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|  | DRAFT Value Engineering Study Report  Project Name  Enter Project Description or Caption  Enter Project Location  [Study dates]  Prepared by:  Engineering  [Address  Suite xx  City, State, Zip] |
|  |  | |

Disclaimer

This report reflects the professional opinions of the Value Engineering (VE) team, based on the information available at the time of the study. As the project evolves, recommendations and findings should be reassessed considering new information.

Cost estimates presented are derived from the best available data at the time of the study and, unless otherwise stated, align with estimates provided to the VE team. All visual materials, including drawings, graphics, maps, and photos, were either supplied by the study sponsor or developed during the study.

The recommendations outlined in this report are based solely on the study’s findings and are independent of any subsequent resolutions. RKK Engineering is not involved, direct or indirect, in post-study decisions.

For any recommendations adopted by the owner and design team, the responsibility for incorporating them into the design lies with the designer of record.

[Statistics table Optional based on DOT]

|  |
| --- |
| Study Statistics  Baseline Cost: $  Number of Recommendations: xx  Recommended Cost Savings: $  Recommended Value Added: $  Total Number of Team Members: xx  [Federal Employees]: xx  [Client] Employees: xx  Others: xx  Facilitator Consultant: RKK |

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Executive Summary

Introduction

This report provides an overview of the events and outcomes of the [virtual] Value Engineering (VE) study conducted by RKK Engineering for [Client Name] on the [Project Name] project in Enter Project Location]. The VE study consisted of a [5] [4] [3]‑day workshop that took place [virtually] with a multidisciplinary team City, State, Zip] [at the workshop location.] [using a SharePoint platform.] [using Microsoft Teams.]

Project Overview

The purpose of the project is to [\_\_\_\_\_]

At the time of the VE study, the project's total estimated cost, encompassing design, construction, right-of-way, utilities, and construction engineering, was [$xx] million.

Scope of VE Study

The primary objectives of the study, through execution of the Value Methodology Job Plan, were to:

* Verify or improve on the various design concepts for the identified section of the Project Name project.
* Conduct a thorough review and analysis of the key project functions using an independent, multidiscipline, cross-functional team.
* Improve the value of the project through innovative measures aimed at improving the performance while reducing costs of the project.

VE [Recommendations] [Alternatives] [Proposals]

The VE team generated [xx] ideas for the project. These concepts were compared against the baseline developed by the project team. The concepts that resulted in improved performance were further developed by the VE team and resulted in [xx] recommendations (Table 1. Summary of Recommendations).

| Table 1. Summary of Recommendations | | | |
| --- | --- | --- | --- |
| # | [Recommendations] [Alternatives] [Proposals] Title | Cost Savings/ (Cost Added) ($M) | Performance Improvement (%) |
|  |  |  |  |
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The individual recommendations are summarized below, with detailed information provided in Section 10.

1—Recommendation Title – [Brief synopsis]

2—Recommendation Title – [Brief synopsis]

3—Recommendation Title – [Brief synopsis]

4—Recommendation Title – [Brief synopsis]

5—Recommendation Title – [Brief synopsis]

6—Recommendation Title – [Brief synopsis]

VE [Strategy’s]

Following the development of VE recommendations, the VE team evaluated and discussed each alternative, reaching a consensus on its prioritization for implementation. Prioritization was determined based on factors such as improved performance, feasibility of implementation, cost savings, or a combination of these elements. [A VE strategy was then formulated, incorporating complementary combinations of the highest-priority VE recommendations] A summary of the VE strategy's cost, performance, and value changes is presented in Table 3. Summary of VE Strategy.

A summary of the VE strategy's cost, performance, and value changes is presented in Table 3. Summary of VE Strategy. The performance scores for each VE strategy were divided by the total cost scores to calculate a value index. These value indices were then compared to the baseline concept's value index, with the difference expressed as a percentage (±%) deviation.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Table 3. Summary of VE Strategy | | | | |
| Strategy Description | Potential Cost Savings | Potential Added Costs | Change in Performance | Change in Value | |
|  |  |  |  |  | |
|  |  |  |  |  | |
|  |  |  |  |  | |

The Value Comparison chart below highlights the trade-offs between performance (represented by the blue columns) and cost (represented by the green columns). The red value line shows the net percentage change in total value compared to the baseline concept.

Figure 1. Comparison of Value

[insert chart]

Implementation of Recommendations

[To support implementation, a Value Engineering Recommendation Approval Form is provided in XX. If your organization chooses to reject or modify a recommendation, please provide a brief explanation of the decision.]

The VE team extends its appreciation to the project managers for their outstanding support during the study. We trust that the recommendations and design considerations provided will aid in making informed management decisions to advance the project through the delivery process.

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AI-generated content may be incorrect.

|  |  |
| --- | --- |
| Christopher Johnson, PMP, CVS®  *VE Facilitator* |  |

# Introduction

This VE report summarizes the events of the [virtual] VE study conducted for [Client Name] and facilitated [virtually] by RKK [using WebEx] [using Microsoft Teams]. The study focused on Project Name and was conducted in [City, State, Zip] during the [30 to 35 percent design phase] [PD&E phase].

## Scope of VE Study

Value is the relationship between a project's functions and the resources required to achieve them. Function is defined by the customer’s performance expectations, while resources include materials, labor, cost, and time. Value Engineering (VE) focuses on improving value by identifying the most resource-efficient methods to achieve the required functions while meeting the customer’s performance standards.

The objectives of the study, guided by the Value Methodology Job Plan, were to:

* Verify or improve various concepts for the identified section of the [Project Name],
* Thoroughly review and analyze key project functions using a multidisciplinary team
* Improve project value through innovative approaches that enhance performance while reducing costs.

The VE team identified essential project functions, determined opportunities of value, explored alternative ways to achieve them, and selected the best recommendations to develop practical solutions for improving value.

## VE Team Members

The VE study was led by a Certified Value Specialist (CVS) from RKK, with participation from several representatives of the [Client] project team. These team members contributed valuable understandings into the project’s background, design development, and opportunities for the VE study. Their support was essential, and the results presented reflect the information they provided throughout the process.

The VE team includes:

* Christopher Johnson, CVS

Include team photo here.

# Information Phase

The VE team received documentation from the project design team, as detailed in Table 4. Information Provided to the VE Team. On the first day of the study, the design team introduced the project and its key attributes. A summary of the project details, including the documentation provided, is outlined below.

## Information Provided to VE Team

Table 4 lists the project documents provided to the VE team for use during the study.

|  |  |
| --- | --- |
| Table 4. Information Provided to the VE Team | |
| Documents | Document Date | |
|  |  | |
|  |  | |
|  |  | |
|  |  | |

## [Project History/Information] [Project Location] [Purpose and Need]

[Write the history, location, purpose and need here - The team reviewed the project history and information for the [Project Location] to better understand the purpose and need behind the project.]

Figure 2. Project Location [insert image]

## [Proposed Improvements]

Insert the current project proposed improvements as presented by the project team. I.e. the proposed improvement is a 4-lane divided highway with 6’ median.

## Constraints and Controlling Decisions

During the project briefing, the VE team was provided with project constraints and key factors that were to be considered when evaluating ideas:

* List bullet
* List bullet

## [Risk Identification]

[A formal risk analysis was not conducted as part of this VE project; however, during the VE study, the team identified several potential risks:]

## [Site Visit Observations] [Project Observations]

[As part of the project overview, the VE team, project team, and stakeholders conducted a site visit. The following observations were made during the visit:]

[The study featured a presentation from the project design team, via a virtual tour of the project using [Google Earth and KMZ files]. The following summarizes the key project issues, project drivers, and observations identified during this session:

12345…

[Before the VE study, during the Information Phase the following highlights key focus areas and observations from these sessions and the VE team’s initial analysis.]

## Project Schedule

The project was [entering the Schematic /PS&E design phase]

[30 to 35 percent design complete]. The current schedule is shown in Table 5. Project Schedule.

[It was assumed that the project will be constructed using the design build (DB) delivery method.]

[The project was in the PD&E phase with the DB procurement anticipated to occur in late 2025 with construction starting in 2028.]

|  |  |
| --- | --- |
| Table 5. Project Schedule | |
| Project Phase | Date |
|  |  |
|  |  |
|  |  |

## Project Cost Estimate

The VE team was provided with the latest cost estimate for the project, with a summary in Table 6. Cost Estimate – Baseline Concept and a detailed estimate in Appendix.

|  |  |  |  |
| --- | --- | --- | --- |
| Table 6. Cost Estimate – Baseline Concept | | | |
| Cost Item | Cost | Percent of Total | Cumulative Percentage |
|  | $ |  |  |
|  |  |  |  |
|  |  |  |  |

## Cost Model

The VE facilitator developed a cost model based on the cost estimate provided by the project team. This model was structured to highlight the major project components in the project (Figure 3). By organizing the cost data in this manner, the model enabled the VE team to prioritize their focus on the project elements that had the greatest financial impact and reveal opportunities of value. This approach helped the team allocate their time and resources more effectively, ensuring that the most cost-intensive areas were thoroughly analyzed for potential value improvements. Additionally, the model served as a tool to track the distribution of costs across various project components, allowing the team to assess whether certain areas were disproportionately expensive and identifying opportunities for cost reduction without compromising the project’s overall quality or performance.

Insert Cost Model

Figure 3. Cost Model

## Value System of Measurement

The value system of measurement process was used as a tool to assess both the baseline project and the VE recommendations. This system is based on the principle that value is the relationship between the performance of a function and the resources needed in achieving it. It provides a standardized approach to identifying, defining, evaluating, and measuring performance by quantifying how well specific attributes contribute to a project’s overall functional purpose. The value is calculated by comparing the resources required to meet a particular level of performance for a given function, which is defined by the project’s requirements and scope.

## Performance Attributes

By using value system of measurement process method, the VE team can systematically evaluate alternatives based on how well they meet the project’s goals and budget. Performance attributes, such as [traffic operations, environmental impacts, and maintainability,] were identified and defined for the project as shown in Table 7. Performance Attributes and Description. These attributes were critical in assessing the value of each recommendation, as they are considered essential elements that support the project’s scope and purpose. The performance attribute matrix facilitated the comparison of these attributes by determining their relative importance, helping the team focus on the most critical elements that aligned with the project’s objectives. This process not only ensured that all project requirements were met but also allowed the VE team to prioritize solutions that enhanced project value while reducing costs.

| Table 7. Performance Attributes and Description | | |
| --- | --- | --- |
| Performance Attribute | Description of Attribute | Baseline Concept |
| Main Line Operations | An assessment of traffic operations and safety on the main line within the project limits.  Operational considerations include level of service relative to the 20-year traffic projections, as well as geometric considerations such as design speed, sight distance, and lane and shoulder widths. |  |
| Local Operations | An assessment of traffic operations and safety on the local roadway infrastructure. Local Operations include frontage roads as well as cross roads.  Operational considerations include level of service relative to the 20-year traffic projections; geometric considerations such as design speed, sight distance, lane and shoulder widths; bicycle and pedestrian operations and access. |  |
| Maintainability | An assessment of the long-term maintainability of the facilities and equipment. Maintenance considerations include the overall durability, longevity, and maintainability of structures and systems; ease of maintenance; accessibility and safety considerations for maintenance personnel. |  |
| Construction Impacts | An assessment of the temporary impacts to the public during construction related to traffic disruptions, detours and delays; impacts to existing utilities; impacts to businesses and residents relative to access, visual effects, noise, vibration, dust, and construction traffic; environmental impacts. |  |
| Environmental Impacts | An assessment of the permanent impacts to the environment including ecological (i.e., flora, fauna, air quality, water quality, visual, noise); socioeconomic impacts; impacts to shore edge; impacts to cultural, recreational and historic resources. |  |
| Project Schedule | An assessment of the total project delivery from the time as measured from the time of the VE Study to completion of construction. |  |

## Performance Attributes Combination Matrix

The performance attribute combination matrix was used to assess the relative importance of various project attributes. The VE and project teams compared attributes in pairs to determine their significance to the project’s goals. Each pair was discussed, tallied, and normalized, with percentages calculated. These scores were then used to evaluate the value of each recommendation during the VE team’s performance evaluation. Results are shown in Table 8. Performance Attribute Combination Matrix.

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Table 8. Performance Attribute Combination Matrix | | | | | | | | | |
| Paired Comparison | | | | | | |  | Total Points | % of Total |
| **Main Line Operations** |  |  |  |  |  |  |  |  |
| **Local Operations** | |  |  |  |  |  |  |  |
| **Maintainability** | | |  |  |  |  |  |  |
| **Construction Impacts** | | | |  |  |  |  |  |
| **Environmental Impacts** | | | | |  |  |  |  |
| **Project Schedule** | | | | | |  |  |  |
| **Total** | | | | | | |  |  |

# Function Analysis Phase

## Overview

Function analysis results in a unique view of the project. It transforms project elements into functions, which help guide the VE team in considering the functional concepts of the project–independent of the current design. Functions are defined in verb-noun statements to reduce the needs of the project to their most elemental level, Table 9. Random Function Identification. Identifying the functions of the major design elements of the project allows a broader consideration of alternative ways to accomplish the functions.

| Table 9. Random Function Identification | |
| --- | --- |
| Project Element | Functions | |
| Project Purpose | Alleviate Congestion Increase Capacity | |
| Barriers | Separate Traffic | |
| Clearing and Grubbing | Prepare Site | |
| Contingency | Mitigate Risks | |
| Drainage | Collect Runoff Convey Runoff | |
| Earthwork | Create Profile Move Earth | |
| Erosion Control | Control Erosion | |
| Illumination | Increase Visibility | |
| Landscaping | Improve Appearance | |
| Lighting | Illuminate Roadway | |
| Median | Create Separation | |
| Mobilization | Deploy Resources Mobilize Equipment | |
| Pavement | Support Loads Protect Base | |
| Right-of-way | Create Space | |
| Roadway | Pave Roadway Smooth Surface | |
| Shoulder | Control Erosion Create Pedestrian Path | |
| Sidewalk | Accommodate Pedestrians | |
| Signage | Convey Information | |
| Signalization | Control Traffic | |
| Structures | Support Loads Span Distance | |
| Traffic Control | Protect Highway User Protect Highway Worker Maintain Traffic | |

## Function Analysis System Technique Diagram

The Function Analysis System Technique (FAST) is a structured method used in function analysis to logically organize and illustrate the relationships between functions within a project or system. FAST diagrams help teams understand how functions interact by arranging them in a cause-and-effect sequence. When read from left to right, the diagram answers "How?", showing how higher-level functions are achieved. When read from right to left, it answers "Why?", clarifying the purpose of each function. Additionally, vertically aligned functions represent concurrent activities or dependencies. By visualizing functions in this manner, the FAST diagram aids in identifying opportunities for cost reduction, performance improvements, and innovation, making it a key tool in value engineering and problem-solving. The team developed a FAST diagram for this project and is shown in (Figure 4).

Figure 4. FAST Diagram

*[Insert FAST Diagram]*

# Creativity Phase

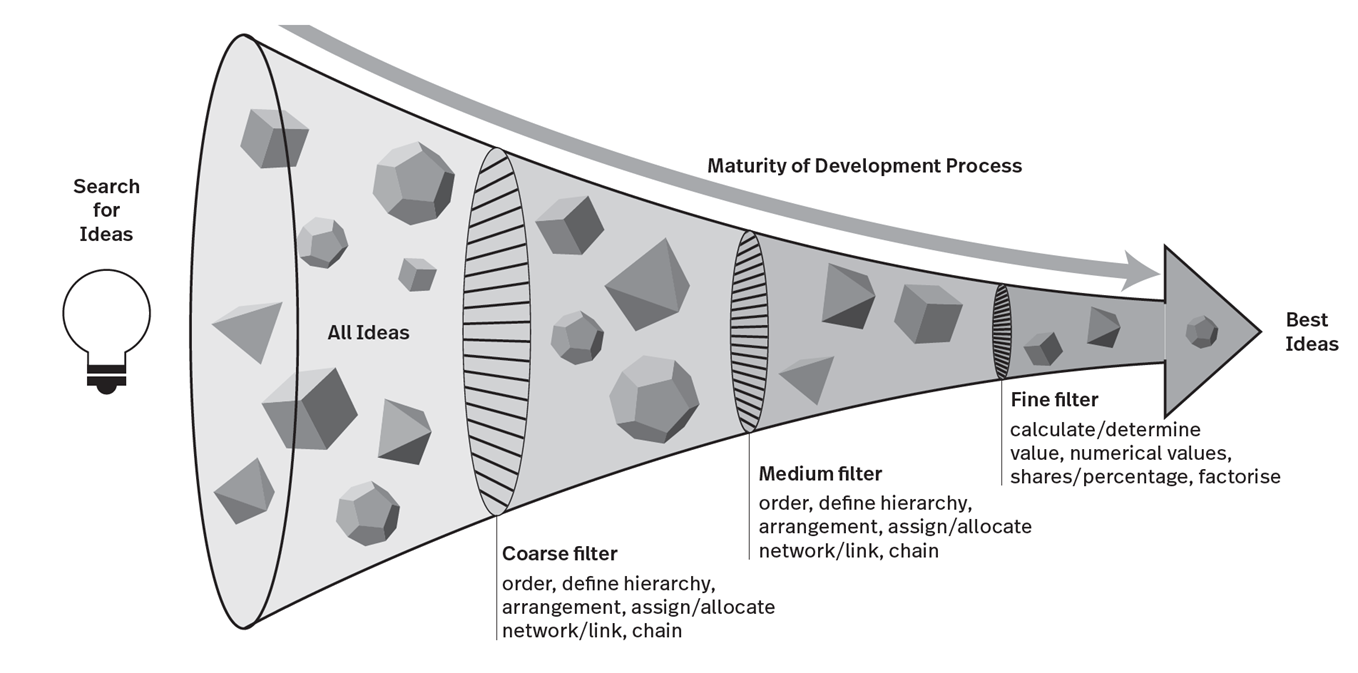
During the Creativity Phase, the VE team generated ideas on how to perform the various functions. The idea list was grouped by function or major project element. All of the ideas generated are recorded in Table 10. Creative Idea List. The final disposition of each idea is included at the end of Section 5.

| Table 10. Creative Idea List | |
| --- | --- |
| Idea No. | Description |
| Function: | |
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|  |  |
| Function: | |
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| Function: | |
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# Evaluation Phase

While every project is unique, the VE evaluation process follows a structured approach to refine, assess, and prioritize ideas until the team reaches consensus on the final recommendations. Figure 5 illustrates the typical flow of information during this phase of the Value Methodology Job Plan, guiding the multidisciplinary team through a systematic decision-making process.

Figure 5. VE Process Information Flow



## Evaluation Process

The evaluation process begins by reviewing ideas generated during the Creativity Phase, considering project constraints and baseline concepts. The VE team assessed each idea’s advantages and disadvantages, comparing its performance to the baseline. Ideas were ranked on a scale from 0 to 3:

3 – Advance for further development

2 – Design consideration for the project team

1 – Poor opportunity, dropped from further development

0 – Unacceptable impact or fatal flaw

Ideas ranked 3 were further developed, while those ranked 0 or 1 were eliminated. Ideas ranked 2 were flagged for potential design consideration. [A mid-point review with the [client] ensured alignment with project goals, refining the list of viable recommendations.]

## Evaluation Summary

Table 12. Idea Evaluation Summary provides a comprehensive list of all ideas generated during the Creativity Phase through brainstorming techniques. These ideas represent a wide range of potential improvements, innovations, and alternative approaches identified by the VE team. Each idea was considered based on its feasibility, alignment with project objectives, and potential to enhance value. This table serves as a foundation for the subsequent evaluation and development phases, ensuring that all creative contributions are systematically reviewed and assessed.

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Table 12. Idea Evaluation Summary Table | | | | | |
| Idea # | Description | Advantages | Disadvantages | Rating | Comments |
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# Development Phase

In this phase of the Value Methodology Job Plan, the VE team refines and develops the highest-ranking ideas from the Evaluation Phase into well-defined VE recommendations. This process involves further analysis, validation, and documentation to ensure that each recommendation aligns with the project's objectives and provides measurable value. Often, multiple ideas are integrated to form a more comprehensive and impactful recommendation, which is then thoroughly reviewed by the VE team for feasibility, cost-effectiveness, and performance improvements.

For this project, of the [xx] ideas generated during the Creativity Phase, [xx] were identified as having significant potential and were selected for further development. Some ideas were combined to create stronger recommendations, while others were determined to be more appropriate as design considerations for the project team rather than full VE recommendations (Section 14). Each selected idea was refined through detailed analysis, incorporating technical insights, cost estimates, and potential impacts on schedule and risk.

To document the findings, the VE team prepared comprehensive narratives, drawings, calculations, and cost estimates for each recommendation. These documents serve as a structured record of the proposed changes, ensuring clarity and transparency in the decision-making process. Each recommendation includes a summary of the baseline concept, a detailed description of the proposed alternative, and a thorough evaluation of its advantages and disadvantages. Additionally, the analysis considers potential impacts on project schedule, risk factors, and overall performance.

# Summary of Recommendations

Table 13. Summary of Recommendations is a summary of all recommendations generated and their cost impact to the project.

| Table 13. Summary of Recommendations | | | |
| --- | --- | --- | --- |
|  | Recommendation Title | Cost Savings/ (Cost Added)  ($M) | Performance Improvement (%) [Performance/Risk] |
|  |  |  |  |
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# Individual Recommendations

Following the evaluation process, the VE team developed individual recommendations, each providing a comprehensive analysis of proposed improvements. Each recommendation includes a summary of the baseline concept, a detailed description of the proposed change, and an assessment of its advantages and disadvantages. Additionally, the recommendations contain a narrative justification supported by sketches, photos, assumptions, and calculations developed during the VE study.

These recommendations offer a well-documented basis for decision-making and can be found below.

| VE Recommendation No. x:  [Recommendation Title] | | | | | | Idea No(s). x | | |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Baseline Concept | | | | | | | | |
| [What is currently planned? Describe the project element(s) as presented in the kickoff meeting and available drawings and cost estimates. Be as descriptive and specific as possible, but only include those elements that are relevant to the alternative concept being proposed below. | | | | | | | | |
| Recommendation Concept | | | | | | | | |
| [What is the change(s) proposed by the VE team? Describe the proposed change(s) to the baseline concept described above. Be as descriptive and specific as possible, but do not discuss the rationale for the change or its benefits.] | | | | | | | | |
| Advantages | | | | Disadvantages | | | | |
| [Why is the Recommendation Concept better?]   * Benefits (“Pros”) of implementing the Alternative Concept * Use concise statements (one per line), not full sentences | | | | [What challenges or disadvantages does the Alternative Concept introduce?]   * Detriments (“Cons”) of implementing the Alternative Concept * Use concise statements (one per line), not full sentences | | | | |
| Cost Summary | | Capital Cost | | [Life Cycle] [Right-of-way] Costs | | | Total Cost | |
| Baseline | |  | |  | | |  | |
| Recommendation | |  | |  | | |  | |
| Cost Savings/(Cost Added) | |  | |  | | |  | |
| FHWA Function Benefit | | | | | | | | |
| Safety | Operations | | Environment | | Construction | | | Right-of-way |
|  | **✓** | | **✓** | |  | | | **✓** |
| Discussion/Sketches/Photos/Calculations | | | | | | | | |
| **Discussion of Recommendation Concept**  [Describe IN DETAIL why the recommendation concept should be implemented. Provide an in-depth narrative about the baseline and recommendation concepts and thorough analysis of the advantages and disadvantages. For instance, if you listed “Reduces required retaining wall maintenance” in the advantages above, it is critical to describe why and how in this section. The Discussion section is intended to PROVE to project stakeholders, owners, and the project team that this alternative should be implemented.]  **VE Recommendation Concept Sketch(es)**  [Provide a visual depiction of the recommendation concept. This could include marked-up plans/drawings, hand-drawn sketches, photos, or figures. Scale and precision are not required, though it is encouraged if it is available.]  **Discussion of Schedule Impacts**  [Describe how implementing the recommendation concept will impact the project schedule. Be specific as to the phases, activities, etc., to be impacted. Providing exact durations for every potential impact is not always possible; therefore, if necessary, estimate lengths of time based on best judgment and expertise.]  **Discussion of Risk Impacts**  [Describe how the recommendation concept will address existing risks and/or opportunities, as well as any new risks/opportunities introduced by implementing this recommendation. It is possible for a recommendation to simultaneously address an existing risk and introduce a new one. In this case, discuss the trade-offs and demonstrate why it is still good practice to implement the recommendation concept.]  **Assumptions and Calculations**  [What was assumed to develop the cost impact of this VE recommendation? Provide assumed quantities, unit costs, calculations, and/or activities that must be (or must not be) performed. This enables the development of the recommendation and the cost estimate/comparison.  If the relevant information is available and there is a high likelihood that life cycle cost savings can be realized by implementing the VE recommendation, then a life cycle cost analysis can be performed. Therefore, provide assumptions and calculations for performing this analysis.]  **Initial Cost Estimate**  [Once finalized, insert the Excel Cost Worksheet here.]  **Performance Assessment**  [How will the recommendation impact each of the various performance attributes? Is performance better or worse? Explain why. At times, this information is captured from discussions during group Idea Evaluation; elaborate on this information.]  **Attachments**  Please label attachments with the Alternative number, “Baseline” or “Alternative”, and the order in which multiples of either should appear (e.g., “ALT SP-1 Baseline 1”, “ALT SP-1 Baseline 2”, “ALT SP-1 Alternative 1”, “ALT SP-1 Alternative 2”, “ALT SP-1 Alternative 3”) | | | | | | | | |

# Performance Assessment

As the VE team developed recommendations, each was assessed in terms of its performance compared to the baseline, with the goal of identifying potential value improvements. To facilitate this comparison, the baseline performance was assigned a score of 5. Table 14. Performance Attribute Rating Scale outlines the criteria used to evaluate how each alternative concept performed relative to the baseline performance, helping to determine which ideas offered the most value improvements.

| Table 14. Performance Attribute Rating Scale | |
| --- | --- |
| Rating | Performance Attribute Scales |
| 10 | The alternative concept is highly preferred. |
| 9 | The alternative concept is very strongly preferred. |
| 8 | The alternative concept is strongly preferred. |
| 7 | The alternative concept is moderately preferred. |
| 6 | The alternative concept is slightly preferred. |
| **5** | **The alternative concept and baseline concept are equally preferred.** |
| 4 | The baseline concept is slightly preferred. |
| 3 | The baseline concept is moderately preferred. |
| 2 | The baseline concept is strongly preferred. |
| 1 | The baseline concept is very strongly preferred. |
| 0 | The baseline concept is highly preferred. |

# Value Comparison

Understanding the interplay between cost, performance, and value is crucial when evaluating the baseline project and VE (Value Engineering) concepts. By comparing the performance and associated costs of each VE recommendation against the baseline, the team can identify which alternatives offer equal or improved value relative to the original design. This evaluation helps determine which concepts deliver the best overall value, taking into account both their cost-effectiveness and performance improvements. In essence, this process allows the team to assess whether the VE concepts can achieve the same or better outcomes as the baseline, while potentially reducing costs or improving efficiency. This is represented in Table 16. Value Comparison.

| Table 16. Value Comparison | | | | | | | | |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Recommendations | | Performance (P) | % Change Performance | Cost (C) $ millions | Cost Change $ millions | % Change Cost | Value  Index | % Value  Improvement |
|  | Baseline | 500 | — |  |  |  |  |  |
| **1** |  |  |  |  |  |  |  |  |
| **2** |  |  |  |  |  |  |  |  |
| **3** |  |  |  |  |  |  |  |  |
| **4** |  |  |  |  |  |  |  |  |
| **5** |  |  |  |  |  |  |  |  |
| **6** |  |  |  |  |  |  |  |  |
| **7** |  |  |  |  |  |  |  |  |
| **8** |  |  |  |  |  |  |  |  |
| **9** |  |  |  |  |  |  |  |  |
|  | **Total** | | |  |  |  |  |  |

# [Design Considerations]

The VE team identified and developed a series of design suggestions for the project design team’s consideration. These suggestions are intended to provide a range of options and ideas that could potentially improve the overall project design and performance. They are presented broadly, offering flexible approaches to enhance various aspects of the project. A summary of these suggestions is outlined in Table 17. Design Considerations, below.

In addition to the broader design suggestions, following a more detailed evaluation and discussion, the VE team concluded that these ideas would be better suited for further exploration and refinement by the design team. The VE team believes that the design team, with its expertise and a more thorough understanding of the project’s requirements, can further investigate the feasibility and potential benefits of the idea.

|  |  |
| --- | --- |
| Table 17. Design Considerations | |
| Idea No. | Description |
|  |  |
|  |  |
|  |  |
|  |  |
|  |  |
|  |  |
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|  |  |

# [Design Validations]

Several ideas that the VE team initially presented as recommendations were ultimately dropped from consideration. This decision was made after a thorough evaluation, which determined that [current geometry] [baseline design] was more economical and feasible for the project’s objectives.

| DESIGN VALIDATION X [TITLE] | | IDEA NO(S). x |
| --- | --- | --- |
| Baseline Concept | | |
|  | | |
| Suggested Concept | | |
|  | | |
| Advantages | Disadvantages | |
|  |  | |
| Discussion | | |
|  | | |