BRIDGING NATIONS FOR WORLD PEACE

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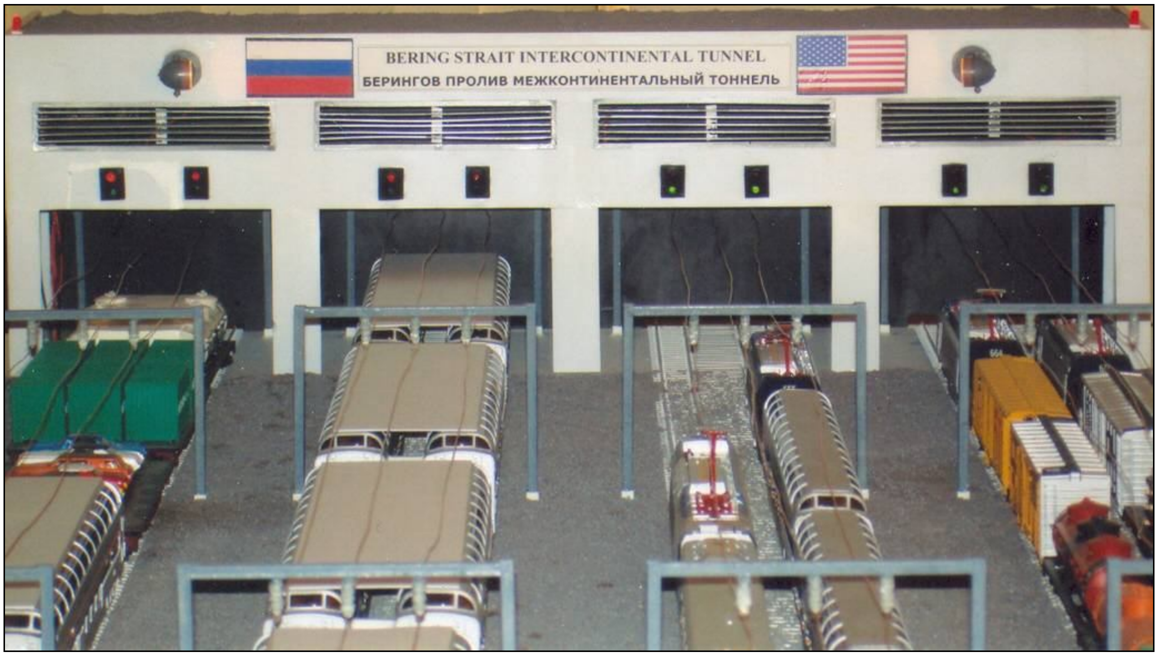

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Introduction

In 1995, I came across an interesting photograph in a book on astronomy. The photograph had been taken from a radar imaging satellite and showed a relief map of the earth with the oceans removed, so I could see the mountains and deep canyons on the ocean floor. What especially caught my interest was the Bering Strait. It is a somewhat short distance, in global terms, from Alaska to eastern Russia (52 miles, or 83.7 kilometers at the closet points) and the ocean between them is not too deep (192 feet, or 58.5 meters maximum along this route). I then thought about the possibility of building a tunnel there and running railways around nearly the entire world from the southern tip of South America (Cape Horn) to the southern tip of Africa (Cape of Good Hope), and across Asia, the Middle East, Russia and Europe as well. This could be a practical solution, in my opinion, for ushering in a new era of world peace and prosperity if undertaken in an unselfish manner with a motive of good will aimed at the betterment of humanity. Freight and passengers could be transported throughout the world much more efficiently than by other means. Such a transportation breakthrough would open new opportunities for positive intercultural interaction throughout the world and offer opportunities for greater peace and stability among nations. Furthermore, a railway system connecting Asia and North America would be shorter than a route across the Pacific by ship.

On this premise, that same year I wrote and copyrighted a proposal for this project,[1] which I submitted to members of the United States and Russian governments as well as the United Nations. In my proposal, I also presented a unique method for building the Bering Strait tunnel. It was a prefabricated design and over the past few years I have refined this tunnel proposal to a more manageable design that now incorporates the Diomede Islands. The Bering Strait is very shallow north of the Diomede Islands. This area could be backfilled and the two islands connected by a manmade section of island. This would provide a straight path for my railway tunnel system proposal. In my original 1995 proposal, I envisioned “maglev” monorail type trains. At that time, the research in high temperature superconductors appeared to have a promising future. Superconducting electromagnets are required in maglev trains. These electromagnets have to be cooled with liquid helium in order to superconduct but liquid helium is very expensive. Alternately, high temperature superconducting material (wire) will superconduct at liquid nitrogen temperature, which is much higher than that of liquid helium. Also liquid nitrogen is much cheaper (78% of our atmosphere is nitrogen). Unfortunately, with the use of the newer superconducting material in conjunction with liquid nitrogen, the required electric current density of high temperature superconductors never reached that of the titanium wire used in liquid helium cooled superconductor magnets. Furthermore, special track is required for maglev trains and is far more expensive than standard steel rail tracks. The term “maglev” is short for “Magnetic Levitation”, which means that the entire train is magnetically levitated or suspended a small distance above the special track to reduce rail friction to that of air friction since the train is not in physical contact with the track while operating. Propulsion of maglev trains is typically generated by a linear induction motor (LIM), in which the electromagnet windings are contained in the locomotive and interact electromagnetically with a special track, usually containing a continuous aluminum bar. Although a maglev has a high-speed capability - over 500 km/hr - it takes a large amount of energy to operate and is much more costly to run and maintain than conventional “steel wheel on rail” trains. Japan, Germany and China have maglev trains; however, they run on relatively short distances compared to that of an intercontinental railway system and are not subjected to the extreme temperature changes that a railway would encounter in Alaska and Siberia. For example, a high degree of precision (close mechanical tolerances) is required with a maglev train and track. Metals used in these designs can easily go out of tolerance specifications with the extreme temperature changes that would be encountered in an intercontinental route due to thermal expansion and contraction. Research is being conducted in the United States on maglev systems that utilize powerful permanent magnets built into the special track.[2] This would eliminate the need for superconducting electromagnets powered by electricity in the locomotive; however, such a plan is still in the experimental stage.

While traveling across the United States and Canada on a North American Rail Pass in 1999, I came up with a new idea for a stable, high-speed train, using standard gauge tracks. These tracks would have four rails, tied by common ties possibly constructed from reinforced concrete or some type of hard plastic suitable for such an application. I started making sketches of this new type of train proposal while I was on my train trips and later, in 2001. I will explain this new type of train in further detail in the **QUADRAIL SUPERWIDE TRAIN** chapter.

Our struggle today is a “war” of survival for all humankind. It is a different kind of war. It is not a battle between nations but rather a desperate search for mutual cooperation among them. It is an effort to fulfill the physical and spiritual needs of people around the world by shipping materials and goods where they are needed, and by providing the opportunity for people to travel to foreign lands and become acclimated with other cultures and customs. This is how world peace will be realized. It has to be based upon mutual trust, understanding and respect between nations and cultures. Wars leave much devastation, death and misery behind. No one really wins wars. If nations worked together on a project such as this, there would be no reason to go to war. As expensive as the Bering Strait and Intercontinental Railway System may be, its cost is insignificant when compared to the expenses of war and defense weaponry. Furthermore, unlike war, this project would give a positive return for the investment.

There have been proposals for a bridge, or bridges, as well as bored tunnels for crossing the Bering Strait and international roadway highways for vehicular traffic. There are problems however with an international highway system. Automobile drivers would have to know several languages to read road signs and know the variations in driving laws in order to travel from country to country. An international highway crossing the Bering Strait, Alaska and Siberia would be extremely dangerous during the long winter months. A 52-mile (83.7 km), or longer, tunnel under the Bering Strait would be very dangerous for automobile and truck traffic. Furthermore, the ventilation requirements for vehicle exhaust would be staggering over such a distance. A bridge across the Bering Strait would present serious problems, too. There would be severe icing and snow conditions, making driving very hazardous during the long winters and potential damage from iceberg flow in the spring and summer months. Temperatures there go down as low as –54 degrees Fahrenheit (-47.8 degrees Celsius).[3] Bridges also require extensive maintenance due to weather damage and road wear. Bridges in harsh climates require even more maintenance and this consumes more repair time per repair season. The repair season in the Bering Strait is so very short that a tunnel system appears to be a more practical option than a bridge for the Bering Strait, considering the structural requirements, the structural loading and maintenance.

It is for the aforementioned reasons that I recommend a Bering Strait tunnel system and intercontinental railway system. However, international highways could be run adjacent to the railway system wherever practical. These rail lines that interconnect countries around the world would be analogous to the blood circulatory system in the human body. As the arteries and veins move the life-carrying nutrients and waste byproducts to and from the cells of the body, the intercontinental railway system would provide an efficient and reliable means to transport raw materials, food, fuel, manufactured goods and people around the world to particular destinations. The increased efficiency of moving freight and people would have the potential to reduce the cost of living and improve the quality of life for people throughout the world. Furthermore, perishable goods such as produce and meats could be shipped to remote destinations in a timely manner at lower costs to consumers. For example, during the winter months, when northern countries are not in their farming season, fresh produce could be shipped from areas such as South America or Africa while they are still in their farming season. Seafood, meats, poultry, lumber, ore, and fuel, such as petroleum and coal, could be efficiently shipped to areas in the world where there is a demand for such items. In most cases, this would be faster and cheaper than shipping by seagoing cargo ships and tankers. (I have been working on a proposal for a unique design for the Bering Strait tunnel crossing. It is outlined in the **Prefabricated tunnels, manmade island and peninsulas** chapter.)

QUADRAIL SUPERWIDE TRAIN

Intercontinental railways are the best option for interconnecting nations around the world. And wherever practical, international highways and shipping ports would be good supplements to the intermodal (ships, trains, trucks and aircraft) transportation system. A railway system crossing under the Bering Strait would be safer than vehicular traffic since locomotive engineers and train attendants are formally trained and skilled in operating trains. The rail lines would be electrified via an overhead catenary wire system with electric locomotives to move trains through the Bering Strait Tunnel System. Over time, railways connecting to the Bering Strait Crossing from North America and Russia could be electrified and powered by nuclear and hydroelectric power generating stations, thus reducing pollutants from internal combustion engines found in other types of locomotives. In the long run, this would significantly reduce the amount of petroleum consumed in the world. In the interim, diesel-electric locomotives could move trains to and from the Bering Strait Crossing.

Before designing a tunnel system for the Bering Strait, we must decide what we want to run through the tunnels in order to determine their size and shape. Sixty percent of the world's railways are standard gauge.[4] Standard gauge trains are only about 10 feet (3 meters) wide. Therefore, they have a somewhat high center-of-gravity since some railcars are over 18 feet (5.5 meters) high, as in the case of double-stacked container railcars. This is why trains rock back and forth, particularly around curves. And that is why I am proposing the QUADRAIL SUPERWIDE TRAIN. The tracks would essentially be two Stephenson standard gauge tracks (56 ½ inch between inside of rails, or 1435.1 millimeter) and the track pairs would be gauged 15 feet (4.572 meters) center-to-center. This is based on a United States code <u>minimum</u> of 14 feet for mainline tracks.[5] The QUADRAIL trains would be 25 feet wide (7.62 meters), as opposed to the standard gauge 10 foot wide trains, thus having a lower center-of-gravity since they would be 2 ½ times wider. At full load, the QUADRAIL train axle load would increase by approximately 25% over the maximum loading on standard gauge railcar axle loading. That is one disadvantage. Using strong, lighter weight materials in railcar construction may compensate for the increased axle loading. The advantages of the QUADRAIL trains are many: Due to the lower center-of-gravity, the trains would be much more stable and subsequently have a higher speed capability than their standard gauge train counterparts. The freight cars would carry bigger and heavier objects. For instance, flatcars could haul large bulky objects, such as generator parts and turbines for large electric power generating stations, power station and substation transformers, other large pieces of machinery and modular homes, to name just a few items. Special QUADRAIL AUTO FLATCARS could be used to ferry automobiles long distance by side loading. For example, auto-carrier railcars could be used to ferry the automobiles for construction workers and others to and from Alaska and the lower forty-eight United States. This would facilitate rapid loading and unloading. Quadrail container cars could haul three rows of containers instead of one, as is the case on the standard gauge trains. Petroleum and chemical tanker cars could haul 2 ½ to 3 times more of the product per car length than their standard gauge counterpart. Hopper and boxcars could haul 2 ½ times the freight of comparable standard gauge cars of the same length. The QUADRAIL PASSENGER TRAINS would also be much roomier. The aisles could be twice as wide as the aisles in a standard gauge passenger car, with double doors for passage between cars, and would thus offer much more spacious, comfortable seating. <u>Furthermore, standard gauge trains would be operated on the QUADRAIL tracks as well</u>. This would not the case with the maglev trains.

Utilities

In my original 1995 manuscript I proposed running oil and natural gas pipelines through the Bering Strait tunnel system, as well as high power DC electrical transmission lines. The oil and natural gas pipelines and electrical transmission lines would be better suited for separate utilities tunnels for safety reasons. Regarding the prefabricated tunnel design, it would be a better choice, in my opinion, to make the size and shape of the utilities tunnels identical to the rail tunnels, thus allowing for the possibility of additional rail lines if an alternate energy source is discovered sometime in the future and conventional oil, natural gas and electrical power transmission systems are no longer needed. In the meantime, Russia and Europe use a 50-Hertz, three phase electrical power transmission system, and North America use a 60-Hertz, three phase electrical power transmission system. The high power DC electrical transmission lines would facilitate the interconnection of these two power grids into one international, intercontinental power grid. The AC power sources can be electronically converted to high voltage, high power DC and converted back to their respective frequencies and AC voltages to feed existing power grids. This would reduce the number of required electric generating stations in the host countries, such as Russia, Canada and the United States, since North America and Russia are on opposite sides of the northern hemisphere. Electrical demand is down at nighttime and when it is night in Russia and daytime in North America, or visa versa, they could trade power, thus reducing the number of generating stations required in these countries. Currently there are high power, high voltage DC electrical distribution lines in use in several places throughout the world.[6] This type of system is referred to as HVDC (High Voltage Direct Current) and utilizes electronic thyristor valves for switching an AC power source into DC and back into AC at the distribution points. There are some distinct advantages to this system such as fewer losses than in AC power lines and no inductive and capacitive transmission line power losses, a problem encountered with AC distribution systems, and also no “skin effect” losses (Current flows near the outer surface in AC electrical conductors, whereas, in DC circuits, the current flows equally through the cross-sectional area of the conductors). Furthermore, the long tunnels crossing under the Bering Strait would contain large quantities of structural steel, a ferrous material that would make electrical transmission lines highly inductive - thus increasing AC power losses, a problem that would be avoided with the use of DC high power electrical transmission lines. Currently HVDC systems operate at up to + and – 600 kilovolts to ground or 1.2 megavolts line-to-line. They exhibit higher power transfers over long distances with fewer lines than with AC power transmission.

In my 1995 proposal, I also recommended installing fiber-optic telecommunication lines through the utility tunnels in the Bering Strait. These fiber-optic lines would ultimately connect North, Central and South American with Russia, Asia, the Middle East, Europe and Africa. They would provide a high-density telecommunications path that would dramatically reduce, if not eliminate, the need for costly geosynchronous orbit telecommunication satellites and the rockets required to put them into orbit. Furthermore, the signal paths would be much shorter. Up to approximately 25,740 miles (41,425 km), the longest (“worst case”) terrestrial distance by land (from Cape of Good Hope, Africa to Cape Horn, South America), versus 45,000 miles (72,000 km) by geosynchronous telecommunication satellites which are in a 22,300-mile (35,888 km) orbit above the earth. This would facilitate a high density telecommunications network capable of meeting the demands of the modern world. The fiber-optic telecommunications cables are analogous to the central nervous system of the human body. As the central nervous system provides a “communication network” for the body, the global fiber-optic telecommunications system would facilitate communication throughout the entire world.

Prefabricated tunnels, manmade island and peninsulas

There have been other proposals submitted for bored tunnel configurations under the Bering Strait. I have a different and unique proposal that originally dates back to my 1995 manuscript. This proposal involves the construction of prefabricated 5 mile (8 km) tunnel sections that are temporarily capped on the ends and would be air and watertight, withstanding the submerged depth pressure of up to 8 atmospheres (approximately 120 psi, or 8.3×10^5 Pa). Initially these prefabricated tunnel sections would be built on dry, level land below sea level. The fabrication areas would consist of manmade peninsulas formed by building parallel pairs of wide dikes, or peninsulas, from rock, crushed stone and sand excavated from cuts and tunnels made through surrounding mountain ranges of Alaska and Russia (for the railway paths). The peninsulas would jut out from the Alaskan and Russian coasts along the rail tunnel path as part of what would become four sloped tunnel sections built onsite approximately 11 mile (17.7 km) in length.

Building two parallel peninsulas at each coastal location would form the initial phase of the peninsulas, creating a temporary canal between them. Each of these parallel peninsulas would be wide enough to facilitate crushed stone paved roadways that would allow for bi-directional vehicular traffic. Furthermore, the roadways would have to be wide enough to allow passage of large excavators, large dump trucks, cranes and other large construction and earthmoving equipment. The sea opening between the ends of these parallel peninsulas would be temporarily blocked with fill. The canal space between these parallel peninsulas would be wide enough to facilitate construction of the number of required prefabricated tunnel sections after the water is temporarily pumped out. This space would be excavated and leveled to a depth required to float the prefabricated tunnel sections when the end of the peninsulas is reopened and the area temporarily flooded again.

The prefabricated tunnel sections would be designed and built to withstand the pressure of the sea depth at which they will be located and the forces associated with towing them into position, such as forces generated by wave heights. Underwater trenches would be blasted, dredged, excavated and partially backfilled with crushed stone and leveled, so as to form ballast on which to set the tunnel sections. Before the ballast material is placed in the trenches, the ends of the trenches would have piers fabricated with reinforced concrete installed between the areas where the ends of the tunnel sections would set. Once the prefabricated tunnel sections are floated into position between the piers and partially flooded, sinking them into their final position, a seawall would be fabricated with reinforced concrete near the ends of the tunnel sections using cofferdams. A layer of elastic sealant, such as some type of synthetic rubber, could be attached over a considerable length near the ends of the tunnel sections during construction for the arch-shaped design. Or a ringed piston-cylinder configuration could be used for pipe-shaped tunnels, a preferred design due to greater structural integrity and greater ease of construction. (See Appendix A.) This would facilitate a watertight seal that could allow for movement of the tunnel sections in relation to the horizontal ends of the onsite fabricated tunnel ramp from the manmade peninsulas. It would form a “telescoping” slip-joint, allowing for movement, which would allow for plate tectonic movements and movements caused by seismic activity. From the GPS (Global Positioning Satellite) tracking data on the JPL/NASA (Jet Propulsion Laboratory/National Aeronautics and Space Administration) website, it is noted that Alaska and Russia are moving toward each other at a longitudinal directional rate of about 16.5 mm/yr, or about 1.65 meters per century.[7] The latitudinal relative velocity of Alaska and Russia, in the Bering Strait area, is approximately 3.84 mm/yr, or 0.384 meters per century. (Alaska is moving south this much faster than Russia at the Bering Strait area.) North, Central and South America are rotating very slowly in a counterclockwise direction, as viewed from above, and Russia, Asia, Europe and Africa are rotating very slowly in a clockwise direction. At the Bering Strait, the difference in rotation velocity between the Russian and Alaskan coasts is very small, 3.84 mm/yr, as mentioned above. The prefabricated tunnel design has this distinct advantage of allowing for movement due to plate tectonics, or "continental drift" and seismic generated movements. The bored tunnel technique does not address this concern, and it is somewhat unpredictable as to what will happen when these tectonic plates shift over time or when seismic activity occurs. At current rates, the Russian and Alaskan coasts in the Bering Strait will make contact in approximately five million years, thus closing off the Bering Strait. No tunnel design would last that long anyway!

Special types of nuclear powered submarines could be designed and built for the task of underwater excavation on the ocean floor of the Bering Strait for the 5-mile (8 km) wide channels. The submarines would be used to assist in the excavation of east/west trenches for the 5-mile channels where the prefabricated tunnel sections would be placed. These submarines would also be equipped with special excavation and grading equipment and capable of drilling and placing explosive charges. Nuclear powered submarines would be capable of staying submerged for long periods of time, avoiding icebergs, and operating continuously with rotating crews. They could guide and move conveyer machines for transporting excavated rock from the underwater trenches to receiving barges on the ocean surface. These barges would transport the rock to the manmade peninsulas during the warmer months of construction activity.

Once the prefabricated tunnel sections are completed, the end of the parallel peninsulas would be reopened and the area would be flooded with seawater, thus forming a canal. The individual 5 mile prefabricated tunnel sections would then be towed by tugboats to their respective piers at the east/west ends of the channel trench, then partially flooded temporarily to lower them into position. The prefabricated tunnel system design only requires a channel trench depth that is deep enough for the height of the tunnel, plus a layer of crushed rock ballast to set the tunnel sections on, and a small covering depth of sand or other suitable material; an estimated 50 to 60 feet (15.24 to 18.288 meters) for single QUADRAIL TRACK tunnel sections.

After all of the prefabricated tunnel sections are set in place in the two 5 mile wide channels, the reinforced concrete seawalls would be built near the ends of the tunnel sections. Then the parallel peninsulas from the Russian and Alaskan coasts and the new section of the Diomede Islands would be extended to the seawalls. Next, the water would be pumped out of the area between the parallel peninsulas and excavated to provide a 0.5% slope to the prefabricated tunnel sections. Then the remainder of the tunnels could be built onsite, along with rail and ventilation stations. The 0.5% slope is an optimum slope for locomotive performance on rail line grades. Ingress/egress shafts with stairwells and elevators would be built at periodic intervals for evacuation, rescue or maintenance purposes. The nearest evacuation route would be within approximately 2 ½ miles (4 km) walking distance in the channel sections of the tunnels but closer in the sloped sections under the peninsulas. This is a feature that is not possible with proposed bored tunnel techniques for crossing under the Bering Strait! Furthermore, the bored tunnel proposals are 10 miles (16 km) longer than my prefabricated tunnel system proposal in order to go to a much greater depth below the sea floor to achieve structural integrity from the natural rock. One bored tunnel proposal estimates a depth of 197 feet (60 meters) below the sea floor.[8]

When the tunnels and rail/ventilation stations are in place and the peninsula sections and the new section of the Diomede Islands are completed, the enclosed area would be filled and graded. Nuclear power stations could be built at the Diomedes to provide electric power for the tunnel systems and a portion of the electrified railway system. An INTERNATIONAL PEACE PARK could be built on the International Date Line, on the new section of land that connects the existing Diomede Islands. A hotel could be built adjacent to the Diomede rail station with a visitor observation roof and an enclosed, windowed observation floor (with restaurants) below for the colder seasons. With the availability of nuclear generated electric power on the Diomedes, a sewage treatment plant could be built and operated there, and fresh water could be piped in from Alaska and/or Russia through water main piping installed in the utility tunnel system. Residential dwellings could also be built on the Diomedes for employees who operate the tunnel system, rail station, hotel, International Peace Park, nuclear power stations, etc. An indoor stadium could eventually be built at the Diomedes for international sporting events, such as hockey and soccer games, etc.

Environmental and Safety Concerns, and Construction Techniques

Transverse-laid concrete pipes could be periodically placed at mean sea level perpendicular to the manmade peninsulas after the sloped tunnel sections have been completed. This would facilitate tidal flow equilibrium during tidal changes between the north and south sides of the peninsulas. A wildlife study could be conducted on the migration patterns of aquatic life to determine if sea creatures could adapt to the partial closing of the Bering Strait by the manmade peninsulas. Keep in mind that the Bering Strait is gradually closing off anyway!

I am also proposing fenced Arctic rail lines to keep animals and humans off of the tracks. Furthermore, I am recommending either transverse laid, large diameter concrete pipes or overpasses, or a combination of the two, placed periodically to facilitate the passage of wild animals. The locations would have to be determined by wildlife specialists cognizant of species migration patterns in the areas of concern. The QUADRAIL TRACKS would NOT have railroad crossings! Roadways would either go under or over the tracks. Furthermore, drawbridges should be avoided, so as not to delay rail traffic; track curvature should also be avoided as much as possible. Track curvature superelevations, where absolutely necessary, should have a very large radius. This will make the trains safer, reduce wheel flange and track wear, and reduce locomotive energy losses. River crossings would be accomplished either by using bridges high enough for ship passage or by installing tunnels. These design criteria will assure timely, safer train travel and prevent delays. Furthermore, I am proposing four lanes of QUADRAIL TRACK: One for westbound and one for eastbound slower freight trains, one for westbound and one for eastbound faster passenger trains. This would offer a greater safety level and reduce train traffic congestion.

The Bering Strait is a very demanding and challenging place for a construction project of this magnitude, with extremely cold temperatures, high winds and inclement weather. For these reasons, I am proposing the use of inflatable-beam temporary aircraft hanger buildings for covering the areas where the prefabricated tunnel sections would be built on the manmade peninsulas at the Russian and Alaskan shores. Once the prefabricated tunnel sections have been completed, towed and lowered into position in the channel trenches, the sloped sections of the tunnels would be completed beneath these temporary structures on the shoreline peninsulas. The inflatable-beam aircraft hangers would then be disassembled and transferred to the manmade peninsulas that extend from the manmade section of the Diomede Islands. They would then be reassembled and construction of the sloped tunnels would commence. The inflatable beam aircraft hangers would be heated and ventilated, thus providing a safer work environment for construction crews and keeping construction materials, such as concrete and steel, within workable temperature and humidity parameters. I have consulted with two inflatable-beam (AirBeam™) aircraft hanger manufacturers in the United States.[9] Their products are designed to withstand the wind loads, temperature extremes and weather conditions encountered at the Bering Strait. Furthermore, the inflatable-beam aircraft hangers are designed to be “ganged” together, fulfilling the 5-mile (8 km) long minimum length requirement, and have a maximum clear span of 87 feet (26.518 meters) built to date with a ridgeline height of 32 feet (9.754 meters). One manufacturer has projected a practical upper limit of a 120 feet (36.576 meters) clear span with an arch height of about 44 feet (13.411 meters). Along the length of the manmade peninsulas parallel reinforced concrete walls would be built that would facilitate temporary attachment of the inflatable aircraft hanger structures. The space between the walls would be the fabrication site of the prefabricated tunnel sections and, after they are completed and towed out, the permanent sloped tunnel sections would then be assembled in these locations. I am proposing six parallel, prefabricated 5-mile (8 km) tunnel sections per channel. The four inner tunnel sections would contain one QUADRAIL TRACK each (two pairs of standard gauge tracks, gauged 15 feet, center-to-center, from each other). This would facilitate two QUADRAIL TRACKS for westbound trains and two eastbound QUADRAIL TRACKS, or eight tracks for standard gauge trains, four westbound and four eastbound. This is a major artery in the entire railway system and four lanes of QUADRAIL track is critical to smooth rail traffic flow. The outer two prefabricated tunnel sections would be utilized for utilities, such as oil and natural gas piping, the High Voltage DC power Transmission Electrical Cable Lines and the fiber-optic telecommunication lines. A single, standard gauge rail line could be run along the center of the utility tunnels for maintenance vehicles. The two-tunnel system for utilities would provide redundancy in case of a failure of one system, fire or flooding. Therefore, there would be seven walls spaced equidistant from each other with a number sequence of the tunnels going from south to north as follows: 1, 2, 3, 4, 5, 6. The temporary aircraft hanger structures would be initially attached to the walls of the fabrication area of tunnel sections 1, 3 and 5. Once the prefabricated tunnel sections 1, 3 and 5 are completed, the temporary aircraft hanger structures would be disassembled and reassembled over the fabrication area of tunnel sections 2, 4 and 6, in a “leap frog” manner. This would allow space for snow, rain and ice to drain from the roof of the temporary aircraft hanger structures, thus preventing accumulation and potential structural failure. After tunnel sections 2, 4 and 6 are completed, all six areas would be temporarily flooded, the Bering Strait ends of the peninsulas opened, and the tunnel sections towed to their locations in the 5-mile (8 km) wide channel and lowered into the trenches. The temporary aircraft hangers would be further utilized to cover the peninsula fabrication areas during completion of the onsite sloped tunnel sections and then moved to the peninsulas extending from the manmade addition on the Diomede Islands to complete the onsite sloped tunnel sections.

A sprinkler system would be required in the tunnels for fire suppression. Pressurized water piping in the tunnels would be essential for this sprinkler system. This would require installation of standpipes/water tanks above the ends of the tunnels. The piping system would have to be heated in order to keep the water from freezing in extremely cold weather. In addition, the tunnels would have to be heated to a safe degree above freezing. Ventilation would be required for the tunnels as well. Furthermore, a United States building code requires that the tunnel ventilation has to be reversible.[10] This could be accomplished by installing large air handling blowers driven by reversible AC electric motors or by movable vanes that reverse the air flow direction through ventilation ducts. Locomotives generate a large amount of heat energy, including the electric locomotives. Therefore, I am also recommending plenum heat exchanger systems that would ventilate stale air yet reclaim some of the heat from that air and transfer it to tunnels ventilated in the opposite direction. The remaining heat requirements would be supplemented with plenum electric heating elements. Security and fire alarm systems and surveillance video cameras could be installed throughout the entire tunnel system, including the ingress/egress elevator and stairwell shafts, and monitored from central dispatcher points. Sump pumps would be installed at the ends of the prefabricated tunnel sections (lowest depth) to prevent flooding.

An international standard railroad signaling system would have to be adopted and applied throughout the rail tunnel system and connecting international rail lines. Special wheel trucks with spline drive axles and mating, transversely movable wheels would have to be designed and built to allow trains to run on differing track gauge, such as from the United States to Russia where the track gauge is 5 feet (1.524 meters). This would require a mechanism on the wheel trucks capable of moving each wheel to and from thrust bearing stops, a distance of 1.75 inches each (44.45 millimeters). Special tracks that gradually widen or narrow, depending on the direction the trains are heading, could be placed in a rail yard near the Russian end of the tunnel system, on a separate rail interlocking, to accomplish this task. They could use hydraulically operated sections of track that press on the wheel flanges where the track goes from the Russian gauge to the Stephenson standard gauge. Initially the QUADRAIL TRACKS in the tunnel system could be connected to distant, existing railheads in Russia and Canada via new temporary mainline two-rail track (probably one track) to start revenue generation by utilizing the completed tunnel system. Over time, the QUADRAIL TRACKS could be fabricated to connect Russia and China with Alaska, Canada and the lower forty-eight United States. When completed, the QUADRAIL TRACK SYSTEM would boost efficiency of the rail system by increasing speed limits on trains and rail traffic flow. As the QUADRAIL SYSTEM generates revenue, the track system could be extended to Central and South America, Europe, Asia, the Middle East, and Africa.

Train and tunnel models

In August 2008, I started building HO scale (1:87 scale) models of the QUADRAIL tracks, QUADRAIL freight and passenger trains, and segment models of the prefabricated tunnel sections. It took ten months to complete the display models, display tables and a dynamic, functional model. The dynamic QUADRAIL freight train model runs very well! I took several photographs and video recordings of the models.[11] In February 2009 I had a website created that offers a brief overview of my Bering Strait Tunnel Project Proposal and Intercontinental Railway, sets of photos of the QUADRAIL train models (as compared to standard gauge trains) and a brief video clip of the dynamic QUADRAIL freight train model actually running on an oval test track. The website is: http://www.quadrail.org A few months after posting the website, I was informed that a James W. Kennedy proposed a nearly identical "double-track" train 33 years ago in Trains® magazine.[12] Mr. Kennedy built HO scale models of his proposal, as I did, and presented many of the same ideas that I did. I had never seen this article or read Trains® magazine till a few months ago. It was pure coincidence! Mr. Kennedy's proposal was only slightly different from mine. His proposal was for 24 feet wide trains, rather than 25 feet wide. He had individual ties on the track pairs, rather than common ties connecting all four rails. The 24 foot wide train that Mr. Kennedy proposed would not have sufficient width on the flatcars for placing and removing three rows of standard 8 foot wide containers, whereas the 25 foot wide train that I am proposing would have sufficient width. Mr. Kennedy had a better idea, though, for the auto-carrier car. He had an upper passenger compartment section above the automobile storage deck and garage-type doors to cover the openings where the automobiles entered and exited.

Conclusion

I have provided photos, sketches and descriptions of train and tunnel models in the APPENDICES, as well as information on inflatable beam (AirBeam) aircraft hangers. James W. Kennedy and myself have only tested the QUADRAIL SUPERWIDE TRAIN concept on HO scale model trains independently. A real, full size prototype QUADRAIL TRAIN would have to be designed, built and tested on a QUADRAIL TEST TRACK to evaluate "proof of performance" before this rail transportation system could be implemented. Furthermore, the actual width of a real QUADRAIL SUPERWIDE TRAIN may have to be about 26 feet in width in order to accommodate Gunderson Mfg-type Well Car railcars for hauling three rows of double-stacked containers. This would require a track spacing of 16 feet center-to-center, rather than 15 feet. The couplers would have to extend 2.5 to 2.6 times further from the ends of QUADRAIL TRAIN railcars than they do on existing standard gauge railcars in order to negotiate track curvature without the corners of the railcars hitting each other. Furthermore, shared wheel trucks, such as the ones used in some container railcars, cannot be used in a QUADRAIL system for obvious reasons.

The original Alaskan Highway, formerly the Alcan Highway, was built in eight months through harsh terrain in the early part of World War II by the US Military. It is over 1400 miles long. It could be extended to the Seward Peninsula to the Bering Strait and kept clear and useable year around to facilitate a supporting infrastructure for fabricating the Bering Strait Tunnel System on the United States side of the project. The logistics and planning for a project of the magnitude of the Bering Strait Crossing Project would be phenomenal. This is by no means a simple task, yet I do not believe that it is out of reach for nations like Russia and the United States that conducted major military operations in World War II, designed and built nuclear powered submarines, launched the first satellites in space, launched humans into space, landed men on the moon and built space stations, to name a few of the amazing achievements of these nations in this past century. Why can't we build a Bering Strait Crossing, I ask?

In closing, my utmost hope is that the nations of the world and their political and economic leaders will seriously consider the aforementioned outlined proposal. Investment bonds purchased by the general public could help fund this project proposal. My hope is that nations will cease engaging in "Global Chess", rapacious war profiteering, and jockeying for advantageous positions in order to oppress and suppress those nations they want to dominate for selfish purposes. Ironically, the manufacturers of weaponry and other military equipment, and much of the military training that nations engage in, can be directly applied to this project for peaceful purposes! Some things have transcendent, universal value and are worth defending and fighting for. Mutual respect for such attributes by all nations will lead to peace and prosperity, thus avoiding wars. My hope is that all nations, including the United States, my home country, will seek to spread goodness in all its forms throughout the world. By following this path, peace will come, an everlasting peace, and the Bering Strait Crossing and International Railway System is the best vehicle to bring it to pass. Currently there is over 10% unemployment in the United States alone. The entire world is in an economic downturn. This project could economically turn everything around for the betterment of all nations. Maybe it is time to drop the swords and pick up the shovels! Let us work together to make it happen! "ALL ABOARD!"

Endnotes

1 The Russian/American Intercontinental Railway/Utilities Tunnel (RAIRUT), And International Monorailway System (IMS) Proposal William C. Simpson, Copyright © December 29, 1995, US Library of Congress TXu 719-354 (Manuscript)

2 Trains® magazine, Kalmbach Publishing Co., Waukesha, WI, USA, July 2009 issue "FACT OR FICTION? MAGLEV REALLY IS THE TECHNOLOGY OF THE FUTURE" by David Lustig, p. 33

3 National Oceanic and Atmospheric Administration, Nome AK, http://www.meterologyclimate.com/US-records.htm

4 ECONOMICexpert.com, http://www.economicexpert.com/a/Standard:gauge.html "60% of the world railway lines"

5 Section 339 of the Railroad Code, 1993, Michigan document http://michigan.gov/documents/rcbook_55515_7.pdf

6 STANDARD HANDBOOK FOR ELECTRICAL ENGINEERS H. Wayne Beaty, Donald G. Fink (deceased) Copyright © 2007, The McGraw-Hill Companies, Inc., US Library of Congress ISBN-13: 978-0-07-144146-9, ISBN-10: 07-14416-8, SECTION 15 DIRECT CURRENT POWER TRANSMISSION, p. 15-1 through 15-35

7 NASA GPS TIME SERIES Jet Propulsion Laboratory, California Institute of Technology Websites: http://slideshow.jpl.nasa.gov/mbh/series.html, http://slideshow.jpl.nasa.gov/mbh/all/BILI.html and http://slideshow.jpl.nasa.gov/mbh/all/CENA.html

8 BERING STRAIT TUNNEL AND RAILWAY PROJECT April 2006 Project cost estimate George Koumal

9 Vertigo, Inc., a business unit of HDT Engineered Technologies, http://www.vertigo-inc.com/aims/ Federal Fabrics-Fibers, Inc., http://www.federalfabrics.com/

10 NATIONAL ELECTRICAL CODE® 2005 edition, Copyright© 2004, NFPA, Article 110.57

11 TRAIN INTO TOMORROW ~ A peaceful option William C. Simpson, Copyright © applied December 2008, US Library of Congress (Digital Video Disk and Photo DVD)

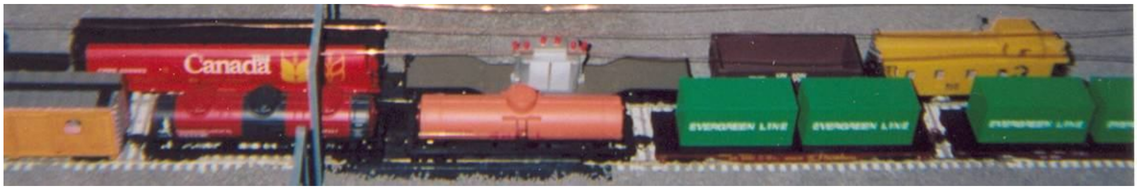
12 Trains® magazine, Kalmbach Publishing Co., Waukesha, WI, USA, March 1976 issue "The case for the double-track train" by James W. Kennedy, p. 28-32

Appendix A: HO SCALE (1:87) TRAIN AND TUNNEL MODELS

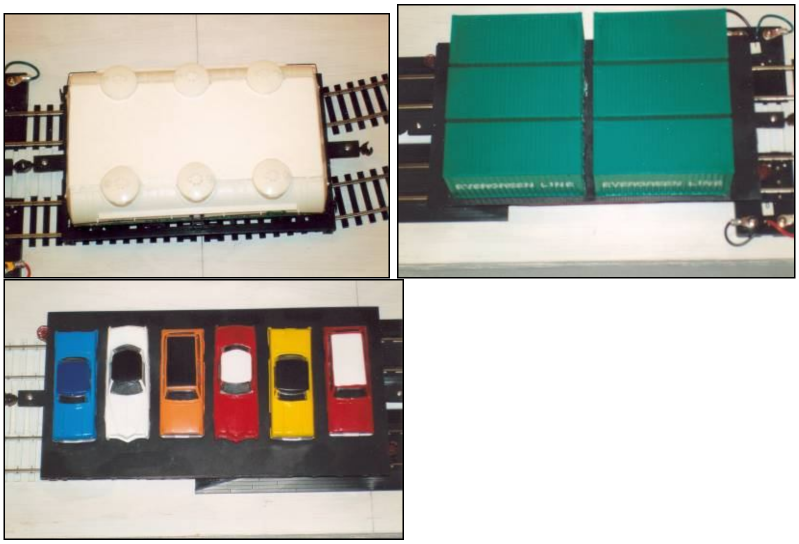
(Note: All photos and drawings by author, unless otherwise noted.)

Left to right: QUADRAIL Freight Train, QUADRAIL Passenger Train, standard gauge trains

Front to rear: QUADRAIL Freight Train, QUADRAIL Passenger Train, standard gauge trains



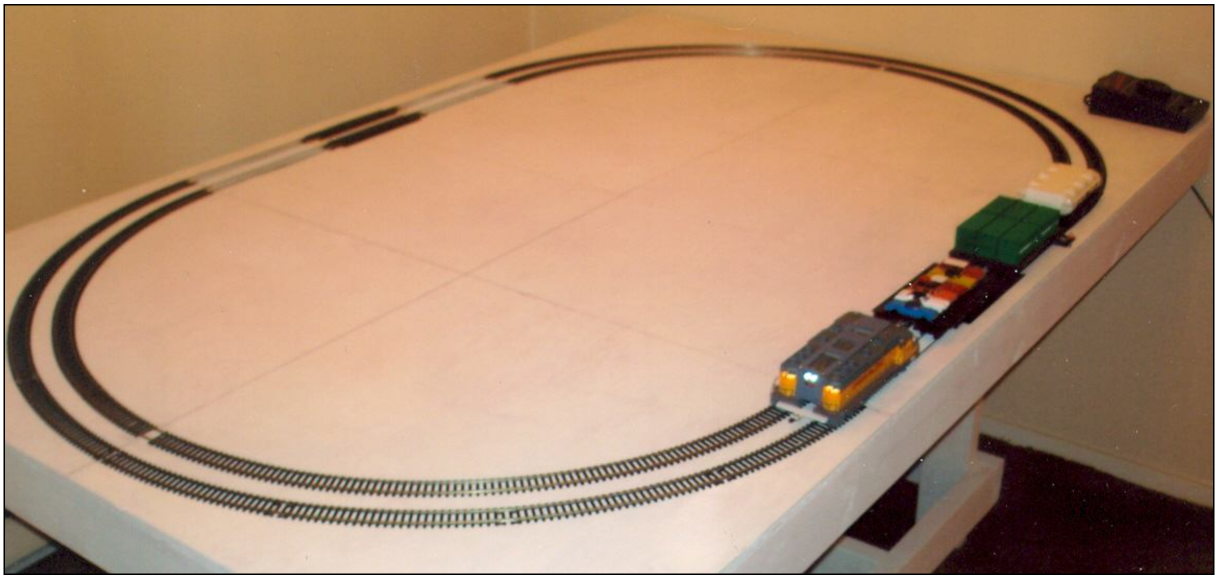
Standard gauge tanker and container railcars



QUADRAIL tanker, container and auto-carrier railcars

Three “HHP-8”, 8,000 HP standard gauge electric locomotives hauling toward tunnel portals.

QUADRAIL PASSENGER TRAIN 3 PHASE ELECTRIC LOCOMOTIVE (Est. 24,000 HP)

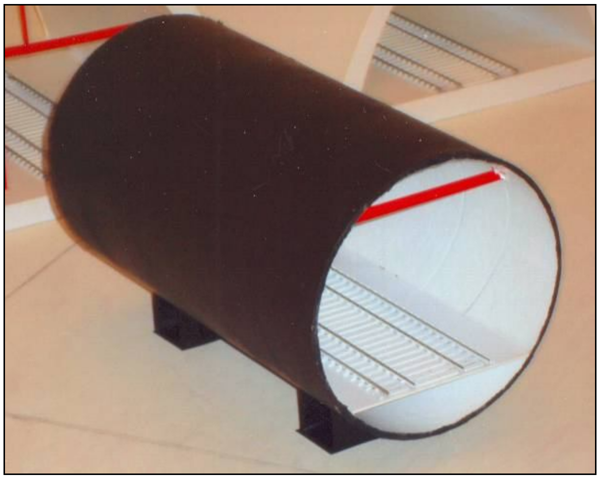


QUADRAIL OVAL TEST TRACK WITH FUNCTIONAL QUADRAIL FREIGHT TRAIN

Bering Strait Tunnel System Models

Tunnel entrance from Alaskan shore. Note four QUADRAIL portals. Utility tunnels not shown.

Arch-shaped segments of two possible 5 mile long prefabricated reinforced concrete tunnels.

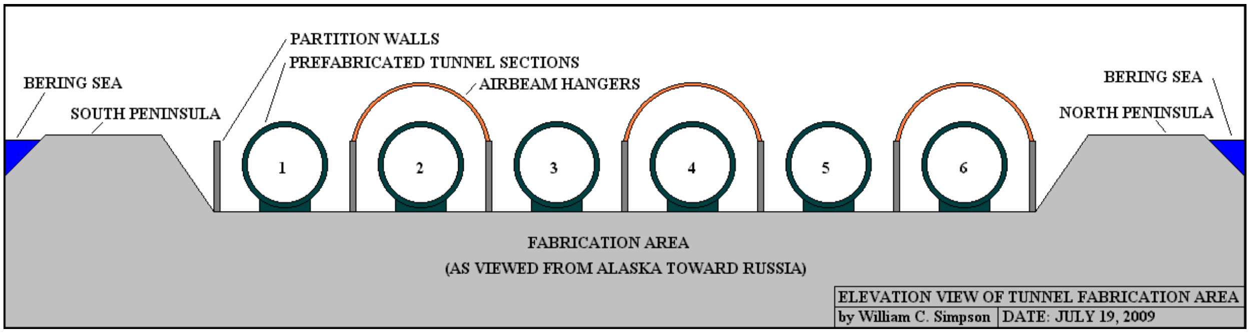


This is a segment of an alternate pipe-shaped 5-mile long tunnel fabricated from a corrosion-resistant steel, possibly extruded HY-80 steel cylinders welded together.

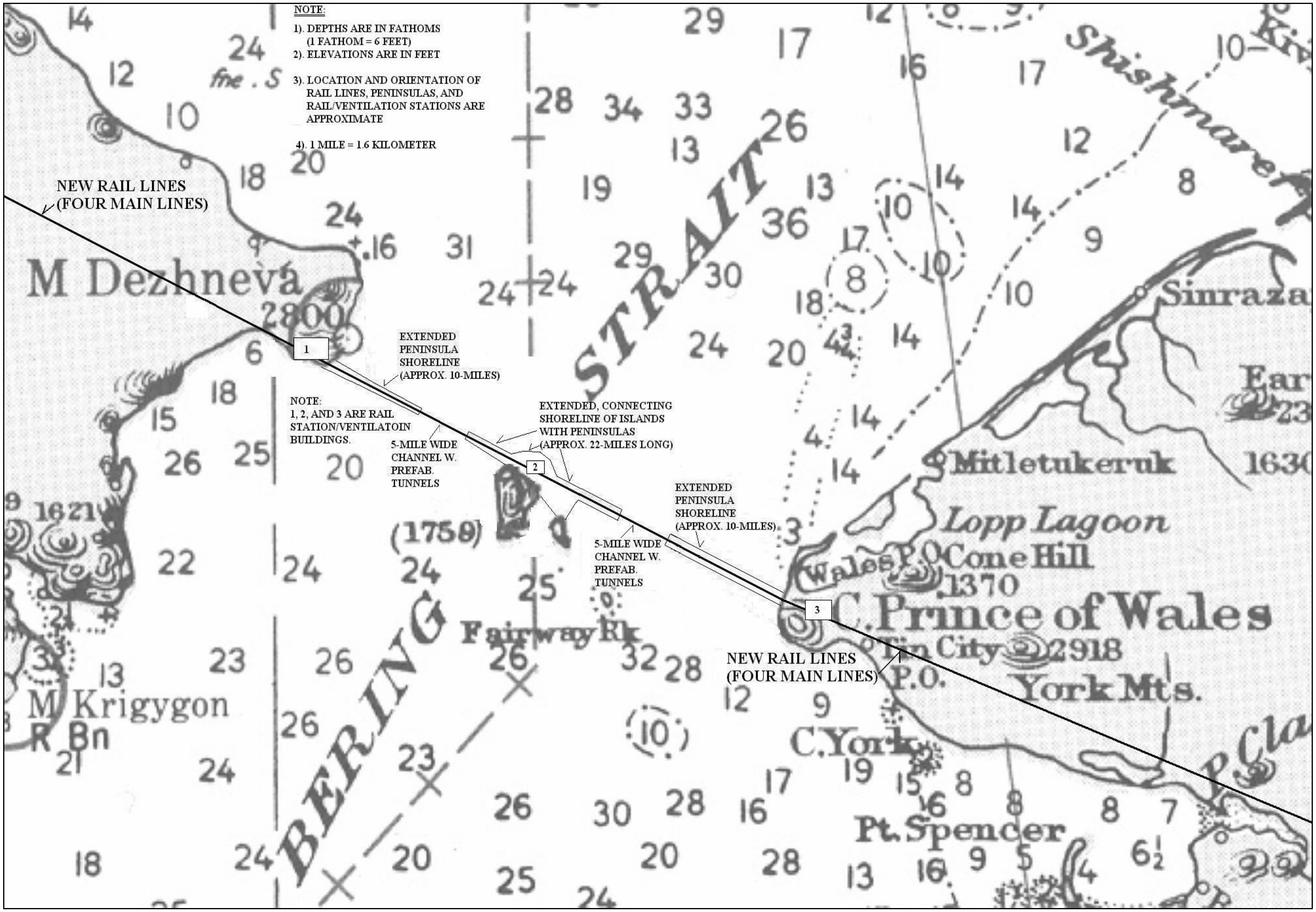
Appendix B: Bering Strait Tunnel System Installation

INFLATABLE BEAM AIRCRAFT HANGERS. HANGERS CAN BE JOINED “GANGED” TOGETHER, END-TO-END, TO FORM 5+ MILE WORK AREA.

Photo Copyright © 2009 by Vertigo, Inc., used with permission



ELEVATION VIEW OF SITE LAYOUT.



NOTE:

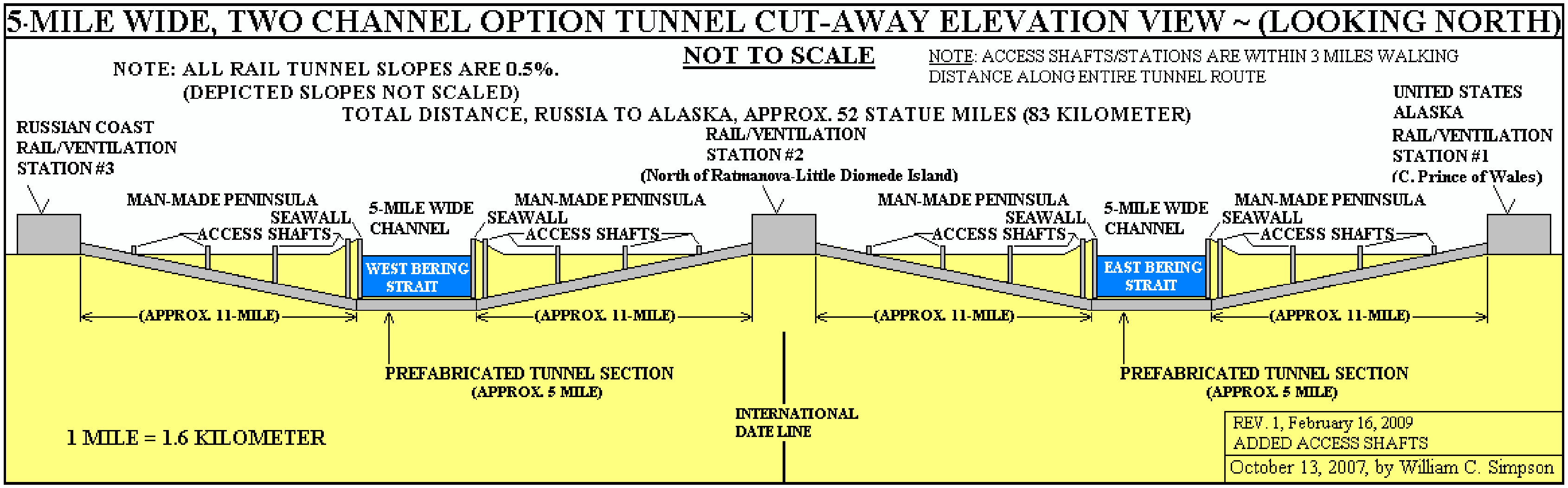
1). DEPTHS ARE IN FATHOMS
(1 FATHOM = 6 FEET)
2). ELEVATIONS ARE IN FEET

3). LOCATION AND ORIENTATION OF RAIL LINES, PENINSULAS, AND RAIL/VENTILATION STATIONS ARE APPROXIMATE

4). 1 MILE = 1.6 KILOMETER

NOTE:
1, 2, AND 3 ARE RAIL STATION/VENTILATOIN BUILDINGS.

NAUTICAL CHART OF BERING STRAIT AREA, TUNNEL SYSTEM LAYOUT



5-MILE WIDE, TWO CHANNEL OPTION TUNNEL CUT-AWAY ELEVATION VIEW ~ (LOOKING NORTH)

NOT TO SCALE

NOTE: ALL RAIL TUNNEL SLOPES ARE 0.5%.
(DEPICTED SLOPES NOT SCALED)

TOTAL DISTANCE, RUSSIA TO ALASKA, APPROX. 52 STATUE MILES (83 KILOMETER)

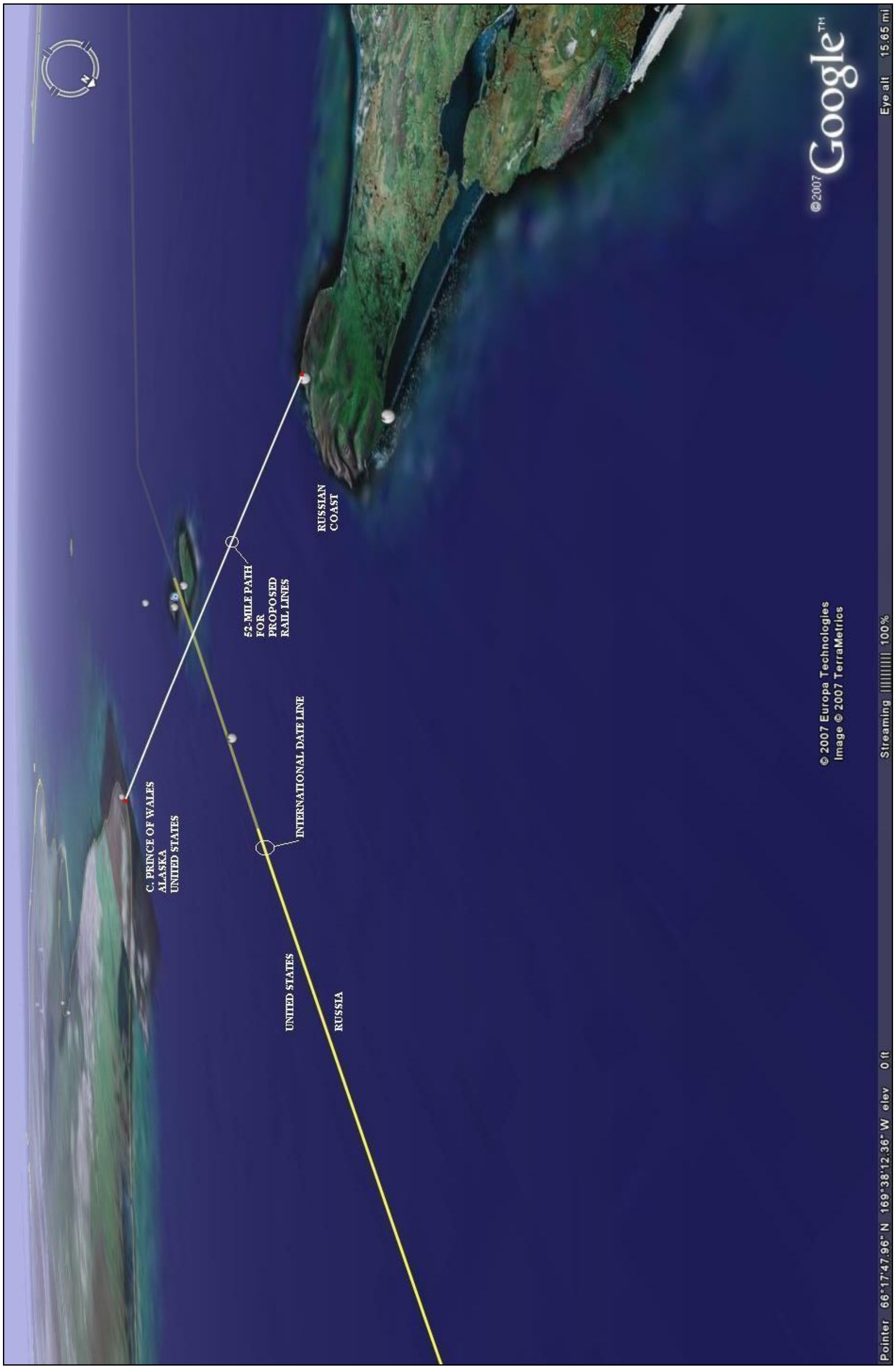
NOTE: ACCESS SHAFTS/STATIONS ARE WITHIN 3 MILES WALKING DISTANCE ALONG ENTIRE TUNNEL ROUTE

1 MILE = 1.6 KILOMETER

REV. 1, February 16, 2009
ADDED ACCESS SHAFTS

October 13, 2007, by William C. Simpson

Appendix C: Google™ Earth photos of the Bering Strait.




RAIL/VENTILATION STATION #1
C. PRINCE OF WALES ALASKA UNITED STATES
MAN-MADE PENINSULA (APPROX. 9-MILE LONG)
5-MILE WIDE CHANNEL WITH PRECAST TUNNEL SEGMENTS
RAIL/VENTILATION STATION #2
DIOMEDE ISLANDS
(RATMANOVA)
DIOMEDE ISLAND MAN-MADE EXTENSION (APPROX. 24-MILE LONG)
5-MILE WIDE CHANNEL WITH PRECAST TUNNEL SEGMENTS
MAN-MADE PENINSULA (APPROX. 9-MILE LONG)
RAIL/VENTILATION STATION #3
RUSSIAN COAST
INTERNATIONAL DATE LINE
NOTE: SUPERIMPOSED RAIL/TUNNEL SKETCH NOT TO SCALE. FOR ILLUSTRATION PURPOSES ONLY.
© 2007 Europa Technologies
Image © 2007 TerraMetrics
©2007 Google™
Pointer 66°17'47.96" N 169°38'12.36" W elev 0 ft
Streaming ||||||||| 100%
Eye alt 15.65 mi