2018 Kansas Society of Professional Engineers

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Engineering Wonders of the Modern World

Engineering Wonders of the Modern World

Chunnel – 32 miles long; 246 feet deep at deepest point
CN Tower – Toronot – 1815 feet tall free standing
Empire state building – 102 stories tall; tallest from 1931-1972
Golden Gate Bridge (1937)1.7 mile span; 6 lanes, 90 feet wide
Itaipu Dam, Paraguay/Brazil; largest functional hydroelectric power plant
Delta Works – Netherlands
Panama Canal

Engineering in Kansas - Historical Items

Essential Qualities of and Executive
{February 1922 Issue of *Professional Engineer*]

- *Judgment* – Reasoning ability, accuracy in conclusions, ability to profit by experience.
- *Initiative* – Alertness, imagination, originality, independence in thinking.
- *Integrity* – Truthfulness, honesty, sincerity.
- Organizing Ability – Systematizing, classifying according to functions, planning and delegating
- *Health* – Bodily vigor, good sight, hearing, etc., included.
- *Perseverance* – Industry, ambition, concentration.
- *Aggressiveness* – Energy, courage, domination of will.
- *Open-Mindedness* – Reasonableness, teachableness, openness to new ideas.
- *Co-Operativeness* – Unselfishness, kindness, cheerfulness, tact, loyalty.
- *Competitiveness* – Interest in playing the business game.
- *Control of Emotions* – Freedom from outbursts of anger or touchiness.
- *Refinement* – Courtesy, manners, general culture.
- *Appearance* – Well-groomed appearance, good carriage, pleasing facial expressions, etc.
- *Sense of Humor*

Engineering Wonders of Kansas – Big Brutus

Big Brutus is the nickname of the Bucyrus-Erie model 1850-B electric shovel, which was the second largest of its type in operation in the 1960s and 1970s.

Fabrication completed in May 1963, after which it was shipped in 150 railroad cars to be assembled in KS.

- Largest electric shovel in the world
- 16 stories tall (160 feet)
- Weight 11 million pounds (5,500 tons)
- Boom 150 feet long
- Dipper capacity 90 cu. yds; 150 tons
- Maximum speed .22 MPH
- cost $6.5 million (in 1962)

Engineering Wonders of Kansas – Big Well

The World's Largest Hand Dug Well, an engineering marvel...

- The Big Well began in 1887 when the city granted a franchise for a water works system to cost approximately $45,000.
- Provided a source of water for the city until 1932.
- When the well was completed in 1888, it was 109 feet deep and 32 feet in diameter.
- The well was covered and opened as a historic attraction in 1937.
- In 1972, the United States Government designated the Big Well as a National Museum and in February of 1974 it was awarded as an American Water Landmark by the American Water Works Association.

Engineering Wonders of Kansas – Stratica

- The Hutchinson Salt Member of the Permian Wellington Formation was formed about 275 million years ago when the Permian Sea dried up.

- One of the largest in the world, this bedded salt deposit is 27,000 square miles in central and south-central Kansas; marginal to Permian Basin salt deposits in OK, the Texas Panhandle, and SE NM that cover 100,000 square miles.
- The purest portion of the salt vein at this location is 650 feet underground and is still mined here today.
- Strataca has access to about 300,000 square feet of mined out area.

Center Pivot Irrigation

Center-pivot irrigation was invented in 1940 by farmer Frank Zybach, who lived in Strasburg, Colorado. It was recognized as a method to improve water distribution to fields.

Engineering Wonders in Kansas – K Hill

KANSAS STATE ENGINEER

VOL. IV. OCTOBER, 1921. NO. 1

THE ENGINEERS BUILD "K" ON PROSPECT

When a stranger first arrives in Manhattan, whether y train, airplane, automobile or Ford, the first thing that e notices is a large concrete "K" on the west slope of rospect point. Naturally he begins to ask questions. He is told that the "K" stands for Kansas State College, nd that it was built in the spring of 1921 by the Engi- eering Division of the College. If, by chance, he should uestion one of the Civil Engineers, he would be told, that n the early part of 1921 the Civil Engineering Society rought up and discussed the proposition of building a uitable memorial for the College. There had been con- iderable agitation at various times in the past to build "K" and several attempts had been made by various de- artments and classes but no permanent marker had ever een built. One attempt made in past years reached the tage where a large letter was blocked out on Prospect by sing strips of canvas, but the plans were never completed. or a short time there was a "K" on Bluemont, made of ose rock, but it soon disappeared. It remained to the ivil Engineers to start the movement that finally resulted the present "K". After several plans had been suggest-

being in favor of the idea, the matter was brought up and discussed in General Seminar, and an assessment was voted which would be sufficient to build a "K", eighty feet long and sixty feet wide. Plans were then made for the new "K" and a date set for constructing it.

The work was done under the following plan: The Freshmen and Juniors were excused from classes in the morning and the Sophomores and Seniors in the afternoon. The men were divided up into groups with a man in charge of each group who would be responsible for a certain part of the work. On the appointed date the Engineers met in Aggieville, dressed in working clothes, and marched to the hill led by a band composed entirely of Engineers. A road had previously been constructed to the top of the hill and all of the material was on the ground, ready for the men to go to work. The ground was cleared, all of the excavating was done, and forms were set in the morning. In the afternoon the reinforcing was placed and at 2:00 o'clock the first batch of concrete was placed in the forms. By that evening the "K" was practically completed. On the following day the finishing work was done by men who volun-

Engineering Wonders in Kansas – K Hill

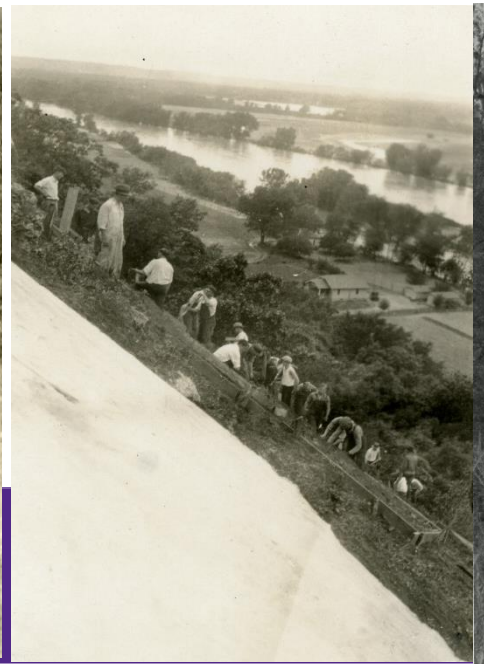
- Construction of the “K” dates back to the 1920s.
- Students at the then-named Kansas State Agricultural College wanted to erect a letter "K" on Mount Prospect — later known as KS Hill, and today as K-Hill.
- The Civil Engineering Society took the lead in promoting construction of a permanent “K”.
- The General Engineering Seminar voted funding to build it after the society’s initial idea of each civil engineering student paying 50 cents failed to raise enough money.
- Ash Grove, Bonner Springs Portland Cement and the Manhattan Chamber of Commerce provided supplies for the construction project.

Engineering Wonders in Kansas – K Hill

- On May 19, 1921, all engineering freshmen and juniors were excused from classes and gathered in Aggieville at 7:30 a.m., along with wagon teams to haul water and a marching band composed entirely of engineers to serenade the group en route to the construction site.
- Materials included 210 sacks of cement, 50 cubic yards of sand and crushed rock, concrete lugs, railroad rails, heavy wire/cables and a bronze star to be placed in memory of KSAC students killed in World War I.

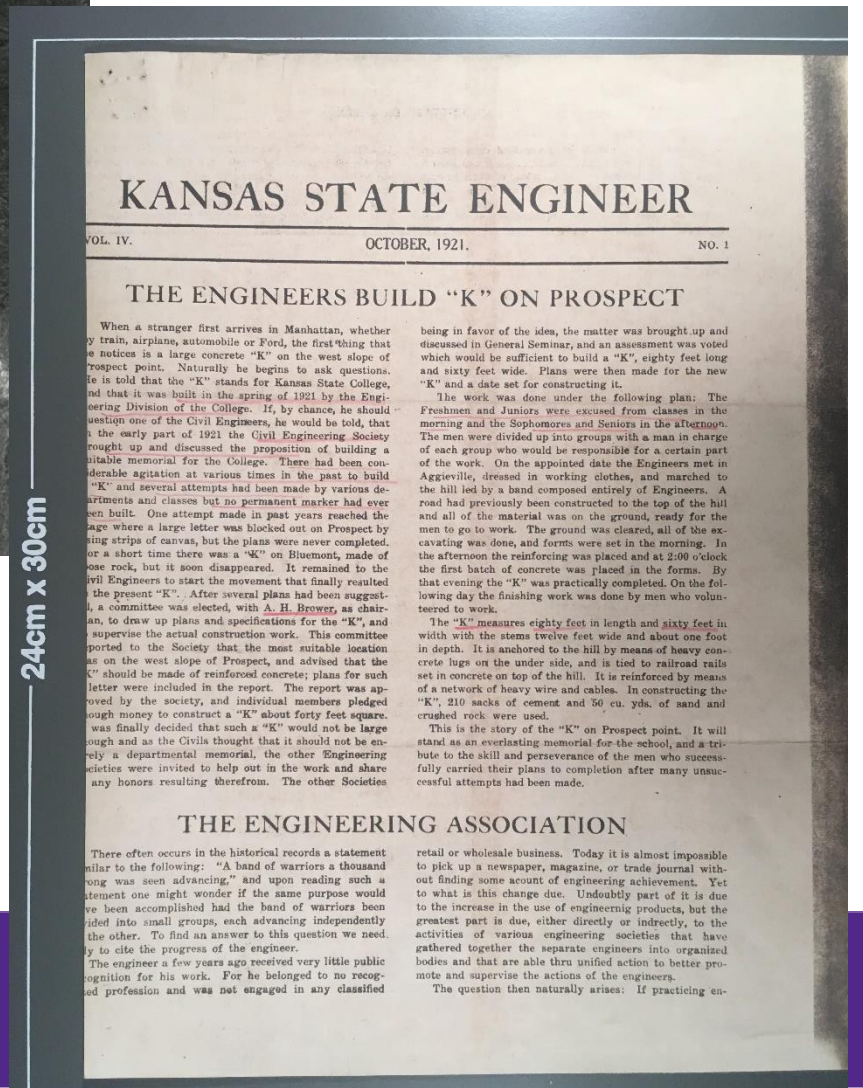
Engineering Wonders in Kansas – K Hill

- Students were enthusiastic to add an "S" to the hill immediately.
- Nearly 10 years passed before the Sigma Tau Engineering Honorary Society began organizing this phase of the project.
- Costs were estimated at $500, and after major efforts — including sponsoring tag days, movies, and boxing matches, the money was raised and the “S” was erected on May 10, 1930.



Engineering Wonders in Kansas – K Hill

- In the following years it became tradition for incoming freshman engineering students to hike Mt. Prospect to whitewash the letters.
- In later years, Sigma Tau took over maintenance of the letters, and when this organization began to lapse in the 1970s, the Tau Beta Pi Engineering Honorary Society was formed and resumed care of the hill.



24cm x 30cm

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The "K" measures eighty feet in length and sixty feet in width with the stems twelve feet wide and about one foot in depth. It is anchored to the hill by means of heavy concrete lugs on the under side, and is tied to railroad rails set in concrete on top of the hill. It is reinforced by means of a network of heavy wire and cables. In constructing the "K", 210 sacks of cement and 50 cu. yds. of sand and crushed rock were used.

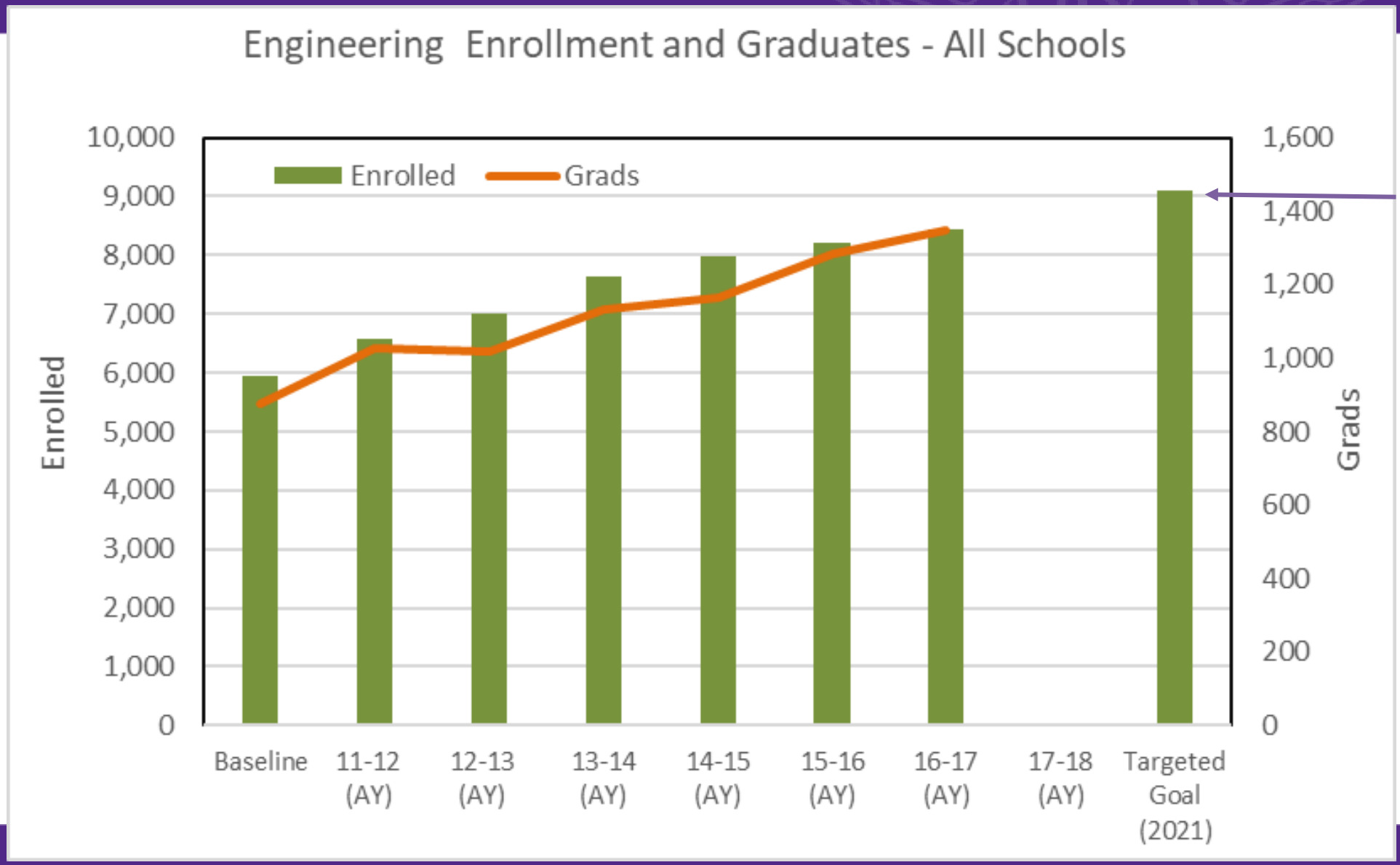
This is the story of the "K" on Prospect point. It will stand as an everlasting memorial for the school, and a tribute to the skill and perseverance of the men who successfully carried their plans to completion after many unsuccessful attempts had been made.

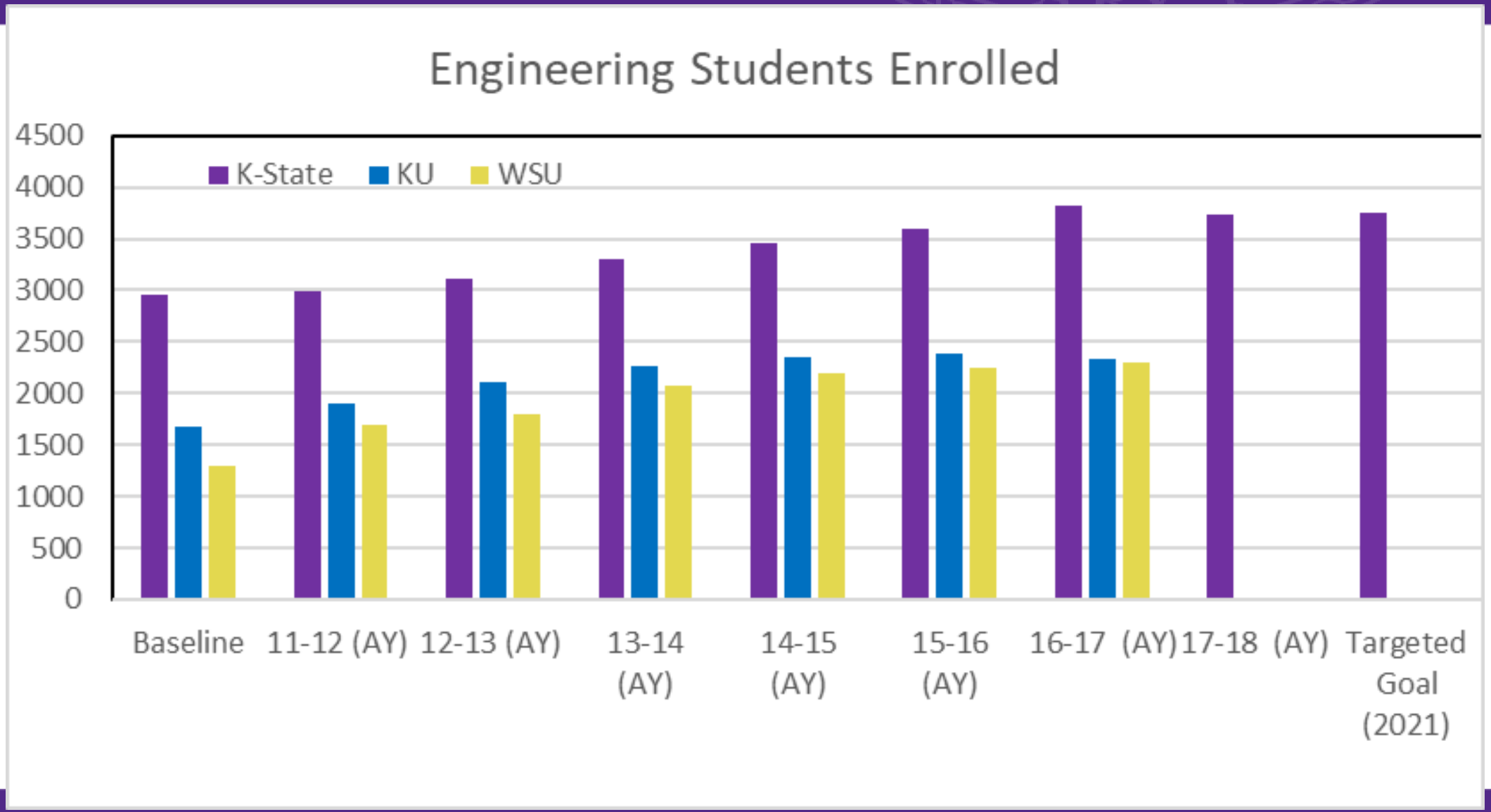
THE ENGINEERING ASSOCIATION

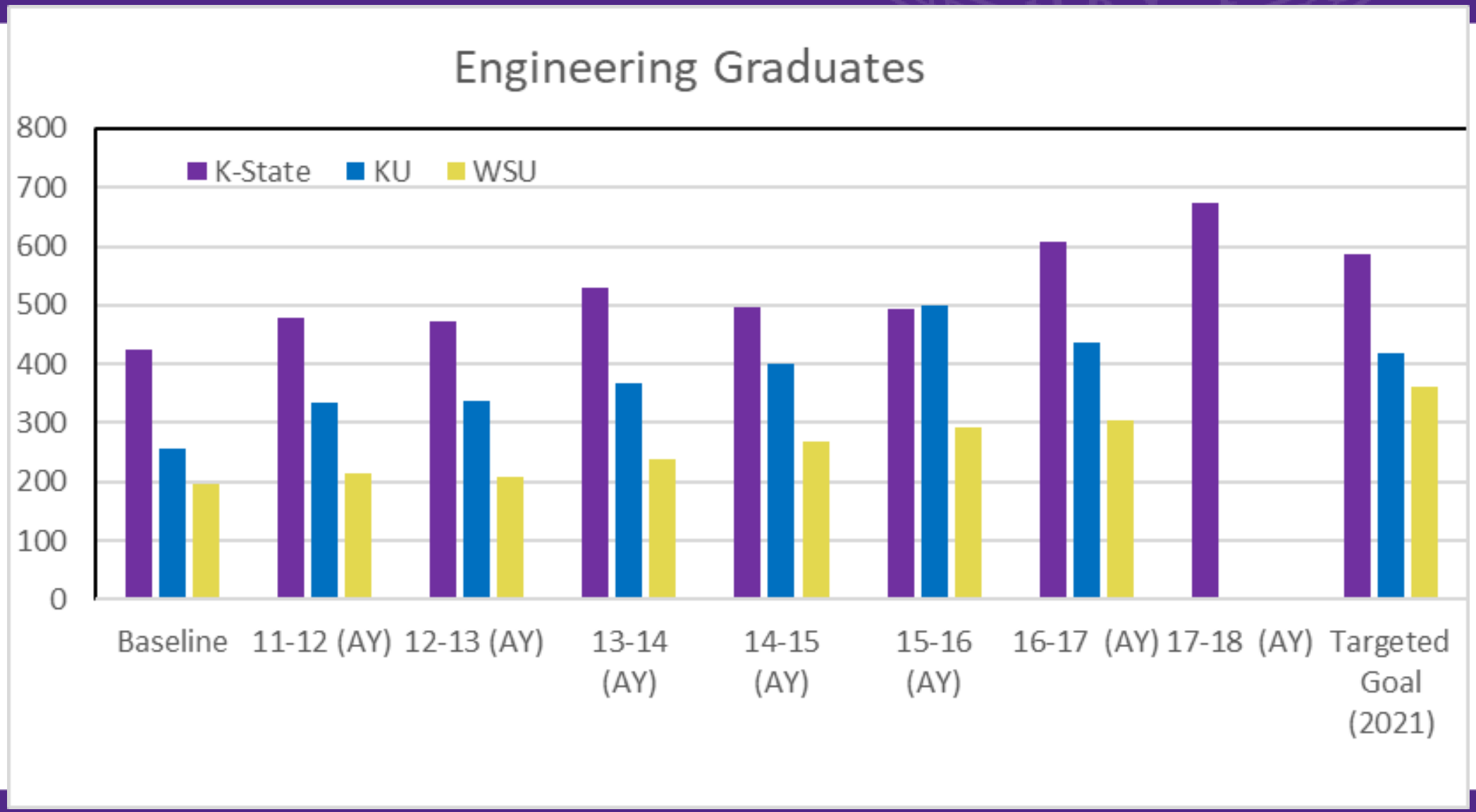
There often occurs in the historical records a statement nilar to the following: "A band of warriors a thousand ong was seen advancing," and upon reading such a tement one might wonder if the same purpose would ve been accomplished had the band of warriors been ided into small groups, each advancing independently the other. To find an answer to this question we need ly to cite the progress of the engineer.

The engineer a few years ago received very little public cognition for his work. For he belonged to no recog- ed profession and was not engaged in any classified retail or wholesale business. Today it is almost impossible to pick up a newspaper, magazine, or trade journal without finding some acount of engineering achievement. Yet to what is this change due. Undoubtly part of it is due to the increase in the use of engineernig products, but the greatest part is due, either directly or indrectly, to the activities of various engineering societies that have gathered together the separate engineers into organized bodies and that are able thru unified action to better promote and supervise the actions of the engineers.

The question then naturally arises: If practicing en-

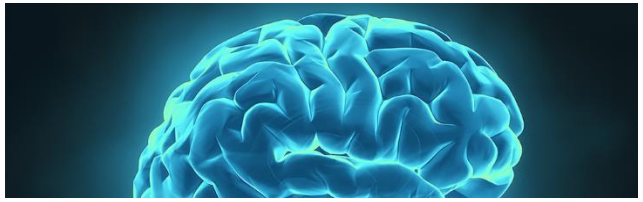

Engineering Enrollment and Graduates - All Schools
Enrolled
Grads
10,000
9,000
8,000
7,000
6,000
5,000
4,000
3,000
2,000
1,000
0
1,600
1,400
1,200
1,000
800
600
400
200
0
Baseline
11-12 (AY)
12-13 (AY)
13-14 (AY)
14-15 (AY)
15-16 (AY)
16-17 (AY)
17-18 (AY)
Targeted Goal (2021)
1365


Engineering Students Enrolled
4500
4000
3500
3000
2500
2000
1500
1000
500
0
K-State
KU
WSU
Baseline
11-12 (AY)
12-13 (AY)
13-14 (AY)
14-15 (AY)
15-16 (AY)
16-17 (AY)
17-18 (AY)
Targeted Goal (2021)


Engineering Graduates
800
700
600
500
400
300
200
100
0
K-State
KU
WSU
Baseline
11-12 (AY)
12-13 (AY)
13-14 (AY)
14-15 (AY)
15-16 (AY)
16-17 (AY)
17-18 (AY)
Targeted Goal (2021)

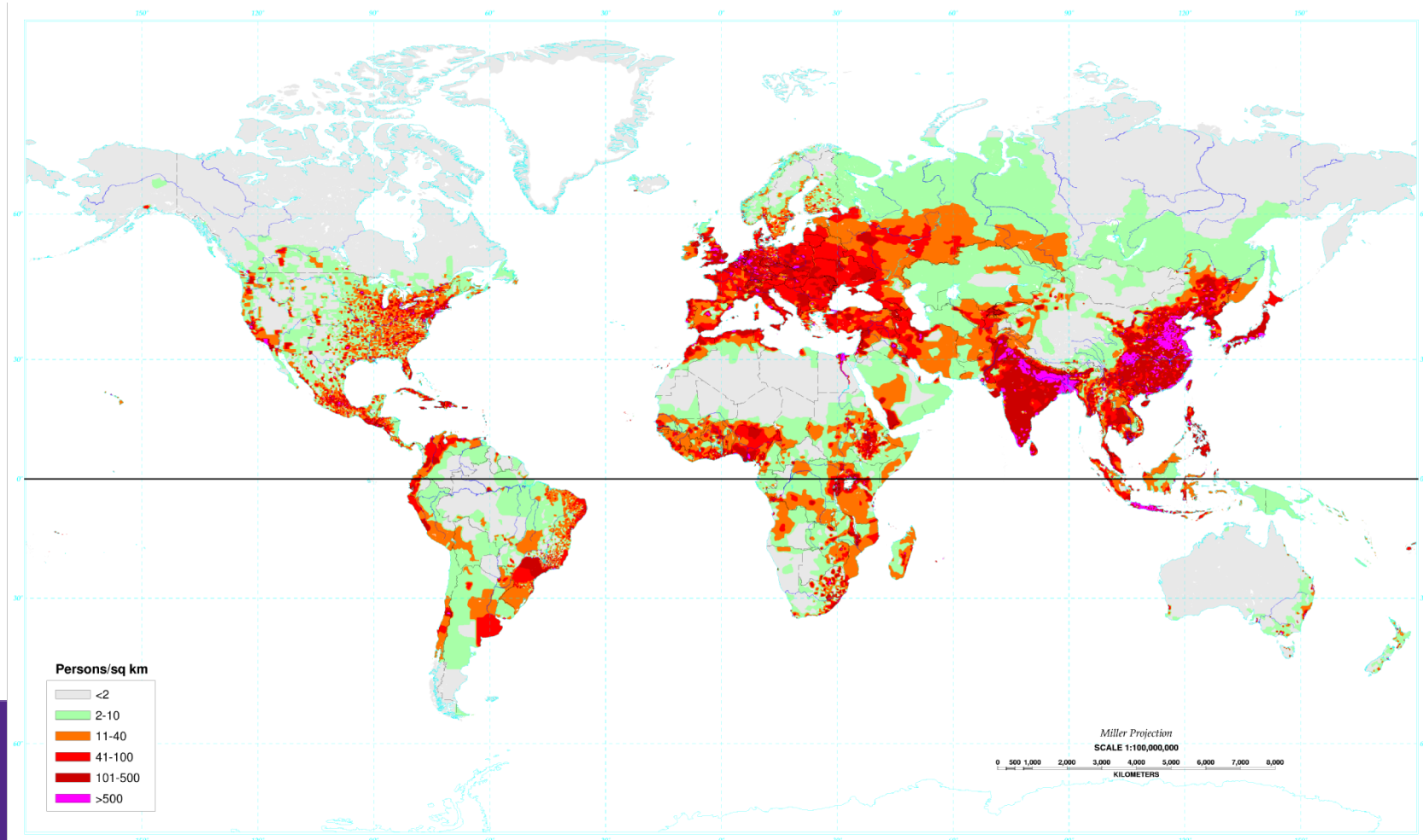
NAE Grand Challenges

- Advance Personalized Learning
- Make Solar Energy Economical
- Enhance Virtual Reality
- Reverse Engineer The Brain
- Engineer Better Medicines
- Secure Cyberspace
- Restore and Improve Urban Infrastructure
- Provide Energy from Fusion
- Provide Access to Clean Water
- Many more: Google NAE grand challenges



Engineering Challenges

- Feeding 9 to 10 Billion People (Currently 7.6 billion)
  - Arable Land
  - Water
  - Mechanization
  - Storage
  - Transportation
  - …..



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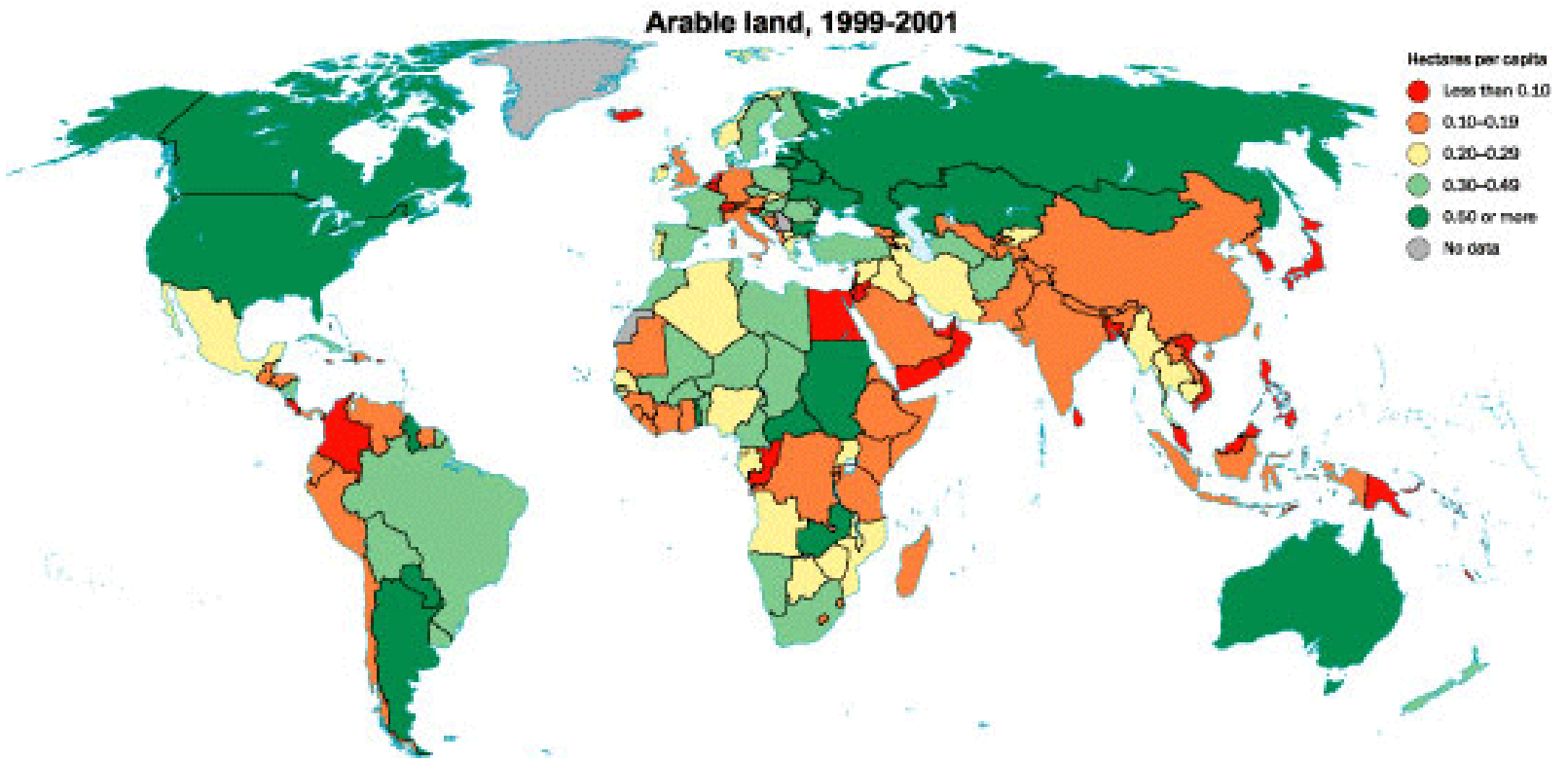
  - Transportation
  - …..

Arable Land



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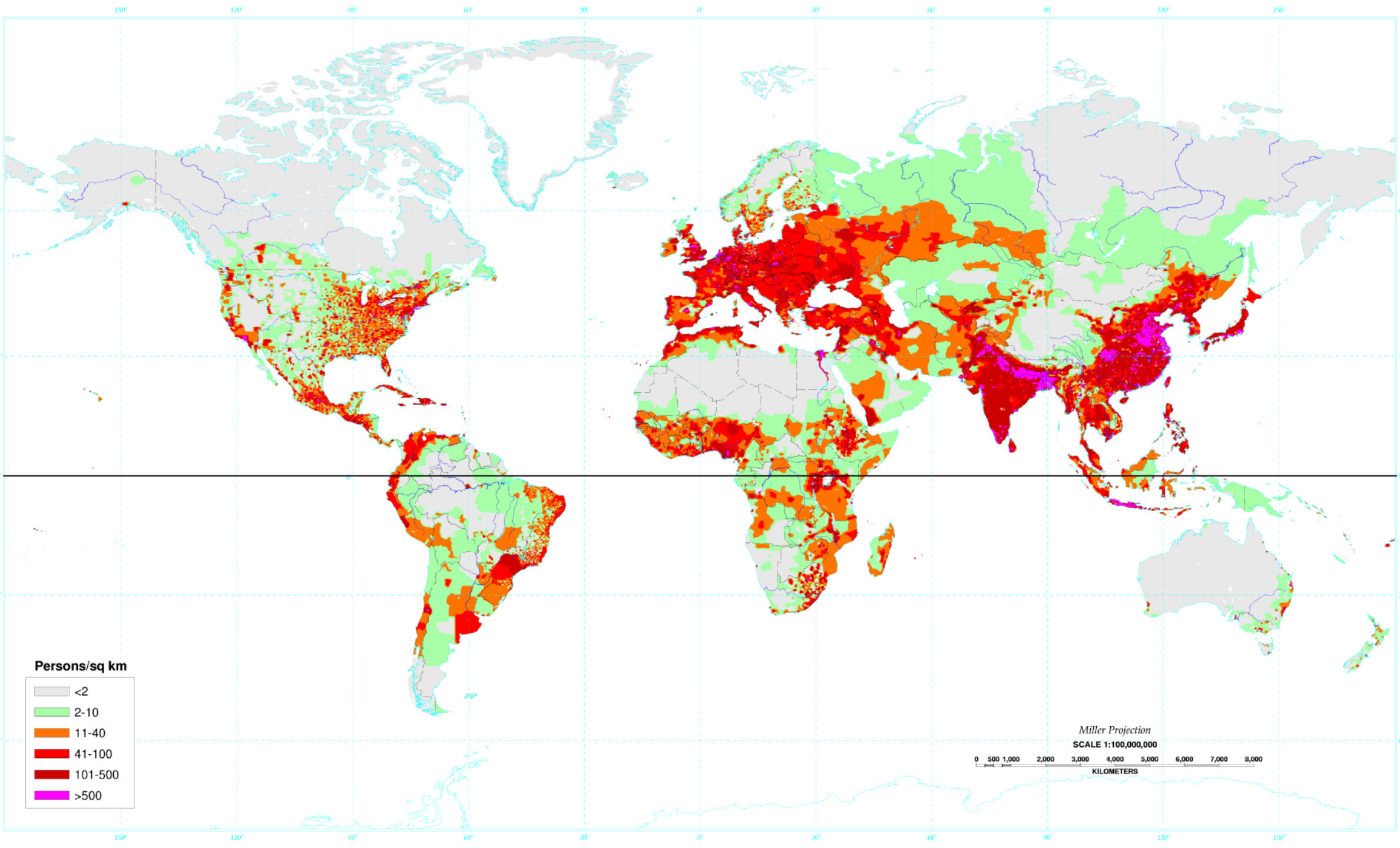
  - Storage
  - Transportation


Persons/sq km
<2
2-10
11-40
41-100
101-500
>500
Miller Projection
SCALE 1:100,000,000
0 500 1,000 2,000 3,000 4,000 5,000 6,000 7,000 8,000
KILOMETERS