Introduction to the Evaluation Standard of Ecological Restoration at Unused Road in Expressway

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INTRODUCTION

- There are 264 Abandoned Sections in Korean Expressways with the Total Length of 362km and the Total area of 11,636,712m^2 as of January 2022. Korea Expressway Corporation has Run the Abandoned Road Restoration Projects Since 2009 – 22 Sections are being Restored to Ecological Forest until 2021 with the Budget of KRW 11.35B.
- In this Study, We will Introduce the Assessment Criteria for Abandoned Road Restoration Project

CONTENTS OF STUDY

• Material and Methodology

- Definition of Restored Area : ‘Restored Areas’ Means Road Sites which are left Unused but then Restored in Consideration of Climate, Green Belts, Surrounding Environment, Topography, Soil and Hydrological Characteristics Excluding Sites for which Accountability is Transferred to the Local Governments or Used for other Purpose after the Road is Abandoned.
- Method of Study : In this Study, the Objects of Restoration Environment Management were Divided into (1) Flora and Fauna, (2) Ecological Infrastructure and (3) Facilities and Landscape. Previous Studies, Papers, and Reports on Ecological Restoration of Abandoned Roads were Investigated and Analyzed. Data from Field Surveys on Restored Areas were Categorized and Analyzed. The Current State of Abandoned Expressways was Investigated and Assessed for their Availability.

• Results and Dicussion(Ⅰ)

• Flow of Abandoned Road Restoration

Data collection for restoration	→	- Analysis on previous project documents and relevant data - Comparison of restoration techniques by section and by type
Analysis on current status & problems of previous restoration projects	→	- General status after restoration - Maintenance issues after restoration
Setting goals for abandoned road restoration project	→	- Set up post-restoration ecological goals - Set up post-restoration landscape goals - Set up post-restoration usage goals
Setting details (tasks & methods) for abandoned road restoration project	→	- Classification of maintenance tasks according to abandoned road restoration - Setting a checklist to achieve goals - Determination of detailed method for each restoration tasks

• Goals and Targets of Ecological Restoration

Restoration Target		Restoration Goal	Major Targets
Ecology	Flora/Fauna	Maintain the property density and comfort in the restoration site.	- Plant species (rootage) and invasive species (removal), tree support, weeds (removal), pests (control), other target trees (pruning, forming layered community and vegetation succession) - Wildlife habitat mitigation support tools (forests, wild animal habitats, perches, piles of stones, etc.), harmful invasive species (control)
	Ecological Infrastructure	Keep maintaining the ecological stability of the restoration site.	- Ecological wetland, water quality, quantity of water, water level, flood-in/-out of pond, drainage - Basic soil, composition ground, physiochemical properties (fertilization), physical properties (soil hardness, compaction) - Restoration project sites: transplanting cavity, rock split, colonization & vegetation module
Scenery/ Availability	Facilities & Landscape	While considering preservation, minimum activities and user safety should be set as the top priority.	- Resting facilities, observation/education facilities, decks, entry plaza, pavement, landscape

• Results and Dicussion(Ⅱ)

• Assessment Criteria for Ecological Restoration

Items				Criteria & Methodology	Details	Period	
						Pre-const.	Post-const.
Terrain Stability	Stability	Ground Collapse		Subsidence, collapse	Likelihood of ground subsidence/collapse		●
		Surface Course		Surface erosion/loss	Changes over time or due to climate crisis		●
	Subsoil Features	Physical Properties		Soil hardness, bulk density, etc.	Changes in physical properties of soil in the planting ground layer	●	●
		Chemical Properties		Soil acidity, organic matters	Changes in chemical properties of soil in the planting ground layer	●	●
		Biological Properties		Soil microorganisms, etc.	Changes in the number of microorganisms suitable for plant growth	●	●
		Soil Horizon		Soil horizon investigation	Soil structure stability based on the horizon analysis		●
Ecology/ Naturalness	Planting	Plant Vitality		Germination rate analysis	Quality based on the germination rate	●	
		Tree Shape		Conditions of imported trees	Roots, stems and leaves of trees	●	
	Plant Growth	Fractional Vegetation Coverage (FVC)		FVC goals	Changes in FVC over time		●
		Survival Rate		Percentage of rootage	Trees are dead due to non-rootage		●
		Vegetation Growth		Whether the goal has been achieved	Whether the vegetation growth increases		●
		Multi-layered Planting		Multi-layered community	Domination & plant community		●
		Pest		Vegetation health	Pest and possibility of spread		●
	Biodiversity	# of Growing Plants	Woody Plant/ Herb	Whether the goal has been achieved	Whether the number of plant species increases		●
		# of Species Discovered	Woody Plant/ Herb	Whether the goal has been achieved	Whether the number of plant species increases		●
Sustainability	Landscape	Harmony with Surrounding Landscape		Harmony with neighborhood	Mitigate inconsistency with neighbor landscaping		●
	Naturalness	Nature recovery		Restoration to original forest	Whether it is being restored to the original forest		●
Constructability	Feasibility	Construction cost		Initially invested construction cost	Cost saving	●	
		Procurement		Smooth procurement	Feasibility in procurement	●	
	Constructability	Efficiency		Efficiency assessment	Construction efficiency	●	
		Stability		Stability assessment	Construction stability	●	
		Maintainability		Maintainability	Periodic monitoring & maintenance		●

CONCLUSIONS

- The Major Targets in Restoration Projects can be Roughly Categorized into Ecology(Flora/Fauna and Ecological Infrastructure), Scenery and Availability(Facilities and Landscape).
- The Assessment Criteria Include Terrain Stability(Stability, Subsoil Features), Ecology/Naturalness (Planting, Plant Growth, Biodiversity), Sustainability(Landscape, Naturalness), and Constructability (Feasibility, Constructability).