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STUDY OF HANDLING LAND ACQUISITION PROBLEMS ON THE YOGYAKARTA – BAWEN TOLL ROAD PROJECT SECTION 1

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ABSTRAK

Proyek Pembangunan Jalan Tol Yogykarta – Bawen Paket 1 Seksi 1 merupakan proyek yang dilaksanakan oleh pemerintah untuk meningkatkan ekonomi dan konektivitas untuk mendukung pembangunan daerah di daerah selatan jawa. Pada pelaksanaannya terdapat keterlambatan prpgress pada pembangunan Jalan Tol Yogykarta – Bawen Paket 1 Seksi 1 pada at grade 1 sta 75 150 – 75+250 yang disebabkan karena terdapat lahan yang belum bisa dibebaskan, regarding this diperlukannya Studi Penanganan Permasalahan Pembebasan Lahan Proyek Jalan Tol Yogyakarta – Bawen Seksi 1. agar pembangunan tol ini berjalan sesuai rencana. Oleh karena itu penelitian ini bertujuan untuk menangani permasalahan pembebasan lahan dengan mengubah trrase jalan atau pembangunan jembatan. Selain itu, penelitian ini akan mendesign perubahan trase jalan dan jembatan secara basic dan pada akhirnya terdapat satu alternatif solusi yang akan diaplikasikan untuk penanganan keterlambatan progress pada Pembangunan Jalan Tol Yogykarta – Bawen Paket 1 Seksi 1. Hasil penelitian ini menunjukan bahwa pada basic design trase jalan baru berada pada sebelah selatan pembangunan tol yang sudah ada, dan basic design jembata tetap berapa pada trase awal dengan elevasi tertentu. Untuk perhitungan waktu pelaksanaan dan biaya untuk trase jalan baru didapatkan 228.5 hari kerja dengan biaya Rp. 87,907,195,901.12 dan untuk jembatan 249.5 hari kerja dengan biaya Rp. 84,694,979,884.13. Dari hasil tersebut dapat disimpulkan bahwa perubahan trase jalan lebih efektif dan optimal.

Kata kunci : Pembebasan lahan, cagar budaya, jalan tol, peralihan trase, jembatan

ABSTRACT

The Yogyakarta–Bawen Toll Road Project Package 1, Section 1, is a government-initiated infrastructure development project aimed at enhancing regional economic growth and connectivity in the southern part of Java. However, the construction progress of the toll road, particularly at the at-grade section STA 75+150 – 75+250, has been delayed due to unresolved land acquisition issues. Therefore, a study on handling land acquisition problems for the Yogyakarta–Bawen Toll Road Project Section 1 is essential to ensure the project proceeds as planned. This study aims to address the land acquisition issue by proposing alternatives, such as realigning the road (trace) or constructing a bridge. The research involves designing basic alternatives for both the new road alignment and the bridge, followed by an analysis to determine the most effective and optimal solution. The steps taken include proposing a new road alignment, designing a bridge, estimating the construction time and cost for each alternative, and selecting the most efficient option. The study's result show that the proposed new road alignment is located to the south of the current toll road construction, while the bridge design remains on the original alignment with a specific elevation adjustment. The estimated implementation time and cost for the new road alignment are 228.5 working days and IDR 87,907,195,901.12, respectively, whereas for the bridge, they are 249.5 working days and IDR 84,694,979,884.13. Based on these findings, it can be concluded that road realignment is the more effective and optimal solution.
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Keywords *: land acquisition, cultural heritage, toll roads, change the trace, bridges.*

1. INTRODUCTION

The development of road infrastructure is currently being undertaken on a large scale to support regional economic growth and enhance inter-regional connectivity. One such project is the Yogyakarta–Bawen Toll Road Project Section 1, which involves both At-Grade (embankment) and Elevated (bridge) structures. Overall, most construction segments are progressing as planned, except for At-Grade 1 at STA 75+150 – 75+250, which is experiencing delays due to land acquisition issues related to a cultural heritage site (Ndalem Mijosastran).

This delay has impacted the project timeline, and no definitive solution has been found yet. Therefore, this study proposes two alternative solutions:

1. Changing the toll road alignment, and
2. Constructing a bridge over the affected cultural heritage area.

The study includes the development of a basic design, calculation of estimated construction time, and cost estimation for both alternatives. The expected outputs are a basic design, construction schedule, and cost estimation (RAB), which will be compared to determine the most effective solution for overcoming the delay at STA 75+150 – 75+250.

This analysis is crucial, as mismatches between planned and actual time or cost during implementation can lead to financial losses. The study is expected to serve as a reference for decision-making and provide valuable insights for similar infrastructure projects in the future.

2. METODE

Location of Research

The Yogyakarta – Bawen Toll Road Construction Project Package 1 Section 1 is located along Mlati District, Sleman Regency, Special Region of Yogyakarta to Ngluwar District, Magelang Regency, Central Java.

Data Analysis

In compiling this study, the steps used to complete the Study on Handling Land Acquisition Problems in the Yogyakarta – Bawen STA 75 + 150 – 75 + 250 Toll Road Construction Project from the aspects of time and cost are as follows:

1. Collect data and prepare the data needed
2. Identify alternative to handling land acquisition problems
3. Creating basic design alternative
4. Calculate Schedule and RAB
5. Deciding on alternative

3. RESULT AND DISCUSSION

Identify alternative

In the implementation of the Yogyakarta–Bawen Toll Road Project Section 1, particularly at At-Grade 1 STA 75+150 – 75+250, land acquisition is hindered by the presence of Ndalem Mijosastran, a designated cultural heritage site. Due to its protected status, any physical intervention—such as relocation—requires a lengthy administrative process involving re-appraisal, technical permits, and preservation studies. This has caused delays in land acquisition and, consequently, in the physical progress of the toll road construction. To address this issue, two alternative solutions are proposed:

1. Modifying the toll road alignment to avoid the cultural site.
2. Constructing a bridge structure that spans over the heritage area, allowing the original alignment to be maintained without direct contact with the protected land. This approach also avoids the need for additional land acquisition, as it utilizes the existing ROW (Right of Way) plan, and eliminates the need for construction activities at ground level near the site.

Both alternatives aim to resolve the delay while preserving cultural heritage and minimizing administrative and social challenges.

Basic Design Alternative

a. Alternative 1

In response to the land acquisition issue at At-Grade 1 STA 75+150 – 75+250 due to the presence of a cultural heritage site (Ndalem Mijosastran), an alternative solution was proposed: modifying the toll road alignment. This new alignment was planned from STA 74+850 to STA 75+400, covering 755.28 meters, and analyzed using tools such as Google Earth and Civil 3D.

The redesign process began by identifying new alignment points and generating contour maps to match the elevation of the new alignment with existing terrain. The new design was then analyzed in detail through:

1. Horizontal Alignment

- Designed to meet the Road Geometric Design Guidelines (PDGJ) from the Directorate General of Highways.
- Parameters such as plan speed (80 km/h), delta angle, and bend radius (310 m) were used.

- The radius complies with design standards, ensuring safety and comfort.

2. Vertical Alignment

- Focused on two PVI (Point of Vertical Intersection) points: PVI 1 (131.786 m) and PVI 2 (131.200 m).
- These values indicate a mild sag curve with a consistent grade in/out of -0.08%, forming a smooth vertical transition that maintains driver comfort and vehicle stability.

3. Corridor Design

- The corridor includes traffic lanes, shoulders, medians, and the ROW (Right of Way).
- Design dimensions:
  Lane width: 3.60 m
  Outer shoulder: 3.00
  m Inner shoulder:
  1.50 m
  Median (including inner shoulder): 5.50 m
- Most of the redesigned area is categorized as heaps, indicated by green markings on the corridor plan, requiring fill work.

4. Cross Section and Volume

- Cross-sections were created at 25-meter intervals to assess the earthwork volume.
- The data will be used in the next section for BOQ and cost estimation.

5. ROW Line and Center Line

- The ROW line on the north side remains unchanged, as the new alignment shifts southward.
- On the south side, a new ROW is defined, requiring additional land acquisition of 7,917.915 m².

This alignment redesign aims to provide a technically feasible, legally compliant, and socially acceptable alternative to continue the Yogyakarta–Bawen Toll Road project while avoiding direct impact on the cultural heritage site.

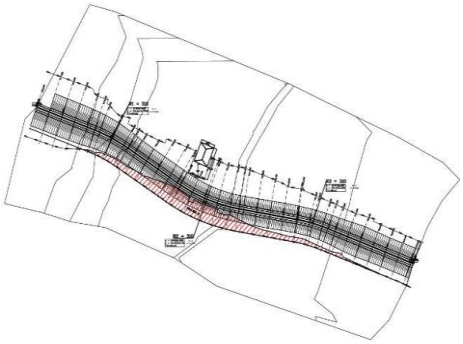

Figure 1 Drawing Plan Changing the Alignment

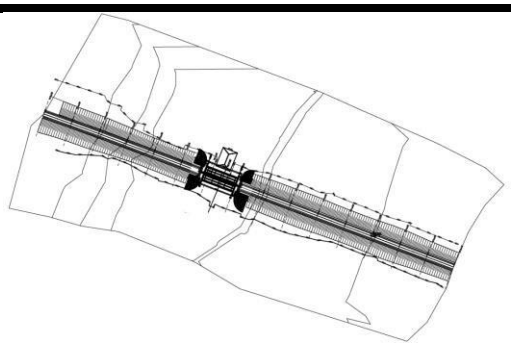

Figure 2 Drawing of the bridge structure plan

b. Alternative 2

The construction of a bridge at STA 75+150 – 75+250 is proposed as an alternative solution to address unresolved land acquisition issues and preserve the integrity of nearby cultural heritage, specifically Ndalem Mijosastran. This bridge enables the toll road to follow its original alignment without requiring land acquisition or directly crossing over the cultural site. The basic design includes:

- Span length: 57 meters
- Height: 10 meters above ground
- Structure type: Steel box girder, totaling 6 girders
- Abutments: A1 = 2.5 meters, A2 = 2 meters
- Clearance from cultural heritage: 6 meters horizontally, with the bridge located beside (not above) the building

The use of steel box girders is selected due to the long span requirement, which exceeds the maximum capability of PCI girders (limited to 40.8 meters). This long-span approach is chosen to minimize ground vibration, avoid direct structural impact on the fragile cultural building, and preserve the visual and historical integrity of the surrounding heritage environment.

The cultural site, with a height of 5 meters, sits safely below and to the side of the planned bridge, maintaining a vertical and horizontal clearance that ensures protection. Additionally, the aesthetic and visual harmony of the area is better maintained using a long-span bridge compared to shorter span options that may visually interfere with the cultural landscape.

Overall, this bridge alternative is technically feasible, aligns with site constraints, minimizes disturbance to heritage structures, and meets structural and aesthetic requirements for sensitive construction zones.

Calculate Schedule and RAB Schedule

Key factors to consider when preparing the project implementation schedule include the order of work, productivity, workload, and duration of work.

Table 1 Bill of Quantity Changing the Alignment

Bill of Quantity			
Number	Job Description	Unit	Volume
DIVISION 1	PUBLIC WORKS		
1.1	Mobilization & Demobilization	Ls	1.0
1.2	Creation of Project Facilities	Ls	1.0
DIVISION 2	LAND CLEARING		
2.1	Cleaning of Work Areas	m²	46,267.05
2.2	Tree Cutting	fruit	60
2.3	Structural Concrete Demolition	m³	5.41
2.4	House Demolition	m'	1,971.66
2.5	Land Acquisition	m²	7,917.92
DIVISION 3	EARTHWORKS		
3.1	Subgrade	m²	814.85
3.2	Common Borrow Material	m³	174,318.84
3.4	Geotextile Separator class 1	m²	10,457.48
3.5	Class A Aggregate Foundation Layer	m³	75.86
DIVISION 4	PAVEMENT WORK		
4.2	Wet Lean Concrete (t = 10 cm)	m³	1,136.65
4.3	Cement Concrete Pavement	m³	231.53

Table 2 Bill of Quantity Bridge

Bill of Quantity			
Number	**Job Description**	**Unit**	**Volume**
DIVISION 1	PUBLIC WORKS		
1.1	Mobilization & Demobilization	Ls	1.0
1.2	Creation of Project Facilities	Ls	1.0
DIVISION 2	LAND CLEARING		
2.1	Cleaning of Work Areas	m²	6,248.33
2.2	Tree Cutting	piece	7
DIVISION 3	CONCRETE STRUCTURE WORK		
3.1	Structural Concrete Class B-1-1c (Reinforced Concrete	m³	452.85
3.2	Flooring of Structural Concrete Class B-1-4e (Abutments, Pier Palms, Ground Retaining Walls, Stepping Plates)	m³	1,930.22
3.3	Class B Structural Concrete (Barrier Concrete)	m³	72.01
3.4	Concrete Structure Class E (Pilecap, Abutment)	m³	61.23
3.5	BjTS 420B Fin Rebar Steel	Kg	516,514.643
3.6	Cast In Place Concrete Cast In Place Cast=120cm (Borepile)	m'	1,113.60
DIVISION 4	STRUCTURAL STEEL WORK		
4.1	Simple Square Steel Girder Provision	Unit	6.000
4.2	Simple Square Steel Girder Installation	Unit	6.000

Calculation duration of work

a. Change of Road Alignment

- Volume of work (obtained from volume calculations)
  Volume Common Borrow Material = 174,318.84 m³

  Coefficients (obtained from productivity calculations)
  Bulldozer, 155 HP = 0.0038 hours
  Excavator/Backhoe, PC-200 (0.93 m3) = 0.0150 hours
  Dump Truck, 10 tons = 0.0415 hours
  Motor Grader = 0.0041 hours
  Vibrator Roller = 0.0053 hours
  Water Tank Truck = 0.0117 hours
- Quantity (assumed as needed)
  Bulldozer, 155 HP = 1 unit
  Excavator/Backhoe, PC-200 (0.93 m3) = 4 units
  Dump Truck, 10 tons = 10 units
  Motor Grader = 1 unit
  Vibrator Roller = 2 units
  Water Tank Truck = 3 units
- Productivity per day (derived from productivity calculations/hours x 8)
  Bulldozer, 155 HP = 2127.132 m³/day
  Excavator/Backhoe, PC-200 (0.93 m3) = 534,392 m³/day
  Dump Truck, 10 tons = 192,655 m³/day
  Motor Grader = 1932.041 m³/day
  Vibrator Roller = 1512.149 m³/day Water
  Tank Truck = 682,971 m³/day
- Total duration (volume of work/ (productivity x amount))
  Bulldozer, 155 HP = 174,318.84 / (2127.132 x 1)
  = 91 days
  Excavator/Backhoe, PC-200 (0.93 m3)
  = 174,318.84 / (534,392 x 4)
  = 91 days
  Dump Truck, 10 tons = 174,318.84 / (192.655 x 10)
  = 91 days
  Motor Grader = 174,318.84 / (1932.041 x 1)
  = 91 days
  Vibrator Roller = 174,318.84 / (1512.149 x 2)
  = 91 days
  Water Tank Truck =174,318.84/ (682.971x 3)
  = 91 days

- Total Duration

From the example of calculating the duration of Common Borrow Material work, the results of the calculation were obtained from 91 working days. It can be seen that the total duration of each machine 91 days.

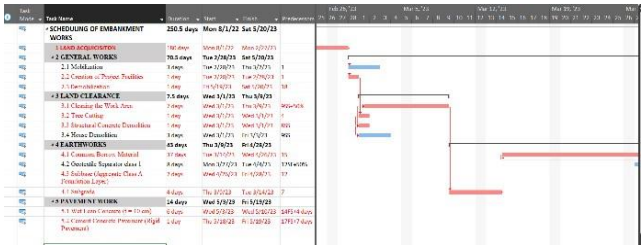

Figure 3 Bar Chart method scheduling view

From the calculation of the duration of the alternative track change, the total duration is 250.5 working days.

b. Bridge

- Volume of work (obtained from volume calculations) Reinforcement = 2,0657.46 kg
  Grade E concrete = 205,269 m³
- Coefficients (obtained from productivity calculations)
  Reinforcement
  - Hiup Crane = 0.0012
  - Bar Bender = 0.0040
  - Bar Cutter = 0.0040

  Grade E concrete
  - Concrete Vibrator = 0.4016
  - Concrete Pump = 0.0469
  - Generator = 0.0089
- Quantity (assumed as needed)

  Reinforcement
  - Hiup Crane = 3
  - Bar Bender = 7
  - Bar Cutter = 7

  Grade E concrete
  - Concrete Vibrator = 4
  - Concrete Pump = 2
  - Generator = 1
- Productivity per day (derived from productivity calculations)
  Reinforcement
  - Hiup Crane = 6640 kg/day
  - Bar Bender = 1992 kg/day
  - Bar Cutter = 1992 kg/day

  Grade E concrete
  - Concrete Vibrator = 19.92 m³/day
  - Concrete Pump = 170.74 m³/day
  - Generator = 896.40 m³/day
- Total duration (volume of work/(productivity x amount))

Reinforcement

- Hiup Crane = 2,0657.46/(6640 x 3)
  = 38 days
- Bar Bender = 2,0657.46/(1992 x 7)
  = 38 days
- Bar Cutter = 2,0657.46/(1992 x 7)
  = 38 days

Grade E concrete

- Concrete Vibrator = 205,269/(19.92 x 4)
  = 1 day
- Concrete Pump = 205,269/(170.74 x 2)
  = 1 day
- Generator = 205.269/ (896.40 x 1)
  = 1 day

- Total Duration

Base on the calculated, total duration, the reinforcement work is requires 38 days, while the class E concrete casting work is takes 1 day. Therefore, the total for each Pile Cap job is 38 days plus 1 day, totaling 39 working days.

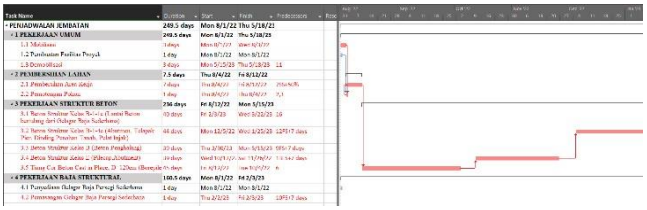

Figure 4 Bar Chart method scheduling view

In calculating the duration of the bridge structure planning, a total duration of 249.5 working days was obtained.

RAB

For calculating cost must calculate Analysis of Unit Price (AHSP) and then calculation of the cost budget plan is the result of multiplying the volume of work with the analysis of the unit price of work in each job.

a. Change of Road Alignment

The following is an example of the calculation of the Unit Price Analysis (AHSP) of Common Borrow Material work:

A. Manpower

- Manpower Coefficient (obtained from productivity calculation)
  a. Worker = 0.2492
  b. Foreman = 0.0415
- Labor Wages (obtained from the Basic Unit Price of Magelang Regency)
  a. Worker = Rp. 75,000
  b. Foreman = Rp. 110,000

Sub Total = Rp. 23,254.04

B. Material

- Material Coefficient (obtained from productivity calculation)
  a. Common Borrow Material = 1,000
- Unit Price (obtained from the Basic Unit Price of Magelang Regency)
  a. Common Borrow Material = Rp. 95,286
  b. Sub Total = Rp. 95,286

C. Tool

- Heavy Equipment Coefficient (derived from productivity calculation)
  a. Bulldozer= 0.0038
  b. Motor Grader = 0.0041
  c. Vibro Roller = 0.0053
  d. Excavator = 0.0150
  e. Dump truck = 0.0415
  f. Water Truck = 0.0117
- Heavy Equipment Rental Price (obtained from the Basic Unit Price of Magelang Regency)
  a. Bulldozer= Rp. 770,084.08
  b. Motor Grader = Rp. 731,721.92
  c. Vibro Roller = Rp. 459,676.68
  d. Excavator = Rp. 704,944.96
  e. Dump truck = Rp. 689,298.31
  f. Water Truck = Rp. 581,863.58
  Sub total = Rp. 54,350.05

D. Overall Sub Total = A + B + C
= Rp. 172,809.09

E. Overhead + Profit = 15% x D
= Rp. 25,933.51

F. Total Price = D + E
= Rp. 198,824

The following is an example of the calculation of the Cost Budget Plan (RAB) for Common Borrow Material work:

1. Volume of Work (obtained from volume calculation) Common Borrow Material = 174,381.84 m^3
2. Unit Price (obtained from AHSP calculation) Common Borrow Material = Rp. 198,824
3. Total Price (Volume x Unit Price of Work)

Common Borrow Material = 174,381.84 x Rp. 198,824
= Rp. 35,654,754,825.06

b. Bridge

The following is an example of the calculation of the Work Unit Price Analysis (AHSP) for Pile Cap work:

A. Manpower

- Manpower Coefficient (obtained from productivity calculation)

1. Reinforcement
   a. Worker = 0.0120
   b. Blacksmith = 0.0201
   c. Foreman = 0.0040
2. Grade E concrete casting
   a. Worker = 0.2811
   b. Foreman = 0.0469

- Labor Wages (obtained from the Basic Unit Price of Magelang Regency)
  1. Reinforcement
     a. Worker = Rp. 75,000
     b. Blacksmith = Rp. 105,000
     c. Foreman = Rp. 110,000
  2. Grade E concrete casting
     a. Worker = Rp. 75,000
     b. Foreman = Rp, 110,000

  Sub Total = Rp. 3,453.82 + Rp. 26,238
  = Rp. 29,691

B. Material

- Material Coefficient (obtained from productivity calculation)
  1. Reinforcement
     a. Steel Reinforcement = 1,000
     b. Concrete Wire = 0.100
  2. Grade E concrete casting
     a. Grade E concrete = 1,000
     b. Iron Scaffolding = 0.100
- Unit Price (obtained from the Basic Unit Price of Magelang Regency)
  1. Reinforcement
     a. Steel Reinforcement = Rp. 17,250
     b. Concrete Wire = Rp. 19,167
  2. Grade E concrete casting
     a. Grade E concrete = Rp. 1,005,000
     b. Scaffolding = Rp. 850,000

Sub Total =Rp. 19,166.70 x Rp.1,090,0000
= Rp. 1,109,166.7

- Heavy Equipment Coefficient (derived fromproductivity calculation)
  1. Reinforcement
     a. Hiup Crane = 0.0012
     b. Bar Bander = 0.0040
     c. Bar Cuter = 0.0040
  2. Grade E concrete casting
     a. Concrete Vibrator = 0.4016
     b. Concrete Pump = 0.0469
     c. Generator = 0.0089
- Heavy Equipment Rental Price (obtained from the Basic Unit Price of Magelang Regency)
  1. Reinforcement
     a. Hiup Crane = Rp. 275,000
     b. Bar Bender = Rp. 218,756.69
     c. Bar Cutter = Rp. 218,756.69
  2. Grade E concrete casting
     a. Concrete Vibrator = Rp. 233,742.11
     b. Concrete Pump = Rp. 939,254.99
     c. Generator = Rp. 619,968.38

     Sub total = Rp. 2,088.41 + Rp. 139,397.16
     = Rp. 141,485.16

D. Overall Sub Total =A + B + C
= Rp. 1,280,342.86

E. Overhead + Profit = 15% x D
= Rp. 192,051,429

F. Total Price = D + E
= Rp. 1,472,394.29

The following is an example of the calculation of the Cost Budget Plan (RAB) for Pile Cap work:

1. Volume of Work (obtained from volume calculation)
   Reinforcement = 20,657.46 kg

Grade E concrete = 205,269 m³

2. Unit Price (obtained from AHSP calculations)
   Reinforcement = Rp. 28,416 Class E Concrete Casting = Rp. 1,443,981
3. Total Price (Volume x Unit Price of Work)
   Reinforcement = 20,657.46 kg x Rp. 28,416
   = Rp. 587,002,383

   Casting = 205,269 x Rp. 1,443,981
   = Rp. 88,411,469.80
4. Total price = Reinforcement + Casting
   = Rp. 587,002,383 + Rp. 88,411,469.80

Deciding on alternative

Table 3 Cost and Time Comparison

ALTERNATIVE	COST	TIME
ALTERNATIVE 1	IDR 78,931,869,596.39	250.5 Days
ALTERNATIVE 2	IDR 84,694,979,884.13	249.5 Days

Table 4 Scoring Alternative Selection

Aspects	Alternative Score	
	1	2
Faster job duration	0	1

Time	There is no time for land acquisition	0	1
	Can accelerate project execution	1	1
Cost	Requires additional time for planning and re-approval	1	1
	No additional fees required for new land acquisition	0	1
	Construction work costs are cheaper	1	0
Technical	There is no need for more complex structural design	1	0
	Construction work touching cultural heritage areas	1	0
	Using the initial track so it doesn't require significant changes to the existing design	0	1
	Design by Bina Marga/SNI	1	1
	Re-feasibility studies and further	1	1
Social	No need for re-coordination with communities affected by land acquisition	0	1
	Reducing social conflicts due to the relocation of historic sites	1	1
	Provide a safe space between the development and the historic site for future conservation activities.	1	0
Law and Administration	Must revise licensing and environmental documents (EIA, ROW, trace permit)	1	1
	No need requires review and approval from the cultural heritage preservation agency (BPCB)	0	1
	Easier in terms of legality because it does not violate the cultural heritage protection zone.	1	0
Environment and Culture	More visually and aesthetically friendly	1	0
	Potential visual disturbances, lighting, and monumental effects on the area below	1	0
	Direct contact with cultural heritage	1	0
	Avoids the risk of structural damage due to vibration from heavy equipment during construction	1	0
	Total Score =	15	12

Based on the analysis and comparison of both alternatives, Alternative 1 – changing the road alignment was chosen as the preferred solution. This decision is supported by the following key considerations:

- Cost efficiency: Alternative 1 requires IDR 78.93 billion, which is lower than Alternative 2 (bridge construction) costing IDR 84.69 billion.
    - Scoring results: In the alternative selection scoring system, the alignment change achieved a higher score than the bridge option.
    - Impact on cultural heritage: Ndalem Mijosastran, a protected cultural heritage site, has shown structural cracks due to nearby toll construction. Constructing a bridge—especially involving heavy equipment near the site—poses a greater risk of further damage.
    - Aesthetic and visual considerations: Shifting the road alignment places the new route farther from the heritage site, preserving its visual harmony and cultural value. In contrast, the bridge would be constructed between heritage buildings, potentially reducing natural lighting and diminishing the site's aesthetic presence.
    - Construction duration: Although the alignment change requires more time (250.5 days) compared to the bridge option (249.5 days), the overall benefits outweigh the extended schedule.

In conclusion, the alignment change is considered more feasible, cost-effective, safer for the heritage site, and better aligned with cultural and environmental preservation goals.

4. CONCLUSION

In the title "Alternative Study on Handling Land Acquisition Problems in the Yogyakarta – Bawen Toll Road Project Section 1", based on the analysis that has been carried out, the following conclusions are obtained:

1. Handling land problems in the Yogyakarta – Bawen Toll Road Project Section 1, especially in AT Grade 1 STA 75 + 150 – 75 + 250 there are 2 alternative problems in land acquisition due to cultural heritage, namely, Track Change and Bridge Structure Construction.
2. The Track Change is designed along 749,339 meters with 3 corners and a radius of 310 in each corner and in accordance with the standard of the Road Geometric Design Guidelines. The working time obtained in the change of track is 250.5 working days at a cost of IDR 78,931,869,596.39.
3. The construction of the bridge structure is designed with a girder span of 57 meters using 6 steel girders. With a construction duration of 249.5 working days at a cost of IDR 84,694,979,884.13.
4. The Transition of Trase was chosen as an alternative to handle the problem of cultural heritage land in the Yogyakarta – Bawen Toll Road Project Section 1, especially in AT Grade 1 STA 75+150 – 75+250 because from the results of the analysis it is more effective than alternative 2.

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