

# Case Study of New Construction Technology

12<sup>th</sup> Mar 2014

WOC3 Torino in ITALY

KOGAS



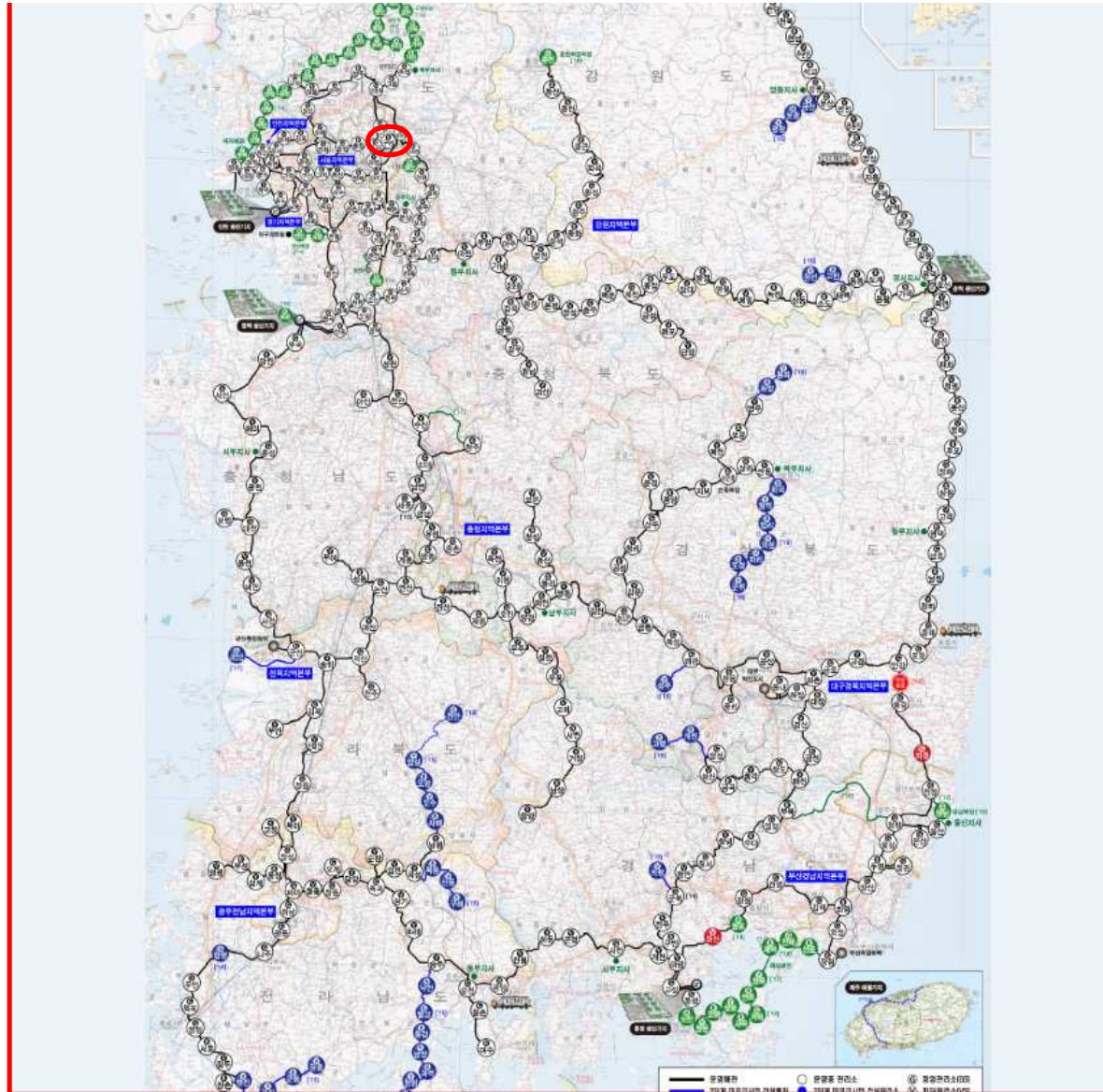


- 1. Introduction**
- 2. Construction Outline**
- 3. Things to Consider**
- 4. Construction Technology**

# 1. Introduction






## KOGAS Transmission Pipeline and LNG Storage Tanks



Total length : 4065km  
Delivery Station : 125  
Operation pressure : 7MPa

Total LNG tanks : 60  
Total capacity : 8.86 million m<sup>3</sup>

-  Pressure back up (under construction)
-  Compressor Station
-  Under construction

# 1. Introduction

LNG Terminals (60 tanks)

Pyeongtaek

In Operation : 23



Incheon  
In Operation : 20

# 1. Introduction

Tongyeong  
In Operation : 17



Samcheok  
Under Construction: 12

## 2. Construction Outline



### Construction Outline

#### Project purpose

To lay pipelines in order to prevent pressure drop at the end of pipeline at Metropolitan's North-East area in 2008 winter.

**Project title** : Namyangju-Gunja station pipeline construction

**Location** : North-east area in metropolitan

**Construction period** : 13<sup>th</sup> June 2007 ~ 31<sup>st</sup> Nov 2008(18months)

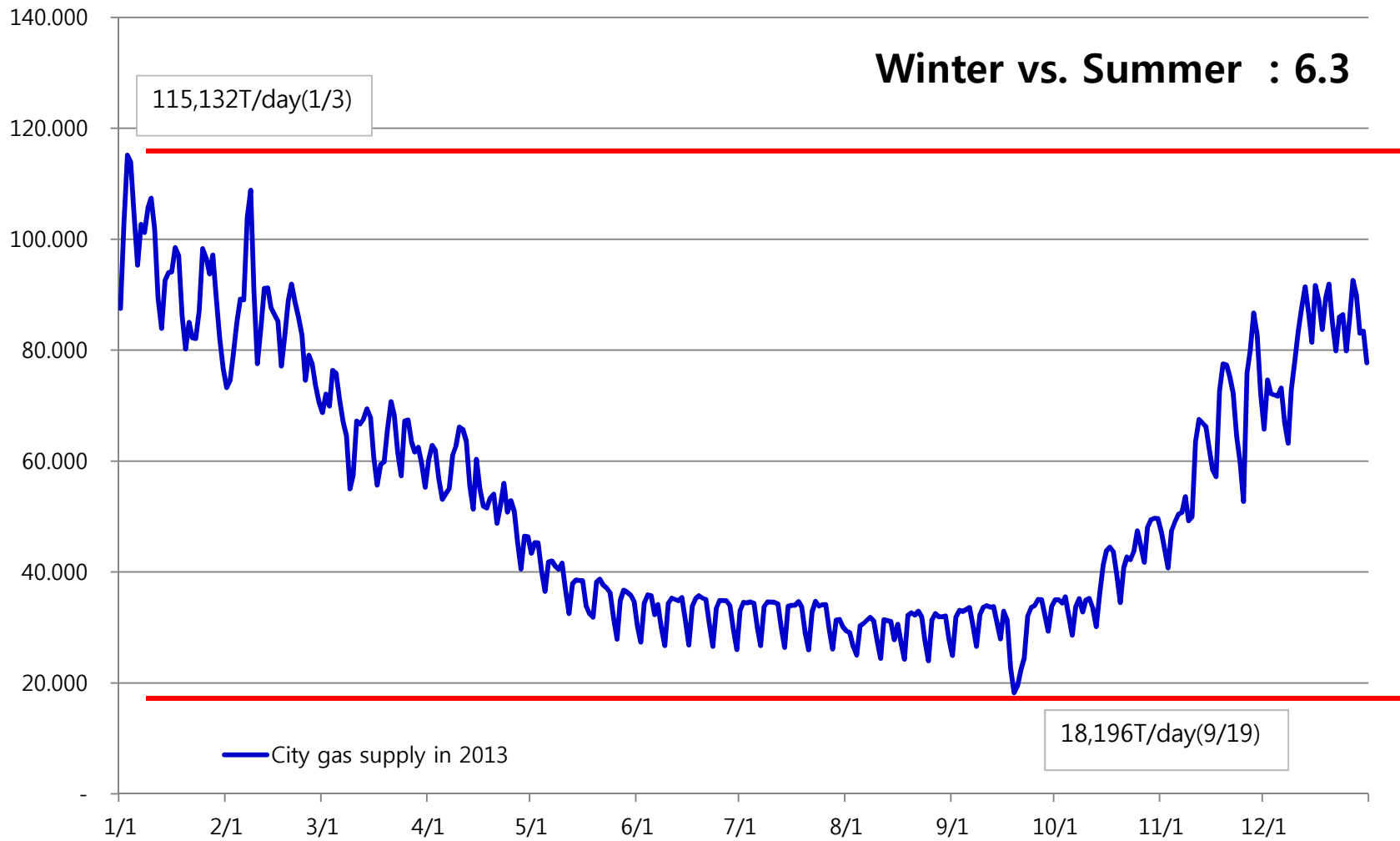
#### Construction size

- **Pipeline** : 26" \* 12.7t \* 13.7km ( Night work : 8.8km / 13.7km, 65% )
- **Delivery stations** : 3 ( Expansion 2, New 1 )

## 2. Construction Outline



### Annual Turn Down Ratio of City Gas in 2013(except power plant)



24.2 BCM

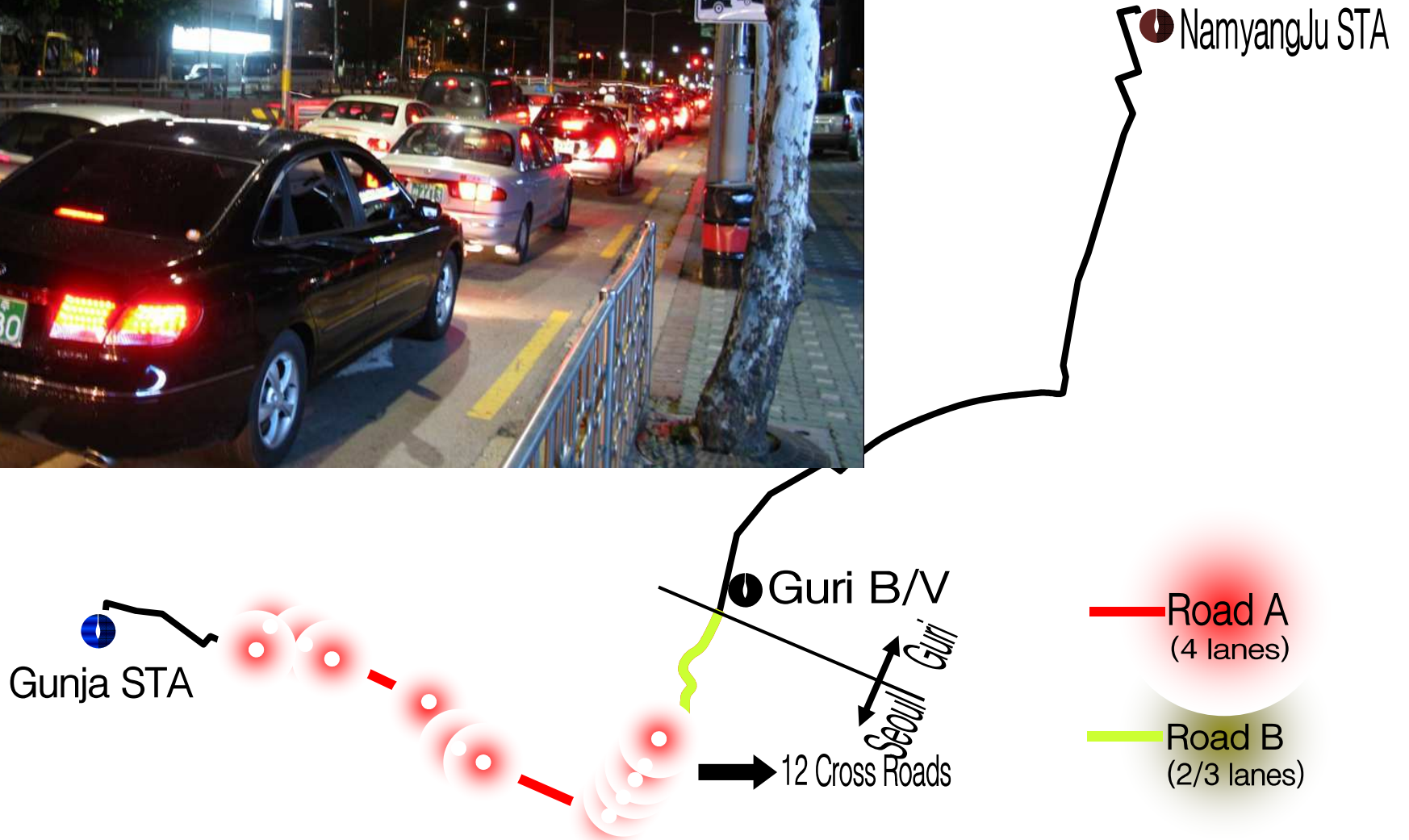
## 2. Construction Outline

### - Construction Section (13.7km)





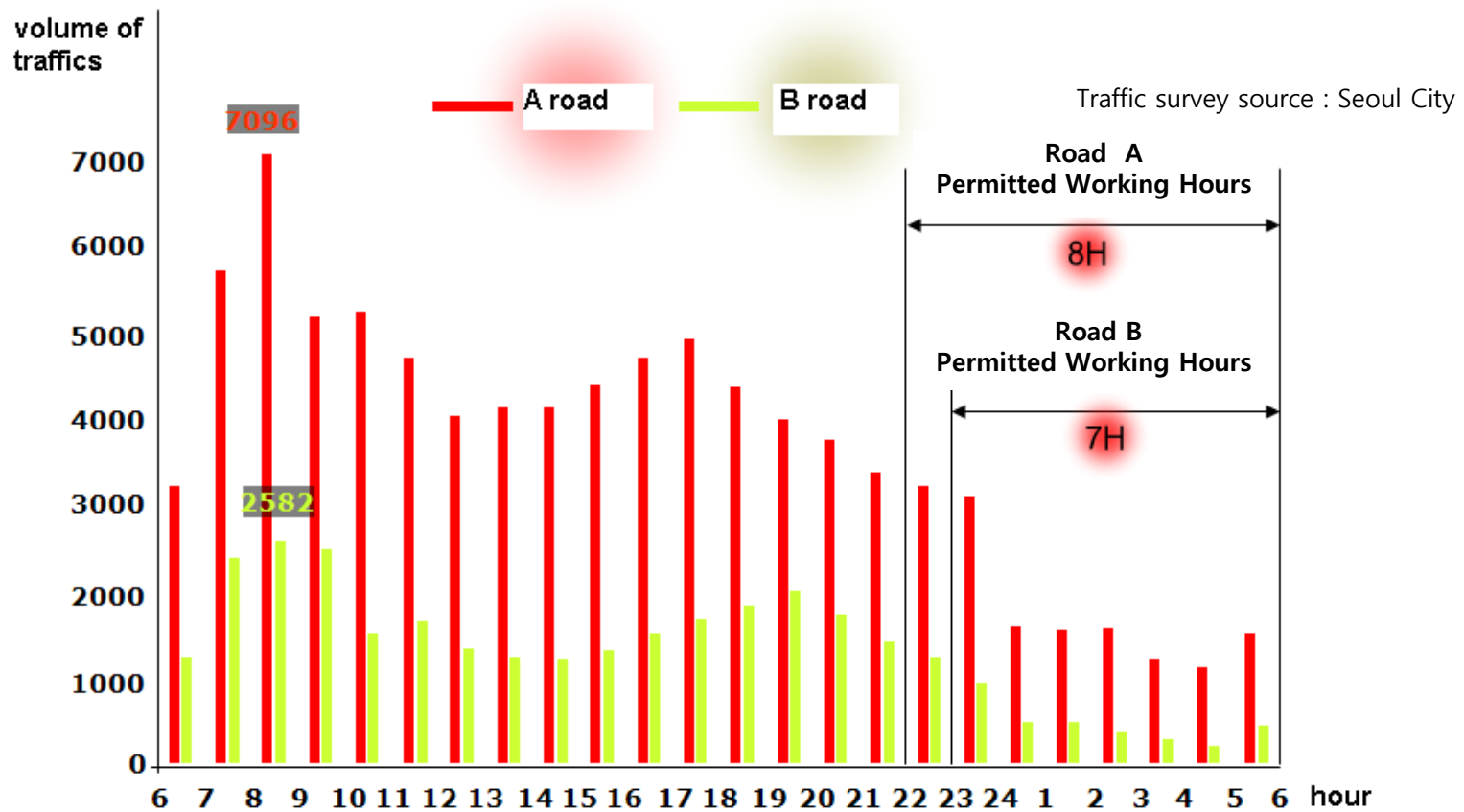
## 2. Construction Outline



\* one direction

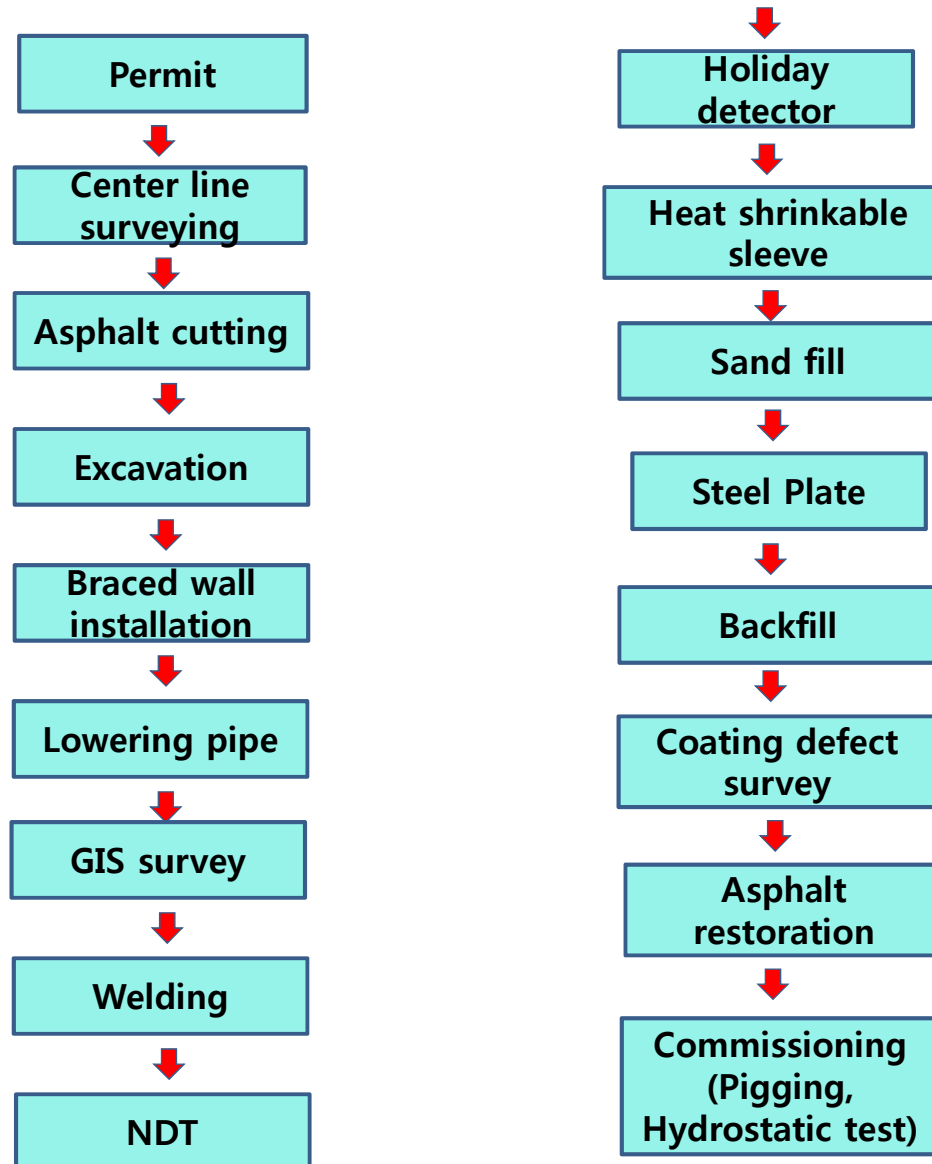
## 2. Construction Outline

### Hourly Volume of Traffic



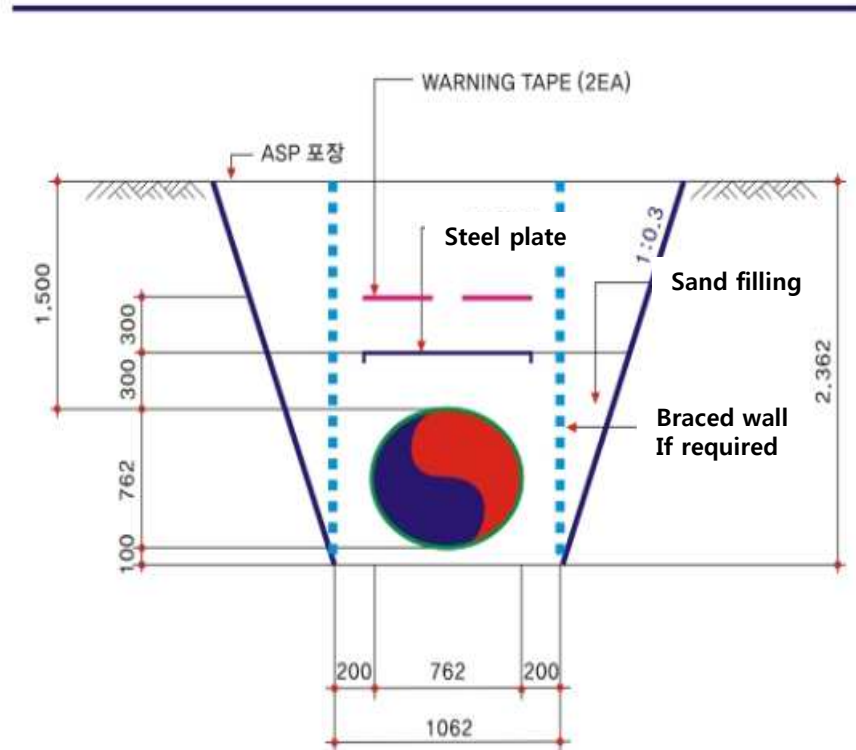
## 2. Construction Outline

### Construction Procedure



## 2. Construction Outline

### Standard Cross Section



Pavement Road

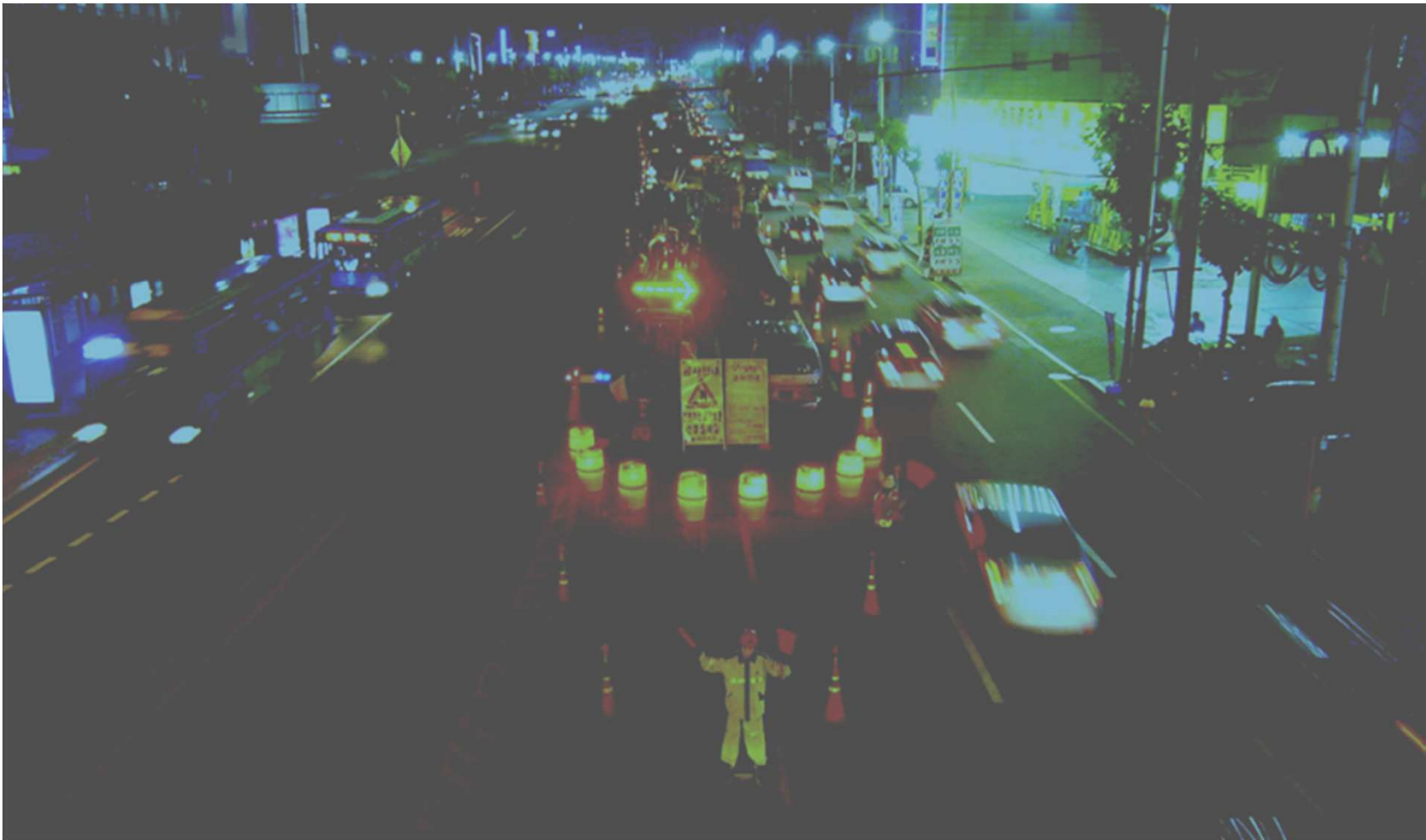
### 3. Things to Consider



**KOGAS has to take into consideration the following items:**

- All welding in trench should be done by manual
- Minimize the space of road occupied for work.
- Waiting space of equipment and material to work on road
- Pedestrian safety issues
  
- Effective control of traffic flow is needed
- Working hours are from 23:00 to 06:00
- The excavation and backfill must be done on the same day
- Workers should be aware of many existing underground utilities and old structures
  
- There is insufficient space of aboveground for pipe handling
- There are rocks within depth of trench when digging
- Safety prevention training
- Traffic safety signs

### 3. Things to Consider



Construction Site

### 3. Things to Consider



Flagmen and robotic flagmen in front of the construction site.  
Self-emitting traffic safety signs on the road.

### 3. Things to Consider



Traffic jam on the site



Road surface restoration at night



### 3. Things to Consider



Manual Welding



Existing underground utilities within depth of trench

### 3. Things to Consider



Wrapping



Compaction by watering  
(water binding)

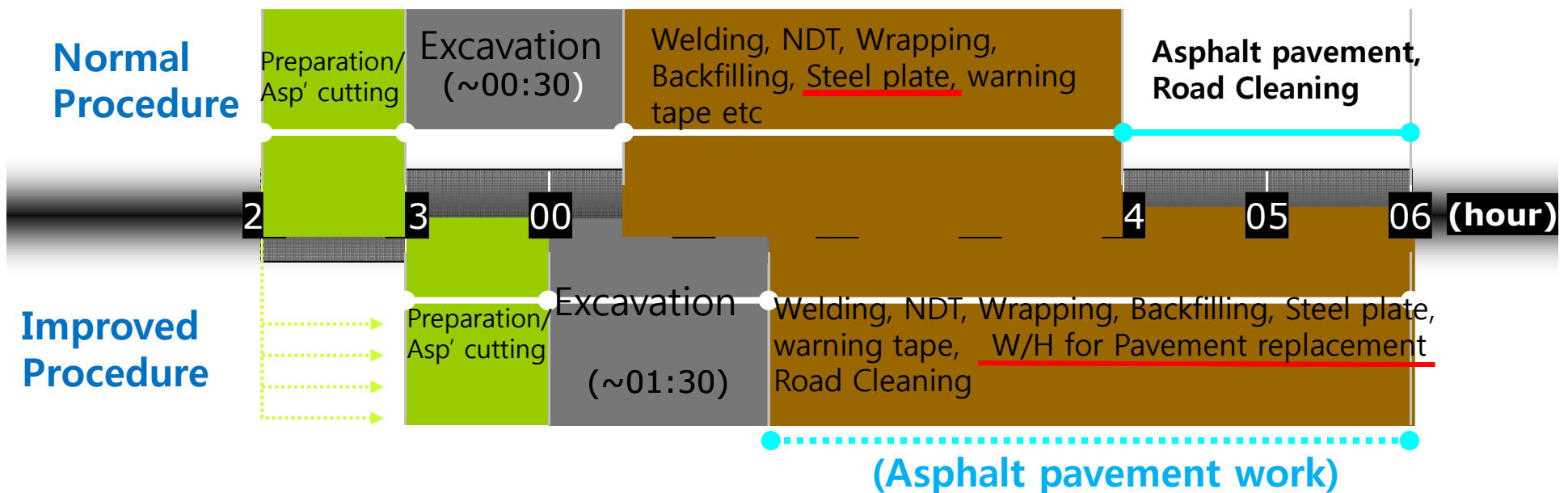


Steel plate installment

## 4. Construction Technology

### Night Work Flow

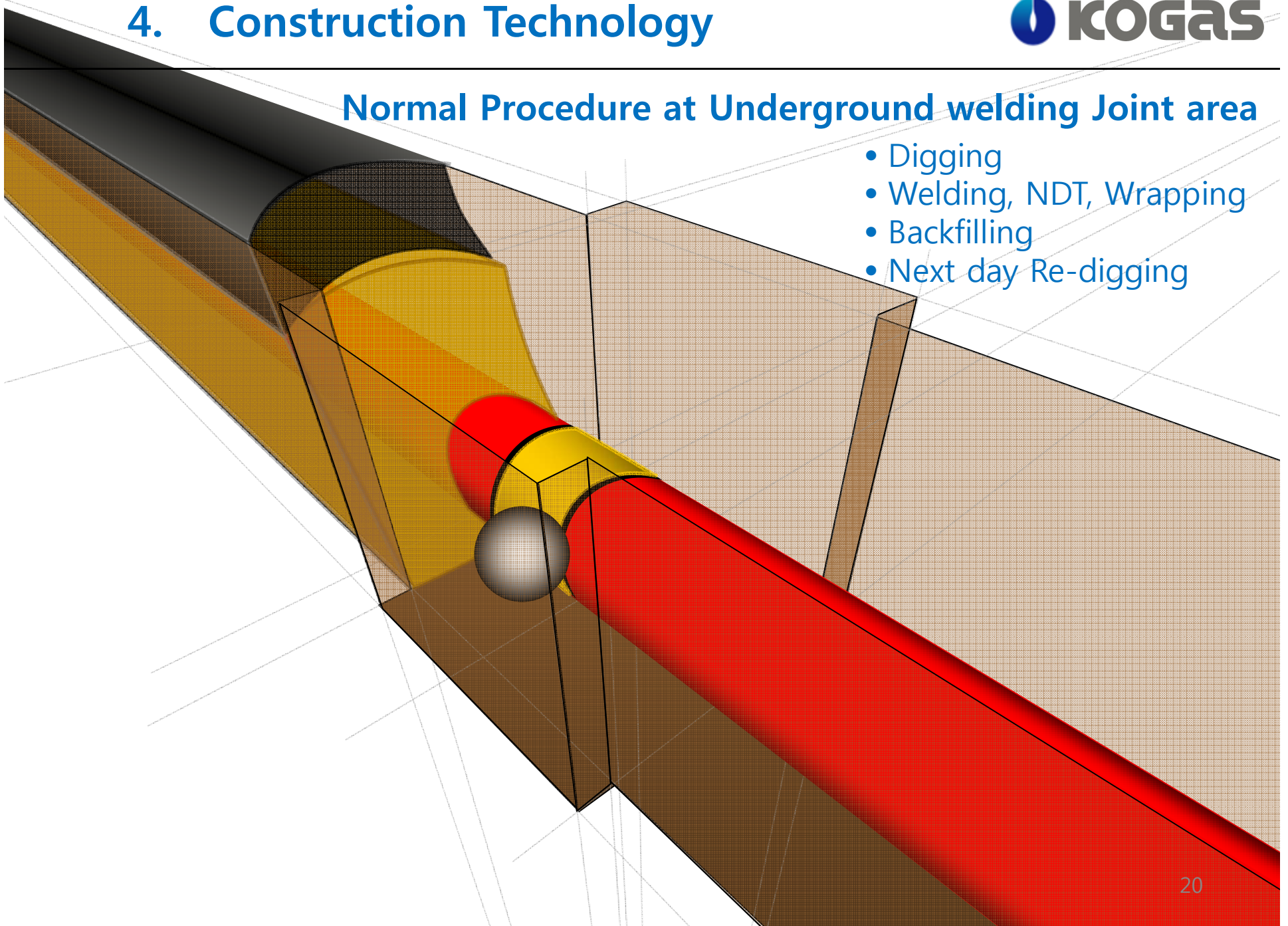
- Seoul City requires work to start from midnight(24:00)
- Lanes occupied by construction must be open from 06:00
- Construction needs to be continuous to the following day
- Should be ready to take measures according to contingency plan
  - heavy rain, NDT reject etc



## 4. Construction Technology

### Normal Procedure at Underground welding Joint area

- Digging
- Welding, NDT, Wrapping
- Backfilling
- Next day Re-digging



## 4. Construction Technology

### Normal Procedure at Underground welding Joint area



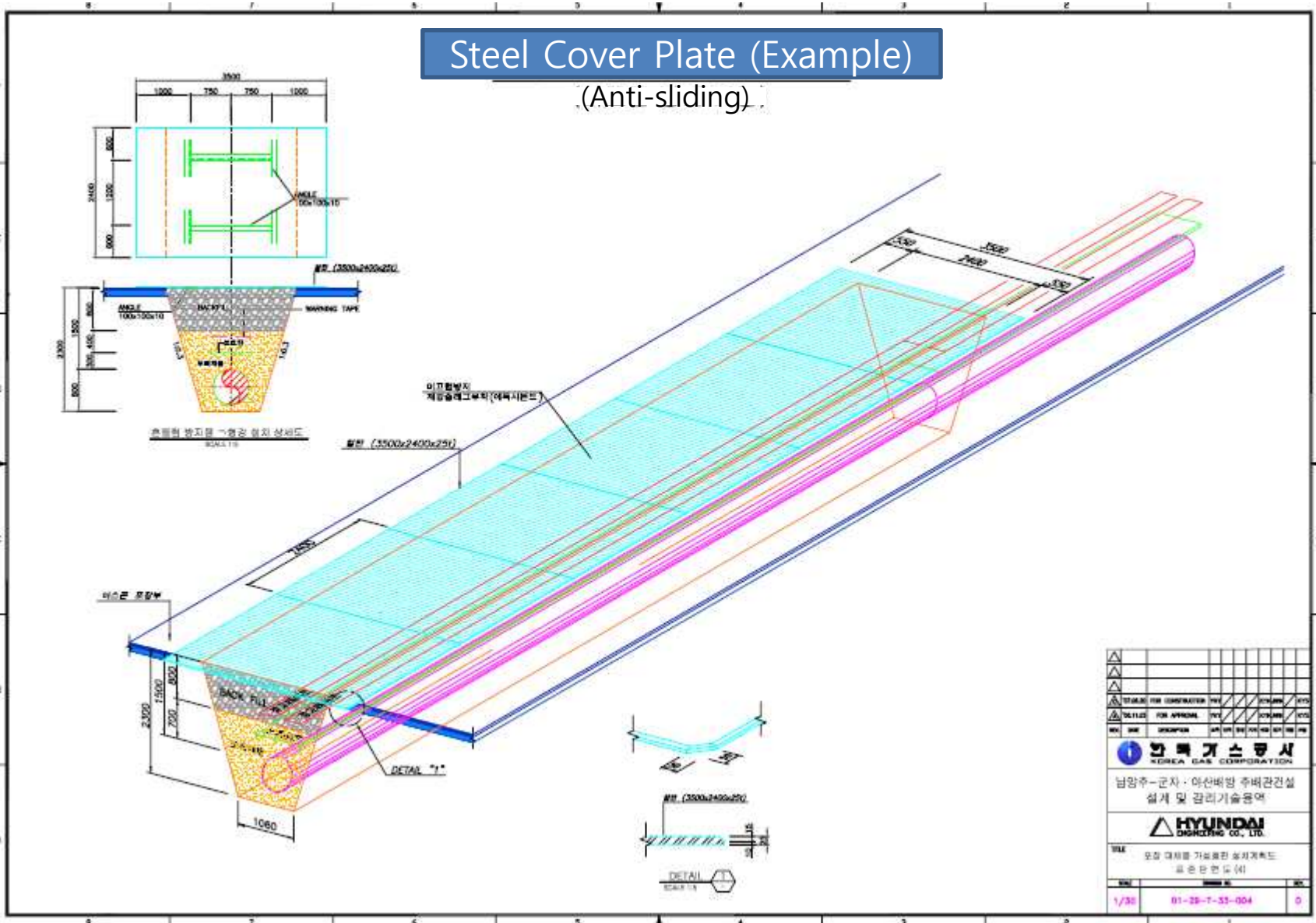
Backfilling in U/G welding Joint area



Covering with Steel plate on the road

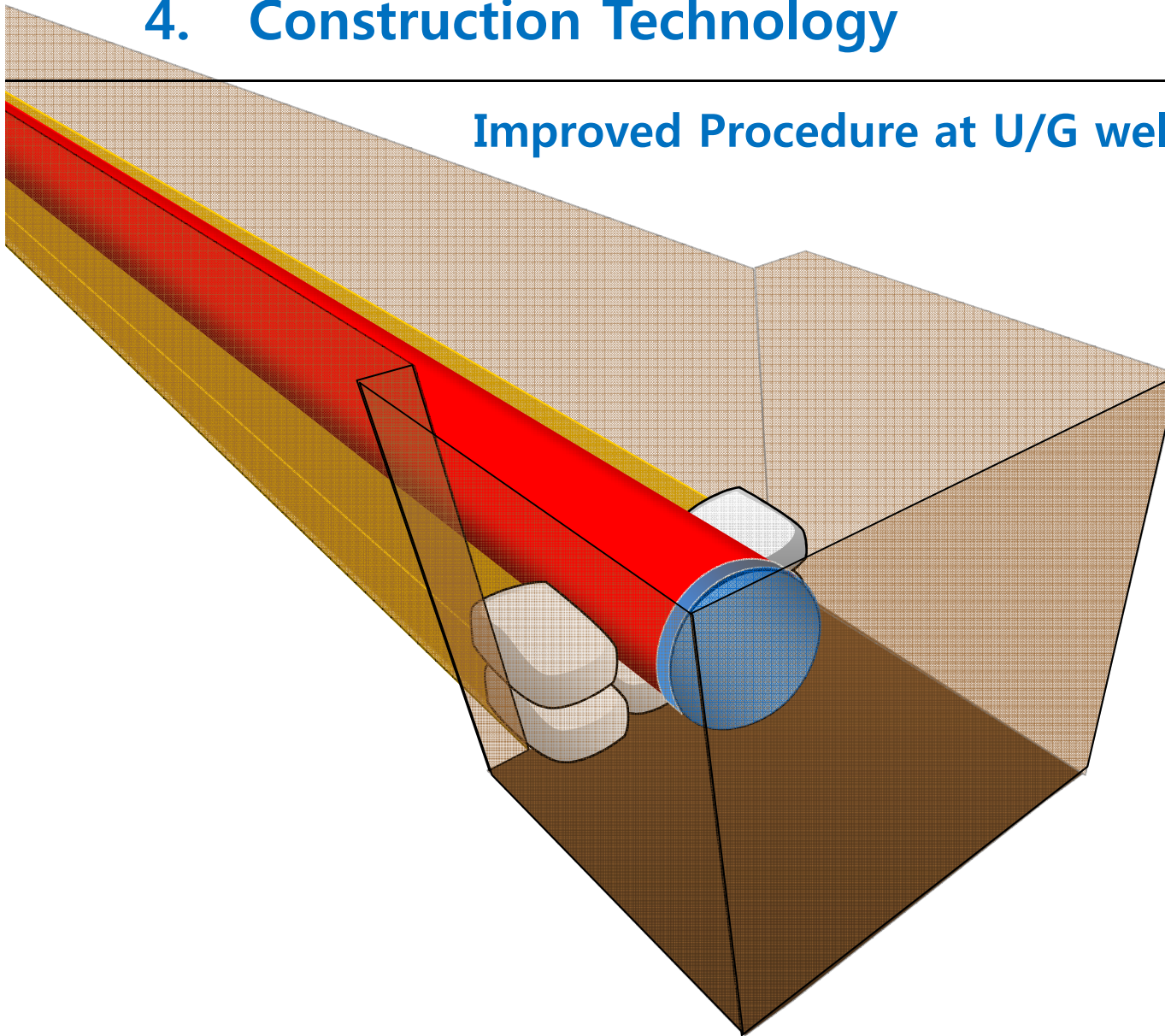
# 4. Construction Technology

**Steel Cover Plate (Example)**  
(Anti-sliding)



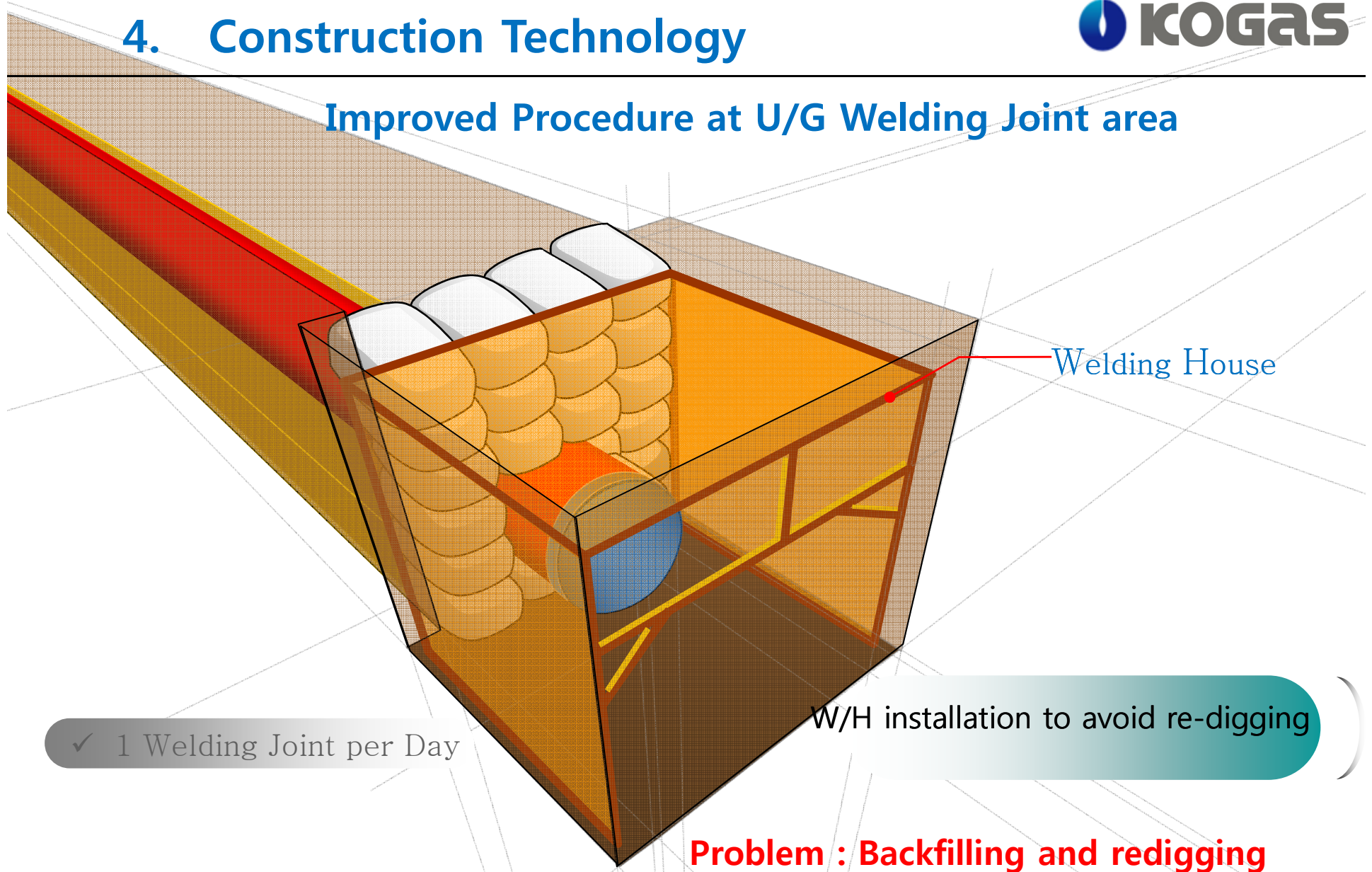
## 4. Construction Technology

### Improved Procedure at U/G welding Joint Area



## 4. Construction Technology

### Improved Procedure at U/G Welding Joint area



✓ 1 Welding Joint per Day

W/H installation to avoid re-digging

**Problem : Backfilling and redigging**



## 4. Construction Technology

### Improved Procedure at U/G welding Joint area

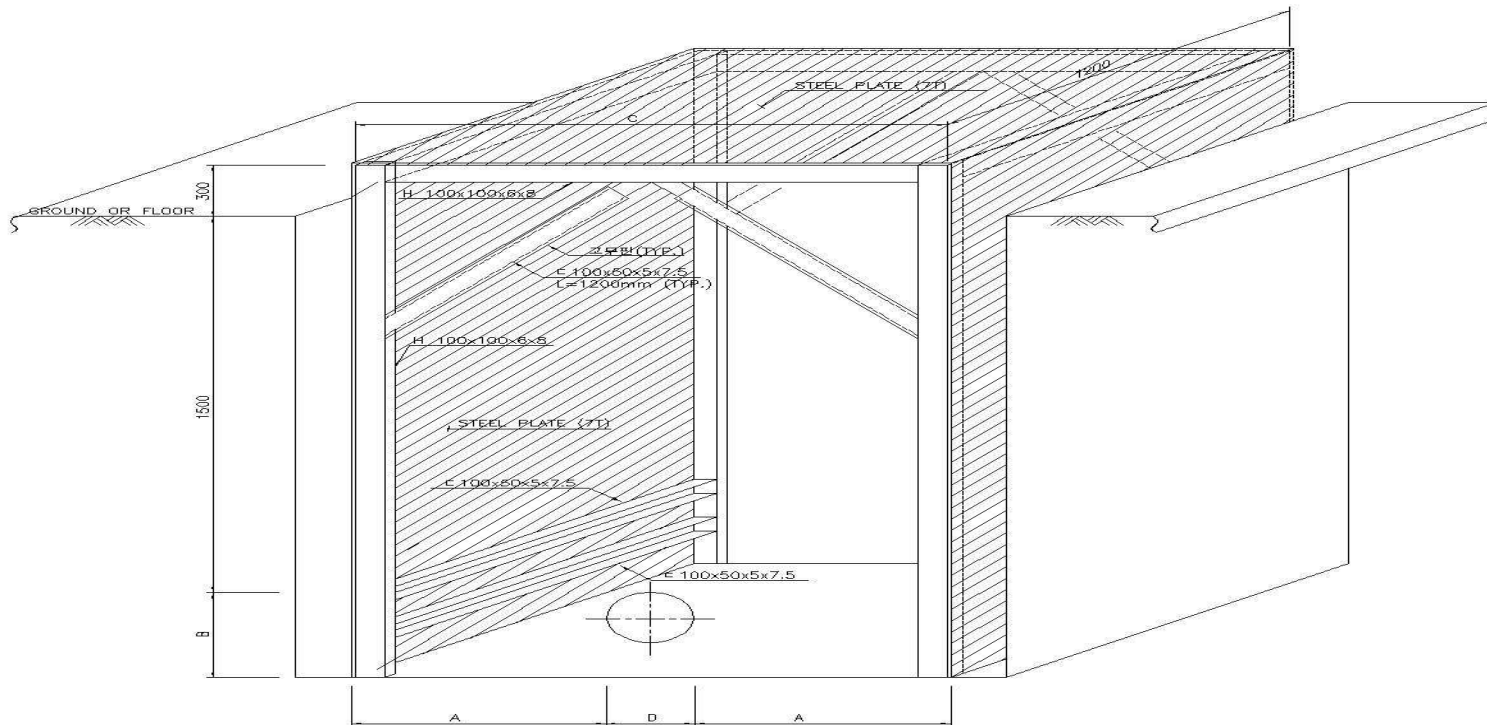
Backfilling

Welding House

No backfilling in the welding Joint area

## 4. Construction Technology

### Welding House sketch (example)

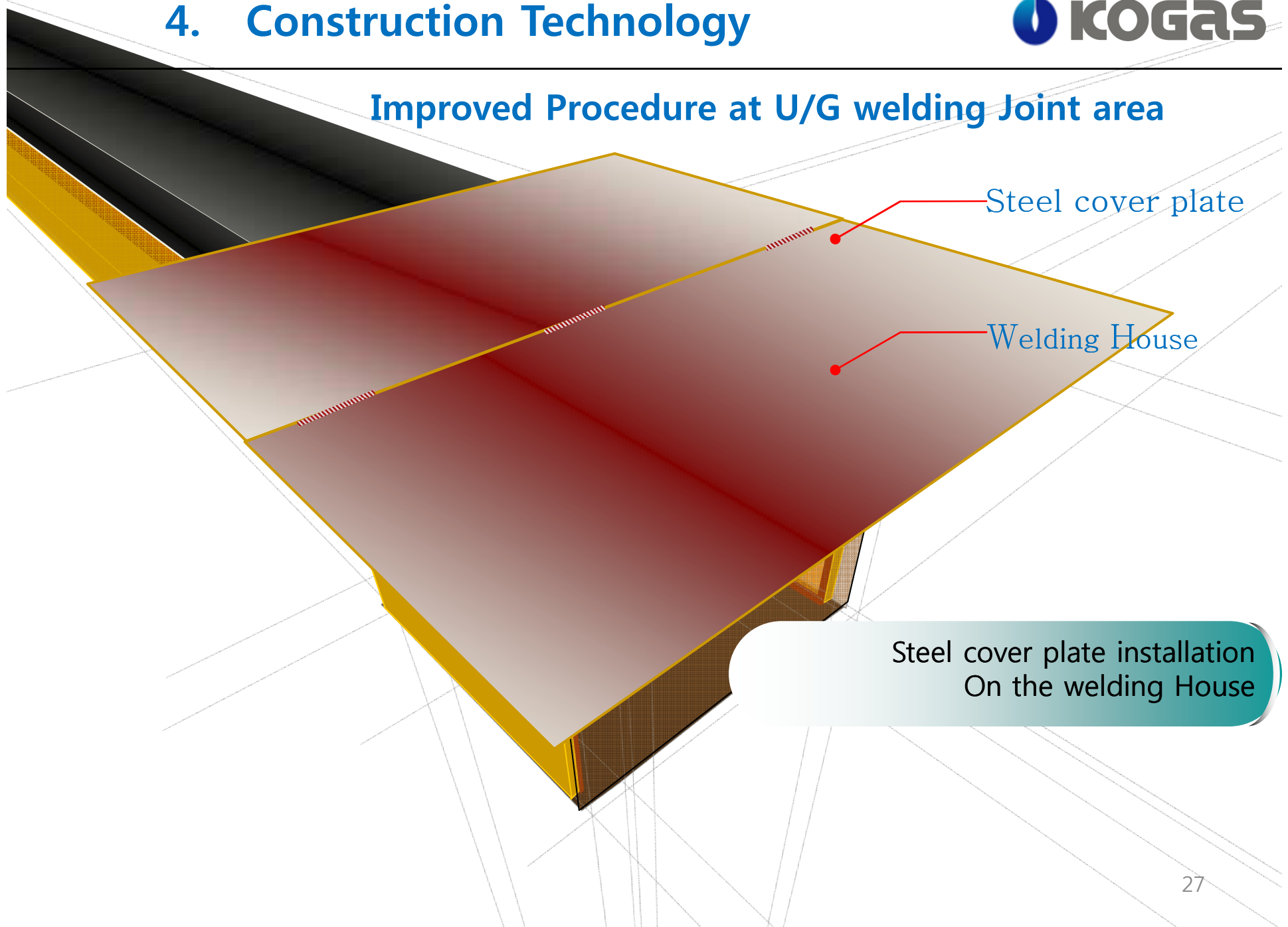


WELDING HOUSE (750mm)

SIZE	D	A	B	C
750mm	762	600	862	1962

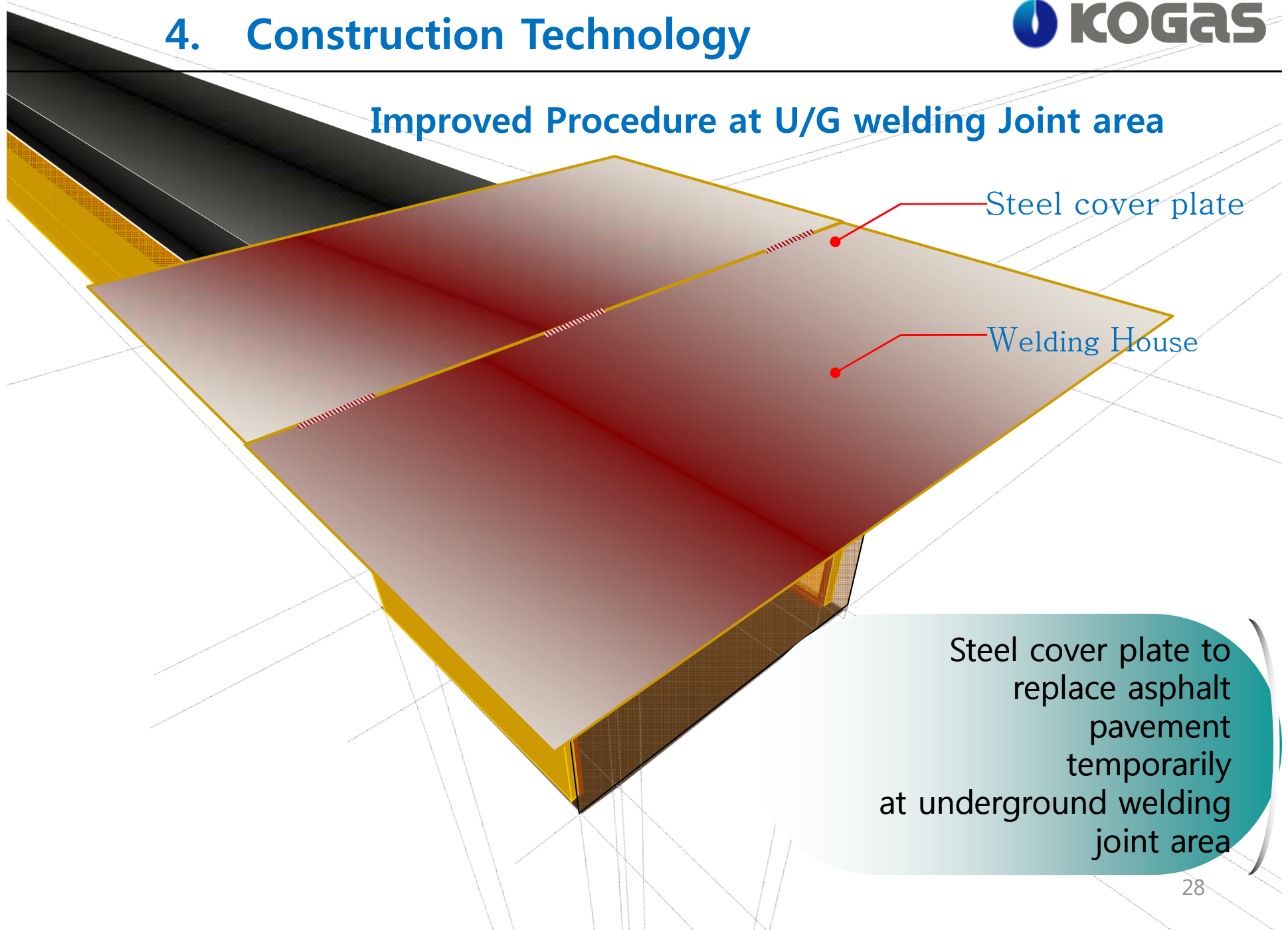
## 4. Construction Technology

### Improved Procedure at U/G welding Joint area



## 4. Construction Technology

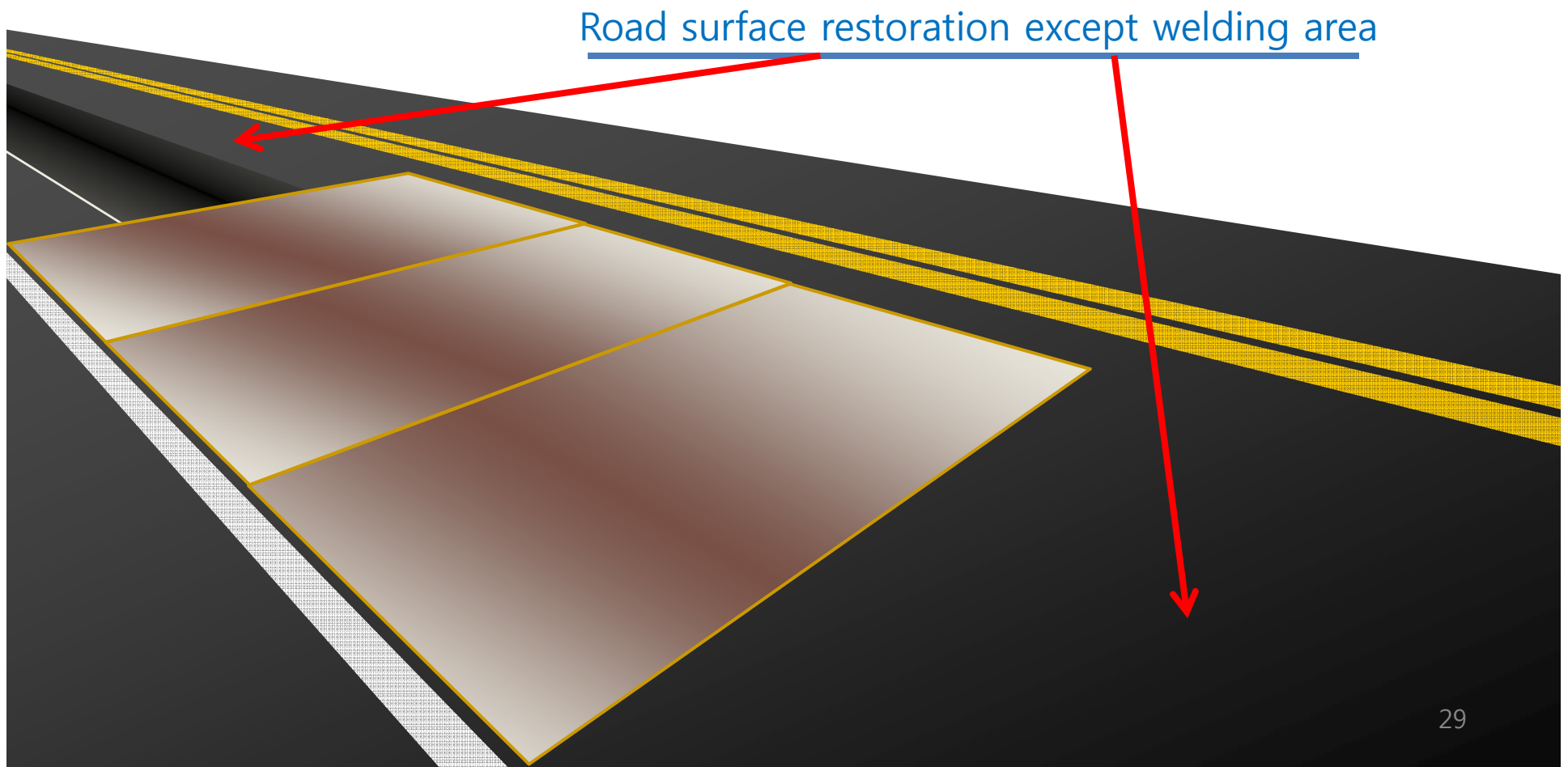
### Improved Procedure at U/G welding Joint area



Steel cover plate to  
replace asphalt  
pavement  
temporarily  
at underground welding  
joint area

## 4. Construction Technology

### Improved Procedure at U/G welding Joint area



# 4. Construction Technology

## Improved Procedure at U/G welding Joint area

### Problems

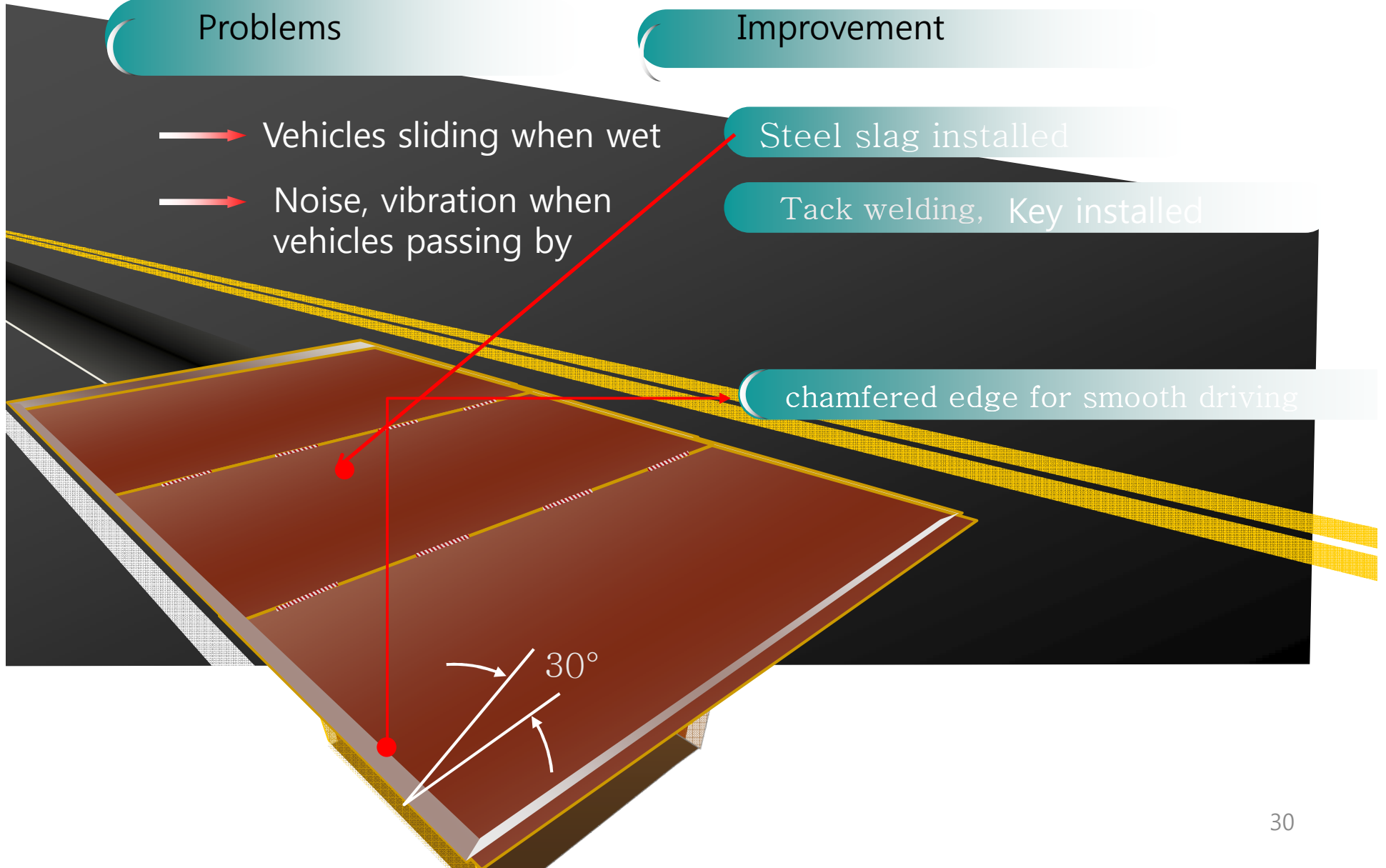
- Vehicles sliding when wet
- Noise, vibration when vehicles passing by

### Improvement

Steel slag installed

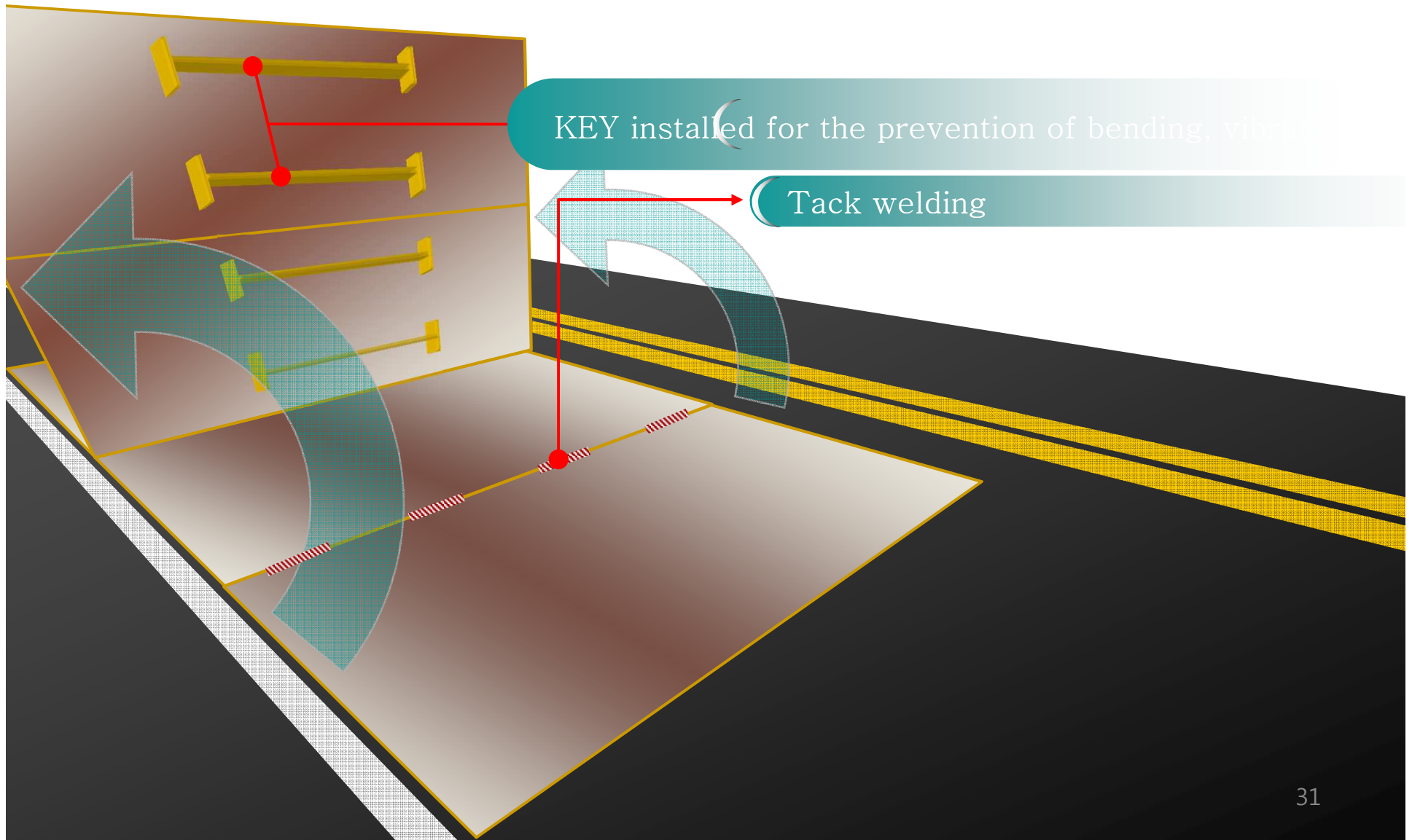
Tack welding, Key installed

chamfered edge for smooth driving



## 4 Construction technology

### Improved Procedure at U/G welding Joint area



## 4. Construction Technology

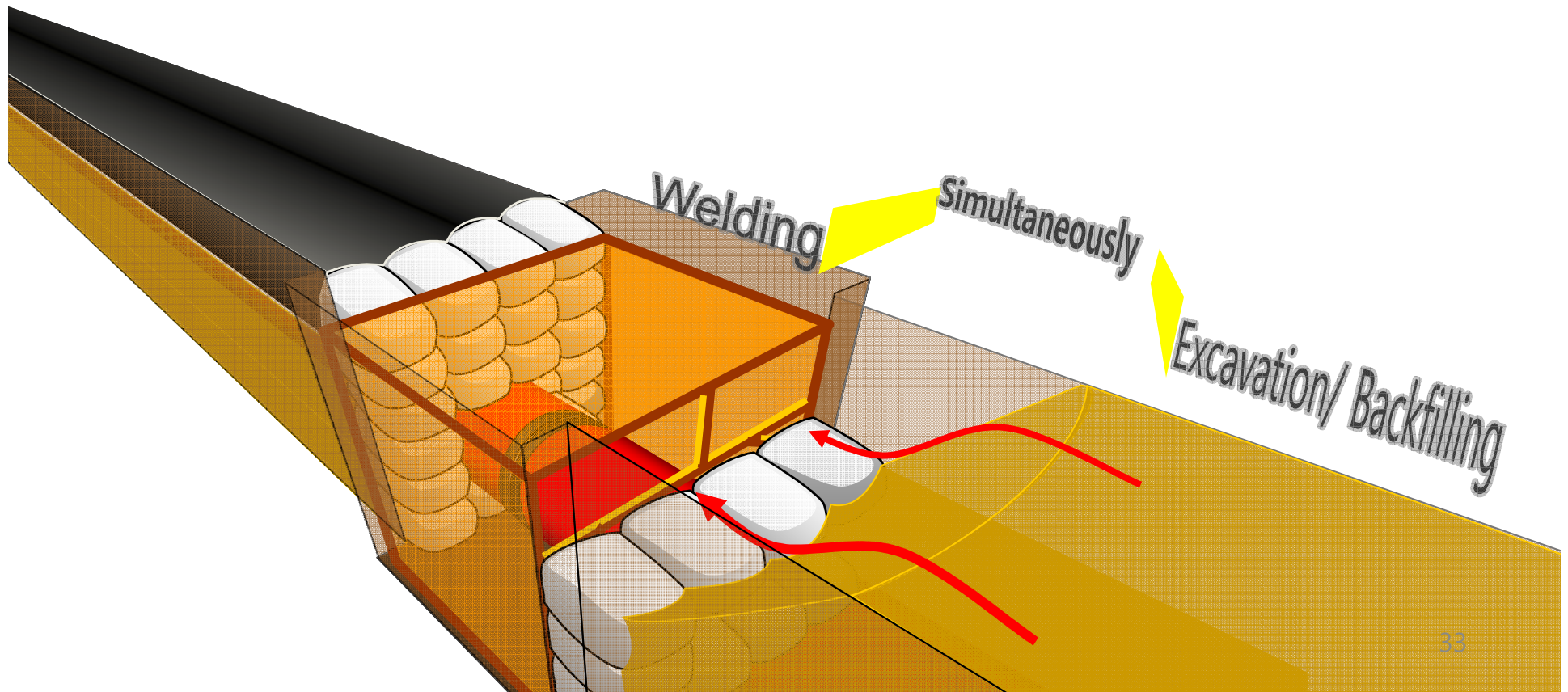




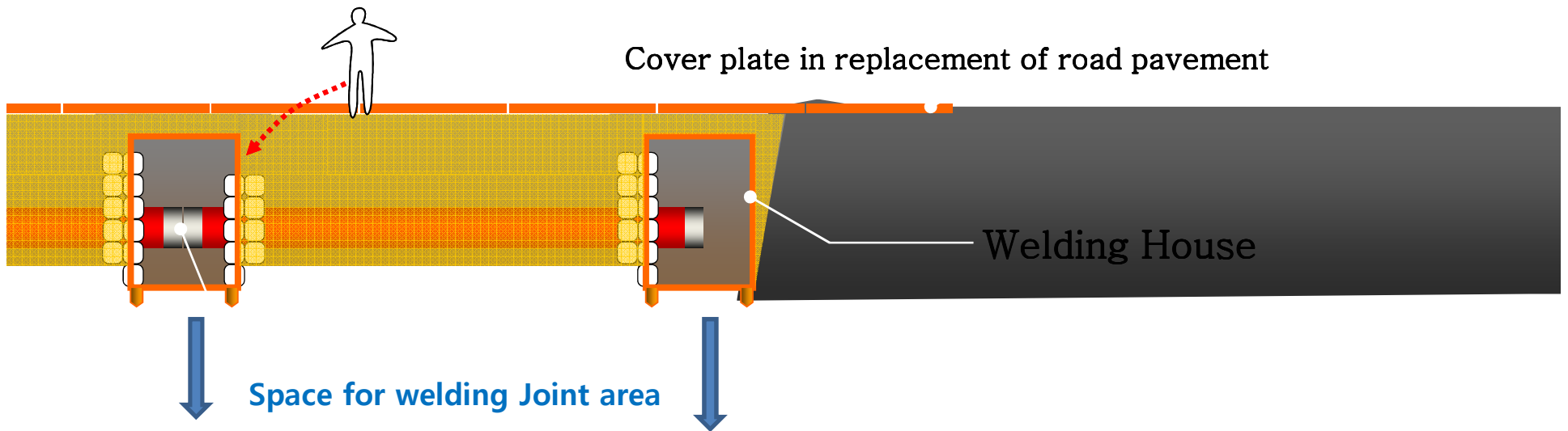
## 4. Construction Technology

### Advantages of the Improved procedure at U/G welding Joint area

- More works can be possibly carried out
- Double excavation can be avoided
- Welding can be done consecutively to the following day
- Can prevent pipe coating damage caused by double digging
- Minimize industrial wastes
- Minimize unforeseeable risk factors

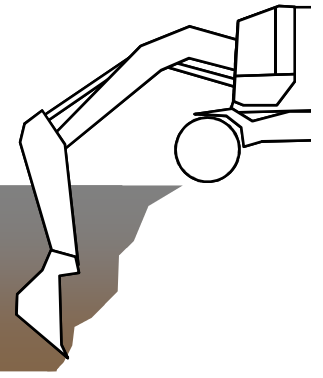


## 4. Construction Technology



# 4. Construction Technology

Comparison :



	Normal Procedure	Improved Procedure
Daily Progress	8 m	23 m
Labor Force	More manpower	Less manpower
Environment	More industrial waste More re-digging	Less industrial waste Less re-digging



# GLOBAL KOGAS

**Thank you!**  
TERIMA KASIH

