

CONSTRUCTING MINDS

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Constructing Minds

Written and directed by David Marcum:

CONSTRUCTING MINDS		
	VIDEO	AUDIO
	PROLOGUE	
P1	<p>FADE IN:</p> <p>SUPERIMPOSE ON SCREEN:</p> <p>"WE ARE TOLD NEVER TO CROSS A BRIDGE UNTIL WE COME TO IT, BUT THIS WORLD IS OWNED BY MEN WHO HAVE 'CROSSED BRIDGES' IN THEIR IMAGINATION FAR AHEAD OF THE CROWD." OLD PROVERB</p> <p>ANGLE ON: SUN SETTING OVER MOUNTAINS</p> <p>SERIES OF SHOTS OF NON-URBANIZED MOUNTAINS AND RIVERS</p> <p>CLOSE IN ON PAINTING OF 19TH CENTURY WHEELING</p>	<p>NARRATOR: Since its origins, the United States has always followed the sun. "Go West" was more than advice to young men; it was the motivation for the fledgling country to invent itself as it went along.</p> <p>In the early 19th century, before St. Louis would become known as the Gateway to the West, Wheeling, the second largest city in what was still Virginia, held that title as it sat at the edge of the post-colonial frontier.</p>
P2	<p>MAP OF THE NATIONAL ROAD CROSS FADING WITH IMAGES OF THE TOWNS IT CONNECTS</p> <p>IMAGE OF OHIO RIVER</p>	<p>NARRATOR: The National Road, America's first "super highway" ran from Cumberland, Maryland to Wheeling in 1818, where it was stopped by the mighty Ohio River. If the nation was to tame the continent, then its roads would have to tame its waters.</p>

P3	<p>19TH CENTURY WHEELING.</p> <p>CHARLES ELLET, JR. AND JOHN A. ROEBLING</p> <p>WHEELING'S FACTORIES OF THE PERIOD</p> <p>VIEW OF WHEELING ISLAND CIRCA 1840</p> <p>VINTAGE MAP OF EUROPE</p>	<p>NARRATOR: A few failed attempts and three decades later, Wheeling made a grand attempt at building a bridge over the Ohio. City leaders created a contest between the two American men who knew the most about bridge design, Charles Ellet, Jr. and John Augustus Roebling.</p> <p>The two men would come to this industrial city, famous for its iron and glass, and evaluate the crossing between downtown and Wheeling Island, which sat in the middle of the river.</p> <p>Interestingly, both men had received their engineering educations in Europe.</p>
P4	<ul style="list-style-type: none"> • ELLET AS A YOUNG MAN • PENNSYLVANIA FARM • ÉCOLE NATIONALE DES PONTS <ul style="list-style-type: none"> • ROEBLING AS A YOUNG MAN • IMAGE OF PRUSSIA CIRCA 1810 <p>PRINT OF BAUAKADEMIE</p>	<p>NARRATOR: Ellet, the son of a Quaker farmer in Pennsylvania, had attended the École nationale des Ponts in Paris, one of two of the most prominent engineering schools on the continent.</p> <p>Roebling was born in and grew up in the Kingdom of Prussia, and immigrated to the United States in 1831, at the age of 25, but not before studying architecture at Bauakademie in Berlin, the other most prominent engineering school Europe had to offer.</p>

P5	<p>EARLY AMERICAN INFRASTRUCTURE</p> <p>SERIES OF IMAGES OF ROEBLING'S DESIGN</p> <p>SERIES OF IMAGES OF ELLET'S DESIGN</p>	<p>NARRATOR: Each man had great accomplishments under his belt, having built canals, bridges and railroads.</p> <p>Roebbling submitted a timid design that would require the use of piers in the river, thus impeding navigable traffic.</p> <p>Conversely, Ellet's design boldly crossed the water, using piers on dry land with no impediments on the river.</p>
P6	<p>ELLET'S DESIGN CROSSFADES TO A VINTAGE PAINTING OF BRIDGE CIRCA 1849</p> <p>SECOND IMAGE OF BRIDGE DURING EARLY PERIOD</p> <p>NEW YORK TIMES ARTICLE ON BRIDGE</p>	<p>NARRATOR: The committee chose Ellet's design for practical purposes. It would be the first major project for Ellet, and the last time Roebbling would be timid with his ideas.</p> <p>The Wheeling Suspension Bridge was completed in 1849 and was hailed as an instant landmark. With a length of one thousand ten feet, it was the longest bridge in the world. Ellet's fame reached far and wide.</p>
P7	<p>PAN OF BRIDGE FROM TOWERS TO...</p> <p>...COLLAPSED PORTION</p> <p>ELLET IN MOURNFUL REPOSE</p> <p>WHEELING BRIDGE AFTER BEING REBUILT, USING ROEBLING'S CABLES</p>	<p>NARRATOR: Unfortunately, the glory was short lived. Two years after opening, high winds rocked the bridge, twisting and contorting it until eventually the center span collapsed.</p> <p>No one was killed or injured but Ellet's reputation was destroyed. He would never again build another bridge. It was Roebbling's wire manufacturing and design that would restore the structure.</p>

	<p>IMAGES OF CINCINNATI'S ROEBLING BRIDGE</p> <p>IMAGES OF BROOKLYN BRIDGE</p>	<p>NARRATOR: Meanwhile, Roebling would go on to great fame; first with his landmark bridge in Cincinnati that would take Wheeling's title of "world's longest".</p> <p>His next span would be his masterpiece, but he would not live to see its completion. The Brooklyn Bridge would become a symbol of accomplishment for Roebling, New York City and America itself.</p>
P8	<p>SERIES OF SHOTS OF CLASSIC AMERICAN BRIDGES</p> <p>ENGINEERING STUDENTS</p> <p>COLLEGE CAMPUSES</p>	<p>NARRATOR: In engineering, the term "lessons learned" is used to apply to any project from which future questions can be answered. In Wheeling, the lessons learned would shape the future of American engineering and bridge design. Education that would come from these disciplines would have to be a collaboration of the greatest minds at the greatest schools, and passed on to its youth, who would then be challenged to carry on the tradition.</p>
P9	<p>MODERN FOOTAGE OF THE WHEELING SUSPENSION BRIDGE</p> <p>WHEELING BRIDGE IN SUNSET</p> <p>TITLE ANIMATION: CONSTRUCTING MINDS</p>	<p>NARRATOR: Over a century and a half later, the Wheeling Suspension Bridge still stands, and is the oldest continuously used major bridge in the world. A product of the greatest engineering minds of its day, it is hailed as the Father of American bridges, beginning a tradition of design and infrastructure that would set the course for an emerging nation.</p>

INTERCALARY CHAPTER 1-BEAM BRIDGES		
I1-1	<p>SIX PANELS FALL INTO PLACE, WITH IMAGES AND THE NAMES OF THE SIX KINDS OF BRIDGES</p> <p>THE BEAM BRIDGE PANEL ZOOMS FORWARD TO FILL THE FRAME</p> <p>CHILDREN WALK ACROSS A FALLEN LOG OVER A RAVINE</p> <p>ANIMATION RESEMBLING A BLUEPRINT OF THE BEAM BRIDGE TAKES SHAPE</p> <p>A TRUCK CROSSES THE NEW BRIDGE; RED ARROWS INDICATE THE PATH OF TENSION, WHILE YELLOW ARROWS INDICATE THE PATH OF COMPRESSION</p> <p>SERIES OF SHOTS OF BEAM BRIDGES</p> <p>SHOT OF COMPLEX BEAM BRIDGES OVERLAPPING EACH OTHER IN DALLAS</p> <p>ANIMATION OF THE WORD 'BEAM' WIPES THE SCREEN CLEAN TO BLACK</p>	<p>NARRATOR: <i>While the world is full of unique bridges, there are, in fact, only six types of bridges.</i></p> <p><i>The most basic bridge is based on the concept of the world's first bridge, a tree fallen over a ravine: the beam bridge. By far the simplest bridge design, it is no more than the use of beams spanning a chasm. The beams themselves bear the weight. Such a bridge is used for spots where the gap is narrow, and the traffic will be light. The Interstate system could not exist if not for beam bridges, that keep the grade even.</i></p> <p><i>Some freeway interchanges, such as this one in Dallas, take the beam bridge to new levels, figuratively and literally. The beam bridge is only the beginning.</i></p>
CHAPTER 1: CROSSING THE RHINE		
C1-1	<p>SUPERIMPOSE: CROSSING THE RHINE</p> <p>FADE IN:</p> <p>DRIVER POV FOOTAGE OF BRIDGES BEING CROSSED</p> <p>SERIES OF SHOTS OF GREAT AMERICAN BRIDGES</p>	<p>NARRATOR: <i>With so many bridges in the world, we lose track of how many we cross. We drive over most bridges while giving them no thought.</i></p>

C1-2	<p>SERIES OF SHOTS OF GREAT BRIDGES CONTINUES</p> <p>IMAGES OF CABLES, BOLTS, BARS, AND PARTS OF BRIDGES</p> <p>ALL THE IMAGERY WE'VE SEEN GOES IN REVERSE AT HIGH SPEED, AS MUSIC DOES THE SAME</p> <p>IMAGES AND MUSIC CRESCENDO INTO A BLUE SKY</p>	<p>NARRATOR: Like so much of the modernization that makes our lives easier, we take these bridges for granted. We forget that trips we now take in an hour used to require a day of travel. And trips that now require a day's worth of driving, used to take a week or more.</p> <p>If necessity is the mother of invention, then the parentage of the United States was the marriage of necessity and innovation. To understand American engineering, we must go back to its origin, back to the turn of the 19th century, to the place of its birth that is now hallowed ground for a variety of reasons.</p>
C1-3	<p>CROSSFADE FROM VIDEO TO THE BLUE SKY OF A PAINTING, PULL BACK TO REVEAL THE USMA IN ITS INFANCY</p> <p>MAP OF WEST POINT AND HUDSON RIVER ROTATES TO GIVE AN OVERHEAD VIEW OF THE TOPOGRAPHY</p> <p>PAINTING OF WEST POINT #2</p> <p>PAINTING OF HUDSON RIVER</p>	<p>NARRATOR: The United States Military Academy was created at what had been a fortified site called West Point, a name that is often used as shorthand for the school.</p> <p>West Point gets its name from the promontory on which it sits, overlooking a strategic S-curve in the Hudson River in downstate New York. During the Revolution, this high ground gave Americans a bird's eye view of the river, for any approaching British forces.</p>
C1-4	<p>PAINTING OF BENEDICT ARNOLD</p>	<p>NARRATOR: It was at this fort that American General, Benedict Arnold, committed an act of <u>treason so great</u> that his name is now synonymous with traitor.</p>

	<p>PAINING OF ARNOLD AND BRITISH COMPATRIOTS</p> <p>PRINT OF AMERICANS CAPTURING BRITISH SPIES</p>	<p>NARRATOR: Arnold acted in covert to surrender the fort to the British in exchange for £20,000 and the title of Brigadier General in the British Army.</p> <p>American forces learned of Arnold's treachery, and hanged his British compatriots, but Arnold himself escaped capture.</p>
C1-5	<p>PAINING OF WEST POINT #3</p> <p>IMAGES OF STUDENTS IN CLASS</p>	<p>NARRATOR: After the Revolutionary War, West Point had not only its excellent location, but ordnances and military stores as well. This gave it the foundation for the nation's first military academy, which it officially became in 1802.</p> <p>From the beginning, the Academy taught its cadets two fundamentals: military strategy and engineering.</p>
C1-6	<p>BLUEPRINTS, BRIDGES & ROADS UNDER CONSTRUCTION</p> <p>IMAGES OF WAR TIME ENGINEERING</p> <p>IMAGES OF:</p> <ul style="list-style-type: none"> • ALEXANDER THE GREAT • HANIBAL • WILLIAM THE CONQUEROR 	<p>NARRATOR: hough most of us associate engineering with the act of facilitating transportation and construction, it is actually military usage that has given the field some of its most important advances.</p> <p>History is replete with great generals and leaders who used engineering to vanquish their opponent.</p>

	<p>IMAGES OF "SPQR" AND JULIUS CAESAR</p> <p>CROSSFADE TO ROMAN ROADS</p>	<p>NARRATOR: Julius Caesar used engineering to conquer Europe. His roads, that famously led to Rome, made clear paths for his marching armies. However, it was a bridge that would be Caesar's engineering triumph.</p>
C1-7	<p>MAP OF ROMAN EMPIRE—CLOSE IN ON BORDER BETWEEN GAUL AND GERMANIA</p> <p>IMAGE OF THE RHINE RIVER</p> <p>POV FROM GERMANIA</p> <p>PAINTING OF CAESAR'S RHINE RIVER BRIDGE</p>	<p>NARRATOR: The year was 55 B.C. Germanic tribes were raiding the Roman province of Gaul from the Northeast, and retreating behind the wide Rhine River, where they felt safe and unassailable.</p> <p>Caesar could easily have attacked the hordes with boats, but he decided to make a statement, one which would forever put fear in the hearts of anyone who felt invulnerable to Roman forces. He had his legion build a bridge across the Rhine, over which his soldiers could boldly march into Germania.</p>
C1-8	<p>ANIMATION—THE BRIDGE RISES ON THE RHINE</p> <p>ROMAN COLOR GUARD RISES INTO FRAME</p>	<p>NARRATOR: Germanic tribes watched in dumbstruck awe as bit by bit, the bridge, hewed from wooden timbers, conquered the wide and mighty Rhine in just ten days, before Caesar conquered them. It may have been the first time the Rhine was crossed with military bridges, but it would not be the last.</p>
C1-9	<p>PICTURES OF WEST POINT STUDENTS IN CLASS THROUGHOUT THE DECADES</p> <p>IMAGES OF EARLY AMERICAN INFRASTRUCTURE</p>	<p>NARRATOR: The engineering program at West Point is the oldest such program of any school in the country.</p>

	<p>MODERN FOOTAGE OF WEST POINT CLASSES</p>	<p>NARRATOR: For the first 50 years of America's history, West Point graduates were responsible for most of the railroad lines, canals, harbors and roads of the young nation.</p> <p>While engineering has largely moved to the private sector, West Point continues to educate engineers with a department that is consistently ranked as one of the best in the United States.</p>
C1-10	<p>FOOTAGE OF MODERN ENGINEERING CLASSES</p> <p>FOOTAGE OF THE CAMPUS CULMINATING IN...</p> <p>...CLASSROOM OF COLONEL STEVE RESSLER, TEACHING ENGINEERING WITH VERVE</p>	<p>NARRATOR: At the military academy, engineering plays a significant role in the curriculum of <u>all</u> students. Even if a cadet's major isn't in engineering, he or she is required to take at least three courses in the subject to prepare them for a fast moving world.</p> <p>It is with this rich history, matched with its current engineering prowess, that West Point has taken the role of cultivating young minds to think in terms of engineering.</p> <p>INTERVIEW: STEPHEN RESSLER</p>

C1-11	<p>VIDEO OF STEVE RESSLER TEACHING</p> <p>CLOSE IN ON EYES OF A STUDENT</p> <p>FADE TO BLACK</p>	<p>NARRATOR: West Point's engineering program has its eye on the future, but not just for its own good, but to assure that the United States forges into this young century prepared to keep our country at the forefront of motivation and ingenuity.</p>
INTERCALARY CHAPTER 2: TRUSS BRIDGES		
I2-1	<p>SIX BRIDGE PANEL</p> <p>THE TRUSS PANEL ZOOMS FORWARD TO FILL THE FRAME</p> <p>ANIMATION: RESEMBLING A BLUEPRINT OF THE TRUSS BRIDGE TAKING SHAPE</p> <p>A TRUCK CROSSES THE NEW BRIDGE; RED ARROWS INDICATE THE PATH OF TENSION, WHILE YELLOW ARROWS INDICATE THE PATH OF COMPRESSION</p> <p>SERIES OF SHOTS OF TRUSS BRIDGES</p> <p>SHOT OF A TRAIN CROSSING A TRUSS BRIDGE</p> <p>ANIMATION OF THE WORD 'TRUSS' WIPES THE SCREEN CLEAN TO BLACK</p>	<p>NARRATOR: <i>When a beam bridge isn't sufficient, engineers turn to the remaining five designs.</i></p> <p><i>The next simplest bridge is a truss bridge. As the name would suggest, it is a steel truss created from various beams in a variety of configurations in which the truss can run underneath or above the bridge deck.</i></p> <p><i>Covered bridges are older examples of truss bridges, and today they are a testimony to the pioneering spirit of America's engineering.</i></p> <p><i>Many <u>railroad bridges</u> are truss bridges, bearing the great load of locomotives and cargo.</i></p>

PART 2: THE GRAVITY OF DESIGN		
C2-1	<p>SUPERIMPOSE: THE GRAVITY OF DESIGN</p> <p>FADE IN:</p> <p>SERIES OF SHOTS OF GREAT BRIDGES</p> <p>CLOSE UP SHOTS OF BOLTS, BEAMS, CABLES, ETC.</p>	<p>NARRATOR: It is said that "bridges are the cathedrals of America." Only the skyscraper could rival our bridges for the designation of being the quintessential American landmark of engineering.</p> <p>Bridges may be designed to look graceful, but they are, in reality, utilitarian. They are built to coexist with an ever shifting earth, and to withstand all the extremities of winters.</p>
C2-2	<p>MACKINAW BRIDGE:</p> <ul style="list-style-type: none"> • IN GOOD WEATHER • DURING GALE • IN ICE <p>AERIAL CIRCLE OF THE SUNSHINE SKYWAY BRIDGE</p> <p>MOVING SHOT OF RAVENEL BRIDGE</p> <p>RAVENELL BRIDGE FROM NEW ANGLE</p> <p>GOLDEN GATE BRIDGE:</p> <ul style="list-style-type: none"> • LONG SHOT • MEDIUM SHOT OF TOWER • OVERHEAD MOVING SHOT 	<p>NARRATOR: The Mackinaw Bridge, connecting Michigan's lower and upper peninsulas, faces brutal Great Lakes gales and freezing weather.</p> <p>The Sunshine Skyway Bridge in Tampa covers three counties, and must endure stormy gulf coast conditions.</p> <p>Similarly, the new Ravenel Bridge, in Charleston, South Carolina, incorporated lessons learned from Hurricane Hugo that had devastated the city in 1989.</p> <p>San Francisco's icon, the Golden Gate Bridge, is built over an ocean passage. Some part of the bridge is being painted every day just to keep up with all that the Pacific can throw at her.</p>

C2-3	<p>NEW RIVER GORGE BRIDGE:</p> <ul style="list-style-type: none"> • LONG SHOT • VINTAGE FOOTAGE OF CONSTRUCTION • MEDIUM SHOT-NEW ANGLE <p>LONG SHOT OF NEWPORT BRIDGE</p> <p>INCONIC ANGLE OF NEW RIVER GORGE BRIDGE—CROSSFADES TO WEST VIRGINIA QUARTER</p> <p>INCONIC ANGLE OF NEWPORT BRIDGE—CROSSFADES TO RHODE ISLAND QUARTER</p> <p>BOTH STATE QUARTERS FILL SCREEN</p>	<p>NARRATOR: In Fayetteville, West Virginia, the New River Gorge Bridge spans the canyon of one of the world's oldest rivers, and in lieu of paint, it is constructed with a steel that oxidizes, and creates a protective coating for the structure.</p> <p>And in Newport, Rhode Island, the Claiborne Pell Bridge, the longest suspension bridge in New England, must endure rough North Atlantic winters.</p> <p>So proud of these landmarks were their home states, that West Virginia and Rhode Island put these latter two bridges on their state quarters, as a testimony to the beauty of their landscapes and its accessibility thanks to engineering.</p>
C2-4	<p>SERIES OF SHOTS OF PREVIOUS BRIDGES</p>	<p>NARRATOR: All of these bridges are aesthetically appealing, but designers took great care to make them safe and long lasting first. Bridge building and design are taken seriously everywhere, of course, but in some states it has a special resonance.</p>
C2-5	<p>POSTCARD OF SILVER BRIDGE</p> <p>CROSSFADE TO VINTAGE FOOTAGE OF SILVER BRIDGE</p> <p>NEWS REPORT FOOTAGE OF BRIDGE COLLAPSE</p>	<p>NARRATOR: In 1967 the worst American bridge tragedy occurred in Pt. Pleasant, West Virginia. The Silver Bridge, built in 1928 and named for its then-unique aluminum paint, collapsed, taking with it the lives of 46 people.</p>

	NEWS FOOTAGE OF THE CLOSED NEW MARTINSVILLE BRIDGE	NARRATOR: This horrific event sent shockwaves throughout the country. Many bridges were closed and frequent inspection became paramount. Engineering designs took on a new seriousness.
C2-6	ANIMATION: BEGINS WITH AN AERIAL VIEW OF THE SILVER BRIDGE, WHICH ROTATES FOR COMPLETE VIEWING CLOSE IN ON EYE-BAR JOINT EYE-BAR JOINT CORRODES EYE-BAR FAILS SILVER BRIDGE TWISTS NORTH TOWER COLLAPSES CENTER DECK COLLAPSES SOUTH TOWER COLLAPSES CROSSFADE TO PERIOD FOOTAGE	NARRATOR: The Silver Bridge was a suspension bridge that used eye-bars instead of cables. These eye bars were connected like chains, and as everyone knows, a chain is only as strong as its weakest link. One of these links corroded, and the 1960s traffic was too much for the 1920s bridge. The eye-bar gave way and the entire structure folded into the Ohio River. This tragedy brought to light a new emphasis on smarter planning. New bridges were designed with redundant safety features, that if one part failed, other parts would support the structure.
C2-7	LONG SHOT OF I-35W BRIDGE ANIMATION: BEGINS WITH WIDE SHOT OF I-35W BRIDGE, WHICH ROTATES FOR COMPLETE VIEWING ZOOM UNDERNEATH TO GUSSET PLATE; GUSSETT PLATE FAILS; ZOOM BACK TO WIDE SHOT, BRIDGE COLLAPSES	NARRATOR: In 2007, the I-35 West Bridge, which spanned the Mississippi River in Minneapolis, collapsed, killing 13 people. The structure opened just two months before the Silver Bridge collapse. Studies indicate that its failure was due to gusset plates that were used in the 1960s construction.

C2-8	IMAGES OF EMERGENCY PERSONNEL AND ONLOOKERS OF COLLAPSED BRIDGE	<p>NARRATOR: As population increased, so did the traffic, and in turn, the weight and pressure placed on the plates: 21st Century traffic on a 20th Century structure.</p> <p>The collapse of I-35 West bridge was an indicator that despite all the changes that were created in bridge inspection after the Silver Bridge collapse, oversights were still possible.</p>
C2-10	<p>SERIES OF SHOTS OF ENGINEERS, OPENING DAY EVENTS, AND BRIDGES</p> <p>ANIMATION: A HUMAN HEAD FACES US; IT SPINS TO EXPOSE THE RIGHT SIDE, FROM WHICH MATHEMATICAL EQUATIONS, A SLIDE RULE, AND A DRAWING TRIANGLE EMANATE</p> <p>THE HEAD SPINS TO THE LEFT SIDE WHERE A PAINTBRUSH, A CANVAS, AND A PALETTE EMANATE</p> <p>THE HEAD SPINS TO FRONT AND THESE ITEMS FROM BOTH SIDES CREATE A RENDERING OF A BRIDGE</p>	<p>NARRATOR: These tragedies remind us of the seriousness of an engineer's work: like an architect, he or she must make designs that are stable; like an artist, their designs should appeal to the eye; but like a doctor, an engineer takes responsibility for the lives and safety of others.</p> <p>We may not know what was technically the first bridge ever built, but we can hypothesize that the <u>first</u> bridge was when a human first connected the analytical nature of the right brain to the creative nature of the left brain.</p> <p>It is this marriage of skills that produce the engineers who shape our world.</p>

INTERCALARY CHAPTER 3: CANTILEVER BRIDGES		
I-2	<p>SIX BRIDGE PANEL</p> <p>THE CANTILEVER PANEL ZOOMS FORWARD TO FILL THE FRAME</p> <p>ANIMATION RESEMBLING A BLUEPRINT:</p> <ul style="list-style-type: none"> • PIERS RISE • CANTILEVER PORTIONS EXTEND FROM PIERS TO THE LAND AND TOWARD EACH OTHER • A TRUSS STRUCTURE CONNECTS THE TWO CANTILEVER DECKS <p>A TRUCK CROSSES THE NEW BRIDGE; RED ARROWS INDICATE THE PATH OF TENSION, WHILE YELLOW ARROWS INDICATE THE PATH OF COMPRESSION</p> <p>SERIES OF SHOTS OF CANTILEVER BRIDGES</p> <p>ANIMATION OF THE WORD 'CANTILEVER' WIPES THE SCREEN CLEAN TO BLACK</p>	<p>NARRATOR: <i>The next advancement of bridge styles was to take the truss and put it into a cantilever design.</i></p> <p><i>When a structure is cantilever, it juts from the main structure like a balcony. Cantilever bridges use bridge decks that are balanced on piers, stretching in one direction to the shore, and in the other direction over the gap. A truss structure connects the two decks. The combination of the anchoring on land and the force of the conjoined trusses creates a bridge that is sturdy and solid.</i></p> <p><i>Cantilevered bridges became an affordable alternative to other bridge designs, and are numerous throughout the Ohio and Mississippi river valleys.</i></p>
CHAPTER 3-THE RULES OF ENGAGEMENT		
C3-1	<p>SUPERIMPOSE: THE RULES OF ENGAGEMENT</p> <p>FADE IN:</p> <p>MONTAGE OF SCHOOL EDIFICES, STUDENTS, BOOKS, ETC.</p>	<p>NARRATOR V/O: Interest in all things scientific has decreased among American students, and that applies to engineering as well. Everyone knows that great bridges don't just happen, but to be the type of person to envision such a connection usually starts young.</p>

	COLONEL STEVE RESSLER TEACHING CLASS	<p>NARRATOR: Colonel Stephen Ressler is the head of the civil and mechanical engineering department at West Point. It is his view that engineering doesn't have to be a dry subject for students. He is noted for finding interesting ways to get students interested.</p> <p>INTERVIEW-COL. STEVE RESSLER</p>
C3-2	<p>FOOTAGE OF WEST POINT STUDENTS ENGAGED IN RESSLER'S PRESENTATION</p> <p>FOOTAGE OF STEVE AND GENE RESSLER WORKING TOGETHER ON A COMPUTER</p> <p>IMAGE OF WEST POINT BRIDGE DESIGNER LOGO ON COMPUTER SCREEN</p> <p>STUDENTS WORK ON A COMPUTER USING THE DESIGN PROGRAM</p> <p>IMAGE OF BRIDGE DESIGN ON COMPUTER SCREEN</p>	<p>NARRATOR: Colonel Ressler realized that students needed to be engaged in engineering <u>before</u> they got to college.</p> <p>INTERVIEW-COL. STEVE RESSLER</p> <p>NARRATOR: Ressler collaborated on and his brother, Gene, to create what has become known as the West Point Bridge Designer. Gene is also an Army colonel, and he heads the academy's Electrical Engineering and Computer Science department.</p> <p>It is a computer program intended for students, but which can be downloaded and used by anyone who would like to enjoy the challenge of designing his or her own bridge.</p>
C3-4	<p>SERIES OF SHOTS OF VARIOUS CHASMS OFFERED BY PROGRAM</p> <p>ANGLE ON DOLLAR AMOUNTS</p>	<p>NARRATOR: The program presents a challenge in the form of a location, and the user must create the bridge in a real world scenario. Every steel beam and wire cable cost money, and the designer is accountable for expenditure.</p>

	ANGLE ON A COMPLETED BRIDGE, CROSSFADE TO ANIMATION OF THAT BRIDGE WITH A TRUCK CROSSING	NARRATOR: Most importantly, the structure must be strong and safe. After a design is in place, it can be viewed with an animated truck testing its strength.
C3-5	BRIDGE ANIMATION INDICATES EXAGGERATED VERSION OF BRIDGE'S DIPPING MOTION STUDENTS ENJOYING BRIDGE PROGRAM	NARRATOR: Of course this bridge wouldn't dip with your car, as seen in the animation. This extreme torsion is used to show the designer a magnified idea of how the bridge would distribute the weight. The bridge design program is free and students can easily download it to their computers, be they Macs or PCs. More importantly, this is the one computer program that the designers encourage to be shared, and put on as many computers as possible. INTERVIEW: STEVE RESSLER
C3-6	FOOTAGE OF WEST POINT BRIDGE DESIGN COMPETITION	NARRATOR: The Ressler brothers worked with West Point to use this program to create a contest that could cast its net over the entire nation, and involve students in an engineering exercise that was both fun and involving. They created the West Point Bridge Design contest. Students across the country could download the bridge design program and, while being monitored locally by teachers, they could compete from their hometown with other kids all over the U.S.

C3-7	<p>IMAGES OF STUDENTS ON COMPUTER INSERTED INTO AN AMERICAN MAP</p> <p>IMAGES OF WEST POINT CAMPUS</p>	<p>NARRATOR: The competition has a qualifying round in late winter. The students with the best scores compete again in a semi-final round. From that group, the best teams are culled and are invited to West Point to compete in the final round, sponsored by the American Society of Civil Engineers. At stake are college scholarships, free computers and a little glory. And the result will hopefully be a generation of new engineers.</p>
INTERCALARY 4: ARCH BRIDGES		
I-4a	<p>SIX BRIDGE PANEL</p> <p>THE ARCH PANEL ZOOMS FORWARD TO FILL THE FRAME</p> <p>ANIMATION RESEMBLING A BLUEPRINT:</p> <ul style="list-style-type: none"> • PIERS RISE • PORTIONS OF THE ARCH RISE • THE KEYSTONE IS PUT INTO PLACE • THE CABLES AND DECK SLIDE IN <p>A TRUCK CROSSES; RED ARROWS INDICATE TENSION; YELLOW ARROWS INDICATE COMPRESSION</p>	<p>NARRATOR: <i>A further advancement in design came with third type of bridge, the arch.</i></p> <p><i>The arch has a noble lineage, harking back to Roman aqueducts and highways, when designers learned that the arch shape—with its keystone—is tremendously strong.</i></p> <p><i>For centuries, arch bridges were built of stone, but with the invention of steel, the arch took on a new dynamic.</i></p>
I-4b	<p>FOOTAGE OF HELL GATE BRIDGE CROSSFADE TO THE NEW RIVER GORGE BRIDGE</p> <p>ALL THE INFRASTRUCTURE SLIDES BENEATH THE DECK</p>	<p>NARRATOR: <i>Like the truss design, arch bridges can be structured above the deck, as is the case with New York's famous Hell Gate Bridge...</i></p> <p><i>...or the structure can be below the deck, as seen in. West Virginia's New River Gorge Bridge.</i></p>

	<p>FOOTAGE OF ARCH BRIDGES</p> <p>ANIMATION OF THE WORD 'ARCH' WIPES THE SCREEN CLEAN TO BLACK</p>	<p>NARRATOR: <i>Arch bridges bring their gentle slopes to communities all over the nation, such as these in Cincinnati, creating an appealing aesthetic in diverse settings.</i></p>
CHAPTER 4-THE EAGLE AND THE TIGER		
C4-1	<p>SUPERIMPOSE: THE EAGLE AND THE TIGER</p> <p>FADE IN:</p> <p>A SERIES OF SHOTS OF STUDENTS COMPETING</p> <p>A MONTAGE OF STUDENTS WINNING TROPHIES FOR A VARIETY OF ACTIVITIES</p>	<p>NARRATOR: Of the many things we learn in school, one of most difficult lessons to accept is that competition makes us sharper; shrewder; work harder.</p> <p>The students who embrace this concept the quickest often find academic, athletic or artistic success more quickly than their peers.</p>
C4-2	<p>MAP OF WEST VIRGINIA, INDICATING PROXIMITY OF MORGANTOWN TO WHEELING</p> <p>FOOTAGE OF PETER AND STEPHEN CHEN</p> <p>PETER AND STEPHEN WORKING ON BRIDGE DESIGN</p>	<p>NARRATOR: Peter and Stephen Chen live in Morgantown, West Virginia, just an hour from Wheeling—where the nation's love for great bridges began.</p> <p>The two boys are brothers who succeed at many endeavors separately, but also succeed when working together, much like the Ressler brothers.</p> <p>Peter and Stephen have always excelled at the West Point Bridge Design competition on the state level, which is no surprise since they are carrying on a family tradition.</p>

C4-3	<p>ROGER AND LUCY CHEN IN A SERIES OF SHOTS</p> <p>SERIES OF SHOTS OF MORGANTOWN</p> <p>SERIES OF SHOTS OF WEST VIRGINIA UNIVERSITY</p> <p>SHOT OF MONONGAHELA RIVER</p> <p>SERIES OF SHOTS OF MORGANTOWN AND THE UNIVERSITY</p>	<p>NARRATOR: Peter and Stephen's parents are Lucy and Roger Chen, who came to Morgantown from Chicago, where they first met as international students from Taiwan.</p> <p>Morgantown is named for Zackquill Morgan, a pioneer who settled the part of this state when it was called Transmontaine Virginia. Transmontaine is a Latin name meaning "over the mountains."</p> <p>Along the storied Monongahela and Cheat Rivers, it is home to West Virginia University, the state's largest school of higher learning.</p>
C4-4	<p>INTERIOR OF MOUNTAIN LAIR STUDENT HALL, TILT UP TO INTERNATIONAL FLAGS, CLOSE IN ON FLAG OF TAIWAN</p> <p>ROGER CHEN AT WORK</p> <p>SERIES OF SHOTS OF CHEN FAMILY AT HOME</p>	<p>NARRATOR: Morgantown is a place in transition. Thanks to the university and its resources, this once small mountain community is becoming an economic boomtown, attracting students from all over the nation, and a faculty from around the world.</p> <p>Roger Chen is a civil engineering professor at WVU, specializing in the study of stress on bridges. He and his wife have raised five sons in Morgantown.</p>
C4-5	FOOTAGE OF CHEN FAMILY	<p>NARRATOR: Being fans of the Beatles, the Chens are probably familiar with John Lennon's famous remark "Life is what happens when you are making other plans."</p>

	PETER AND STEPHEN WORKING ON BRIDGE DESIGN	<p>INTERVIEW: ROGER CHEN</p> <p>INTERVIEW: LUCY CHEN</p> <p>NARRATOR: With an engineer father, and an academic mother, it is no small surprise that the Chen's sons have embraced the bridge design competition.</p> <p>INTERVIEW: LUCY CHEN</p>
C4-6	<p>PICTURE OF CHEN SONS</p> <p>PICTURE OF ALAN CHEN PICTURE OF BRIAN CHEN</p> <p>PETER & STEPHEN TOGETHER</p> <p>PETER AT UNIVERSITY HIGH SCHOOL</p> <p>STEPHEN AT MOUNTAINEER MIDDLE SCHOOL</p>	<p>NARRATOR: Their two oldest sons, now in college, started the tradition of competing in the contest.</p> <p>Alan, their oldest, is in medical school at Duke University, and their second oldest, Brian, is a premed major at Princeton University, and is also a Presidential Scholar.</p> <p>They have now passed the torch to their younger brothers. Peter is a sophomore at Morgantown's University High School, and Stephen, is an eighth grader at Mountaineer Middle School.</p> <p>INTERVIEW-PETER CHEN INTERVIEW-STEPHEN CHEN</p>
C4-7	FOOTAGE OF CHEN BROTHERS WORKING ON BRIDGES	<p>NARRATOR: Dr. Chen insists that his sons took the initial interest in the bridge design contest, and that he plays only a small role in their development as designers.</p> <p>INTERVIEW-ROGER CHEN</p>

C4-8	SERIES OF SHOTS OF MICHAEL ROWE	<p>NARRATOR: Peter is quite fortunate to have not just an excellent science teacher, but the best. UHS' Michael Rowe won the Seimens Founders Award for best math & science teacher in the nation. Like Colonel Ressler at West Point, he is known for finding ways to engage his students.</p> <p>INTERVIEW-MICHAEL ROWE</p>
C4-9	<p>TAIWANESE FLAG WAVING CHINESE CHARACTERS CAST SHADOWS OVER THE FLAG</p> <p>IMAGES OF TAIWNESE SCHOOLS AND CLASSES</p> <p>FOOTAGE OF ROGER CHEN AT WORK AT WVU</p> <p>FOOTAGE OF PETER COMPETING IN SWIM COMPETITION</p>	<p>NARRATOR: As immigrants from Taiwan, Roger and Lucy bring with them the awareness of educational systems in Asia, where constant study is famously practiced. Having been a part of that system, which afforded them both great educations, the Chens were faced with a much more relaxed system in the United States.</p> <p>INTERVIEW-LUCY CHEN INTERVIEW-ROGER CHEN</p>
C4-10	<p>IMAGES OF ROGER AND LUCY TOGETHER</p> <p>FOOTAGE OF STEPHEN AT SCHOOL, AMERICAN STUDENTS INTERACTING WITH TEACHERS</p>	<p>NARRATOR: As individuals who studied in both systems, the Chens arrived at the conclusion that they would raise their children with ideas from the best of both worlds, as they had seen the upsides and downsides of each.</p> <p>INTERVIEW-LUCY CHEN</p>

	<p>FOOTAGE OF AMERICAN STUDENTS PRACTICING VARIOUS SPORTS</p> <p>THE CHENS AT HOME, PRACTICING GUITAR, PIANO AND VIOLIN</p>	<p>NARRATOR: In America, study can sometimes take a back seat to recreation or athletics, and in Asia study and discipline can stifle the spirit of the child. The Chens wanted to be sure that their sons study hard, but at the same time develop their personalities, are able to explore various interests, and, most importantly, make friends.</p> <p>INTERVIEW-PETER CHEN INTERVIEW STEPHEN CHEN</p>
C4-11	<p>STEPHEN AT SCHOOL</p> <p>PETER AT SCHOOL</p> <p>STEPHEN AT SCHOOL</p> <p>PETER AT SCHOOL</p>	<p>NARRATOR: It is easy to see the success of this East-meets-West philosophy in the Chen's sons. They encourage their boys to march to the beat of their own drummer, but not so far as to lose contact with their peers.</p> <p>INTERVIEW-LUCY CHEN</p> <p>NARRATOR: Peter and Stephen defy the geeky stereotype of the single-minded science nerd, participating in a variety of activities, and are popular with their classmates.</p>
C4-12	<p>PETER IN CLASS, SWIMMING AND IN CHOIR</p>	<p>NARRATOR: Peter is president of the incoming junior class at University High School. He is also on the swim team and is in the school choir.</p> <p>INTERVIEW-PETER CHEN</p>

	STEPHEN IN CLASS, RUNNING, COMPETING	NARRATOR: Stephen has just completed Mountaineer Middle School, where he excelled with his musical skills and at science bowls.
C4-13	<p>FOOTAGE OF ANTHONY CHEN AT SCHOOL, COMPETING, PERFORMING</p> <p>ANTHONY WATCHES OVER HIS BROTHERS' SHOULDER AS THEY COMPETE AT BRIDGE DESIGN</p> <p>THE FIVE BROTHERS PERFORM AT A STREET FAIR</p>	<p>NARRATOR: The Chens have a fifth son, Anthony, a student at Mountaineer Middle. Like his brothers, he excels at a variety of things, especially performance.</p> <p>As he watches his brothers compete in the bridge design contest, one can rest assured that he will have come to understand the dynamics of the competition quite well by the time it is his turn to give it a try.</p> <p>INTERVIEW-LUCY CHEN INTERVIEW-STEPHEN CHEN INTERVIEW-PETER CHEN</p> <p>NARRATOR: It is this individuality that has brought the Chen brothers quite far, but there is no time to rest on laurels. The road of accomplishment still stretches out before them.</p>
INTERCALARY CHAPTER 5: CABLE STAY		
I-5a	<p>SIX BRIDGE PANEL</p> <p>THE CABLE STAY PANEL ZOOMS FORWARD TO FILL THE FRAME</p> <p>ANIMATION RESEMBLING A BLUEPRINT:</p> <ul style="list-style-type: none"> • TOWERS RISE • PORTIONS OF THE DECK EXTEND FROM TOWERS AS CABLES SNAP INTO PLACE 	<p>NARRATOR: <i>The cable stay bridge has become a relatively modern design preference, coming into greater usage in the last 30 years. However, the concept dates back to 1595, when Venetian designer Fausto Veranzio, conceived an idea that was ahead of its time.</i></p>

	<ul style="list-style-type: none"> • TOWERS BECOME TWINS • TWIN TOWERS DOUBLE INTO FOUR <p>A TRUCK CROSSES; RED ARROWS INDICATE TENSION; YELLOW ARROWS INDICATE COMPRESSION</p>	<p>NARRATOR: <i>Cable stay bridges use tall towers from which steel cables are tightly strung to support the main deck.</i></p>
I-5b	<p>IMAGE OF OAKLAND BAY BRIDGE ADDITION</p> <p>FOOTAGE OF REDDING BRIDGE</p> <p>FOOTAGE OF COMPLETED DALLAS BRIDGES; IMAGES OF PROJECTED BRIDGES</p> <p>ANIMATION OF THE WORDS 'CABLE STAY' WIPES THE SCREEN CLEAN TO BLACK</p>	<p>NARRATOR: <i>Cable stay bridges have a simplicity of design that makes them appealing for modern construction.</i></p> <p><i>The Oakland Bay Bridge in San Francisco is building a cable stay portion that will replace the previous cantilever portion of the structure. A few hours drive north, In Redding, Spanish architect Santiago Calatrava designed a cable stay footbridge that resembles a giant sundial. And in Dallas, Calatrava is creating unique cable stay structures in configurations never before seen.</i></p>
CHAPTER 5: ENGINEERING THE FUTURE		
C5-1	<p>SUPERIMPOSE: ENGINEERING THE FUTURE</p> <p>FADE IN:</p> <p>FOOTAGE OF MARSHALL UNIVERSITY IN HUNTINGTON, WEST VIRGINIA</p> <p>WEST VIRGINIA BRIDGE COMPETITION REGISTRATION</p>	<p>NARRATOR: <i>The Chens return to the scene of past successes, the West Virginia Bridge Competition. This state competition is not a prerequisite for the West Point competition, but it is an excellent creative environment for all of the contestants to sharpen their skills.</i></p>

	PAN OF ROOM OF STUDENTS	NARRATOR: Scores of bright minds come from all over the state to Marshall University in Huntington, to be a part of this academic competition that is becoming more popular by the year.
C5-2	SERIES OF SHOTS OF MARSHALL UNIVERSITY PAINTING OF JOHN MARSHALL CROSSFADE TO STATUE OF JOHN MARSHALL LONG SHOT OF CITY OF HUNTINGTON PAINTINGS OF: <ul style="list-style-type: none"> • COLLIS P. HUNTINGTON • LELAND STANFORD • MARK HOPKINS • CHARLES CROCKER CROSSFADE TO TRANSCONTINENTAL RAILROAD	NARRATOR: Marshall University was founded Huntington, West Virginia in 1837. It is named for John Marshall, the Supreme Court justice who played a key role in defining the American legal system. The city of Huntington bears the name of industrial magnate and founder, Collis P. Huntington, who, along with Leland Stanford, Mark Hopkins and Charles Crocker, created the "Big Four" of railroad tycoons, who developed the nation's first Transcontinental Railroad.
C5-3	PAINTING OF OHIO RIVER PICTURE OF COLLIS P. HUNTINGTON TRADES PLACES WITH STOCK CARD FOR CHESAPEAKE & OHIO RAILROAD SERIES OF SHOTS OF HUNTINGTON'S GILDED AGE ARCHITECTURE	NARRATOR: In 1870, Huntington founded this city that bears his name along the Ohio River, to act as a western terminus for the Chesapeake & Ohio Railroad. Hence, the city was built by, and in service of transportation. The city's architecture reflects its Gilded Age boom, when the United States first asserted its financial and industrial might.

C5-4	<p>DOWNTOWN STREET</p> <p>CUT TO:</p> <p>CLOSED PLANTS AND WORKING FACILITIES</p> <p>PAN FROM WEST VIRGINIA STEEL TO WEISBERG ENGINEERING LAB</p>	<p>NARRATOR: Like Morgantown, Huntington finds itself in transition, but for different reasons. The 1970s saw a decline in heavy industry in the Ohio Valley and Great Lakes region. Huntington experienced the same great decline with loss of jobs and population.</p> <p>But also like Morgantown, Huntington has turned to academia to develop its new economy, in this case its own Marshall University.</p>
C5-5	<p>FOOTAGE OF NEW ECONOMY JOBS IN HUNTINGTON, INCLUDING AMAZON, DIRECT TV AND MEDICAL CENTERS</p> <p>CUT TO:</p> <p>NEWS FOOTAGE OF THE OPENING OF THE WEISBERG ENGINEERING LAB</p>	<p>NARRATOR: Jobs in communications and medicine are slowly taking place of jobs in manufacturing, and Huntington is still in the process reversing its fortunes.</p> <p>One of Huntington's leading business families, Arthur and Joan Weisberg, have worked to restore an engineering program at Marshall, to assure the future of mutual growth for the city and university.</p> <p>INTERVIEW-JOAN WEISBERG</p>
C5-6	<p>TIGHT ANGLE ON WEST END BRIDGE, PULL BACK TO REVEAL RAHALL BRIDGE IN FOREGROUND</p> <p>CROSSFADE TO:</p> <p>GUNNER GATSKI BRIDGE</p>	<p>NARRATOR: It is only appropriate that the state bridge competition be held here, in a city of great bridges stretching over the Ohio River, including the Gunner Gatski Bridge, one of the first cable stay bridges built in the United States.</p> <p>INTERVIEW-JOAN WEISBERG</p>

	OVERVIEW SHOTS OF COMPETITION	NARRATOR: West Virginia is the only state that has its own statewide competition. The West Virginia Department of Transportation promotes the bridge designer vigorously, and is having great success in winning young hearts.
C5-7	ANGLE ON WEST POINT BRIDGE DESIGN CONTEST SIGN EXTERIOR SHOT OF WEISBERG LAB, WITH STUDENTS FILING IN SERIES OF SHOT OF STUDENTS CREATING DESIGNS SERIES OF SHOTS OF STUDENTS COMPETING IN AMAZING RACE	NARRATOR: West Virginia's contest uses the West Point program as its centerpiece, but is a unique creation of its own. Organizers have thought up new and fun ways to look at engineering. Students compete in a variety of tasks. At the Weisberg Engineering Lab, participants have to create a design using Lego blocks, and then draw that design so that a teammate can replicate it. Downtown, at the city's Pullman Square, the students compete in a new version of The Amazing Race, as they run around the city looking for clues that will offer them answers to engineering questions posed by the contest creators.
C5-8	ANGLE ON STUDENTS FILING INTO THE COMPETITION SERIES OF SHOTS OF STUDENTS DESIGNING BRIDGES	NARRATOR: But finally, on Saturday morning, it is time to get down to the brass tacks of the event: the actual design portion of the competition. Students can work as two member teams or alone, and they adapt witty names that describe their own personalities.

	<p>ANGLE ON PETER AND STEPHEN, TEAM ROCKET NAME</p> <p>SERIES OF SHOTS OF STUDENTS DESIGNING BRIDGES</p>	<p>NARRATOR: Peter and Stephen call themselves Team Rocket, which is hopefully prescient of their sky high success. In this mountainous state, where engineering has been paramount to development, kids put all that they have learned to work to create unique bridges</p>
C5-9	<p>SERIES OF SHOTS OF STUDENTS COMPETING CONTINUES; INSERT SHOTS OF BRIDGE DESIGNS</p>	<p>NARRATOR: As with the West Point competition, scoring is based on the decisions the students make, and he or she is faced with the same issues that face any engineer:</p> <ul style="list-style-type: none"> • What kind of bridge will best meet the needs of the site? • How wide is the gap? • How high must the navigable clearance be? • What is the sturdiness of the earth at the site? • Can piers be used in the water? • What unique safety issues might have to be considered such as winds, tides, heat or cold?
C5-10	<p>SERIES OF SHOTS OF STUDENTS COMPETING CONTINUES; INSERT SHOTS OF BRIDGE DESIGNS</p>	<p>NARRATOR: Students may not have taxpayers to answer to, with their designs, but they must take all of these initiatives into account to create the best bridge for the lowest possible cost.</p> <p>All student scores are compared and the most sound and affordable bridge is considered the winner.</p>

C5-11	<p>SERIES OF SHOTS OF GIRLS IN COMPETITION</p> <p>CLOSER SHOTS OF GIRLS DESIGNING</p> <p>FOOTAGE OF GIRLS PARTICIPATING</p>	<p>NARRATOR: One complaint often heard in the halls of science is about the lack of involvement from girls. This is not a problem for the West Virginia bridge competition.</p> <p>Not only are young women present and competing, they are succeeding. This generation of young women don't see the hindrances their mothers encountered, nor the barriers their grandmothers had to cross.</p> <p>INTERVIEW-ANNA COKELY INTERVIEW-BECCA COKELY INTERVIEW-KATIE DELUCA</p>
C5-12	<p>FOOTAGE OF END OF COMPETITION</p> <p>SERIES OF SHOTS OF AWARDS PRESENTATION</p> <p>MEDIUM SHOTS OF CHEN BROTHERS ACCEPTING AWARD</p>	<p>NARRATOR: The competition winds down and students make last minute decisions that they hope won't cost them.</p> <p>After all is said and done in Huntington, the awards for the various aspects of the competition see the wealth spread evenly.</p> <p>As for the biggest prize, best in design, the Chen brothers win with bridges that cross the gap the safest and most affordably. It is yet another feather in their cap, but they are not yet finished.</p>
<i>INTERCALARY CHAPTER 6-SUSPENSION</i>		
I-6a	<p>SIX PANELS FALL INTO PLACE, WITH IMAGES AND THE NAMES OF THE SIX KINDS OF BRIDGES</p> <p>THE SUSPENSION BRIDGE PANEL ZOOMS FORWARD TO FILL THE FRAME</p>	

	<p>ANIMATION:</p> <ul style="list-style-type: none"> • TOWERS RISE • CABLES CONNECT TOWERS • CABLES EXTEND DOWN TO • DECK EXTENDING FROM TOWERS TO SHORE • SEPARATE DECK PARTS MEET <p>A TRUCK CROSSES THE NEW BRIDGE; RED ARROWS INDICATE THE PATH OF TENSION, WHILE YELLOW ARROWS INDICATE THE PATH OF COMPRESSION</p> <p>SERIES OF SHOTS OF BRIDGES:</p> <ul style="list-style-type: none"> • WHEELING SUSPENSION • ROEBLING (CINCINNATI-COVINGTON) • BROOKLYN 	<p>NARRATOR: <i>Suspension bridges are typically what people conceive when they think of landmark bridges. Using tall towers that hold graceful cables, suspension bridges have become America's sightseeing treasures.</i></p> <p><i>From Wheeling to Cincinnati to Brooklyn, suspension bridges set the pace for American engineering. From there, American engineers took the ball and ran with it.</i></p>
I-6b	<p>SERIES OF SHOTS OF BRIDGES:</p> <ul style="list-style-type: none"> • BEN FRANKLIN • NEWPORT • VERRAZANO NARROWS • AMBASSADOR <p>CUT TO:</p> <ul style="list-style-type: none"> • OAKLAND BAY BRIDGE • GOLDEN GATE BRIDGE <p>RETURN TO THE SIX PANEL BRIDGE DESIGNS; CROSSFADE TO IMAGES OF REAL BRIDGES THAT DEFINE THE TYPE</p> <p>WIPE SCREEN TO BLACK</p>	<p>NARRATOR: <i>To Philadelphia To Newport To Staten Island To Detroit</i></p> <p><i>And, of course, the Oakland Bay and Golden Gate bridges of San Francisco.</i></p> <p><i>America's suspension bridges went beyond their traditional role of facilitating traffic, and have become icons of American ingenuity.</i></p> <p><i>It is these six kinds of bridges that an engineer considers when he or she begins the process of design.</i></p>

CHAPTER 6: KEPT IN SUSPENSE		
C6-1	<p>SUPERIMPOSE: KEPT IN SUSPENSE</p> <p>FADE IN:</p> <p>LONG SHOT OF SAILING UP EAST RIVER, NYC BRIDGES IN THE DISTANCE</p> <p>MEDIUM SHOT OF TAPPAN ZEE MEDIUM SHOT OF NEWBURGH-BEACON BRIDGE</p> <p>ANGLE ON THE BEAR MOUNTAIN BRIDGE CROSSFADE TO: NEW ANGLE OF SAME BRIDGE</p> <p>PAN THE LENGTH OF BEAR MOUNTAIN BRIDGE</p> <p>DRIVE BY SHOT OF SAME BRIDGE</p>	<p>NARRATOR: It is impossible to drive to West Point without crossing a landmark bridge of some sort. Whether the famous bridges of New York City, the famously busy Tappan Zee Bridge, or the unique humpback of the Newburgh-Beacon Bridge.</p> <p>However, at the very threshold of the military academy rests the glorious suspension of the Bear Mountain Bridge.</p> <p>The Bear Mountain Bridge was the longest suspension bridge in the world when it was completed in 1924. It is a final sentinel of American architectural greatness before entering the campus of the institution that started it all.</p>
C6-2	<p>SERIES OF SHOTS OF USMA</p> <p>SERIES OF SHOTS OF CADETS IN FORMATION</p>	<p>NARRATOR: The United States Military Academy at West Point is a unique school that mixes centuries old military tradition with cutting edge technology.</p> <p>Just a visit to the campus is exposure to the rigors of being a student <u>and</u> cadet.</p>

C6-3	<p>SERIES OF PICTURES OF</p> <ul style="list-style-type: none"> • ULYSSES S. GRANT • WILLIAM TECUMSEH SHERMAN • JOHN J. PERSHING • DWIGHT D. EISENHOWER • DOUGLAS MACARTHUR • GEORGE S. PATTON III <p>IMAGE OF JULIUS CAESAR CROSSING THE RHINE; CROSSFADE TO GEORGE S. PATTON AT THE RHINE; CROSSFADE TO PONTOON BRIDGES</p>	<p>NARRATOR: The Great Lions of American Armed Forces studied here:</p> <ul style="list-style-type: none"> • Grant • Sherman • Pershing • Eisenhower • MacArthur • And Patton <p>Who followed in the vaunted steps of Julius Caesar, and during World War II, built pontoon bridges across the Rhine River to defeat Germany.</p>
C6-4	<p>CLOSE UP OF PICTURE OF GENERAL WILLIAM AVERELL; PULL BACK</p> <p>CROSSFADE TO:</p> <p>PICTURE OF ASPHALT IN FIRST USAGES</p>	<p>Another highly regarded West Point graduate was Union Civil War commander, General William Averell, who had decisive victories in West Virginia at Moorefield and Droop Mountain. But he was not known just for his military expertise. His greatest claim to fame would be from his post-war life, as the inventor of modern asphalt pavement.</p>
C6-5	<p>SERIES OF SHOTS OF USMA'S STATELY ARCHITECTURE</p> <p>INTERIOR OF THAYER HOTEL; CONTESTANTS MEET</p> <p>MAP PINPOINTING LOCATION OF CONTESTANTS</p> <p>SERIES OF SHOTS OF COMPETITORS BONDING</p>	<p>It is in these hallowed halls of achievement and greatness that the top student designers come to compete.</p> <p>Joining Peter and Stephen Chen are the remaining five teams in the nation, coming from Orlando and Ocoee, Florida; Defiance, Missouri; Cornwall, New Windsor, and Oneonta, New York; and Middletown, New Jersey.</p>

	SERIES OF SHOTS OF WEST POINT CADETS IN FORMATION, ETC.	NARRATOR: The young men get a chance to become friends, and get to know their peers, as well as get exposure to the life of the West Point cadet.
C6-6	INTERIOR OF HALL; CLOSE UPS OF RELIEFS AND STATUARY ANGLE ON STUDENTS AS THEY COMPETE	NARRATOR: The next morning, they share breakfast, and are then whisked off to the competition, where six computers await them, and, as they had in their own communities, they take their place and begin design for a bridge over a crossing that none of them had yet seen.
C6-7	SERIES OF SHOTS OF STUDENTS COMPETING CONTINUE SERIES OF SHOTS OF STUDENTS COMPETING	NARRATOR: Nervous parents watch over their sons' shoulders, unable to help or comment, not that they would need it. These students have become adept at problem solving, which in reality is the triumph of this competition. NARRATOR: Hearts may have been won or lost to the cause of recruiting engineers, but as with other academic competitions, this one helps students to find a fun and competitive way to put their minds to work; an excellent preparation for the challenges of college and career, regardless of what vocation they choose.

C6-8	<p>ANGLE ON STUDENTS AS THEY FINISH AND STAND</p> <p>PAN OF STUDENTS AT COMPUTERS</p> <p>ANGLE ON AWARDS PODIUM; PETER AND STEPHEN CHEN ANNOUNCED AS 4TH PLACE WINNERS</p> <p>ANGLE ON AWARDS PODIUM; FIRST PLACE WINNERS TAKE THEIR PLAQUES</p> <p>PAN OF TOP SIX TEAMS</p> <p>ANGLE ON HALL AS CONTESTANTS AND PARENTS DISPERSE</p> <p>POV OF CAR DRIVING OVER BRIDGE</p>	<p>NARRATOR: After three long hours, the students' are stopped. They have designed two bridges and the result of their labor is immediate. Each of the teams is awarded a trophy and a Dell laptop computer.</p> <p>As the awards are announced, Team Rocket, Peter and Stephen Chen, come in fourth.</p> <p>All six teams are considered winners, as they are the cream of a crop that started with over seven thousand contestants nationwide.</p> <p>The contestants and their proud parents depart from Wet Point, and make use of the bridges and transportation system that brought them here.</p>
EPILOGUE		
E1	<p>SERIES OF SHOTS OF FAMOUS AMERICAN BRIDGES</p> <p>CONTINUE SERIES OF SHOTS OF FAMOUS AMERICAN BRIDGES</p>	<p>NARRATOR: Different American bridges have held records and had titles and superlatives, such as longest, highest or most used. But eventually new bridges are built somewhere in the world that steals that status.</p> <p>American design and ingenuity has transformed the way the world travels, and the cultivation of engineers is a worthwhile task that will assure that the United States and all the world will keep moving.</p>

E2	<p>CONTINUE SERIES OF SHOTS OF FAMOUS AMERICAN BRIDGES</p> <p>SERIES OF SHOTS OF CONTESTANTS YOUNGER SIBLINGS</p> <p>ANGLE ON ANTHONY CHEN LOOKING OVER THE HUDSON RIVER, HE LOOKS INTO THE CAMERA AND SMILES</p> <p>FADE OUT</p>	<p>NARRATOR: Perhaps that is why bridges are America's cathedrals. Their spires and arches are a meeting place for the American dream that brought a humble nation to greatness.</p> <p>But their work isn't yet done. For who knows what brilliant new designs the next generation is dreaming up for us?</p>
	THE END	
	ROLL CREDITS	