TRUE NORTH PAVILION

Project Proposal and Development Plan

Concept by BLGardner ~ 2026

TRUE NORTH PAVILION

A GIANT MAGNETIC COMPASS FOR DISCOVERY AND LEARNING

CONCEPT PAPER

True North Pavilion is a unique educational installation that brings the science of navigation to life. Encased and elevated above visitors, a giant magnetic compass card rotates freely to align with Earth's magnetic field.

Visitors look upward to watch the compass in real time - an awe-inspiring blend of science, engineering, and nature.

HIGHLIGHTS

REAL & ACCURATE
A true magnetic compass, not a decorative replica. Aligns with Earth's magnetic field.

SOLAR POWERED
Roof-mounted solar panels provide clean energy for electronics and lighting.

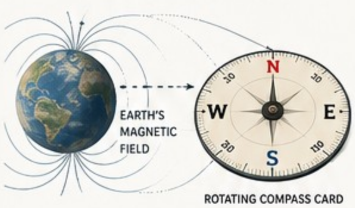
PROTECTED & DURABLE
Enclosed, weatherproof chamber protects the compass and keeps it secure.

EDUCATIONAL
Interpretive displays explain magnetism, declination, navigation and more.

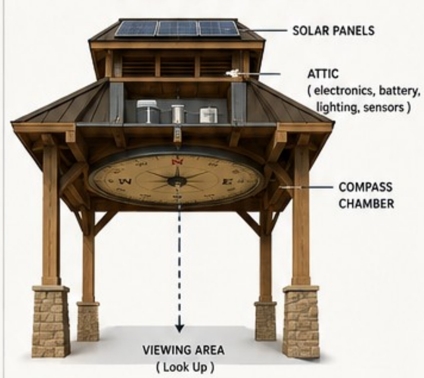
BUILT SUSTAINABLY
Constructed from non-magnetic materials in a magnetically safe location.

HOW IT WORKS

Earth's magnetic field exerts a tiny force on the compass assembly. A low-friction bearing allows it to rotate freely. Passive damping keeps the motion smooth and stable. Sensors read the heading and power an educational display for visitors.



STRUCTURE OVERVIEW



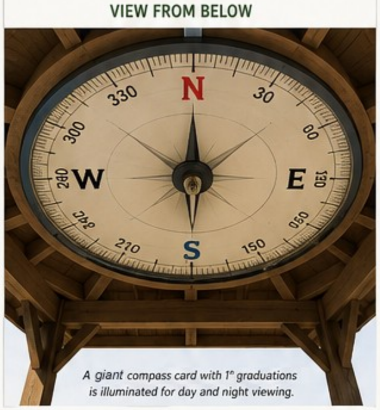
MATERIALS & DESIGN

- Magnetically neutral construction: wood, aluminum, brass, 300-series stainless.
- Non-magnetic fasteners and hardware.
- Located in a pre-approved magnetically quiet zone - away from buried utilities, fences, and other sources of interference.
- Compass chamber isolated from electronics to prevent magnetic noise.

WHY IT MATTERS

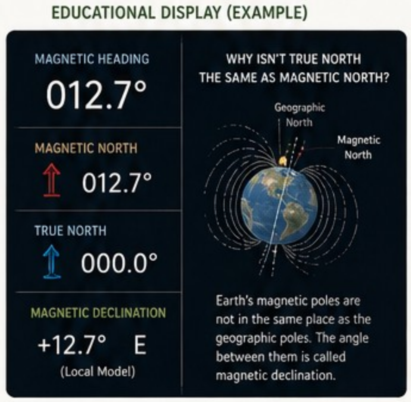
True North Pavilion inspires curiosity and hands-on learning about Earth science, navigation, and renewable energy. It's a destination that sparks wonder for all ages.

VIEW FROM BELOW



A giant compass card with 1° graduations is illuminated for day and night viewing.

EDUCATIONAL DISPLAY (EXAMPLE)



SITE PLAN (EXAMPLE)

TRUE NORTH PAVILION

LOOK UP. DISCOVER NORTH. EXPLORE OUR WORLD.

SCIENCE IN ACTION

POWERED BY THE SUN

BUILT FOR LEARNING

An educational landmark for parks, schools, and communities – designed to inspire generations.

TRUE NORTH PAVILION

A Student-Built Giant Magnetic Compass and Community Science Exhibit

Working project name: The True North Project

A proposed partnership among schools, STEM programs, parks, engineering firms, manufacturers, sponsors, and the local community.

Initial concept scale: 36 to 60 inch rotating compass card inside a protected solar-powered pavilion.

Executive Summary

The True North Pavilion is a proposal for a permanent outdoor science exhibit built around a large, working magnetic compass.

The centerpiece would be a circular compass card, initially planned at about 36 inches in diameter, with the possibility of going larger after the first prototypes are tested. The card would rotate freely on a low-friction bearing and use the Earth's magnetic field as its source of direction.

The entire compass would be housed above visitor reach inside a protected pavilion. Visitors would walk underneath it and look up to see the compass. The roof would protect the instrument from weather and provide a natural location for solar panels. An enclosed attic or service area above the compass would hold the battery, charge controller, electronics, sensors, lighting, and related equipment.

The project is especially well suited to a school or community STEM program because students can be involved in nearly every stage. They can study magnetism, build small prototypes, test different bearings and damping methods, design the structure, develop the solar system, write software, collect data, create signs, and help develop a permanent public exhibit.

The project should also include a safe, mechanical way for visitors to disturb the compass and then watch it return toward magnetic north. This should not be treated as a finished engineering solution at this stage. Instead, it should become one of the student engineering challenges.

Possible approaches include a spring-powered mechanical generator, a foot-operated or hand-operated mechanism, a temporary electromagnet, a retractable magnet, magnetic shielding or shunting, or other methods students may develop through testing.

The long-term goal is not simply to build a very large compass. The goal is to create a working scientific station that demonstrates Earth's magnetic field, allows visitors to conduct a simple experiment, and provides students with a long-term source of real data.

Because the installation may need to be located in a relatively remote, magnetically quiet area, protection from vandalism and unauthorized access must also be treated as a primary engineering requirement rather than an afterthought.

1. The Idea

The basic idea is simple.

Build a large magnetic compass that actually works.

Put it high enough that people cannot reach it.

Protect it inside an attractive park pavilion.

Let people stand below it and look up.

Then use the surrounding space to explain what they are seeing.

That simplicity is part of the appeal. A visitor does not need to operate a touch screen or read a long explanation before the exhibit becomes interesting. The compass is visibly doing something on its own.

The project can then answer the obvious question:

Why does it do that?

That question leads naturally into Earth's magnetic field, navigation, geography, physics, and engineering.

2. The Visitor Experience

The pavilion should feel more like a small outdoor observatory than a piece of playground equipment.

A visitor approaches the structure, enters the viewing area, and looks upward. The compass is visible above them through the protected chamber.

The compass face could include the cardinal and intercardinal directions, degree markings, and a clear indication of magnetic north.

A small display or illuminated panel could provide additional information such as:

- Current magnetic heading
- Magnetic north
- True north
- Local magnetic declination
- A simple explanation of Earth's magnetic field
- Solar energy being produced
- Battery status

The electronic display is secondary. The real attraction is the physical instrument overhead.

A possible visitor message is:

> ***LOOK UP. DISCOVER NORTH. EXPLORE OUR WORLD.***

Another is:

> ***You are watching Earth's magnetic field in action.***

3. Why This Makes a Strong STEM Project

This project has an unusual advantage over many school projects: the final product can remain in the community after the class is over.

Students would not just learn about magnetism. They would have to solve a real engineering problem.

The work naturally crosses several subjects.

Physics

Students can study magnetic fields, magnetic torque, friction, inertia, damping, and the difference between magnetic north and true north.

Mathematics

Students can work with angles, bearings, circles, scale, measurements, experimental data, and simple engineering calculations.

Mechanical Engineering

Students can design the compass card, hub, shaft, bearing, damping system, support structure, and maintenance access.

Electrical Engineering

Students can work with solar panels, batteries, charge controllers, low-voltage wiring, sensors, lighting, and power monitoring.

Computer Science

Students can collect heading data, operate a display, log measurements, and create a simple monitoring system.

CAD and Fabrication

Students can create drawings, make prototypes, compare materials, and work with wood, aluminum, composites, and other suitable materials.

Art and Communication

Students can design the compass face, signs, educational graphics, project identity, and public presentation materials.

This makes the project suitable for a team of classes or even several schools working together.

4. Student Development Plan

The project should be developed in stages. There is no reason to begin by trying to build the final compass.

The students should first prove the basic idea, then make it larger.

Phase 1: Discover

Suggested length: 4 to 6 weeks

Students start with ordinary compasses and simple experiments.

Topics include:

- How a compass works
- Earth's magnetic field
- Magnetic and true north
- Magnetic interference
- Permanent magnets
- Magnetic attraction and repulsion

Students can test common materials and objects to see what changes compass behavior.

The first project deliverable is a simple demonstration that shows what a compass needs in order to work and what can interfere with it.

Phase 2: Prototype

Suggested length: 6 to 10 weeks

The students build increasingly large versions.

A possible progression is:

- 6 to 12 inch prototype
- 18 to 24 inch prototype
- 30 to 36 inch prototype

At each stage they measure how the compass behaves.

Questions to answer include:

- How much friction does the bearing create?
- How quickly does the compass respond?
- How much does it overshoot?
- How long does it take to settle?
- Does it return to the same heading?
- Which magnet arrangement works best?
- Which materials are easiest to work with?

The goal is not to make a pretty prototype. The goal is to learn what makes a large compass work.

Phase 3: Engineer

Suggested length: 8 to 12 weeks

Once the prototype is understood, the students can begin the full design.

Teams can work in parallel.

Mechanical team

- Compass card
- Central hub
- Shaft
- Bearing
- Magnetic assembly
- Damping
- Service access

Electrical team

- Solar panels
- Battery
- Charge controller
- Sensors

- Lighting
- Power monitoring

Computer team

- Heading measurement
- Digital display
- Data logging
- Simple educational interface

Design and construction team

- Pavilion
- Roof
- Compass chamber
- Visitor area
- Signage
- Accessibility

The major deliverable is a complete design package that can be reviewed by professional partners.

5. The Compass

A rotating compass card is the preferred design.

A long needle would certainly be possible, but the card provides several advantages for this application. It gives a much larger viewing surface, makes the motion easy to see, and allows educational markings to be incorporated directly into the instrument.

The initial concept uses a 36 inch diameter card.

A 48 inch or 60 inch version should also be investigated. The final size should be based on the results of the prototypes rather than simply choosing the largest possible size.

The visible card should be lightweight. The magnetic material can be concentrated near the center where it is mechanically easiest to support.

The compass should not need a motor to point north.

The intended arrangement is:

- Earth's magnetic field provides the directional force.
- A precision bearing provides low-friction rotation.
- Passive damping controls unwanted oscillation.
- Electronics measure and explain what the compass is doing.

That distinction is important. If the power system fails, the compass should still work.

6. Damping and Stability

A large compass may continue to swing back and forth after it is disturbed. The first solution to investigate should be passive damping.

Eddy-current damping is particularly interesting because it can slow motion without requiring continuous electrical power.

Electromagnetic damping can be tested later if it provides a useful improvement.

The goal is not to force the compass to point north electronically. The goal is to allow the Earth's magnetic field to do the work while the mechanical system keeps the movement controlled and easy to observe.

3. The Interactive Disturbance Experiment

The disturbance mechanism should be treated as an open engineering problem for students.

The project should not begin by declaring that one particular mechanism is the answer. Students should investigate several methods, build prototypes, measure their results, and determine which approach provides the best combination of reliability, safety, repeatability, cost, vandal resistance, and educational value.

One promising concept is a spring-powered electrical system.

A visitor could press down on a large pad or lever located in a sturdy pedestal at the center of the pavilion. Pressing the pad would store energy in a spring. When the visitor releases the pad, the spring would slowly return to its original position while driving a small generator or dynamo.

The generated electricity could temporarily energize an electromagnet located near the compass assembly.

The intended sequence would be:

Visitor presses the pad.

Mechanical energy is stored in a spring.

The spring is released.

The generator produces a short electrical output.

The electromagnet temporarily disturbs the compass.

The magnetic influence is removed.

The compass is free again.

The compass swings and settles toward magnetic north.

This is only one possible approach. Students should also investigate alternatives.

4. Possible Disturbance Methods for Students to Investigate

Spring-powered dynamo and electromagnet

A spring could store the visitor's mechanical energy and use it to spin a small generator.

The generator could provide a short pulse to an electromagnet.

Potential advantages include:

- No battery required for the disturbance
- Visitor supplies the energy
- Easily understood by students
- Repeatable if the spring mechanism is controlled
- Electrical output can be measured
- Could be made entirely inaccessible to visitors

Questions for students to answer include:

- How much energy can a visitor comfortably supply?
- How much generator output is required?
- How long should the magnetic pulse last?
- How much compass movement results?
- Can the system be made repeatable?

Retractable permanent magnet

A permanent magnet could be mechanically moved into a controlled position near the compass and then retracted.

Students could investigate ways to park the magnet so its influence on the compass is very small when the system is not being used.

Magnetic shunt or flux path

A permanent magnet or electromagnet might be paired with a high-permeability magnetic path that redirects much of its magnetic flux away from the compass when the system is inactive.

This could allow the disturbance mechanism to remain in a fixed location.

The effectiveness of such a design would need to be demonstrated through testing.

Electromagnet with controlled shutoff

An electromagnet could provide the disturbance and then be switched off.

Students would need to determine whether the magnet core or nearby components retain enough residual magnetism to affect the compass.

A physical retraction or magnetic shunt might still be needed.

Mechanical impulse

Another possibility is a mechanism that gives the compass a carefully controlled mechanical impulse without continuing to constrain it afterward.

This approach would need to be considered carefully because the basic concept of the exhibit is that the compass should ultimately be free and respond to Earth's magnetic field.

5. The Most Important Requirement for the Disturbance System

Whatever method is selected, the disturbance system should never become the thing that actually points the compass north.

The compass should remain a free magnetic instrument.

The disturbance system should only move it away from equilibrium.

Once the disturbance is removed, the compass should be on its own.

A useful design principle is:

The visitor provides the disturbance. Earth's magnetic field provides the return.

6. A Possible Visitor Pedestal

The central pedestal is worth exploring as a major part of the exhibit.

A broad pad or lever could be placed low enough for younger children to operate.

The mechanism could be designed so that:

1. Pressing the pad stores mechanical energy.
2. The visitor reaches the end of the allowed travel.
3. A mechanical latch releases the stored energy.
4. The pad slowly rises as the mechanism returns to its resting position.
5. The generator or magnetic actuator operates during the controlled release.
6. The disturbance ends automatically.

The slow return of the pad would give visitors a visible indication that their mechanical energy is being used.

A small protected window could potentially allow visitors to see part of the spring or generator mechanism without giving them access to it.

That would make the pedestal itself an educational exhibit.

7. Measuring the Disturbance

The disturbance mechanism could also become a physics experiment.

The system could measure:

- Initial heading
- Maximum displacement
- Time to first return
- Number of oscillations
- Settling time
- Spring energy
- Generator output

A simple display might show:

DISTURBANCE: 18 degrees

SETTLING TIME: 16.4 seconds

The exact measurements and definitions should be developed during the prototype stage.

Teachers could ask students to predict how the compass will behave before activating the mechanism.

Students could then compare their prediction with the measured result.

8. Long-Term Geomagnetic Observation

The compass should also become a real scientific station.

The direction a compass points at a fixed location changes gradually over time because Earth's magnetic field changes.

The project could continuously record the local magnetic field and compare measurements from year to year.

A long-term data system could record:

- Date and time
- Compass heading
- Magnetic field strength
- Temperature
- Sensor readings
- Disturbance events
- Compass settling time

The exact sampling rate can be determined after the system has been tested.

The important idea is that the data record should continue for years.

A student who works on the project during its first year could establish a baseline that later students compare with measurements collected five, ten, or twenty years later.

9. Physical Compass and Electronic Sensor

The project could use two related but independent measurement systems.

The giant mechanical compass would provide the visible demonstration.

A separate electronic geomagnetic sensor could provide higher resolution measurements.

Students could compare the two.

For example:

What does the physical compass say?

What does the electronic sensor say?

How close are they?

Do both instruments show the same long-term trend?

This turns the project into more than a display. It becomes a real instrument validation exercise.

The electronic system should observe the compass rather than control its direction.

10. Site Selection

The site is a major part of the project.

The pavilion should be located in an area that has been surveyed for magnetic interference before the final design is approved.

A large open section of a park could be a good candidate. A frisbee golf area, dog park, or similar open space may provide the necessary separation from buildings and infrastructure, provided the site survey confirms that it is suitable.

The survey should look for possible sources of interference such as:

- Buried utilities
- Steel fences
- Reinforced concrete
- Light poles

- Motors
- Transformers
- Large electrical equipment
- Nearby structures
- Maintenance equipment
- Frequently parked vehicles

The exact exclusion distance should be determined from measurements at the proposed site.

11. Vandalism and Remote-Site Protection

Because the best magnetic site may be away from buildings and regular supervision, vandalism must be treated as a primary design requirement.

The goal should not be to make the pavilion look like a fortress. The goal is to make the important components difficult to reach, difficult to damage, and difficult to remove while keeping the visitor experience open and inviting.

This should become another student engineering challenge.

Passive protection first

The best protection is physical separation.

Visitors should not be able to reach:

- The compass bearing
- Magnets
- Electromagnets
- Wiring
- Batteries
- Solar charge equipment
- Sensors
- Generator components
- Fasteners that could be removed
- Service connections

The compass chamber should be enclosed with strong, transparent or translucent protective material that does not interfere with the magnetic system.

The exact material should be tested for optical quality, durability, weather resistance, and magnetic behavior.

Tamper-resistant construction

The project should investigate:

- Security fasteners
- Captive fasteners
- Hidden fasteners
- Reinforced service doors

- Internal hinges
- Protected cable routes
- Locked service compartments
- Anti-pry construction
- Tamper switches
- Impact-resistant panels
- Replaceable sacrificial panels

The goal is not to make every part indestructible. It is to make the system difficult to damage casually and easy for authorized personnel to service.

Protecting the visitor controls

The central disturbance pedestal should be designed so that the public can operate it without gaining access to the mechanism.

The pad or lever should have a defined range of movement and a mechanical stop.

The mechanism should tolerate repeated use and reasonable abuse.

It should also be designed so that someone standing or jumping on the control cannot damage the generator, spring, or compass.

Solar panels and electronics

The solar panels are likely to be among the most exposed components.

Possible approaches include:

- Mounting them above normal reach
- Using a suitable roof angle
- Protecting edges and wiring
- Routing wiring inside structural members
- Avoiding exposed connectors
- Using tamper-resistant hardware
- Housing batteries and electronics in a locked interior service compartment

The final design should also consider whether solar panels can be damaged by thrown objects or other activity in the surrounding park.

Vandalism testing as a student project

Rather than simply guessing what will protect the pavilion, students could perform controlled tests on small-scale prototypes.

For example:

Can this panel be pried loose?

Can this fastener be removed with common tools?

Can someone reach the wiring?

Can a person force the visitor control beyond its normal travel?

What happens if the protective panel is struck repeatedly?

Can water enter the service compartment?

The tests should be conducted on inexpensive prototype components, not the finished pavilion.

This creates another authentic engineering cycle:

Design -> Test -> Fail -> Improve -> Retest

That is exactly how real-world engineering works.

11. Materials and Magnetic Cleanliness

The compass does not need to be shielded from Earth's magnetic field. In fact, that field is exactly what makes the instrument work.

Instead, the area around the compass should be kept as magnetically quiet as practical.

The pavilion can be built primarily from materials such as:

- Wood
- Aluminum
- Brass or bronze
- Suitable composites
- Carefully selected stainless steel

One point deserves special attention: stainless steel is not automatically nonmagnetic.

Austenitic 300-series stainless steels are generally low in magnetic response, but manufacturing and cold working can change that behavior. Finished components should therefore be tested when they are close enough to matter.

A simple project rule can be adopted:

Nothing magnetic goes near the compass unless there is a good reason for it.

12. Electronics and Solar Power

The roof provides a natural location for solar panels.

The attic or upper service area can contain:

- Battery
- Solar charge controller
- Microcontroller
- Sensors
- LED drivers
- Communications equipment
- Data storage
- Service disconnects

The electrical system should be physically separated from the compass.

A conductive enclosure may be useful for protecting sensitive electronics from radio frequency and electrical interference. This is different from shielding the compass from Earth's magnetic field.

The compass itself should not be placed inside a magnetic shield.

The system should also be designed so that current-carrying wires and other sources of magnetic noise are kept away from the compass chamber.

13. Power Independence

The electronics should be designed around a modest, predictable load.

Possible loads include:

- Heading display
- Small LED lighting system
- Sensors
- Data logging
- Wireless communications
- Educational audio, if desired

The exact solar panel and battery size should be determined after the prototype electronics are built and measured.

A simple display could show:

SOLAR ENERGY TODAY

BATTERY LEVEL

CURRENT MAGNETIC HEADING

This makes the power system part of the lesson instead of hiding it.

11. Data and Long-Term Science

One of the most interesting possibilities is to let the compass become a long-term science station.

A sensor can record the heading continuously.

Students could later study:

- Daily changes
- Seasonal changes
- Magnetic declination
- Local disturbances
- Long-term trends
- Differences between the physical compass and electronic sensors

This gives future classes something to work with even after the original builders have graduated.

The pavilion could therefore become a permanent part of the school's science program.

12. Preliminary Size

The following numbers are starting points, not final engineering dimensions.

Component	Preliminary target
Compass diameter	36 to 60 inches
Compass chamber	About 5 to 7 feet across
Pavilion footprint	About 12 to 18 feet across
Overall height	About 12 to 16 feet
Compass position	Well above adult reach
Roof	Weather protection and solar panels
Upper service area	Battery, electronics, sensors, lighting
Visitor view	From below
Compass power source	Earth's magnetic field
Electrical power	Solar and battery

The final dimensions should be established after prototype testing, site review, accessibility review, and structural engineering.

13. Safety and Accessibility

The finished structure must be reviewed by qualified professionals and the appropriate local authorities.

Areas that need professional review include:

- Structural design
- Wind and snow loads
- Electrical safety
- Foundation and site work
- Fire safety
- Accessibility
- Visitor circulation
- Maintenance access
- Service disconnects
- Lighting
- Long-term durability

The compass should remain out of visitor reach.

The path into the viewing area should be designed so that children, adults, wheelchair users, and school groups can all use the exhibit comfortably.

14. Working With Professional Partners

This project does not need to be built entirely by students.

In fact, it should not be.

Students should do the work that provides the greatest educational value while qualified professionals handle work that requires professional certification, specialized equipment, or legal responsibility.

A partnership model could look like this.

School or STEM program

Provides:

- Students
- Teachers
- Curriculum time
- Classroom facilities
- Project coordination

Park department or municipality

Provides:

- Candidate site
- Site information
- Approvals
- Long-term stewardship

Engineering partner

Provides:

- Mechanical engineering
- Structural review
- Electrical guidance
- Safety review
- Professional mentoring

Fabrication partners

Provide:

- Machining
- Specialized fabrication
- Materials
- Equipment access

Sponsors

Provide:

- Funding
- Materials
- Solar equipment

- Technology
- Professional services

This approach also gives students a chance to see how a real engineering project is organized.

15. Community Value

A finished pavilion can serve several purposes at once.

For schools, it is a permanent outdoor classroom.

For teachers, it is a hands-on teaching instrument.

For students, it is a project they can point to years later and say they helped build it.

For the park, it is a distinctive attraction that gives visitors another reason to stop.

For families, it is a free science experience.

For sponsors, it is a visible investment in education and the community.

For engineering and manufacturing companies, it is an opportunity to support local STEM education while giving employees a meaningful mentoring project.

16. Project Timeline

A reasonable first estimate is 18 to 30 months from project launch to public opening.

Stage	Approx. time	Result
Form project team	1 to 2 months	Partners and project plan
Identify possible sites	1 to 2 months	Candidate locations
Magnetic site survey	1 month	Site selection
Classroom studies	1 to 2 months	Student foundation
Small prototypes	2 to 3 months	Working proof of concept
Larger prototypes	2 to 3 months	Mechanical data
Full engineering design	2 to 4 months	Construction package
Fundraising and procurement	2 to 4 months	Materials and services
Pavilion fabrication	3 to 5 months	Structure
Final compass fabrication	2 to 4 months	Working instrument
Site installation	1 to 2 months	Completed pavilion
Testing and calibration	1 to 2 months	Verified operation
Public opening	Project milestone	Community exhibit

Several stages can overlap, especially fundraising, engineering, and classroom work.

17. Budget Framework

It would be premature to put a firm dollar figure on the project before the prototype and site are defined.

The major cost areas are likely to be:

- Engineering and professional services

- Magnetic site survey
- Structural materials
- Compass mechanism
- Magnets
- Precision bearing
- Damping system
- Solar panels
- Battery
- Electronics
- Display and lighting
- Pavilion construction
- Foundations and site work
- Signage
- Accessibility improvements
- Testing equipment
- Long-term maintenance

The student and sponsor model may make it possible to obtain donated materials, professional time, fabrication, or equipment.

18. Risks and How to Handle Them

The compass does not rotate reliably

Build progressively larger prototypes before committing to the final size.

Bearing friction is too high

Measure it directly and compare several bearing designs.

The site has magnetic interference

Survey the site before construction and choose another location if necessary.

The compass oscillates too much

Test passive damping first, then consider controlled electromagnetic damping.

Electronics affect the compass

Increase physical separation, reduce current loops, test wiring layouts, and keep magnetic components away from the compass.

The project becomes too large for one class

Divide the work into teams and involve several classes, schools, or community partners.

The project becomes too expensive

Separate the project into stages and seek sponsors for specific pieces such as the bearing, solar system, pavilion materials, electronics, or signage.

19. Measures of Success

The project should be judged by more than how large the compass becomes.

Scientific success

- The compass reliably aligns with Earth's magnetic field.
- The movement is repeatable.
- Local magnetic interference is understood.
- Measurements are documented.

Engineering success

- The structure is safe and durable.
- The compass requires little maintenance.
- The solar system reliably supports the electronics.
- The system continues to work when the electronics are off.

Educational success

- Students participate in design, testing, and problem solving.
- Students can explain the science behind the instrument.
- Multiple subject areas are involved.
- Future classes can continue using the installation.

Community success

- The pavilion is attractive and accessible.
- The public can understand what they are seeing.
- Schools can use it for field trips.
- The exhibit becomes a recognizable local feature.

20. The Long-Term Vision

The True North Pavilion should not be thought of simply as a very large compass.

It is a public scientific instrument built by students.

It can become a permanent outdoor classroom, a STEM project, a community landmark, a renewable energy demonstration, a long-term data station, and a place where students can see the results of their work every time they visit the park.

The most important part may be the simplest.

A child walks into the pavilion, looks up, and sees a compass several feet above them quietly turning toward north.

That creates a question.

Why?

The project gives students a chance to discover the answer by building the instrument themselves.

Appendix A: Design Principles

1. The compass should work without electricity.
2. Earth's magnetic field should provide the primary directional force.
3. Electronics should measure and explain the compass rather than point it.
4. The compass chamber should be protected from weather and physical access.
5. The site should be magnetically surveyed before construction.
6. Ferromagnetic materials should be kept away from the compass.
7. Finished materials should be tested when necessary.
8. Electronics and batteries should be physically separated from the compass.
9. Passive damping should be investigated before powered damping.
10. Safety and maintainability should take priority over size.
11. The project should remain valuable even if the final compass is smaller than originally planned.
12. The pavilion should be designed as a permanent community resource.

Appendix B: Suggested Project Identity

Public name: TRUE NORTH PAVILION

Educational program: THE TRUE NORTH PROJECT

Possible tagline: LOOK UP. DISCOVER NORTH. EXPLORE OUR WORLD.

Core message: EARTH'S MAGNETIC FIELD IN ACTION.

Project Status

This is a concept and development proposal, not a final structural, mechanical, electrical, or geotechnical design.

Final engineering, material specifications, site selection, accessibility provisions, permitting, construction, and safety requirements should be reviewed by qualified professionals and the appropriate local authorities.

The dimensions and technical approach in this document are starting points for investigation. Prototype testing should determine the final compass size, bearing, magnetic assembly, damping method, power system, and pavilion design.