety Features	41
7. Toboggan Inspections	44
8. Technical Exhibition.....	47
8.1. General.....	47
8.2. Technical Display	47
8.3. Technical Presentations.....	49
9. Race Day	50
9.1. General.....	50
9.2. Race Day Events.....	50
9.2.1. Drag Race	50
9.2.2. Giant Slalom	50
9.2.3. Reine de la Montagne Tournament.....	51
9.3. Competitor Safety	52
9.4. Race Hill Geometry	53
9.5. Race Starts	54
9.6. Complete Run	55
9.7. DNF, Crashes, and Reinspection.....	56
9.8. Disqualifications, Deductions, and Penalties	57
10. Spirit.....	59

10.1. Theme	59
10.2. Participation	59
10.2.8. Opening Ceremonies Spirit Presentation	60
10.2.9. Tech Ex Spirit Presentation	61
10.2.10. Spirit Challenges	61
11. Scoring and Judging	63
11.1 General Scoring Guidelines	63
Table 4: Scoring Rubric.....	63
11.2. Deductions	65
Table 5: List of Deductions	66
11.3. Petitions	68
11.4. Toboggan Design	69
Table 6: Toboggan Design scoring criteria.....	69
11.5. Project Management	71
11.5.1. Project Schedule	71
11.5.2. Budget.....	71
Table 7: Budget Marking Rubric	72
11.5.3 Bang For Your Buck (BFYB)	73
11.6. Reports and Presentations	74
11.7. Race Day	74
11.7.1. Fastest Run.....	74
11.7.2. Steering Performance	75
11.7.3. Braking Performance	75
11.7.4. Reine de la Montagne Tournament.....	76
11.8. Safety.....	77
11.9. Spirit.....	77
12. Awards.....	79
13. Win by Default	83

13.1. Requirements for a Win by Default.....	83
Glossary	84
Appendices	89
Appendix A: Technical Report Requirement Checklist	89
Appendix B: Detailed Scoring Rubric	91
Appendix C: Hill Information	98
Appendix D: Braking Deployment Penalty Scenarios.....	102
Appendix E: Schedule KPI Audit Rubric.....	104
Appendix F: Budget Template	108
Appendix G: Tilt Test	113
Appendix H: Safety Inspection Checklist.....	115
Appendix I: Hazard Analysis Forms.....	117
Appendix J: Life Cycle Analysis Template	123
Appendix K: “All dates in one place”	127

Hello From Montréal

Hello GNCTR competitors,

We, the 2025 Great Northern Concrete Toboggan Race (GNCTR) Organizing Committee (OC), are excited to bring you to Montréal, Québec, for the next competition!

This rule book has been written to provide competitors with the minimum design requirements, safety expectations, technical specifications, competition itinerary, expected behaviour guidelines, and general information pertaining to the competition.

In order to achieve a successful GNCTR 2025, it is requested that all of the guidelines and rules given by the OC and volunteers are followed by all of the competition participants.

The Organizing Committee aims to be clear and concise with all communication of expectations and guidelines. If your team or team members have any issues related to the rules as outlined in this document, a Request for Information (RFI) form may be filled out at <https://gnctr2025.ca>. See Section 1.7 for more information regarding a RFI submission.

A French version of the rulebook can be made available upon request.

Sincerely,

The 2025 GNCTR Organizing Committee

Key Changes in the 2025 GNCTR Rulebook

We hope to carry on the legacy of GNCTR and organize an event fundamentally similar to past competitions, while improving on specific aspects of the rules and execution of the competition. In this section, we highlight some of the key changes made to the rulebook and competition requirements this year. The 2025 OC wishes to focus on developing a sustainable and innovative competition, for example, with new “bang for your buck” bonus points. Please note that while we hope [Table 1](#) will help teams situate themselves with any major changes from the 2024 to the 2025 rulebook, the list of changes for Version 0 of the 2025 rulebook is not exhaustive, and we want to reinforce the importance of reading the entire rulebook thoroughly. The changes listed within [Table 1](#) under Version 1 and beyond of this rulebook will, however, be documented in a comprehensive way to reflect revisions to the 2025 rulebook following RFIs.

Table 1: Changes to the Rulebook

Section	Date	Rulebook Version	Description
N/A	2024-06-03	0	The Definition Section has been moved to the end of the rulebook as a Glossary. All definitions have been added throughout the rulebook for ease of understanding the competition requirements.
11.4.3.	2024-06-03	0	Innovation will be assessed similarly to previous years, but teams this year can specify which area within civil and mechanical they are focusing on for innovation (e.g., reinforcement for civil and steering for mechanical), or teams may choose to innovate in all categories.
11.4.5.	2024-06-03	0	Sustainability scoring is worth more points. Addition of a Life Cycle Assessment requirement.
11.5.3.	2024-06-03	0	Introduction of the Bang For Your Buck bonus points.
6.4.1.3.	2024-06-03	0	Failure to deploy brakes within the Braking Zone will result in a score of 0 for Braking Performance, with failure to deploy brakes within the Safety Buffer Zone will meet criteria as a Crash.
6.4.1.4.	2024-06-03	0	Early Brake Activation Penalty (EBAP) will lead to a one (1) point deduction per occurrence as per Section 11.2.
6.4.1.5.	2024-06-03	0	The Braking Deployment Penalty (BDP) issues a penalty to a team's Toboggan if the back of the Toboggan passes into the Safety Buffer Zone. Points will be deducted depending on distance achieved by the toboggan as per Section 11.2.
5.5.3.	2024-06-03	0	A JHA and FLHA for toboggan and crate manipulation will also need to be submitted, where applicable.
5.4.1.	2024-06-03	0	Safety reports should include all required safety features of the Toboggan's design and should not include detailed technical justification for the design approach.

5.5.5.	2024-06-03	0	Appendices shall be for supporting and supplementary information and documentation only, with fundamental technical considerations included in the main body of the report.
5.5.2.	2024-06-03	0	Technical Report word count has been decreased from 10,000 to 8,000 words.
6.1.2.	2024-06-03	0	The Toboggan must be able to accommodate safely and comfortably five (5) Racers using a standard height and weight of a person (6'0", 200 lbs). If deviated from, teams are expected to justify in their Technical Report any decisions to adjust the standard height and weight prescribed above.
6.1.1.5.	2024-06-03	0	The Toboggan's final weigh-in weight score has been changed to a new sliding scale.
6.3.2.	2024-06-03	0	Crash scenario design speed parameter has been changed to 70km/h.
6.4.1.9.	2024-06-03	0	Braking system design speed parameter has been changed to 70km/h.
6.6.3.	2024-06-03	0	In Safety Report #2, teams must include their securement method, loading calculations, and material property considerations to withstand crash scenarios. The Toboggan egress point must be sufficiently rigid with no significant flexure observed when the toboggan is fully loaded. A list of prohibited materials has also been provided.
6.6.11.	2024-06-03	0	The egress enclosure must meet load requirements as mentioned in Section 6.6.3.
8.3.4.	2024-06-03	0	A maximum of three (3) Team members will be allowed to present and have speaking roles. An additional two (2) Team members may be allowed in the room to observe the presentation.
9.8.9.	2024-06-03	0	It is expected that Teams exiting the Racecourse from the previous run immediately report to the safety inspection and tow-up area, as directed by the Race Official or Safety Judge. Any modifications or repairs are to be conducted there.
Glossary	2024-06-03	0	Brake Deployment Failure has been removed in its entirety.
Glossary	2024-06-03	0	Frame has been removed in its entirety.
Glossary	2024-06-03	0	Participant has been added. "Participant: Any individual who will be present during the Competition and participating in its events. Includes competitors, judges, volunteers, and OC members."
Glossary	2024-06-03	0	Pusher has been added. "Pusher: Any Competitor that is pushing the Toboggan during a Run."
Glossary	2024-06-03	0	Racing Configuration has been added. "Racing Configuration: The set up of the toboggan as it will be used on Race Day, including all safety features as required on the Safety Report (and by the Safety Committee in the response to the Safety Report), and excluding any decorative components which are only used during Tech Ex."

Glossary	2024-06-03	0	Safety Buffer Zone has been added. "Safety Buffer Zone: The marked area beginning at the end of the braking zone and ending at a fixed distance of 35ft. " <i>See Glossary modification on 2024-07-01.</i>
Key Changes in the 2025 GNCTR Rulebook	2024-07-01	1	The text has been revised to clarify that this section along with Table 1 will be used as "Version Control" for the different Rulebook versions that will be released.
6.4.1.2.	2024-07-01	1	The Braking Zone now ends at a fixed distance of 20ft beyond the Finish Line. The Safety Buffer Zone now ends at a fixed distance of 30ft beyond the Braking Zone.
6.4.1.5.	2024-07-01	1	The Braking Zone End and the two (2) point deduction criteria have been updated. The three (3) point deduction criteria has been removed.
9.4.3.	2024-07-01	1	The Braking Zone and Safety Buffer Zone definitions have been updated.
11.2. Table 5 (9.8.4.)	2024-07-01	1	1- and 2-point deduction criteria have been updated. 3-point deduction has been removed.
11.7.3.3.	2024-07-01	1	The Braking Zone distance has been updated.
Glossary	2024-07-01	1	Braking Zone: The marked area beginning at the finish line of the Racecourse and ending at a fixed distance of 20ft.
Glossary	2024-07-01	1	Braking Deployment Penalties (BDP): Will follow if the Toboggan activates the braking system but does not come to a stop within the Braking Zone. Deductions according to Section 11.2. If the back of the toboggan passes the 20 ft Braking Zone End, one (1) point will be deducted per occurrence. If the back of the toboggan passes 35ft from the finish line (15 ft into Safety Buffer Zone), two (2) points will be deducted per occurrence.
Glossary	2024-07-01	1	Safety Buffer Zone: The marked area beginning at the end of the Braking Zone and ending at a fixed distance of 30ft.
Appendix C	2024-07-01	1	The Braking Zone and Safety Buffer Zone have been updated on the graphic.
Appendix D	2024-07-01	1	The Braking Zone Layout has been updated.
11.3.6.	2024-09-10	2	The article number was corrected for 11.3.6.
11.4.2.	2024-09-10	2	The article number was corrected for 11.4.2.
11.4.5.	2024-09-10	2	The crate has been added to the sustainability criteria.
11.7.3.	2024-09-10	2	Article 11.7.3.4. was modified and articles 11.7.3.5. and 11.7.3.6. were added to this section. To note that the braking performance formula has been updated to account for possible EBAP and BDP penalties.
12.9.	2024-09-10	2	The wording was modified for added clarity and the crate and concrete reinforcement were added to the sustainability criteria.
Appendix K	2024-09-10	2	The dates for Initial Registration were modified.

Appendix I	2024-09-16	3	The FLHA form was updated to replace duplicate information with three (3) additional potential hazard components to consider.
5.3.1.	2024-10-06	4	The Baseline Project Schedule and Budget must be submitted along with Safety Report 1 either before construction commences or according to the deadline prescribed in Table 2 from Section 5.1.
5.3.2.	2024-10-06	4	The Project Schedules must be created in Microsoft Project (.mpp) or Microsoft Excel (.xlsx) and must be submitted in GANTT Chart form.
6.6.5.1.	2024-10-06	4	This article was added to clarify that functional components such as brakes (which are essential for the operation of the Toboggan) may be permitted as sharp objects on the outside of the Toboggan as long as they are designed and positioned to avoid any contact with the Riders.
Appendix B	2024-10-06	4	In the detailed scoring rubric in Appendix B, the section on “Safety Report I, Report Deliverables” refers to the deliverables presented in section 5.4. of the rulebook (and not 6.4.). This section reference has been removed for formatting consistency in the rulebook.
5.4.3.2.	2024-11-03	5	Section reference for Superstructure crash calculations is now 6.4.1.8.
6.4.1.2.	2024-11-03	5	Safety Buffer Zone now ends at a fixed distance of 80ft.
6.4.1.4.	2024-11-03	5	Early Brake Activation Penalty (EBAP) is now Brake Activation Penalty (BAP).
6.4.1.5.	2024-11-03	5	Article 6.4.1.5. has been removed. The following article numbers have been adjusted accordingly.
6.6.3.	2024-11-03	5	Additional information has been included clarifying the tests that will be performed for enclosure integrity.
6.6.6.	2024-11-03	5	Minimum padding thickness has been increased to ½”.
9.4.3.	2024-11-03	5	Safety Buffer Zone now ends at a fixed distance of 80ft.
9.6.3.	2024-11-03	5	The requirement for the back of the toboggan to stop within the Braking Zone has been removed.
9.8.3.	2024-11-03	5	Early Brake Activation Penalty (EBAP) is now Brake Activation Penalty (BAP).
9.8.4.	2024-11-03	5	Article 9.8.4. has been removed. The following article numbers have been adjusted accordingly.
Table 5	2024-11-03	5	Updated section references and acronyms. Teams must present themselves at least 10 minutes prior to tow-up/inspection zone. Updated wording for penalty associated with 9.8.7 (previously 9.8.8.).
11.7.3.4.	2024-11-03	5	EBAP is now BAP. BDP has been removed.
11.7.3.6.	2024-11-03	5	EBAP is now BAP. BDP has been removed.
Glossary	2024-11-03	5	The definition for Brake Activation Penalty (BAP) has been added.
Glossary	2024-11-03	5	Braking Deployment Penalties (BDP) has been removed.
Glossary	2024-11-03	5	Early Brake Activation Penalty (EBAP) has been removed.

Glossary	2024-11-03	5	Safety Buffer Zone now ends at a fixed distance of 80ft.
Appendix C	2024-11-03	5	Hill Slope and Slalom Layout images have been updated.
Appendix D	2024-11-03	5	Text and image have been updated.
Appendix H	2024-11-03	5	Rulebook section references have been updated.
Table 4	2024-12-22	6	Scoring for Spirit has been updated.
Table 5	2024-12-22	6	Under 7.8, the text was updated regarding prohibited activities at the Tech Ex venue.
12.15.	2024-12-22	6	Best Superstructure Design Award has been added, the subsequent award numbers were updated.
12.25.	2024-12-22	6	The text was updated to reflect the updates to Table 4.
Appendix B	2024-12-22	6	The detailed scoring for the categories "Safety Inspection" and "Spirit" were updated.
Appendix C	2024-12-22	6	Updated Slalom Layout with revised crash zone details.
Appendix D	2024-12-22	6	Updated Braking Zone Layout with revised crash zone details.
Appendix J	2024-12-22	6	The second header in the LCA template was changed from "Mechanical" to "Civil."

1. General

Welcome to the 51st annual Great Northern Concrete Toboggan Race! GNCTR is the longest running and largest engineering Competition in Canada. Teams are required to build a 350 lbs Toboggan with a Concrete Sliding Surface and with fully functional Steering and Braking Systems. This Toboggan must be able to safely carry five (5) Racers and compete in Drag, Slalom, and Reine de la Montagne (the Montréal edition of the King of the Hill) races.

Outlined below are some high-level goals for Teams competing in the Competition. Please keep these in mind when planning and working with your Team:

- Designing a Toboggan that can safely complete the Competition tasks.
- Scheduling and managing a large engineering project.
- Developing practical, hands-on skills.
- Practice working in an industry environment.
- Encouraging creativity and outside-the-box thinking.
- Recruiting and networking with industry partners.
- Making new connections and creating a community with like-minded individuals.
- Having fun!

The following are high-level rules for the competition:

1.1. The rules contained in this document (the Rules) will govern GNCTR 2025, hosted in Montréal, Québec.

1.2. This document shall be read in conjunction with a number of additional documents to be posted on the GNCTR 2025 website <https://gnctr2025.ca>. Competing Teams are required to check the website regularly for updates on registration, accommodations, Rules, and the Competition in general.

1.3. The group responsible for the planning and execution of the Competition is titled the Organizing Committee (the OC). The names and roles of the individual members of the Organizing Committee can be found in the Registration Package and on the GNCTR 2025 website (<https://gnctr2025.ca/meet-the-oc>).

1.4. The OC reserves the right to add, remove, or modify the Competition Rules at any time for any reason.

1.5. Students who would like to participate in the Competition are required to assemble a Team. There are three (3) types of teams as follows:

1.5.1. Competing Team: Any Team registered for the Competition that is eligible to receive points and win the Competition.

1.5.2. Non-Competing Team: Any Team registered for the Competition that is not eligible to receive points or win the Competition. Non-Competing Teams are not required to submit a Toboggan to participate in the Competition. If they do, they will still be required to complete the Safety Reports and Inspections as outlined in Section 5.4. [Safety Reports](#) and Section 7. [Toboggan Inspections](#).

1.5.3. Alumni Team: A Non-Competing Team composed of members who have graduated from post-secondary institutions. The majority of the members on this Team should have participated in the Competition during their time as a student.

1.6. Each team will be required to designate one member as Captain, who shall be the primary point of communication between the members of their Team and the Organizing Committee. Only members of a competing team will be considered as Competitors. All others, including non-competing team members and general volunteers, are considered Participants.

1.7. If Teams have any questions pertaining to the information outlined within this document, a "Request for Information" (RFI) form should be filled out on <https://gnctr2025.ca>. In this form, questions should be clearly stated, and relevant Sections of the Rules should be referenced. The Organizing Committee will issue responses to all RFI's publicly on <https://gnctr2025.ca/technical-overview> such that all Teams have access to all rule clarifications.

1.8. Teams are expected to check <https://gnctr2025.ca/technical-overview> on a regular basis. This website will outline minor amendments and clarifications to the Rules. In the event that major amendments to this document need to be made, registered Teams will be notified and provided with a revised copy of this document.

1.9. The Organizing Committee and Judges will act as compliance officers throughout the Competition and may request proof of compliance to any rule at any time. A judge is an impartial, knowledgeable, industry and/or academic professional appointed by the

Organizing Committee responsible for reviewing various aspects of the Competition and assigning scores within their respective categories. Judges are divided into the following categories:

1.9.1. Civil Judge: Responsible for evaluating the quality of design and construction of the concrete elements of the Toboggans. Civil Judges will allocate points based on concrete mix design, concrete reinforcement design, performance of concrete during Race Day, ingenuity, sustainability, and construction quality.

1.9.2. Mechanical Judge: Responsible for evaluating the quality of design and construction of the mechanical elements of the Toboggans. Mechanical Judges will allocate points based on Braking System design, Steering System design, superstructure design, safety features, performance of these elements during Race Day, ingenuity, sustainability, and construction quality.

1.9.3. Safety Judge: Part of the Safety Committee, and responsible for reviewing and evaluating the safety features of Toboggans.

1.9.4. Spirit Judge: Former GNCTR Competitor responsible for promoting and encouraging Team and Competition Spirit as well as evaluating Team Spirit components.

1.10. The Safety Judges form the Safety Committee. The Safety Committee is responsible for reviewing Safety Reports and administering Safety Inspections. These individuals hold the right to refuse a Team from attempting a Run if they deem the Toboggan unsafe.

1.11. Teams found to be non-compliant with any requirements defined in this document may be subject to Deductions in the relevant scoring categories at the discretion of the Organizing Committee. This is to ensure that the Competition is fair for all Competitors.

1.12. The decisions of the Organizing Committee with respect to enforcing the Rules outlined herein are final, apart from cases outlined in Section [11.3 Petitions](#).

2. Communication & Logistics

This Section outlines the logistical requirements for Teams at the Competition.

2.1. Before the Competition

2.1.1. The Organizing Committee will provide all official communications prior to Competition through one of the following platforms. Teams are expected to monitor both:

- The official GNCTR 2025 website: <https://gnctr2025.ca>
- Email: The Organizing Committee will send emails to Team Captains and Spirit Captains based on the addresses provided at registration.

2.1.2. The Organizing Committee will provide additional material through the following communication platforms. It is recommended that Teams monitor these in addition to those defined in Section 2.1.1. Additional communication platforms in this category may be defined at a later date.

- Instagram: [@gnctr2025gcntb](https://www.instagram.com/gnctr2025gcntb)

2.1.3. All Teams are required to arrange for their Toboggans to be transported to the Competition. Any Team that chooses to use a trailer to transport their Toboggan to the Competition maintains responsibility for transporting it to Tech Ex and Race Day. It is strongly recommended that Teams work with the official GNCTR 2025 logistics partner to ship their Toboggan inside of crates. Teams cannot open their crates until Tech Ex. Logistic partner details and crate requirements to be confirmed at a later date. The Toboggan crate must follow the maximum measurements of 8' x 4' x 6' and < 1500lbs. Anything outside the maximum dimensions/weight is not acceptable and Teams found to be non-compliant will be accountable for additional costs for storage and transportation, as well as point deduction(s).

2.1.4. In the case that additional information is required, Teams are welcome to reach out to our Organizing Committee using the relevant point of contact, found in: <https://gnctr2025.ca/meet-the-oc>. For example:

- General information: info@gnctr2025.ca
- Technical information: technical@gnctr2025.ca

2.2. During the Competition

2.2.1. The Organizing Committee will provide a schedule of the events which shall take place during the Competition. These shall include:

- **The Opening Ceremonies:** A social event at the beginning of the Competition that includes a banquet and introduction of the Teams and the Organizing Committee.
- **Competitor Interaction Day:** A day for participants to explore the host city and connect with other Competitors by engaging in activities planned by the Organizing Committee.
- **Technical Exhibition (Tech Ex):** A tradeshow-style event in which Teams present their Toboggans to the Judges, fellow Competitors, and the public. The Technical Exhibition includes the initial Toboggan Safety Inspection and Weigh-In (Section 7.), Technical Presentations (Section 8.3.), and a Spirit presentation (Section 10.). See Section 8. for general details about the exhibition.
- **Race Day:** Consists of a series of solo and head-to-head racing events with the intent of evaluating Toboggan performance. See Section 9. for general details about Race Day.
- **Closing Ceremonies:** The final event of the Competition, which includes a banquet and an awards ceremony.

2.2.2. Competitors will be able to communicate with the OC using WhatsApp or our emergency phone line which will be provided at a later date.

2.2.3. All Teams are required to attend a Competition Orientation Session upon arrival prior to participating in any Competition events. The time and location of this session will be communicated to Team Captains in advance. This session will serve as the submission deadline for concrete test cylinders.

2.2.4. The Organizing Committee will host Captain's meetings each day of Competition. The intent of these meetings is to disseminate logistical information to Competitors regarding transportation, food, etc. and address any issues that have arisen. Captains will be notified of the time and location of these meetings in advance. Teams that fail to attend Captain's meetings could face a Deduction of one (1) point for each infraction at the discretion of the Organizing Committee.

2.2.5. Spirit Judges will host Spirit Captain's meetings each day. The intent of these meetings is to disseminate information regarding Spirit to Competitors (Spirit Challenges, Theme Nights, etc.). Spirit Captains will be notified of the time and location of these meetings in advance.

3. Code of Conduct

This Section outlines the expectations of Participants at GNCTR 2025.

3.1. A supplementary document, the Participant Code of Conduct, will be posted on the GNCTR 2025 website at least one month prior to the start of Competition. This document will govern the conduct of Participants during the Competition.

3.2. All Competitors, Alumni, Volunteers, Judges, Sponsors, OC, and all other Participants attending the Competition must conform to the Competitor Code of Conduct.

3.3. All Competitors, Alumni, Volunteers, Judges, Sponsors, OC, and all other Participants will be required to sign a document agreeing to the Competitor Code of Conduct at the Competition Orientation Session.

3.4. The Organizing Committee reserves the right to remove or disqualify any Participant from the Competition or any individual Competition event for violation of the Code of Conduct, or for any behaviour that is determined to be detrimental to other Participants or the Competition. Behaviors that may warrant such action include, but are not limited to:

- Social media posts showing inappropriate behaviour.
- Abuse and/or harassment of the OC, Judges, fellow Competitors, Safety Committee, Race Officials, Volunteers, sponsors, and/or venue employees.
- Illegal consumption of alcohol or cannabis as outlined by the government of Quebec during the Competition.
- Possession or consumption of illegal drugs at any time during the Competition.
- Violation of any specific rules defined by event venues.
- Violation of any Rules specified in this document.
- Causing damage to property.

A disqualification is the removal of a Team or Participants from all Competition events, including the forfeiture of any points accrued by the Team or Competitor in question at the time of infraction.

3.5. Any Participant or Team removed from the Competition will not be permitted to participate in any subsequent activities and may be removed from the hotel or other venues. Registration

fees will not be refunded and the cost of transportation back to their home city will be the responsibility of the Participant or Team.

3.6. Penalties for infractions may be issued by the Organizing Committee and the Spirit Judges to Teams for conduct that is against the Spirit of the Competition. Infractions will be investigated on a case-by-case basis and may result in Spirit points being deducted.

3.7. All Competitors, Alumni, Volunteers, Judges, Sponsors, OC, and all other Participants will be required to sign a waiver releasing the Organizing Committee from all responsibility for any and all losses and/or injuries, including death, resulting from participation in the Competition activities. A signed waiver will be required for participation in any and all Competition events and will be provided prior to the start of the Competition. Signed waivers for all Competitors must be included in the final registration of a Team. Final registration will not be accepted without signed waivers.

3.8. Bribery of any event officials, (including OC, spirit judges, safety judges, etc.) is not permitted, and may result in a point deduction or other disciplinary action.

4. Registration

The following Section pertains to the required attributes of a Team wishing to register to compete in GNCTR 2025.

4.1. Registration Package: A package produced by the Organizing Committee containing all pertinent information related to Team registration, transportation, and accommodations is called the Registration Package. All documents included in the Registration Package will be uploaded to <https://gnctr2025.ca> as soon as they become available.

4.2. Pre-Registration: On June 14th, 2024, a pre-registration form will be posted on the webpage noted in Section 4.1. This form will allow Teams to “pre-register,” to reserve their Theme and be added to the official GNCTR 2025 mailing list. Teams that complete this form will still be required to submit all documents outlined in the Registration Package to guarantee participation in GNCTR 2025.

4.2.1. Included in this form, Teams will be able to declare use of 2024 Competition parts and designs. To be eligible to do this, Teams must also submit their 2024 Technical Report, which will be used for comparison at the 2025 Competition to ensure that the reports are not plagiarized. See Section 5.5. for more information on the Technical Report.

4.2.2. Theme selection and pre-registration information must be received by June 28th, 2024, at 11:59:59 PM EST. If teams elect not to pre-register, the same declarations and registration requirements are included in the initial registration in Section 4.3.

4.3. Initial Registration: In order to secure a spot at the Competition, all Teams defined in Section 1.5. must complete the initial registration, which will open on September 15th, 2024, and close on October 4th, 2024, at 11:59:59pm EST. The complete registration process will be outlined in the Registration Package. The process will include filling out registration documents and paying an initial deposit (equal to a flat fee). The intent of this initial registration is to allow the Organizing Committee to plan events for the anticipated number of Teams and Competitors. The initial deposit is non-refundable and will guarantee a Team’s right to participate in GNCTR 2025.

4.2.1. Competitor fees for GNCTR 2025 will be determined at a later date.

4.2.2. Amount due at initial registration will be determined at a later date.

4.4. Teams that are unable to register by the deadline outlined above in Section 4.3 may be eligible to register later. Teams must contact the Organizing Committee's VP of Communications at info@gnctr2025.ca should they require an extension. Extensions will be handled on a case-by-case basis and are not guaranteed.

4.5. Final Registration: Final payments and registration will open on October 18th, 2024, due on December 1st, 2024, at 11:59:59pm EST.

4.6. All registration fees must be provided to the Organizing Committee via e-transfer to finance@gnctr2025.ca or cheque sent to the address included in the Registration Package. These fees and their associated deadlines will be outlined clearly in the Registration Package.

4.7. Due to limited venue capacities, Teams will be capped at a maximum of thirty (30) participants. Non-Competing (including Alumni Teams) may bring up to thirty (30) participants. However, Competing Teams will be prioritized for admissions to social events and activities. The Organizing Committee reserves the right to expand the capped limit at a later date upon the review of initial registration numbers.

4.8. Competing Teams must be composed solely of students who are, or have been, enrolled in full-time or part-time undergraduate studies at a post-secondary institution between September 2024 and April 2025. All members of the same Team should be from the same post-secondary institution, unless an exception is requested to, and approved by, the Organizing Committee.

4.8.1. Competing Teams are allowed to register with full-time graduate program students. Competing Teams will be capped at a maximum of two (2) full-time graduate program students. Non-Competing Teams will have no cap for the number of full-time graduate students on their Team.

4.8.2. Competitors from other disciplines/departments/faculties are allowed to register as part of a Competing Team, however at least 60% of students on a Competing Team must be enrolled in an applied science/engineering program.

4.9. All Competitors must be 18 years of age or older as of January 22nd, 2025.

4.10. Only one (1) Competing Team may be registered per post-secondary institution. Additional Teams may be registered as Non-Competing Teams.

4.11. Each Competing Team must provide the Organizing Committee with a Letter of Support from the administration at their institution in order to participate in the Competition. This does not apply to Non-Competing Teams that are not necessarily associated with an institution, such as Alumni Teams.

4.12. The Organizing Committee reserves the right to limit the number of Teams that are registered in the Competition. Notice of limited registration capacity will be communicated clearly via the methods outlined in Section [2](#).

5. Competition Deliverables

The following Section outlines the submission requirements for the deliverables to be submitted by all Teams participating in GNCTR 2025.

5.1. Deliverable Due Dates

5.1.1. Deliverable due dates are listed in [Table 2](#) and [Table 3](#). All deliverables are due at 11:59:59pm EST on the noted date. This list should be used as a project management tool and is not an exhaustive list of Competition requirements.

5.1.2 Competing Teams will be expected to complete all the deliverables outlined in [Table 2](#).

[Table 2: Deliverable Due Dates for Competing Teams](#)

Deliverable	Due Date
Job Hazard Analysis – Fabrication (digital)	Start of construction
Field Level Hazard Analysis (FLHA)	To be submitted on the 5 th of each following month (i.e Oct 5 th for September's FLHAs)
Safety Report 1 (at 50% of design)	October 11 th , 2024
Baseline Project Schedule and Budget	October 11 th , 2024, OR start of construction, whichever is earlier
Safety Report 1 Response	October 25 th , 2024
Safety Report 2 (at 80% of design)	November 22 nd , 2024
Job Hazard Analysis – Toboggan Racing (digital)	November 22 nd , 2024, OR prior to testing of toboggan, whichever is earlier

Safety Report 2 Response	December 6 th , 2024
Technical Report (digital)	January 3 rd , 2025
Technical Presentation (digital)	January 17 th , 2025

5.1.3. Non-Competing Teams (including Alumni Teams) will be expected to complete all of the deliverables outlined in Table 3 assuming that they will have a Toboggan participating in any of the Race Day activities outlined in Section 9. If they are not bringing a Toboggan to the competition, they will not be required to submit any deliverables.

Table 3: Deliverable Due Dates for Non-Competing Teams

Deliverable	Due Date
Safety Report 1	November 22 nd , 2024

5.1.4. In addition to the submission of the Safety Report, Non-Competing Teams must pass the Safety Inspection to participate in any runs on Race Day.

5.1.5. All deliverables listed in Table 2 and in Table 3 should be submitted electronically to technical@gnctr2025.ca and safety@gnctr2025.ca.

5.2. Required Formats for Competition Deliverables

5.2.1. Technical Reports can be submitted in English or French. Safety Reports must be submitted in English. Any Team that would prefer to submit in another language shall inform the VP Technical via email (technical@gnctr2025.ca) no later than September 27th, 2024, at 11:59:59pm EST.

5.2.2. The Safety Reports and Technical Report must be submitted electronically in PDF format by the dates specified in Section 5.1. to the VP Technical via email at technical@gnctr2025.ca.

5.2.3. Teams are not required to submit a physical hard copy of their Reports. However, it is strongly recommended that Teams print all deliverables and have them available for reference at the Competition.

5.2.4. Concrete test cylinders must be clearly marked with their Team name, cylinder number, and mix number (if applicable, see Section 5.7.) using permanent marker prior to submission.

5.2.5. All Technical Presentations files must be submitted as Microsoft PowerPoint files (.ppt or .pptx) by the date specified in Section 5.1.

5.3. Project Schedule and Budget

5.3.1. All competing teams are required to submit a Baseline Project Schedule and Budget, Baseline Project Budget, Progressed Project Schedule, and Actual Project Budget. The Baseline Project Schedule and Budget must be submitted along with Safety Report 1 either before construction commences or according to the deadline prescribed in Table 2 from Section 5.1. The Progressed Project Schedule and Actual Project Budget are to be submitted as part of the Technical Report.

5.3.2. The Project Schedules must be created in Microsoft Project or Microsoft Excel and must be submitted in GANTT Chart format and include all elements as described in the Schedule KPI Audit Rubric attached in Appendix E. The Project Schedule work breakdown structure must include the following for each task or milestone:

- Activity ID
- Activity Description
- Activity Duration
- Baseline Start and Finish
- Actual Start and Finish
- Start and Finish Variance

Submissions: The Baseline Project Schedule and Progressed Project Schedule must both be submitted in PDF (.pdf) and Microsoft Project (.mpp) or Microsoft Excel (.xlsx) format. The PDFs should be saved in 11"x17" page format for electronic submission. In total, four (4) files are expected to be submitted for schedule scoring.

5.3.3. The Baseline Project Budget and the Actual Project Budget must include all headers as shown below. Subtotal rows, projected sponsorship, Total Projected, and Actual Costs must also be shown. The Project Budgets must consider each aspect of the competition, and include a subtotal row for each of the following:

- Construction Materials (may be further broken down into multiple Sections. Must be noted if cost is covered by a Sponsor)
- Travel & Accommodations
- Registration & Competition Fees
- Spirit
- Safety
- Administration (if applicable)
- Contingencies

5.4. Safety Reports

5.4.1. Each Competing Team must submit Safety Reports outlining the compliance of the Toboggan design with the requirements outlined in Section 6.6. The purpose of the Safety Reports is not to provide detailed technical justification for the design approach. Instead, it is to demonstrate that the Team has included all required safety features in its Toboggan design and allow the Safety Committee to provide feedback while there is still time to address design concerns. The details of each Safety Report are listed in Section 5.4.2. and Section 5.4.3.

5.4.2. Safety Report 1

5.4.2.1. Safety Report 1 should include a general overview and conceptual design of the Toboggan's technical components. The purpose of this report is to see preliminary progress in the Team's design, not a final polished product. Designs may change between the submission of Safety Report 1 and 2, as long as all safety and performance requirements are met and outlined in Safety Report 2.

5.4.2.2. Deliverables of Safety Report 1 include:

- A brief description of safety components as outlined in Section 6.6.

- A brief design description along with a 3D CAD model of each of the Toboggan's main mechanical components (Superstructure, Braking and Steering Systems, and ski mounts).
- A brief overview of preliminary concrete mix design and reinforcement.

5.4.3. Safety Report 2

5.4.3.1. Safety Report 2 should include more details about the design of the Toboggan, such as adherence to safety requirements, design calculations, and detailed construction drawings.

5.4.3.2. Deliverables of Safety Report 2 will be split into three (3) sections: 1) Basic Safety Requirements, 2) Technical Requirements, and 3) Safety Design Mitigations, as outlined below:

Basic Safety Requirements required for disclosure are as follows:

- Racer configuration
- Minimum head clearance
- Toboggan enclosure (securement method, loading calculations, and material property)
- Racer floor area design
- Hand grip locations and design
- Estimated weight
- Tow cable design and location
- Brake center of gravity
- Steering limiter design
- Toboggan center of gravity
- Egress strategy
- Basic lifting plan for weigh-in
- Toboggan and crate manipulation strategy

Technical Requirements required for disclosure are as follows:

- Superstructure crash calculations as detailed in Section 6.3.2.
- Braking impact calculations as detailed in Section 6.4.1.8.
- Steering calculations as detailed in Section 6.4.2.4.
- Ski mount calculations as detailed in Section 6.4.3.2.

- Detailed construction drawings of all components. Drawings must be of sufficient quality that the safety committee can clearly evaluate the effectiveness of the design and identify potential risks. Drawings must be on 11"x17" sheet size.
- Sliding surface structural calculations as detailed in Section 6.2.5. These calculations should reflect reasonable assumptions regarding the properties of the Sliding Surface Mix.

Safety Design Mitigations: Common reasons for toboggan crashes or injuries have been identified from past competitions and are listed below. Teams should describe the measures they have taken to avoid these problems when racing.

- Toboggan over-steering causing contact with the side barrier or tipping.
- Lateral instability caused by a high center of gravity when the Toboggan is loaded.
- Tipping caused by Concrete Sliding Surface edge digging into snow.
- Ejection of Racers during the Run (including during braking), particularly front Racers.
- A Toboggan egress strategy for the scenario of a serious crash in which racers are unconscious or seriously injured. (See Section 6.6.11.).
- Show how Toboggan will mitigate an overturning moment caused by lateral instability (See Section 6.6.13.).

5.4.4. The Safety Reports will have a word limit of 2,500 words each, excluding appendices. Calculations and construction drawings must be presented in the appendices, while illustrations, graphs, figures, etc. may be included within the body of the report to aid in the flow of contextual presentation.

5.4.5. The Safety Committee will review all Safety Reports submitted by the prescribed deadline, and feedback will be provided to Teams no later than October 25th, 2024, at 11:59:59pm EST for Safety Report 1 and December 6th, 2024, at 11:59:59pm EST for Safety Report 2.

5.4.6. Competing Teams that submit the Safety Reports after the deadlines will receive a one (1) point deduction from their total score for each day the submission is late, for up to a maximum of ten (10) points. If point deductions exceed the category total due to lateness in submission, the deduction will be applied to the Team's overall score.

Regardless of any late submissions, Safety Reports are required to be submitted for a Team to be eligible to compete on Race Day.

5.4.7. The Safety Committee reserves the right to request a response to all or part of the feedback given with the Safety Report review. If response to feedback is required of a Team, responses must be submitted by a date set by the Safety Committee based on the level of requested changes and questions. The entire safety report shall be re-submitted with all changes and responses highlighted and clearly indicated.

5.4.8. Teams that are required to respond to feedback provided by the Safety Committee and fail to respond or justifiably request an extension to their feedback deadline will receive a half (0.5) point deduction from the total score for each day the response is late, for up to a maximum of five (5) points. Failure to respond to feedback may lead to expulsion from the competition if deemed necessary from the Safety Judges.

5.4.9. If a Team (Competing or Non-Competing) fails to submit a Safety Report or respond to Safety Report feedback prior to the Safety Inspection during the Technical Exhibition, the Team will not be permitted to race the Toboggan.

5.4.10. If a Team arrives at the Safety Inspection and has failed to implement changes prescribed by the Safety Committee during Safety Report feedback, the Team will receive a minimum one (1) point deduction or greater at the discretion of the Safety Judges based on the severity of the infraction. In addition to a point deduction, the Safety Judges may disqualify Teams from racing if upon re-inspection, the issue is not satisfactorily corrected as per Section 7.9.

5.5. Job Hazard Analysis and Field Level Hazard Analysis forms

5.5.1. Competing Teams are to submit two (2) Job Hazard Analysis (JHA) forms, one (1) for hazards related to manufacturing and one (1) for hazards relating to the testing and racing of Toboggans. The MS Excel version of the form can be found on our website or in Appendix I for a non-editable form.

5.5.2. Competing Teams are to submit all Field Level Hazard Analysis (FLHA) forms. These are to be completed daily, as a pre-task Toolbox Talk, and are compiled and submitted for the month, five (5) days after the last day of that month (on the 5th of the

following month). The MS Word version of the form can be found on our website or in Appendix I for a non-editable form.

5.5.3. Crate and Toboggan construction and manipulation at Tech Ex and Race Day are major aspects of the competition and need to be included for safety review. A JHA and FLHA for toboggan and crate manipulation will also need to be submitted, where applicable.

5.5.4. Late submissions of JHA and FLHA forms will result in 0.1-point deduction per day, up to a maximum of one (1) point.

5.6. Technical Report

5.6.1. Each Competing Team must submit a Technical Report outlining all aspects of the design and construction of its Toboggan. The specific content required for this report is outlined in Appendix A and the following sections.

The Technical Report must include, at a minimum, the following:

- All design concepts and justification for the Toboggan and its components including all assumptions.
- Proof of compliance with all Toboggan requirements outlined in Section 6. A checklist of these details can be found in Appendix A.
- Safety and risk analysis for both design and construction.
- Risk mitigation through design.
- Description of a substantial innovation in the design approach with specific attention paid to one part or subsystem within the Toboggan, with justification of the potential benefit for Toboggan performance.
- Sustainability considerations in the design and construction of the Toboggan. A Life Cycle Analysis (LCA) should be submitted to analyze the environmental impact of the major components and materials of the Toboggan “from cradle to grave”. A template can be found in Appendix J.
- Construction methods and justification.
- Quality control and assurance measures for construction.
- Any testing methodology and results, including concrete mix design.
- Project management considerations such as budget, schedule, critical path, milestones, and schedule variances.

- Technical calculations for the superstructure as laid out in Section 6.3.

5.6.2. The Technical Report must be clear and concise. The body of the Technical Report shall not exceed 8,000 words. There will be a one (1) point deduction from a Team's overall score for every 500 words in excess of the limit, rounded up to the nearest 500 words. No word limit is imposed on the appendices.

5.6.3. Technical Report point deductions may be applied for inclusion of false or exceptionally superfluous information as determined by the Judges.

5.6.4. All reports submitted to the GNCTR 2025 Competition must be original and produced solely by the registered members of the Competing Team. Reports may be subject to plagiarism and AI detection software.

5.6.5. Appendices shall be for supporting and supplementary information and documentation only, i.e. additional design calculations, drawings, construction photographs, and testing reports. Fundamental design considerations should be included in the main body of the report, along with figures and assembly drawings necessary to understand critical systems of the Toboggan operation.

5.6.6. Construction drawings for the Toboggan (that are not critical to understanding the systems of the Toboggan operation) must be included with the Technical Report as an appendix. All drawings must be submitted on 11"x17" sheets. Drawings should be neat, legible, and sufficiently detailed that a third party could construct the Toboggan without clarification from the design team. The drawing package will be available to Judges and the Organizing Committee and will not be distributed to any other parties.

5.6.7. Competing Teams that submit the Technical Report after the deadline will receive a one (1) point deduction on their Technical Report score per day that the report is late, for up to a maximum of ten (10) points. If point deductions exceed the category total due to lateness in submission, the deduction will be applied to the Team's overall score. Regardless of any late submissions, the Technical Report is required to be submitted for a Competing Team to be eligible to compete on Race Day.

5.7. Concrete Test Cylinders

5.7.1. All Competing Teams are required to provide sample concrete cylinders upon arrival at the Competition. These shall be submitted during the orientation session, with their Team name, cylinder number, and mix number clearly labelled in permanent marker.

5.7.2. Three (3) concrete test cylinders of their Sliding Surface Mix(s) are required to be submitted by each Competing Team. These will be used to verify quality control, the compressive strengths listed in the Technical Report, and the validity of Sliding Surface calculations.

5.7.3. Teams utilizing multiple concrete mix designs in the construction of their Toboggan must submit three (3) sample cylinders of each Sliding Surface Mix that could be used on Race Day.

5.7.4. Test cylinders of the final concrete mix design(s) shall be:

- 100 millimeters in diameter and 200 millimeters in height (100mm x 200mm).
- Made and cured according to the CSA A23.2-3C standard.
- Cast at the same time of the Sliding Surface casting.
- Be of the final concrete mix design(s) used.
- Unbroken.
- Have ends pre-ground ready for compressive testing.
- Cured in the same condition as the Sliding Surface components for a minimum period of 28 days. (Teams pouring Sliding Surface components late that are unable to achieve a 28-day cure period must note this in their Technical Report along with projected compressive strength at time of testing.)

5.7.5. The Organizing Committee, and/or designated representatives, will conduct compressive strength testing of the sample cylinders during the Competition in accordance with CSA A23.2-9C. If all three (3) submitted cylinders are found to have an individual compressive strength less than 85% or more than 115% of the compressive strength reported in the Technical Report, the Team will be given a two (2) point deduction to their overall total score. Teams will not receive the two-point deduction if any one (1) of their cylinders falls within the 85% to 115% range of the reported compressive strength.

5.7.6. Competing Teams that fail to submit concrete test cylinders on the first day of Competition will receive a half (0.5) point deduction from the total score for each day that cylinders have not been submitted, for up to a maximum of one (1) point. Teams that fail to submit their cylinders by January 23rd, 2025, at 11:59:59am EST (noon) will receive zero (0) points in the Concrete Mix Section in the Scoring Rubric.

5.7.7. If Teams choose to design for backwards compatibility with Sliding Surface(s) used in previous GNCTR events, they must provide full test results and calculations reflected of said Sliding Surface(s) as an appendix to the Technical Report. Sliding Surface(s) used in previous GNCTR events will result in a 50% score deduction, with a maximum of a four (4) point deduction for Event(s) where said Sliding Surface(s) are used in a Run.

5.8. Technical Exhibition Deliverables

Additional information on the Technical Exhibition deliverables is outlined in Section 8.

5.8.1. Booth Display

5.8.1.1. Each competing team must present a technical poster or some form of multimedia which showcases the major design components. This display will be presented at the respective Team's booth of the Technical Exhibition for the purpose of displaying their Toboggan, communicating the technical features of their Toboggan with the public, and often incorporating elements of their Theme.

5.8.1.2. Technical display formats could include but are not limited to: Posters, Slideshows, Videos, etc.

5.8.1.3. Teams are encouraged to treat the technical display as a "marketing" exercise for their Toboggan by showcasing major innovative or engineering accomplishments within their design.

5.8.1.4. Teams that use multimedia for their technical display must provide all necessary resources for setup at the technical exhibition (i.e. projectors, TV's, HDMI cables, etc.) and communicate power requirements at registration.

5.8.2. Technical Presentations

5.8.2.1. During the Technical Exhibition, competing Teams must give two (2) technical presentations to the judges to communicate technical aspects of the design and construction of the Team's Toboggan, including safety considerations. This is a formal presentation delivered to Judges.

Teams will be required to complete the following two (2) presentations:

- Concrete Mix & Reinforcement Presentation
- Superstructure, Steering, and Braking System Presentation

5.8.2.2. Each Competing Team must submit their MS PowerPoint presentation for their technical presentations ahead of the competition. For further details, see Section [8.3. Technical Presentations](#).

6. Toboggan Specifications

A concrete Toboggan is a gravity-propelled vehicle with concrete Sliding Surface(s) that conforms to the minimum requirements outlined in the following section. Toboggans are required to meet these requirements to compete in the Competition.

6.1. General Specifications

6.1.1. Toboggan Weight

6.1.1.1. The Toboggan shall weigh no more than 350 lbs. (159 kg) in its heaviest unloaded racing configuration (i.e. excluding the weight of any racers). This configuration must include all safety equipment specified in the Safety Report and identified by the Safety Judges during the review of the Safety Report. The heaviest racing configuration is defined as the racing configuration of the Toboggan with all required components that have the greatest weight. This is important for Teams with multiple racing configurations (such as multiple sets of Sliding Surfaces). Any theme components not included in the Racing Configuration during weigh-in cannot be added back during Race Day.

6.1.1.2. Additional material may be added to the Toboggan in excess of the 350 lbs. weight limit (up to a maximum of 10 lbs. additional weight), for necessary modifications identified during the pre-race Safety Inspection. These additional material requirements must not have been previously identified in the Safety Report review. This rule does not exempt Teams from the deductions outlined below in [Section 6.1.1.3.](#)

6.1.1.3. Toboggans weighing greater than 350 lbs. will be allowed to race but will be penalized one (1) point per lb. in excess of the limit (rounded up to the nearest half lb.) from their Toboggan Design score, for up to a maximum of fifty (50) points deducted (i.e. Maximum of fifty (50) point deduction allows for a maximum of 400 lbs. toboggan). Toboggans exceeding the maximum weight at initial weigh-in will be allowed to adjust their toboggan, without removing any safety features, to weigh within the acceptable limit. Toboggans must re-weigh at the end of the Technical Exhibition and be less than or equal to 400 lbs. Toboggans over 400 lbs. at re-weigh will not be permitted to race. Point

deductions will be applied after final weigh-in. No weigh-in will take place after the end of the Technical Exhibition or during Race Day.

6.1.1.4. Toboggans will be weighed using a digital scale with a resolution of 0.2 lbs.

6.1.1.5. The Toboggan's final weigh-in weight will be compared to the calculated weight submitted in the Technical Report. Teams will be scored based on the following sliding scale:

- 1 point for 90%-110% of estimated weight.
- 0.5 points for 75%-89% or 111-125% of estimated weight.
- 0 points for anything not meeting the ranges above.

6.1.2. The Toboggan must be able to accommodate safely and comfortably five (5) Racers using a standard height and weight of a person (6'0", 200 lbs.). Teams must be able to demonstrate this at the Technical Exhibition and during all pre-race Safety Inspections, if requested. Teams are expected to justify in their Technical Report any decisions to adjust the standard height and weight prescribed above.

6.1.3. The Toboggan must have an attachment point for a tow cable to pull the Toboggan to the top of the race hill. A 50 mm diameter (minimum) eyelet, U-bolt, or similar is typically sufficient for this. However, a connection point that can accept a variety of connections is recommended. Teams should demonstrate in their Technical Reports that this attachment point can withstand the forces generated from towing up the incline. Teams that do not provide an attachment point will not be transported to the top of the hill and will not be able to race.

6.1.4. All Toboggan and component designs submitted to previous Competitions are considered to be in the public domain and are valid to be replicated by Competing Teams, provided that proper technical justification is given, evidence of new construction is provided, and adherence to design rules is demonstrated in the technical documents.

6.1.5. The Teams should use commonly accepted engineering practices and formulas in developing design loadings and in calculation of member capacities.

6.1.6. All design calculations must be provided with clearly stated assumptions, such as load points, operating conditions, load distributions, etc.

6.1.7. Toboggans should be designed for use on the Racecourse depicted in Appendix C.

6.1.8. Toboggans shall be conceived, designed, and constructed solely by the Team's Competitors, without direct involvement from professional engineers, professors, or related professionals. Professional engineers, professors or related professionals must not make design decisions or drawings; however, they are permitted to offer high-level theoretical advice. Welders are exempt from this rule, as they are required as per Section 6.5.3.

6.2. Sliding Surface

A Toboggan Sliding Surface is any portion of the Toboggan that is in contact with the snow for the majority of the duration of the Run which conforms with the following section. Braking and Steering components will not be considered to be part of the Sliding Surface unless they are intended to be in constant contact with the snow.

6.2.1. The Toboggan's Sliding Surface must be composed entirely of concrete.

6.2.2. The Sliding Surface Mix is a concrete mix which was used in the fabrication of the Sliding Surface. There are no restrictions on the number of cementing materials required in the concrete mix.

6.2.3. Wax is the only permissible coating for the Sliding Surface. The material data sheet for the type used and method of application must be clearly indicated in the Technical Report.

6.2.4. The profile of the Toboggan's running surface must include geometric feature(s) intended to prevent the Toboggan from experiencing yaw rotation (fishtailing). The development of this profile must be clearly indicated in the Technical Report.

6.2.5. Teams are required to demonstrate in their Technical Report and Technical Presentation, through design calculations and material testing, that their concrete and reinforcement can safely withstand all loading scenarios that are likely to be experienced during a Run.

6.2.6. As stated in Section 5.7.7., Teams are permitted to use Sliding Surface(s) previously used in previous GNCTR events. Use of old Sliding Surface(s) will result in a

50% score deduction, with a maximum of four (4) points deducted, for Event(s) where said Sliding Surface(s) are used in a Run.

6.2.7. Teams should calculate the load capacity of any connections of the Superstructure to the concrete Sliding Surface and demonstrate that the load capacity exceeds likely demand during all foreseeable race conditions. This should be included in the Technical Report as part of the concrete team's Section(s).

6.3. Superstructure

A Toboggan Superstructure is considered to be the portion of the Toboggan that is not in contact with snow for the majority of the duration of a Run and is designed to protect Racers should the Toboggan experience a Crash.

6.3.1. The Toboggan must have a superstructure that can act as a roll cage to withstand any foreseeable crash impact and protect all Racers.

6.3.2. Three (3) crash scenarios must be analyzed, calculated, and presented in the Technical Report. These scenarios include front and rear impact, roll-over impact, and side impact into side barriers. The minimum design parameters used to calculate loads on the superstructure in each scenario are as follows:

1. Front and Rear Impact

Weight: 1350 lbs. (5 racers + toboggan weight)

Toboggan Speed: 70 km/hr

Impact Duration: 0.5 seconds

2. Roll-over Impact

Weight: 1350 lbs.

Toboggan Speed: 45 km/hr

Impact Duration: 0.5 seconds

3. Side Impact into the crash/side barriers

Weight: 1350 lbs.

Toboggan Speed: 30 km/hr

Impact Duration: 0.5 seconds

6.4. Mechanical Systems

6.4.1. Braking System

A Toboggan Braking System is the mechanical system designed to stop the Toboggan at the end of the Run.

6.4.1.1. The Toboggan must be equipped with a mechanical system (or braking system) capable of safely bringing the Toboggan to a stop within the Braking Zone at the conclusion of each Run. Forces due to braking should be justified in the report.

6.4.1.2. The Braking Zone is the marked area beginning at the finish line of the Racecourse and ending at a fixed distance of 20ft. The Safety Buffer Zone is the marked area beginning at the end of the braking zone and ending at a fixed distance of 80ft.

6.4.1.3. Failure to deploy brakes within the Braking Zone will result in a score of zero (0) for Braking Performance equivalent to a DNF. Teams must follow re-inspection procedures prior to attempting another Run, as outlined in Section **9.7.4**. Failure to deploy brakes within the Safety Buffer Zone will meet the criteria for a Crash. See Appendix D for clarification.

6.4.1.4. Brake Activation Penalty (BAP) will lead to a one (1) point deduction per occurrence as per Section **11.2**.

6.4.1.5. The portion of the Braking System acting on the snow and generating the Toboggan's stopping force must be placed behind the Toboggan's center of gravity when deployed. However, portions of the Braking System may be mounted or otherwise located forward of the Toboggan's center of gravity prior to deployment.

6.4.1.6. The Braking System must have a foolproof method of deployment. Teams are encouraged to add redundancy in their deployment methods to avoid a crash scenario. Deployment of brakes must be completed by an individual who has a clear line of sight out of the front or sides of the Toboggan.

6.4.1.7. The brake release mechanism must not transmit any force to the brake operator during or after the deployment of the Braking System.

6.4.1.8. Teams are required to analyze, calculate, and present their Braking System in the Technical Report. The minimum design parameters used to calculate loads on the brakes in a stopping scenario are as follows:

- Weight: 1350 lbs. (5 racers + toboggan weight)
- Toboggan Speed: 70 km/hr
- Stopping time: 0.5 seconds

6.4.2. Steering System

A Toboggan Steering System is the mechanical system designed to change the direction of a Toboggan during a Run.

6.4.2.1. The Toboggan must have a Steering System. The use of Racer bodyweight as the sole steering mechanism is not permitted.

6.4.2.2. Steering Systems must be designed with a limiter to prevent oversteering during a Run. The limit on the angle of turn is up to the discretion of the Team but must be justified in the Technical Report.

6.4.2.3. Additional provisions for Toboggan stability (if any) during a turn should be provided in the Technical Report.

6.4.2.4. The Steering System must be able to safely withstand all dynamic race loads, turning forces, and racer input torque during the operation of the Toboggan. Detailed calculations must be provided.

6.4.3. Ski Mount System

6.4.3.1. The Toboggan must have a mounting system to act as an interface between the skis (Sliding Surface) and the Superstructure of the Toboggan.

6.4.3.2. The Ski Mount System must be able to safely hold the weight of the Toboggan and its passengers (five (5) racers) under dynamic race conditions. Detailed calculations must be provided.

6.4.4. Other Mechanical Systems

6.4.4.1. Justification for the use of all additional mechanical systems must be provided in the Technical Report.

6.4.4.2. Suspension geometry, spring rate, and damping must be justified with supporting calculations.

6.5. Construction

6.5.1. All Competing Teams must construct an entirely new Toboggan, containing no part or component which has been used in construction of a previously submitted Concrete Toboggan. Teams that incorporate components of a past competition's toboggan, without seeking Organizing Committee's approval, will automatically receive an innovation score of zero (0). The Team's overall design score for the reused components will also automatically be scored a zero (0). If a Team receives approval from the Organizing Committee to reuse past Toboggan components, then only that design component's innovation will be deducted (1 point for each component). The overall design score for said component will still be zero'd (0). The following are the only exceptions:

6.5.1.1. The repurposing of salvaged raw materials such as individual lengths of roll superstructure tube is permitted. Teams are greatly encouraged to seek approval from the Organizing Committee prior to proceeding with such a modification. The Safety Committee may request Non-Destructive Testing (NDT) on any salvaged raw materials prior to approving their use.

6.5.1.2. Teams that choose to design for backwards compatibility with Sliding Surface(s) used in previous GNCTR events, must provide full test results and calculations of said Sliding Surface(s) as an appendix to the Technical Report. Please see Section 5.7.7. for more details.

6.5.2. If the Toboggan used by an Alumni Team has competed in a past GNCTR, the Toboggan will still be held to the standards set out by the GNCTR rules of the year in which it originally competed. This is subject to review by the Organizing Committee on a case-by-case basis. If the Toboggan is a new build, it will also be held to the standards

set out by the rules of GNCTR 2025. It is the Team's responsibility to reach out to the Organizing Committee if members have concerns regarding the Safety Inspection.

6.5.3. All Toboggans must be constructed exclusively by Team members with photographic documentation of the construction process provided in the Technical Report. The contracting of specialized work, such as welding or CNC machining, is permitted under the following circumstances: if some specific licensure is required to perform the work; if it is deemed to be too severe of a safety risk for a Team member to complete the work; or if the work requires specialized equipment.

6.5.4. Teams must be able to demonstrate the integrity of all connections, fasteners, and welds. Applicable testing (i.e. Non-Destructive Test, etc.) must be completed to provide verification. This must be included in the Technical Report.

6.5.5. All welds may be subject to inspection except for those performed by a licensed professional for whom a license number has been provided in the Technical Report.

6.6. Safety Features

6.6.1. The rules listed in this Section are additional safety requirements to those mentioned in the previous Sections.

6.6.2. There must be clear space for roll protection between the head of each Racer to the inside of the superstructure. This distance must be a minimum of two (2) inches and a maximum of six (6) inches. Teams may be asked to demonstrate this clearance during safety inspections.

6.6.3. All sides of the Toboggan must be enclosed to ensure no part of any Racer can be ejected from the Toboggan during a Crash. The Toboggan will be considered to be enclosed if well-secured paneling is fixed to the Toboggan, and it is deemed to be sufficient to contain the Racers in the event of a Crash. Teams must include their securement method in the Technical Report and enclosures must meet load requirements to verify it is of suitable strength. Teams **MUST** include their securement method, loading calculations, and material property considerations along with Safety Report 2. Bungee cords, rope, Velcro straps, or other similar attachment methods will be strictly prohibited. Teams must provide information as to why their enclosure is proven to withstand crash scenarios. The Toboggan egress point as required by Section **6.6.11**.

must be sufficiently rigid with no significant flexure observed when the toboggan is fully loaded.

At their discretion, the Safety Judges will perform a pull test on each team's enclosure and attachment method during Tech Ex safety inspections. This pull test will involve a softball-sized ball (approximately 3.5"-3.8" in diameter) with an eyelet drilled through it, which will be connected to a rope and luggage scale. Safety Judges will pull this setup from inside the enclosure to apply a force of 200 lbs. The location of this test on the toboggan enclosure will be determined by the Safety Judges during the safety inspection. Enclosures that do not pass this 200 lbs pull test during inspection will require modifications before the team is permitted to race.

6.6.4. The Racers' seating area shall be free from bolts, superstructure members, or other protruding objects. All pinch points inside the toboggan shall be adequately covered.

6.6.5. No sharp objects are permitted inside or outside of the Toboggan.

6.6.5.1. Functional components which are critical for the safe operation of the Toboggan, such as the Braking System, are not necessarily considered to be in violation to this rule even if they may be sharp by design. The intent of this rule is to ensure that no sharp objects pose a safety risk to the Riders. As such, for example, sharp brakes should be directed toward the snow with no chance of impacting the Riders, thus ensuring that they function solely to stop the Toboggan and that they do not create any additional hazards.

6.6.6. All Superstructure components that present risk to Racers on impact shall be padded with foam (1/2-inch minimum thickness). This includes any members inside the Toboggan, such as a Steering column or Superstructure members.

6.6.7. Soft hand grips must be provided for all Racers such that they can hold onto the Toboggan with both hands.

6.6.8. Individual Racer seats may be utilized. Seats must be securely fastened to the Toboggan. Seats and mounting systems must be designed to accommodate forces exerted during a collision. All seats must have, at a minimum, four-point restraints to keep Racers in place during the Run. Lap belts are not permitted.

6.6.9. All racers must be able to exit the Toboggan independently without assistance from someone outside of the Toboggan. No tools may be carried within the toboggan enclosure for Riders to use to exit the Toboggan.

6.6.10. All racers must be able to enter and exit the Toboggan without removing their racing helmets.

6.6.11. Teams must provide a Toboggan egress strategy for the scenario of a serious crash in which racers are unconscious. Unconscious racers must be able to be easily removed from the Toboggan by a medical team without any significant movement of a racer's spine. This is most commonly accomplished by designing the rear face of the Toboggan to be easily removable, but Teams may be innovative in meeting this requirement. Teams are required to show their compliance with this rule in the Safety Report. The egress enclosure must meet load requirements as mentioned in Section 6.6.3.

6.6.12. Smoke grenades, fireworks, or any other similar explosive or incendiary devices are not to be attached to a Toboggan or deployed in any way during the Competition.

6.6.13. Teams must provide preliminary calculations in the Safety Report and final calculations in the Technical Report showing how their design mitigates an overturning moment, based on the location of the center of gravity. Teams are required to define the worst-case scenario which they have designed for. The following diagram is a general reference for defining the overturning moment of a Toboggan. The point of rotation will vary with the Toboggan design; however, it is generally defined as the furthest point from the centre line of the Toboggan that is in contact with the snow. Teams may include additional forces and conditions beyond those shown below.

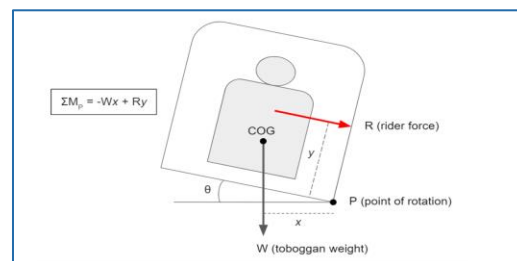


Figure 1: Overturning Moment Diagram

6.6.14. Teams are recommended to lift their Toboggan with a minimum of six (6) Team members at all times throughout the Competition.

7. Toboggan Inspections

A Safety Inspection is an inspection of a Toboggan to be completed by the Safety Committee to ensure each Team's compliance with the Competition Rules, Safety Report and design drawings. The following Section outlines the Rules surrounding the Toboggan Safety Inspections which will allow Teams to participate in Race Day activities.

7.1. All Toboggans will be subject to a Safety Inspection by the Safety Committee. The official Toboggan Weigh-In will occur following a successful Safety Inspection. A Toboggan Weigh-In is an official measurement and recording of the Toboggan's unloaded weight (without aesthetic features or racers), executed during the Technical Exhibition.

7.2. The Safety Inspection will be completed during the Technical Exhibition. The order of Safety Inspections will be announced prior to the Technical Exhibition Day and the Organizing Committee will endeavor to ensure Safety Inspections do not conflict with the Technical Presentations.

7.3. Teams must have at least one (1) Team member but not more than five (5) Team members present at the Safety Inspection to answer questions. All other Team members required to help carry the Toboggan must immediately leave the area until called back to remove the Toboggan. Teams will receive a one (1) point deduction to their safety score at the discretion of the Safety Judges if they fail to adhere to this limit.

7.4. During the Safety Inspection, Toboggans must be in race-ready condition, with Skis and any other detachable components mounted as they will be during a Race. If there are multiple configurations, all variations must be presented, and the heaviest configuration will be used for the official weigh-in. Deductions will be applied at the discretion of the Safety Judges if Toboggans arrive at their Safety Inspection without all components mounted and in race-ready condition.

7.5. Each Toboggan may be subject to a static tilt test of 50 degrees during the safety inspection to determine if the Toboggan can mitigate an overturning moment. Details on the testing criteria can be found in Appendix G. Deductions will be applied if toboggans show up to their safety inspection without all components mounted and in race-ready condition. Toboggans will be scored based on the following: 50deg = 100% of points; 30deg = 0% of points; less than 30deg = ineligible to race.

7.6. Teams that fail to attend their scheduled Safety Inspection will be deducted two (2) points from the Team's overall score and must be available to participate in a safety inspection at any point during the remainder of the Tech Ex.

7.7. Teams that do not pass their Safety Inspections or are found to exceed the Toboggan weight limit will be permitted to make modifications to the Toboggan and have it re-inspected and/or re-weighted following the scheduled Safety Inspections on a first-come, first-served basis.

7.8. Hot work (grinding, welding, brazing, waxing, etc.) will not be permitted inside the Technical Exhibition venue. Teams found in violation with this rule will receive a minimum of one (1) point deduction from their safety score, as determined by the severity of their actions and at the discretion of the Safety Judges, and will be liable for any damages to the venue. An alternative location may be available for hot work; however, anything required to complete the work (e.g. transportation, lifting, equipment/tools, etc.) will be solely the Team's responsibility.

7.9. Any Toboggan that does not pass the Safety Inspection and fails to make revisions as per the requirements of the Safety Judges, or fails to pass subsequent Re-Inspection, will be prohibited from racing.

7.10. Toboggans must be re-inspected and weighed following any modifications that are made after the initial Safety Inspection. Such modifications include but are not limited to changes to Steering and Braking Systems, replacement of Sliding Surfaces, changes to the Racer safety features, or the addition or removal of any components.

7.11. Following the Safety Inspection and Weigh-In, Teams will be provided with a custom sticker to be placed on their Toboggan indicating that they have completed all requirements. At this point, no further modifications to the Toboggan will be permitted without the knowledge and permission of the Judges and Safety Committee.

7.12. Toboggans must be re-inspected after any Crash or other potentially damaging event that occurs during Race Day prior to being permitted to race again.

7.13. Any Team caught racing or attempting to race without having their Toboggan re-inspected following modifications or a Crash will be penalized at the discretion of the Organizing

Committee, up to and including removal from all remaining Runs and forfeiture of all points earned during Race Day.

7.14. Toboggans can be inspected at any time before any Run at the discretion of the Organizing Committee or Safety Committee. However, Teams who are missing components or are making modifications may be disqualified at the discretion of the Organizing Committee or Safety Committee to maintain the Race Day schedule.

8. Technical Exhibition

The Technical Exhibition (Tech Ex) is the part of competition where teams get an opportunity to display their Toboggan to the other teams, sponsors, and the general public. It is a chance to practice their presentation and marketing skills and demonstrate their engineering design prowess. The following Section outlines the Rules that govern the Technical Exhibition Day as well as the specifications of the Technical Exhibition and the general guidelines for Technical Presentations. Additional rules defined by the venue must also be followed.

8.1. General

8.1.1. All Competing Teams must be present at the Technical Exhibition and adhere to the requirements of this Section.

8.1.2. Teams are permitted to perform modifications on their Toboggan or Technical Display on the premises of the Technical Exhibition, barring activities mentioned in Section 7.8. or any activities that could damage the facility. Teams must conduct work safely and will be held liable for any damages to the venue. It is the responsibility of the Team to provide anything required to complete said work.

8.1.3. All Team members are required to be knowledgeable about the general design and construction of the Toboggan.

8.1.4. Teams must ensure that all materials brought into the Technical Exhibition area are removed and their space is left clean at the end of the day. Teams found leaving the Technical Exhibition prior to ensuring their space is thoroughly cleaned of any debris will be subject to point deductions at the discretion of the Organizing Committee.

8.1.5. Participants are not permitted to be under the influence of illicit substances including drugs or alcohol during Tech Ex.

8.2. Technical Display

8.2.1. Each Competing Team must present a Technical Display showcasing their Toboggan, design approach, and manufacturing processes. The display may include any form of media, including posters and video displays, and should showcase the main features of the Toboggan in a format accessible to a non-technical audience.

8.2.2. The Toboggan and any components to be used during the Run must be present at the Technical Display.

8.2.3. A panel of Technical Exhibition Judges will conduct walkthroughs of each Competing Team's Technical Display. Teams shall be present and prepared to conduct an informal five (5) minute presentation of their display and toboggan. A five (5) minute question period will follow the presentation.

8.2.4. Design and aesthetics of the Technical Display should incorporate the Theme. Spirit Judges will judge the Technical Display for relevance to a Team's chosen Theme.

8.2.5. Each Team must have a minimum of three (3) Team members present at its Technical Display for the duration of the scheduled Technical Exhibition.

8.2.6. Each Team will be allotted a 10-foot by 20-foot (10'x20') space within the Technical Exhibition which must entirely contain all components of the Toboggan and the Technical Display.

8.2.7. Each Team is required to provide flooring protection for their Technical Display. Teams without floor protection will not be permitted to set up their Technical Displays and will consequently score a zero (0) for their technical display. A rug or similar material is typically sufficient floor protection.

8.2.8. Technical Displays should be limited to 10' in height. Teams that have Technical Displays taller than 10' or those containing an accessible suspended floor must contact the GNCTR 2025 Organizing Committee for approval by November 15th, 2024, at 11:59:59pm EST. Technical Displays shall comply with applicable local building codes regarding the construction of temporary structures.

8.2.9. Technical Displays should be completely set up (i.e. no further manipulation required by Team members) when the Technical Exhibition is opened to the public. A schedule for the day will be provided in advance.

8.2.10. Electricity access will be coordinated with the venue. Teams requiring this access must inform the Organizing Committee as outlined in the Registration Package.

8.2.11. No food or drink samples may be given out at a Technical Display.

8.3. Technical Presentations

8.3.1. Each Team will conduct two (2) formal presentations on the design features of their Toboggan. One presentation will focus on Concrete Mix, Concrete Reinforcement, and Ski Geometric Profile, while the other will focus on the Toboggan's Superstructure, Steering System, and Braking System components, as outlined in Section 5.8.

8.3.2. Presentations will be scheduled during the Technical Exhibition. Teams will be provided with the schedule prior to the Technical Exhibition. They shall take place in rooms separate from the Exhibition Hall, which allows for a private presentation between the presenting Team members and the respective Judges.

8.3.3. Presentations will be strictly limited to five (5) minutes of presentation followed by five (5) minutes for questions from the Judges. Presentations exceeding these time limits will be cut short which may impact the perceived quality of the presentation.

8.3.4. A maximum of three (3) Team members will be allowed to present and have speaking roles. An additional two (2) Team members may be allowed in the room with the sole purpose of watching the presentation as a means of transferring knowledge of the presentation process to new Team members.

8.3.5. A projector and laptop will be provided in each presentation room for the use of the presenters. All presentations must be saved as a .ppx or .pptx file and emailed to technical@gnctr2025.ca no later than January 17th 2025 at 11:59:59pm EST.

8.3.6. Teams that fail to attend their scheduled presentation times will score zero (0) on their Technical Presentations.

8.3.7. Presentations will be judged on the technical content, presentation quality, and communication skills of the presenter.

9. Race Day

The following Section outlines Competitor requirements at Race Day events.

9.1. General

9.1.1. Race Day will consist of three (3) Events as defined in Section 9.2. The races will be conducted in the following order: Drag Race; Giant Slalom; Reine de la Montagne.

9.1.2. The Organizing Committee reserves the right to remove, add, or modify race specific rules prior to or during Race Day due to weather and track conditions, time constraints, or other unforeseen circumstances.

9.1.3. All competitors are expected to follow venue rules and guidelines, in addition to the rules defined in this Section.

9.2. Race Day Events

9.2.1. Drag Race

9.2.1.1. The Racecourse will be oriented in a straight line.

9.2.1.2. The objective of this Run is to complete the course in the shortest time possible, and to stop the Toboggan by engaging the Brakes within the Braking Zone in the shortest distance possible.

9.2.1.3. Each Team will be permitted one (1) attempt to complete the Drag Racecourse. Teams that have not passed all required Safety Inspections will not be permitted to race, as per Section 7.9.

9.2.2. Giant Slalom

9.2.2.1. The Slalom Racecourse will be set up with three (3) sets of gates, staggered laterally across the width of the course. The geometry of the Slalom course will be confirmed at a later date.

9.2.2.2. The objective of this Run is to complete the course while passing through each set of gates without making contact with the gate markers, and to stop the Toboggan by engaging the Brakes within the Braking Zone in the shortest distance possible.

9.2.2.3. Each Team will be permitted one (1) attempt to complete the Giant Slalom Racecourse. Teams that have not passed all required Safety Inspections will not be permitted to race, as per Section 7.9.

9.2.3. Reine de la Montagne Tournament

9.2.3.1. Any Team that successfully completes at least one (1) of the Drag Race or Giant Slalom Race (i.e. did not Crash or receive a DNF), and has passed all necessary safety inspections, will be entered into the Reine de la Montagne tournament. Crashes in the Reine de la Montagne tournament will result in DNF and/or score deduction.

9.2.3.2. Teams will be paired for the tournament based on ranking of their fastest Run time in either the Drag Race or Giant Slalom race. The tournament bracket will be posted at the Race Day venue prior to the tournament start.

9.2.3.3. In each round, two (2) Teams will race down the hill simultaneously in separate lanes. The Team that crosses the finish line first and successfully deploys their brakes in either the Braking Zone or Safety Buffer Zone will advance to the next round. The other Team will be 'eliminated' and removed from the bracket.

9.2.3.4. Teams that receive a DNF will not continue in the tournament. It is possible that both Teams in a race receive a DNF, in which case neither Team will continue.

9.2.3.5. Teams that fail to pass necessary Safety Inspections between Runs will no longer be allowed to race.

9.2.3.6. The tournament bracket style will be released at a later date. The bracket will be chosen by the Organizing Committee based on the number of teams that qualify for the tournament. The bracket may be modified at any point, for any reason, at the discretion of the Organizing Committee and Race Officials.

9.2.3.7. In the event of an odd number of Teams qualifying for the tournament, at the discretion of the Race Officials, the Team with the Fastest Run Time (see Section 11.7.1. [Fastest Run](#)) may be granted a 'bye' to the next round of the tournament. Additionally, the Team with the longest run time may be eliminated from the tournament. Teams eliminated from the tournament as a result of this rule will be scored as a team who lost their first race in the tournament.

9.2.3.8. Non-Competing Teams may have the opportunity to compete in a separate Reine de la Montagne competition following the same rules, if time permits.

9.3. Competitor Safety

9.3.1. The Race Day events will be managed by Race Officials. Race Officials are volunteers or Organizing Committee members contributing to Race Day operations. Their responsibilities include organizing Teams at the Staging Area, preparing the Racecourse between Runs, measuring stopping distances, recording Run statistics, noting Deductions or Disqualifications, and other tasks as required.

9.3.2. Participants are not permitted to be under the influence of drugs or alcohol on Race Day. Teams caught with a Competitor under the influence of drugs or alcohol will immediately be prohibited from racing and will lose all points for Race Day activities accrued up to the time of the infraction.

9.3.3. Racers must wear helmets compliant with the Protective Helmets Regulation (<https://www.legisquebec.gouv.qc.ca/en/document/cr/C-24.2.%20r.%206>) during all Runs. Helmets may not be removed until the Racer has safely left the Racecourse. Helmets will be inspected for compliance during Tech Ex. A helmet shall conform to the requirements of the:

9.3.3.1. Canadian Standards Association, Standard D-230, Safety Helmets for Motorcycle Racers, as amended, and the helmet shall bear the monogram of the Canadian Standards Association Testing Laboratories; or

9.3.3.2. United States Federal Motor Vehicle Safety Standard 218, as amended, and the helmet shall bear the DOT symbol as used by the United States Department of Transportation; or

9.3.3.3. United Nations Economic Commission for Europe, ECE Regulation 22 incorporating the 05 series of amendments, as amended, and the helmet shall bear the approval mark as required by the regulations.

9.3.4. Racers must wear boil-and-bite style mouth guards during all Runs. The mouth guards must be boiled and fitted to the mouth of each individual Racer prior to Race Day. Teams must have 6 bite guards.

9.3.5. Teams are highly encouraged to have their Racers wear motocross-style neck braces during all Runs. These braces are not mandatory but recommended.

9.3.6. Racers must remain seated, have themselves and all their limbs inside the Toboggan during the entire Run; and may not exit the Toboggan until it has come to a complete stop. In the event that a Racer leaves the Toboggan during the Run or before the Toboggan has come to a complete stop, the Run will be considered a DNF (see Section 9.7.).

9.3.7. The boundaries of the Racecourse will be clearly marked. Spectators (anyone not riding a Toboggan) are not allowed on the Racecourse at any time. Violation of the Rule by any Competitor may result in that Team's forfeiture of Race Day points at the discretion of the OC.

9.3.8. All Racers must be dressed in an appropriate manner for a Run. The starting official may direct participants to change their attire prior to a Run.

9.3.9. Any competitor who may be or is pregnant will not be permitted to race.

9.3.10. Race Day will take place on an active ski/tubing hill. Any Competitor who does not stay within the competition's boundaries or is disruptive to the venue, may result in that Team's forfeiture of Race Day points at the discretion of the OC and the potential removal of the Competitor from the Competition.

9.4. Race Hill Geometry

9.4.1. Races will take place on a ski/tubing hill. Specific hill geometry has been provided in Appendix C.

9.4.2. A starting line will be drawn at the top of the hill. The area behind this line will be considered the Staging Area where Toboggans prepare for and begin a Run.

9.4.3. Three (3) lines will be painted at the bottom of the race hill. The first line (i.e. the line closer to the top of the hill) is referred to as the Finish Line. The area past the Finish Line, before the second line represents the Braking Zone (20ft). The area past the Braking Zone, between the second and third line is the Safety Buffer Zone (80ft).

9.4.4. The racing lane adjacent to the viewing area is only to be occupied by the Organizing Committee, Volunteers, and medical staff. This lane will be clearly marked off with a physical barrier. Any competitor entering this lane without the express consent of a member of the Organizing Committee will cause their team to receive a score of zero (0) in the Race Day category.

9.5. Race Starts

9.5.1. A Run is considered as a single official attempt by a Team to ride its Toboggan down the Racecourse. A Run begins when any part of the Toboggan crosses the starting line and ends when the Toboggan has come to a complete stop at the bottom of the hill or has been deemed unable to finish the Run.

9.5.2. Any Competitor that is riding in a Toboggan during a Run is titled a Racer.

9.5.3. Any Competitor that is pushing the Toboggan to begin a Run is considered a Pusher. A Team can have two (2) members act as Pushers for their Toboggan at the start of the Run. Only these people may push the Toboggan.

9.5.4. A Team's Racers, Pushers, and Toboggan must be present in the Staging Area at least five (5) minutes prior to the start of their Run. Failure to do so may result in the Team forfeiting their Run.

9.5.5. Teams who do not have enough Team members to push their Toboggan should contact Race Officials prior to Race Day. Pushers will be assigned to such Teams by Race Officials.

9.5.6. Teams must not start their Run until directed to do so by a Race Official.

9.5.7. Toboggans are to be placed such that the leading edge of the Toboggan is located behind the starting line.

9.5.8. Those pushing the Toboggan must push against the Toboggan and not against the Racers.

9.5.9. Pushers shall commence their efforts while in contact with the Superstructure. Running starts will not be permitted.

9.5.10. Pushing of the toboggan can only occur while behind the starting line. Pushers may not cross the starting line while still in contact with the Toboggan.

9.5.11. Only Racers and Pushers are allowed in the Staging Area when a Run begins. The Organizing Committee and Race Officials may ask Competitors and viewers to move to different viewing areas during Runs. Failure of Competitors to listen to Race Officials may put the Team at risk of Disqualification and Race Day points deducted at the discretion of the Organizing Committee.

9.5.12. The Toboggan may not gain any forward momentum from anything other than the Pushers. This includes mechanical devices that may add potential energy to aid the Pushers in reaching a faster speed.

9.6. Complete Run

For a run to be considered a Complete Run, it must meet the following criteria:

9.6.1. The Toboggan must cross the Starting Line using the procedure outlined in Section 9.5.

9.6.2. The Toboggan must reach the Finish Line, having completed Event Objectives without meeting Crash Criteria.

9.6.3. Brakes must be deployed as soon as the back of the Toboggan crosses the Finish Line to bring the Toboggan safely to a stop.

9.7. DNF, Crashes, and Reinspection

9.7.1. A Run will be considered as a Did Not Finish (DNF) if it meets any of the following criteria. The OC reserves the right to add further criteria to this list at their discretion.

9.7.1.1. If the leading edge of the Toboggan does not cross the finish line and the Run does not meet the criteria of a Crash as outlined in the section above.

9.7.1.2. If Race Officials suspect that Pushers have not maintained contact with the Toboggan during pushing as noted in Section [9.5.9](#).

9.7.1.3. If any portion of a Pusher's feet extended past the starting line while pushing, as detailed in Section [9.5.10](#).

9.7.1.4. A Racer leaves the Toboggan during the Run or before the Toboggan has come to a complete stop.

9.7.1.5. If the Team fails to deploy brakes within the Braking Zone.

9.7.2. A Crash is defined as a Run which meets any of the criteria below. A Crash will result in a Did Not Finish (DNF) and/or score deductions. The following scenarios constitute a Crash. This list is not exhaustive:

9.7.2.1. The Toboggan has impacted the side barrier causing the Toboggan to come to a stop.

9.7.2.2. The Toboggan has rolled over.

9.7.2.3. A structural failure of any part of the Toboggan has occurred during the Run.

9.7.2.4. The Toboggan is considered by Race Officials to be out of control, or the Run cannot feasibly continue without external manual manipulation of the Toboggan, or when there is reasonable doubt that any component of the Toboggan is fully operational.

9.7.2.5. The Toboggan has left the Racecourse.

9.7.2.6. The Steering System has allowed the Toboggan to steer past the limited angle, suggesting a mechanical failure.

9.7.2.7. The Toboggan does not come to a complete stop by the end of the Safety Buffer Zone.

9.7.3. In the event of a Crash or DNF defined above, no attempt to continue the Run shall be made. The Organizing Committee will direct Teams on how to proceed in this scenario.

9.7.4. In the event of a Crash or DNF, the Toboggan must pass an additional Safety Inspection in order to be allowed to race again. Teams who make any modifications to their Toboggans between Runs are required to pass an additional Safety Inspection. Modifications are only permitted at the bottom of the hill prior to passing through the Safety Inspection and Tow-Up area. Teams caught making modifications past this point will be disqualified at the discretion of the Organizing Committee and Safety Judges.

9.8. Disqualifications, Deductions, and Penalties

9.8.1. Failure of Competitors to listen to Race Officials may put the Team at risk of Disqualification and Race Day points deducted at the discretion of the Organizing Committee.

9.8.2. As noted in Section 6.4.1., failure to deploy brakes within the Braking Zone will result in a zero (0) score for braking performance, equivalent to a DNF, and Teams must follow re-inspection procedures, as outlined in Section 9.7.4. See Appendix D for clarification on braking deployment penalties.

9.8.3. Brake Activation Penalty (BAP) will lead to a one (1) point deduction per occurrence as per Table 5 in Section 11.2. Deductions. See Appendix D.

9.8.4. During Reine de la Montagne, Teams who begin pushing before Race Officials initiate the Race will be disqualified.

9.8.5. Any member who does not abide by the Competition Code of Conduct or the venue rules, may place their Team at risk of disqualification at the discretion of the Organizing Committee.

9.8.6. Failure to show up to the inspection and tow-up area within ten (10) minutes of being asked by a Race Official will receive a point deduction to their Race Day score, at the discretion of the Organizing Committee.

9.8.7. During the Reine de la Montagne tournament, Teams in excess of ten (10) minutes between leaving the Run and returning to the tow-up area will be disqualified. Their place will be assumed by the Team that most recently lost to the disqualified team. In the event that a Team is disqualified in the first bracket, the OC reserves the right to adjust the brackets or grant a bye as they see fit (see Section 9.2.3. Reine de la Montagne).

9.8.8. It is expected that Teams exiting the Racecourse from the previous run immediately report to the safety inspection and tow-up area. Any modifications or repairs are to be conducted there. Upon being directed to enter the Staging Area by a Race Official or Safety Judge, teams must immediately comply and start positioning their Toboggan and/or loading Racers as directed by the Race Official or Safety Judge subject to point deductions or disqualification.

10. Spirit

The following Section outlines expectations for the Spirit component of GNCTR, a category unique to GNCTR among other design and engineering competitions. Teams are awarded points based on how they exemplify the values of GNCTR and embody the overall Spirit and culture of the Competition. Rooted in the principles of fair play, sportsmanship, diversity, and inclusivity, GNCTR Spirit encompasses how Competitors demonstrate their enthusiasm and support for their Team and school; other Teams, schools and Competitors; and the Competition as a whole.

10.1. Theme

A Theme is a chosen topic or concept that leads a Team's choices regarding aesthetic and promotional components of the Competition.

10.1.1. Each Team may choose its own Theme. The Organizing Committee reserves the right to reject any Theme for any reason and require that the Team select a new one.

10.1.2. Teams must register and reserve their Theme as part of pre-registration as outlined in the Registration Package. No Teams may have the same Theme or similar Themes. Themes will be allocated on a first come, first serve basis. Similarity will be determined by the Organizing Committee.

10.1.3. All Teams must develop a coherent brand related to their Theme. Elements of this brand should include Costumes and Technical Display aesthetics, at a minimum. Incorporation of other aspects such as logos, chants/cheers, social media, patches/giveaways, and Toboggan decorations are highly encouraged. Teams will be judged by the Spirit Judges on all components for allocation of points according to the scoring rubric and grant Spirit awards.

10.1.4. Any offensive or insensitive Theme content may result in Disqualification or a Spirit score of zero (0) at the discretion of the Organizing Committee and/or Judges.

10.2. Participation

10.2.1. Each Team shall have a designated Spirit Captain who shall be the primary point of communication between the members of their Team and the Spirit Judges.

10.2.2. Competitors will be evaluated on their overall attitude and engagement throughout the duration of the Competition. **Evaluation of competitor spirit is not associated with the consumption of alcohol.**

10.2.3. The Competition will include two (2) evening events that will have unique themes and/or activities determined by the Spirit Judges. Competitors are encouraged to wear costumes relating to these unique themes on these evenings. Evening event themes will be announced no later than one (1) month prior to the Competition.

10.2.4. Competitor Interaction Day will include events that allow Competitors to get to know those on other Teams and further develop the Spirit of GNCTR.

10.2.5. Teams are permitted to give away variations of their 'swag' or theme-related items (patches, pins, etc.) to the Organizing Committee, Volunteers, and Spirit Judges.

10.2.6. Competitors are encouraged to start cheers or chants at any and every opportunity throughout the Competition, provided they respect the Organizing Committee's instruction to stop chanting when necessary. Offensive or insensitive cheers will not be permitted and may result in a Spirit score of zero (0) or Disqualification. The appropriateness of cheers is left up to the discretion of the Organizing Committee and dealt with on a case-by-case basis.

10.2.7. Attempts at bribing the Spirit Judges is prohibited and will result in a score of zero (0) in a Team's overall Spirit scoring.

10.2.8. Opening Ceremonies Spirit Presentation

10.2.8.1. Each Team will be given four (4) minutes (from seat to seat) to present a short introduction of their Team and chosen Theme to the Spirit Judges and fellow participants.

10.2.8.2. The venue will provide audio and visual capabilities. Any audio or visual media to be used in this presentation must be provided to the Organizing Committee in advance. A deadline for submitting presentation media will be provided to Team Captains at a later date.

10.2.8.3. The order of Team presentations will be provided to Team Captains prior to Opening Ceremonies.

10.2.9. Tech Ex Spirit Presentation

10.2.9.1. A presentation to the Spirit Judges will be scheduled for each Team during the Technical Exhibition. The intent of this presentation is to showcase the Team's Spirit in the context of the Technical Display. Teams are encouraged to find creative ways to use the Technical Display in this presentation.

10.2.9.2. Presentations will be no longer than five (5) minutes long and will begin when the Spirit Judges arrive at the Team's Technical Display.

10.2.9.3. The order of presentations will be released to Competitors in advance.

10.2.9.4. It is the responsibility of the Spirit Captains to be aware of the Spirit Judges' estimated time of arrival, as based on their current location and the predefined order of presentations. The Organizing Committee will assist in communicating estimated time of arrival.

10.2.9.5. Teams may be required to give Technical Presentations and Spirit presentations simultaneously. They will not be required to attend the Safety Inspection or Weigh-In and give the Spirit presentation simultaneously.

10.2.10. Spirit Challenges

10.2.10.1. Each Team will be tasked with completing several Challenges defined by the Spirit Judges at their discretion. These challenges may be issued and have due dates before or during the Competition.

10.2.10.2. Spirit Challenges issued after the start of the Competition will be communicated to the Spirit Captains as the Spirit Judges see fit.

10.2.10.3. Spirit Challenges issued prior to the start of the Competition will be communicated via email sent to Captains and Spirit Captains. It is the responsibility of each Team to provide correct email addresses for these parties to the Organizing Committee as per the Registration Package.

10.2.10.4. Teams submitting Spirit Challenges late will receive a score of zero (0) for that challenge unless previously discussed and approved by the Spirit Judges.

10.2.10.5. All Spirit Challenges and proposed methods of communication will be reviewed and must be deemed acceptable by the OC prior to being released to Spirit Captains.

11. Scoring and Judging

11.1 General Scoring Guidelines

11.1.1. To preserve the integrity of the Competition, the Organizing Committee, Judges, and the Safety Committee reserve the right to add, delete, or modify any judging criteria (and their associated score values) at any time prior to or during the Competition. Teams will be notified immediately in the event of any major changes to the rules. Teams are expected to check the Request for Information (RFI) feed on the website regularly for rule clarifications. Responses to all RFIs will be posted publicly on the competition website, and the team that asked for clarification will be notified directly when a response to their question is complete and available. RFI responses will not contain any information identifying which school the request came from.

11.1.2. Points will be awarded to Teams based on their performance in a number of different categories. [Table 4](#) describes these categories and shows the points available to Teams for each subcategory. [Table 5](#) describes possible point deductions. Refer to Appendix B of these rules for a more detailed breakdown of the Scoring Rubric:

Table 4: Scoring Rubric

Category	Available Points
Toboggan Design	35
Concrete Reinforcement & Connection	3
Concrete Mix	3
Geometric Profile & Formwork	3
Superstructure Design	4
Braking System Design	4
Steering System Design	4
Innovation	6
Sustainability	7

Toboggan Weight Accuracy	1
Technical Communication	17
Schedule	1
Budget	1
Safety Report	2
Technical Report	6
Technical Presentation	5
Technical Display	2
Race Day	28
Fastest Run	7
Steering Performance	7
Braking Performance	7
Reine de la Montagne Rank	7
Safety	8
Safety Documentation	2
Safety Design	4
Safety Inspection	2
Spirit	12
Theme and Costumes (Spirit Judges)	2
Pre-Competition Spirit Challenges (Spirit Judges)	0.5
Competition Spirit Challenges (Spirit Judges)	0.5
Opening Ceremony Skit (Spirit Judges)	1
Team Engagement and Participation (Spirit Judges)	2

Attitude and Friendliness (Spirit Judges)	2
Design and Visual Appeal in Technical Display and Toboggan (Spirit Judges)	1
Incorporation of Theme in Technical Display and Toboggan (Spirit Judges)	1
Team Captains Communal Vote	1
Organizing Committee Communal Vote	1
Overall	100
<i>BFYB Bonus Points</i>	2

11.1.3. A Team's scores for individual categories will be determined by Judges for the respective category. Every effort will be made by the Organizing Committee and Judges to ensure impartial and consistent judging of all Teams.

11.1.4. A detailed breakdown of each Team's scores will be available on the GNCTR 2025 website no later than February 3rd, 2025.

11.1.5. The maximum total score a Team can be awarded is 100. Any additional bonus points will not be added to a Team's overall score beyond this maximum.

11.1.6. Raw scores in any category may be mathematically redistributed to utilize the full range of the available points in that category, at the discretion of the Organizing Committee.

11.2. Deductions

The following Section includes a list of possible Deductions to a Team's Overall Score. This Section does not include Deductions that are used as the mechanism by which scores in a subcategory are assigned. Any deductions that exceed the category total will be deducted from the Team's total score.

11.2.1. The scoring rubric outlined [Table 4](#) is subject to Deductions. A Team's score in each category will be reduced by the number of Deductions they incur in that category.

11.2.2. Spirit Points may be deducted from Teams for Competitor conduct that is against the Spirit of the Competition on a case-by-case basis.

11.2.3. Judges reserve the right to assign additional Deductions in the event that Teams violate the rules outlined in this document or otherwise violate the intent of the Competition.

11.2.2. A non-exhaustive list of the Deductions that a Team can incur are listed below in Table 5.

Table 5: List of Deductions

Section	Description	Deduction	Deducted From
2.24.	Missed Captain's meeting	1 point per missed meeting	Tech. Comm.
5.4.	Late submission of the Safety Report	1 point per day, up to 10 points	Safety Report
5.4.	Late response to the Safety Report feedback	1 point per day, up to 10 points	Safety Report
5.4.	Failure to highlight changes on resubmitted Safety Reports	0.5 points per occurrence	Safety Report
5.5.	Late submission of the JHA and FLHA forms	0.1 points per day, up to 1 point	Safety Report
5.6.3.	Technical Report over the word limit	1 point per each 500 words, rounded up to the nearest 500 words	Technical Report
5.6.	Late submission of the Technical Report	1 point per day, up to 10 points	Technical Report
5.7.5.	Concrete test cylinders having inaccurate compressive strength	2 points	Concrete Mix
5.7.1.	Late submission of concrete test cylinders	0.5 point from the total score for each day that cylinders have not been submitted, for up to a maximum of 1 point	Concrete Mix

5.7.1.	No submission of concrete test cylinders	A score of zero (0) in the Concrete Mix section of the Scoring Rubric	Concrete Mix
6.2.6.	Use of Sliding Surface(s) used in previous GNCTR events	50% point reduction with a maximum of 4 points deducted for Event(s) where the Sliding Surface(s) are used in a Run	Race Day
6.1.1.3.	Toboggan over 350 lbs	1 point per lb., up to 50 points	Superstructure Design
6.5.1.	Use of Previously Constructed Toboggan Component without OC approval	A score of zero (0) for overall Innovation.	Innovation
		A score of zero (0) in respective re-used component in Toboggan Design.	Toboggan Design
6.5.1.	Use of Previously Constructed Toboggan Component with OC approval	A score of zero (0) in respective re-used component under the Innovation design score.	Innovation
		A score of zero (0) in respective re-used component in Toboggan Design.	Toboggan Design
7.3.	Over five (5) members at Safety Inspection	0.5 points per additional person	Safety
7.4.	Incomplete Toboggan at Safety Inspection/Failure to implement changes prescribed nu the Safety Committee during feedback	1 point	Safety
7.6.	Failing to attend Safety Inspection	2 points	Safety
7.8.	Conducting prohibited activities at the Technical Exhibition venue such as improper use of	Minimum of 1 point. Higher point deduction at the discretion of Judges/OC	Technical Display

	tools (e.g., failure to wear proper PPE, operating tools outside designated areas, etc.), unauthorized hot work, or engaging in any actions that violate safety protocols or venue regulations.		
9.7.	Race Day Crash	1 point per crash	Race Day
9.8.3.	Brake Activation Penalty (BAP)	1 point per occurrence	Braking Performance
9.8.6.	Failure to show up a minimum of 10 minutes prior to tow-up/inspection zone	1 point per occurrence	Race Day
9.8.7.	Excess of 10-minutes to return to towing and set up between runs during Reine de la Montagne tournament and not adhering to Race Day timelines and requests from OC	Disqualification from next race	Race Day
10.2.4.	Bribing	Disqualification	Overall
11.3.5.	Excessive repeated failed petitions	Can result in 0.5 point, doubling for each failed petition thereafter	Overall Team Score

11.3. Petitions

A Petition is an official complaint submitted to the Organizing Committee regarding the scoring of the Competition.

11.3.1. Teams that feel that they have been unfairly judged during the Competition, including but not limited to Deductions, can submit a written Petition to the Organizing Committee. Captains should handle all petitions. Petitions can be emailed to chair@gnctr2025.ca with the subject line “Petition - <Team Name>”.

11.3.2. A Team’s Petition should include as much information as possible, including how they believe judging was unfair, any relevant Sections in this rule book, and the desired result of the Petition.

11.3.3. Petitions must be submitted at least two (2) hours prior to the start of the Closing Ceremonies, except as stipulated in Section **12.3.6**. Petitions submitted within two (2) hours of Closing Ceremonies will not be considered.

11.3.4. Petition decisions will be made by the Organizing Committee and Judges prior to the Closing Ceremonies. All decisions will be final.

11.3.5. Excessive repeated failed petitions can result in a deduction of 0.5 points, doubling in severity for each failed petition thereafter.

11.3.6. In the event that a major issue arises after Closing Ceremonies (i.e. the Organizing Committee makes a mistake in calculating scores). Petitions may be submitted up to two (2) weeks after the official scores have been posted.

11.4. Toboggan Design

11.4.1. Toboggan Design will be judged by the respective Civil and Mechanical judges. Preliminary scoring will be based on the Team's Technical Reports and scores will be finalized after the Technical Presentations. Scores shall be based on the detailed scoring rubric in Appendix B.

11.4.2. Each sub-category of Toboggan Design shall be scored based on the criteria listed in **Table 6**.

Table 6: Toboggan Design scoring criteria

Criteria	Description
Design Justification	<ul style="list-style-type: none"> • What challenge(s) are you trying to address? • How will your design address the challenge? • Why is your design best optimized to handle the challenge?
Accuracy and Quality of Calculations/ Simulations	<ul style="list-style-type: none"> • How accurate are your calculations/simulations in comparison to real life applications? • How thoroughly is each member/item evaluated for applied stresses?

Construction and Execution	<ul style="list-style-type: none"> • What was your fabrication process and why was it chosen? • How does your final product meet the requirements of your Design? • Quality, detail, and level of professionalism of engineered drawings
----------------------------	---

11.4.3. Innovation in Toboggan Design will be assessed as a measure of the originality, uniqueness, and degree of engineering thought put into the design with regards to performance, safety, and functionality. Innovation will be assessed by the Civil and Mechanical Judges and evaluated based on the Technical Report and Technical Presentation. Teams can specify which area within the civil and mechanical categories they are focusing on for innovation (e.g., reinforcement for civil and steering for mechanical), or choose to innovate in all categories. They can receive points for innovation in both civil and mechanical components as outlined in the rubric.

11.4.4. Toboggan Aesthetics will be judged by the visual appeal of the Toboggan and its representation of the Team's Theme. The aesthetics score will be determined by a combination of communal Team vote as well as an OC vote.

11.4.5. Sustainability in design and manufacturing shall be scored based on the following, to be included in the Technical Report:

- Describe in detail the environmental impacts of the materials you are using in your design.
- In the manufacturing of your toboggan, tech-ex, and crate, describe ways in which you have been sustainable.
- Describe in detail what will happen to your toboggan and associated materials (e.g., tech-ex, display, crate, etc.) after the competition. (I.e. Will it be disassembled, recycled, put on display, used as a fundraiser, etc.)
- Include a detailed Life Cycle Analysis (LCA).

The Life Cycle Analysis (LCA) component has been added as an opportunity for Teams to demonstrate a comprehensive understanding of the environmental impact of their efforts. For the first year, the LCA should analyze the environmental impact of the major components and materials of the toboggan (such as concrete and aluminum) 'from cradle to grave'. The LCA will be graded based on the life cycle stages, activity, aspects,

impacts, control/influence, risks, opportunities, operation and mitigation control elements outlined, as per the template.

11.5. Project Management

11.5.1. Project Schedule

11.5.1.1. The Project Schedule will be evaluated through the Technical Report Discussion (25% of the points) and the completeness of the schedule, as outlined in Appendix D: Schedule KPI Audit Rubric (75% of the points).

The Technical Report must contain a section discussing the results of the Project Schedule. Teams will be evaluated based on their discussion of:

- Predicted vs actual timelines
- Causes for delays
- Suggested solutions for delays
- Suggestions for future project schedules

11.5.1.2. The Schedule KPI Audit Rubric will account for 75% of the points allocated to the schedule. The following formula will be used to calculate the points awarded to the Team:

$$P_i = P_a \times t$$

- Where P_i is the points awarded to the Team
- Where P_a is the maximum points available to be won
- Where t is the Team's total score from the Schedule KPI Audit Rubric

11.5.2. Budget

11.5.2.1. See Appendix E for an example of what is expected for the budget submission.

11.5.2.2. The project will be evaluated based on the expected revenue and expenses vs. actual revenue and expenses incurred, and a justification for any discrepancy between the two. Points will not be deducted if the actual expenses result in a surplus or shortfall. The Technical Report should include a

section that can justify and explain why a surplus or shortfall may have occurred, and how this risk could be mitigated in the future. See [Table 7](#) for the Budget Marking Rubric.

Table 7: Budget Marking Rubric

Budget Marking Rubric				
0	No budget submitted.			
0.25	An insufficient number of categories or line items are provided to demonstrate a robust and comprehensive budget for the project.	No formulas are used.	Expected revenue or expenses are omitted from the budget and no comparison between expenses vs. actual expenses are shown.	No justification for the budget shortfall or surplus is provided.
0.5	An ample number of categories are provided, but the number of line items are insufficient to demonstrate a robust and comprehensive budget for the project. Line items are not listed under specific categories or are listed under incorrect categories.	Formulas and reference cells show errors and do not calculate what is intended	Expected revenue and expenses and actual revenue and expenses are not represented in their own columns and are difficult to follow within the spreadsheet.	An attempt at a justification for the budget shortfall or surplus is provided but does not provide sufficient detail to explain the discrepancy between expected revenue and expenses vs. actual revenue and expenses.
0.75	An ample number of line items are provided to demonstrate a robust and comprehensive budget for the project. The majority of line items are logically categorized, but there may be some items out of place.	The majority of formulas and reference cells are properly formatted, but some errors or incorrect calculations may be present.	Expected revenue and expenses and actual revenue and expenses are represented in their own columns, but are not easily followed within the spreadsheet.	A justification for a budget shortfall or surplus is provided but lacks sufficient detail or provides a weak explanation for the discrepancy between expected revenue and expenses vs. actual revenue and expenses.

1.0	An ample number of categories are provided and line items listed demonstrate a robust and comprehensive budget for the project. Line items are logically categorized.	Formulas and reference cells are properly formatted, calculations are correct.	Expected revenue and expenses and actual revenue and expenses are clearly represented in their own columns and easy to follow within the spreadsheet.	A detailed justification for a budget shortfall or surplus is provided that clearly explains the discrepancy between expected revenue and expenses vs. actual revenue and expenses.
-----	---	--	---	---

11.5.3 Bang For Your Buck (BFYB)

The “Bang For Your Buck (BFYB)” bonus points have been introduced this year for the first time in GNCTR history. This addition is based on the assumption that Teams that can invest thousands of dollars into their Toboggan normally have an advantage with regards to Toboggan performance. This places Teams with less resources and/or industry connections at a disadvantage. We acknowledge that the amount of money assigned to each Toboggan varies greatly on factors outside of the Team’s control, and ignoring this inequality is unfair to those Teams who have limited budgets. We would like to mitigate the effects of this bias during GNCTR so that we may reward the students who have performed well despite a lack of funds. This would incentivize resourceful allocation of funding and encourage Teams to think outside the box to produce designs that are more economical, sustainable, and innovative. We do not want to penalize teams for having a larger budget, but we would like to recognize and reward Teams who have done well despite a reduced funding. Teams can receive a maximum of two (2) bonus points by assessing their performance on Race Day and their Toboggan’s price compared to materials cost for competing teams in GNCTR 2025. See calculation below:

$$BFYB \text{ Bonus Points} = 2 \times \left(\frac{\text{Race Day Score}}{28} \right) \times \left(\frac{C_{max} - C_i}{C_{max} - C_{min}} \right)^2$$

- Where C_{max} is the material and construction cost of the most expensive competing Toboggan in GNCTR 2025.

- Where C_{min} is the material and construction cost of the least expensive competing Toboggan in GNCTR 2025.
- Where C_i is the material and construction cost of the Team's competing Toboggan in GNCTR 2025.

11.6. Reports and Presentations

11.6.1. The Technical Report, Technical Presentations, and Technical Display will be scored by the respective judges according to the criteria described in the detailed scoring rubric in Appendix B.

11.7. Race Day

11.7.1. Fastest Run

11.7.1.1. The Fastest Run for each Team shall be the shortest of the Run times recorded for the Drag Race and Giant Slalom Runs.

11.7.1.2. Points will be awarded to any Team that completes at least one (1) of the Drag Race or Giant Slalom Runs. If a Team fails to complete either of the Runs, they will be awarded zero (0) points.

11.7.1.3. Points will be allocated based on a Team's Fastest Run time relative to the best and worst overall recorded Run times. The following formula will be used to calculate the points awarded to a Team:

$$P_i = 0.5 + 6.5 \left(\frac{\max(t) - t_i}{\max(t) - \min(t)} \right)$$

- Where P_i is the number of points awarded to the Team.
- Where t_i is the fastest time in seconds it took for the Team to finish the Run in either Giant Slalom or Drag Race.
- Where $\max(t)$ is the maximum time any Team took to finish either Giant Slalom or Drag Race.
- Where $\min(t)$ is the minimum time any Team took to finish either Giant Slalom or Drag Race.

- For the above calculations, DNF results are ignored. Teams who DNF in both races will receive zero (0) points.

11.7.2. Steering Performance

11.7.2.1. Steering Performance will be judged solely based on a Team's performance in the Giant Slalom race.

11.7.2.2. All Teams will have seven (7) points prior to the start of the Giant Slalom and will be given deductions for infractions during the Run as follows:

- 1.5-points deduction for contacting a gate marker, per occurrence.
- 3-points deduction for entirely missing a gated area, per occurrence.
- 3.5-points deduction for striking the side barrier of the course, per occurrence.

11.7.2.3. Minimum possible score in Steering Performance is zero (0) points.

11.7.2.4. Points are therefore allocated using the following formula:

$$P_i(d_i) = \begin{cases} 7.0 - d_i & \text{if } 7.0 - d_i \geq 0 \\ 0 & \text{if } 7.0 - d_i < 0 \end{cases}$$

- Where P_i is the number of points awarded to Team for Steering Performance
- Where d_i refers to the summation of Steering Performance deductions for the Team

11.7.3. Braking Performance

11.7.3.1. Braking Performance will be judged for any Run in either the Drag Race or Giant Slalom events. Braking performance will not be judged for any subsequent Reine de la Montagne Runs, though a safe braking performance in the Braking Zone or Safety Buffer Zone is still required to avoid a Crash result.

11.7.3.2. Points may be awarded to any Team that completes at least one of the Drag Race or Giant Slalom Runs. If a Team fails to complete any of the Runs, they will be awarded zero (0) points for braking. Only Runs in which the Braking

System is deployed within the Braking Zone will be graded for Braking Performance.

11.7.3.3. The braking score for any particular Run will be based on a combination of ability of the Toboggan to engage the brakes inside a specified 20-foot Braking Zone and the calculated average deceleration of the Toboggan. The Toboggan speed will be recorded at the crossing of the finish line. The stopping distance will be measured from the indentation in the snow where the brake was first applied, to the brake location in the Toboggan's final resting place. The rate of average deceleration will be calculated for each Run using this information.

11.7.3.4. If BAP penalties are to occur during a braking performance, deductions will be given per infraction for the run it occurred in.

11.7.3.5. Minimum possible score in Braking Performance is zero (0) points.

11.7.3.6. The following formula will be used to calculate the points awarded to a Team:

$$P_i = 0.5 + 6.5 \left(\frac{A_i - \min(a)}{\max(a) - \min(a)} \right) - d_i$$

- Where P_i is the number of points awarded to the Team
- Where A_i is the highest average deceleration of the Team's Toboggan during braking in either of the Drag Race or Giant Slalom Runs
- Where $\min(a)$ is the minimum overall average deceleration by any Team
- Where $\max(a)$ is the maximum overall average deceleration by any Team
- The Runs in which a Team does not successfully deploy their Brakes are not considered while calculating $\min(a)$ and $\max(a)$
- Where d_i refers to the summation of BAP deductions for the Team

11.7.4. Reine de la Montagne Tournament

11.7.4.1. All Teams that participate in the Reine de la Montagne tournament will receive points. Any Team which does not qualify for the Reine de la Montagne tournament will be awarded zero (0) points in this category.

11.7.4.2. Teams will receive points based on the following formula:

$$P_i = 0.5 + 6.5 \left(\frac{W_i}{R_{tot}} \right)$$

- Where P_i is the number of points awarded to Team
- Where W_i refers to the number of wins the Team has in the tournament.
Note that all “byes” and wins by default are considered wins
- Where R_{tot} is the number of total elimination rounds in the tournament.

11.8. Safety

11.8.1. Safety documentation will be scored based on the following criteria:

- Job Hazard Analysis (JHA) completed before task execution.
- Field Level Hazard Assessments (FLHA) completed during manufacturing.

11.8.2. Each subcategory of Safety will be scored based on the following criteria and criteria listed under Section 6.6.:

- What dangers, hazards, and failure modes have you identified?
- How will your design effectively mitigate the identified risks and ensure racer safety?
- What additional safety features have you added (if any) to ensure racer safety?

11.8.3. Safety inspection will be scored based on the following criteria:

- Presentation to judges.
- Ability to respond to questions.
- Tilt test results.
- Meets safety criteria for race day.
- Were required changes implemented.

11.9. Spirit

11.9.1. Spirit will be scored by the Spirit Judges according to the detailed scoring rubric in Appendix B.

12. Awards

The following are the awards that will be presented to Teams during the Closing Ceremonies at the end of the Competition. All awards are allocated based on overall point totals from the Scoring Rubric in Section 11., Table 4. One (1) award will be given out per category winner, as well as an award for overall highest score given to the Team that will be crowned the Competition's champion. A second and third place runner up for each category will also be announced during the awards ceremony.

Please note: For a detailed breakdown of how points are allocated and which judges grant each award in each category, please refer to Section 11. [Scoring and Judging](#).

12.1. First Place, Overall Champion, & Recipient of the CSCE Cup: Awarded to the team with the highest overall score, or any team satisfying two (2) “win by default” clauses outlined in Section 13 of the GNCTR 2025 Official Competition Rules.

12.2. Second Place: Awarded to the Team with the second highest overall score.

12.3. Third Place: Awarded to the Team with the third highest overall score.

12.4. GNCTR Excellence in Safety Award: Awarded to the Team with the highest Safety score. Display of safety practices and culture on Race Day will contribute to selection.

12.5. Best New Team: Awarded to the new Team with the best overall score. A “new team” is defined as a team that has never competed at GNCTR before, or has not competed in the past two (2) years (GNCTR 2023 and GNCTR 2024).

12.6. Best Non-Competing Team: Awarded to the Non-Competing Team with the highest overall non-competing team score, based solely on Race Day performance and spirit scores.

12.7. People's Choice: Awarded to the Team who receives the most votes by other Teams to be the most spirited, fun, and innovative and who otherwise enhances the competition for other Teams. The People's Choice Award is voted on at the final Captain's meeting prior to Closing Ceremonies.

12.8. Most Improved Team: Awarded to the Team that has competed in the past two (2) GNCTR competitions (GNCTR 2023 and GNCTR 2024) and achieved the greatest overall score improvement from the 2024 to the 2025 competition.

12.9. Most Sustainable Team: Awarded to the Team that best demonstrates in their Technical Report and Technical Display how they were sustainable in both the choice and use of materials in the design process, construction, and disposal plan of their Toboggan. The award will be based on the sustainability of the following components: concrete mix design; ski and/or slab formwork; toboggan superstructure; toboggan mechanical systems (braking and steering); construction methods; crate, technical display, and theme components.

12.10. Best Theoretical Toboggan: Awarded to the Team with the highest Toboggan Design score.

12.11. Most Innovative Design: Awarded to the Team with the highest Innovation score.

12.12. Best Concrete Mix Design: Awarded to the Team with the highest Concrete Mix Design score.

12.13. Best Concrete Reinforcement Design: Awarded to the Team with the highest Concrete Reinforcement Design score.

12.14. Best Geometric Profile and Formwork: Awarded to the Team with the highest Geometric Profile and Formwork score.

12.15. Best Superstructure Design: Awarded to the Team with the highest Superstructure System Design score.

12.16. Best Braking Design: Awarded to the Team with the highest Braking System Design score.

12.17. Best Steering Design: Awarded to the Team with the highest Steering System Design score.

12.18. Best Technical Report: Awarded to the Team with the highest Technical Report score.

12.19. Best Technical Presentation: Awarded to the Team with the highest Technical Presentation score.

12.20. Best Performing Toboggan: Awarded to the Team with the highest Race Day score.

12.21. Reine de la Montagne: Awarded to the Team that places first in the Reine de la Montagne tournament on Race Day.

12.22. Fastest Run Time: Awarded to the Team with the fastest run time.

12.23. Most Spectacular Run: Awarded to the Team the judges and spectators deem to have had the most spectacular Run to watch on Race Day. Both judges and Team Captains on behalf of their Teams will have the ability to vote for the most spectacular run. The following weighting will be used to calculate the score for the award: Judges: 50%; Team Captains: 50%.

12.24. Best Team Spirit, Recipient of the Spirit Cup: Awarded by Spirit Judges to the Team with the highest overall Team Spirit score.

12.25. Best Theme & Costumes: Awarded by Spirit Judges to the Team who has the highest scores for Theme and Costumes.

12.26. Best Opening Ceremony Performance: Awarded to the Team deemed by the Spirit Judges to have put on the most entertaining and/or polished performance at Opening Ceremonies.

12.27. Most Aesthetically Pleasing Toboggan: Awarded to the Team with the highest score in Design, Visual Appeal and Incorporation of Theme in Toboggan, who the Spirit Judges deem to have designed and built the most aesthetically pleasing Toboggan.

12.28. Best Technical Display: Awarded to the Team with the highest combined score in Technical Display and Design, Visual Appeal and Incorporation of Theme in Technical Display (Spirit Judges), based on the informative content of the display, incorporation of the Team's theme, and overall aesthetics of the display.

12.29. Additional Awards:

This Section outlines the additional awards that will be given at the Competition:

12.29.1. Spirit Awards: In addition to the Spirit Cup, the Spirit Judges will be allowed to determine additional Spirit Awards at their discretion and approved by the OC. These will not be reflected in any official GNCTR 2025 scores, and the criteria and associated prize will be announced at a later date. Recipients of these awards will be decided by the Spirit Judges or via Team voting.

13. Win by Default

Any Team may be awarded the title of overall GNCTR Champion if they are able to completely satisfy at least two (2) of the following requirements, hereby causing a “win by default,” regardless of actual Competition performance.

13.1. Requirements for a Win by Default

13.1.1. The Team must construct their Toboggan’s superstructure solely out of used hockey sticks from the Montreal Canadiens NHL team, with concrete reinforcement also made exclusively from used Canadiens hockey sticks. The Team must also have a current Montreal Canadiens player, Geoff, Andrew, Justin Molson, and Youppi! ride in the Toboggan during Race Day.

13.1.2. The Team must drink (exactly) 514 lbs of Gibeau Orange Julep and eat 438 lbs of poutine in under one (1) hour before the start of Race Day. The Team must then successfully complete a bar crawl down Peel St. while riding their Toboggan, without attracting the attention of law enforcement or facing any legal repercussions.

13.1.3. The Team must design and build a Rube Goldberg machine that produces maple syrup live during Race Day by tapping into a local Montreal maple tree. One of the Rube Goldberg machine activities must also include successfully pushing the Toboggan down the hill on Race Day.

13.1.4. The Team must successfully convince Robert Maddox, also known as Crazy Rocketman, to build a detachable concrete engine for their Toboggan, attend the Competition as a member of their Team, and ride in their Toboggan on Race Day. The Toboggan must still be able to perform without the engine and be in the Top 3 of Race Day performance, adhering to all other competition rules.

13.1.5. The Team must successfully race their Toboggan around the Formula One Canadian Grand Prix Circuit Gilles-Villeneuve pulled by a 12-horse fleet of Quebec Royal Canadian Mounted Police officers. The Team must provide photo and video evidence.

Glossary

Alumni: A competition participant that has competed in a past GNCTR event and is ineligible to participate as part of a Competing Team at GNCTR 2025.

Braking Activation Penalty (BAP): Activation of Braking System before or after the Braking Zone will lead to a one (1) point deduction per occurrence as per Section 11.2.

Braking System (Brake): The mechanical system designed to stop the Toboggan at the end of the Run.

Braking Zone: The marked area beginning at the finish line of the Racecourse and ending at a fixed distance of 20ft.

Captain: A Competitor designated as the primary point of communication between the members of their Team and the Organizing Committee.

Closing Ceremonies: The final event of the Competition, which includes a banquet and an awards ceremony.

Complete Run: For a run to be considered a Complete Run, it must meet the criteria outlined in Section 9.6.

Competition: Refers to the series of events coordinated by the Organizing Committee to be held in Montreal, Quebec between January 22nd-January 26th, 2025.

Competitor Code of Conduct: A document produced by the Organizing Committee that governs the conduct of Competitors during the Competition.

Competitor Interaction Day: A day for participants to explore the host city and connect with other Competitors by engaging in activities planned by the Organizing Committee.

Competitor: An Individual member of a Competing or Non-Competing Team participating in the Competition.

Concrete Toboggan (Toboggan): A gravity-propelled vehicle with concrete Sliding Surface(s) that conforms to the requirements outlined in Section 6. [Toboggan Requirements](#).

Crash: An incomplete Toboggan Run due to one of the conditions outlined in Section 9.7.

Deductions: The subtraction of points from a Team's Overall Score due to noncompliance with the requirements set out by the Rules or acting in violation of the intent of the Competition. A list of Deductions is outlined in Section 11.2.

Did Not Finish (DNF): A Run in which the leading edge of the Toboggan does not cross the finish line and which does not meet the criteria of a Crash.

Disqualification: The removal of a Team or Competitors from all Competition events, including the forfeiture of any points accrued by the Team or Competitor in question at the time of infraction.

GNCTR: Great Northern Concrete Toboggan Race.

Judge: An impartial, knowledgeable, industry and/or academic professional appointed by the Organizing Committee responsible for reviewing various aspects of the Competition and assigning scores within their respective categories. Categories of Judges are outlined in Section 1.9.

Opening Ceremonies: A social event at the beginning of the Competition that includes a banquet and introduction of the Teams and the Organizing Committee.

Organizing Committee (OC): A group responsible for the planning and execution of the Competition. The names and roles of the individual members of the Organizing Committee can be found in the Registration Package and on the GNCTR 2025 website (<https://gnctr2025.ca/meet-the-oc>).

Participant: Any individual who will be present during the Competition and participating in its events. Includes competitors, judges, volunteers, and OC members.

Petition: An official complaint regarding the scoring of the Competition.

Pusher: Any Competitor that is pushing the Toboggan during a Run.

Racecourse: A marked area on the race hill that defines a Toboggan's intended trajectory for a Run. The Racecourse begins with a starting line and ends with a finish line.

Race Day: Consists of a series of solo and head-to-head racing events with the intent of evaluating Toboggan performance.

Race Official: A Volunteer or Organizing Committee member contributing to Race Day operations. Their responsibilities include organizing Teams at the Staging Area, preparing the Racecourse between Runs, measuring stopping distances, recording Run statistics, noting Deductions or Disqualifications, and other tasks as required.

Racer: Any Competitor that is riding in a Toboggan during a Run.

Racing Configuration: The set up of the toboggan as it will be used on Race Day, including all safety features as required on the Safety Report (and by the Safety Committee in the response to the Safety Report), and excluding any decorative components which are only used during Tech Ex.

Registration Package: A package produced by the Organizing Committee containing all pertinent information related to Team registration, transportation, and accommodations.

Run: A single official attempt by a Team to ride its Toboggan down the race hill. A Run begins when the Toboggan crosses the starting line and ends when the Toboggan has come to a complete stop at the bottom of the hill or has been deemed unable to finish the Run.

Safety Buffer Zone: The marked area beginning at the end of the Braking Zone and ending at a fixed distance of 80ft.

Safety Committee: Composed of impartial and knowledgeable industry professionals appointed by the Organizing Committee with previous GNCTR or other relevant experience. The Safety Committee is responsible for reviewing Safety Reports and administering Safety Inspections. These individuals hold the right to refuse a Team from attempting a Run if they deem the Toboggan unsafe.

Safety Inspection: Inspections of Toboggans to be completed by the Safety Committee to ensure each Team's compliance with the Competition Rules, Safety Report and design drawings.

Safety Report: A submission outlining the safety features included in the design of a Toboggan.

Sliding Surface: Any portion of the Toboggan that is in contact with the snow for the majority of the duration of the Run which conforms with Section 6.2. Braking and Steering components will not be considered to be part of the Sliding Surface unless they are intended to be in constant contact with the snow.

Sliding Surface Mix: Concrete mix which was used in the fabrication of the Sliding Surface.

Spirit Captain: A Competitor designated as the primary point of communication between the members of their Team and the Spirit Judges.

Spirit: Rooted in the principles of fair play and good sportsmanship, GNCTR Spirit encompasses how Competitors promote a positive experience for all Participants and enthusiastically support their own Team, other Teams and Competitors, and the Competition as a whole.

Staging Area: The defined area at the top of the race hill where Toboggans prepare for and begin a Run.

Steering System: The mechanical system designed to change the direction of a Toboggan during a Run.

Superstructure: The portion of the Toboggan that is not in contact with snow for the majority of the duration of a Run and is designed to protect Racers should the Toboggan experience a Crash.

Team: Any Competing or Non-Competing Team registered and participating in the Competition. See Section 1.5 for the types of Teams that may register for the Competition.

Technical Display: A Team's booth at the Technical Exhibition for the purpose of displaying their Toboggan, communicating the technical features of its Toboggan with the public, and often incorporating elements of its Theme.

Technical Exhibition (Tech Ex): A tradeshow-style event in which Teams present their Toboggans to the Judges, fellow Competitors, and the public. The Technical Exhibition includes the initial Toboggan Safety Inspection, Weigh-In, Technical Presentations and a Spirit presentation.

Technical Poster: Print or digital media created to communicate design features of a Team's Toboggan in a comprehensive, interesting, and visually pleasing manner.

Technical Presentation: A presentation made by members of a Competing Team to communicate technical aspects of the design and construction of the Team's Toboggan, including safety considerations. This is a formal presentation delivered to Judges. Details on the Technical Presentation content and format are in Sections 5.8. and 8.3.

Theme: A chosen topic or concept to lead a Team's choices regarding Spirit components of the Competition.

Volunteer: Any individual officially assisting with running the Competition, who is not part of the Organizing Committee.

Weigh-In: An official measurement and recording of the Toboggan's unloaded (empty) weight, executed during the Technical Exhibition.

Appendices

Appendix A: Technical Report Requirement Checklist

Technical Report Requirement Checklist

The following checklist is provided as a courtesy and serves as a summary of the details to include in the Technical Report as per Section 7. [Toboggan Requirements](#). Teams are encouraged to go above and beyond the list below. The checklist includes but is not limited to:

1. Justifications and calculations to support all design assumptions made.
2. Justification for the towing attachment used on the Toboggan.
3. Final Mix Design composition for the Sliding Surface.
4. Load capacity calculation of the connection between the Superstructure and Sliding Surface.
5. Geometric Profile used to prevent the Toboggan from experiencing yaw rotation.
6. Type and method of ski wax application.
7. Design Calculation for flexural and compressive loading scenarios for the concrete and reinforcement.
8. Design calculations and justification that the Toboggan superstructure can withstand a front, rear, side or roll-over impact cases.
9. Design calculations and justification that the braking system can withstand braking forces.
10. Design calculations and justification that the ski mounts can withstand dynamic race forces.
11. Design calculations and justification that the steering system can withstand dynamic race forces, turning forces, and racer input torque.
12. Proof that the Toboggan is capable of safely bringing the Toboggan to a stop within the braking zone at the design speed.
13. Proof that the portion of the braking system creating the stopping force is located behind the Toboggan's center of gravity.
14. Explanation of the limiter device or design used to prevent oversteer of the Toboggan along with the maximum angle of turn.
15. Justification for any additional systems included on the Toboggan.
16. Construction photographs of the Toboggan.
17. Justification of the integrity for all connections, fasteners, and welds.
18. Professional Welder's license number (if applicable).
19. Securement method for the enclosure around the Superstructure of the Toboggan.
Design calculations and justification that the Toboggan enclosure and securement method can withstand dynamic loading of racers.
20. Design calculations and justification for the mitigation of an overturning moment of the Toboggan.

Appendix B: Detailed Scoring Rubric

Detailed Scoring Rubric

Category	Available Points	Score
<u>Toboggan Design</u>	35	
<u>Civil Design</u>	9	
<u>Concrete Reinforcement & Connection</u>	3	
1. Design Justification	1	
2. Accuracy and Quality of Calculations	1	
3. Construction and Execution of Design	1	
Sub-Category Total: Concrete Reinforcement and Connection		/3
<u>Concrete Mix</u>	3	
1. Design Justification	1	
2. Accuracy and Quality of Calculations	1	
3. Construction and Execution of Design	1	
Sub-Category Total: Concrete Mix		/3
<u>Geometric Profile & Formwork</u>	3	
1. Design Justification	1	
2. Accuracy and Quality of Calculations	1	
3. Construction and Execution of Design	1	
Sub-Category Total: Geometric Profile and Formwork		/3
Category Total: Civil Design		/9
<u>Mechanical Design</u>	12	
<u>Superstructure Design</u>	4	

1. Design Justification	1.33	
2. Accuracy and Quality of Calculations	1.33	
3. Construction and Execution of Design	1.33	
Sub-Category Total: Superstructure Design	/4	
<u>Braking System Design</u>	4	
1. Design Justification	1.33	
2. Accuracy and Quality of Calculations	1.33	
3. Construction and Execution of Design	1.33	
Sub-Category Total: Braking System Design	/4	
<u>Steering System Design</u>	4	
1. Design Justification	1.33	
2. Accuracy and Quality of Calculations	1.33	
3. Construction and Execution of Design	1.33	
Sub-Category Total: Steering System Design	/4	
Category Total: Mechanical Design	/12	
<u>Innovation</u>	6	
i. Innovation in Civil	3	
ii. Innovation in Mech	3	
Category Total: Innovation	/6	
<u>Sustainability</u>	7	
i. Environmental Impact of Materials	2	
ii. Manufacturing Sustainably	2	

iii. End of Life Toboggan Use	2	
iv. Life Cycle Analysis	1	
Category Total: Sustainability	/7	
<u>Toboggan Weight Accuracy</u>	1	
i. Toboggan Weight Accuracy	1	
Category Total: Toboggan Weight Accuracy	/1	
Toboggan Design Score	/35	
<u>Technical Communication</u>	17	
<u>Schedule</u>	1	
i. Schedule report discussion	0.25	
ii. Schedule KPI Audit Rubric	0.75	
Category Total: Schedule	/1	
<u>Budget</u>	1	
i. Budget Performance	1	
Category Total: Budget	/1	
<u>Safety Report</u>	2	
i. Report Deliverables ii. Conciseness and Clarity of Technical Language & Implementation of feedback from report 1	1	
iii. Effective use of Graphics, Tables Figures and Appendices	0.4	
iv. Completeness and Clearness of Calculations and Design Drawings	0.4	
v. Report Formatting	0.2	

Category Total: Safety Report	/2	
Technical Report	6	
i. Conciseness and Clarity of Technical Language	1.8	
ii. Effective use of Graphics, Tables Figures and Appendices	1.8	
iii. Completeness and Clearness of Calculations and Design Drawings	1.8	
iv. Report Formatting	0.6	
Category Total: Technical Report	/6	
Technical Presentation	5	
i. Conciseness and Clarity of Technical Language	1.5	
ii. Effective use of Graphics, Tables Figures and Appendices	1	
iii. Oral Presentation (Preparation Level, Confidence, Clarity)	1	
iv. Response to Questions from Judges	1	
v. Professionalism	0.5	
Category Total: Technical Presentations	/5	
Technical Display	2	
i. Display of Technical Content (Tech Ex Judge)	1	
ii. Presentation to Judges (Tech Ex Judge)	1	
Category Total: Technical Display	/2	
Technical Communication Score		/17
Race Day	28	

Fastest Run	7	
Steering Performance	7	
Braking Performance	7	
Reine de la Montagne	7	
Race Day Score	/28	
<u>Safety</u>	8	
<u>Safety Documentation</u>	2	
i. FLHA	1	
ii. JHA	1	
Category Total: Safety Documentation	/2	
<u>Safety Design</u>	4	
Superstructure	0.75	
Brake	0.75	
Steering	0.75	
Concrete Mix	0.50	
Concrete Reinforcement and Connection	0.50	
Geometric Formwork	0.75	
Category Total: Safety Design	/4	
<u>Safety Inspection</u>	2	
Presentation to Judges	0.3	
Ability to Respond to Questions	0.3	
Tilt Test Results	0.2	
Meets Safety Criteria for Racing	0.6	
Implementation of Required Changes	0.6	

Category Total: Safety Inspection	/2	
Safety Score	/8	
<u>Spirit, Theme, and Aesthetics</u>	12	
Theme & Costumes (Spirit Judges)	2	
Pre-Competition Spirit Challenges (Spirit Judges)	0.5	
Competition Spirit Challenges (Spirit Judges)	0.5	
Opening Ceremony Skit (Spirit Judges)	1	
Design, Visual Appeal and Incorporation of Theme in Technical Display (Spirit Judges)	1	
Design, Visual Appeal and Incorporation of Theme in Toboggan (Spirit Judges)	1	
Team Engagement & Participation (Spirit Judges)	2	
Attitude & Friendliness (Spirit Judges)	2	
Team Captains Communal Vote	1	
Organizing Committee Communal Vote	1	
Spirit, Theme, and Aesthetics Score	/12	
Overall Score Sub-Total	/100	
<i>BFYB Bonus Points</i>	/2	
Overall Total Score	/100	

Appendix C: Hill Information

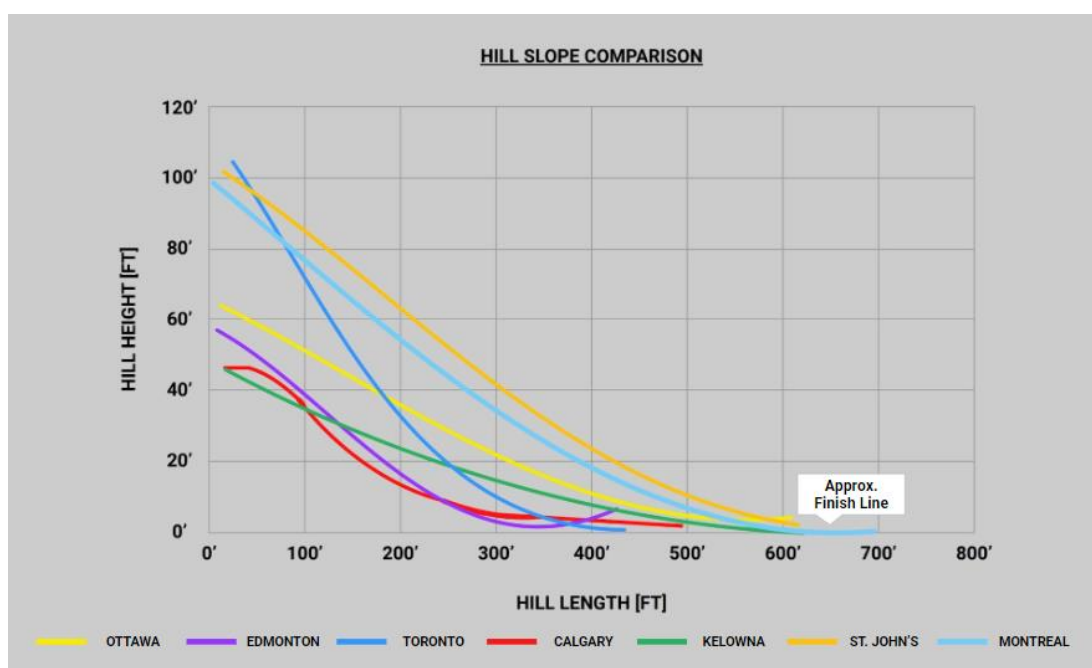
Hill Information

Disclaimer: The following information is intended to be used as reference material and may not reflect the actual conditions during the competition. The layout, length, and width may vary depending on winter site conditions. The GNCTR 2025 Organizing Committee reserves the right to modify the venue or layout at any time providing adequate justification.

General Information:

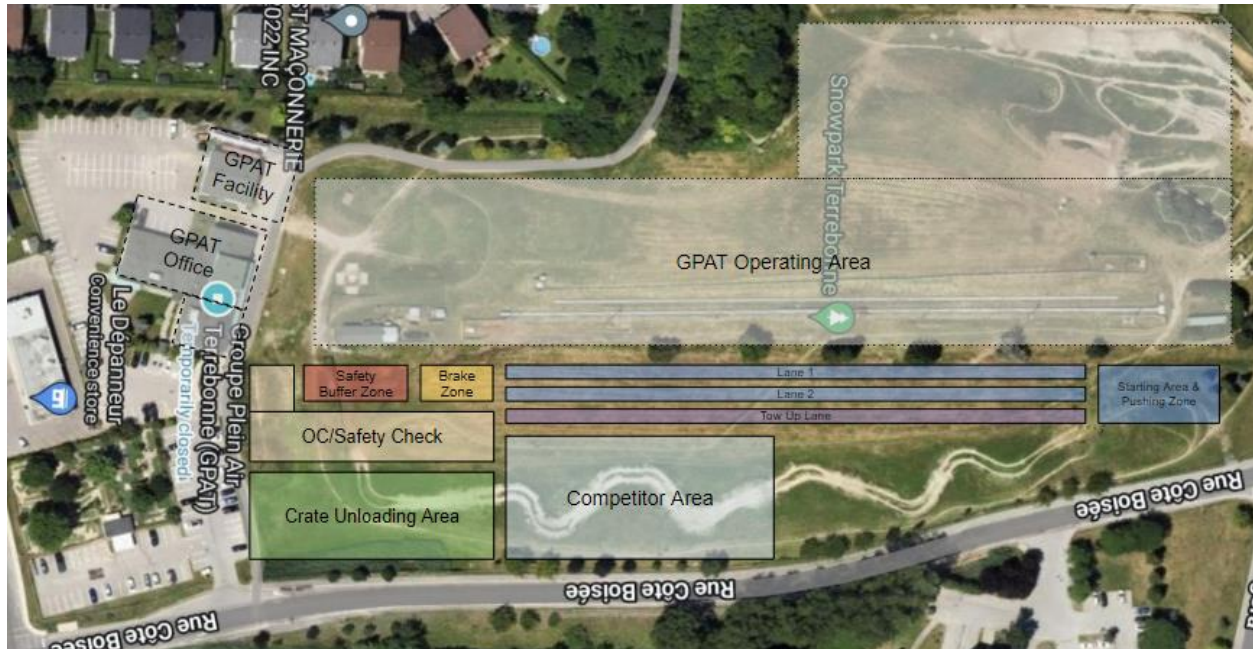
The 2025 GNCTR Competition will be conducted in Montreal, QC. Race day events will be held at Groupe Plein Air Terrebonne (GPAT) in Terrebonne, QC on a designated tube hill. Amenities such as tents, heaters, and seating will be available for competitors throughout the day. Washrooms are located near the tube hill in the lodge, but additional facilities may be opened for the event. Historical weather patterns suggest the weather should range between 0 to -20 degrees Celsius however competitors should view the weather prior to the event and pack accordingly. GPAT will be at full operation during Race Day. Safety barriers and anything else required to delineate between GNCTR Race Day operations and GPAT operations will be in place. All participants of Race Day must adhere to all safety protections implemented or may be subject to point deduction and/or removal from Race Day.

Hill Slope:



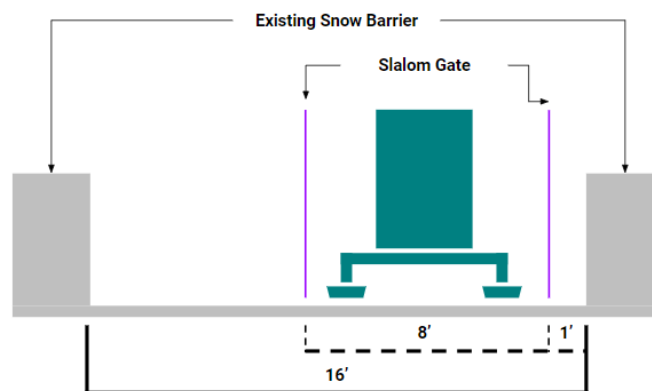
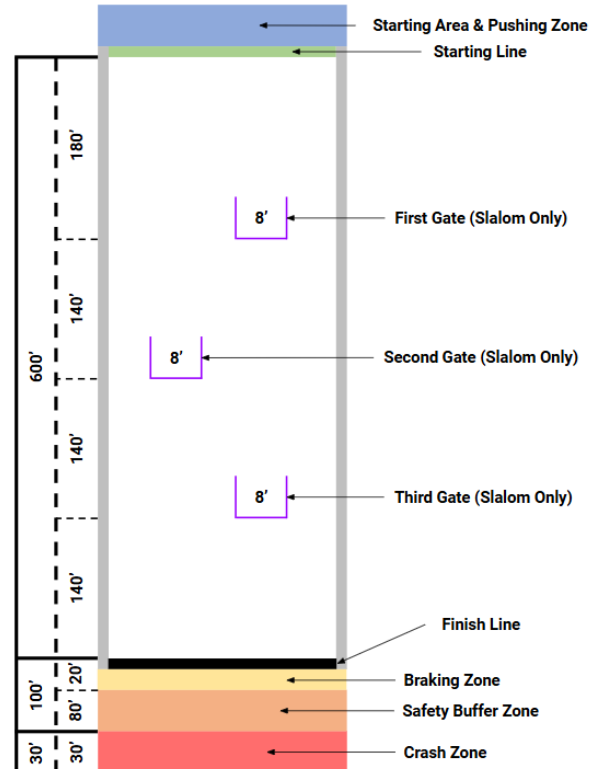
Overall Layout:

The following image reflects the anticipated overall site locations. Toboggans will be unloaded prior to team arrival in the storage area. Only members required for assembly should make their way to this area after unloading the bus. A volunteer will be present there and can be contacted for crate locations and assist if any unforeseen issues arise. The remaining team members can proceed to the competitor area.



Slalom Layout:

The following figures reflect the anticipated slalom gate distances however measurements may change based on snow conditions. Gates will be placed to highlight the lateral movement of the toboggan with an adequate safety factor for corrections. The Organizing Committee would like to test the steering capabilities of the toboggan and may adjust the width of the gates and distances between them to encourage sharper turning.



Appendix D: Braking Deployment Penalty Scenarios

Braking Deployment Penalty Scenarios

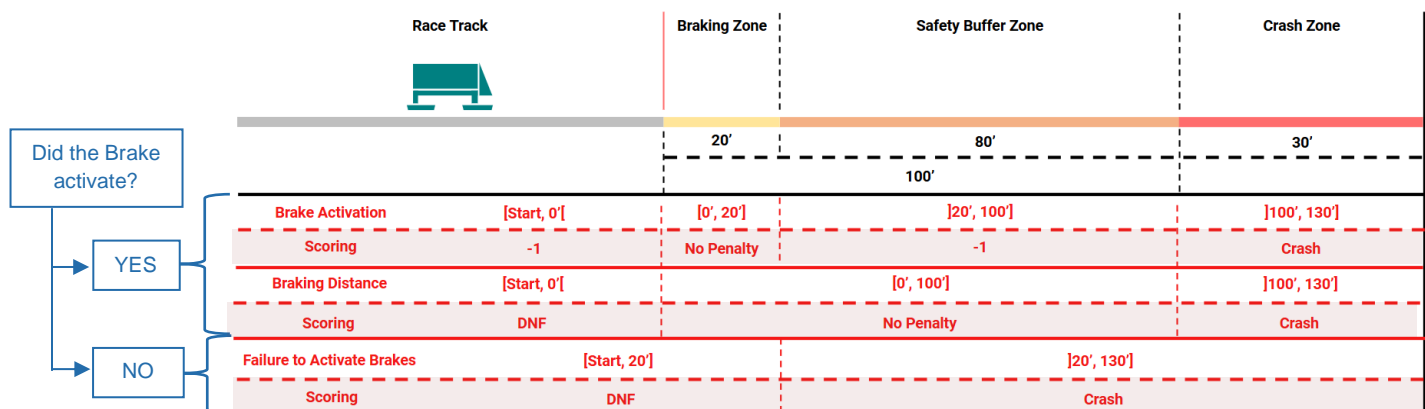
The following figure reflects the anticipated Braking Zone and Safety Buffer Zone measurements as well as the zones depicting the Brake Activation Penalty. Markings will be added to the racetrack to clearly indicate the Finish Line, the Braking Zone, and the Safety Buffer Zone. In order to avoid incurring penalties, a team's Toboggan must activate its Brake once the back of the Toboggan has passed the Finish Line, and the Toboggan must come to a stop within the Braking Zone or Safety Buffer Zone. All other outcomes will be subject to penalties as stated in [Section 11.2](#).

Brake Activation: If the brake is activated outside of the Braking Zone, a Brake Activation Penalty will be applied as shown in the image below.

Braking Distance: Once the brake is activated, depending on the distance achieved by the Toboggan, the scenario will be evaluated as shown in the image below. Please note that as of Version 5 of the GNCTR 2025 Rulebook, no additional penalty will be given based on Braking Distance.

Failure to Activate Brakes: If the brakes of the Toboggan malfunction and/or do not activate, depending on the distance achieved by the Toboggan, a penalty will be applied as shown in the image below.

Braking Zone Layout



Appendix E: Schedule KPI Audit Rubric

Schedule KPI Audit Rubric

KPI Audit Rubric	Weight	Score	Team Score
Weight values: 2 = Correct/NA, 1 = Needs Improvement, 0 = Missing/Incorrect			
Schedule Presentation			/8
Project Name and Schedule in Center Header	0.5	/2	
Team Logo in Right Header, OC Logo in Left Header	0.5	/2	
Date, Revision, Page Number in Footer	0.5	/2	
Team Name in Footer	0.5	/2	
Project Start/Finish, Duration, BL in Footer	0.5	/2	
Progress Layout – BL Start, BL Finish, BL Variance	0.5	/2	
Gantt Chart – Critical Path, Baseline, Data Dates are Correct	0.5	/2	
Time Scale – Weeks/Months are Correct	0.5	/2	
Project Baseline			/16
Correct Baseline Imported	2	/2	
Is Original Backup Baseline Saved	2	/2	
Gantt Chart Links Through Actual, not Baseline	2	/2	
Appropriate Level of Detail (4-week max duration)	2	/2	
Critical Path			/30
Critical Path is Displayed in Red	3	/2	
Competition is Linked to Critical Path	3	/2	

CP is Correct, Longest Path or Total Float equals 0 Days	3	/2	
CP is at a Minimum from the first task to the last task	3	/2	
No Lag on the Critical Path	3	/2	
Project Milestones			/8
Key Milestones are Displayed at top of schedule	1	/2	
Milestones are Linked to main Body of Schedule	1	/2	
Correct Milestone Type Shown (Start/Finish)	1	/2	
Correct Linkage to Main Body (FF/SS)	1	/2	
Preconstruction/Procurement			/6
Date of Contract Award (Rules Issued)	1	/2	
Design Development Shown	1	/2	
Construction Drawings Issued (This can be done in Phases, if applicable)	1	/2	
Calendars			/12
Appropriate Calendars Imported into Project (i.e., Academic Calendar for Team's institution)	2	/2	
Appropriate Calendar Assigned to Activities	2	/2	
Default Calendar set to Project Calendar	2	/2	
Schedule Logic			/60
No Constraint used	6	/2	
Long Lags used (4 weeks and greater)	6	/2	
Tasks have Correct multiple Predecessors	6	/2	

Tasks have Correct Multiple Successors	6	/2	
Milestones Linked Correctly	6	/2	
Progress Accuracy			/36
The Schedule Has Been Progressed	2	/2	
Durations Updated as Schedule Progresses	2	/2	
Baseline Updated if Required	2	/2	
Links Updated as Schedules Progresses	2	/2	
Each Progress has been saved separately	2	/2	
Milestones have been Progressed	2	/2	
Actual Dates are Accurate and not in the Future	2	/2	
Remaining Durations have been updated	2	/2	
Data Date is Correct	2	/2	

Appendix F: Budget Template

University of _____

Concrete Toboggan

Team Budget 2024-2025

TO DATE AS OF YYYY/MM/DD
PREPARED BY: _____

Project Budget for *GNCTR 2025* : EXPENSES

Administration & Finance	2025 Estimated	2025 Actual
Courrier fees	\$50	\$32
Printing	\$200	\$209
Registration	\$8 250	\$8 250
Sponsor thank-you gifts	\$250	\$250
Team meals	\$100	\$134
Team wear	\$1 200	\$1 162
Total	\$10 050	\$10 036

Concrete	2025 Estimated	2025 Actual
Mix materials	\$75	\$72
Ski form construction	\$240	\$268
Wax	\$110	\$100
Total	\$425	\$439

Events	2025 Estimated	2025 Actual
Events cost 1	\$80	\$72
Events cost 2	\$30	\$28
Events cost 3	\$50	\$48
Events cost 4	\$150	\$152
Events cost 5	\$90	\$90
Total	\$400	\$390

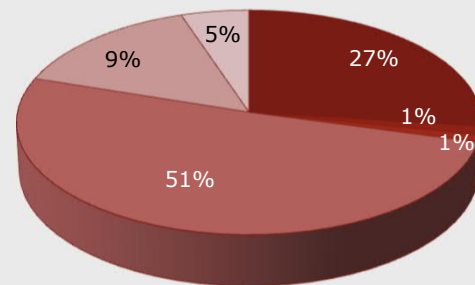
Logistics	2025 Estimated	2025 Actual
Accommodations	\$6 000	\$5 267
Shipping	\$1 700	\$1 539
Travel	\$12 000	\$12 072
Total	\$19 700	\$18 878

Superstructure	2025 Estimated	2025 Actual
Brake materials	\$200	\$150
Flooring	\$45	\$25
Frame materials	\$1 000	\$975
Siding	\$400	\$400
Ski mount materials	\$50	\$5
Steering materials	\$100	\$125
Paint	\$130	\$130
Welding and shop fees	\$4 500	\$3 700
Total	\$6 425	\$5 510

Technical Interaction	2025 Estimated	2025 Actual
Costumes	\$700	\$683
Crate/technical display construction	\$350	\$340
Paint	\$75	\$65
Patches	\$525	\$533
Props	\$100	\$65
Spirit	\$250	\$235
Total	\$2 000	\$1 920

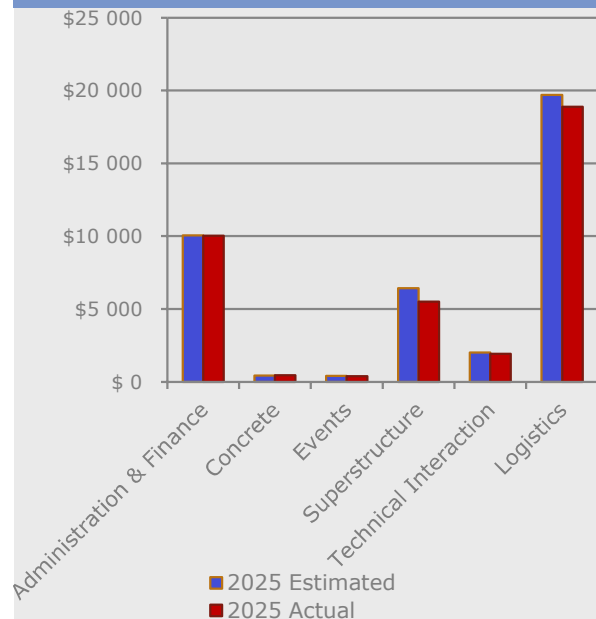
Total Expenses	2025 Estimated	2025 Actual
	\$39 000	\$37 173

Actual Cost Breakdown



■ Administration & Finance
■ Concrete
■ Events
■ Logistics

Estimated vs. Actual



University of _____

Concrete Toboggan

Team Budget 2024-2025

TO DATE AS OF YYYY/MM/DD
PREPARED BY: _____

Project Budget for *GNCTR 2025* : INCOME

Fundraising	2025 Estimated	2025 Actual
Fundraising event 1	\$500	\$252
Fundraising event 2	\$800	\$1 078
Fundraising event 3	\$500	\$700
Total	\$1 800	\$2 030

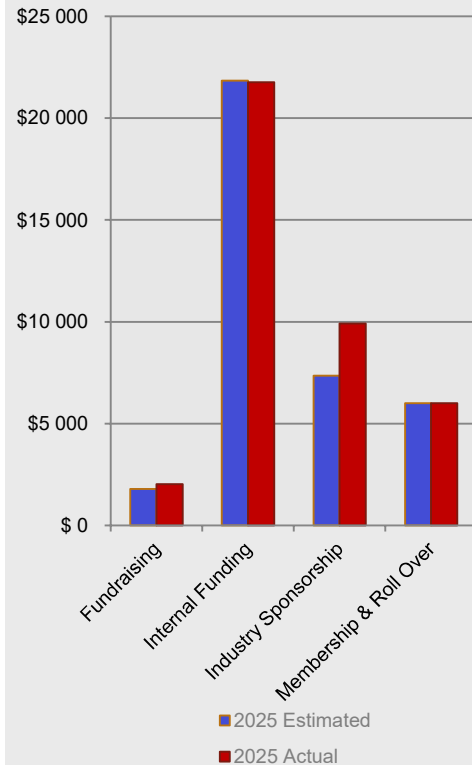
Internal Funding	2025 Estimated	2025 Actual
University funding 1	\$5 340	\$5 267
University funding 2	\$2 000	\$2 000
University funding 3	\$14 500	\$14 500
Total	\$21 840	\$21 767

Industry Sponsorship	2025 Estimated	2025 Actual
Sponsor 1	\$500	\$500
Sponsor 2	\$250	\$0
Sponsor 3	\$1 000	\$500
Sponsor 4	\$500	\$0
Sponsor 5	\$250	\$0
Sponsor 6	\$500	\$500
Sponsor 7	\$500	\$500
Sponsor 8	\$500	\$3 000
Sponsor 9	\$500	\$670
Sponsor 10	\$600	\$1 000
Sponsor 11	\$1 000	\$1 500
Sponsor 12	\$250	\$250
Sponsor 13	\$1 000	\$1 500
Total	\$7 350	\$9 920

Membership & Roll Over	2025 Estimated	2025 Actual
Membership & Roll Over 1	\$1 000	\$1 000
Membership & Roll Over 2	\$5 000	\$5 000
Total	\$6 000	\$6 000

Total Income	2025 Estimated	2025 Actual
	\$36 990	\$39 717

Income Comparison



University of _____

Concrete Toboggan

Team Budget 2024-2025

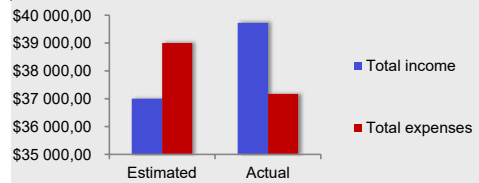
TO DATE AS OF YYYY/MM/DD
PREPARED BY: _____

Project Budget for *GNCTR 2025*: PROFIT/LOSS SUMMARY

	Estimated	Actual
Total income	\$36 990,16	\$39 716,89
Total expenses	\$39 000,00	\$37 173,11

Total profit (or loss)	(\$2 009,84)	\$2 543,78
------------------------	--------------	------------

Profit vs. Loss



University of _____

Concrete Toboggan

Team Budget 2024-2025

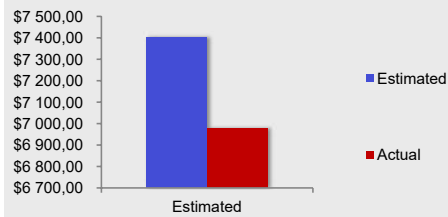
TO DATE AS OF YYYY/MM/DD
PREPARED BY: _____

Project Budget for *GNCTR 2025*: TOBOGGAN COST

	Estimated	Actual
Concrete (Expenses)	\$425,00	\$439,38
Superstructure (Expenses)	\$6 425,00	\$5 510,00
Donated materials (income)	\$450,00	\$564,00
Other (income)	\$100,00	\$465,00

Total Toboggan cost		
	\$7 400,00	\$6 978,38

Estimated Toboggan Cost vs. Actual Toboggan Cost

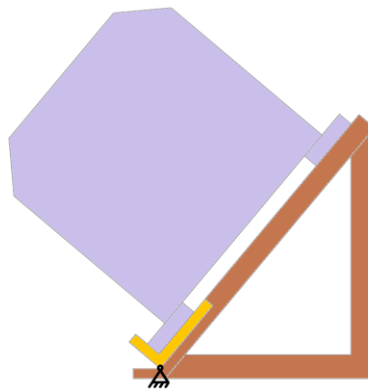


Appendix G: Tilt Test

Tilt Test

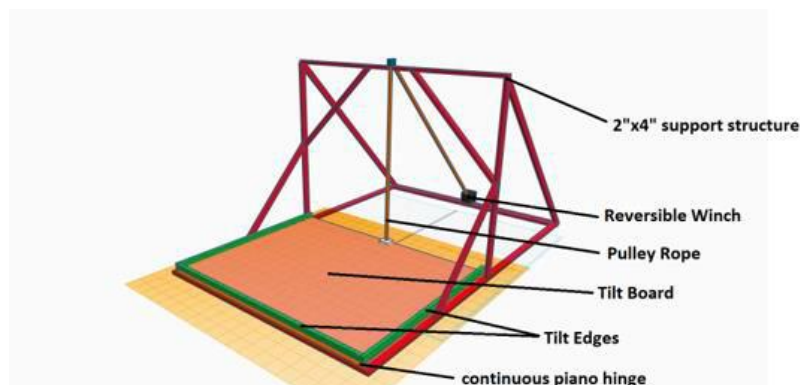
Each sled will be placed sideways on a 50 deg angled slope (depicted below) to test the capability of the sled to resist an overturn moment.

The sled will not have riders in it during the test. All concrete running surfaces must be attached at the time of the Static Tilt, attachment methods must be the same as those intended to be used for racing. If teams have multiple concrete designs or racing configurations, all variations must be displayed. Teams must provide center of gravity information for each configuration. The configuration to be tested will be determined by the judges.



The orange section will be able to rotate freely in the overturn direction. Safety straps will secure the sled so it is unable to fall. Any lifting of the uphill ski will result in a test failure and the sled will be deemed unsafe. Unsafe sleds will not be allowed to compete in dynamic events.

Please see figure below for a drawing of the tilt tester



Appendix H: Safety Inspection Checklist



GNCTR 2025 - Safety Inspection Checklist

School Name:		Filled out by:	
--------------	--	----------------	--

This checklist provides key elements of the GNCTR 2025 Official Competition Rules regarding toboggan design requirements. All Toboggans MUST pass this checklist in order to be allowed to race. However, Safety Judges may require additional safety features as they deem necessary that are not outlined in this checklist to allow for any Toboggan to race.

Feature	Yes	No	Notes
Weight under 350lbs at heaviest configuration (6.1.1)			Heaviest weight in lbs: _____
Accommodates 5 riders (6.1.2)			
Towing eyebolt exists (6.1.3)			
Towing eyebolt is secured (6.1.3)			
Towing eyebolt diameter >50mm (6.1.3)			
Roll cage exists (6.3)			
Sliding surfaces are concrete (6.2.1)			
Braking system deploys (6.4.1)			
Braking system touches the ground (6.4.1)			
Brakes behind CoG (6.4.1.5)			
No brake force on operator (6.4.1.7)			
Steering exists (6.4.2.1)			
Steering limiter exists (6.4.2.2)			
Weld quality passes visual check (6.5.5)			
Distance from helmet to roll cage $2 < d < 6$ in (6.6.2)			
Toboggan is enclosed appropriately (6.6.3)			
Seating has no protrusion (6.6.4)			
Foam padding all around (6.6.6)			
Hand grips (6.6.7)			
If has seats, mounting points are secured			
If has seats, restraints exist and are secured			
Racers can exit independently (6.6.9)			
Serious crash egress strategy (6.6.11)			
50 degree tilt test (7.5)			
Helmet certification check (9.3.3)			
Team has 6 x bite guards (9.3.4)			

Additional safety features required:	
--------------------------------------	--

CONCLUSION:		
PASS	FAIL	REVISIT (time permitting)

Appendix I: Hazard Analysis Forms



FIELD LEVEL HAZARD ASSESSMENT (FLHA) FORM

Created by the GNCTR 2025 Organizing Committee. To be completed by Participating Teams.

Date:

Name:

Site Location:

Work Area:

Weather		Emergency Contact Information			
Temperature:		Emergency Contact Name:		First Aid Kit Location:	
Wind:		Emergency Contact Phone #:		Fire Extinguisher Location:	
Precipitation:		Primary Communication Method:		Eye Wash Location:	
Supporting Documentation		Pre-Job Checklist			
Lock Out Tag Out (LOTO)	YES / NO	Are we working on the right component?		YES / NO	
Job Hazard Analysis (JHA)	YES / NO	Are we competently trained for the task?		YES / NO	
Standard Operating Procedure (SOP)	YES / NO	Do we have all the correct tools required?		YES / NO	
Confined Space Permit	YES / NO	Do we have all the required materials?		YES / NO	
Hot Work Permit	YES / NO				
Potential Hazards					
Human Factors		Environmental Hazards		Tool Hazards	
Distracted	YES / NO	Excessive Heat / Heat Stress	YES / NO	Excessive Loud Noises	YES / NO
Rushing	YES / NO	Excessive Cold / Hypothermia	YES / NO	Rotating Tools	YES / NO
Frustrated	YES / NO	Wildlife Encounters	YES / NO	Cutting Tools	YES / NO
Complacent	YES / NO	Spills Into Sensitive Area	YES / NO	Dust / Vapours / Fumes	YES / NO
Work Scope Understood	YES / NO	Slippery Conditions / Snow / Ice	YES / NO	Hazardous Chemicals	YES / NO
	YES / NO	Poor Lighting / Visibility	YES / NO	GFCI Protected Power Tools	YES / NO
Ergonomic Hazards		Job Site Hazards		Equipment Hazards	
Heavy Manual Lifting	YES / NO	Other Crews Working in Area	YES / NO	Clear Communication / Spotter	YES / NO
Repetitive Motion	YES / NO	Energized or Pressurized Equipment	YES / NO	Unobstructed View of Area	YES / NO
Awkward Body Position	YES / NO	Hot Surfaces / Steam / Extreme Cold	YES / NO	Aerial Work Platform	YES / NO
Pinch Points	YES / NO	Dropped Objects / Overhead Work	YES / NO	Crane or Other Lifting Equipment	YES / NO
Crush Points	YES / NO	Interactions with the Public	YES / NO	Overhead Lines	YES / NO
Uneven / Elevated Work Surface	YES / NO		YES / NO	Steep Grades	YES / NO



FIELD LEVEL HAZARD ASSESSMENT (FLHA) FORM

Created by the GNCTR 2025 Organizing Committee. To be completed by Participating Teams.

List all tasks that are planned for the work shift, any hazards that arise from these tasks, and the implemented control measures to mitigate these hazards

Job Tasks	Specific Hazards	Control Measures

The names of workers involved in these tasks must understand and agree to hazards and mitigations above.

Name	Signature	Name	Signature
1		7	
2		8	
3		9	
4		10	
5		11	
6		12	

Did any incidents occur during shift?	YES / NO	Are tools and materials stored securely?	YES / NO	List remaining hazards:
Who were incidents reported to:		Are there any hazards left at the job site?	YES / NO	

Foreman Name	Signature (Start of Shift)	Foreman Name	Signature (End of Shift)

Audit of FLHA	Auditor Name:	Needs Improvement / Good / Excellent
---------------	---------------	--------------------------------------



JOB HAZARD ANALYSIS (JHA) FORM

Created by the GNCTR 2025 Organizing Committee. To be completed by Participating Teams.

JHA Title:		Date Created:		
Form Completed By:		Project Manager:		
Location:				
Required PPE:		Speciality PPE:		
<p>JHA OBJECTIVE: Assign every working area activity a risk rating. Each rating is equal to the likelihood of an accident occurring multiplied by the severity of that accident (Ex: A fire in a lab due to the mixing of chemicals may be remote (2) in occurrence but may lead to hazardous (4) consequences, therefore, a fire would have a risk rating of 8). Once a possible accident has been assessed, controls may be administered to reduce the risk of the accident occurring by reducing the likelihood or the severity of the accident (Ex: Performing mixing near a fire extinguisher (administrative) and wearing protective equipment (PPE) could reduce the severity to minor (2), therefore the new risk rating would be 4). It is up to the project manager, design leads, workers, etc. to identify and list all possible safety risks that might occur within their working area and include all controls available to workers to help keep them safe.</p> <p><i>RISK RATING = LIKELIHOOD x SEVERITY</i></p>				
LIKELIHOOD			SEVERITY	
Level	Likelihood	Description	Level	Severity
1	Rare	Not expected to occur but still possible	1	Negligible
2	Remote	Not likely to occur under normal circumstances	2	Minor
3	Occasional	Possible or known to occur	3	Moderate
4	Frequent	Common occurrence	4	Hazardous
5	Almost Certain	Continual or repeating experience	5	Catastrophic
EXAMPLE				
No.	Task	Hazards	RATING w/o controls	CONTROLS TO REDUCE OR ELIMINATE HAZARD (Engineering, Administrative, PPE)
1	Mixing Chemicals	• Igniting a fire	8	• Have a fire extinguisher available • Wear safety goggles, gloves, lab coat ;)
				RATING w/ controls
				4

RISK MATRIX					
LIKELIHOOD/ SEVERITY	Rare (1)	Remote (2)	Occasional (3)	Frequent (4)	Almost Certain (5)
Negligible (1)	1	2	3	4	5
Minor (2)	2	4	6	8	10
Moderate (3)	3	6	9	12	15
Major (4)	4	8	12	16	20
Catastrophic (5)	5	10	15	20	25

ACTIONS FOR RISK LEVELS		
RISK LEVEL	RISK ACCEPTABILITY	RECOMMENDED ACTIONS
Low Risk	Acceptable	<ul style="list-style-type: none"> No additional risk controls may be needed. Frequent review and monitoring of hazards to ensure risk level is accurate and doesn't increase
Moderate Risk	Tolerable	<ul style="list-style-type: none"> Management attention is required A careful evaluation of hazards should be carried out to ensure risk level is as low as reasonably practicable Interim control measures may be implemented while longer term measures are being established
High Risk	Not Acceptable	<ul style="list-style-type: none"> Management review is required before work may commence High level risk must be reduced before work may commence

No.	Task	Hazards	RATING w/o controls	CONTROLS TO REDUCE OR ELIMINATE HAZARD (Engineering, Administrative, PPE)	RATING w/ controls
1		•	1	•	1
2		•	2	•	2
3		•	3	•	3
4		•	4	•	4
5		•	5	•	5
6		•	6	•	6
7		•	10	•	7
8		•	10	•	7
9		•	15	•	8
10		•	15	•	8
11		•	20	•	9
12		•	20	•	9
13		•	25	•	10
14		•	25	•	10

NOTE: If at any point any unforeseen hazard presents itself the supervisor shall halt the work until a decision is made on how to proceed safely.



JOB HAZARD ANALYSIS (JHA) FORM

Created by the 2025 Organizing Committee. To be completed by Participating Teams.

SIGN OFF FOR PERSON(S) CARRYING OUT THIS PROCESS ON THE WORK SITE:

Name:

Signature:

Date:

Appendix J: Life Cycle Analysis Template

Double click [here](#) to insert your team's name or logo.

Life-cycle Analysis Template

ISO 14001:2015 EMS

An understanding of your team's environmental impacts, even at a high level, will help concentrate efforts on where environmental performance can be improved the most. When applying a life cycle perspective, the following examples of activities, aspects, impacts, level of control or influence, risks and opportunities and actions; can be used to develop your own life cycle analysis.

Mechanical							
Life-Cycle Stage	Activity	Aspects	Impacts	Control or Influence	Risks	Opportunities	Operation Control
Life cycle stage	Example activity	Example aspect(s)	Example impact(s)	Possible considerations for control or influence?	Example risks to the organisation	Example opportunities for the organization	Examples of actions including operational control or influence
Examples for "supply chain"	Raw material extraction Underground or open pit mineral/ metal mining, drilling and pumping oil and gas	Discharge of mining tailings, fuel combustion, and fertiliser runoff	Resource depletion, surface and ground water quality, climate change, air quality	Control type of material used Limited influence of suppliers' processes	Unavailability of raw materials and parts due to depletion of natural resources	Securing a source of strategically important materials to ensure business continuity	Establish environmental requirements in the design process, e.g. relating to material use
Supply chain							
Manufacturing							
Transport and delivery							
End-of-life treatment							

Double click [here](#) to insert your team's name or logo.

Life-cycle Analysis Template

ISO 14001:2015 EMS

Civil							
Life-Cycle Stage	Activity	Aspects	Impacts	Control or Influence	Risks	Opportunities	Operation Control
Life cycle stage	Example activity	Example aspect(s)	Example impact(s)	Possible considerations for control or influence?	Example risks to the organisation	Example opportunities for the organization	Examples of actions including operational control or influence
Civil							
Manufacturing							
Transport and delivery							
End-of-life treatment							

Double click [here](#) to insert your team's name or logo.

Conclusions

Recommendations

Appendix K: “All dates in one place”

All dates in one place

Date(s)	Deliverable
June 14 th – 28 th , 2024	Theme selection and pre-registration
September 15 th – October 4 th , 2024	Initial registration
Start of construction date	Job Hazard Analysis (JHA)
The 5 th of each month following the Start of Construction	Field Level Hazard Assessment (FLHA)
October 11 th , 2024, or at Start of Construction	Baseline Project Schedule and Budget
October 11 th , 2024	Safety Report 1
October 18 th – December 1 st , 2024	Final payments and registration
October 25 th , 2024	Safety Report 1 Response
November 15 th , 2024	Approval for larger tech display
November 22 nd , 2024	Safety Report 2
November 22 nd , 2024	Only Safety Report submission for non-competing teams
November 22 nd , 2024, or prior to testing Toboggan	JHA Toboggan Racing
December 6 th , 2024	Safety Report 2 Response
January 3 rd , 2025	Technical Report
January 17 th , 2025	Technical Presentation
Deadline provided to captains one (1) week prior to its arrival	Audio and visual media for opening ceremonies spirit presentation
January 22 nd , 2025 @ noon	Three (3) Concrete Cylinders
January 22 nd – 26 th , 2025	Competition
Two (2) hours before Closing Ceremonies	Petitions
February 3 rd , 2025	Individual Scores
Two (2) weeks after Official Scores	Major issue petition