

The 19th
ASIA CONSTRUCT CONFERENCE
14-15th November 2013

Part 1: Country Report

Economy and Construction Industry in Korea

Prepared By
Lee, Seung-bok and Kim, Geun-Yong



254 Simindea-ro, Dongan-Gu
Anyang-Shi, Kyonggi-Do 431-712, Korea
sebolee@krihs.re.kr

Korea Research Institute for Human Settlements

Table of Contents

1. Executive Summary
2. Macro Economic Review and Outlook
3. Trading country
 - 3.1. Value of import and export
 - 3.2. Five Major Trading Countries
4. Overview of the Construction Industry
 - 4.1. Value of Construction contracts
 - 4.2. Construction Companies
 - 4.3. Construction Employees and Labors
 - 4.4. Productivity
 - 4.5. Construction Cost
 - 4.6. Import and Export of Construction work
5. Construction outlook 2013 /2014

1. Executive summary

The Korean economy has successfully passed through the global financial and economic crisis, even if it is currently slowing down due to sluggish exports and imports. The Korean GDP growth rate in the first half of 2013 showed a slight increase compared with the previous year, due to the drop in international oil prices and the improvement of terms-of-trade. In the first half of 2013, the private consumption and construction investment increased 1.9% and 6.1% respectively, but the equipment investment decreased 1.2% compared with the previous year. Both exports and import increased by 0.6% and 2.4% respectively compared with the same period of last year, because of the growth of cordless telephone and automobile car, the influence of US government shut-down, rise of exchange rate and so forth.

In the construction sector, the value of contracts in the first half of 2013 definitely has decreased 24.2% owing to the recession in civil (infrastructure) and residential construction. The number of contractors in August 2013 decreased about 5% compare with last year, and that of employees maintained the same level. For the exports in construction, the Civil sector showed an exceptional growth, while the Plant sector confronted with the shrinking trend. The construction investment in 2013 is expected to increase by 2.8% improved from the negative results of the previous year.

All things considered, the Korean GDP growth rate in 2013 is expected to be 2.8% under the influence of the domestic and global economic slowdown. The economic outlook for next year is predicted to be more improved, even if it will be affected by domestic demand reduction and uncertainty of the global economy.

2. Macro Economic Review and Outlook

The Korea as well as other countries had been confronted with a serious economy crisis after the Subprime mortgage in U.S.A, 2008. However, the GDP growth rate had greatly been up to 6.2 percent in 2010 from 0.3 percent in 2009, riding on brisk exports and recovering domestic demand. The GDP growth rate, unfortunately, has fallen again from 2.0 percent in 2012 to 1.9 percent in the first half of 2012, which means that the Korean economy has been at a standstill. In the first half of 2013, the population and labour force growth rate slightly increased and the unemployment rate slightly declined, compared with the values in 2012. The interbank and short term loan interest rate decreased during the same period, the long term loan interest rate also decreased 3.13 to 2.87 percent.

In the first half of 2013, private consumption grew by 1.6% over a year ago, which was helped by the increases of nondurable goods like the clothing and shoes and of durable goods like cordless phone and automobile. The construction investment increased by 2.2% with a growth of engineering projects, while the investment in plant and equipment decreased by a drop of the machinery like the communication and broadcasting equipments.

On the production side, the manufacturing sector decreased of 1.8% over the same period in the previous year, which was mainly due to the decrease of metalware and electric and electronic equipments. The construction sector also increased of 2.8% because of expansion of private sector . In addition, the service sector increased of 2.6% on the strength of finance, insurance, food and lodging industries.

As the rate of Korean economic growth is predicted to be 3.6% in the next half of 2013, it is difficult to say that economic has been completely recovered. However, the major credit rating agencies like Moody's take an optimistic view of Korean economy despite downgrading the most developed countries' rating. In conclusion, the Korean economy is expected to be positive growth but its pace might slow down.

Table 2.1. Main Economic Indicators

| | 2005 | 2006 | 2007 | 2008 | 2009 | 2010 | 2011 | 2012. | 2013 2Q |
|--|---------------|---------------|---------------|---------------|---------------|----------------|----------------|----------------|----------------|
| GDP and Components | | | | | | | | | |
| GDP at real price (bill. won, base year 2005) | 865,241 | 910,049 | 956,515 | 978,499 | 981,625 | 1,043,666 | 1,082,095 | 1,104,214 | 550,603 |
| GDP at current market price (bill. won) | 865,241 | 908,744 | 975,013 | 1,025,452 | 1,065,037 | 1,173,275 | 1,235,160 | 1,272,459 | 627,229 |
| GDP growth (%) | 4.0 | 5.2 | 5.1 | 2.3 | 0.3 | 6.3 | 3.7 | 2.0 | 1.9 |
| GDP growth (%) for agri and fishing sector | 1.3 | 1.5 | 4.0 | 5.6 | 3.2 | -4.4 | -2.0 | -0.6 | 0.5 |
| GDP growth (%) for manufacturing sector | 6.2 | 8.1 | 7.2 | 2.9 | -1.5 | 14.7 | 7.3 | 2.2 | 1.6 |
| GDP growth (%) for services sector | 3.5 | 4.4 | 5.1 | 2.8 | 1.2 | 3.9 | 2.6 | 2.5 | 2.1 |
| GDP growth (%) for mining sector | -0.4 | -0.1 | -4.1 | 1.3 | -1.6 | -7.7 | -6.7 | 0.6 | -3.6 |
| GDP growth (%) for construction sector | -0.3 | 2.2 | 2.6 | -2.5 | 1.8 | -2.7 | -4.3 | -1.6 | 2.9 |
| Demographic Indicator | | | | | | | | | |
| Population (1000 people) | 48,138 | 48,371 | 48,597 | 48,948 | 49,182 | 49,410 | 49,779 | 50,004 | 50,219 |
| Population growth rate (%) | 0.21 | 0.49 | 0.47 | 0.72 | 0.48 | 0.46 | 0.75 | 0.45 | 0.43 |
| Labour force (1000 people) | 22,856 | 23,151 | 23,433 | 23,577 | 23,506 | 23,829 | 24,244 | 24,681 | 25,291 |
| Labour force growth rate (%) | 1.33 | 1.29 | 1.22 | 0.61 | -0.30 | 1.37 | 1.74 | 1.80 | 2.47 |
| Unemployment rate | 3.7 | 3.5 | 3.2 | 3.2 | 3.6 | 3.7 | 3.4 | 3.2 | 3.1 |
| Inflation rate (CPI) | 2.8 (86.1) | 2.2 (88.1) | 2.5 (90.3) | 4.7 (94.5) | 2.8 (97.1) | 3.0 (100.0) | 4.0 (104.0) | 2.2 (106.3) | 1.0 (107.3) |
| Financial Indicator | | | | | | | | | |
| Interbank interest rate | 3.35 | 4.14 | 4.65 | 4.77 | 1.92 | 2.03 | 3.01 | 3.02 | 2.47 |
| Short term loan interest rate (Yields on CD(91-day)) | 3.65 | 4.48 | 5.16 | 5.49 | 2.63 | 2.67 | 3.44 | 3.30 | 2.69 |
| Long term loan interest rate (Yields of Treasury Bonds (3-year)) | 4.27 | 4.83 | 5.23 | 5.27 | 4.04 | 3.72 | 3.62 | 3.13 | 2.87 |
| Average change against USD\$ | 1,024.3 | 955.5 | 929.2 | 1,102.6 | 1,276.4 | 1,156.3 | 1,108.1 | 1,126.9 | 1,135.2 |

3. Trading Country

3.1. Value of Import and Export

The balance of trade was recorded a surplus of \$41.1 billion in 2010, due to the sharp increase of export exceeding the increase of import. However, that value in 2012 declined to \$28.3 billion, even if the trade volume of export and import increased. In the first half of 2013, it made a surplus of \$20.0 billion, that is, 2 times bigger than that of last year.

The export in the first half of 2013 is estimated to have grown 0.6%, which was caused by the growth of cordless telephone, automobile car, general machinery and petrochemicals and by the decline of shipping and wireless mobile products. The import is inversely estimated to have shrunk about 2.8%, which was caused by recession of domestic demand and slowdown of world economy.

The balances of exports and imports in 2013 are being forecasted to increase about 5.5% and 3.8% respectively by the effects of the domestic and foreign economic uncertainty, which would be reduced below than anyone expected.

Table 3.1. Export and Import

| | 2005 | 2006 | 2007 | 2008 | 2009 | 2010 | 2011 | 2012 | 20132Q |
|---------------------------|-----------------|-----------------|-----------------|-----------------|------------------|-----------------|-----------------|-----------------|-----------------|
| Export (increase rate) | 284.4 (12.0) | 325.5 (14.4) | 371.5 (14.1) | 422.0 (13.6) | 363.5 (-13.9) | 466.3 (28.3) | 555.2 (19.0) | 547.8 (-1.3) | 276.6 (0.6) |
| Import (increase rate) | 261.2 (16.4) | 309.4 (18.4) | 356.8 (15.3) | 435.3 (22.0) | 323.1 (-25.8) | 425.2 (31.6) | 524.4 (23.3) | 519.5 (-0.9) | 256.6 (-2.8) |
| Balance of trade | 23.2 | 16.1 | 14.6 | -13.3 | 42.6 | 41.1 | 30.8 | 28.3 | 20.0 |

Source: Korea Customs, The Korea International Trade Association.

3.2. Five Major Trading Countries

The three major trading countries of Korea in the first half of 2013 are China, Japan and America. Hong Kong and Singapore are also included in the five major countries of export, and Middle East Asia countries including Saudi Arabia and Qatar are the major countries of import. About 80% of oil import of Korea is from these Middle East countries. While the share of EU Countries in the trading to Korea has decreased, the share of East South and Middle East Asia countries has increased.

Table 3.2. Top 5 Major Trading Countries of Import and Export (2Q, 2013)

| Rank | Export | | Import | |
|------|-----------|--------|--------------|--------|
| | Country | Value | Country | Value |
| 1 | China | 69,537 | China | 40,979 |
| 2 | America | 31,299 | Japan | 30,500 |
| 3 | Japan | 17,120 | America | 20,834 |
| 4 | Hong Kong | 13,477 | Saudi Arabia | 18,199 |
| 5 | Singapore | 12,053 | Qatar | 13,634 |

Source: Korea Customs

4. Overview of construction industry

4.1. The Value of Construction Contracts

Until 2007, the construction business has risen helped by buoyant housing business, regardless of government's strong restriction on the real estate market. And thus residential building construction was increased in the nation wide, especially apartments in local cites. With the spreading global financial crisis by sub-prime mortgage in America, domestic housing business was also greatly shrunk in the end of 2007. It has resulted in a huge oversupply in housing market and unsold apartments all over the country.

Since early 2008, the economic stimulus policy had led the government expenditure to rise rapidly, letting the investment in construction, mainly for infrastructure projects, to rise fast. In 2009, the rate of civil construction contracts increase by 31.2%, but that of total construction contracts conversely decreased by 1.1% with offsetting by a large fall of private projects. In 2010, only non-residential construction contracts recorded positive growth of 18.6%. Fortunately, the residential construction contracts in 2011 increased rapidly into 22.4%, which brought about the positive growth in total construction.

However, construction contracts including civil and privates have been deeply decreased by domestic recession since 2012. The civil and residential construction contracts in the first half of 2013 were recorded the extremely negative growth of 32.1% and 31.3% respectively, meanwhile the non-residential construction contract decreased by 6.5% compared with the same period the previous year. By the results, the total construction contracts showed the negative growth of 24.2%, reaching a value of KRW 51.9 trillion (US\$ 44.3 billion).

The economic prospects for the second half of this year are different from the sectors. It is expected that it will be difficult to improve the residential construction contracts by the depressing of the housing market in Seoul metropolitan area. It is predicted to be the positive growth in the non-residential buildings and infrastructure, however, resulted by increasing the supply in public sector relocation into Multifunctional Administrative City (Sejong City) and New-Town projects in cities .

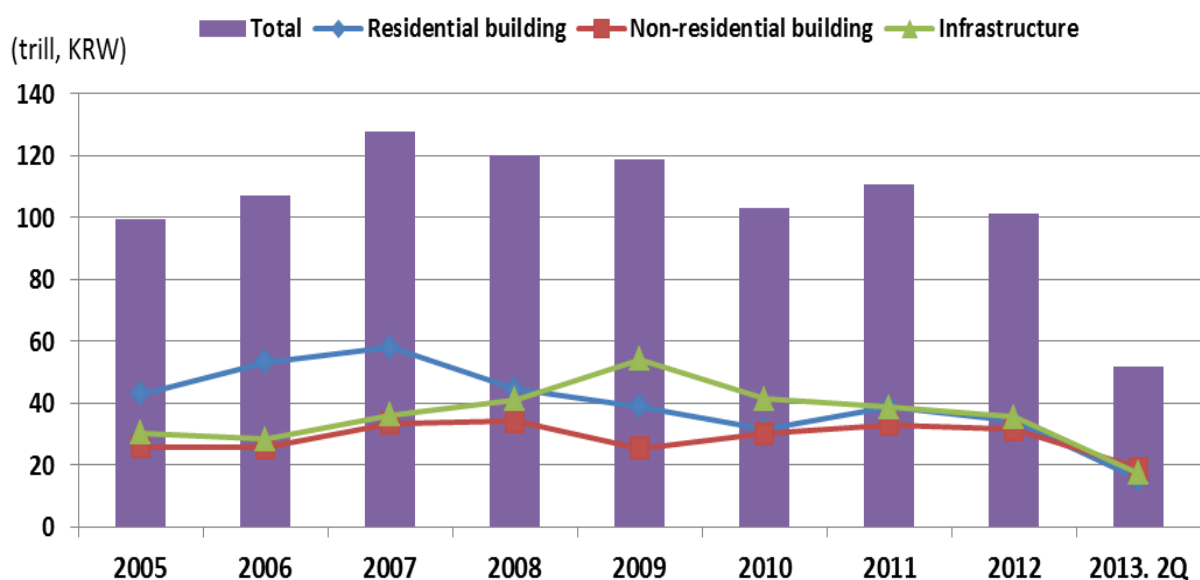


Figure 4.1: The Value of Construction Contracts (2005~2013.2Q)

Table 4.1. The growth rate of construction Contracts

(Unit: %, compared with the same period)

| year | residential | non-residential | civil(Infra) | total |
|--------|-------------|-----------------|--------------|-------|
| 2005 | 20.6 | -2.6 | -5.7 | 5.1 |
| 2006 | 23.9 | -1.2 | -6.6 | 8.0 |
| 2007 | 9.1 | 30.8 | 27.5 | 19.2 |
| 2008 | -23.2 | 1.8 | 14.0 | -6.1 |
| 2009 | -12.5 | -25.4 | 31.2 | -1.1 |
| 2010 | -19.1 | 18.6 | -23.5 | -13.0 |
| 2011 | 22.4 | 9.8 | -6.2 | 7.2 |
| 2012 | -11.4 | -5.0 | -8.1 | -8.3 |
| 2013.8 | -31.3 | -6.5 | -32.1 | -24.2 |

Table 4.2. Breakdown of Construction Contracts

(Unit: bill. won, current price)

| Type of Contract | 2005 | 2006 | 2007 | 2008 | 2009 | 2010 | 2011 | 2012 | 2013. 8 |
|------------------------------|--------|---------|---------|---------|---------|---------|---------|---------|---------|
| Public Project | | | | | | | | | |
| Residential building | 3,853 | 5,122 | 7,570 | 9,346 | 7,378 | 4,738 | 6,963 | 6,446 | 1,614 |
| Non-residential building | 7,001 | 5,755 | 7,587 | 9,149 | 8,327 | 7,749 | 7,779 | 8,730 | 5,928 |
| Infrastructure | 20,972 | 18,643 | 21,932 | 23,354 | 42,782 | 25,749 | 21,882 | 18,901 | 12,159 |
| Sub-Total | 31,826 | 29,519 | 37,089 | 41,849 | 58,487 | 38,236 | 36,624 | 34,077 | 19,701 |
| Private Project | | | | | | | | | |
| Residential building | 39,155 | 48,155 | 50,578 | 35,311 | 31,699 | 26,875 | 31,742 | 27,850 | 13,722 |
| Non-residential building | 18,978 | 19,905 | 25,984 | 25,021 | 17,161 | 22,486 | 25,406 | 22,797 | 13,103 |
| Infrastructure | 9,425 | 9,740 | 14,261 | 17,904 | 11,366 | 15,631 | 16,927 | 16,781 | 5,333 |
| Sub-Total | 67,559 | 77,799 | 90,823 | 78,236 | 60,227 | 64,993 | 74,076 | 67,428 | 32,158 |
| Total | | | | | | | | | |
| Residential building | 43,009 | 53,276 | 58,148 | 44,657 | 39,078 | 31,613 | 38,705 | 34,295 | 15,336 |
| 1994Non-residential building | 25,979 | 25,660 | 33,571 | 34,170 | 25,488 | 30,235 | 33,185 | 31,528 | 19,031 |
| Infrastructure | 30,396 | 28,383 | 36,193 | 41,258 | 54,149 | 41,380 | 38,809 | 35,683 | 17,493 |
| Total | 99,384 | 107,318 | 127,912 | 120,085 | 118,714 | 103,229 | 110,701 | 101,506 | 51,860 |

Source: Construction Association of Korea.

4.2. Construction Companies

4.2.1. The number of Contractors by Type

The number of construction companies had steadily increased since 2006, and dropped back to 55,372 in 2012, where it hardly changed the amount of contractors until August 2013. Although the number of general contractors and specialized and equipment contractors are gradually decreasing year after year, those of equipment contractors is reversely increasing a little.

Most of the contractors are composed with the general and specialized companies, and the shares of them consist of 20.0% and 68.1% respectively in total.

Table 4.2.1. The number of Construction Companies

(Unit: each).

| Year Type | 2005 | 2006 | 2007 | 2008 | 2009 | 2010 | 2011 | 2012 | 2013.8 |
|-------------------------|--------|--------|--------|--------|--------|--------|--------|--------|--------|
| General contractors | 13,202 | 12,914 | 12,842 | 12,590 | 12,321 | 11,956 | 11,545 | 11,304 | 11,058 |
| Specialized contractors | 35,547 | 35,040 | 36,422 | 37,106 | 37,914 | 38,426 | 38,100 | 37,605 | 37,542 |
| Equipment contractors | 5,505 | 5,387 | 5,478 | 5,768 | 5,994 | 6,151 | 6,330 | 6,463 | 6,619 |
| Total | 54,254 | 53,341 | 54,742 | 55,464 | 56,229 | 56,533 | 55,975 | 55,372 | 55,219 |

Source: Construction Association of Korea.

4.3. Construction Employees and Labors

4.3.1. The number of construction workers by job type

The number of workers shows an up-and-down pattern in the construction industry. For the year of 2007, more than 1.8 million employees worked in the construction field, 7.9% of total employment. However, the number of workers in 2008 slightly declined with construction business depression. And it sharply fell by 1.7 million workers in 2009, when Korean economy was in the deepest recession affected by global financial crisis. In 2010, the number of employees in construction increased a few owing to the growth in the economically active population. Reflecting this trend, the number of employees in September 2013 already exceeded that of previous year.

It is hard to analyze the latest trend by job type, because the relevant data was only available until 2010, as showing in the Table 4.3.1b. The number of building construction workers increased amid the buoyant housing and building business from 2006 to early 2007.

Table 4.3.1a. The total number of workers in Construction

(Unit : thousand persons)

| Year Number | 2005 | 2006 | 2007 | 2008 | 2009 | 2010 | 2011 | 2012 | 2013.9. |
|------------------------------------|-------|-------|-------|-------|-------|-------|-------|-------|---------|
| Number of employee in construction | 1,813 | 1,833 | 1,849 | 1,812 | 1,720 | 1,753 | 1,751 | 1,773 | 1,788 |

Source: Korea National Statistical Office.

Table 4.3.1b. The number of Construction Workers by Job Type

(Unit: thousand workers)

| Type \ Year | 2005 | 2006 | 2007 | 2008 | 2009 | 2010 |
|----------------------------------|-------|-------|-------|-------|-------|-------|
| General construction | 571 | 579 | 576 | 529 | 491 | 468 |
| Heavy construction | 176 | 161 | 162 | 157 | 196 | 166 |
| Building construction | 395 | 417 | 414 | 372 | 294 | 302 |
| Special trade construction | 1,147 | 1,138 | 1,151 | 1,127 | 1,170 | 1,157 |
| Engineering and building | 475 | 482 | 477 | 469 | 465 | 466 |
| Building installation | 183 | 170 | 165 | 165 | 169 | 177 |
| Electrical & communication works | 252 | 246 | 265 | 258 | 290 | 280 |
| Building completion | 236 | 239 | 243 | 233 | 246 | 234 |
| Equipment construction | 95 | 116 | 121 | 155 | 59 | 128 |
| Total | 1,813 | 1,833 | 1,849 | 1,812 | 1,720 | 1,753 |

Source: Construction Association of Korea.

4.3.2. The number of foreign construction workers by job type

There are few statistics about the number of foreign workers in Korean construction market, because it is difficult to assemble acute figures for the number of foreign workers. The reason that can't exactly accumulate the number of foreign workers is that there are a lot of illegal foreigner more than 1 million. In 2012, the number of legal foreign construction workers is approximately 85 thousand.

4.4. Productivity

4.4.1. The Value added per employee

The index of value added per employee was changed into 100 in 2010, therefore we just suggest the figures since 2008. The table 4.4.1 shows the value added per employee construction dropped from 118.4 in 2009 to 84.6 in 2012. Showing the trends in the past data, the value added per employee in each industry had been gradually worse since 2010, even though the percentages charged in manufacturing had increased from 2008 to 2012.

Table 4.4.1. The Value Added per Employee

(unit : %)

| | 2008 | 2009 | 2010 | 2011 | 2012 |
|----------------|---------|---------|---------|---------|---------|
| Construction | (109.6) | (118.4) | (100.0) | (89.9) | (84.6) |
| Manufacturing | (91.1) | (92.4) | (100.0) | (103.8) | (106.2) |
| Service | (97.3) | (96.1) | (100.0) | (99.6) | (99.6) |
| Primary sector | (95.8) | (102.0) | (100.0) | (98.0) | (99.9) |

Source: Korea National Statistical Office.

4.4.2. Physical measurement of construction productivity

We do not have the adequate data explaining physical measurements of construction productivity, since there is no labor input data classified by construction types.

4.5. Construction Cost

4.5.1. Major construction material average price

The official prices of major construction materials are influenced by government guideline but the actual transaction value changes according to the market conditions. The demand and supply of most construction materials can be more or less matched domestically. Shown as table 4.5.1, the price of construction materials has not been much changed since 2005, except Steel bars.

In 2008, the price of Steel bar sharply rose to 888,500 won per ton from the previous year 526,500 won. Because the raw material of Steel bar mainly depended on import, the price was influenced by international market situation such as construction and shipbuilding. The price of steel bar came down to 811,000 won in 2010. But it had been risen up to 995,000 won in 2012 and the price has been stabilized so far.

Table 4.5.1. Average Construction Material Price

| RMC * kg/cm ³ (won per m ³) | Cement in bulk (won per 40kg) | RMC * kg/cm ³ (won per m ³) | Steel bars (won per ton) | 25mm aggregates (won per m ³) | Concreting sand (won per m ³) | Common Bricks (won per thousand pieces) |
|--|--|--|-----------------------------|---|---|---|
| 2005 | 3,387 | 51,708 | 498,583 | 14,167 | 13,083 | 46,000 |
| 2006 | 3,370 | 49,080 | 455,667 | 11,333 | 13,250 | 45,000 |
| 2007 | 3,370 | 49,080 | 526,500 | 11,500 | 13,083 | 45,000 |
| 2008 | 3,370 | 51,248 | 888,500 | 12,417 | 12,000 | 45,000 |
| 2009 | 4,000 | 51,970 | 741,000 | 12,000 | 13,000 | 45,000 |
| 2010 | 3,800 | 54,670 | 811,000 | 12,000 | 13,000 | 50,000 |
| 2011 | 3,800 | 51,430 | 975,000 | 12,000 | 13,000 | 50,000 |
| 2012 | 3,890 | 56,970 | 995,000 | 13,500 | 13,000 | 55,000 |
| 2013 | 4,400 | 57,600 | 995,000 | 13,500 | 13,000 | 55,000 |

* RMC: Ready Mix Concrete.

Source: KPC (Korea Price Information Corp).

4.5.2. Construction industry wages

In construction like other industries, the salaries and wages have mildly increased since 2005. For instance, the wage special daily workers was 68,917 won and gradually increased by 95,232 won in 2012. In the first half of 2013, the average wages per day were 105,174 won (about 90.7 dollars) for chief workers, 100,936 won (about 87.1 dollars) for special daily wage, and 93,975 won (about 81.1 dollars) for normal daily wage.

Table 4.5.2. Wages in the Construction Industry

(unit : Korean won)

| | 2005 | 2006 | 2007 | 2008 | 2009 | 2010 | 2011 | 2012 | 2013.9 |
|--------------------|--------|--------|--------|--------|--------|--------|---------|---------|---------|
| Chief worker | 73,402 | 78,124 | 81,700 | 87,995 | 90,889 | 97,000 | 101,726 | 104,876 | 105,174 |
| Special daily wage | 68,917 | 73,572 | 79,027 | 83,141 | 84,862 | 91,396 | 96,325 | 95,232 | 100,936 |
| Normal daily wage | 54,171 | 57,321 | 59,715 | 65,076 | 68,437 | 71,456 | 74,808 | 81,088 | 93,975 |

Source: CAK (Construction Association of Korea).

4.6. Import and Export of Construction Work

4.6.1. Annual exports of construction work

Such a tremendous increase in export of construction work was experienced in 2010, because the United Arab Emirates (UAE) nuclear power plant contract signed at the end of 2009 was brought into 2010 calculation. The 18.6 billion dollar UAE project accounted for most of the increase in the amount. Meanwhile, the exports in 2011 showed a little decreasing by the global depression sparked in Europe. The total value in export in construction was recorded 45,117 million dollars by September 2013, and this was amount of 1.3 times higher compared with 32,650 in the same period the previous year.

Among construction sectors, the export of plant occupied the largest portion recording 26,938 million dollars in 2013, but it showed the largest drop in 2012. On the other hand, the export of architecture in construction sectors increased by 12,779 million dollars, which was more than the value over the past year in 2012.

Table 4.6.1. Annual Exports of Construction Work

| year | Total | Contract Amount by work type(million US\$) | | | | | |
|--------|--------|--|--------------|--------|----------|----------|-------------|
| | | Civil | Architecture | Plant | Electric | Telecomm | Engineering |
| 2005 | 10,859 | 836 | 1,226 | 8,263 | 374 | 13 | 147 |
| 2006 | 16,468 | 1,532 | 3,433 | 10,920 | 474 | 3 | 106 |
| 2007 | 39,788 | 5,232 | 8,177 | 25,268 | 690 | 41 | 381 |
| 2008 | 47,640 | 9,364 | 9,192 | 26,764 | 1,336 | 19 | 965 |
| 2009 | 49,147 | 5,746 | 6,273 | 35,692 | 756 | 20 | 660 |
| 2010 | 71,578 | 4,124 | 7,724 | 57,285 | 770 | 458 | 1,217 |
| 2011 | 59,144 | 5,857 | 7,846 | 43,269 | 954 | 61 | 1,157 |
| 2012 | 64,880 | 8,795 | 14,332 | 39,549 | 1,323 | 73 | 818 |
| 2013.9 | 45,117 | 12,779 | 4,154 | 26,938 | 304 | 237 | 705 |

Source: ICAK (the international Construction Association of Korea).

4.6.2. Five major foreign markets by value

Middle-east Asian countries are usually included in top five countries for construction export of Korea. Saudi Arabia were the highest countries in construction exports, in addition, Singapore and Australia recently entered into the five major export countries. The construction service of exported to middle-east Asian countries is mainly plant construction sector and the service to south-east Asian countries is infrastructure or architecture construction sector.

In 2012, Saudi Arabia was the most important country in construction exports, where 16,167 million dollars of construction service was exported. It was noteworthy that Kazakhstan in Middle Asia held the third rank in the construction export.

Table 4.6.2. Top Five Countries for Construction Export

(unit : million US\$)

| Rank | 2009 | | 2010 | | 2011 | | 2012 | | 2013.9 | |
|------|--------------|--------|--------------|--------|--------------|--------|--------------|--------|--------------|-------|
| | Country | Value | Country | Value | Country | Value | Country | Value | Country | Value |
| 1 | U.A.E | 15,860 | U.A.E | 25,602 | Saudi Arabia | 16,588 | Saudi Arabia | 16,167 | Saudi Arabia | 8,266 |
| 2 | Saudi Arabia | 7,203 | Saudi Arabia | 10,531 | Brazil | 4,606 | Iraq | 9,636 | Australia | 5,855 |
| 3 | Algeria | 3,727 | Kuwait | 4,893 | Iraq | 3,666 | Kazakhstan | 4,161 | Singapore | 3,435 |
| 4 | Libya | 3,134 | Vietnam | 3,298 | Vietnam | 3,459 | Vietnam | 3,416 | Vietnam | 3,151 |
| 5 | Iran | 2,492 | Australia | 3,246 | Singapore | 3,289 | Singapore | 3,345 | Turkmenistan | 2,471 |

Source: ICAK (the international Construction Association of Korea).

5. Construction Outlook 2013 / 2014

The Korea's GDP growth had sharply dropped off after the global financial crisis, and the growth rate was only 0.3 percent in 2009. In 2010, however, the growth rate rose to 6.8 percent with economic activity increasingly led by the private sector. The recovery was led by the rebound in fixed investment and the turning of the inventory cycle. Nevertheless, the growth rate in 2011 dropped again into 3.7 percent with the stagnant domestic economy and the financial crisis triggered by Europe. The growth rate in 2012 was 2.0 percent lower than that of last year. The economists in Korea, meanwhile, would forecast that the world economic growth rate will be 3.2% with reflecting the main countries' economic situation and on the other hand,

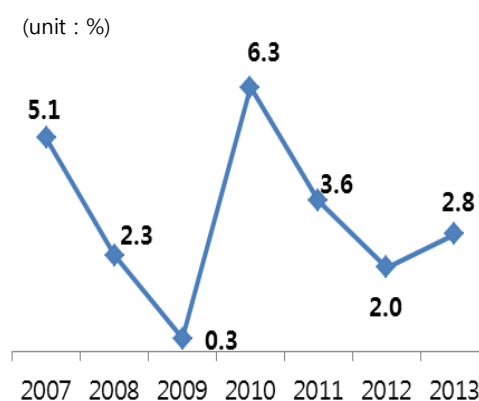


Figure 5.1: Korea's GDP growth

Korea economic growth rate will be 2.8% lower than the average growth rate of the world economic. The growth rate in construction investment was converted from negative in 2012 into positive in 2013, which reached 2.4% in the first half of 2013. It is expected that the annually rate will be about 2.2%.

Table 5.1. Prospect of Construction Investment in 2013

(Unit: %, compared with the same period)

| Segment | 2012 annually | 1 st half of 2013 | 2 nd half of 2013 | 2013 annually |
|-------------------------|---------------|------------------------------|------------------------------|---------------|
| Construction Investment | -2.2 | 2.4 | 1.7 | 2.2 |

Source: Korea Research Institute for Human Settlements

The prospects for the Korean economy next year is a little hopeful. The government of Korea plans to strengthen its investment for healthcare, welfare and the research of new growth engines, while cutting the budget for social overhead capital including road construction in 2013. There are so many uncertainties ahead in the Korean economy as well as the global economy. Even though the government in the next year plans to cut down construction investment sector, the GDP growth rate in 2014 would be predicted to be about 3.8% due to the growth of domestic demand and the recovery of world economy.

Asia Construct

Disaster Risk Reduction in Infrastructure

Sanghyeok Kang, Research Fellow, Ph.D.

Construction & Economy Research Institute of Korea (CERIK)

Contents



What is DISASTER?

What causes disasters?

Man-made disasters

Cases and Measures

Conclusion

What is disaster?

- An event that results in great harm, damage, or death, or serious difficulty (Cambridge Dictionary)
- natural disasters and man-made disasters

bencana

재해

malapetaka

विपत्ति

гамшиг

අයහෝගය

災害

tai họa

disaster

Natural disaster



Man-made disaster



Explosion



Fire



Collapse



Water



Pollution



Traffic accident

Man-made
Disaster

Characteristics of recent disasters

- Enlarge
 - Affects on a large area
- Irregular
 - Unpredictable
- Complex
 - Multiple disasters occur simultaneously.
- Frequent
 - Occurs more frequently
 - Frequent man-made disasters

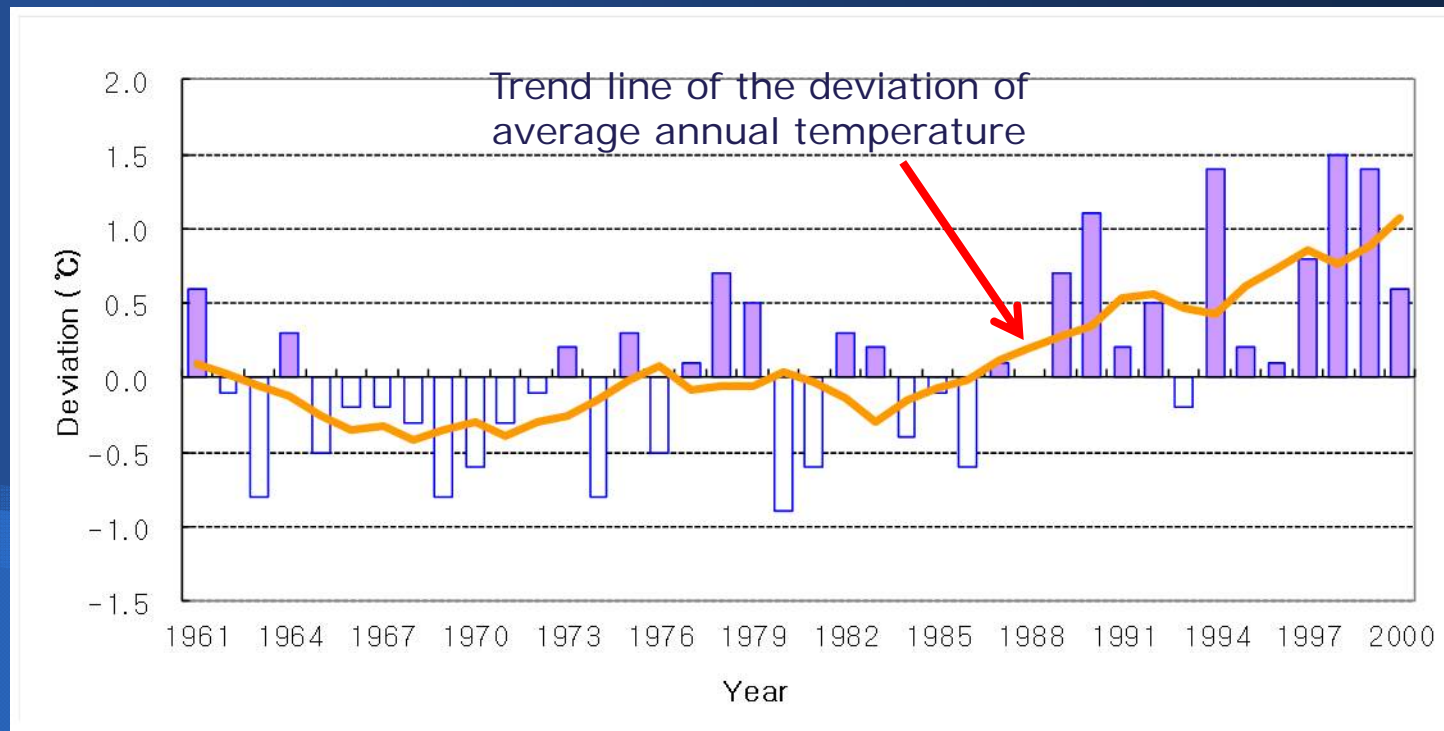


What causes disasters?

- Climate change
 - Global warming
 - Higher rainfall intensity
 - Increased 1-day probable max. precipitation
- Rapid urbanization, industrialization
 - High population density
 - Thoughtless development
 - Increased impervious surfaces
 - Increased underground infrastructure facilities such as electricity, gas, drainage, water supply systems

Climate change in Korea

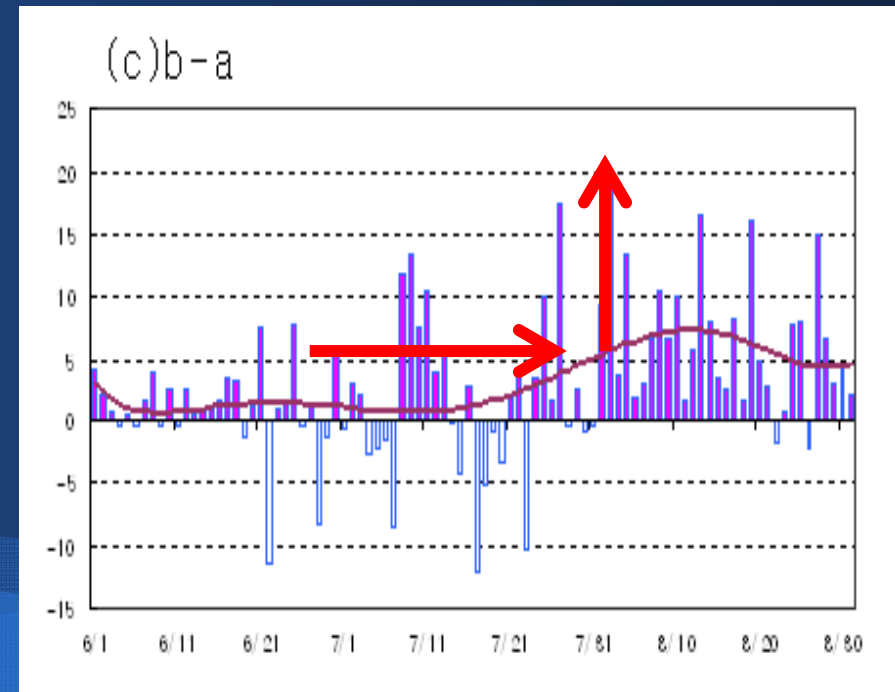
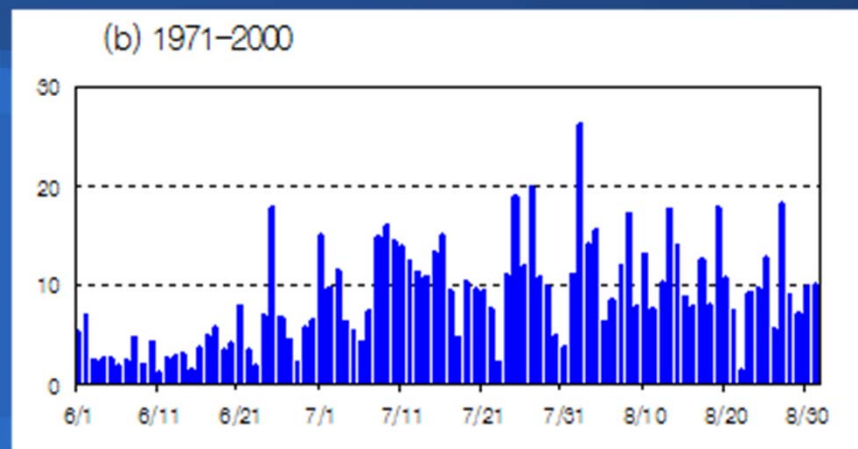
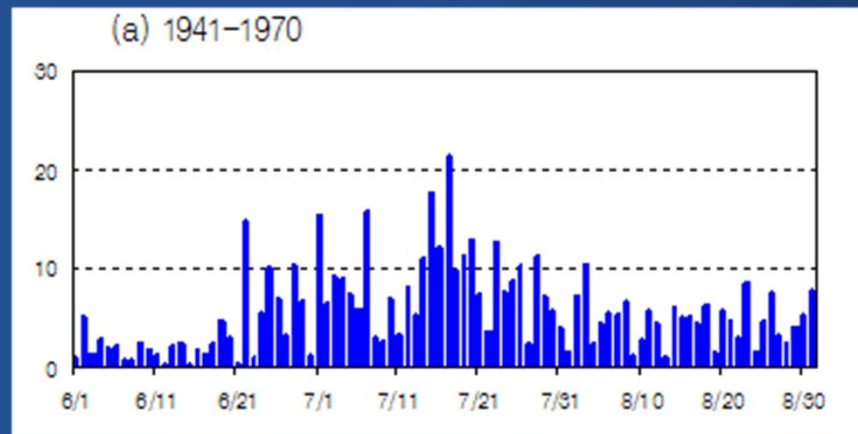
- 1.2°C increased for the last 30 years.
- Especially, it gets warmer in winter.



<Source: Korea Meteorological Administration>

Climate change in Korea

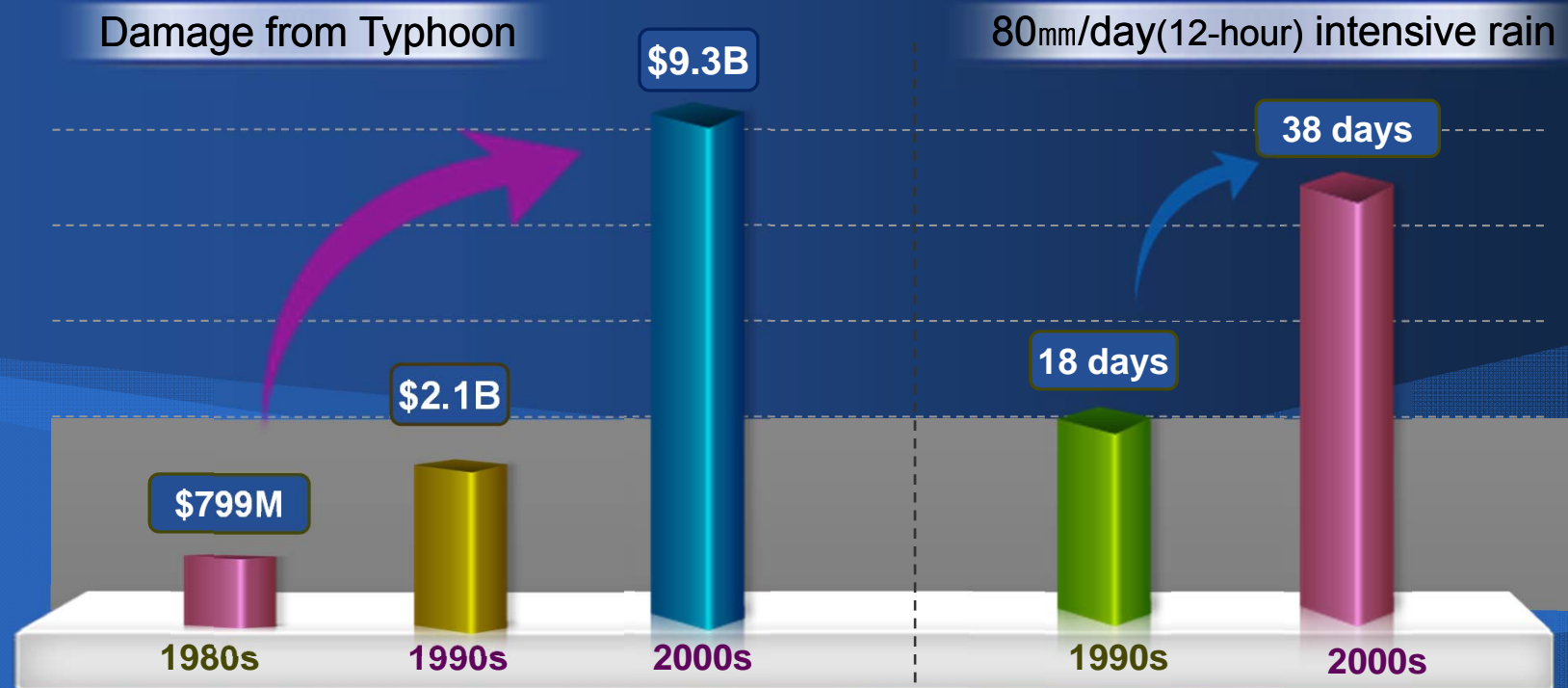
- Change in summer precipitation over Seoul
- Rainfall intensity increased
- Average rainfall not changed, concentration period changed to Aug.



<Source: Korea Meteorological Administration>

Climate change and disasters

- Exposed to hazards from climate change
 - Typhoon, frequent intensive rain
 - 3.2 times the damage every 10 years



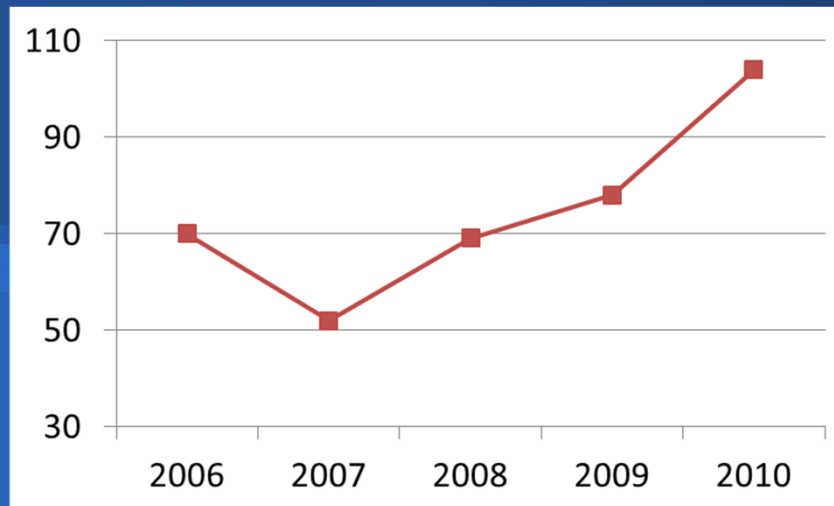
Flooding in Seoul





Man-made disasters

Bursts of Water Supply System



<Bursts of Water supply system in Seoul>



Bridge Collapse



- Sungsu Bridge crossing Han River in Seoul
- At 7:40 A.M. on Oct. 21, 1994
- 32 died, 17 injured
- Reopened on Jul. 3, 1997
- One of concrete slabs fell due to a failure of the suspension structure
- Improper welding of the steel trusses of the suspension structure
- Improper maintenance

Building Collapse



- Sampoong Department Store in Seoul
- Construction completed in 1989.
- Open to the public in 1990
- At 5:57 P.M. on Jun. 29, 1994
- 502 died
- 939 injured
- 6 missed
- \$254 million damage
- Rapid development
- Air conditioning unit
- Plan changed

Building Collapse



12:30 PM: Store facility manager thinks air conditioning units are to blame for vibrations. He shuts them off.

4:00 PM: The store facility manager explains to the head manager that the cracks around Column 5E have increased to 4 inches since the morning. The structural engineer who built the store complex is present at this meeting. He recommends closing the store immediately for urgent repairs. The head manager refuses.

5:40 PM: Customers hear a loud noise from the top floor, the ceiling shifts.

5:47 PM: Customers hear an even louder disturbance from the top floor.

5:52 PM: Entire building vibrates violently. Building progressively collapses in less than 20 seconds.

(Chris McLean et al., wikispaces)

Subway Fire



- Daegu Metropolitan Subway
- At 9:53 A.M. on Feb. 18, 2003
- 198 died
- 147 injured
- An arsonist set fire.
- Regulations tightened
- All materials have been replaced with nonflammable ones.
- Regulations on evacuation systems have been tightened.



Increasing disaster risks in urban area

- High-rise buildings and underground facilities
 - As of Mar. 2012, 69 skyscrapers and 194 underground complexes in Seoul
 - Life-line underground infrastructure is not currently identified and managed.
 - A number of such structures are being built.
- A number of subway users
 - 7 million people use Seoul metropolitan subway daily.
 - Are those people safe enough to any disaster?
- 31 Grand bridges longer than 1km over Han River

Government's actions

- Declared “Special Act for the safety control of public structures” in 1995
- Established Korea Infrastructure Safety & Technology Corporation (KISTEC)
 - In-depth inspection on major public structures
 - Development and operation of a Disasters Information Center on Construction and Traffic
- Declared ‘Construction Supervision’ system
 - 3rd party must take part in a construction project for safety guarantee.



Infrastructure maintenance system

- 110,000 infrastructure facilities over the country are inspected regularly.
- Grades system: A, B, C, D, E
 - Facilities of grade D and E are kept less than 1.0%.
- However, people still feel unsafe on infrastructure.
- Now, we are changing maintenance paradigm to include various attributes such as resilience to disasters.

Resilience to disaster

- Report card for infrastructure
 - American Society of Civil Engineers
 - Physical condition of infrastructure
- From 2005, Resilience (public safety) has been added to the assessment criteria.
 - The ability to withstand and recover from natural and man-made hazards

TABLE A ★ 2009 Report Card for America's Infrastructure

| | |
|-----------------------------|-----------|
| Aviation | D |
| Bridges | C |
| Dams | D |
| Drinking Water | D- |
| Energy | D+ |
| Hazardous Waste | D |
| Inland Waterways | D- |
| Levees | D- |
| Public Parks and Recreation | C- |
| Rail | C- |
| Roads | D- |
| Schools | D |
| Solid Waste | C+ |
| Transit | D |
| Wastewater | D- |

AMERICA'S
INFRASTRUCTURE G.P.A.

D

ESTIMATED 5 YEAR
INVESTMENT NEED

**\$2.2
TRILLION**

NOTES

Each category was evaluated on the basis of capacity, condition, funding, future need, operation and maintenance, public safety and resilience

A = Exceptional
B = Good
C = Mediocre
D = Poor
F = Failing

Design Trends

- Old drainage systems which were built in 1970s have not been properly repaired or sufficiently reinforced.
- Design criteria have not been updated to reflect current climate in Korea.
- Recently, design criteria have been tightened.
 - 10-year frequency rainfall → 30-year frequency rainfall



Conclusion

- Disaster is just next to you!
 - Urban infrastructure, safe and resilient enough?
- Respond to climate change
 - Design criteria need to be tightened.
- Proper maintenance of infrastructure
- Design for resilience to hazards
 - Sustainability and resilience
- Eco-friendly urban development
- Government leadership is required to protect people from disasters.

The background is a solid dark blue at the top, transitioning into a lighter blue with a subtle wavy pattern. A white wavy line separates this blue section from a solid white section at the bottom.

Thank You !