



REQUEST FOR PROPOSAL
For
SCIENCE IMMERSION LAB PROJECT

by
***New Albany-Floyd
Consolidated School Corporation***

July 23, 2021

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1 GENERAL INFORMATION AND REQUESTED SERVICES

1.1 INTRODUCTION

New Albany-Floyd Consolidated School Corporation (NAFCS) requests Proposals for Science Immersion Lab Project at Floyd Central Senior High School. The Owner's objective in issuing this Request for Proposal (RFP) is to provide a competitive means in which to select a cost-effective solution with simplicity of design. The cost of preparing a response to this RFP, including site visits and engineering analysis will not be reimbursed by the NAFCS.

1.2 DEFINITIONS AND ABBREVIATIONS

Award Recommendation	NAFCS's summary to the School board of the proposals and suggestions on vendor selection for purposes of beginning contract negotiations.
Contract Award	The acceptance of the Award Recommendation by the School Board
Contractor	The offeror who responds to this solicitation by submitting an offer, to whom the award is made, whose proposal was determined to be the most advantageous to NAFCS, and who then enters into a contract with NAFCS.
Installation	The delivery and physical setup of products or services requested in this RFP
Offer or Proposal	An offer as defined in Ind. Code § 5-22-2-17
Offeror or Respondent	An offeror as defined in Ind. Code § 5-22-2-18. NAFCS will not consider a proposal responsive if two or more offerors submit a joint or combined proposal. One entity or individual must be clearly identified as the Respondent who will be ultimately responsible for performance of the contract
Services	Furnishing of labor, time, or effort not involving the delivery of specific supplies other than printed documents or other items that are merely incidental to the required performance and to be performed as specified in this RFP
Supplies	Equipment, goods, products, and materials as specified in this RFP
Total Bid Amount	The amount that the Respondent proposes represents their total, all-inclusive price.

1.3 AWARDS UNDER THE RFP

It is the intent the award shall be made to the responsible offeror whose proposal is determined in writing to be the most advantageous to NAFCS, taking into consideration price and the other evaluation factors set forth in the request for proposal.

1.4 SUMMARY OF PRODUCTS & SERVICES

Provide a Fulldome Projection System

Single projector, center-mounted Digistar 7 with new Canon laser-phosphor-illuminated digital cinema projector, custom fisheye lens, stand and cover, two custom Dell computers, dual monitors, keyboard/mouse, Digistar7 real-time software with perpetual license; includes Cloud Library, DomeCasting, STEAM teaching assets, Science on a Sphere datasets, Data2Dome, Show Builder, Spitz/Bradstreet astronomy curriculum, remote control from anywhere in the planetarium via included iPad mini and Xbox controller, new controller to interface with existing cove lighting, and installation/ integration.

Specifications are included in exhibit A

1.5 QUESTION/INQUIRY PROCESS

Questions/Inquiries may be submitted via bwiseheart@nafcs.org and must be received by 8/13/2021. The subject line of the email submissions must clearly state the following:

FCHS - Science Immersion Lab Project

NAFCS will compile a list of any questions/inquiries submitted by Respondents. No Respondent shall rely upon, take any action, or make any decision based upon verbal communications with any NAFCS employee. Inquiries are not to be directed to any staff member of NAFCS. Such action may disqualify Respondent from further consideration for a contract resulting from this RFP.

If it becomes necessary to revise this RFP, or if additional information is necessary for a clearer interpretation of provisions of this RFP prior to the due date for proposals, an addendum will be posted on the NAFCS website. If such an addendum is necessary, NAFCS may extend the due date and time of proposals to accommodate such additional information requirements.

1.6 DUE DATE FOR PROPOSALS

The proposals will be received on Tuesday, August 17, 2021, at 2:00 p.m. (Prevailing Local Time) Proposals must be delivered to Bill Wiseheart, New Albany Floyd County School Corp., 2809 Grant

Line Rd, New Albany, IN 47150, and copy via email to bwiseheart@nafcs.org All proposals received after that time will not be considered and returned to that submitter.

Regardless of the delivery method, all proposals must be **sealed** and identified with the RFP information. NAFCS will not accept any unsealed proposals. Any proposal received by NAFCS after the deadline will not be considered even if postmarked before the deadline.

NAFCS accepts no obligations for costs incurred by Respondents in anticipation of being awarded a contract.

1.7 MODIFICATION OR WITHDRAWAL OF OFFERS

Modifications to responses to this RFP may only be made consistent with the submittal of the original response, acceptable to NAFCS, and clearly identified as a modification. Only Respondent's authorized representative may modify or withdraw its proposal and prior to the deadline.

1.8 PRICING

Pricing on this RFP must be firm and remain open for a period of not less than 60 days from the proposal due date.

1.9 PROPOSAL CLARIFICATIONS AND DISCUSSIONS, AND CONTRACT DISCUSSIONS

NAFCS reserves the right to request clarifications on proposals submitted to NAFCS. NAFCS also reserves the right to conduct discussions, either oral or written, with Respondents. These discussions could include a request for additional information. NAFCS will provide equivalent information to all Respondents which have been chosen for discussions. Discussions, along with negotiations with responsible Respondents, may be conducted for any appropriate purpose.

1.10 BEST AND FINAL OFFER

NAFCS may request best and final offers from those Respondents determined by NAFCS to be reasonably viable for contract award. However, NAFCS reserves the right to award a contract on the basis of initial proposals received. Following evaluation of best and final offers, NAFCS may select for final contract negotiations that are most advantageous to NAFCS, considering cost and the evaluation criteria in this RFP.

1.11 CONFIDENTIAL INFORMATION

Respondents are advised materials contained in proposals are subject to the Indiana Access to Public Records Act (APRA), and after the contract award, the entire RFP file may be viewed and copied by the public.

1.12 TAXES

Proposals should not include any tax from which NAFCS is exempt.

1.13 GOVERNMENT REGISTRATION

Respondents must possess any required licenses and registrations issued by state, county, and local governmental entities.

1.14 COMPLIANCE CERTIFICATION

Responses to this RFP serve as a representation neither Respondent nor its principal(s) is presently in arrears in payment of taxes, permit fees, or other statutory, regulatory, or judicially required payments or reports to the State of Indiana. Submission of a proposal is a warranty by the Respondent that it has no current, pending or outstanding criminal, civil, or enforcement actions initiated by any governmental entity within the State of Indiana. Respondents also by submitting a proposal represents neither it nor its principals nor any of its subcontractors are presently debarred, suspended, proposed for debarment, declared ineligible, or voluntarily excluded from entering into a contract with NAFCS by any federal agency or by any department, agency or political subdivision of the State of Indiana.

1.15 SUMMARY OF MILESTONES

Due to the unpredictable nature of the evaluation period, the estimated dates below are subject to change.

Publication of RFP	7/23/2021
Deadline to Submit Written Questions	8/12/2021
Response to Written Questions/RFP Amendments	8/13/2021
Submission of Proposals	8/17/2021

*The dates for the following activities are target dates only. These activities may be completed earlier or later than the date shown.

Proposal Evaluation	8/19/2021
RFP Award Recommendation	9/03/2021
Award of Contract	9/13/2021

2 SECTION II PROPOSAL PREPARATION INSTRUCTIONS

2.1 GENERAL

SECTION II: PROPOSAL FORMAT & CONTENT

I. Executive Summary

A. Responses shall include a concise abstract stating the respondent's understanding of the project.

II. Company Qualifications

A. **Company Profile:**

1. Provide general information on the responding firm including company name, address, telephone number, and contact person(s) for this project.
2. Where is the company's headquarters located?
3. How many years has your company has been involved in planetarium installations?

B. **Insurance Certificate**

1. The Contractor shall include a certificate of insurance in the Proposal indicating its insurance coverage, and the Contractor shall maintain such insurance in full force and effect at all times until the Work has been completed, in the following minimum amounts:

<u>COVERAGES</u>	<u>LIMITS OF LIABILITY</u>
General Liability	\$1,000,000
Umbrella Policy in addition to individual coverage	\$1,000,000

C. **Proposal Documents**

1. Proposal Form
 - a) Complete and include the proposal (page 8)
2. Indiana Form 96 (exhibit B)
 - a) Complete and include Form 96

Proposal Form

The Owner intends to award a contract to the Contractor offering the Best Value proposal. The Owner will likely reject any proposal that does NOT meet the minimum criteria described in this RFP.

The undersigned proposes to furnish all labor, materials, tools, equipment, and transportation necessary for:

Science Immersion Lab Project

In accordance with this RFP and the needs and solutions described in the provider's proposal for the sum of:

Base Proposal:

_____ \$ _____
(written amount) (numerals)

Alternate (If applicable):

_____ \$ _____
(written amount) (numerals)

Shipping (If applicable):

_____ \$ _____
(written amount) (numerals)

Supplemental Documents: (attach to Proposal) State Form 96 (revised 2009)

Company Name

By (authorized signature)

By (printed name)

Date _____

Office telephone _____

Email _____

SECTION III: PROPOSAL EVALUATION CRITERIA

The Owner intends to award a contract to the Contractor offering the Best Value proposal. The Owner will likely reject any proposal that does NOT meet the minimum criteria described in this RFP.

EXHIBIT A

Floyd Central Immersion Lab Specifications

- 1.0 The School Corporation shall extract and remove the Spitz 512 star instrument, cables and console, and provide additional power outlets, flush floor, as necessary.
The new digital planetarium system shall be integrated, by the supplier, with the existing LED cove lighting and sound system. Since the fulldome system shall be able to stream any desktop application onto the front of the dome, the existing inset projector and early e-Media system shall not be integrated.

2.0 TECHNICAL SPECIFICATIONS

The digital planetarium shall be a true astronomical simulator for dome teaching. The system shall compose the scene virtually within the computer software.

Realtime images of additional STEAM topics for dome teaching must also be included, as well as pre-rendered fulldome movies and the ability to display them on the dome through a single projector fitted with a fisheye lens.

2.1 OPERATOR'S WORKSTATION

The User interfaces shall include two 24" 1920 X 1200 flat panel LCD monitors, mouse and a keyboard, which shall be installed on a customer-supplied console or table, or built into an optional control desk supplied from the system manufacturer at extra cost.

2.1.2 COMPUTING RACK

An equipment rack housing two (2) Dell custom computers shall be supplied and installed by the planetarium contractor in a back room, tech closet, or other location within the theater. One, controlling PC shall run the realtime user-interface applications and the system automation software. The other two shall run the realtime rendering applications exclusively, which, taking commands from the controlling computer, shall generate the high-resolution real time images to be displayed on the dome.

2.1.3 HOST PC:

- A. Processor: Dual Intel(R) Xeon(R) Silver 4110 CPU @ 2.1GHz, 3.0GHz Turbo, 8 Core(s), 16 Logical Processor(s)
- B. Memory: 32GB, 2666MHz DDR4 RDIMM ECC
- C. Graphics Subsystem: Nvidia GeForce RTX 3070
- D. Disk Storage: 2TB SSD
- E. Operating System: Windows 10 Professional

2.1.4 GRAPHICS PC/SERVER:

- A. Processor: Dual Intel(R) Xeon(R) Silver 4110 CPU @ 2.1GHz, 3.0GHz Turbo, 8 Core(s), 16 Logical Processor(s)
- B. Memory: 32GB, 2666MHz DDR4 RDIMM ECC

C. Graphics subsystem: Nvidia GeForce RTX 3070

D. Disk Storage: 2TB HDD

E. Operating System: Windows 10 Professional

2.1.5 FIREWALL

For full and complete access to all available features, the system must access Internet-based data repositories. The customer is responsible for Internet security, relying on an existing, customer-supplied firewall and other appropriate security measures.

2.1.6 AUDIO OUTPUT

The fulldome planetarium computer rack shall provide either analog or digital output to the sound system as A) stereo or 5.1 channel analog unbalanced line level output, or B) 8 or 16 channel Dante digital output. The sound system is not included in this specification section.

2.1.7 PROJECTION SYSTEM

The fulldome digital planetarium shall employ a single 4K laser illuminated (phosphor) LCoS projector fitted with a fisheye lens to project over the entire surface of the hemispherical projection surface. The projector shall be located as close as possible to the center of the dome in the X and Y axes. The projection system shall typically be positioned below the center of the dome in the Z axis although the final positioning shall be determined based on the geometry of the dome and the architecture of the room.

A. Image Resolution: The projector shall have a native resolution of 4096 X 2400 pixels. This will produce an image on the screen with an effective resolution of 2400 pixels in diameter or a total of over 5 million pixels.

B. Brightness: The projector shall have a light output of 6000 ANSI lumens.

C. Dome Size: Dome sizes ranging from 24 to 40 feet diameter.

D. Contrast Ratio: 10,000:1.

E. Projector Tilt: The projector stand is adjustable in tilt to match the angle of the dome.

F. Projector Masking: An adjustable mask shall be provided to accurately conform the projected image to the dome edge.

G. Power Consumption: 100/240VAC at 50/60 Hz, consumes a maximum of 600 watts of power.

H. Size: Stand-alone unit with a footprint of less than 1.5m x .75m floor area.

I. Stand: Enclosure/stand shall be provided and secured to the floor.

J. Projection Angle: The projection system shall include zoom capability, to change its projection angle, allowing the projector to be placed at an optimal height/position regardless of dome diameter or height.

2.1.8 WIRELESS CONTROL

The system shall include an iPad and an Xbox for controlling visuals from anywhere in the chamber.

2.1.9 DOCUMENTATION

The digital planetarium shall include a complete User's Manual.

2.1.10 INFRASTRUCTURE AND INSTALLATION REQUIREMENTS

Documentation shall be provided defining power, conduit, and physical placement requirements for the digital planetarium system. The customer shall be responsible for providing this infrastructure, and for an electrician to make final power terminations at the time of installation (if applicable).

2.1.11 PRODUCT DEVELOPMENT PROGRAM

All specifications here represent the digital planetarium on the date of this specification and may change to accommodate product improvements.

2.2 FUNCTIONAL SPECIFICATIONS

This section will describe the functional capabilities of the fulldome system/software.

2.2.1 USER INTERFACE

- **Lighting Modes.** The user interface must support a dark or red mode to preserve a presenter's night vision during live astronomy presentations.
- **Backward and Forward Synchronization.** The system will allow the user to interactively seek to any point within a show (moving forwards or backwards in time.) In addition, one may set a playback rate to "fast forward" through a show or slow it down if desired.
- **Library Content.** The user interface shall include a customizable, searchable library of content available for use on the dome.
- **On-screen Tips.** Users will have access to a panel or window that displays information about the selected item on the dome to aid in live astronomy presentations.
- **Integrated Help.** Hover over any user interface element to see context-sensitive help. Hover over any window or panel and press F1 to open help for that window.
- **Custom Tools.** From the interface, users must be allowed to create custom pages that contain buttons, sliders, and other controls to interact with the system.
- **Remote Control.** The user interface shall supply the ability to control the system from an iPad or other wireless mobile device.

- **Drag and Drop.** Users must be able to drag and drop installation of new videos, audio, models, images, etc., including automatically copying that content to all computers in the system.
- **Scripting.** The system shall provide a scripting language that allows the user to write a sequence of commands for the system to execute. The language shall provide access and control over all system features and all attributes of the objects used in shows and presentations. The scripting language shall also provide a means of specifying the time when each command should be executed either relative to the beginning of the script or relative to a previous command. There shall be a means of sharing these scripts between other theaters with similar type systems.
- **Advanced Script Programming.** To supplement the basic scripting language described above the system shall either natively within the scripting language or by means of a supplemental advanced programming language provide access and control over all system features. This includes control over all attributes of the objects used in shows and presentations - using typical computer language features. Advanced script programming shall provide variables, arrays, and objects that can be assigned and reassigned values, looping constructs, logical branching, and functions or methods. The system shall execute these advanced scripts within the context of the scripting language without the need for separate compilation or execution outside of the main system program.
- **Script Editor.** The user interface shall include a script editor that automatically colors commands, suggests commands as the user types, and helps the user find errors when a script plays.
- **Saving Options.** A single button will allow the user to save the state of the current scene on the dome for one-click restoration to the dome at a later time.
- **Cloud Library.** The user interface must provide access to a searchable library of models, images, videos, audio, etc., hosted on the web and provide the ability to easily download this content to the system and use it in the dome without requiring any external software.
- **Sharing Options.** The user interface shall provide the ability to share content to an Internet library that is available to other sites using only a few clicks and does not require any external software to do so.

2.2.2 LOCAL LANGUAGES

- **Language Options.** The user interface must be easily translated to other local languages within the system and without plug-ins or other external services. Translation shall include all system errors, warnings, messages, etc.
- **Complete Localization.** Independent of the chosen language, labels for system objects (guides, planetary bodies, named stars, deep space objects, etc.) shall include the option of localization to the chosen language or to a different language.
- **Custom Localization.** Languages will be available on a per-show basis via the ability to load custom preference files; i.e., the 1 P.M. show can be in English and the 2 P.M. in Spanish.

2.2.3 PLANETARIUM SOFTWARE

- **Real-time Playback.** Real-time astronomy features and video playback will be accessible from a single, integrated user interface. The pre-rendered video and real-time generated graphics must be playable simultaneously, and not be mutually exclusive.

- **Drag and Drop.** The system will be capable of using the mouse to drag an image, 3D model, video, or audio file from Windows Explorer into the user interface, and specifically into the Dome View for immediate display on the dome. In addition:
 - Folders of images shall be supported as a “slide show” by using the mouse to drag and drop into the Dome View.
 - Panorama, allsky, and spherical imagery will also be accessible by this same method.
 - Support for automatic display of AVM tagged images is also required.
 - Drag library items onto control panel pages to automatically create custom button controls.
- **Real-time Authoring.** Users shall have the ability to create real-time shows within the user interface without the need for scripts, screen recordings, or text-based solutions. This feature must allow the user to capture a current scene, create a new scene, then have the feature automatically create a transition between the two. This will be a repeatable process for creating an entire real-time show.
- **On-screen Dome View.** The user interface will include a live, real-time view of the dome on the computer monitor.
- **Interactive Dome View.** Using a mouse, a user must be able to drag real-time objects around the dome, move astronomical diurnal motion forward, and zoom in and out of real-time objects. This is to be integrated into the user interface and not as a stand-alone or non-interactive dome view. In addition, users will be able to drag objects onto the dome view directly.
- **Grid and Guide Objects.** The system shall provide an extensive collection of grid and guide objects: from planetary graticules, to distance guides, coordinate system guides, waypoints, and markers.
- **Object Scalability.** The system shall allow the user to place user-created models for objects of any desired size (from nanometers and smaller to astronomical scales) at any desired position in 3D space or relative to any object.
- **Shortcuts or Macros.** Planetarium software must allow the user to create, edit, resize, and style user-programmable buttons to automate commonly used sequences and commands.
- **Date and Time Options.** Users will be able to view the sky at any date or time from the surface of any solar system body, with correct local diurnal motion, where data is available. The system must also support annual motion, along with precession and proper motion. Simultaneous use of annual and diurnal motion must be possible. It shall be possible to produce a visual solar analemma from the surface of any planet.
- **API.** A full Application Program Interface (API) shall be available to allow the system and user to connect to other devices and data sources. In addition, the system will allow the user to create plug-ins to load and render custom data.
- **Fulldome Video.** Fulldome video and real-time imagery will play through the same software, without switching between programs.
- **Data Processing.** The software will load and display various distinct data sets without having to close and restart.
- **KML Support.** Keyhole Markup Language (KML) files can be downloaded from the Internet and used to demonstrate a wide range of scientific concepts.

- **Horizon Panorama:** The system shall include and display horizon panoramas showing the foreground objects on the horizon. Panorama files shall be a standard digital photographic format and users must be able to substitute the provided panoramas for photographs or illustrations of their own choice.

2.2.4 STARFIELD

- **Culling.** Users must be able to select a range of absolute magnitudes or visual magnitudes for display, and culling based on temperature (Kelvin) and distance.
- **Catalogs.** The system shall include the Hipparcos, Revised Bright Star, and Nearby Star (Gliese) catalogs, and be HR-complete. Support must also be provided for the Gaia star catalog.
- **Aberration.** Accurate simulation of aberration and stellar position during near-speed-of-light travel, and by implication faster-than-light travel as well, is required.
- **Starfield Documentation.** The planetarium system must have each individual star in a starfield cross-referenced and searchable by the Bayer-Flamsteed designation, as well as designated in a variety of catalogs, including but not limited to: *Yale Bright Star Catalog (HR)*, *Bonner/Cordoba/Cape Photographic Durchmusterung (BD/CD/CP)*, *Henry Draper Catalogue (HD)*, *Gliese Catalogue of Nearby Stars (GJ)*, *Smithsonian Astrophysical Observatory Star Catalog (SAO)*, and *Hipparcos (HIP)*.
- **Multiple Stars.** Users will be able to access flights to systems of multiple stars. Multiple stars will move correctly in their relative gravitational orbits with the passage of time.
- **Messier Objects.** The system must also include all Messier objects.

2.2.5 SKY SURVEYS

- **HiPS/HEALPix Support.** Software must support interactive exploration of publicly available HiPS datasets. Resolution must automatically increase with change of field of view, up to the maximum supported by the dataset. Datasets stored in the TOAST format must also be supported.
- **Catalogs.** This system shall provide built-in access to a variety of HiPS catalogs, and support user addition of surveys (without need of software update or vendor support).
- **All-Sky Surveys.** The system must also support “traditional” single-resolution all-sky surveys which are properly aligned and layered. The system must include a variety of built-in surveys from all major wavelengths.

Planets and Moons

- **Atmospheric Simulation.** The planetarium system shall provide proper simulation of atmospheric refraction, reddening, extinction, and scintillation.
- **Raleigh Scattering.** System must support realistic Rayleigh and Mie scattering, and where appropriate, seamlessly transition between surface and space views. It shall also be possible to interactively adjust the molecular density of the atmosphere and aerosol properties to accurately simulate atmospheres on all planets.
- **Shadows.** The system will show proper simulation of eclipses (planet and moon shadows), and ring shadows.
- **Shading.** Likewise, the system must show proper crater/relief shading for rocky bodies.

- **High-resolution.** Users shall have access to high-resolution terrain for Earth that implements the following features and requirements, allowing them to:
 - Transition smoothly from outer space to any place on Earth.
 - Access high-resolution details for cities to street level.
 - With an Internet connection provided by the facility, display any available WMS or WMTS mapping data with up to 30 cm per pixel imagery, and without writing a script or preparing this data manually. Further, the system must manage all data files and distribute as needed to all system components without user intervention.
 - Where possible, prevent the user from flying through solid objects.
 - Navigate smoothly across a terrain without loss in frame rate, severe frame jumps, or channel tearing.
 - Access detailed surface “terrains” for the Moon and Mars (vendor must describe how the high-resolution terrain imagery is licensed). We also provide terrain for Venus, Mercury, Pluto, Vesta, Ceres, and Bennu.
 - At Earth, visualize sub-surface earthquake locations.
- **Additional Planet and Moon Requirements.**
 - Overlay datasets and maps on body surfaces (image, image series, or video)
 - Simulate surface lights on any body
 - Interactively adjust ocean level
 - Simulate rings and ring particles
 - Simulate aurora (animated, with adjustable parameters/appearance)
 - Provide interior views (image, image sequence, or video)
 - Simulate planetshine – the reflection of light from a planet onto its moon(s)
 - Proper oblate shapes and support for 3D models for non-spherical bodies
 - Named surface locations with markers and labels
 - Astronomically correct simulation of Lunar libration

Artificial Satellites and Spacecraft

- **Models and Trajectories.** Allow the user to create and add date-synchronized trajectories to the system. By default, the system must include models and trajectories for the following spacecraft: Voyager I and 2, Pioneer 10 and 11, Cassini, New Horizons, Dawn, Ulysses, Spitzer, Galileo, Rosetta, Mars Science Laboratory, and Stardust.
- **Satellite Database.** Users will be able to access a database of all known active and inactive satellites in Earth’s orbit, along with objects tagged as space debris.
- **Automatic Updates.** Earth satellite orbital elements shall be updated automatically, along with those for asteroids and comets.

Comets

- **Ion and Dust Tails.** The system will automatically and realistically visualize both ion and dust tails.
- **Orientation.** Dust and ion tails shall automatically face away from the sun.
- **Custom Options.** The system must provide a high degree of customizability, to include adjusting the size, color, brightness, glow size, and texture of a comet’s:

- Coma
- Dust Tail
- Ion Tail
- **Comet Nucleus.** Users will have the ability to fly up to the comet's nucleus and free fly around it.
- **Sizing.** The size of the coma, dust tail, and ion tails shall increase in size according to how close users' flights are to the sun, and when users fly far enough away, the coma and tails will disappear completely, leaving only the nucleus.
- **MPC Compatibility.** The system must include all known comets published in the Minor Planet Center (MPC) database.
- **Elements Data.** The system must accept comet elements data from the IAU Minor Planet Center.
- **Meteor Showers.** The system shall include a built-in set of automatic meteor showers, along with date-dynamic debris clouds.

Asteroids

- **Asteroid Models.** Models of common asteroids shall be provided and available to activate automatically.
- **Accurate Flight.** Users must be able to fly smoothly to any individual asteroid model in its correct location in space and time.
- **MPC Compatibility.** The system will include all known comets published in the Minor Planet Center (MPC) database.
- **Elements Data.** The system must accept asteroid elements data from the IAU Minor Planet Center.

Exoplanets

- **Exoplanetary Systems.** Exoplanetary systems associated with stars in the starfield must be included. These stars, the planets, and their orbits will show correctly with orientations and motions based on the latest available data.
- **Accurate Modeling.** Provide models or automatic visualizations of all known exoplanets based on existing scientific theories of what those planets look like.
- **Approach.** Ability to smoothly fly from anywhere, directly up to the exoplanet, and land on any exoplanet.
- **Planetary Parity.** All features available for solar system planets shall be possible for any exoplanet (rings, atmosphere, orbits, labels, textures, etc.).
- **Gravitation.** Gravitation motions will be accurately simulated. The parent star will "wobble" appropriately when orbited by large planets.

Navigation and Flight

- **Stability.** The system will allow the user to fly a camera within any specified distance of any model in the system, including user-created models and system-created celestial objects. Motion of the camera, and the resulting real-time graphics imagery from the camera's point of view, must be smooth throughout the flight, regardless of the

destination object's size or distance from Earth. The images of objects within the flying camera's view shall not appear to jump about or scintillate on the dome.

- **Universal Landing.** The system will allow the user to land the camera at any location on any solar system body or exoplanet. Once landed, the system will allow the user to fly the camera to or take off from other locations on that body or exoplanet. All motion must be smooth.
- **Relative Motion.** Navigation and flight actions shall work correctly while the system's scene date is changing and with bodies and exoplanets rotating in relative motion.

2.2.6 3D STEREO

For the purposes of this section, 3D Stereo is defined as 3D projection where the guest wears 3D glasses to experience 3D content on the dome.

- **Real-time 3D.** All real-time features and functions of the software must be included.
- **Stereo 3D.** The system shall include real-time stereo 3D features (not the supporting hardware, but the core software itself).

2.2.7 Additional Astronomy and Earth Science Data

- **Barycenter.** The system must show the Sun's motion relative to the solar system barycenter.
- **Milky Way Database.** The system shall include datasets for Pulsars, Globular Clusters, OB Associations, Open Clusters, HII Regions, Planetary Nebulae, Supernovae Remnants, and exoplanetary systems. Along with these datasets, a variety of grid and guide objects must be easily accessible.
- **Galactic and Extragalactic Database.** The system shall include the following galactic datasets from the following catalogs: Cosmicflows-3, Third Reference Catalogue of Bright Galaxies (RC3), Gravitational Wave Galaxy Catalog, HyperLEDA, Sloan Digital Sky Galaxy and Quasar Surveys, Two-Degree Field Galaxy and Quasar Surveys, and WiggleZ survey. Along with these surveys, a variety of grid and guide objects must be easily accessible.
- **Scaling.** All celestial objects displayed by the system will be represented at their known sizes and at their known positions in 3D space.
- **Volumetric Milky Way.** Users will be able to display a volumetric Milky Way Galaxy in real-time.
- **Volume Rendering.** The system shall support generic real-time volume rendering and include astronomical and non-astronomical volume sample data.
- **Real-Time Particle System.** The system shall support real-time particle generation for special effects. This may include rocket exhaust, water fountains, volcanoes, fire, etc.
- **NOAA SOS & NOAAView Compatible.** The system shall also include Science on a Sphere (SOS) and NOAAView data sets from the National Oceanic and Atmospheric Administration (NOAA). Video datasets will wrap correctly around Earth and other bodies as appropriate.
- **Astronomy Picture of the Day.** The Astronomy Picture of the Day by NASA will be fully integrated into the system and available as a one-click download (with Internet connection provided by facility).

- **VOTables.** The system must be able to process and display astronomical datasets stored in the VOTable standard.
- **Data2Dome.** The system must support the Data2Dome metadata standard. D2D content must be easily searchable and available for one-click download and display.
- **Text-To-Speech.** The system must provide Text-to-Speech capabilities, accessed live on-the-fly from the user interface or via show/presentation.
- **SPICE Integration.** The system must support SPICE kernels and use SPICE for astronomical body positions.
- **Virtual Reality.** The system must support HTC Vive, Vive Pro, and Oculus Rift and Rift S VR headsets, and Equirectangular rendering for mobile device experiences.
- **Desktop Streaming.** It shall be possible to stream the contents of the user interface desktop to the dome. Any desktop application can appear on the dome, and cover any portion of the dome.
- **Live Video Input.** The system shall support a hardware live video input option, at up to 3840x3840/30Hz.
- **Black Holes.** The system shall simulate Black Holes in real-time – with correct physical properties. It shall be possible for the user to create their own Black Hole objects, and to adjust the visual and physical parameters of existing objects.
- **Astronomy Events Calendar.** The system shall include an up-to-date astronomy events calendar with searching features.
- **Trails.** The system shall allow the display trails for bodies in motion. This includes 2D (screen) and 3D trails. It shall also be possible for all visible objects to leave a trail.
- **Preferences.** The system shall support flexible user preferences, allowing local customization.
- **Multi-Camera Multi-Scene.** The system shall support rendering from multiple camera views simultaneously and allow for multi-scene organization.

2.2.8 CONTENT REQUIREMENTS

- **Fulldome Content.** The system shall include a large selection of free fulldome content – short and long sequences - available via internet cloud download.
- **Fulldome Feature Shows.** The system shall include five (5) pre-rendered shows (titles fixed) with unlimited use license for at least 5 years. The supplier must also resupply dome movies the customer has contracted in the past from Spitz, Inc., if the licenses for those shows are still valid.
- **Built-in Curriculum/Live Lessons.** The system must include at least 12 astronomy lessons designed to be presented live, along with a guide/script.

2.2.9 TRAINING

The installation technician shall present a brief session on routine maintenance/cleaning the school staff should perform on system equipment. After the installation, the system vendor shall supply basic training on the software and curriculum, simultaneously to up to two (2) staff via a series of on-line sessions over 3 weeks at no additional charge. On-site basic training may also be available to arrange for an additional fee.

EXHIBIT B



CONTRACTOR'S BID FOR PUBLIC WORK - FORM 96

State Form 52414 (R2 / 2-13) / Form 96 (Revised 2013)

Prescribed by State Board of Accounts

PART I

(To be completed for all bids. Please type or print)

Date (month, day, year): _____

1. Governmental Unit (Owner): _____

2. County : _____

3. Bidder (Firm): _____

Address: _____

City/State/ZIPcode: _____

4. Telephone Number: _____

5. Agent of Bidder (if applicable): _____

Pursuant to notices given, the undersigned offers to furnish labor and/or material necessary to complete the public works project of _____

(Governmental Unit) in accordance with plans and specifications prepared by _____

_____ and dated _____ for the sum of

_____ \$ _____

The undersigned further agrees to furnish a bond or certified check with this bid for an amount specified in the notice of the letting. If alternative bids apply, the undersigned submits a proposal for each in accordance with the notice. Any addendums attached will be specifically referenced at the applicable page.

If additional units of material included in the contract are needed, the cost of units must be the same as that shown in the original contract if accepted by the governmental unit. If the bid is to be awarded on a unit basis, the itemization of the units shall be shown on a separate attachment.

The contractor and his subcontractors, if any, shall not discriminate against or intimidate any employee, or applicant for employment, to be employed in the performance of this contract, with respect to any matter directly or indirectly related to employment because of race, religion, color, sex, national origin or ancestry. Breach of this covenant may be regarded as a material breach of the contract.

CERTIFICATION OF USE OF UNITED STATES STEEL PRODUCTS

(If applicable)

I, the undersigned bidder or agent as a contractor on a public works project, understand my statutory obligation to use steel products made in the United States (I.C. 5-16-8-2). I hereby certify that I and all subcontractors employed by me for this project will use U.S. steel products on this project if awarded. I understand that violations hereunder may result in forfeiture of contractual payments.

ACCEPTANCE

The above bid is accepted this _____ day of _____, _____, subject to the following conditions: _____

Contracting Authority Members:

PART II

(For projects of \$150,000 or more – IC 36-1-12-4)

Governmental Unit: _____

Bidder (Firm) _____

Date (month, day, year): _____

These statements to be submitted under oath by each bidder with and as a part of his bid. Attach additional pages for each section as needed.

SECTION I EXPERIENCE QUESTIONNAIRE

1. What public works projects has your organization completed for the period of one (1) year prior to the date of the current bid?

Contract Amount	Class of Work	Completion Date	Name and Address of Owner

2. What public works projects are now in process of construction by your organization?

Contract Amount	Class of Work	Expected Completion Date	Name and Address of Owner

3. Have you ever failed to complete any work awarded to you? _____ If so, where and why?

4. List references from private firms for which you have performed work.

SECTION II PLAN AND EQUIPMENT QUESTIONNAIRE

1. Explain your plan or layout for performing proposed work. *(Examples could include a narrative of when you could begin work, complete the project, number of workers, etc. and any other information which you believe would enable the governmental unit to consider your bid.)*

2. Please list the names and addresses of all subcontractors *(i.e. persons or firms outside your own firm who have performed part of the work)* that you have used on public works projects during the past five (5) years along with a brief description of the work done by each subcontractor.

3. If you intend to sublet any portion of the work, state the name and address of each subcontractor, equipment to be used by the subcontractor, and whether you will require a bond. However, if you are unable to currently provide a listing, please understand a listing must be provided prior to contract approval. Until the completion of the proposed project, you are under a continuing obligation to immediately notify the governmental unit in the event that you subsequently determine that you will use a subcontractor on the proposed project.

4. What equipment do you have available to use for the proposed project? Any equipment to be used by subcontractors may also be required to be listed by the governmental unit.

5. Have you entered into contracts or received offers for all materials which substantiate the prices used in preparing your proposal? If not, please explain the rationale used which would corroborate the prices listed.

SECTION III CONTRACTOR'S FINANCIAL STATEMENT

Attachment of bidder's financial statement is mandatory. Any bid submitted without said financial statement as required by statute shall thereby be rendered invalid. The financial statement provided hereunder to the governing body awarding the contract must be specific enough in detail so that said governing body can make a proper determination of the bidder's capability for completing the project if awarded.

BID OF

(Contractor)

(Address)

**FOR
PUBLIC WORKS PROJECTS
OF**

Filed _____,

Action taken _____
