A CASE STUDY OF APPLYING RADON RESISTANT NEW CONSTRUCTION ACCORDING TO SOIL RADON POTENTIAL, SOUTH KOREA

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CONTENTS TITLE

BACKGROUND & Objective

Background

- Awareness of effects of radon has been increased in Korea recently
- Researches and projects with government fund
- Radon mitigation projects for existing buildings/house(Ministry of Environment, National Defense, Education)
- Law revision(enhance the regulations for for indoor radon concentration)

→ Need the solution for radon resistant new construction

→ However, detailed rule and solutions are not stated

→ Still need more data and case studies

Objective

- To obtain the basic data for assessment of site radon risk level
- Applying radon resistant new construction
- Evaluate the result
- Improve the assessment method

-> To provide data for establish Korean RRNC code

Current status

Indoor air quality management law(implementation Dec. 23. 2016)

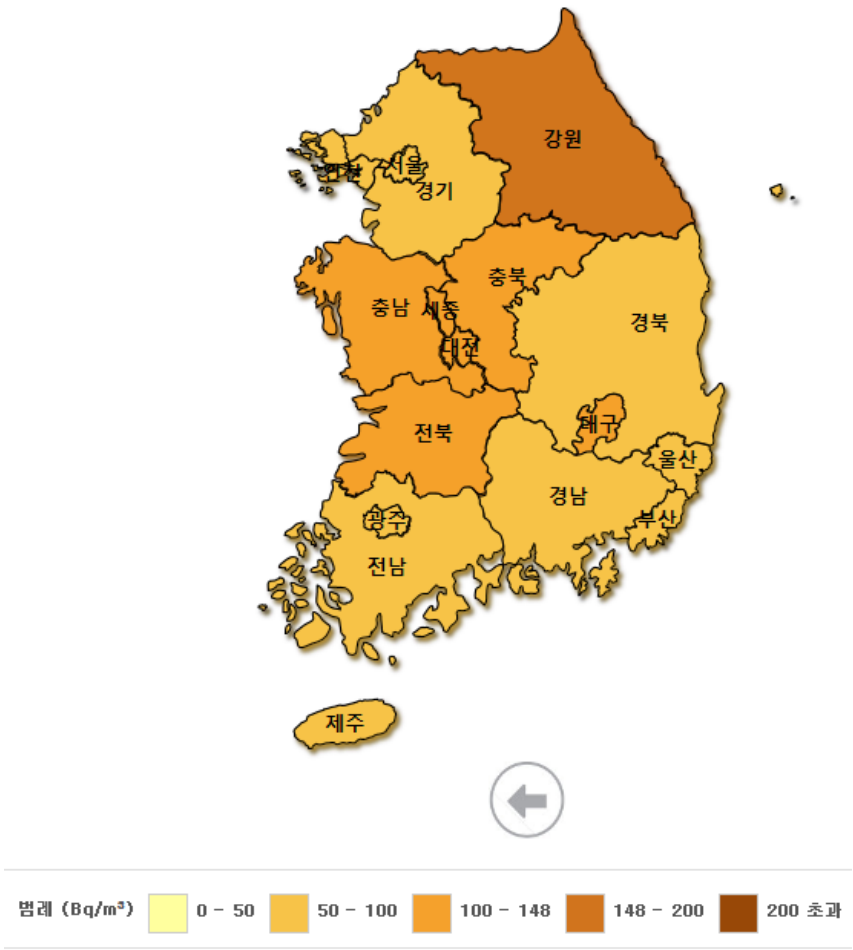
• To protect the people who use multiuse facility and public transportation and live multi-unit dwelling from indoor pollutant by maintain and control indoor air quality

	Multiuse facility(same as at present)	Multi-unit dwelling(new)
Recommended Level	148Bq/㎥	200Bq/㎥
Management	Measuring Indoor radon every 2 years	Measuring Indoor radon Before moving into
	Report to government	Report to government Notice the result to the plubic

* **Multiuse facility :** The facility that many and unspecified persons use(21 groups ex. subway station, medical institution, super market, theater, daycare center etc.)
** **Multi-unit dwelling** : Apartment, dormitory, townhouse

Current status

Indoor radon map



- Indoor radon mapping(Every 2 years for 20,000 homes)
- Conducting the research to establish radon potential map(For 5 years)
- Local government need to establish the solution to protect exposure from Radon
- Radon mitigation project for vulnerable social groups with government fund

Assessment of Radon risk in soil

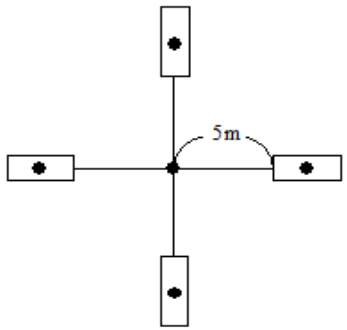
Assessment of radon risk in soil

Decide the investigation point at the site

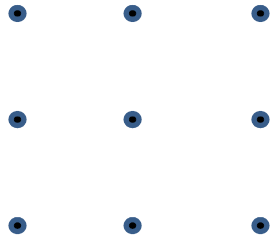
1) Classify 2 categories by construction area

2) If construction area is below 330㎡, select 5 cardinal points include center(5~10m)

3) If construction area is above 330㎡, select the point from 10m X 10m grid



< Below 330 ㎡ >



< Above 330 ㎡ >

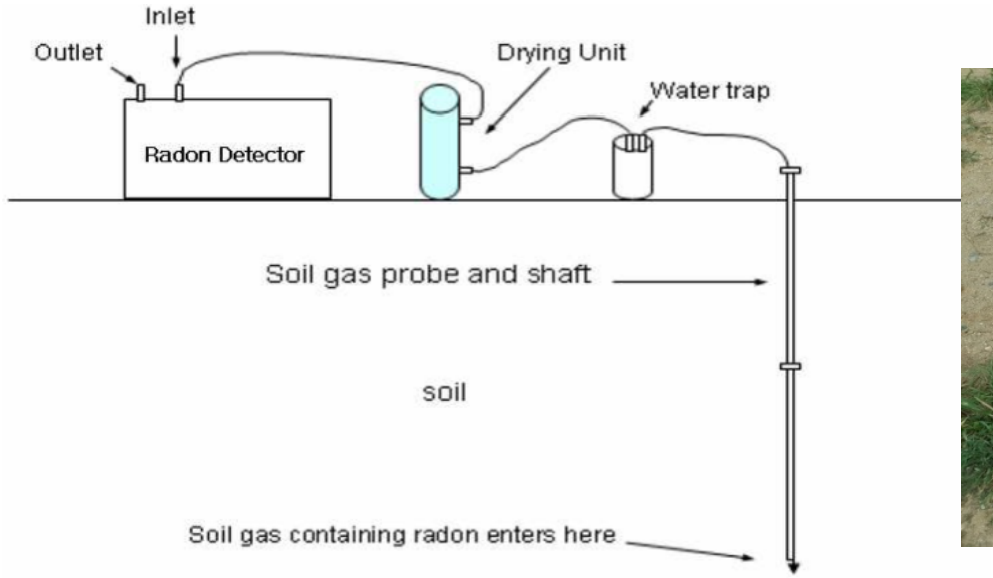
Measurement Items

1) Radon concentration in Soil, 2) Soil moisture content, 3) Load pressure in soil

Assessment of radon risk in soil

Measurement of Radon concentration in soil

- Sample the soil gas from a depth of 50cm below the ground surface
- Measure the radon concentration with Grab mode of RAD7 detector

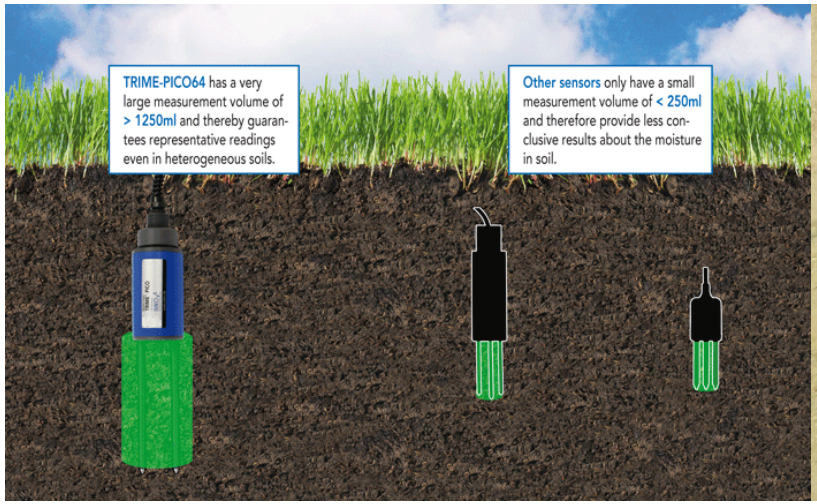


〈 Measurement of Radon in soil gas 〉

Assessment of radon risk in soil

Measurement of Soil moisture content

- Measure the soil moisture content at the same depth(50 m)
- The sensor measures conductivity with the same large soil volume as it will be used for the TDR moisture measurement. And it is converted as soil moisture content percentage.

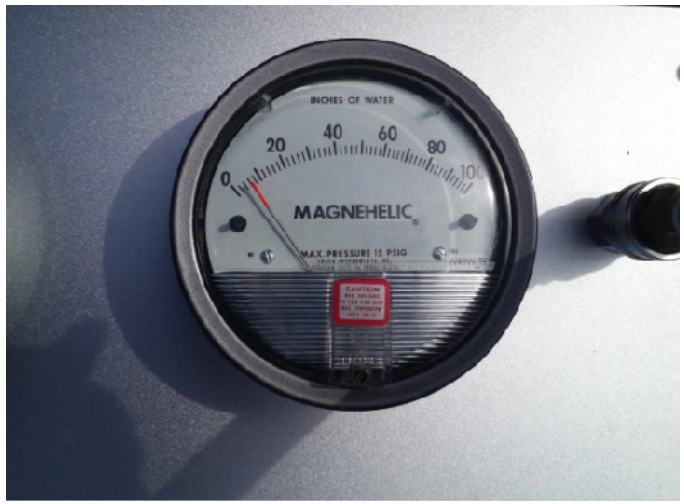


〈 Measurement of soil moisture content 〉

Assessment of radon risk in soil

Measurement of Load pressure in soil

- Measure the air permeability at the same depth(50 m)
- Use vacuum pump to measure load pressure inside the tube from the prove in and out of soil . And calculate the soil load pressure.



〈 Measurement of air permeability in soil 〉

Assessment of radon risk in soil

Assessment of radon risk in soil(RDR index)

Radon permeability \ Radon Concentration (Bq/m³)	2000 ~ 10,000	10,000 ~ 25,000	25,000 ~ 50,000	Above 50,000
Below 30	1	2	3	3
30~70	1	2	3	4
Above 70	2	3	4	4

Proposed solution

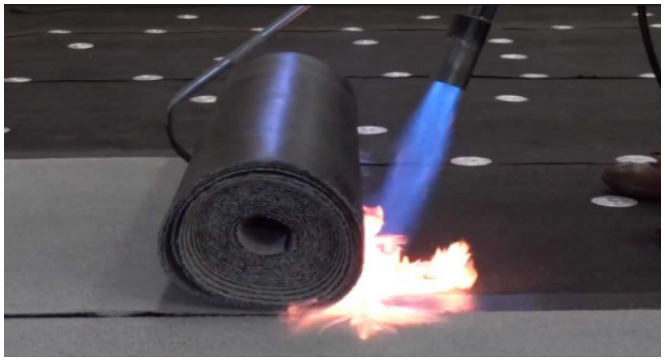
. Level 1 – Safety Level
. Level 2 – Caution Level, Install the anti-radon membrane
. Level3 – Warning Level, Install the ASD
. Level4 – Hazard Level, Install the anti-radon membrane and ASD

Materials

Reduction materials

Soil Gas Mat

Radon fan



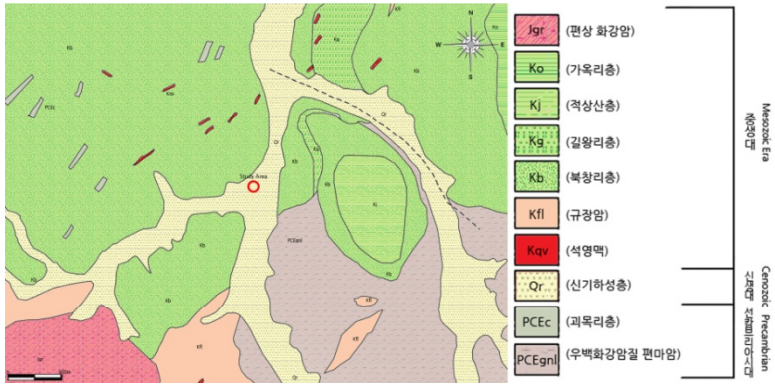
Anti-Radon membrane

PVC pipe

Application Case

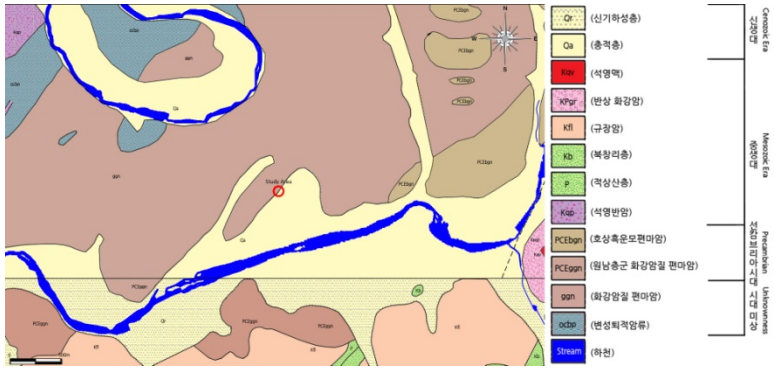
Application Case

Site information



Site No. 1 :

16, Samga-ro, Jeoksang-myeon, Muju-gun, Jeollabuk-do, Korea



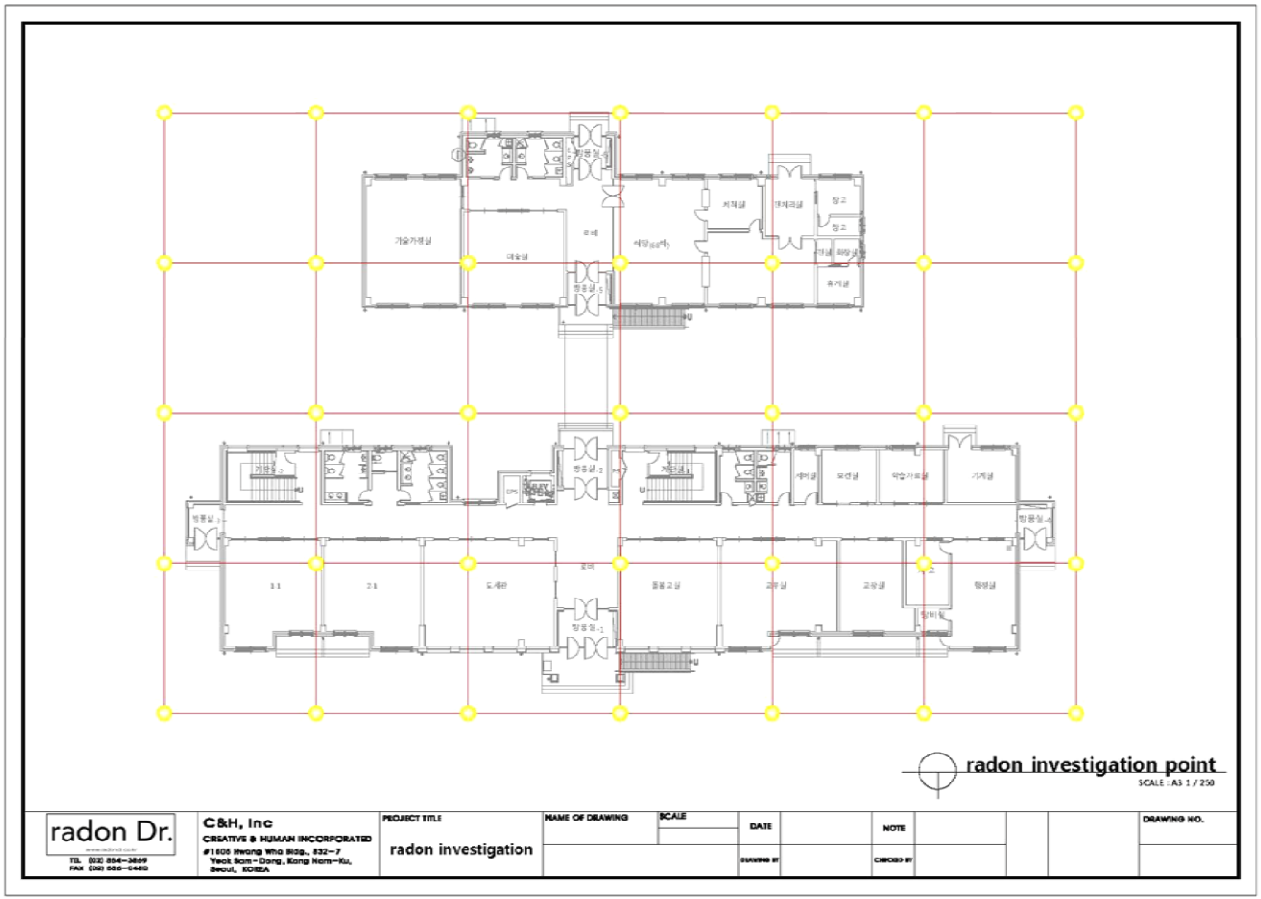
Site No. 2 :

87, Hyanghak-ro, Muju-eup, Muju-gun, Jeollabuk-do, Korea

Geological features : Coarse Granite and Black shale

Application Case

Assessment of radon risk at Site No.1



- RDR index level

–Radon concentration in Soil

: 38,520 Bq/m³

–Soil moisture content

: 21%

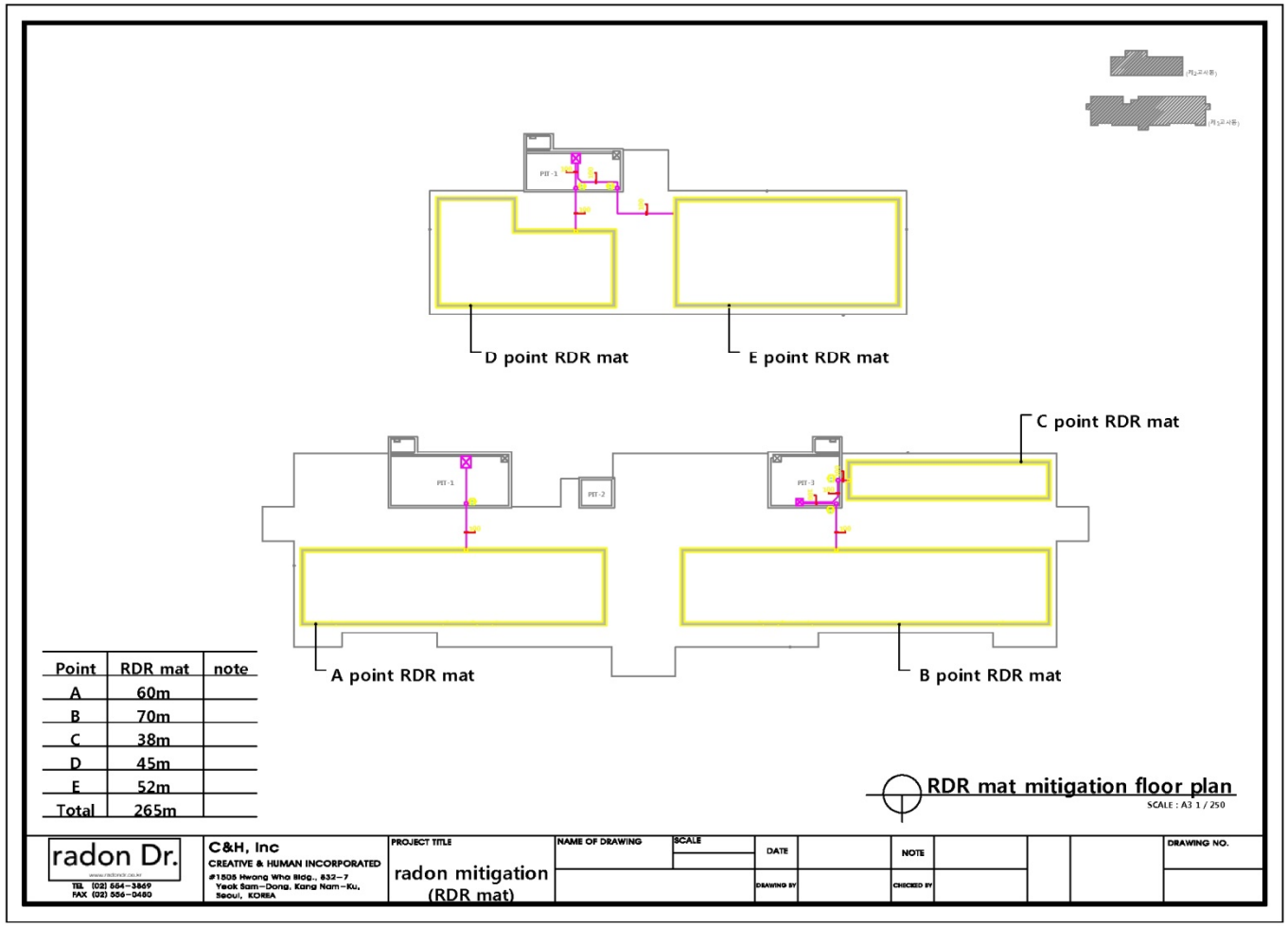
–Load pressure in Soil

: 3.5 WC

–> Warning Level

Application Case

Design of radon resistance at Site No.1



Point	RDR mat	note
A	60m	
B	70m	
C	38m	
D	45m	
E	52m	
Total	265m	

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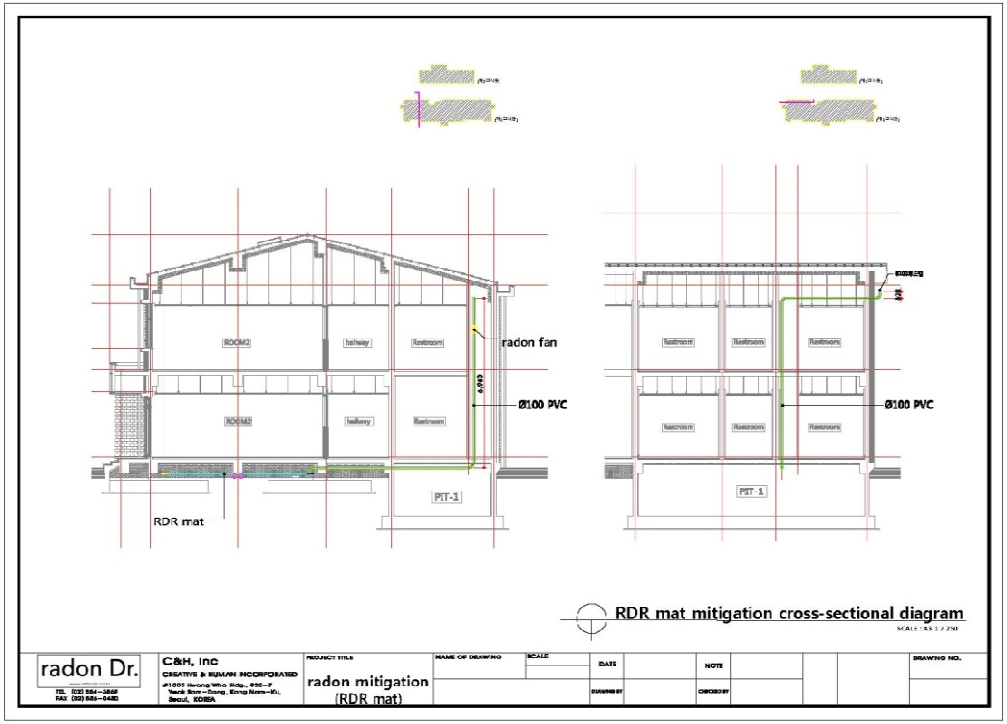
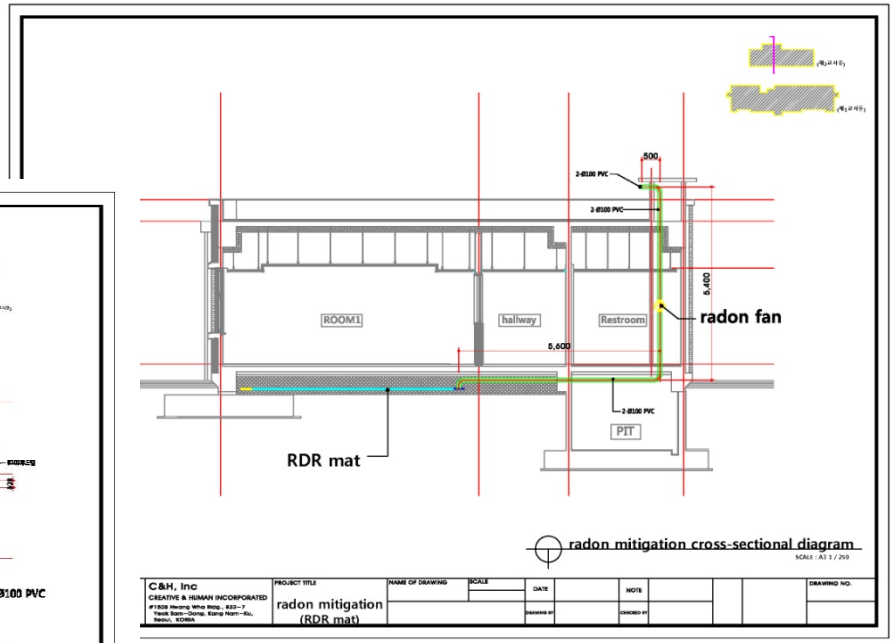
TEL (02) 554-3469 FAX (02) 556-0480
PROJECT TITLE: radon mitigation (RDR mat)
NAME OF DRAWING | SCALE | DATE | DRAWING BY | NOTE | CHECKED BY | DRAWING NO.

Application Case

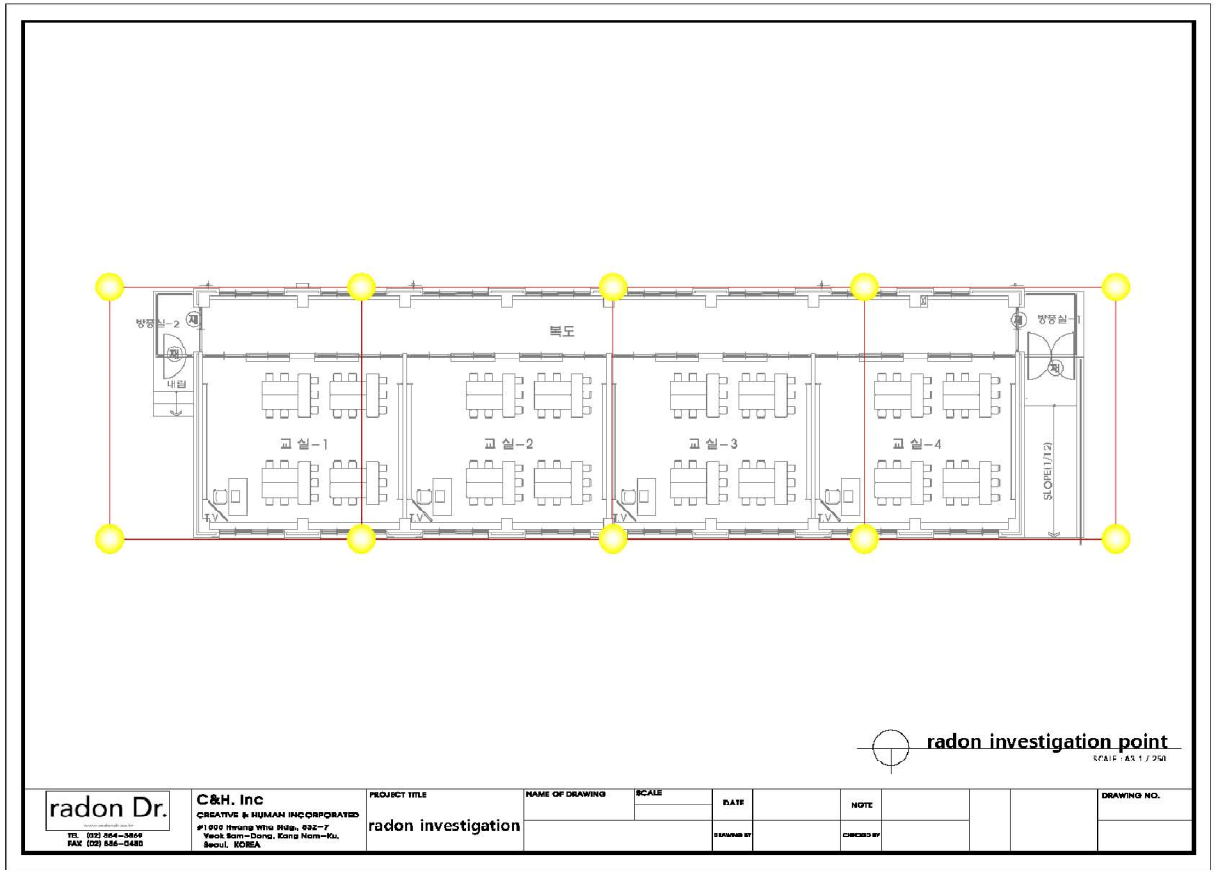
Design of radon resistance at Site No.1





Application Case

Assessment of radon risk at Site No.2



- RDR index level

–Radon concentration in Soil

: 21,380 Bq/m³

–Soil moisture content

: 8.1%

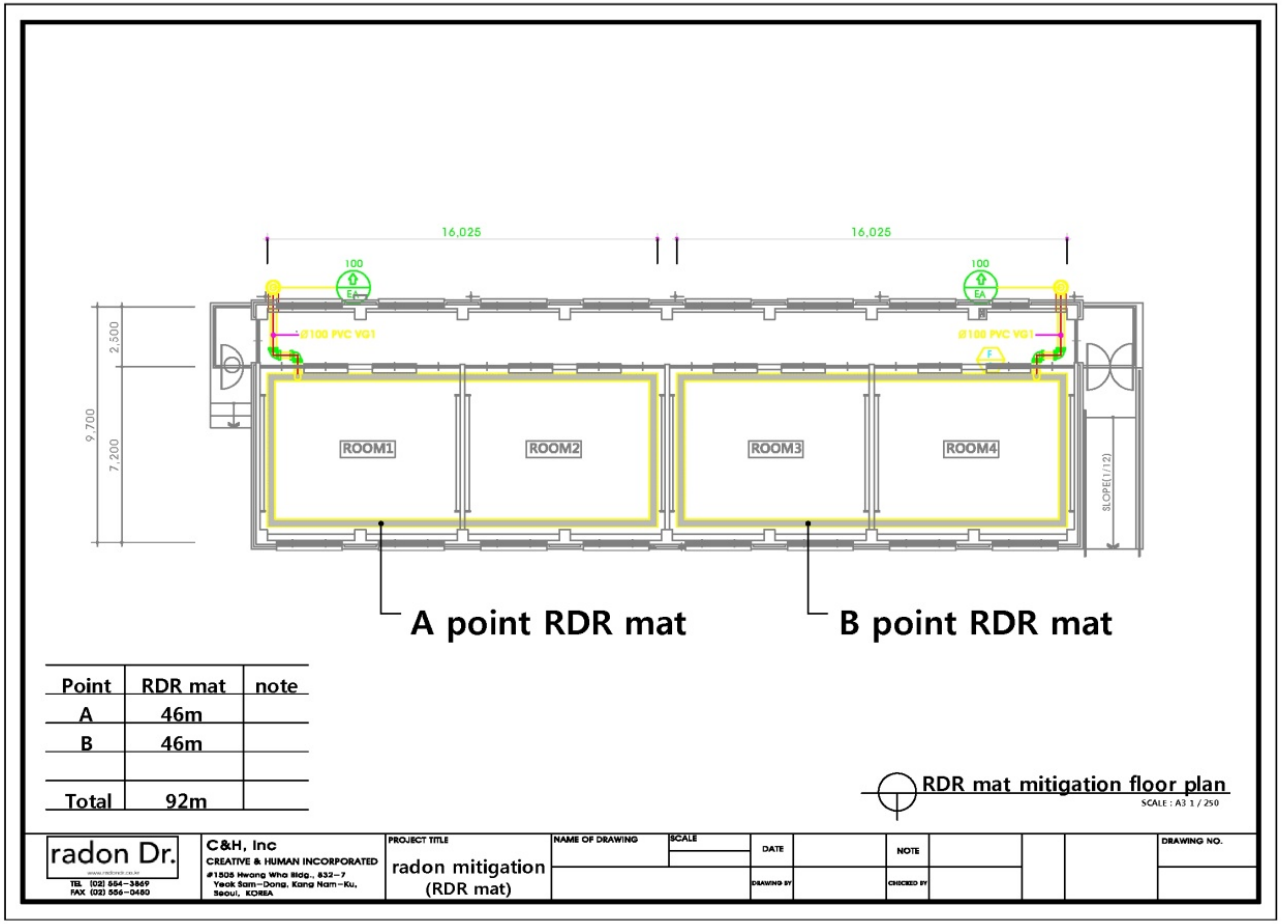
–Load pressure in Soil

: 1.3 WC

–> Warning Level

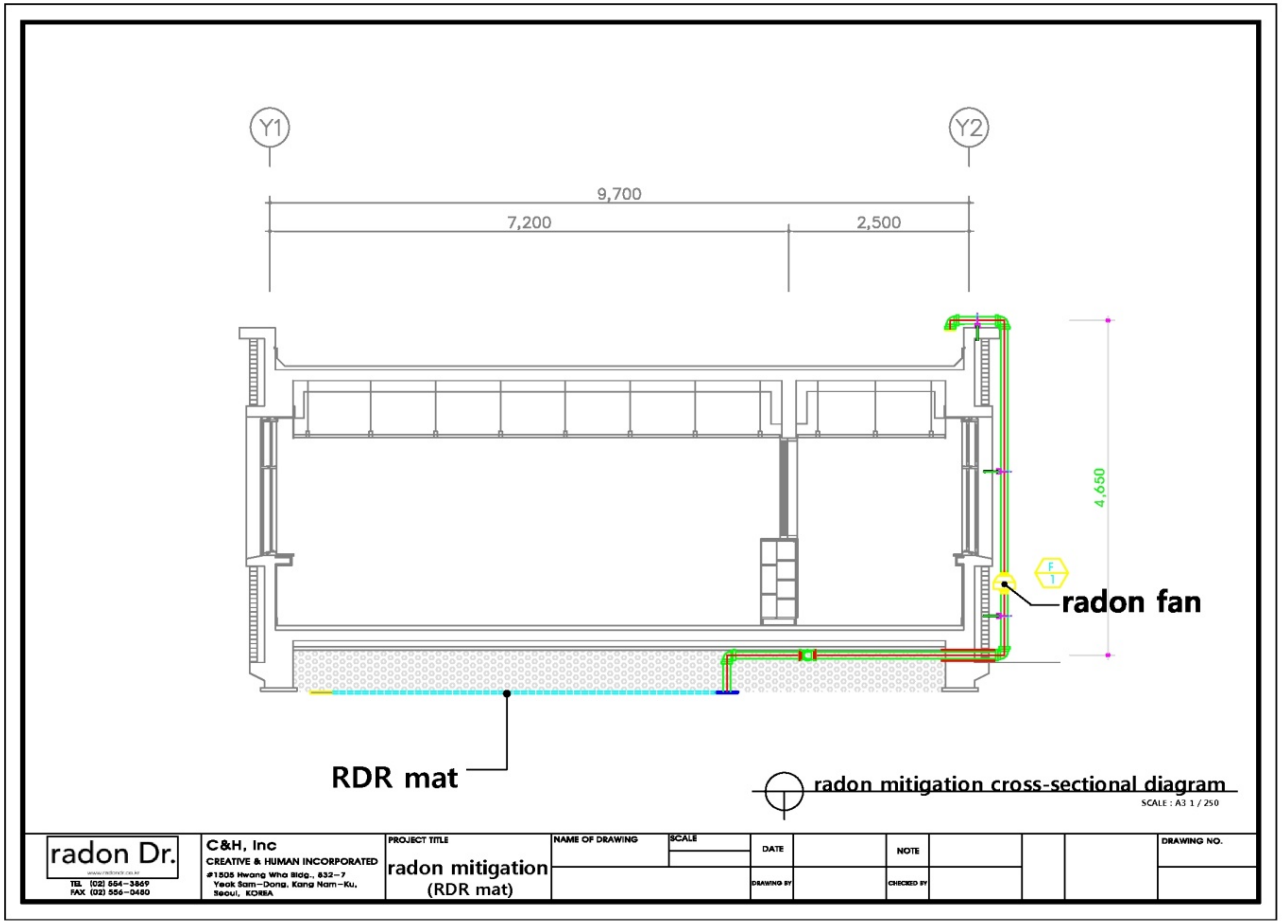
Application Case

Design of radon resistance at Site No.2



Application Case

Design of radon resistance at Site No.2

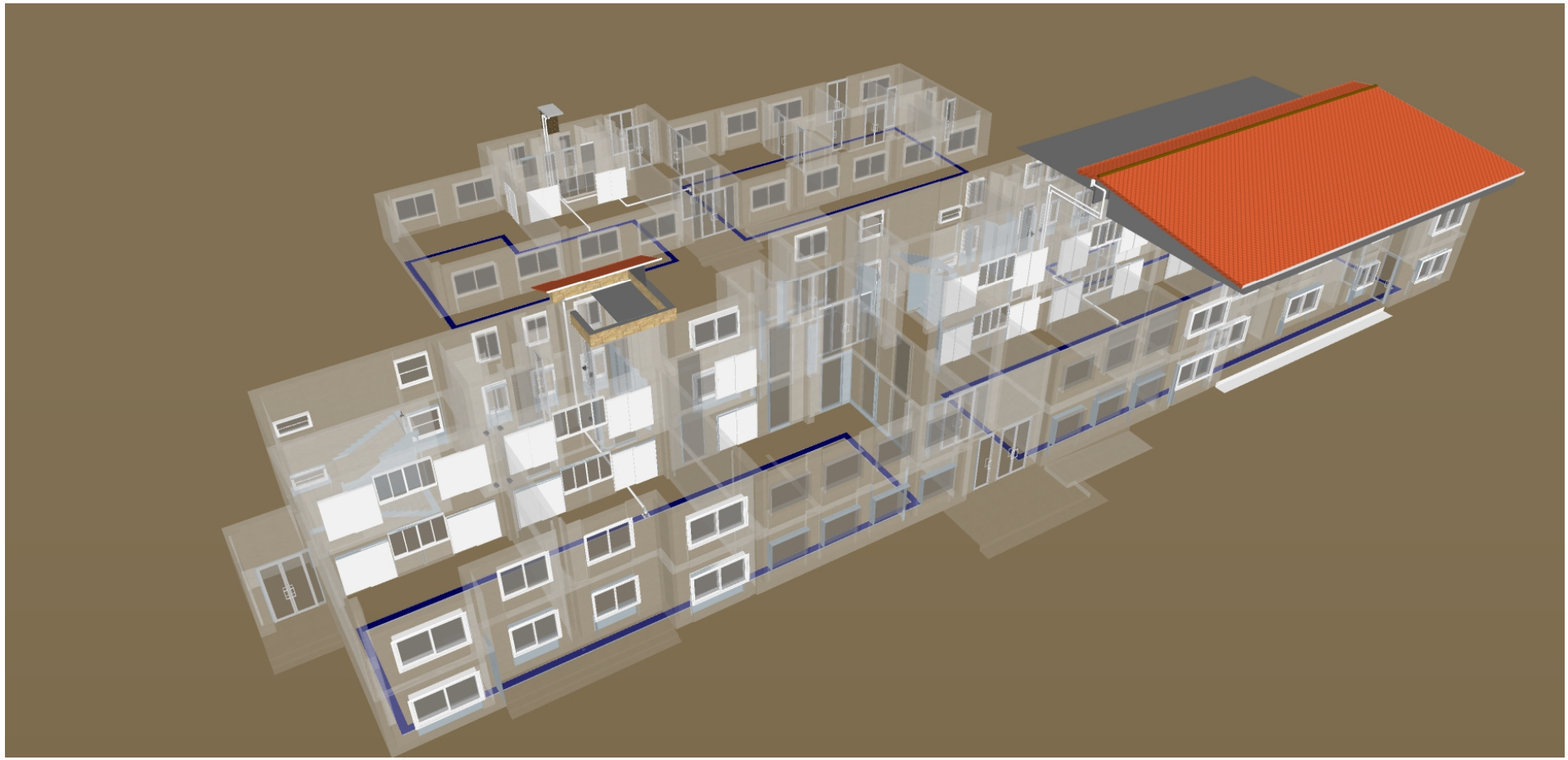


Application Case

Construction of radon resistance at both Site

Application Case

Construction of radon resistance at Site No.1



Application Case

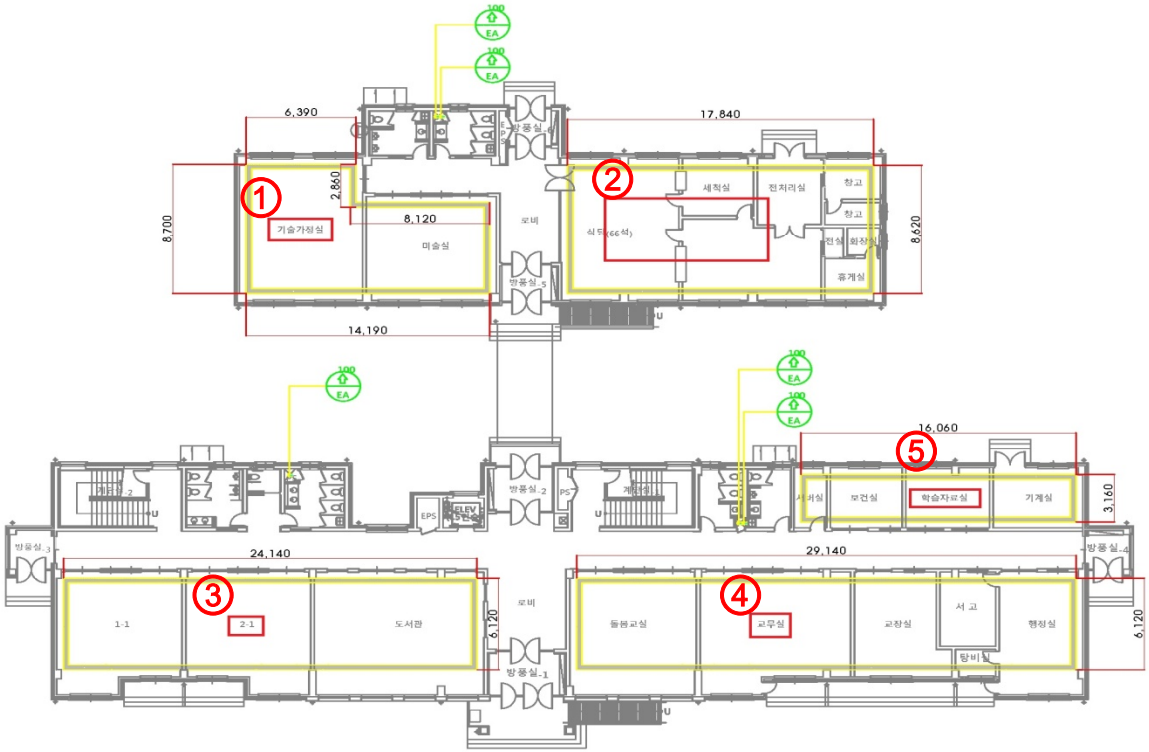
Construction of radon resistance at other site

Result and conclusion

Results

Result of Site No. 1

- **Measurement Points**



- **Radon Concentration(Bq/㎥)**

Room ①	Room ②	Room ③	Room ④	Room ⑤
74.6	71.3	81.7	83.5	85.1

Result

Result of Site No. 2

- Measurement Points

- Radon Concentration(Bq/㎥)

Room ①	Room ②	Room ③	Room ④
77.6	69.3	58.7	51.8

Conclusion

- **Assessment of radon risk in soil for new construction site**
- **RDR index levels are warning Level for both site**
- **Applying the ASD installation according to proposed solution**
- **Indoor radon concentrations are below the recommended level for multiuse facility(148 Bq/㎥) about 50% or less**

→ Further case sample considered at various conditions are needed for better assessment of RDR index which can be used for establishing Korean RRNC code.

Thank you

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