A TRAVELING EXHIBITION FROM The Field Museum

A T. REX NAMED SUE™

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INTRODUCTION

The *Tyrannosaurus rex* has long commanded respect and sparked curiosity in the mind of the public, and Sue is the most famous *T. rex* of all. At 42 feet (12.8 m) long and 12 feet (3.66 m) tall at the hips, her skeleton inspires as much awe today as she did 67 million years ago.

In the Field Museum's traveling exhibition ***A* T. rex *Named Sue***, explore how this remarkable creature interacted with its world and what we can learn from studying its bones. Revel in the sheer size of a fully articulated, life-sized skeleton cast, look a cast of Sue's skull in the eye, and experience Sue's movement, vision, and sense of smell for yourself. Touch casts of Sue's bones and diagnose pathologies that left their mark in Sue's leg, jaw, and tail. Follow Sue's sensational journey from the Cretaceous to the rock of South Dakota to the U.S. courts, and finally to the world. Learn about the technology used to prepare and study this very special fossil.

Featuring the largest, most complete, best-preserved *Tyrannosaurus rex* ever discovered, ***A* T. rex *Named Sue*** has delighted 20 million visitors and counting and is one of the most successful U.S. exhibitions ever.

A *T. rex* Named Sue will…

- Develop a greater understanding of the way *Tyrannosaurus rex* lived, died, and interacted with its Cretaceous environment
- Help visitors understand how Sue has been the key to unlocking many secrets of the species
- Educate visitors about the often creative methods of fossil preparation and study

Visitors to **A *T. rex* Named Sue** will…

- Encounter the largest *T. rex* ever discovered face-to-face
- Touch casts of Sue's bones and manipulate interactives to understand how Sue moved, saw, smelled, and ate
- Learn the truth behind dino-myths and speculation

EXHIBITION WALKTHROUGH

A *T. rex* Named Sue brings the story of the largest, most complete, and best-preserved *T. rex* to life in a visceral experience that combines visual, tactile, audible, and aromatic activities with compelling educational content. Visitors of all ages will marvel at Sue's size and ferocity while learning about its scientific importance through engaging interactives.

Highlights:

1) Sue's Skeleton
   The centerpiece of **A *T. rex* Named Sue** is a fully articulated cast skeleton of Sue mounted on a stage. Dramatic lighting throws a spectacular shadow of the skeleton against a graphic backdrop, and a reading rail around the stage engages visitors with:
   - touchable casts of Sue's arm bone, tail bone, and rib;
   - interactive activities that let visitors interpret surface features and anomalies of Sue's bones;
   - interpretive graphics and text that relate Sue's history, from discovery to display, and incorporate headlines, news articles, and behind-the-scenes photos taken at The Field Museum.

2) Sue's Skull
   Visitors first encounter an enticing shadow of Sue's skull moving across a scrim. On the other side, visitors can get an eye-to-eye look at a cast of Sue's skull, a whopping 5 feet (1.5 m) in length, that rotates and growls. Rail-mounted elements surrounding the skull include:
   - touchable models of Sue's teeth;
   - an activity that lets visitors diagnose a pathology in Sue's jawbone;
   - graphics and text that describe the story of Sue's skull from discovery to display;
   - the legal dispute over Sue's bones and how it led to Sue's purchase at auction;
   - the process of making the casts from the fossilized bones.

3) <u>Interactives</u>
Visitor-controlled mechanical models and interactive pods encourage visitors to explore in-depth topics related to Sue, *T. rex*, and dinosaur science:

- Step up to dino-view devices to take a peek into the Cretaceous world through the eyes of a *T. rex* and a *Triceratops*. Understand important differences between monocular and binocular vision.
- Sue probably had a keen sense of smell. Test your nose to find food, water, and shelter.
- Use spare parts from a "bone bank" in a large-format 3D puzzle of Sue's skeleton to demonstrate Sue's completeness.
- Sue's arms worked much like human arms do. Strap your arm into an apparatus to feel how scientists think Sue could and couldn't move her forelimbs.
- Manipulate a model of Sue's jaws to demonstrate how Sue's gigantic jaw muscles slammed shut on prey.
- Scientists think that Sue didn't chew. Find out how she probably ate.
- Manipulate a model of Sue's strong, stiff tail to discover how Sue used it to help stay balanced.
- Sue's neck also helped keep Sue's body in balance. Feel how a *T. rex* head, tail, and s-shaped neck worked together to help Sue move and stay upright.
- Study two sets of bones to identify those that belonged to a *T. rex*.
- Sort out the difference between dino-science and dino-speculation by examining clues about dinosaurs.

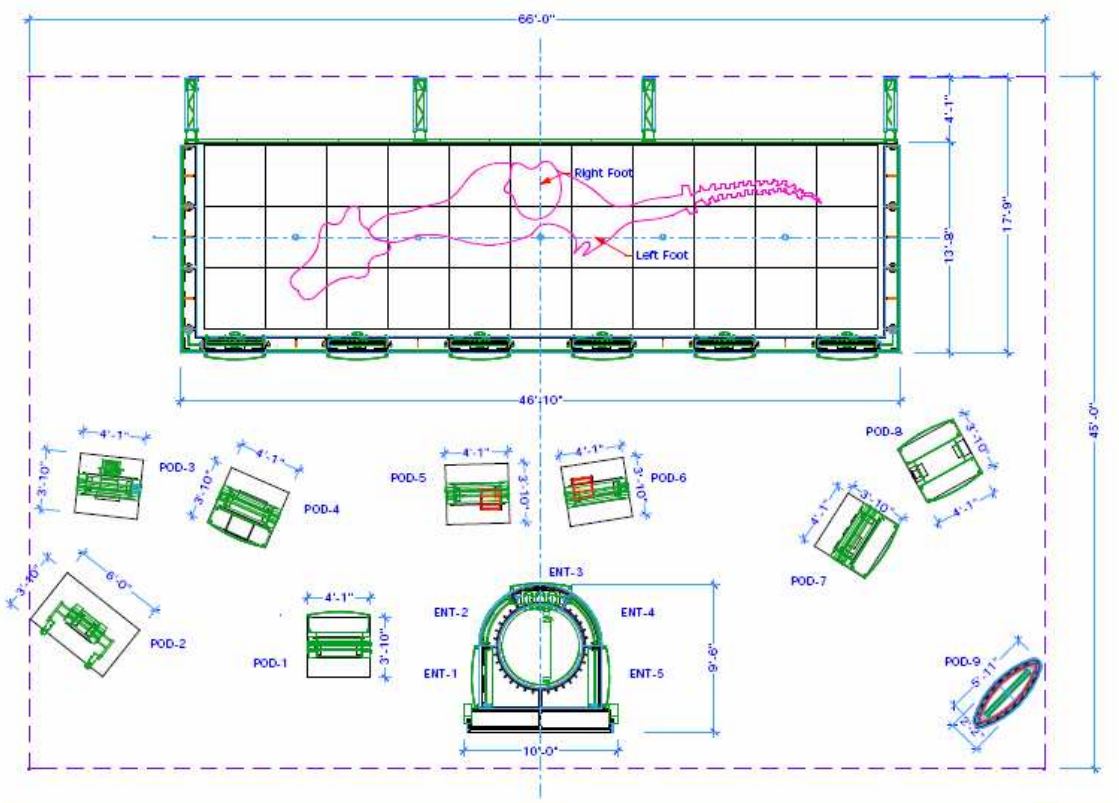
4) <u>Media</u>

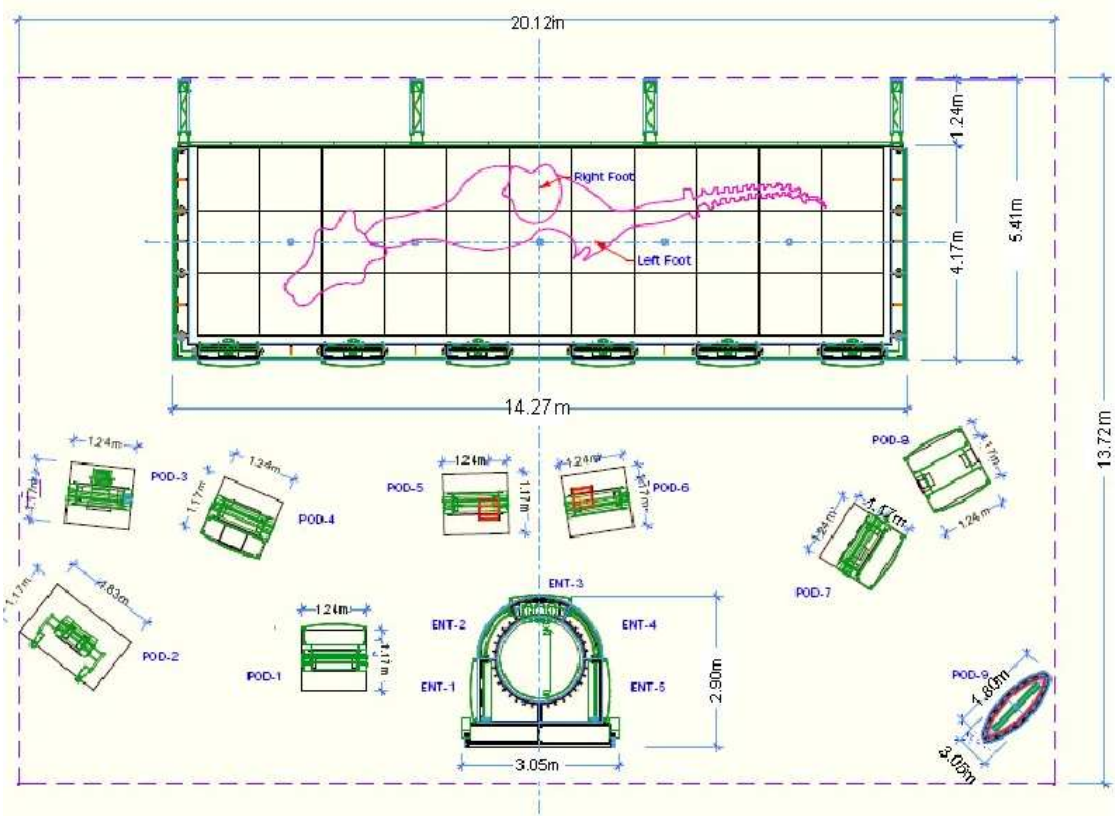
- An entertaining video incorporates a variety of pop-culture images and a short animation sequence to show how our perceptions of *T. rex* have changed over time as scientists have made new discoveries.
- A documentary-style video shows how scientists at The Field Museum obtained CT images of Sue's skull, and how these high-tech scans have helped researchers learn more about what was inside Sue's head.

EXHIBITION SPECIFICATIONS

Size Requirements:	3000 – 3500 sq. ft. (279-325 sq. m.) gallery with 4.88 m. (16 ft.) ceiling height Stage area for Sue with backdrop: 46.8 x 17.75 ft. (14.27 x 5.41 m) Largest crate size: 13 ft. long by 7.2 ft. high by 7 ft. wide (3.96 m. long by 2.19 m. tall by 2.13 m. wide)
Rental Fee:	95,000 USD for 3 months; please inquire about longer bookings
Floor Capacity:	110 lbs. per sq. ft. (537 kg. per sq. m.)
Shipping:	One-way, outbound, paid by host venue; international venues will also pay transit from nearest port
Insurance:	Hosting venues need to provide coverage for $1,000,000 USD in value
Languages:	All text is in English and Spanish; for all other languages, host venues are responsible for translation and reprinting
Support:	Field Museum staff technician leads onsite installation and de-installation Educators' Guide, including programs, curriculum, and volunteer training guide Marketing Kit, including press kits contents, ad templates, and images Merchandise Kit, including a wide range of available products developed for the exhibition Installation and Design Manual
Sponsorship:	McDonald's is the national sponsor for the exhibition's U.S. tour. Please inquire about international sponsorship opportunities.
Website:	www.fieldmuseum.org/sue

FLOORPLAN / STANDARD and METRIC





BACKGROUND & HISTORY OF SUE

Sue was a *Tyrannosaurus rex* that roamed North America about 67 million years ago, one of the last dinosaur species and one of the largest flesh-eaters to have ever inhabited the Earth. The "Tyrant Lizard King," with its extraordinarily powerful jaws and massive serrated steak-knife teeth, still dominates popular perceptions of the Age of Dinosaurs.

Sue the *T. rex* is named for Sue Hendrickson, who discovered the dinosaur near Faith, South Dakota, in the United States, during the summer of 1990 on a commercial fossil hunting trip. Shortly after its discovery, the fossil became the center of an intense ownership dispute. A protracted court battle ensued, and the court ruled that Sue belonged to the rancher on whose land it was discovered. The rancher decided to sell Sue at public auction.

On October 4, 1997, the auction took place at Sotheby's auction house in New York. To ensure that Sue would be preserved for future generations of scientists and visitors, The Field Museum in Chicago purchased Sue for $8.4 million. Field Museum preparators spent more than 30,000 hours preparing the more than 250 bones and teeth in Sue's skeleton. After the bones were fully prepared, The Field Museum made exact, fully articulated replicas so that people around the world would have the opportunity to view and study Sue.

As the most complete *T. rex* specimen ever discovered, Sue has tremendous value for scientists and the general public. Previously, only a handful of partial *T. rex* specimens had been found, none more than 60% complete. At 90% complete and exquisitely preserved, Sue is the most celebrated member of its species, permitting more detailed studies of the biology, growth, and behavior of *T. rex* than had previously been possible.

Sue has helped us make important discoveries about *T. rex*:

- **Ear Bone**. Sue is the first *T. rex* ever found with a tiny ear bone called a stapes. The more than six-inch-long, pencil-thin ear bone transmits sound vibrations from the eardrum to the inner ear. This delicate ear bone is almost never preserved in dinosaur fossils and promises to give scientists a better understanding of the evolution of ear bones and hearing in dinosaurs and birds. The shape, size and orientation of the external ear hole also may be a feature unique to the *tyrannosaurid* family, including *T. rex*.

- **Wishbone.** Sue's skeleton includes the first furcula, or wishbone, ever found in a *T. rex*. Present in bird skeletons, the wishbone provides evidence for interpreting the relationship of advanced theropods (a group of two-legged, meat-eating dinosaurs) to birds, the descendants of dinosaurs. The furcula has also helped scientists investigate the function of wishbones in dinosaurs.

- **Birdlike Leg Muscles.** Soft tissues are almost never preserved in dinosaurs, but Sue's beautifully preserved bones reveal detailed evidence of the attachments and orientations of the dinosaur's limb muscles. This has allowed scientists to reconstruct the most accurate picture ever, from hip to foot, of the birdlike hind limb muscles in *Tyrannosaurus*.

- **Tail Muscles.** A mass of gnarled, bony overgrowths fusing two of Sue's vertebrae together also preserves a remarkable anatomical feature rarely seen in fossil dinosaurs: detailed, natural mold impressions of tail muscles.

- **A Fast-Walking Dinosaur.** Based on an analysis of Sue's well-preserved foot bones, Field Museum scientists have concluded that Sue's top speed was probably a fast walk of about 15 miles per hour, about the maximum speed of an elephant. While this may seem slow for a *T. rex*, most of Sue's dinosaur contemporaries would not have been nearly as swift.

- **The Neck Bone's Connected to the Skull Bone….** Sue's skeleton contains a pair of tiny bones that lie between the first neck vertebra and the back of the skull. Called proatlas bones, these are rarely seen in dinosaur fossils and are the first ever found in a *T. rex*. Birds do not have proatlas bones. Their presence in both an advanced theropod, such as *T. rex*, and in the ancient theropod *Herrerasaurus* may help scientists tease apart anatomical transformations and evolutionary relationships in the transition from advanced theropods to birds.

- **3-D Picture of the Skull.** The Field Museum's research on Sue marked the first time that a high-resolution, industrial x-ray scanner was used to create a detailed, 3-D image of the inside of a *T. rex* skull. (One famous early study involved cutting a *T. rex* skull in half, altering the fossil forever.) These CT images, interpreted by Field Museum paleontologists and published in the *Journal of Vertebrate Paleontology*, showed very large olfactory bulbs—indicating that Sue had a keen sense of smell. Also discovered in the skull was a new air sinus never seen before in a *T. rex*. Detailed analyses of the nerve passages in Sue's braincase revealed new evidence from *T. rex* that birds are flying theropod (two-legged, meat-eating) dinosaurs.

- **A Sensitive Snout.** An extensive series of holes in the upper jawbone of Sue's skull appear to be aligned in a pattern. This observation, new to *T. rex*, suggests that the dinosaur's snout was highly sensitive to touch.

- **New Clues to Evolutionary Relationships of Dinosaurs and Birds.** Unusually well-preserved fossils like Sue are invaluable for resolving debates about evolution. Field Museum researchers studying the 90-percent complete *T. rex* skeleton and skull have discovered important new evidence supporting the theory that birds are descended from theropod dinosaurs. Findings include the wishbone, the birdlike limb muscles, birdlike air sacs (pneumatization) throughout the skeleton and skull, and several features in Sue's braincase—revealed for the first time through high-resolution x-ray (CT) images of the skull.

- **Living Fast.** In a study featured on the cover of the journal *Nature*, scientists determined that *T. rex* reached its massive adult size due to an extraordinary growth spurt that stretched from about 14 to 18 years of age. Scientists studied the bones of Sue and other *T. rex* specimens to find that, during the peak in its growth spurt, *T. rex* gained 2.1 kilograms (4.6 pounds) per day, developing into a more than 5,000-kilogram (11,000-

pound) giant, one of the largest terrestrial carnivorous animals ever. *T. rex* grew faster but had a shorter lifespan than an African elephant, the only living land animal of a comparable size.

- **Dying Young.** In the same study, scientists discovered that Sue was 28 years old at the time of death. By counting lines in tyrannosaurid bones that correspond to annual growth cycles, researchers found that *T. rex* could live for about 30 years, one-third of which would have been spent at adult size. Judging by evidence of disease, arthritis, and broken bones, scientists believe that Sue was a "train wreck" at death and probably died of natural causes.

- **Tough Life of a Tyrannosaur.** Sue's bones display several abnormalities, from a deformed right arm to jaws riddled with holes. Initially, scientists assumed that these oddities were battle wounds from clashes with other dinosaurs. Now scientists believe most of Sue's bone abnormalities are just healed-over evidence of injuries, infections, and diseases—the normal wear-and-tear of life in the Cretaceous.

- **Male or Female?** Before Sue was found, body size and anatomical differences were used to speculate whether a *T. rex* was male or female. One important clue was believed to be the location of a v-shaped tail bone called a chevron. It had been suggested that Sue was a female, based on the assumption that the first chevron was positioned far from the pelvis in female crocodiles. But after piecing together the skeleton, scientists discovered that Sue's first chevron was actually closer to the pelvis, more like that of males in some living reptiles. After surveying living reptiles and other theropod dinosaur specimens, Field Museum scientists concluded that the position of the chevron varies too widely to make it a good indicator of gender, even in modern reptiles. The bottom line: *we may never know if Sue was male or female.*

- **Was *T. rex* Warm-Blooded?** More and more evidence points to the fact that some dinosaurs were fast-moving, and perhaps warm-blooded animals. Living warm-blooded birds and mammals (like humans) have a series of bones in their nasal passages, called turbinates, that help to warm and humidify air before it enters their lungs. The x-ray scans of Sue's skull allowed Field Museum scientists to look for this warm-blooded feature for the first time in *T. rex*. While thin bony structures were found in Sue's nose, it was concluded that they were not turbinates. This does not necessarily prove that *T. rex* was not warm-blooded; it may mean that turbinates evolved later on in the theropod-bird lineage, and that these dinosaurs had some other mechanism for warming the air they breathed.

The Field Museum
Chicago, Illinois, USA

Since its inception in 1893, The Field Museum has dedicated itself to exploring the Earth and its peoples, building on the strength of its world-renowned collections and scientific research to engage visitors of all ages. Through innovative exhibitions and education programs, cutting-edge environmental conservation projects, and pioneering fieldwork undertaken on every continent, over 500 full-time Field Museum staff members share their knowledge about important scientific, cultural, and environmental issues with an average of 1.5 million guests each year.

The Field Museum is an international leader in evolutionary biology, paleontology, archaeology, and ethnography. The Museum's approximately 300 curatorial and scientific staff in the four departments of Anthropology, Botany, Geology, and Zoology conduct research in more than 90 countries around the world. These scientists also study and preserve the 24 million artifacts and specimens within The Field Museum's collections and collaborate with the departments of Education and Exhibitions to create exciting and informative public programs.

Field Museum traveling exhibitions combine cutting-edge research with award-winning design. From the world's most famous dinosaur to the natural and cultural history of chocolate, from natural disasters to landmark scientific discoveries, The Field Museum's exhibitions explore intriguing topics that encompass natural history, contemporary science, ethnology, community participation, and popular culture. Clients as varied as natural history museums, science centers, art museums, children's museums, and local history centers have enjoyed The Field Museum's engaging exhibitions and exceptional service and support.

CONTACTS

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