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Федеральное государственное бюджетное образовательное учреждение высшего образования
«Российский университет транспорта (МИИТ)»

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Н.Д. Овчинникова, Ю.Ф. Найденова

HIGH SPEED NETWORK

Учебно-методическое пособие

Москва – 2017

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Учебно-методическое пособие включает в себя аутентичные тексты по вопросам развития высокоскоростного движения и предназначено для студентов, аспирантов, преподавателей в рамках магистерской программы «Инфраструктура высокоскоростного движения».

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Оглавление

PART I BASIC TERMINOLOGY

I Read and translate the text:

The high speed definition of the European Union:

DIRECTIVE 96/48/EC APPENDIX 1

1. Infrastructure

a) The infrastructure of the trans-European High Speed system shall be that on the trans- European transport network identified in Article 129C of the Treaty:

- those built specially for High Speed travel,
- those specially upgraded for High Speed travel. They may include connecting lines, in particular junctions of new lines upgraded for High Speed with town centre stations located on them, on which speeds must take account of local conditions.

b) High Speed lines shall comprise:

- Specially built High Speed lines equipped for speeds generally equal to or greater than 250 km/h,

- Specially upgraded High Speed lines equipped for speeds of 200 km/h,

- Specially upgraded High Speed lines which have special features as a result of topographical, relief or town-planning constraints, on which the speed must be adapted to each case.

2. Rolling stock

The High Speed advanced-technology trains shall be designed in such a way as to guarantee safe, uninterrupted travel:

- at a speed of at least 250 km/h on lines specially built for High Speed, while enabling speeds of over 300 km/h to be reached in appropriate circumstances,

- at a speed of 200 km/h on existing lines which have been or are specially upgraded,

- at the highest possible speed on other lines.

3. Compatibility of infrastructure and rolling stock

High Speed train services presuppose excellent compatibility between the characteristics of the infrastructure and those of the rolling stock. Performance levels, safety, quality of service and cost depend upon that compatibility.

PRINCIPLES OF HSR

1ST PRINCIPLE: HIGH SPEED RAIL IS A SYSTEM

High speed railways are very complex systems which combine the state of the art in many different fields:

Infrastructure (including civil engineering works, track, signalling, power supply and catenary, etc.)

Stations (location, functional design, equipment)

Rolling stock (technology, comfort, design)

Operations (design and planning, control, rules, quality management)

Maintenance strategy and corresponding facilities

Financing

Marketing

Management

Legal issues, regulations.

It is essential that all these components contribute to the quantitative and qualitative global technical performance and commercial attractiveness.

2ND PRINCIPLE: HIGH SPEED RAIL SYSTEMS ARE (EQUAL BUT) DIFFERENT EVERYWHERE

High speed systems depend on how all their components are designed and interact.

3RD PRINCIPLE: HIGH SPEED RAIL SYSTEMS MEAN CAPACITY

Capacity requires accessibility, complementarities and multimodal approach. The coherence in the application of all these three principles is essential in order to obtain the success in the application of this modality of rail transport.

II Answer the questions:

1. What is the definition of HSR infrastructure/ rolling stock?
2. What is meant by compatibility of infrastructure and rolling stock?
3. What are the principles of HSR?

I Read and translate the texts:

TECHNOLOGY REQUIREMENTS

From a strictly technical point of view, operating high speed rail systems requires:

Special Trains (“train sets” instead of conventional trains (locomotives and cars), because of the power-to-weight ratio and various other technical reasons, such as aerodynamics, reliability and safety constraints).

Special Dedicated Lines

Conventional lines, even with major up-grades, are unable to allow speeds above 200-220 km/h.

The layout parameters (horizontal and vertical profiles as well as other parameters such as the cant), transverse sections, track quality, catenary and power supply, and special environmental conditions must be designed so as to make high operational speeds sustainable.

Special Signalling System

Line side signals are no longer useable above 200 km/h, because they may not alwaysbe observed in time by the drivers. In-cab signalling is definitely the solution for high speed operation.

TRACK SUPERSTRUCTURE COMPONENTS (TYPICAL BALLASTED TRACK)

Rail type: Usually 60kg/m, welded

Type and number of ties: Concrete monobloc or bi-bloc, 1,666 per km

Fastening types: Elastic, many types

Turnouts: Depending on the functionality of the line, they can have movable or fixed crossings. Technological current limit: maximum speed on deviated track is 220 km/h

Electrification: Single phase. The most common voltages are 25kV, 50 or 60Hz or 15kV, 16 2/3Hz

Signalling, communications and other fix equipments: above 200km/h, a full on-board signalling system is necessary.

COMMON BASIC CHARACTERISTICS OF HIGH SPEED TRAINS

Self propelled, fixed composition and bi-directional

High level of technology

Limited axle load (11 to 17 tons for 300 km/h)

High traction power (approx. 11 to 24kW per ton)

Power electronic equipment: GTO, IGBT > Control circuits. Computer network. Automatic diagnostic system

Optimised aerodynamic shape

In-cab signalling system/s

Several complementary braking systems

Improved commercial performances

High level of RAMS (Reliability, Availability, Maintainability and Safety)

Airtight structure (sometimes)

Technical and safety requirements (compliance with standards)

Compatibility with infrastructure (track gauge, loading gauge, platforms, catenary, etc.).

TYPES OF HIGH SPEED TRAINS

Articulated or non-articulated trains

Concentrated or distributed power

Tilting or non-tilting

Single or multiple gauges

Single or double deck body structure

Dual power trains (electric and diesel engines).

OPTIMUM SPEED OPERATING ANY HIGH SPEED LINE

A constant feature in the world of transport is the desire of passengers to arrive earlier (accordingly with the idea of the

increased value of time). From the point of view of the operators, going faster and faster means being more competitive. The process of increased speed in all modes has led, however, in each of them to a situation of stabilising around a level atwhich they become stuck permanently, or at least for a long period of time until a trend breaking technological leap forward occurs.

This level around which speed stabilises in a unanimous process is the optimum speed for each transport mode. Due to several reasons, all long-distance passenger transport modes have maximum operating speeds stabilised over years that correspond to the optimum speed of each system (120 km/h in the case of the routes and around 900 km/h in the case of the aviation).

The railway is the exception because the maximum operating speed continues to increase as technological improvements arise.

The maximum operating speeds for high speed rail has increased steadily since the 1960's and continues to increase today. The «optimum speed of the system» is not yet reached but some limits are imposed by physical phenomena, technological barriers or criteria of a social nature.

After analysing the various phenomena surrounding train operations at increasing speeds and according to experts, it is considered that the main factor with regard to limiting speed increases is of aerodynamic origin, with its associated noise component. Factors overlapping between line geometry requirements, rolling stock restrictions, growing needs for acoustic attenuation measurements and the aerodynamic phenomenon, point to the optimum speed in the high speed system appearing in the 500-550 km/h range.

This optimum speed of the system is close to the record speeds achieved to date for the two families of railway technologies – wheel rail running and magnetic levitation – which have reached 570 km/h and 600 km/h.

II Answer the questions:

1. What are the basic technological requirements for HSR systems?
2. Name track superstructure components.
3. What are the common basic characteristics of high speed trains?
4. Name the types of high speed trains.
5. Give the definition to the optimum speed.

6. Is the optimum speed reached for any mode of transport?

7. What railway technologies have achieved the record speeds?

III Make a report on HSR according to the plan:

1. Definition of HSR,
2. Principles of HSR,
3. Technology requirements,
4. Track superstructure,
5. Basic characteristics and types of HS trains,
6. Optimum speed and HSR.

TEST YOURSELF

Give the English equivalents for the following expressions:

Применять систему высокоскоростного движения, состав постоянного формирования, стандартный состав, ж.д. вагон, мощность на единицу веса, надежность, выделенная линия, стандартная линия, параметры прокладки пути, горизонтальный и вертикальный профиль, уклон, поперечное сечение, контактная цепь,

энергоснабжение, экологичный, система сигнализации, полоса отчуждения, внутрилокомотивная сигнализация

Верхнее строение пути, балластированный путь, сварной рельс, бетонная литая шпала, двублочная шпала, тип крепления, стрелочный перевод, подвижная крестовина, глухое пересечение, ускорение тока, однофазная электрификация, напряжение

Дизель-поезд (самоходный), реверсивный, осевая нагрузка, тяговая мощность, цепь (схема) управлениия, дополнительная система торможения, коммерческая эффективность, Безотказность Готовность Ремонтопригодность Безопасность, герметичная структура, ширина колеи, габарит подвижного состава

Сочлененный/ несочлененный поезд, поезд концентрированной/ распределенной электроэнергии, поезд с принудительным наклоном кузова, одноколейный поезд, одноэтажный каркас кузова, поезд двойного питания, электродвигатель, дизельный генератор

Оптимальная скорость, всеобщий процесс, вид транспорта, стабилизировать, звукопоглощение, взаимодействие колеса с рельсом, магнитный подвес

PART II OPTIONS FOR BUILDING HIGH SPEED RAIL

INTRODUCTION

All over the world, governments of different political orientation are investing in high speed rail (HSR) infrastructure. In some countries the enthusiasm is more intense than in others. UK and the US are now closer to building HSR infrastructure but until now they have been reluctant to give the *definitive approval*, and the money allocated to HSR has not gone beyond financing the cost of the evaluation of its *economic and financial viability*. Other countries, like France and Spain, have been keener on HSR than other European countries like Norway or Sweden, for example, whose governments are still studying whether this type of investment is *socially worthy*. Spain is a unique case because with much less *traffic density* than other countries (and much less *congestion*) in the conventional rail network,

it is going to very soon be one of the first countries in the world measured in HSR kilometers.

Other countries have chosen alternative ways of improving the *intercity passenger rail services*. UK and Sweden, for example, *upgraded* their conventional rail using their *conventional network*, increasing speeds on existing tracks up to 200 km per hour, using *tilting trains* where necessary because of the *curvature* of the track. Now, the so-called HS2, between London and Edinburgh, is under study to introduce a new HSR track.

HSR performs very well in terms of market share in corridors of 400-600 km but not as good with other key parameters that do not reach some minimum thresholds to offset the high investment costs associated to the construction of this rail infrastructure. Many lines are *heavily subsidized*, so high load factors and market shares *are compatible with a poor social return*. It is not surprising that HSR investment is more popular among politicians and the general public than among economists.

There is considerable pressure on governments to built new high speed lines as if the investment were a kind of `now or never´ decision. This does not seem to be the case with this

technology. The construction of HSR infrastructure is *irreversible* and there is uncertainty associated with *costs* and *demand*. In these conditions the question of the right moment to invest is critical as the investment can be postponed in most cases. Hence, the optimal timing of the investment should be addressed in the case of a positive *Net Present Value* (NPV). Even the idea of `all or nothing´ is false, as it could be profitable to build a line today and another in the future. Moreover, it is feasible to build a HSR rail track on parts of the overall line and use it for traditional trains at the same time as it is prepared for high speed services which would operate once demand motivates building new tracks on missing links. There exist several `do something´ alternatives.

COMPREHENSION

I Read the text and say if the statements are true or false:

1. The enthusiasm of governments of different political orientation to invest in HSR is equally intense.
2. Spain is going to very soon be one of the first countries in the world measured in HSR kilometers.

3. Alternative ways of improving intercity passenger rail services include upgrading conventional rail, increasing speeds on existing tracks, using tilting trains.

4. HSR is popular among politicians, general public and economists.

5. There is uncertainty associated with costs and demand in the construction of HSR infrastructure.

II Answer the questions:

1. What's the attitude of governments of different countries to HSR?

2. What are the ways to upgrade the conventional rail?

3. Why is pressure on governments not consistent with this technology?

4. What is uncertainty with HSR associated with?

5. Why is the idea of "all or nothing" false?

VOCABULARY

I Translate the italicized phrases into Russian

II Use words and phrases from the text to complete the sentences:

1. UK and the US have been reluctant to give the d… a..., and the money allocated to HSR has not gone beyond financing the cost of the evaluation of its economic and financial v….

2. Some governments are still studying whether this type of investment is s… w….

3. There are alternative ways of improving the i… p… r… such as using u… conventional rail, using their c… n…, t… t…

4. The question of the right moment to invest is associated with c… and d…

5. The optimal timing of the investment should be addressed in the case of a positive N… P… V…

III Match the verbs with the nouns:

Invest in, build, give, measure in, improve, reach, subsidize, be compatible with, upgrade, use

Tilting trains, HSR infrastructure, conventional rail, approval, HSR kilometers, poor social return, intercity passenger rail services, lines, minimum thresholds

IV Fill in the gaps with prepositions:

1. All … the world, governments … different political orientation are investing … high speed rail (HSR) infrastructure.

2. Other countries have been keener … HSR.

3. The so-called HS2, … London and Edinburgh, is … study … introduce a new HSR track.

4. HSR investment is more popular … politicians and the general public … … economists.

5. There is considerable pressure … governments … built new high speed lines.

6. It is feasible … build a HSR rail track … parts … the overall line and use it … traditional trains … the same time.

SPEECH PRACTICE

I Discus the following points:

1. Spain is a unique case; it is going to very soon be one of the first countries in the world measured in HSR kilometers.

2. HSR performs very well in terms of market share in corridors of 400-600 km.

3. There is considerable pressure on governments to built new high speed lines.

II Agree or disagree:

1. HSR investment is socially worthy.
2. For countries with less traffic density and less congestion HSR is a good solution.
3. The optimal timing of the investment should be addressed in the case of a positive Net Present Value.

III Expand the situation:

There is considerable pressure on governments to built new high speed lines as if the investment were a kind of `now or never´ decision. This does not seem to be the case with this technology. There exist several "do something" alternatives.

CONVENTIONAL HIGH SPEED RAIL

With one minor exception, all current high speed rail systems use conventional steel wheel on steel rail technology. At speeds up to around 125 mph, these trains can be *pulled by diesel-electric locomotives*. For higher speeds, trains *powered by externally supplied electricity* become necessary. These trains' engines draw power from *overhead wires* (catenaries). This technology allows for *lighter-weight trains*, in part

because they do not have to carry fuel. Because of their lighter weight, electric trains can stop and start more quickly and cause less wear on the track.

These trains can operate at very high speeds: in 2007 a French *electric-powered train* on conventional tracks reached 357 mph. However, because of the greater costs and diminishing benefits of operating at extremely high speeds, the top operating speed of high speed trains in most countries is around 210 mph.

There are two main reasons why such trains are not widely available in the United States. First, only a small portion of the U.S. rail network is electrified, so most passenger trains must use diesel-electric locomotives. Second, because passenger trains typically use the same tracks as *freight trains* (and neither generally uses the most advanced *collision avoidance systems*), federal regulations require that passenger trains have a variety of design features to protect passengers in the event of a train crash. This results in relatively heavy passenger trains, which are thus slower *to get up to speed* and take longer to stop.

TRACK

To make very high speed operation possible, rail track must be substantially *flat* and straight, with *shallow curves* and gentle changes in elevation. As train speeds increase, the risk of crashes where roads cross the rail line *("at-grade crossings"*) increases, so safety dictates that high speed tracks not have any at-grade crossings. This is the standard to which new very high speed lines in other countries are usually built. The result is the rail equivalent of the Interstate Highway System, allowing trains to operate at high average speeds without risk from *crossing traffic*. A high speed rail system using dedicated track can *handle many trains* at one time without compromising safety.

SIGNAL AND COMMUNICATIONS NETWORKS

The prevailing *train control system* on the U.S. rail network relies on *dispatchers* at *central locations* who track the location of trains and signal to train operators when it is safe to proceed onto *a stretch of track*. This system is somewhat analogous to the air traffic control system, in that the dispatchers can see the location of trains but cannot directly control those trains. Thus, when a train operator does not

respond correctly to an operational signal, a collision may occur.

Very high speed rail networks use electronic train control systems (often referred to as "*positive train control*," or PTC). PTC uses communications systems, global positioning systems, on-board computers with digitized maps, and central control system computers to monitor and control train movements. This technology is intended to improve efficiency and safety through better communication and reducing the threat of human error in the operation of trains. Outside of the NEC, almost none of the nation's rail network is equipped with positive train control. However, the Rail Safety Improvement Act of 2008 requires that rail carriers implement positive train control by December 31, 2015, on main lines over which passengers or *poison- or toxic-by-inhalation hazardous materials* are transported.45 *Implementation* is underway, though there are proposals *to extend the deadline*.

MAGNETIC LEVITATION (MAGLEV)

Maglev train technology was developed in the United States in the 1960s. It uses electromagnets *to suspend (levitate) the*

train above *a guideway*, as well as *to propel the train*. The lack of direct contact (and hence friction) between the train and the guideway allows maglev trains to go very fast. Maglev trains and tracks are expected to experience relatively little *wear and tear* and hence to have low maintenance costs, although there is not enough experience with maglev in commercial operations *to verify* this.

Many maglev lines have been proposed, but the few that have been constructed, notably a 19-mile line completed in 2004 connecting a Shanghai subway station to Pudong International Airport, have been relatively short. As a consequence, the costs of constructing and maintaining *an intercity maglev line* are unclear. It is generally believed that such projects are very expensive, in part because the need for a relatively straight guideway may require costly *land acquisition and tunneling*. Japan and Germany have operated maglev test tracks since the 1970s and 1980s, respectively, but neither country has gone on to build the commercial maglev lines that *were envisioned*. Congress established a program to promote maglev in the United States in the 1990s, but none of the projects that received federal support have advanced beyond *the planning stage*.

Because conventional train technology is capable of speeds comparable to maglev technology, and the costs of maglev implementation are probably very high, there is little *impetus* to adopt maglev technology. Moreover, maglev trains could not operate over the existing rail network, but would require an entirely separate network. China reportedly built the Shanghai line in part to examine maglev technology as a candidate for high speed lines it planned; it subsequently chose conventional train technology for its high speed rail network.

The Central Japan Railway Company (JR Central) has announced that it will deal with *capacity limitations* on its high speed line between Tokyo and Osaka, *the most heavily traveled intercity rail segment* in the world, by building a maglev line roughly parallel to the existing line. The planned train would travel at 300 mph over the 175 miles between Tokyo and Nagoya and would eventually be extended to Osaka. Due in part to the *geographic constraints*—as the line would pass through *mountainous areas*, as well as *densely populated* areas, about 80% of the track would be located on viaducts or in tunnels—JR Central has estimated the cost of

building the Tokyo-Nagoya segment at 5.1 trillion yen (around $60 billion), or a little less than $350 million.

COMPREHENSION

I Read the text and say if the statements are true or false:

1. All current high speed rail systems use conventional steel wheel on steel rail technology and are pulled by diesel-electric locomotives.
2. Very high speed operation doesn't always demand flat and straight rail track with shallow curves and gentle changes in elevation.
3. Very HSR networks use PTC to improve efficiency and safety.
4. Maglev train technology was developed in the United States in the 1950s.
5. The costs of construction and maintaining the intercity maglev line have been unclear.

II Answer the questions:

1. What are the technical requirements for higher speed train?

2. What are the risks as train speeds increase?

3. What is PTC and what does it use?

4. What are the advantages and disadvantages of maglev train technology?

5. Why have a few maglev lines been built?

VOCABULARY

I Translate the italicized phrases into Russian. Retell situations they are used in.

II Use words and phrases from the text to complete the sentences:

1. Neither passenger trains nor freight trains use the most advanced c… a…s….

2. The risk of crashes at g…-c… increases as train speeds increase.

3. The system of d… at c…l… is somewhat analogous to the air traffic control system.

4. It uses electromagnets to l… the train above a guideway as well as to p… the train.

5. The Interstate Highway System allows trains to operate at h…a…speeds without risk from cr…tr…

III Match the words to make word combinations:

Diesel-electric, overhead, electric-powered, get up to, at-grade, crossing, shallow, hazardous, suspend (propel), wear, densely populated, capacity	Limitations, areas, materials, and tear, the train, train, locomotive, crossing, curves, wires, speed, traffic

IV Give the explanation to each phrase from III.

V Fill in the gaps with prepositions:

1. …speeds … … 125 mph, these trains can be pulled … diesel-electric locomotives.
2. Many HSR systems use conventional steel wheel … steel rail technology.
3. Relatively heave passenger trains are slower …get …speed.
4. Japan and Germany have operated maglev test tracks … the 1970s and 1980s, respectively, but neither country has

gone … … build the commercial maglev lines that were envisioned.

5. Due … part …the geographical constraints 80% … the track would be located … viaducts or … tunnels.

SPEECH PRACTICE

I Discus the following points:

1. In 2007 a French electric-powered train on conventional tracks reached 357 mph. However, because of the greater costs and diminishing benefits of operating at extremely high speeds, the top operating speed of high speed trains in most countries is around 210 mph.

2. Safety dictates that high-speed tracks not have any at-grade crossings.

3. PTC is intended to improve efficiency and safety through better communication and reducing the threat of human error in the operation of trains.

4. Many maglev lines have been proposed, but the few that have been constructed have been relatively short.

II Agree or disagree:

1. A high speed rail system using dedicated track can handle many trains at one time without compromising safety.
2. Because of the greater costs and diminishing benefits of operating at extremely high speeds, the top operating speed of high speed trains in most countries is around 210 mph.
3. Maglev trains would require an entirely separate network.
4. The Central Japan Railway Company (JR Central) has announced that it will deal with *capacity limitations* on its high speed line between Tokyo and Osaka, *the most heavily traveled intercity rail segment* in the world, by building a maglev line roughly parallel to the existing line.

III Expand the situation:

1. There are two main reasons why such trains are not widely available in the United States. First, only a small portion of the U.S. rail network is electrified, so most passenger trains must use diesel-electric locomotives. Second, because passenger trains typically use the same tracks as freight trains, federal regulations require that

passenger trains have a variety of design features to protect passengers in the event of a train crash.

2. Outside of the NEC, almost none of the nation's rail network is equipped with positive train control.

3. There is little impetus to adopt the maglev technology.

PART III COST ISSUES

The costs of HSR can be divided into two general categories: infrastructure costs, including the costs of building the line and maintaining it, and operating costs, such as labor and fuel, which tend to vary according to the amount of train service offered. Of the many high speed routes in the world, it is thought that only two have earned enough revenue to cover both their infrastructure and operating costs.

INFRASTRUCTURE COSTS

High speed rail requires a significant up-front capital outlay for development of the *fixed infrastructure (right-of-way*, track, signals, and stations) and for its *upkeep*. However, system costs are highly *site- and project-specific*. A leading determinant of cost is whether a new right-of-way is planned

or if an existing railroad right-of-way is going to be improved. Another key cost determinant is speed. Generally, as speed increases, the cost of providing the infrastructure to attain that speed rises *at an increasing rate*. The highest speeds will require *grade-separated corridors, limited curvature,* and modest gradients so that passengers do not experience extreme discomfort at high speeds. As speed increases, the *signaling and communications system* must be more advanced (and costly) to ensure safe operations. Building a route through *mountainous terrain* is more costly than construction on *level terrain,* and building a route through an urban area is generally costlier than construction in a *rural area.*

These drivers of cost are evident in the various projects to build higher speed or very high speed rail in the United States. For instance, a proposed route between Los Angeles (Anaheim) and Las Vegas would utilize maglev technology, with a top speed of 311 mph, at an estimated cost of nearly $12 billion, or $48 million per route mile. A proposed alternative would use conventional steel rail, with a top speed of 150 mph, and, rather than beginning in Anaheim, would start in Victorville, CA, which is beyond the mountains to the

north of Los Angeles. The estimated cost of this alternative is nearly $4 billion or $22 million per route mile. Much of the decrease in estimated cost is due to not bringing the line through the mountains into the Los Angeles area, which in turn may lower its attractiveness to *potential riders.*

In contrast to these projects involving acquisition of new rights-of-way, a project to increase train speeds between Chicago and other Midwest cities would involve improvements to approximately3,000 miles of existing track at an *estimated cost* of $7.7 billion, or about $2.5 million per route mile.

Since the objective of building or improving a rail line is *passenger mobility*, rail project costs could be compared with the costs of alternative methods of increasing mobility, such as expanding a highway or an airport. The cost of highway or airport expansion is also highly project- and site-specific. Comparing costs on a *per-mile basis* is not as useful as comparing costs on a per passenger-mile basis (the cost of moving one passenger one mile) or comparing the reductions in total travel time across alternative modal projects. These measures incorporate the improvement in *passenger throughput* expected from the construction project. However,

comparing costs and benefits of modal options in this manner is not common because of institutional and organizational obstacles.

In addition, there is evidence that transportation project costs are routinely underestimated. One study examined 258 transportation infrastructure projects around the world and found that in almost 90% of the cases costs were underestimated, that actual costs on average were 28% higher than estimated, and that rail projects in particular were the most severely *underestimated*, costing on average 45% more than estimated.

Most U.S. railroad track is owned and maintained by private freight railroad companies whose trains operate more economically at slower speeds. Improving the quality of this track to allow for higher speed passenger trains could involve rebuilding *track substructure*, such as *replacing the ballast*, improving drainage, or replacing wood ties with concrete ties, as well as *upgrading* signaling and communications *systems*. Although the host freight railroads might *gain some benefit* from such improvements, they may be reluctant to fund them, as they may *gain* little *advantage* from being able to operate freight trains at higher speeds.

More importantly, because *intercity passenger and freight trains*, as well as *commuter trains, share the track* in many corridors where higher speed service is proposed, it will be necessary to increase capacity on these routes to avoid delays caused by interference from other trains.

According to Amtrak, many delays are due to *interference from freight trains*, and to a lesser extent, commuter trains. The simplest way to increase capacity is to add *sidings* to allow slower trains to make way for faster trains to pass, but significant improvements in speed and reliability may require installing a second track with *high-speed crossovers* so trains can shift from one track to the other, a layout which more than *doubles route capacity*.

VOCABULARY

I Translate the italicized phrases into Russian. Retell situations they are used in.

II Use words and phrases from I to complete the sentences:

1. System costs are highly s…- and p…-s….

2. The highest speeds will require g…-s… corridors, l… c…, and modest gradients so that passengers do not experience extreme discomfort at high speeds.

3. Building a route through m… t… is more costly than construction on l… t…, and building a route through an urban area is generally costlier than construction in a r… a….

4. Improving the quality of this track to allow for higher speed passenger trains could involve rebuilding *t... s...*, such as *r... the b...*, improving drainage, or replacing wood ties with concrete ties, as well as *u...* signaling and communications *s...*.

5. More importantly, because *i... p...* and f… trains, as well as c… trains, s… the track in many corridors where higher speed service is proposed, it will be necessary to increase capacity on these routes to avoid delays caused by interference from other trains.

III Fill in the gaps with prepositions:

1. A proposed route would utilize maglev technology, … a top speed … 311 mph, … an estimated cost … nearly $12 billion … route mile.

2. Much … the decrease…estimated cost is due …not bringing the line…the mountains … the L.A. area, which …turn may lower its attractiveness…potential riders.

3. …contrast…these projects, a project …increase train speeds would involve improvements …3000 miles…existing track.

4. Most U.S. railroad track is owned and maintained … private freight railroad companies whose trains operate more economically …slower speeds.

5. The simplest way … increase capacity is … add…

IV Find antonyms:

Fixed infrastructure, increase, level terrain, estimated cost, potential riders, upgrade, gain advantage, shared track, improve, double.

OPERATING COSTS AND REVENUES

Once a higher speed or very high speed infrastructure has been completed, operating costs can be a significant public expense if the train operator cannot *generate* sufficient *revenue* from *passenger fares*. Operating costs include labor, fuel or electric power, equipment and track maintenance,

track access charges, and other costs that vary depending on the number of trains that are operated. In the United States, all intercity passenger operations except Amtrak's Acela service are subsidized, in the sense that federal and state governments *supplement revenues* from ticket sales, as these are insufficient to cover the costs of operating the trains plus a portion of general *administrative expenses*. Few if any passenger rail operations anywhere in the world generate sufficient revenue to cover all capital as well as operating costs.

Some high speed rail project sponsors have estimated that their services would be able to operate without public subsidies once construction is complete. Additionally, some supporters of high speed rail projects have asserted that profit-maximizing private companies could operate rail services without subsidy, especially in corridors where *air and highway congestion* are extreme.

The organizational structure of passenger rail is not *conducive* to a market environment in which competition among carriers *exerts downward pressure* on operating costs. The "*low-cost carrier*" phenomenon in the airline and intercity bus industries, in which multiple carriers compete

with one another over the same infrastructure, is not practicable in the passenger rail industry.

Operating costs aside, the other key determinant of whether high speed rail can be *profitable* without subsidies is fare revenue, which is dependent on *ridership levels* and how much riders would be willing to pay for the service. The *cost-effectiveness* of higher speed and very high speed rail depends on achieving high ridership levels. Estimates of the level of ridership needed to justify the cost of a high speed line similar to those in other countries range from 6 million to 9 million riders in the first year.

Ridership, of course, will depend heavily on the fares charged. Most plans for very high speed systems are premised on their ability to attract business customers who currently travel by air, as these are the travelers most willing to pay high fares for premium service. Despite an airplane's speed advantage, HSR can be *time-competitive* with airplanes if distances between cities are less than about 400-500 miles, given that security screening and pre-boarding wait times generally are significantly longer for air travelers than they are for train riders.

It is more difficult for rail to compete with automobile transportation. If a traveler needs to make multiple stops *en route* to or around the *destination city*, a car may be more convenient, especially if the destination city *lacks* an extensive mass *transit system*. Driving is likely to be less expensive than rail if two or more people are traveling together, since the added cost of each additional traveler is virtually zero for passenger cars, and if *tolls and parking fees* are low.

People traveling for leisure or personal reasons are likely to be more *price-sensitive* than business travelers, and their willingness to use the train instead of a personal car may depend in good part on the availability of low-cost fares.

High speed trains are not expected to compete well against intercity buses in many instances because bus travelers are more concerned about price than about travel time or comfort. Recent improvements in intercity bus service quality and frequency may reduce demand for high speed rail in some markets.

Trains depend on population density to operate efficiently. To compete with the airlines, trains must depart frequently but they also must *fill a large proportion of their seats* to

generate sufficient *ticket revenue* if they hope to cover their operating costs. Not only is the population size of a city important but also the concentration of economic activity in the central business district or otherwise near the train station(s). Although the nation as a whole is becoming more urbanized, trends show that employment is steadily decentralizing in almost all U.S. cities, which may raise questions about *the viability of high speed rail* as a transportation alternative for many business travelers.

VOCABULARY

I Translate the italicized phrases into Russian. Retell situations they are used in.

II Use words and phrases from I to complete the sentences:

1. Operating costs can be a significant public expense if the train operator cannot *g*... sufficient *r*.... from *p*... *f*....
2. Some supporters of high speed rail projects have asserted that profit-maximizing private companies could operate rail services without subsidy, especially in corridors where a… and h… c… are extreme.

3. The “l…-c… c…” phenomenon in the airline and intercity bus industries is not practicable in the passenger rail industry.

4. A car may be more convenient, especially if the destination city l… an extensive mass t… s….

5. To compete with the airlines, trains must depart frequently but they also must f… a large proportion of their s… to generate sufficient t… r… if they hope to cover their operating costs.

III Fill in the gaps with prepositions:

1. The organizational structure … passenger rail is not conducive … a market environment … which competition among carriers exerts downward pressure … operating costs.

2. Estimates … the level … ridership needed … justify the cost … a high speed line similar … those … other countries range … 6 million … 9 million riders … the first year.

3. Most plans … very high speed systems are premised … their ability … attract business customers who currently travel .. air, as these are the travelers most willing … pay high fares … premium service.

4. High speed trains are not expected … compete well … intercity buses … many instances because bus travelers are more concerned … price than … travel time or comfort.

5. Trains depend … population density … operate efficiently.

IV Match the words:

Cost, time, price, low, profit	Cost, competitive, maximizing, sensitive, effectiveness

COMPREHENSION

I Read the text and say if the statements are true or false:

1. System costs are highly site- and project specific.

2. Building a route through mountainous terrain is equally costly level terrain.

3. Many delays are due to interference from freight trains.

4. Many passenger rail operations everywhere in the world generate sufficient revenue to cover all capital and operating costs.

5. The organizational structure of passenger rail depends on a market environment.

II Answer the questions:

1. What are the types of HSR costs?
2. Name the leading determinants of cost.
3. What infrastructure improvements are required for attaining high speeds?
4. What can rail project costs be compared to?
5. Why is it necessary to increase capacity on shared tracks?
6. Which costs can be called operating?
7. Why is the “low-cost carrier” not practicable in the passenger rail industry?
8. What does cost-effectiveness of HSR depend on?
9. What is necessary for trains to compete with cars, intercity buses and airlines?
10. When are the questions about the viability of HSR as a transportation alternative for business travelers raised?

III Agree or disagree:

1. HSR requires a significant up-front capital outlay for development of the fixed infrastructure.
2. There is evidence that transportation project costs are routinely underestimated.
3. Few if any passenger rail operations anywhere in the world generate sufficient revenue to cover all capital as well as operating costs.
4. The cost-effectiveness of higher speed and very high speed rail depends on achieving high ridership levels.

PART IV POTENTIAL BENEFITS OF HSR (PASSENGER)

Reading.

Text 1. Alleviating Highway and Airport Congestion.

With decades of experience from around the world, conventional HSR can be considered a proven technology that potentially offers a convenient and comfortable way to travel between major urban centers. However, HSR has come in for criticism based on concerns about its cost effectiveness compared to travel by air or highway. Assessments of cost-effectiveness are likely to depend, in part, on the ability of

HSR to provide various social goods whose benefits will not be reflected in passenger revenues.

In heavily traveled and congested corridors, HSR has the potential to relieve highway and air traffic congestion, and thereby to reduce the need to pay for capacity expansions of roads and airports. With respect to highway congestion relief, many studies estimate that HSR will have little positive effect because most highway traffic is local and the diversion of intercity trips from highway to rail will be small. In a 1997 study, FRA estimated that in most cases rail improvements would divert only 3%-6% of intercity automobile trips, and even less in corridors with average trip lengths under 150 miles.70 DOT's Inspector General (IG) found much the same thing in a more recent analysis of HSR in the Northeast Corridor, estimating that reductions of one hour in rail trip times from Boston to New York and from New York to Washington would reduce automobile ridership along the NEC by less than 1%.71 Planners of a high speed rail linking Florida between Orlando and Tampa, a distance of about 84 miles, estimated that it would shift 11% of those driving between the two cities to the train, but because most of the traffic on the main highway linking the two cities, Interstate

4, is not travelling between Orlando and Tampa, the HSR project was estimated to reduce traffic on the busiest sections of I-4 by less than 2%.72

Since HSR is more comparable to commercial air travel than to automobile travel, it is likely that in the right circumstances a significant share of air travelers would switch to HSR. The IG's study of the NEC estimated that 11%-20% would divert to HSR from air, depending upon train speeds, concluding that "this would provide congestion relief at NEC airports and in NEC airspace."

Such high diversion rates would not necessarily reduce airport congestion. Airlines might substitute smaller aircraft for larger ones, or replace flights to locations accessible by rail with flights to and from other locations. The net effects of such changes may be positive, as they may improve intercity transport links overall. However, it is possible that a smaller airport in a community served by HSR could suffer a disproportionate loss of its air service. Even in heavily congested areas, HSR may be a costlier way of relieving air traffic congestion on a per-passenger basis than some combination of measures such as expanding airport capacity,

applying congestion pricing to takeoff and landing slots, and implementing an enhanced air traffic control system.

1. Understanding the main points: read the statements and decide if they are true or false.

1). HSR offers a convenient and comfortable way to travel only between major countries.

2). Many studies estimate that HSR will have great positive effect.

3). The IG's study of NEC estimated that 11%-20% would divert to HSR from air.

4). Airlines might substitute larger aircraft for smaller ones.

5). HSR may be costlier way of reliving air traffic congestion than some combination of measures such as expanding airport capacity.

2. Understanding details: answer the questions.

1). Why the conventional HSR is called "a proven technology" that offers convenient way to travel?

2). Why the specialists say that HSR makes not much to relieve congestion?

3). Why the specialists prefer to compare HSR with air travel than automobile?

Vocabulary.

1. Translate into Russian.

Proven technology-

To substitute for-

Urban center-

To come in for criticism-

Cost-effectiveness-

Passenger revenue-

Congested corridor-

Capacity expansion-

Intercity trip-

FRA (Federal Road Administration)-

DOT (Department of Transportation)-

NEC (Northeast Corridor)-

Ridership-

Significant-

Net effect-

Congestion pricing-

Takeoff and landing slots-

Enhanced control system-

2. Synonyms: find words in the article which mean the same.

Town=

Passenger trip=

Replace=

Overall outcome=

To take heat=

3. Word partnership: match the Nouns and the Adjectives.

1.	Landing	a. corridor
2.	Northeast	b. effectiveness
3.	Intercity	c. pricing
4.	Congestion	d. slots
5.	Cost	e. trips

4. Make up sentences with the phrases from ex.3 Word partnership.

Speech Practice.

1. Discuss the following points.

1) High speed rail cannot seriously displace air travel.

2) The impact of weather when traveling by HSR and air.

3) HSR and airport infrastructure: which is costlier?

2. Expand the situation.

1) Specialists say that HSR has greater capacity than roads…

2) Phillip Hammond argues that it is ineffective solution just to upgrade the existing railroad infrastructure…

3) HSR is promoted as something that can sort out nasty carbon-producing aircraft on domestic routes…

Reading.

Text 2. Alleviating Pollution and Reducing Energy Consumption.

Another major benefit claimed for HSR is that it uses less energy and is relatively less polluting than other modes of intercity transportation. While the physics of rail do generally provide favorable energy intensity and carbon emission attributes in comparison with highway and air travel, such claims tend to rest heavily on assumed high passenger loads and the use of clean sources of electricity generation to power the trains. Moreover, they tend to ignore the energy and carbon emission of building, maintaining, and rebuilding the infrastructure that supports each mode, and they tend to assume automotive and airplane engine technology will not become more energy efficient in the future. Completed as part of a wide-ranging review of transportation policy in the United Kingdom, an analysis of building a high speed rail

system connecting London with Glasgow and Edinburgh(distances of approximately 350 miles and 330 miles, respectively), including its energy use and carbon emissions profile, concluded: high level analysis of the potential carbon benefits from modal shift from air to high speed rail suggests that these benefits would be small relative to the very high cost of constructing and operating such a scheme, and that under current assumptions a high speed line connecting London to Scotland is unlikely to be a cost-effective policy for achieving reductions in carbon emissions compared to other policy measures. Because HSR will only capture a relatively small share of total passenger trips, it is also unlikely to make much difference in achieving greenhouse gas reduction targets and in reducing petroleum consumption. A study of the potential benefits of HSR in Sweden concluded that investment in rail networks is a less cost-effective climate policy instrument than general policies, such as increased fuel taxes. Similarly, analysis of a proposed line from London to Scotland estimated carbon savings would be 0.2% of the UK's current emissions, assuming that all flyers take the train and HSR emits no greenhouse gases.

1. *Understanding the main points: read the statements and decide if they are true or false.*

1) They tend to ignore the energy and carbon emission of building, maintaining, and rebuilding the infrastructure that supports each mode.

2) High level analysis suggests that these drawbacks would be small relative to the very high cost of constructing and operating.

3) It is also likely to make much difference in achieving greenhouse gas reduction targets and in reducing petroleum consumption.

2. *Understanding details: answer the questions.*

1) Is HSR environmentally friendly?

2) How many urban travelers will shift to HSR motivated by its green nature?

Vocabulary.

1. Translate into Russian.

To alleviate pollution-

Intercity transportation-

Carbon emission-

Modal shift-

Potential benefits-

Petroleum consumption-

Rail networks-

Greenhouse gas-

2. Word search: find words and phrases in the text that fit those meanings.

To bring into movement=

Strategy=

A charge for the support of government=

The weather at a certain place=

People, which use planes for travel=

3. Sentence completion: use words and phrases from ex.2 Word search to complete these sentences.

1) Everyday thousands of (…) go through the terminal of the airport.

2) That's enough energy to (…) 750,000 cars.

3) Honesty is the best (…).

4) Twice a year citizens pay (…) and other charges.

5) The (…) has changed greatly, since carbon emissions increased.

Speech Practice.

1. Agree or disagree.

1) Biofuels that could power aircraft now cost hundreds of dollars per gallon to produce. Batteries that a big enough charge to power vehicles between cities are still too big and expensive to make electric cars and buses affordable.

2) Despite soaring fuel prices, motoring and flying are still expected to be cheaper than high speed rail.

3) High speed rail can play a major role in tackling climate change around the world.

2. Expand the situation.

1) HSR is sustainable because…

2) I advise to make a shift for HSR such countries like…

3) The most sustainable transportation system in the world is in …

Reading.

Text 3. Promoting Economic Development.

There is no doubt that HSR projects create employment in planning, design, and construction. Research shows that infrastructure spending tends to create more jobs than other types of spending. The California High Speed Rail Authority claims that its planned HSR system will create 100,000 construction-related jobs each year during the building phase.

The longer-term impact of HSR in spurring economic development and encouraging potentially beneficial changes in land use around high speed rail stations, by contrast, is disputed. CHSRA claims that high speed rail in California will create 450,000 permanent jobs due to faster economic growth. Looking at the experience of HSR in Japan, one study argues "the claims that a multiplier effect (or economic development effect) of 450,000 jobs as a result of the introduction of CHSR [California HSR] are not likely to be realized." Moreover, GAO pointed out in 2009 that "while benefits such as improvements in economic development and employment may represent real benefits for the jurisdiction in which a new high speed rail service is located, from another jurisdiction's perspective or from a national view they may represent a transfer or relocation of benefits." On the question of whether HSR can provide broader economic benefits by allowing workers greater access to jobs and improving business travel, the UK study discussed earlier found that "such effects are quite limited in mature economies with well-developed infrastructure."

1. Understanding the main points: read the statements and decide if they are true or false.

1) Research shows that infrastructure spending tends to create more jobs than other types of spending.

2) Looking at the experience of HSR in Japan, one study argues "the claims that a multiplier effect of 5,000 jobs.

3) From an international view they may represent a transfer or relocation of benefits.

2. Understanding details: answer the questions.

1) How many construction-related jobs each year during the building phase does the CHSRA claim to create?

2) Why do most studies argue that building HSR infrastructure has not a great impact on mature economies?

Vocabulary.

1. Translate into Russian.

To create employment-

Types of spending-

Building phase-

To spur development-

Permanent jobs-

Relocation of benefits-

Developed infrastructure-

2. Prepositions: complete the sentences using the prepositions in the box.

1) HSR projects create employment (…) planning, design and construction.

2) It claims that high speed rail will create permanent jobs due (…) faster economic growth.

3) (…) the question of whether HSR can provide broader economic benefits, the study found that such effects are quite limited.

3. Synonyms: find words in the text that mean the same.

Utilities=

Costs=

Employment=

Interest=

Growth=

Speech Practice.

1. Agree or disagree.

1) High-speed rail helps businesspeople be more productive.

2) The project is doomed to be another expensive government project in search of a need.

3) High speed rail is a great tourist attraction.

2. Discuss the following points.

1) HSR is used by high-income passengers, and the £11bn would be a public investment from all taxpayers to encourage wealthy individuals to travel to and from London more often and at a higher speed.

2) As is the case with Amtrak, HSR can't compete with more efficient modes of transportation like automobiles and airplanes without massive subsidies.

3) HSR is efficient only for small countries, the bigger ones will benefit from conventional transportation more.

Reading.

Texts 4/5/6.

Improving Transportation Safety

Despite several serious accidents, HSR in other countries generally has a very good safety record. France's TGV, for example, boasts that it has never had a single on-board fatality running at high speed in over two decades of operation. However, it is unlikely that HSR will significantly reduce the number of transportation-related deaths and injuries in the United States. Autos are by far the most dangerous form of passenger travel, in terms of fatalities per passenger-mile, and, as noted above, the ability of HSR to

divert highway travelers to rail is likely to be limited. The diversion of flyers to trains would make little difference in terms of passenger safety because air transportation is also very safe.

Providing Travelers a Choice of Modes

There is some value in providing travelers with a choice of modes, particularly for those unable or unwilling to fly or drive. In congested corridors, frequent and reliable HSR could provide travelers an attractive alternative to dealing with the frustrations of traffic bottlenecks and airline delays. Intercity rail can also be a relatively comfortable way to travel, affording travelers more seating room than airplanes or buses and greater opportunity to walk around. However, while these benefits accrue to individual users of HSR, it is not apparent that greater comfort and convenience bring social benefits that would justify public subsidies.

Making the Transportation System More Reliable

Many different types of events can dramatically disrupt a transportation system. These include floods, snowstorms, hurricanes, earthquakes, fires, and terrorism. During such

events, it can be very valuable to have extra capacity to handle extra demand or an alternative means of travel when other means fail. For example, rail service often continues when bad weather grounds air service. Building in redundancy to any system entails added costs, but the availability of alternatives tends to make the system as a whole more reliable during unusual events and emergencies.

1. Understanding the main points: read the statements and decide if they are true or false.

1). Autos are by far the most dangerous form of passenger travel.

2). There is some value in providing travelers with a choice of meals, particularly for those unable or unwilling to fly or drive.

3). Long distance train rail can also be a relatively comfortable way to travel.

4). Rail service often continues when bad weather cleared for takeoff air service.

2. Understanding details: answer the questions.

1). Explain the meaning of the notion “safety record”. Do you have the same in your country?

2). Which factors can disrupt the transportation system?

3). Which benefits can intercity trains offer to make people divert from other modes?

Vocabulary.

1. Translate into Russian.

Safety record-

To divert to rail-

Traffic bottleneck-

Airline delay-

Seating room-

Disrupt a transportation-

To entail added cost-

2. Opposites: Find words and phrases which mean the opposite of these.

1. Fortune- a). congested
2. Danger- b). reliable
3. Free- c). safety
4. Untrustworthy- d). accident

3. Sentence completion: Use the phrases from 1. Translate into Russian to complete these sentences.

1. Bridge construction has created a … on the Southern part of Main Street.

2. He made some suggestions about improving … at our hotel.

3. Reconstruction of the railroad track will … in future.

Speech Practice.

1. Discuss the following points.

1). Do you feel safe when you use public transportation?

2). Is public transportation in your city too expensive?

3). If public transportation were free, would you use it more?

2. Expand the situation.

1). The transportation safety is an economic attribute of transportation service…

2). When it comes to intercity travel, large numbers of consumers choose to drive than to …

3). The safety-related activities, programs and features that go with the road system are determined as road safety delivery …

PART V HIGH SPEED RAIL IN OTHER COUNTRIES

Reading.

Text 1. Other countries' experience.

Proponents of HSR often cite the networks in Japan, France, and other countries, with the implication that their adoption of HSR demonstrates the feasibility and desirability of building HSR lines in the United States. This conclusion may not be warranted. The motives that led other countries to implement very high speed rail lines are varied. Some, like Japan and China, did so originally in part to meet the demand on already overcrowded conventional rail lines. Others did so to promote economic development in certain locations or encourage rail travel in the face of the growing role of car and air travel.

In Europe and Japan, HSR has succeeded in capturing market share from commercial aviation. For example, rail has captured 85% of the air/rail market between Tokyo and Osaka (a distance of 320 miles, with a fastest scheduled rail travel time of 2 hours 25 minutes), and 74% of the air/rail market between Rome and Bologna (a distance of 222 miles, with a fastest scheduled rail travel time of 2 hours 44 minutes).

The relative efficiency of HSR as a transportation investment varies among countries, depending upon the interplay of

many factors, including geography, economics, and government policies.

For example, compared to the United States, countries with HSR have higher population densities, smaller land areas, lower per capita levels of car ownership, higher gasoline prices, lower levels of car use (measured both by number of trips per day and average distance per trip), and higher levels of public transportation availability and use.

Also, there is a significant difference in the structure of the rail industry in countries with HSR compared to the United States. In most of those countries, high speed rail was implemented by state-owned or state-supported rail infrastructure companies and is operated by state-owned rail companies whose principal business is passenger, rather than freight, transportation. By contrast, in the United States the rail network is almost entirely owned by private companies specializing in freight transportation. The history of HSR development in other countries reveals a recurring tension between economic analysis and political pressure in HSR development.

A country's initial HSR line is usually built in a location where the investment makes the most sense economically, in

terms of population density and travel demand. Once that line is built, and if it is considered successful, the desire for similar benefits in other parts of the country can result in political pressure to build additional lines, even if economic analysis indicates that these are unlikely to be as successful as the initial

line. Japan is perhaps the best example, in part because it has been building HSR lines for the longest time: its first HSR line was the most successful the world has seen, but subsequent lines have carried fewer passengers and had weaker financial performance.

3. 1). Understanding the main points: read the statements and decide if they are true or false.

1. The motives that led other countries to implement very high speed rail lines are the same.

2. In most of those countries, high speed rail was implemented by private rail infrastructure companies.

3. A country's initial HSR line is usually built in a location where the investment makes the most sense economically, in terms of population density and travel demand.

2). Understanding details: Answer the questions.

1. How could European and Japanese HSR succeed?

2. Which is the fastest scheduled rail travel time in Europe?

3. How the policy of the country can influence the development of HSR?

Vocabulary

1). Translate these phrases from Russian into English.

Сторонники ВЖД-

Обосновывать-

Иметь гарантию-

Перегруженная линия-

Регулярные ж/д перевозки (поездки)

Взаимодействие многих факторов

Плотность населения-

Значительная разница-

Государственный-

Грузовые перевозки-

Иметь смысл-

Строить дополнительные линии-

Добавочная линия-

2). Prepositions: Complete the sentences using the prepositions in the box.

1. Some countries did so originally in part to meet the demand (…) overcrowded lines.

2. In Europe and Japan HSR has succeeded (…) capturing marked share from commercial aviation.

3. Compared (…) the US, countries with HSR have higher population densities.

4. In most of the countries HSR was implemented (…) state-owned rail infrastructure.

5. The US rail network is almost entirely owned by private companies specializing (…) freight transportation.

3). Understanding expressions: Choose the best explanation for each phrase from the article.

1. Demonstrate feasibility- a). the necessity of going somewhere
2. Economic development- b). show possibility
3. Car ownership- c). the most successful illustration
4. Travel demand- d). automobile possession
5. Best example- e). improvement in different spheres of nation life

Speech Practice

1). Discuss the following points.

1. Why do the proponents of HSR usually cite the networks of France and Japan?

2. What stops Russian HSR develop in the same way as mentioned earlier?

3. Discuss the differences between the US HSR system and European one.

2). Agree or disagree.

1. It is less expensive to build new lines for HSR than reconstruct the existing ones.

2. All the HSR networks in the world are state-owned.

3. Population density is the most important factor for building a country's initial HSR line.

3). Expand the situation.

1. The consumers of HSR have a lot of preferences…

2. To speak about Russian HSR, I can say…

3. To my mind, we can use the HSR experience of…, because…

Text 2/3/4 European Countries.

Following are brief accounts of high speed rail networks in selected countries. Except where otherwise indicated, these

countries have lines currently operating at speeds of 186 mph or more.

France

France opened its first high speed rail line in 1981, between Paris and Lyon. Its high speed trains are referred to as TGVs (*Trains à Grande Vitesse*). As of 2013, the system has approximately 1,185 miles of high speed rail line, with more under construction. Because of the relatively low population density of France and the central role of Paris (the nation's capital and largest population center), the French high speed rail network has been developed as spokes radiating outward from Paris. Regional governments are responsible for a significant share of construction costs. The state-owned rail operating company, SNCF, reports that its TGVs have taken the dominant share of the air-rail travel market in several of the high speed corridors, taking over 90% in the Paris-Lyon market (with a TGV travel time of less than two hours) and about 60% in corridors where the TGV travel time is around three hours.

Germany

Article 87 of the German Constitution makes rail transport a government responsibility. Germany opened its first high

speed rail line in 1991. Its high speed trains are called InterCityExpress (ICE). Germany's network varies significantly from that of its neighbor, France. Due in part to the more geographically distributed political demands of a federal system of government and in part to a

denser and more evenly distributed population, Germany's high speed rail service has been developed to connect many hubs rather than centering on a single city. Germany's high speed trains also have more stops than those of France, whose system emphasizes connecting distant city pairs with few intermediate stops. These considerations have led Germany to put more emphasis on upgrading existing rail lines to accommodate higher speed service, and less emphasis on building entirely new high speed lines. One result is that Germany's high speed trains have longer average trip times than do those of France over comparable distances.

Spain

Spain opened its first high speed rail line in 1992. Like France, its population density is relatively low by European standards, and, except for Madrid, the capital and largest city, which is located in the center of the country, the population is largely concentrated near the coasts. Spain's conventional rail

network was built using a wider gauge (i.e., it is also known as “width of the gauge”, the distance between the two parallel rails) than the international standard. Its high speed rail network is being built to the international standard, producing two separate rail networks. Many trains have special equipment to allow them to operate on both networks. As of 2013, Spain had more than 1,900 miles of high speed track in service. Government spending on rail infrastructure (both high speed and conventional) surpassed spending on roads in 2003. The Spanish Government’s Ministry of Public Works issued a Strategic Plan for Infrastructure and Transport for the period 2005-2020, which called for increasing the size of the high speed rail network to 6,200 miles by the year 2020. However, economic and financial issues have led to reconsideration or postponement of some of the projects in the plan.

1). Understanding the main points: read the statements and decide if they are true or false.

1. In France the first high speed rail line was built in 1981, between Paris and Dijon.

2. The French high speed rail network has been developed as spokes radiating outward from Paris.

3. Germany opened its first high speed rail line in 1990.

4. Germany's high speed trains also have more stops than those of France.

5. Spain's conventional rail network was built using international width of the gauge.

2). Understanding details: Answer the questions.

1. What was the reason for developing HSR network radiating outward from Paris?

2. Why is all rail transport in German under government control?

3. Which regions in Spain have the largest population density?

4. What are the main differences between HSR in France, Germany and Spain?

5. What issues made Spanish government reconsider some projects?

Vocabulary

1). Translate these phrases from Russian into English.

Краткие отчеты-

Расходиться лучами-

Находиться в ведении-

Затраты на строительство-

Доминирующая доля-

Равномерно распределенный-

Соединять транспортные узлы-

Существующие ж/д линии-

Предоставлять услугу-

Ширина колеи-

Международный стандарт-

Превышать затраты-

2). Word search: Find the words which have the same meaning (first letter and the number of letters in the word are given).

1. HSR= T… (3)
2. State-supported=s… (10)
3. Control=r… (14)
4. Provide=a… (10)
5. Costs=s… (8)

3). Word partnership: Match the verbs with the nouns.

1. to take a). the size
2. to open b). high speed lines
3. to connect c). dominant share
4. to have d). special equipment
5. to increase e). hubs

Speech Practice

1). Discuss the following points.

1. The HSR line Paris-Lyon was the first line of such a capacity in Europe in 1991. What were the main factors which provided its building?
2. Prepare information about German InterCityExpress (ICE) trains.
3. Consider the differences between French and German HSR systems.

2). Agree or disagree.

1. The system of spokes radiating outwards from the center is the best for HSR network.
2. The longer average trip times of German HSR is compensated by greater coverage.
3. The necessity of building new lines for HSR in Spain was the only factor which hampered high speed transport development.

3). Expand the situation.

1. The central role of Paris made …
2. Geographical peculiarities of Germany caused …
3. Global financial crisis stopped Spain from …

Reading.

Text 5/6/7/8 Asian Countries.

Japan

Japan may be the ideal country, geographically, for high speed rail; its main island is relatively long and narrow, so that its relatively large population is concentrated in cities arrayed along a corridor. Japan opened its first high speed rail line, between Tokyo and Osaka, in 1964. That line was built to expand capacity in an overcrowded rail corridor. From its inception it earned enough revenue to cover its operating costs, and reportedly earned enough money within its first few years to pay back its construction costs. The success of the Tokyo-Osaka line encouraged expansion, and the Japanese government has supported construction of other high speed lines. As of 2011, the high speed rail network was 1,665 miles in length, with more under construction.

Currently, new lines are funded by public-private partnerships, with part of the funding coming from the now-privatized regional rail companies, and the rest from the national and local governments.

Since 1987, when the government began the privatization of Japan National Railways, all high speed lines have been

operated by private companies. Current information on the profitability of individual high speed lines is not available, but all of the more recent lines have much lower ridership than the heavily traveled Tokyo-Osaka line.

China

China is developing an extensive high speed rail system in part to relieve the pressure of both passenger and freight demand on its overcrowded existing rail system, in part to improve transportation connections between its different regions, and in part to promote the economy of less developed regions. China is upgrading parts of its existing rail network to achieve speeds of 120-150 mph, and is building new dedicated electrified lines to enable speeds of 180 mph or more. The national government has announced plans to have approximately 10,000 miles of high-speed lines (including both upgraded existing lines and new dedicated electrified lines) in operation by 2020. China accelerated its HSR construction schedule in 2008-2010, in part to stimulate the economy. But in the wake of a high-profile collision between two high-speed trains that killed 40 people in the summer of 2011, China acknowledged that it expanded the

network too quickly, and slowed the pace of its HSR construction.

Taiwan

Taiwan is an island nation slightly smaller than Maryland and Delaware combined, with a population estimated at around 23 million. The high speed line runs 214 miles north to south along the western side of the country. Upon completion of its first segment in 2007, it cut end-to-end travel times from 4.5 hours to 90 minutes. The Taiwanese government executed a build operate-transfer contract with a private consortium, the Taiwan High Speed Rail Corporation, to develop the line at a cost of approximately $15 billion. Some 87% of the line had to be placed either in tunnels or on viaducts. Initial ridership projections were around 65 million passengers annually. However, subsequent economic difficulties resulted in airline ridership dropping to 9 million in 2005, and the opening of a new highway also increased the attractiveness of highway travel. In 2009, the Taiwanese government took control of the Taiwan High Speed Rail Corporation, which was on the brink of bankruptcy. In 2012, the corporation reported a profit, and said ridership totaled 44.5 million passengers.

South Korea

The Republic of Korea is slightly larger in area than the state of Indiana, with a population estimated at 49 million people. Korea began construction of a 255-mile high speed line in 1992, connecting its capital, Seoul (population 10 million), with its main port, Busan (population 3 million). This corridor serves 70% of the nation's population, and was previously serviced by a conventional line. The project was substantially completed in 2010, with a small amount of new track in central cities yet to be built. End-to-end travel time was cut from 4 hours to around 2 hours and 20 minutes, and ridership was reported to be 140,000 passengers a day in 2011 (about 51 million passengers, annually). Initial cost estimates were around $5 billion, but the ultimate project cost was around $20 billion. The project was costly in part due to the challenging terrain; nearly half the line is in tunnels and another quarter on viaducts, with only a quarter at grade.

4. 1). Understanding the main points: read the statements and decide if they are true or false.

1. The failure of the Tokyo-Osaka line encouraged expansion, and the Japanese government has supported construction of other high speed lines.

2. New lines in Japan are funded only by private partnerships.

3. China accelerated its HSR construction schedule in 2000, in part to stimulate the economy.

4. Taiwan is a very large island nation, with a population estimated at around 23 million.

5. Korea began construction of a 500-mile high speed line in 1992, connecting its capital, Seoul (population 10 million), with its main port, Busan (population 3 million).

2). Understanding details: Answer the questions.

1. What was the reason for China to slow the pace of its HSR construction?

2. What was the travel time-saver upon completion of Taiwan first segment in 2007?

3. Why there was such a great difference in costs while constructing South Korean HSR lines?

Vocabulary

1). Translate these phrases from Russian into English.

Увеличить пассажиропоток-

Покрыть операционные затраты-

Способствовать распространению-

Быть на стадии строительства-

Общественно-государственное объединение-

Местные органы самоуправления-

Спрос на грузоперевозки-

Заявить о своих планах-

Специальные электрифицированные линии-

График строительства-

Стимулировать экономику-

Сократить время в пути-

Последующие трудности-

На грани банкротства-

Сложные ландшафтные условия-

2). Prepositions: Complete the sentences using the prepositions from the box.

to, along, from…to, between, of

1. Its relatively large population is concentrated in cities arrayed … a corridor.
2. Japan opened its first high speed rail line, … Tokyo and Osaka, in 1964.
3. China acknowledged that it expanded the network too quickly, and slowed the pace … its HSR construction.
4. Upon completion of its first segment in 2007, it cut end-to-end travel times … 4.5 hours … 90 minutes.

5. The project was costly in part due … the challenging terrain.

3). Explain the meaning of the phrases from the text and make your own English sentences with them.

1. Ideal country-
2. Relatively large-
3. Overcrowded rail corridor
4. Lower ridership-
5. Developed regions-
6. Increased attractiveness-

Speech Practice

1). Discuss the following points.

1. What can we call "an ideal country" for high speed rail?
2. What is the reason for such an early deployment of HSR in Japan?
3. Why does China need extensive high speed rail system?
4. How does Taiwanese government control HSR?
5. How can you describe South Korean HSR system?

2). Expand the situation.

1. Japanese HSR system became successful because…
2. Chinese government acknowledged that it …
3. The Taiwan High Speed Corporation was on the brink …

4. The Korean government decided to shift from the conventional lines to …

5. The ultimate project cost of Korean HSR network was …

PART VI HIGH SPEED RAIL PROJECTS IN RUSSIA

Reading:

Text 1. Potential Investors Get Preview of Moscow-Kazan High-Speed Rail Project

The American and Russian experience demonstrates that HSR is not a one-size-fits-all transport strategy. Different nations—of different sizes, different population levels, different cultural habits, and, above all, different preexisting transport infrastructures—have different needs. Russian Federation Transport Strategy 2030 includes the implementation of prioritized High-Speed Rail Line projects (HSR): HSR 1 "Moscow – Saint-Petersburg", HSR 2 "Moscow – Kazan – Yekaterinburg" (with future incorporation of Perm, Ufa, and Chelyabinsk), and HSR Center—South "Moscow—Rostov-na-Donu—Adler". The planned high-speed and speed rail lines gravity zone

population amounts to more than 100 million people, which is around 70% of the total Russian Federation population.

The Moscow-Kazan high-speed railway concession project was presented to potential investors on Tuesday, in advance of expected government approval for the project due in March.

A tender for construction of the line, in which participants are expected to invest in exchange for long-term return out of operating revenue, is slated for the end of this year.

The overall price for the railroad has grown since its inception last year from 928 billion rubles ($25.5 billion) to 1 trillion rubles ($27.5 billion).

This is still cheaper than most international analogues. The railroad will cost about $40 million per kilometer, while according to PriceWaterhouseCoopers, the global average is $49 million.

"This is a first project of this kind for Russia, it equals three to four similar ones in Europe," said Alexander Misharin, the head of Skorostniye Magistrali, Russian Railways' subsidiary in charge of high-speed rail development.

The railroad will be the first true high-speed line in Russia. With trains wheezing on track at up to 400 kilometers per

hour, the rail trip from Moscow to Kazan, which today can take close to 13 hours, will be reduced to 3.5 hours. The closest rival is the Moscow-St. Petersburg line, where trains run at up to 240 kilometers per hour.

Under the finalized financial scheme for the project, more than 300 billion rubles, or 30 percent of the total sum, will come directly from state coffers. Another 31 percent will come jointly from Russian Railways, the Pension Fund and the National Welfare Fund. Private companies who want to participate will have to provide a quarter of the overall financing using their own funds or loans while another 14 percent could come as loans to private companies issued under government guarantees.

The line was divided into four segments, each planned to be built simultaneously. Russian Railways will construct the first segment, the 197 kilometer stretch from Moscow to Vladimir, on its own. The other three segments are planned to be built by consortia of private companies under concession agreements.

A number of international companies are interested in the project. Consortia of French, Spanish, German, Chinese

and Italian firms and conglomerates reportedly submitted preliminary applications.

"We are building three high-speed lines with similar systems in France," said Marc Svechine, the head of the high-speed rail development project in Russia at French state rail operator SNCF. He said there are a number of large operating and manufacturing companies in his country ready to come to build the line and to provide the trains for it.

One of them is Vinci Concessions, which is already involved in the construction of the Moscow-St. Petersburg toll highway. And French manufacturer Alstom earlier said that it is ready to supply the high-speed trains for the line.

Siemens, which has produced the Sapsan trains for the high-speed rail link between Moscow and St. Petersburg, is also eyeing the new project.

"We can use the experience we have with Sapsan to produce new trains that will run at 400 kilometers on the Moscow to Kazan line," said Rolf Epstein, CEO of complete transportation solutions department at Siemens.

Completion of the Moscow-Kazan high-speed railroad is scheduled for 2018.

At the end of last year Prime Minister Dmitry Medvedev said that state funding for the high-speed line should be postponed until a more in-depth calculation made into its cost and a technical evaluation of the whole project is done.

A political decision to build the rail line that would connect Moscow and Kazan, 770 kilometers to the east, was first announced by President Vladimir Putin at the St. Petersburg Economic Forum last year.

1. Understanding the main points: read the statements and decide if they are true or false.

1) Russian experience demonstrates that HSR is a one-size-fits-all transport strategy.

2) The planned high-speed and speed rail lines gravity zone population amounts to more than 100 million people, which is around 30% of the total Russian Federation population.

3) The expected government approval for the project is due in May.

4) The railroad will cost about $40 million per kilometer, according to PriceWaterhouseCoopers, the same as the global average.

5) The closest rival is the Moscow-St. Petersburg line, where trains run at up to 240 kilometers per hour.

6) The line was divided into five segments, each planned to be built simultaneously.

2. Understanding details: answer the questions.

1) According to the Russian Federation Transport Strategy 2030, what is HSR 1 and HSR 2 mean?

2) Which other directions does RZD consider?

3) Which countries did reportedly submit preliminary applications?

4) Why the building of HSR infrastructure was postponed?

Vocabulary.

1. Translate into Russian.

Доход от эксплуатации-

Общая стоимость-

Государственная казна-

Предварительная заявка-

Платная автодорога-

Присматриваться к проекту-

2. Word search: Find the words or phrases in the article to fit those meanings.

1) Adding or working into something already existent

2) Formal permission or sanction

3) Something having similar characteristics

4) A company whose controlling interest is owned by another company

5) One of the parts into which something naturally separates

6) To put off to a later time

7) To make known publicly or officially; proclaim

3. Sentence completion: Use the words and phrases from 2) Word search: Find the words or phrases in the article to fit those meanings.

1) We are hoping that he will (…) for governor.

2) The possible (…) of your company will benefit you more than the attainment acquirer.

3) A (…) company formed to handle that end would pay well in a few years when the place got going.

4) A visual (…) of musical sound helps to set visual instructions to performers.

5) The 10 p.m. train was (…) and we had time to ramble about the town.

6) To build HSR system the company needed government (…).

7) We see the body of the beetle consists of several (…).

Speech Practice.

1. Discuss the following points.

1) Is it reasonable to use foreign equipment and rolling stock for HSR in Russia in the current sanctions situation?

2) Why foreign companies consider Russian project as highly profitable?

3) Offer your directions for HSR development.

2. Expand the situation.

1) Now HSR infrastructure has …

2) Sapsan can carry …

3) The transport fee for HSR in Russia is comparatively …

Reading:

Text 2. First HSR designing soon to complete

In September 2016, design documents for the initial section of Moscow-Kazan HSR will be submitted for approval to Glavgosexpertiza, State Expert Review Board. Alexander Misharin, First Vice President of Russian Railways and CEO of High-Speed Rail Lines, announced at the Eastern

Economic Forum in Vladivostok that design documents for the initial section of Moscow-Kazan HSR will be ready by the end of 2016, informs RZD TV corporate channel. “We are soon to finish designing of the initial Moscow-Nizhny Novgorod section. We have announced bids for technology and price audit. In September we will sum up the results and proceed to the bidding and Glavgosexpertiza review procedure. By the year-end, we will have a full set of the section's design documents available. Concurrently, we work to develop the project's legal and financial models. We expect the project to proceed to its construction phase next year”, told Alexander Misharin. According to Russian Railways's First Vice President, Moscow-Kazan HSR project is implemented on the basis of public-private partnership with a consortium of companies. To serve the project needs, a large carrier, owned by Russian Railways, will be set up. As Gudok.ru has already informed, according to High-Speed Rail Lines' estimates, social and economic effect of Moscow-Kazan HSR will equal almost RUB2.5 tn. Certain large international financial institutions have already expressed their intent to invest in the HSR. In particular, China Development Bank wishes to invest over RUB400 bn. There

are proposals from Indian branch of the New Development Bank, BRICS New Development Bank, and Asian Development Bank. At the pre-project phase Gosstroy of Russia developed and approved 15 special technical specifications (STU) for the HSR. Russian-Chinese designer consortium specifically set up to design Moscow-Kazan HSR involved over 60 specialist organizations in project surveys. Besides, an Expert Council for HSR Technical Policy was established at the Russian Transport Academy. French partners from SYSTRA and SNCF (French national railway) were engaged for an unbiased assessment of the designs. Construction of the first high-speed railway line Moscow-Kazan 772 km long is going to be a largest infrastructure project of the new millennium. Russia will have its first HSR with trains moving at a speed of up to 400 km/h. The total value of Moscow-Kazan HSR is RUB1.068 tn. The project will fully "pay for itself" and be profitable for both the government and private investors. The first section (Moscow-Nizhny Novgorod) may be completed as early as 2018 for test operation. The second RUB441.9 bn section (Nizhny Novgorod-Kazan) will not be financed by the Sovereign Wealth Fund; it will use RUB150 bn of Chinese investments,

another RUB150 bn of infrastructure bonds and private pension funds' money, and RUB37 bn of equity financing. It is planned to raise about RUB105 bn through a business loan granted at a market rate. Russian Railways and China Railway Corporation also agreed to facilitate Moscow-Beijing Eurasian High-Speed Transport Corridor and implement Moscow-Kazan HSR project as part of the Eurasian Corridor. The estimated cost of Moscow-Beijing HSR is RUB7 tn. A cooperation agreement has been signed between Sinara Group and Chinese CRRC Changchun Railway Vehicles for localization of high-speed train production.

1. Understanding the main points: read the statements and decide if they are true or false.

1) In September 2016, design documents for the initial section of Moscow-Kazan HSR will be submitted for approval to Glavgosexpertiza.

2) Certain large international financial institutions have already invested in the HSR.

3) Construction of the first high-speed railway line Moscow-Kazan 772 km long is going to be a largest infrastructure project of the new millennium.

4) The estimated cost of Moscow-Beijing HSR is $7 tn.

2. Understanding details: answer the questions.

1) Which establishment is to approve the design documents of Russian HSR infrastructure?

2) Which financial institutions intend to invest in the project?

3) How Russian Transport Academy does participate in the project?

4) Which two capitals will the Eurasian High-Speed Transport Corridor connect?

5) How does Sinara Group and Chinese CRRC Changchun Railway Vehicles intend to participate in the project?

Vocabulary.

1. Translate into Russian.

To submit for approval-

Initial section-

To announce a bid-

By the year-end-

Concurrently-

To serve the project needs-

Consortium of companies-

Intent to invest-

Unbiased assessment-

To pay for itself-

2. Opposites: Find the words and phrases which mean the opposite of these.

1) Final—
2) Retreat—
3) Local—
4) Worthless—
5) National—

3. Word partnership: Match the two parts of the phrase.

1)	Design	a) procedure
2)	Review	b) carrier
3)	Large	c) documents
4)	Economic	d) specification
5)	Technical	e) effect

Speech Practice.

1. Discuss the following points.

1) Which is the model of HSR infrastructure in Russia? Is it similar to the US?
2) How does population density of Russian Federation influence the HSR development?
3) Say a few words about governmental program "Strategy for Railway Development in the Russian Federation to 2030,"

2. Expand the situation.

1) Although Russia's railways are among the most freight-dominant in the world, …
2) Though Russia still has the tradition of "night train" to St. Petersburg …
3) A full upgrade to a dedicated HSR line would likely…

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