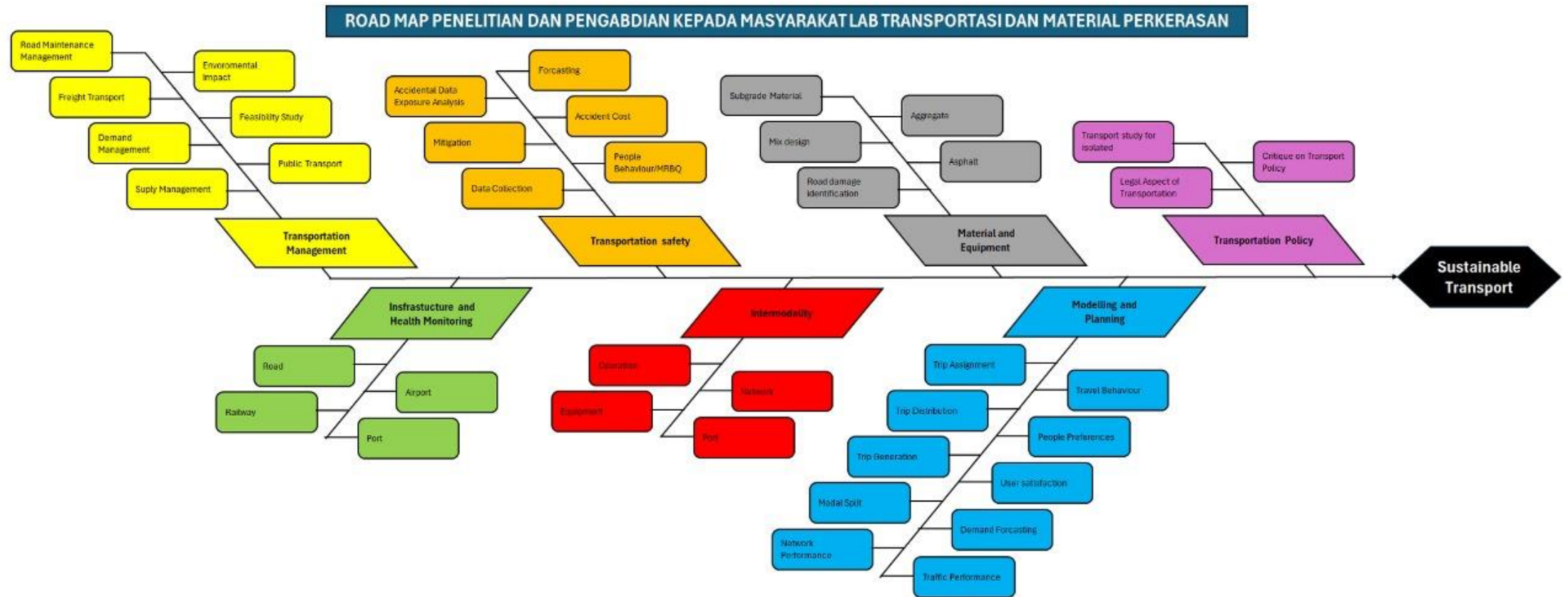
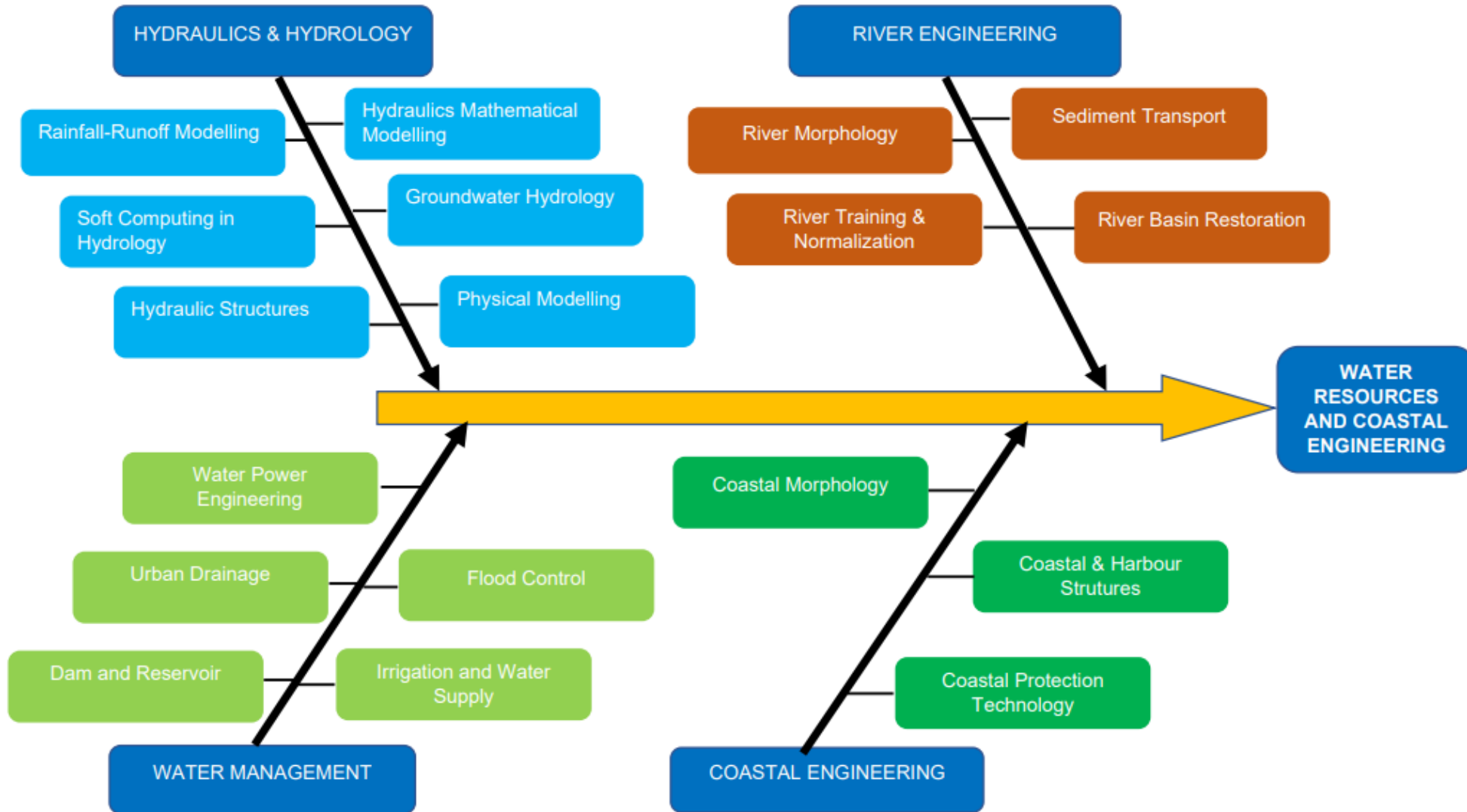


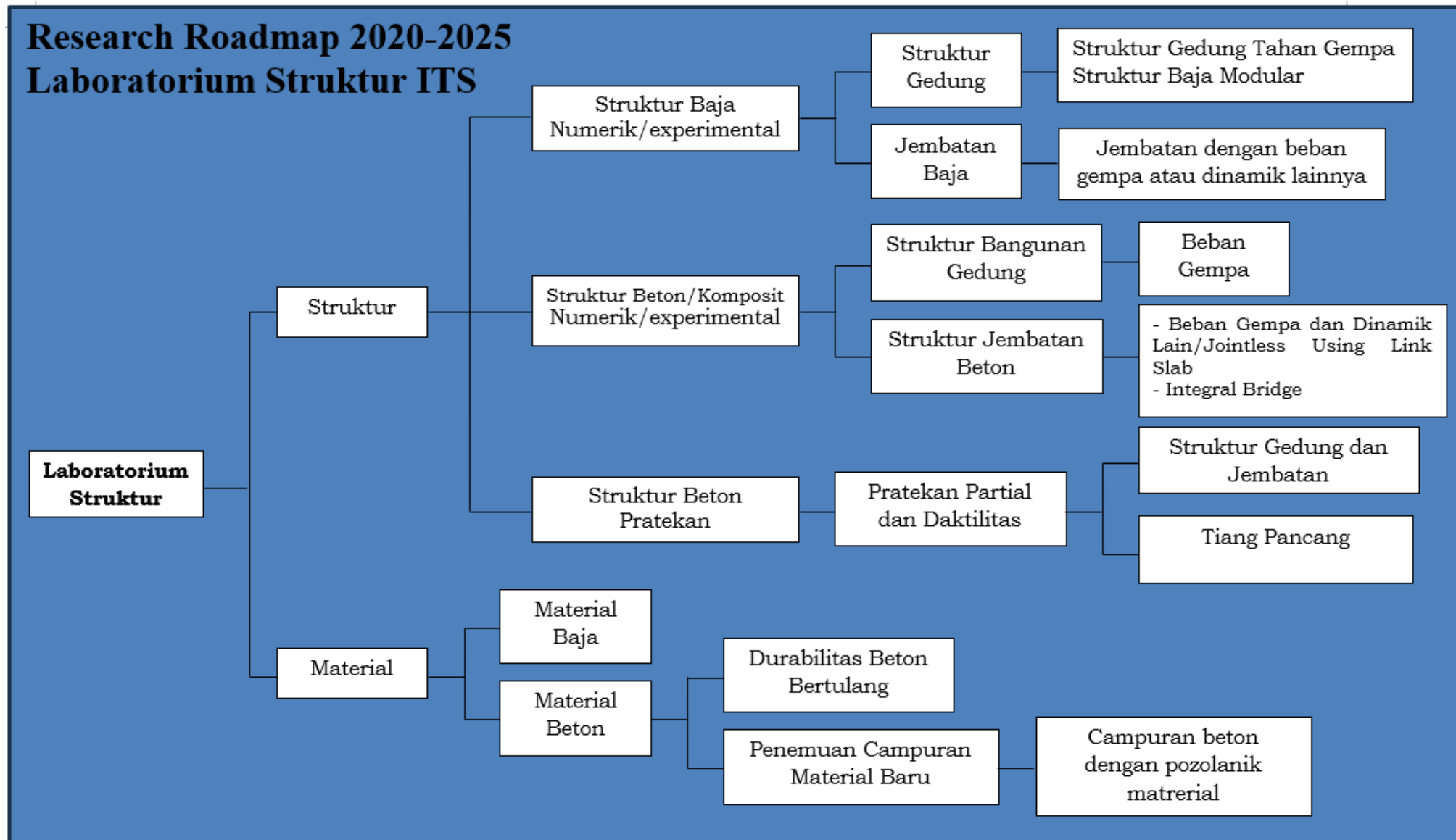
Laboratorium Transportasi dan Material Perkerasan



Laboratorium Rekayasa Sumber Daya Air dan Pantai



Laboratorium Struktur



Laboratorium Beton, Material Maju dan Komputasi Mekanik

| LB3 Research Road Map | | | Year 1 | Year 2 | Year 3 | Year 4 | |
|------------------------------|------------------------------------|------------------------------------|--|---|---|--|--|
| MATERIAL | Green and Recycled Material | Sidoarjo Mud (LuSi) Based Concrete | Calcined Sidoarjo Mud study | Study on effect of LuSi and flyash with various curing temperature as well as various expanded agents | LuSi as artificial lightweight aggregate for nonstructural mortar | LuSi as artificial lightweight aggregate and additional natural fiber as tension and shear reinforcement | |
| | | GeoPolymer Concrete | Study of mixture to achieve the desire strength for base course material | Study to utilize the existing or modified equipment to perform green concrete in Laboratory Scale | Full scale study for readiness of equipment and method | Methods and equipments extension to industrial scale | |
| | | Waste Based Material | Properties of waste material study e.g. paper pulp, petrochemical etc. | Trial for various shapes and sizes of waste based building materials by mean of mixing, compacting, and molding with other material as a binder or stabilizer | Laboratory test for mechanical and physical properties of waste base materials | Develop the methods and equipments for mass production | |
| | Advanced Material | Sandwich Material | Skin and core material mechanical and physical properties study | Develop mathematical model and analysis software | Structural components fabrication and method development | Construct housing prototype | |
| | | Bio Cellular Material | Study of source material availability and demand | Fabricating structural elements and studying mechanical properties of the elements | Structural components fabrication and method development | Construct the small building as structural prototype | |
| | | Cement Based Material | Seeking for suitable material to be bind with cement for producing new building material | Finding the method and equipment to produce the new building material | Laboratory scale research for testing mechanical and physical properties of new material | Research for long term performance of new material | |
| | Quality Assurance / Control | Artificial Intelligence in QA/QC | Develop basis knowledges database of QA/QC | | Develop AI software for QA/QC in PROLOG | | Test the program on real world application and make modifications if necessary |
| | | Performance based mixed design | Develop mathematical relationship of concrete ingredient to the most common performances could be achieves | | | Refined the mathematical relationship by laboratory test, and develop the mix design procedures | Apply the procedure to industrial scale and refine the mix design or mathematical model if necessary |
| | | Accelerated material testing. | Develop mathematical model of accelerated testing of materials, and its maturity history | Develop supporting equipments for accelerated testing and recording maturity history | Laboratory scale test for testing equipment reliability and fitting mathematical model with laboratory result | Use the accelerated test equipment in the field and compare its performance to the laboratory result | |

Laboratorium Beton, Material Maju dan Komputasi Mekanik

| | | | | | | |
|------------|--|-------------------------------------|--|---|--|--|
| STRUCTURAL | Precast/prestressed Elements and Connections | Innovative Elements. | Invent the special precast elements for special structural needs | Develop mathematical model for the element and study its behavior on loads | Conduct full scale test of the new precast element, and refine the mathematical model if necessary | Seek the opportunity to introduce it to the market |
| | | Innovative Connections. | Invent the innovative precast/prestressed connections | Develop mathematical model for the connections to help the understanding its behavior under loads | Conduct full scale test of the new precast connections, and refine the mathematical model if necessary | Seek the opportunity to introduce it to the market |
| | Optimization and Software Development | In House Software | Mobile Apps for Mix Design | Mobile Apps for beam and slab detailing | Mobile Apps for column section | Mobile Apps for QA/QC |
| | | Structural Optimization | Structural reinforcement optimization | | Structural System Optimization | |
| | Rehabilitation, Repair, and Retrofit | High speed repair and strengthening | Seeking for new method and material to conduct the high speed repair and strengthening | Conduct small laboratory test and observe its behaviors | Conduct laboratory test for repeatability, reliability, and exposure to weather | Apply the method to some real structures |
| | | Self Healing Structures | Study the materials with special property to be used in self healing structure | Develop mathematical model of the material | Develop the method to embed the material in the structures | Conduct laboratory scale to study its performance |
| | | Equipment Advancements | Record the needs of equipment for everyday laboratory test of research | Engineered the equipment according to available standard | Use the equipment for small scale test to study its performance and reliability | Redesign the equipment with higher quality material and to achieve professional appearance |
| | | Forensic Engineering | Study the deterioration, damage, degradation of reinforce concrete structures | Develop methods for identifying deterioration | Develop measuring device for degraded structures | Laboratory test for new equipment and find out its reliability and repeatability |
| | Earthquake Risk Reduction | Casualty prevention | Evaluate the current building code for future earthquake loads | Improve calculation method and detailing | Laboratory test for proofing the new calculation method and detailing | Disseminate the result |
| | | Seismic loss reduction | Evaluate the current building code for future earthquake loads | Evaluate possibility of reusable energy dissipation systems | Laboratory test for new energy dissipation system | Disseminate the result |
| | | Disaster management | Identify the needs during disaster | Create the flow of management on disaster handling | Create the tools and equipment according to flow management | Disseminate the result |

Laboratorium Mekanika Tanah dan Batuan

ROAD MAP PENELITIAN

UNDERGROUND STRUCTURE

1. Pengembangan metode perhitungan daya dukung
2. Pengembangan tipe pondasi untuk berbagai jenis tanah bermasalah
3. Pengembangan metode perhitungan cepat pada design bangunan bawah

DIFFICULT SOIL

1. Unsaturated Soil
2. Swelling soil
3. Soft Clay
4. Gambut Berserat
5. Clayshale
6. Pemanfaatan Lumpur Lapindo

SLOPE STABILITY

1. Pengembangan system monitoring stabilitas lereng
2. Pengembangan peralatan uji lab untuk penentuan kuat geser
3. Mekanisme kelongsoran akibat hujan
4. Potensi kelongsoran dengan data geolistrik
5. Crack soil terhadap potensi kelongsoran
6. Stabilitas Tanggul Sungai

MICROZONATION

1. Mapping Soil Improvement
2. Mapping kebutuhan pondasi
3. Mapping Parameter Tanah

Laboratorium Mekanika Tanah dan Batuan

ROAD MAP PENELITIAN

SOIL-STRUCTURE INTERACTION

1. Pengembangan metode perhitungan kapasitas lateral tiang berdasarkan pile load test
2. Pengembangan metode interpretasi hasil soil monitoring
3. Pengembangan metode perhitungan kapasitas vertical tiang berdasarkan pile load test

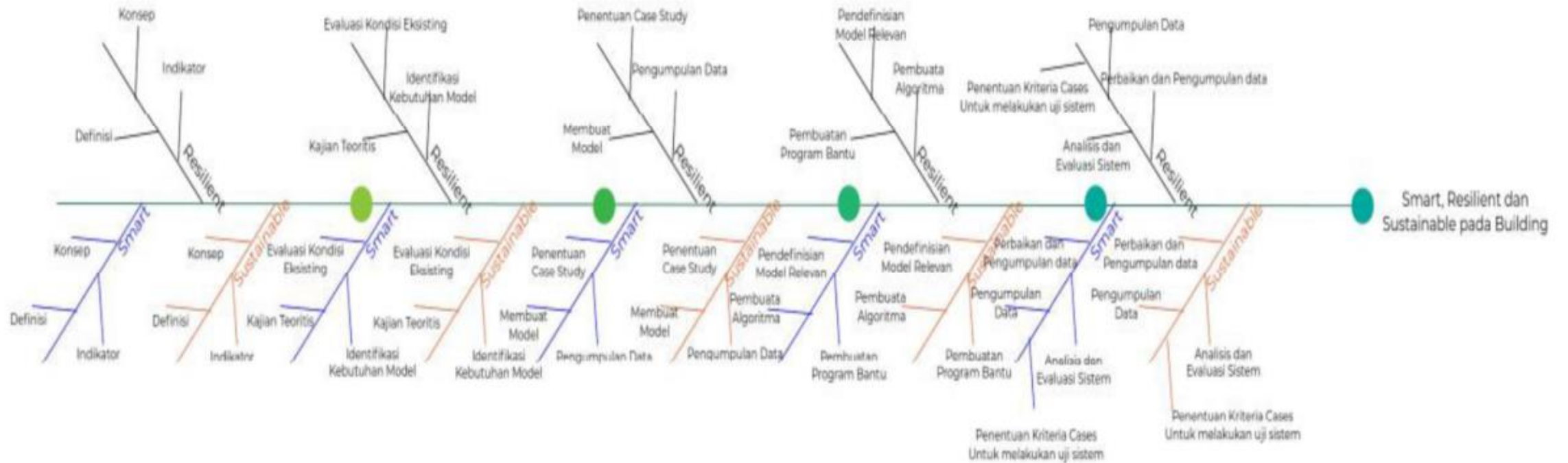
GROUND IMPROVEMENT

1. Pengembangan metode peningkatan daya dukung tanah dengan menggunakan cara kimia & biologi
2. Pengembangan metode perhitungan kebutuhan perkuatan geotextile dengan slope 2D dan 3D

PAVEMENT AND ROAD TECHNOLOGY

1. Perkerasan kuat dan awet
2. Perkerasan berpori/ Porous pavement
3. Asbuton technology

Laboratorium Manajemen Konstruksi



TAHAP 1
(2019-2020)
Eksplorasi Konsep
Smart, Resilient dan
Sustainable pada Building

TAHAP 2
(2020-2021)
Menghasilkan Framework / Model
Konseptual untuk
Smart, Resilient dan
Sustainable

TAHAP 3
(2021-2022)
Verifikasi / Validasi Model
Smart, Resilient dan
Sustainable pada Building

TAHAP 4
(2022-2023)
Mengembangkan Sistem
Pengambilan Keputusan
(IT-Based)
Smart, Resilient dan
Sustainable pada Building

TAHAP 5
(2023-2024)
Evaluasi dan Pengempurnaan
Sistem Pengambilan Keputusan
(IT-Based)
Smart, Resilient dan
Sustainable pada Building